

July 18, 2019

Mr. Myles Hargrove Summit Earthworks Inc. #109 – 32885 Mission Way Mission, BC V2V 6E4

Dear Mr. Hargrove:

Re: Construction Environmental Management Plan Derwent Way Soil Transfer and Barge Facility, New Westminster, BC Project No. 12943 – Revision 6

Please find enclosed a copy of the *Construction Environmental Management Plan, Derwent Way Soil Transfer and Barge Facility, New Westminster, BC.* If you have any questions, please do not hesitate to contact us.

Sincerely,

Keystone Environmental Ltd.

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Craig S. Patterson, R.P.Bio. Project Biologist

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Construction Environmental Management Plan

Derwent Way Soil Transfer and Barge Facility New Westminster, BC

Prepared for: Summit Earthworks Inc.

Project No.12943 (Rev. 6) July 2019

Environmental Consulting • Engineering Solutions • Environmental Planning

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PREFACE

This Construction Environmental Management Plan (CEMP) for construction activities related to the Soil Transfer Facility Development (the Project) has been prepared for Summit Earthworks Inc. (Summit) as a guide to:

- The Contractor(s) and operator(s) working on the Project when working on-site and around the aquatic (Fraser River) environment
- Environmental regulatory agencies involved in review and approval of the Project

The prime objectives of this particular manual are the protection of environmental resources that could be potentially impacted during the construction works. The primary means of achieving these objectives include the following general statements:

- All permits and approvals must be in place prior to the start of work on the Project and the Contractor must comply with all conditions of approval at all times.
- The limits of disturbance must be clearly defined prior to the start of construction activities, and sediment and erosion control devices must be installed around the perimeter of the construction zone(s) prior to start up, where applicable.
- All equipment used on-site must be clean and free of leaks.
- There is a zero discharge objective with regard to this Project: there is to be no discharge of sediment, sediment-laden water, sanitary wastes, garbage or other contaminants into any water body, or to land.

Additional and more specific requirements and restrictions are identified within the body of this CEMP and its appendices, based on the project information provided by Summit, and construction best management practices for the proposed Project works. This document is a living document and may be modified based on site conditions.



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4. 5.

LIST OF ABBREVIATIONS AND ACRONYMS

BRITISH COLUMBIA WATER QUALITY GUIDELINES (APPROVED AND WORKING)

BMPs	BEST MANAGEMENT PRACTICES
CCG CEMP CNW	CANADIAN COAST GUARD CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN CORPORATION OF NEW WESTMINSTER
DFO	FISHERIES AND OCEANS CANADA
EA ECC EC EIR EM EMS ESC	ENVIRONMENTAL ASSESSMENT EMERGENCY COORDINATION CENTRE ENVIRONMENT CANADA ENVIRONMENTAL INCIDENT REPORT ENVIRONMENTAL MONITOR ENVIRONMENTAL MANAGEMENT SYSTEM EROSION AND SEDIMENT CONTROL PLAN
HWM	HIGH WATER MARK
IL	INDUSTRIAL LAND
MCTS MOE	MARINE COMMUNICATIONS AND TRAFFIC SERVICES BC MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY
NTU	NEPHELOMETRIC TURBIDITY UNITS
PM PMV	PROJECT MANAGER PORT METRO VANCOUVER
SRS	SPILL REPORTING SYSTEM
TC TDG	TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS



BCWQG

1. INTRODUCTION

This Construction Environmental Management Plan (CEMP) describes mitigative measures that are to be implemented during construction of the Summit Earthworks Inc. (Summit) proposed Soil Transfer Facility Development project (the Project). Available Project site plans for the Project have been included in Appendix A. Site specific permits and approvals will be included in a new appendix, Appendix B, as they are obtained.

The soil transfer facility will be accepting graded IL soil. The transfer station will facilitate delivery of contaminated soils to soil treatment facilities in the Lower Mainland and Fraser Valley. Trucks will bring soils to the facility where they are temporarily stored before being transferred to a barge and transported to an approved treatment facility. The site will be fully self-contained and will have emergency procedures in place at all times.

The intent of this manual is to provide the construction Contractor with sound environmental protection planning and BMPs; this plan is a living document, subject to change where construction practices may be upgraded and BMPs improved as technology is improved. The plan is also meant to be flexible, so as to accommodate changes to design or methodology that may be required once actual field conditions are known and possible obstacles discovered.

The Proponent (Summit) will be responsible for compliance with 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 authorizations obtained by Summit for the individual components of the Project, including any commitments generated as part of the application and approval process. This CEMP applies to all Contractors involved in the Project and any personnel, whether working for the Contractor or observing/monitoring on-site during construction activities. Thus, where the words "Contractor" or "Operator" are used, those words apply to any company or personnel as described above.

1.1 **Project Location and Key Construction Activities**

The Summit Soil Transfer Facility is to be located at Derwent Way in New Westminster, BC, on the northern bank of the Fraser River (49°11'14.5" N; 122°55'56.0" W). The upland portion of the Project site is bounded to the north by a rail right-of-way and paved access road from Salter Street, a paved shipping container storage lot is located to the east, the Fraser River to the south, and a rail right-of-way and Derwent Way to the west (see Lease Plan No. 2016-015 in Appendix A). The area is largely industrial, with residential housing on the western side of Derwent Way. The Project site area (upland and water lease lot) is 9,833 m², and approximately 100 m wide along the Fraser River bank. The area is currently vegetated and will be cleared, graded, and have new roadways installed for truck access and egress. Construction will not occur outside daylight hours and, hence, construction lighting requirements will be minimal.



The proposed key construction works are anticipated to occur between June 16, 2019 and February 2020 (within the fisheries least-risk work window), and will include, but may not be limited to, the following tasks:

- Site preparation prior to construction, sediment and erosion control measures will be installed, and the site will be cleared of vegetation. Mature trees will have major limbs removed and will be felled in-land away from the water. Logs will be removed without dragging to minimize ground disturbance.
- Installation of additional underground utilities utility installations will require linear excavations for pipe or conduit placement, such as Stormwater drains and catch basins. The depth of excavation for utility installation will be minimal and it is not anticipated that dewatering will be required.
- Paving and curbing the works site.
- Minor $(<5m^3)$ concrete work for the hopper footing.
- Erection of the weigh scale and scale house, pumping station, truck access and egress roadways.
- In-water pile installation to construct the conveyor system, and berthing and bumper dolphins to tie-off barges. The construction will include vibratory driving 16 steel pipe piles. The piles without pile caps will be equipped with bird cones to prevent wildlife entrapment.

The key construction tasks are addressed in this document with respect to various environmental protection measures that can be applied directly or with modifications to the various activities, once actual field conditions are known and any obstacles encountered. Where the terms, "watercourse," "waterbody," and "drainage," are used in this document, they may be used interchangeably to refer to freshwater, or tidal environments.

1.2 Review, Permitting and Applicable Legislation

Elements of the Project involve permitting approvals from the Corporation of New Westminster (CNW), and Fisheries and Oceans Canada (DFO).

The majority of the upgrades required for the Project will occur within the boundaries of the current property; however, some construction will be required outside of the existing property boundaries. The piles related to the conveyor system and bumper dolphins will require DFO review and permitting per the *Fisheries Act*, land riparian works will require permits from PMV and *Water Act*, and any active nests that need to be cleared inside the nesting window, or eagle/heron nests will require a permit from the Canadian Wildlife Service. A self-assessment will be submitted for PMV Project & Environmental Review (PER) review upon receipt of final design drawings for the applicable in-water work. Applicable permits are currently being acquired, and will be added to this document as they become available. A working list of relevant environmental legislation and the status of applicable permits and approvals is provided in Table 1. Additional guidance documents and policies are listed in Section 3 Environmental Management Plans under the appropriate subsections.



	Agency	Act, Regulation, or Bylaw	Description	Applicability
	Fisheries and Oceans Canada (DFO)Fisheries ActProhibits the polluting of watercourses with substances deleterious to fish and fish habitat, and 		A DFO Request for Review is submitted for projects with potential to cause serious harm to fish to determine if a Fisheries Act Authorization is required. A Request for Review is required for the Project for works and potential impacts below the high water mark.	
al		Navigation Protection Act	List of Scheduled Waters includes the Fraser River as a protected channel.	The Project requires the submission of a Notice to the Minister, and will likely also require an Application for Approval for permanent structures in the Fraser River.
Feder	Transport Canada	Federal Migratory Bird Conventions Act	Ensures the conservation of migratory bird populations by regulating all activities that are harmful to migratory birds, their eggs or their nests.	The Project has the potential to impact migratory birds, their eggs, and/or their nests.
		Federal Species at Risk Act	Establishes Schedule 1 of the Act, which classifies those species as extirpated, endangered, threatened, or of special concern. Once listed, the measures to protect and recover a listed wildlife species are implemented	
	Port of Vancouver	Project and Permit under Environmental Assessment Procedure (EAP)	Proposed works and activities within or partially within the Port's jurisdiction are required to obtain a Project and Environmental Review Project Permit, in order to proceed.	For proposed development and, construction in the PMV jurisdiction including the Fraser River
Provincial		Environmental Management Act	Establishes regulations related to waste management, discharge, and the handling and transport of contaminated material.	The proposed project has the potential to include the transport and handling of contaminated material.
		Wildlife Act	Prohibits possessing, taking, or destroying (i) a bird or its egg, (ii) the nest of an eagle, peregrine falcon, gyrfalcon, osprey, heron or burrowing owl, or (iii) the nest of a bird not in (ii), when the nest is occupied by a bird or its egg unless authorized under permit.	Can be used to authorize direct management of wildlife, including trapping, salvages, or relocation in the event of impacts to wildlife.

Table 1 Relevant Environmental Legislation



	Agency	Act, Regulation, or Bylaw	Description	Applicability
	Ministry of Forests, Land, and Resources Operations, <i>Water Sustainability</i> Resource <i>Act</i> Stewardship Division (MFLNRO)		Protects surface and groundwater resources.	Approvals may be required from the BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development to enable impacts to drainage watercourses following the land transfer.
Provincial (<i>cont'</i> c	Ministry of	Riparian Areas Regulation (RAR)	Protects the riparian features, functions, and conditions vital for maintaining the ecological health of watercourses. Establishes the assessment methodology to determine appropriate development setbacks for watercourses and, by association, the required compensation areas when permanently impacting watercourses.	Will guide project work within and around the riparian areas of the Project Site.
	(MoE)	Weed Control Act	The BC Weed Control Act, [RSBC 1996] Chapter 487 in Section 2 – Duty to control noxious weeds states that: "In accordance with the regulations, an occupier must control noxious weeds growing or located on land and premises, and on any other property located on land and premises, occupied by that person."	Ensures the containment and prevention of invasive species on site.
Municipal		Bylaw 7754: Erosion and Sediment Control	The bylaw outlines water quality regulation for large construction projects in the jurisdiction of New Westminster.	Guides adherence to erosion and sediment control best practices.
		Bylaw 7799: Tree Protection and Regulation	To prevent the loss of urban trees the city requires a permit prior to any tree removal	Required prior to any tree removal on the Site.



2. ROLES AND RESPONSIBILITIES

The CEMP involves numerous stakeholders and staff that will contribute to its successful implementation. Communication between the Project Team members (Table 2) is essential for the success of the Project. The following section outlines the roles and responsibilities of the Contractor, the Environmental Manager and the EM for achieving environmental compliance with applicable legislation, permits, licenses, or approvals during construction of the Project.

Table 2	Project Team Roles and Responsibilities
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Government Department, Consultants, etc.	Role	Contact	Contact Information
Proponent			-
Summit Earthworks Inc.	Proponent Contact	Myles Hargrove Steve Rosell	604-820-0569
Government			
Port Metro Vancouver	Environmental Assessment / Application Review for Type C works	TBD	
Fisheries and Oceans Canada	Fisheries Act Request for Review regulatory obligation	TBD	
Corporation of City of New Westminster	Issues development permit and building permit	TBD	
Ministry of Environment	Water Sustainability Act for works below the HWM	TBD	
Consultants			
Keystone Environmental Ltd.	Environmental Manager	Jason Christensen	jchristensen@ keystoneenvironmental.ca (604) 430-0671
TBD	Environmental Monitor		

2.1 Contractor and Sub-Contractors

The Contractor retained for the Project is responsible for being familiar with this CEMP, implementing the mitigation measures listed, and for ensuring their activities are in compliance with the requirements of the CEMP and applicable legislation and permits issued for the Project. The Contractor is also responsible for the adherence of their sub-contractors to the environmental requirements set out in this CEMP. Additionally, the Contractor is responsible for the following:



- Designing and/or appointing qualified personnel to design a site specific Erosion and Sediment Control Plan (ESCP) that includes drawings indicating the location of ESC measures (e.g., sediment control, catch basin protection, sediment control facilities, etc.).
- Complying with all legislative and regulatory requirements, and applicable permits and approvals.
- Complying with the contract documents and requirements of the CEMP.
- Reporting and documenting all environmental incidents, as outlined in this CEMP.
- Incorporating environmental protection strategies into the design and planned work practices.
- Understanding the roles and responsibilities of the EM.
- Correcting deficiencies and non-compliance upon direction from the EM and Summit as soon as reasonably possible, ideally within 24 hours of the notification of deficiency/non-compliance.
- 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.
- Responding to environmental incidents, such as spills, using personnel that are appropriately trained and equipped.

2.2 Environmental Manager

Summit will employ an Environmental Manager that will report directly to Summit Earthworks Inc. The Environmental Manager will be responsible for providing overall environmental management and coordination; roles will include environmental compliance tracking and reporting, managing the EM, management of required qualified environmental specialists, and coordinating and communicating on progress with the Construction Manager. The Environmental Manager will liaise with regulatory agencies and other authorities in accordance with the CEMP. Additional responsibilities of the Environmental Manager include:

- Providing input into the preparation of the CEMP and other environmental submittals (e.g., notifications or permits) prepared by the Contractor or Summit.
- Reviewing and submitting environmental monitoring reports, identification of appropriate environmental performance indicators and other activities.
- Overseeing and directing qualified environmental professionals, and reviewing the deliverables (including erosion and sediment control plans and specialty monitoring during in-water pile installation during conveyor system installation).
- Notifying PMV immediately of any non-compliance.



2.3 Environmental Monitor

Summit will employ an EM who will report directly to the Environmental Manager. The EM will liaise with the Construction Manager, Contractor and applicable regulatory agencies, as required. The EM will be appropriately trained and demonstrate relevant environmental monitoring experience. The EM will measure key environmental indicators during routine monitoring to determine if work being conducted is in accordance with the CEMP. The EM will have the authority to halt works if an activity is considered to be causing, or likely to cause, unacceptable environmental damage or risk, until an appropriate solution has been developed. The EM will be on-site during relevant periods of increased potential environmental impacts to ensure appropriate mitigation efforts are in place. The EM will have the following responsibilities and authorities:

- Providing site monitoring to assess whether or not construction is complying with the mitigative measures outlined in the CEMP. The frequency of the monitoring activities would be influenced by the type of construction activities and weather conditions.
- Present at the start of new phases of the project to monitor the implementation of mitigative measures.
- Present during activities being conducted below the HWM.
- Attending the installation of erosion and sediment control measures. Completing regular monitoring visits of erosion and sediment control measures (including water quality tests) to determine they are working properly and effectively.
- Conducting hydrophone monitoring at the onset of pile driving to establish noise and vibration levels are within DFO standards (outlined in Section 3.1). Frequency of follow-up monitoring will be adapted based on field conditions and projected installation timeline.
- Monitoring hazardous material containment, storage, transportation, and disposal to ensure compliance with applicable legislation and regulation.
- Monitoring whether the Contractor and Project works comply with federal and provincial permits, approvals, guidelines and regulations relating to environmental protection.
- Liaising with the Contractor, Construction Manager, Project Manager and Summit to assist in planning (i.e., identify potential environmental issues and the appropriate mitigation measures).
- Attending site meetings, as required, to maintain environmental communications between the Project Team.
- Conducting ad-hoc site visits to address concerns raised by the Project Team.
- Informing the Contractor immediately of construction activities that fail to meet the environmental requirements as described in the CEMP or that present an unacceptable risk to the local environment.
- Promote timely correction of environmental deficiencies by working directly with the Contractor.
- Will maintain complete records of activities related to the implementation of the CEMP. This includes any field samples collected, photographs, and incident reports. Additional responsibilities are also defined within specific environmental management plans.



3. ENVIRONMENTAL MANAGEMENT PLANS

3.1 Fisheries and Marine Mammals Management Plan

Fish, marine mammals, and aquatic habitat have the potential to be negatively impacted during the pile installation activities or through a release of sediment laden water associated with the upland works.

The following potential impacts to fish, marine mammals and aquatic habitat have been identified during the construction works:

- Changes to water quality as a result of sedimentation or spills
- Riverine habitat loss or disruption
- Accidental spills
- Disruption to migrating fish populations
- Pile driving in the Fraser River and vibratory hammer impacts to fish and aquatic mammals

In order to protect aquatic species, the Contractor shall:

- Perform the work in strict compliance with timing restrictions outlined in the permits, regulatory obligations, and approvals. This includes but is not limited to constraining in water work to within the DFO advised in-water work window (June 16 February 28).
- Employ sediment control devices as described in the Erosion and Sediment Control Plan, in Section 3.11, to prevent the dispersal of sediments outside the construction zone and to protect fish from detrimental effects of gill abrasion due to sediment-laden water (i.e., silt curtains for ground improvements below the HWM, silt fencing for upland works, etc.).
- Perform work near the river bank when favorable weather conditions prevail.
- Adhere to Section 3.12: Water Quality Management Plan.
- Installation of bubble curtain or other pile driving methods to mitigate impact pressure and maintain pressure levels below what is recommended by DFO as industry standard. Peak pressure waves will be maintained under 30 kPa for finfish species, <206 dB re 1 µPa peak sound pressure levels, and/or <187 dB re 1 µPa cumulative sound exposure levels for the general health and behavior of fish. To reduce the likelihood of impacts on marine mammals, sound levels will be maintained below 160 dB re 1 µPa (RMS).
- Halt activities immediately if distressed, injured or dead, fish or mammals are observed following the commencement of pile driving. Measures will be employed to reduce sound pressure before work is resumed.

Specific BMPs, legislation and regulations, and guides can be found at:

- BC Fish Protection Act. (1997) http://www.bclaws.ca/civix/document/id/complete/statreg/ 89 2000 pitBC
- Water Sustainability Act. (1996): http://www.qp.gov.bc.ca/statreg/stat/W/96483_01.htm



- DFO. (2014). British Columbia marine/estuarine timing windows for the protection of fish and fish habitat South Coast and Lower Fraser areas. http://www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/bc-s-eng.html#area-28
- DFO. (2003). Guidelines and Best Management Practices for Pile Driving and Related Operations (BC Marine and Pile Driving Contractors Association, November 2003) http://a100.gov.bc.ca/appsdata/epic/documents/p351/d32211/1273516310337_a8f9af96262 d9ff325e4452109b72a5c6e2c4828796e47dd8ed0c732bc322dfb.pdf
- DFO. Measures to Avoid Causing Harm to Fish and Fish Habitat: http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/measures-mesures-eng.html
- Fisheries Act (2012): http://laws-lois.justice.gc.ca/eng/acts/F-14/
- Ministry of Environment (MoE) & DFO. (1992). Land Development Guidelines for the Protection of Aquatic Habitat: http://www.dfo-mpo.gc.ca/Library/165353.pdf
- Ministry of Water, Land and Air Protection. (2004). *Standards and Best Practices for Instream Works*: http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf

3.2 Wildlife Management Plan

The site is currently vegetated and the potential for wildlife usage exists; appropriate surveys and/or salvages should be performed prior to any clearing.

The following potential impacts to wildlife and their habitat have been identified during the construction works:

- Mortality and injury (e.g., as a result of vehicle/wildlife collision, ingestion of hazardous materials, feeding or harassment of wildlife by construction personnel).
- Adverse physiological or behavioural effects (e.g., from increased noise levels).
- Interruption during the breeding season.

In order to protect wildlife and wildlife habitat, the Contractor shall:

- Minimize construction related disturbance (e.g., noise, fugitive dust, etc.) to wildlife.
- Report any apparent aggregation areas or migration routes that are occupied to the EM immediately upon encountering them within the work zone or its environs.
- Use low toxicity antifreeze/coolants in equipment on land sites in order to minimize the
 potential for poisoning wildlife and domestic animals that stray onto the site in the event of a
 malfunction or leak. In the event low-toxicity antifreeze is not in use, the following
 management should be in place to reduce the potential of contact with wildlife outside
 working hours:
 - Household waste or any other waste that may be considered an animal attractant must be stored in a lidded, lockable container; household waste should not be left on-site overnight.



- Spills and leaks should be cleaned up at the end of the day to prevent pooling overnight. Immediate repairs are to be conducted for equipment experiencing leaks to avoid pooling of antifreeze and unattended spill pads outside working hours. Appropriate spill pads and secure disposal containers are to be present to immediately clean potential spills/drips as they occur.
 - Antifreeze containers or other potentially harmful substances should be stored securely on site.
- Dispose of garbage in secure bins and ensure that staging areas/vessels are clean and free of food items to deter the attraction of nuisance pests (such as raccoons, seagulls, and ravens). Organic/ household waste should be disposed of in lidded and lockable containers.
- Contact the EM in the event a wild animal is found trapped on-site or has taken up residence therein, and will not leave "willingly" (depending on the type of animal trapped, a professional animal control officer or company may be brought in to capture the animal and release it at an appropriate location outside of the work area).
- Implement a noise reduction strategy as outlined to decrease sensory disturbance.
- Conduct nest surveys if vegetation clearing is scheduled to occur during the passerine nesting season between March 1 and August 31, or if Raptor/heron nests are present and require relocation.

Specific BMPs, legislation and regulations, and guides can be found at:

- Ministry of Environment. *Develop with Care Guidelines*. (2014): https://www2.gov.bc.ca/ gov/content/environment/natural-resource-stewardship/laws-policies-standardsguidance/best-management-practices/develop-with-care
- Migratory Birds Convention Act. (1994): https://laws-lois.justice.gc.ca/eng/acts/m-7.01/
- Ministry of Water, Land and Air Protection. (2004). Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia: http://www.env.gov.bc.ca/wld/BMP/herptile/HerptileBMP_final.pdf
- Species at Risk Act. (2002): http://laws-lois.justice.gc.ca/eng/acts/s-15.3/

3.3 Vegetation Management Plan

The site is vegetated with mature trees along the northern, eastern and southern (river) edge of the site. The centre and western edge of the site are occupied by shrubs and grasses. The following potential impacts to vegetation have been identified during the construction works:

- Increased opportunity for establishment and spread of invasive plant species on newly disturbed lands.
- Destruction or disturbance of vegetative communities outside of the necessary construction work area.



In order to protect vegetation, the Contractor shall not destroy, remove or clear vegetation to any extent greater than is absolutely necessary for the performance of the work, or to any greater extent than has been authorized

In order to prevent the introduction of invasive or non-native species, equipment working on this Project should be kept clean and will be regularly monitored/checked by the EM. Any invasive or non-native plant species or materials encountered will be bagged to prevent spread or disbursement and removed from site for disposal at an approved facility. Exposed soil should be covered to reduce the likelihood of invasive plants establishing on the site. Invasive plants that have specific management and disposal requirements include Himalayan blackberry (*Rubus armeniacus*), Japanese knotweed (*Fallopia japonica*) and Scotch broom (*Cytisus scoparius*).

A BMP regarding noxious weed control is available at:

• Ministry of Environment. (2002). Noxious Weed Control (Pest Management): https://www2.gov.bc.ca/gov/content/environment/pesticides-pest-management/businessindustry/sector-specific-tools-guides/noxious-weeds-vegetation-management?keyword= noxious&keyword=weed&keyword=control

3.4 Soil Management Plan

Project works may require stockpiling of potentially contaminated soil on-site. When required, the Contractor will be responsible for providing documentation that any imported soils meet applicable provincial and environmental regulations and standards (BC Contaminated Sites Regulations 2014).

The following mitigation measures are included to minimize potential impacts to soil during construction activities.

- Soil quality must be sampled appropriately if required to be removed or transported off-site to characterize soil for potential contaminants (soil quality is to be compared to BC Contaminated Sites Regulation Schedule 7 column II or column III standards, as appropriate).
- Excavated soil suspected or identified to contain contaminants must be immediately removed from the Site during excavation and disposed of at a facility permitted under the *BC Environmental Management Act*, following appropriate classification. Disposal to a federal or out of province facility will not be permitted. Copies of truck slips or manifests shall be provided to the Environmental Monitor.
- During excavation and/or loading of haul trucks with contaminated soils, all equipment operators must minimize movements, swing paths, distances travelled, etc., in order to avoid spreading contamination.
- Equipment used during contaminated soil excavation or loading must be swept off prior to moving it out of the immediate work zone, or be left parked in the same area. Sides, bumpers, wheels, etc., must be swept off and any soils spilled around the truck by the loader swept back into the stockpile.
- All haul trucks must be equipped with load covers prior to leaving the site.



- When immediate removal and disposal is not feasible, contaminated soil may be temporarily stockpiled in an area of impermeable ground prior to off-site disposal. This containment cell must be isolated by berms (e.g., poly-wrapped sandbags or other suitable substitute, such as straw bales, no-posts) to prevent the spread of materials. There will be one access point which can be closed off at end of shift.
- Stockpiles of contaminated soil and potentially contaminated material must be covered with
 poly-sheeting or other suitable impermeable covering that extends over the containment cell
 walls or berms to prevent precipitation from contacting the stockpiled soil. Surface runoff
 must be directed away from the stockpile to avoid contact with the contaminated soil.
 Polyethylene sheeting must be weighted down in order to not be blown away by wind.
- Where on-site treatment may not be appropriate or feasible, vacuum trucks may be used to transport contaminated water to an appropriate off-site facility for treatment and disposal.

3.5 Waste Management Plan

The Contractor shall also comply with applicable laws, regulations, permit conditions and requirements when disposing of wastes generated by this Project, including but not limited to general garbage and trash, hazardous wastes (such as used paint or waste batteries), waste oil, or other materials not authorized for on-site disposal. At no time shall any waste material be allowed to enter the river environment or be discarded or abandoned on land. The Contractor shall be responsible for assuring that all reasonable efforts are implemented to eliminate or minimize waste production. In addition, only facilities approved by the authorities having jurisdiction may be used for disposal or recycling of any waste (garbage, trash, hazardous material, etc.). Potential impacts related to waste management have been identified during the construction phase:

- Waste generated on the Project site could potentially attract wildlife, creating nuisance wildlife.
- Release of Hazardous Waste could potentially contaminate soil, groundwater or a watercourse.
- Spread of contamination within soil and groundwater via contaminated soil and groundwater movement.

The Contractor shall follow the mitigation measures in the following subsections.

3.5.1 Garbage and General Waste

All non-hazardous and non-toxic garbage, such as paper, paper products, wood, plastic, glass, and discarded food items, shall be stored in closed, leak-proof storage bins that are secure against nuisance wildlife. The Contractor is responsible for the proper collection and transportation of garbage to disposal facilities (i.e., sanitary landfill).



3.5.2 Recyclable Materials

Materials which can be recycled, such as paper and cardboard products, glass bottles and plastic and metal containers, will be sorted and recycled at all times. Recoverable recyclable construction materials (i.e., metals and associated construction wastes) will be taken to an appropriate recycling facility, where available, for handling and/or shipping to another location, where it will be recycled and re-used in other products, if feasible. The Contractor is responsible for the proper collection and transportation of material to appropriate recycling facilities. Debris and other garbage will not be deposited in the Fraser River.

3.5.3 Sanitary Wastes

Sanitary facilities may be required during Project works. These facilities must be serviced on a regular basis and the waste disposed of at permitted treatment facilities. The Contractor will supply and service chemical toilets in its work areas. Portable sanitary facilities will be located at least 30 m from the Fraser River HWM if possible and must be tied down or anchored, such that they cannot be blown or tipped over, under reasonable conditions.

3.5.4 Equipment-related Wastes

For equipment related waste, the following measures should be adhered to:

- Used oil filters must be drained into a waste oil container and drained filters placed in an appropriate labelled container (i.e., drum) before disposal at a recycling facility or other approved facility.
- Waste-oil and antifreeze must be collected and recycled/disposed of at an approved facility.
- Used acid-lead batteries must be stored on an impervious surface, under cover, and disposed of at an approved recycling facility.

3.5.5 Hazardous Wastes

It is the Contractor's responsibility to determine whether any waste generated pursuant to the execution of the work has any hazardous or toxic characteristics, or is identified as a "Hazardous Waste" by the Ministry of Environment (MoE), Environment Canada (EC), or any other authority having jurisdiction, and to treat this material appropriately. In addition, the Contractor must also implement the following measures:

- The Contractor shall review the lists of Hazardous Wastes, as defined by MoE and EC to determine if any waste generated during construction is hazardous.
- If the waste item cannot be found in published Hazardous Waste lists, the Contractor shall determine if the waste displays a characteristic which would make it hazardous.
- The Contractor will review and comply with the *Standards Applicable to Transporters of Hazardous Waste* as defined by MoE and EC.



 Hazardous Waste shall be treated/ disposed of in authorized facilities, permitted under regulations as defined by MoE and EC. The Contractor shall identify potential facilities for waste disposal and evaluate each facility's legitimacy, compliance with regulatory requirements and capacity. After selecting a facility, the Contractor shall periodically check and verify that the facility is properly handling and disposing of the Hazardous Waste.

3.6 Spill Prevention and Emergency Spill Response Plan

Keystone Environmental has prepared a stand-alone spill response document, Contingency and Spill Response Plan, which should be printed out and kept onsite at all times. A short summary of emergency spill response procedures is included below.

The following process will be followed to record and report all spills internally:

- The spill observer contacts the Environmental Manager, completes an Environmental Incident Report (EIR), and sends the report to the environmental consulting provider. The consulting company will complete the EIR in conjunction with the spill observer if the consultant is on-site at the time of the spill.
- The consultant will forward the EIR to the Project Team.
- The spill is recorded internally by Summit and the report should be forwarded to all relevant staff.

3.6.1 External Spill Reporting

Under Section 1 of the BC Spill Reporting Regulation, a "spill" means a release or discharge of a substance in an amount equal or greater than that specified in the Schedule of this Regulation. The reportable quantities vary according to class of substance, ranging from any amount to 200 kg, depending on the nature of the material that has been spilled. The Contractor must develop an environmental spill procedure applicable to the types of materials being utilized on the Project and be familiar with the reportable spill quantities applicable to these materials. The EM will document and follow up on internal and external spill response actions to ensure that they comply with internal and external reporting requirements.

In the event of a spill occurring that triggers the BC Spill Reporting Regulation, this incident must be immediately reported to the Emergency Coordination Centre (ECC) at 1-800-663-3456 and/or EC at the 24-hour emergency telephone number 604-666-6100 and an EIR completed by the spill observer or in conjunction with the environmental consultant. ECC will notify concerned provincial and federal agencies. Spill response advice can be obtained from both EC and the Emergency Coordination Centre, as well as from Transport Canada's (TC) Chemical Accident Emergency Advisory Service at 1-800-613-9966.

The following process will be followed to record and report all spills externally:

• Spill observer contacts the Environmental Manager immediately, completes an EIR and sends to the Environmental Manager.



- The EM will complete the EIR in conjunction with the spill observer if on-site at the time of the spill.
- The Environmental Manger provides immediate notification to the Project Manager and follows up with the completed EIR.
- Summit will contact EEC and other agencies as applicable (e.g., Canadian Coast Guard (CCG) Marine Communications and Traffic Services (MCTS)) may need to be contacted to report any release, or potential release, of any volume of product to the Fraser River waters (i.e., resulting from vessel operations related to this Project within the Fraser River bank).
- Spill is recorded internally by Summit and should be forwarded to all relevant staff and appropriate investigative action undertaken.

The following require consideration when addressing measures to mitigate impacts associated with accidents and malfunctions:

- Accidents and malfunctions generally involve deleterious substances, such as petroleum products and others regulated under the *Canadian Environmental Protection Act* that are released into the environment.
- Release of these substances may impact soil and water quality, and affect the general health of flora and fauna that comes in contact with the substances.
- Vegetation and soil may need to be removed as part of the clean-up effort. If the spill occurs into water, fauna that comes in contact with the substance may be killed or injured (physiological effects are "acute" in that the occurrence is temporary and not continuous, in which case the animal will recover).
- The greater the spill into the environment, the more difficult it is to contain; therefore, the risk is greater that some longer term impact may occur.

Where a physical impact occurs, property damage or habitat destruction may occur (i.e., Fraser River riparian banks may be negatively impacted). Potential impacts would be short-term in that the damage would be repaired where possible or the impact removed and the habitat allowed to recover on its own.

The Contractor shall also implement the following mitigation measures:

- During construction, only limited quantities of oils, greases, fuels, and other deleterious substances (i.e., paints, epoxies, wood preservatives, etc.) are to be brought to site.
- Emergency response and contingency plans are reviewed annually or as per legal requirements.
- Ensure employees are appropriately trained to respond to identified emergencies.
- The Contractor must have an appropriate spill kit equipped with the required clean-up products (e.g., absorbent pillows/pads, booms, disposal bags) on-site at all times.
- All construction staff must be thoroughly informed of the restrictions of this particular Project location and will be required to act accordingly. Staff must be vigilant in ensuring petroleum products and any potentially harmful substances are handled with extreme caution.



- Fire extinguishers and other emergency response equipment and supplies must be kept in known and visible locations. Access to them shall not be blocked by other materials or equipment.
- A list of emergency contacts must be posted at predetermined, accessible and visible locations, as well as kept with the emergency response equipment. By law, fire extinguishers are routinely inspected and certified, as is other fire-suppressant equipment and materials. Emergency preparedness must also be covered in the Contractor's Health and Safety Program. Locations vary by type of activity and whether land- or river-based and the locations of fire-fighting equipment are made known to personnel during site orientations; moreover, gas- or diesel-powered equipment must have a fire extinguisher attached or inside the cab.

3.7 Vehicles and Equipment – Fuelling and Servicing Plan

The Contractor shall service or refuel vehicles and equipment in such a way that contaminants do not enter any waterbody, and are not released to land. The following requirements are to be implemented during the Project activities:

- All machinery shall be free of excess oil and grease, and shall be in good mechanical order so that no leaks occur.
- Equipment is to be inspected daily to ensure that it is leak-free or repaired prior to deployment.
- Servicing of equipment is to be done within bermed containment areas and at least 30 m from any waterbody or at an off-site work yards.
- All vehicles utilized for refuelling will be equipped with automatic back-pressure shut-off valves, and nozzles should be kept locked at all times, except during refuelling. Spigots should be metal to prevent them being accidentally or intentionally damaged. A crew member is to remain in attendance at all times while refuelling is being carried out, to prevent overfilling of gas tanks. Fuelling should occur over an impermeable surface, such as polyethylene sheeting or sorbent pads.
- Drip trays should be placed under vehicles and equipment being refueled.
- All grease and oil required for maintenance will be properly applied. Any excess shall be cleaned up and disposed of in an environmentally appropriate manner, as shall all containers, lids, and contaminated cloths and applicators.
- Portable generators and pumps shall be located within bermed and lined containment frames to prevent inadvertent releases of fuels and oils to the environment.
- Refuelling of machinery, including portable generators and pumps, must occur away from the shoreline or any roadside drainages, or be contained within a suitable pan.
- Each machine working on-site should have a spill kit containing, as a minimum: 24 oil-absorbent sheets; two 1.2 m absorbent socks, and a disposal bag.
- Spill booms should be available for deployment in the event spills enter the Fraser River.



- Any effluent generated during work on the Project will be contained and disposed of in such a manner as to ensure that the effluent is not released into the river environment or surficial drainages, unless properly treated and approved by the EM.
- Used spill response materials will be bagged in heavy-duty polyethylene bags, labelled, and disposed of appropriately.
- Waste containers will be appropriately labeled and stored in a secure location, protected from weather until removal and disposal can be arranged.
- Waste oil or materials will be removed from site for appropriate disposal in accordance with Transportation of Dangerous Goods requirements and the BC Hazardous Waste Regulation.
- Equipment operators and personnel responsible for spill response will review the Contractor's spill response plan regularly to ensure that it is up to date and all required materials are on site and easily accessible. The EM will regularly remind the Contractor of this requirement during progress meetings.
- Machinery employed will be inspected for leaks, worn hoses or fittings, and appropriate repairs will be completed prior to mobilization.

The following BMPs provide further information regarding fuel handling procedures:

- Ministry of Environment. (1995). *Summary of Environmental Standards & Guidelines for Fuel Handling*, Transportation and Storage. http://www.llbc.leg.bc.ca/public/PubDocs/ bcdocs/241667/soesgffh.html.
- Ministry of Water, Land and Air Protection. (2002). A Field Guide to Fuel Handling, Transportation and Storage Guidelines covers land- and river-based operations from jerry cans to depots. https://www2.gov.bc.ca/assets/gov/environment/waste-management/ industrial-waste/industrial-waste/oilandgas/fuel_handle_guide.pdf

3.7.1 Spill Contingency Plan

The Contractor must be familiar with regulatory requirements and be adequately prepared to respond to a spill within the shortest possible time. Spill Response Team(s) will be assembled from suitably qualified members of the workforce at the Project site. Spill contingency procedures will be posted in visible locations within the Contractor's work site offices and trailers and at strategic locations within each smaller work site. All spills (of any volume) will be reported to the EM, regardless of its location within the construction zone. The Contractor will also implement the following measures and procedures to ensure adequate protection of the natural resources.

• Drainage control measures will be put in place as required by site drainage features to protect open water and watercourses from potential spill substances (i.e., if interceptor ditches are constructed for stormwater management, booms will be placed at intervals within the ditches).



- Sorbent material will be on hand at the work areas as a means of containing and soaking up any spill substance before it reaches the groundwater table or open water.
- If required, excess concrete, grout, drilling wastes and other liquid waste products will be directed to secure containment facilities for subsequent removal and disposal by the Contractor in accordance with the procedures outlined in Section 3.5: Waste Management Plan.
- Empty drums will be provided on-site by the Contractor for pre-disposal storage of spillable substances and for disposal of used absorbents, contaminated soil, etc.
- Each vehicle, machine or piece of equipment will be inspected on a daily basis for leaks, and worn hoses will be repaired, if needed, prior to use.

3.8 Generic Emergency Spill Response Plan

The following Generic Emergency Spill Response Plan is provided as a basic guide for developing plans for the Fraser River and land locations and activities.

GENERIC EMERGENCY SPILL RESPONSE PLAN

INCIDENT

If a spill of fuel, oils, lubricants or other harmful substances occurs at the site, the following procedures will be implemented. ALL spills must be reported internally immediately regardless of the amount, and especially if released to a water body.

SPILL RESPONSE STEPS

- 1. ENSURE SAFETY
- 2. STOP THE FLOW (when possible)
- 3. SECURE THE AREA
- 4. CONTAIN THE SPILL
- 5. NOTIFY/REPORT (EMBC 1-800-663-3456)
- 6. CLEAN-UP

(Circumstances may dictate another sequence of events)

ENSURE SAFETY

- Ensure Personal, Public, and Environmental Safety
- Wear appropriate Personal Protective Equipment (PPE)
- Never rush in, always determine the product spilled before taking action
- Warn people in immediate vicinity
- Ensure no ignition sources if spill is of a flammable material



STOP THE FLOW (when possible)

- Act quickly to reduce the risk of environmental impacts
- Close valves, shut off pumps or plug holes/leaks, set containers upright
- Stop the flow of the spill at its source

SECURE THE AREA

- Limit access to spill area
- Prevent unauthorized entry onto site

CONTAIN THE SPILL

- Block off and protect drains and culverts
- Prevent spilled material from entering drainage structures (ditches, culverts, drains)
- Use spill sorbent material to contain spill
- If necessary, use a dike, berm or any other method to prevent any discharge off site
- Make every effort to minimize contamination
- Contain as close to the source as possible

NOTIFY/REPORT

- Notify the EM or Summit Project Manager of incident for any volume (provide spill details) When necessary the first external call should be made to (see spill reporting requirements): EMBC 1-800-663-3456 (24 hours)
- Provide necessary spill details to other external agencies (see spill reporting and contact requirements as described in the Project's Contingency and Spill Response Plan)

SUBSTANCE:	AMOUNT	REPORTABLE TO:
Oile	> 100 litres	EMBC
Olis	Any spill amount into water	EMBC, DFO & MoE
Special Wastes:		
PCB Oil	any amount > 2 ppm PCB	EMBC
Corrosive	> 5 kilograms	EMBC
Hazardous, e.g., pesticides/Herbicides	> 5 litres	EMBC

SPILL REPORTING REQUIREMENTS EMBC 1-800-663-3456

Note: If in doubt regarding spill size, affected environment, materials involved and whether reportable, err on the side of caution and report the spill to the external body (i.e., EMBC).



The list of emergency contacts will be posted in strategic locations, on land and on each aquatic rig along with the Spill Response Plan (contacts will be updated as required for each site-specific location).

CLEAN-UP

- Technical assistance is available from the Environmental Monitor on clean-up procedures and residue sampling.
- All equipment and material used in clean-up (e.g., used sorbents, oil containment materials, etc.) must be disposed of in accordance with MoE requirements in approved locations. The Environmental Monitor will assist in compliance with MoE regulations.
- Accidental spills may produce special wastes (e.g., material with > 3% oil) and contaminated soil. All waste disposals must comply with the BC Hazardous Waste Regulations and the *Waste Management Act.* The Environmental Monitor will assist in compliance with MoE regulations.
- Waste sorbent material may not be disposed of in a landfill without prior approval from MoE.
- If contaminated soil is encountered it must be treated and dealt with as required on a site-specific basis, and must comply with the requirements of the *B.C. Contaminated Sites Regulations*.

SPILL REPORT

The spill report should include the following information:

- Name and phone number of person reporting the spill
- Name and phone number of person involved with the spill
- Location and time of the spill
- Type and quantity of material spilled
- Cause and effect of spill
- Details of action taken or proposed to contain the spill and minimize its effect
- Names of other persons or agencies advised

3.9 Noise Abatement Strategy

Activities associated with construction can pose a concern to health or hearing. The following strategies are provided in order to limit unnecessary disturbance:

• Any idling equipment should be turned off when not in use and in compliance with emission-reduction strategies.



- Equipment should be operated at the minimum engine speeds that still provide for effective operation.
- Equipment or processes should be employed that have additional noise control features, such as better mufflers and enclosures on diesel- or gas-powered equipment or exhaust silencers on air tools.
- Machinery should be in good condition prior to construction and should not utilize excessively noisy equipment. Regular maintenance must be undertaken on all equipment, including lubrication and replacement of worn parts, especially exhaust systems.
- The quietest piece of equipment that is available should be used to conduct a task where feasible (i.e., utilize hydraulic-powered rather than pneumatic-powered equipment).
- All on-site workers should be trained to be aware of noise issues and how to minimize noise emissions where possible.
- Communication and mitigation measures should be directed to local residents across Derwent Way, in order to minimize negative community response to potential noise created by construction. In order to lessen any negative perceptions the residents may have about noise impacts from construction activities, the following actions may be taken:
 - Keep residents informed about the Project, its purpose and benefits, its local construction schedule, including when the periods of greatest noise may occur, and what is being done to minimize the noise as much as possible.
 - Ensure that a public relations contact is available by phone at all times to respond directly to any concerns.
 - Complete the Project as efficiently and quickly as possible in order to limit the length of time that local residents and wildlife are exposed to noise and/or vibration disturbances.

The project work will be completed during PMV standard construction hours of Monday to Saturday between 7am – 8pm, excluding holidays.

3.10 Air Quality Management Plan

Construction activities may result in degraded air quality as a result of demolition and construction, with potential vectors of dust formation, exhaust emissions and sandblasting/ paint emissions.

The major potential sources of air pollution during construction at the Project site include, but are not limited to:

- Greenhouse gases (e.g., from combustion of diesel and gasoline) from construction vehicles
- Particulate matter from non-combustion sources (e.g., soil disturbance and use of unpaved access areas)



3.10.1 Idle Reduction Strategies

The Contractor will reduce idling of construction vehicles and equipment whenever possible. The Ministry of Transportation and Infrastructure has developed idle reduction opportunities to improve air quality and to reduce greenhouse gas emissions and has provided the following guidelines and requirements:

- Exhaust emissions:
 - Operational equipment that is not yet required to meet emission standards in Canada must be fitted with catalyzed particulate traps, to filter out particulate matter emissions and to reduce diesel odour emissions.
 - > Diesel vehicles shall use ultra-low sulphur diesel fuel, when and where available.

Restrict idling times during periods of inactivity, such as when vehicles are stopped in a queue or off-road equipment and heavy machinery is not being used, according to the following guidelines:

- Motor vehicles and light trucks one minute
- Heavy duty diesel vehicles five minutes
- Diesel vehicles involved in construction site passenger transportation ten minutes
- Idling for more than the above times is permitted under the following circumstances:
 - > When vehicles or equipment are forced to remain motionless because of traffic conditions or mechanical difficulties where the operator has no control.
 - > When bringing the vehicle or equipment to the manufacturer's recommended operating temperature.
 - When the outdoor temperature is below 0°C or above 30°C and the operator or passengers are inside the vehicle and there are no auxiliary power sources available to provide temperature control.
 - When it is necessary to operate auxiliary equipment that is located in or on the vehicle or equipment to accomplish the intended use of the vehicle or equipment (i.e., cranes and cement mixers).
 - > When the vehicle is detaching or exchanging a trailer.
 - When the vehicle or equipment is being repaired or engaged in repairing another vehicle, if idling is necessary for that task.
 - When the vehicle or equipment is queued for inspection, if idling is necessary for such inspection.
 - For designated emergency vehicles or any vehicle or equipment assisting in police, fire, or ambulance services.
 - > When defrosting or de-fogging windows.

The Contractor shall reinforce the idle reduction initiative through signage and during toolbox, health and safety, and other meetings.



Further information regarding air emissions is provided in the following BMP:

- Cheminfo Services Inc. (2005). Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities (March, 2005). http://www.bieapfremp.org/Toolbox%20pdfs/EC%20-%20Final%20Code%20of%20 Practice%20-%20Construction%20%20Demolition.pdf
- Greater Vancouver Regional District (Metro Vancouver). (2012). Non-Road Diesel Engine Emission Regulation Bylaw No. 1161, 2012. http://www.metrovancouver.org/boards/Bylaws1/GVRD_Bylaw_1161.pdf

3.10.2 Dust Control

Dust control will be required to prevent dispersal onto nearby vegetation and into drainages, and for air quality. Mitigation of fugitive dust emissions will consist of the following strategies:

- If there has been no rain for seven days and the surface is not damp, watering will be done. A simple test for dampness is to take a handful of material and squeeze it tightly. The sample is "wet" if water squeezes out, "damp" if it holds its shape or "dry" if the sample will not hold shape and crumbles. Note that over watering should be avoided to reduce the risk of runoff from access routes and surface being graded.
- Watering of an area can cease if the surface has crusted or there is no evidence of fugitive emissions by visual observation.
- As per the Best Practices for the Reduction of *Air Emissions from Construction and Demolition Activities* and the *Best Environmental Practices for Highway Maintenance Activities*, "street cleaning" will be conducted where dust and dirt is seen to be accumulating on the road and there is the potential for the generation of fugitive road dust by construction vehicles.

3.11 Erosion and Sediment Control Plan

The ESCP outlines the methodology required to provide both short and long term sediment and drainage management measures essential to the protection of aquatic resources. The key factors in erosion and sediment control planning are to intercept and manage stormwater that occurs on-site in order to limit the potential for soils to become eroded and for sediment-laden surface runoff to enter any drainage.

By planning construction timing and following BMPs, it is expected that the potential for erosion, sedimentation and harmful substance spills will be minimized. All necessary supplies and equipment for implementing BMPs, such as silt fencing, tarps, filter fabric, straw bales, silt curtains, pumps, hoses, etc., will be kept on-site and utilized as required to maintain environmental compliance.

Erosion and sediment control measures required for this Project may vary greatly depending upon local site conditions and weather at the time the work is undertaken (i.e., not all measures will work in every given situation and during all seasons of the year). The following general sediment and erosion control plans are meant to be flexible in order to react to spatial and temporal requirements and conditions in the aquatic and upland environment.



Specific objectives of the plan are to provide the following:

- Construction procedures that should be utilized to minimize the potential for erosion and sediment production.
- Site-specific mitigation measures for erosion prevention and control.
- Mitigation measures for ensuring acceptable water quality.

The following are potential impacts from erosion and sedimentation during Project works:

- Introduction of sediment-laden water into river waters from construction activities such as site preparation, pile installation and conveyor system construction.
- Introduction of contaminants into river waters from contaminated soil movement.
- Alteration of natural surface water flow from the Project site.
- Introduction of concrete leachate into river waters.

3.11.1 Erosion Control

The Contractor shall:

- Minimize disturbance of vegetation when possible as a first defense in the control of erosion and sediment release.
- Minimize trenching, grading, benching and scarification where possible.
- Use swamp pads where necessary to minimize soil/sediment disturbance and erosion, especially on soft soils.
- Take reasonable care to avoid damage to graded and/or seeded areas.
- Employ sediment and erosion controls as required to minimize the generation of sediment-laden water within the work site (i.e., by staging work and/or only undertaking that portion that can be reasonably completed within a work shift).
- Refer to the requirements identified in Section 3.12: Water Quality Management Plan.

Erosion control can be implemented using both temporary and permanent methods. As the Project is primarily within the upland areas, the greatest potential for erosion will be from the upland works, such as the hopper concrete footing. The following general strategies will be used during the construction process to reduce erosion potential:

- Restrict construction during periods of heavy precipitation and runoff to minimize soil erosion and potential off-site sedimentation.
- Cover temporary fills or stockpiles with polyethylene sheeting or tarps.
- Locate stockpiles away from any drainages or the HWM area.
- In wet conditions, erosion control should be implemented immediately upon completion of any earthwork operations.
- Redirect the flow of water away from bare areas and steep slopes.



- Intercept up gradient water sources and divert water around the site.
- Divert water through the site via subsurface piping, channels or ditches that have been constructed to reduce erosion.
- Line drainage ditches with erosion resistant material and place check dams at regular intervals to reduce the erosive energy of runoff.

Backfilling of excavations and re-grading of the upland construction sites will be carried out to completion as quickly as possible in order to maintain stability of disturbed slopes and exposed soils are stabilized; where necessary, slopes may be temporarily covered with tarps or plastic sheeting to prevent erosion during periods of inclement weather. Exposed soils and seabed sediments (stockpiled upland) will be tarped at the end of each workday and during inclement weather to prevent erosion until such time as the infrastructure are completed and the soils can be stabilized during the site restoration process. If applicable to site conditions, the Contractor will have a designated person on-site who will ensure that vehicle tires are cleaned of debris/mud prior to exiting the construction zone and who will also ensure that off-site access areas are swept and kept clear and clean of construction traffic tracking.

3.11.2 Sediment Control

Sediment control seeks to prevent the off-site migration of sediment suspended in stormwater or the river environment, and its subsequent deposition in sensitive habitats. The following general strategies will be used to control sediment movement offsite:

- Roadways will be regularly swept to prevent sediment tracking.
- Installation and maintenance of silt fencing, gravel berms, and other barriers will be conducted as required to control sediment laden waters within and around the Project area.
- Stormwater and surface runoff associated with works will be managed using best available practices to prevent the release of sediment, sediment laden water (in excess of turbidity levels presented in Section 3.12 Water Quality Management Plan), or any deleterious substance into the aquatic environment, where necessary.

3.12 Water Quality Management Plan

Silts and fine materials re-suspended from the River and sediment-laden water that may be generated during construction activities can have adverse effects on the aquatic environment and its resources. Therefore, controlling particle resuspension and generation during construction work will be given high priority. All works in, over or adjacent to the water, or works discharging to the water shall be conducted in a manner that prevents or minimizes the direct or indirect release of sediment or sediment-laden water into the aquatic environment. In this regard, the works should address the applicable water quality criteria as described in the British Columbia Water Quality Guidelines (Criteria) (BCWQG): 1998 Edition produced by BC Ministry of Environment, Lands and Parks. In particular, the BCWQG include the following specific criteria for aquatic life (freshwater and estuarine):



- Change from background of 8 Nephelometric Turbidity Units (NTU) at any one time for a duration of 24 h in all waters during clear flows or in clear waters.
- Change from background of 2 NTU at any one time for a duration of 30 days in all waters during clear flows or in clear waters.
- Change from background of 5 NTU at any time when background is 8 NTU–50 NTU during high flows or in turbid waters.
- Change from background of 10% when background is >50 NTU at any time during high flows or in turbid waters.

Degradation of water quality and sedimentation of aquatic habitats are potential impacts identified during the Project works. The Contractor will ensure that water exiting land-based sites and entering the aquatic environment or any watercourse will meet the applicable approved and working BCWQG. Measures that will be taken to control resuspension of aquatic sediments and generation of sediment-laden water on land are:

- Should discharge or generated sediment-laden water not meet legislated criteria, where applicable, activity will cease until the water clears, whether by dispersal of sediments by currents or by resettling (no flocculants will be used in salt water).
- The EM will conduct water quality monitoring on an as-required basis (activity-dependent). Water quality will be checked more frequently at Project start-up in order to ensure that sediment-control and water handling measures are functioning as intended. In situ parameters that will be routinely measured include pH and turbidity.

3.13 Marine Works Plan

Marine construction works will take place from marine-based rigs, derricks, scows and from land. Marine activities are restricted to the construction of the new floating conveyor system and dolphins. The following section provides a brief overview of the activities and addresses the activity specific environmental protection measures to be implemented during these works.

3.13.1 Floating Conveyor System and Berthing Dolphins

The floating conveyor system and berthing dolphins will be constructed of 16 steel pipe piles with steel pile caps for the conveyor system. Biodegradable hydraulic oil will be used as conveyor bearing grease.

The Contractor will ensure that water pH within and around construction activities remains within the BCWQG (marine water between 7 and 8.7). In addition, concrete works will follow the BMPs developed for cast-in-place activities for EC: Ready Mix Concrete Industry Environmental Code of Practice 1993 Update. Prepared for Environment Canada, DoE FRAP 1993-26 (http://research.rem.sfu.ca/frap/9326.pdf). Construction of the conveyor system and bumper dolphins shall be completed within the fisheries window, and thus potential impacts to fish during construction is expected to be low.



The installation of the temporary support frame will be from a marine derrick using marine access. The pipe piles will be installed using a vibratory hammer and Vibroflot.

To reduce the impacts to fish and fish habitat, the Contractor shall:

- Follow the BMPs for concrete use in proximity to marine areas, prepare a spill contingency plan, and provide a qualified EM to measure water quality and observe in water construction works.
- Construction works will not be conducted prior to issuance of a DFO Authorization. Detailed construction plans and protection measures will be submitted for PMV's review as part of the work permit applications process.
- Conduct hydrophone monitoring at the outset of sheet pile and stone column driving to ensure that pressure created is below the most recent DFO recommended upper maximum for fish and marine mammals.
- Install floating oil containment booms around any marine construction activities.
- Install floating silt/debris curtains completely around the area of work during ground improvement works.

When working on the water, the Contractor shall use the following mitigative strategies to offset potential impacts of vessel operation:

- Minimize wake when operating close to shore or enclosed waterbody, channel or inlet.
- Implement "No Wake" policy in areas subject to erosion, environmentally-sensitive habitats or when marine mammals are present.
- Stay clear of highly productive habitat, unless specifically authorized to enter such an area as part of a Project.
- Turn off engines when not in use (applicable to boats and other motorized equipment) to reduce noise and preserve air/water quality.
- Use low sulphur diesel, where available.
- Do not ground any vessel, unless in an absolute emergency.
- Lift engine legs/adjust trim in shallow water and maintain minimum depth for size of vessel to avoid stirring up sediment and/or grounding.
- Reduce approach speeds.
- Maintain course or heading as designated by an authority (i.e., do not trespass within marine reserves, stay in middle of a channel, etc.).
- Spud/anchor in areas relatively barren to prevent drag and maintain stability.
- Minimize impact on fish by limiting in water work to the recommended DFO work window times (June 16 February 28).



3.14 Heritage and Archaeology Resources

Based on current disturbed nature and historical fill activities on-Site, it is not anticipated that heritage or cultural resources will be encountered during the Project. "Chance find protocols" should be implemented during the project to manage the limited possibility of encountering heritage or archaeological resources. If artifacts are discovered during Project works, the Contractor is to halt all work that may disturb the archaeological site and contact the proponent's Project Manager immediately. The appropriate authorities will subsequently be notified, and work will resume after an archaeological management plan has been implemented for the site. Items of interest that may be uncovered include human bones, stone tools, or other artifacts, all of which are protected under the BC *Heritage Conservation Act*.

3.15 Environmental Monitoring and Reporting Plan

The EM will report directly to Summit and regulatory agencies to ensure the effectiveness of mitigation and compensation measurements during construction activities. The following activity specific environmental monitoring plan has been developed for the Project.

3.15.1 Water Quality Monitoring Component

Water quality monitoring will be conducted, if required by the site-specific conditions and activities. *In situ* parameter measurements, such as dissolved oxygen, pH and turbidity, are commonly used to evaluate potential localized effects on water quality. River water quality will be monitored during installation of gravel columns. Water quality results will be compared to background measurements recorded at an area not influenced by construction. Water quality criteria will adhere to the Water Quality Management Plan (Section 3.12).

Sampling in and around any aquatic operations will be limited to a safe distance, such that sudden drops/breaks in the rig or crane cable(s) will not endanger monitoring personnel. The EM will monitor the site regularly during active construction, at start-up of an activity that has the potential to affect water quality, and more often during periods of inclement weather (i.e., when rainfall exceeds 25 mm in a 24-hour period) to ensure that erosion and sediment control measures are functioning as intended or remediated as necessary. Monitoring will be conducted during the entire tenure of works below the HWM.

When water quality measurements, such as turbidity, are taken in order to determine the zone of construction influence and whether activities are compliant with environmental regulatory guidelines, the direction of flows/currents must be considered. In this area of the Fraser River, tidal changes can influence current flow. Background turbidity will also vary with the season and depending on algal blooms (turbidity measurements do not distinguish between re-suspended inorganic particulate matter and naturally-occurring planktonic organisms or other organic particles). Background or reference measurements are taken outside or up current of the work zone and will depend on the flow conditions during the sampling event. When and where applicable and appropriate, the BC Approved and Working Water Quality Guidelines for Freshwater, Marine and Estuarine Life will be used for comparison to in situ measurements.



3.15.2 Marine Mammal and Migratory Bird Monitoring Component

Project works are expected to comply with the Marine Mammal Regulation of the federal *Fisheries Act*, the *Migratory Bird Convention Act*, and the provincial *Wildlife Act*. The presence of marine animals, although unlikely, such as seals and birds observed in or about the works will be documented as to type and number. Identifying features will be noted, where such identifications of individuals may be of interest to other stakeholders or agencies. 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. At no time will any intentional interactions, such as petting or feeding wildlife be allowed.

3.15.3 Environmental Incident Reporting

An environmental incident is one that has caused, or has the potential to cause, one or more of the following:

- Environmental damage
- An adverse effect on fish, wildlife or other environmental resources
- Heightened publicity associated with a negative effect on the environment
- Legal action with respect to environmental noncompliance and/or damage

In addition to the above points, all spills (regardless of volume) are considered to be environmental incidents in the context of this Project. In the event of an environmental incident, as defined above, the following procedures shall be undertaken by the Contractor:

- Take immediate action to minimize environmental consequences and manage resolution of the incident.
- Gather information for the assessment of causes so that prevention of future incidents can be planned.
- Prepare a written EIR as soon as possible (within one working day of the occurrence) summarizing events, actions and recommendations for future avoidance.
- Submit EIR to the Environmental Manager and EM. The Environmental Manager and EM will forward copy of the final EIR to Summit's Environmental Representative.
- Prepare updates to the EIR as necessary and submit them to the Environmental Manager.

3.15.4 Environmental Training and Orientation

As part of Project requirements, the EM will fulfill the following tasks:

- Attend meetings where environmental issues or concerns may arise or may ask for a meeting to discuss such issues with the various stakeholders involved.
- Give an environmental orientation to the Contractor's employees, including other monitors or observers that may not necessarily be aware of the environmental issues or concerns that are part of the activities being undertaken.



- Discuss discipline- or activity-specific environmental issues/concerns and mitigative strategies with crews or individuals as the need arises, such that they are aware of the environmental protection measures that should or could be implemented under the conditions at the time the work is undertaken.
- Be available for meetings (whether in person or via telephone) should the need arise, and will respond to messages or written communications as required by the circumstances.

The Contractor shall participate in implementing an education and training system as part of the site orientation for on-site Contractor and their sub-Contractor staff.

3.15.5 Environmental Monitoring and Compliance Tracking

The EM will keep field notes and logs of site visits conducted; will document site conditions/compliance with a checklist prepared for site-specific conditions and activities; and will keep a photographic record of activities and site conditions as work progresses. These records will form the basis of the formal monitoring reports (prepared following site visits), as well as provide records for quality management control.

Where required by the conditions of an authorization, letter of advice or other permits issued for the Project, reports will be submitted as specified to the regulatory agencies and stakeholders listed in the conditions, by the EM or through a designated Summit representative. The Project authorities may then disseminate the reports to other stakeholders, as deemed appropriate, or request that the Environmental Monitor include them on the transmittal list.

Formal monitoring reports will include a list of construction activities, water quality monitoring results and environmental protection measures implemented or mitigative strategies employed, as well as photographs where appropriate. A discussion of the effectiveness of the environmental protection measures will be included. Special provisions will be detailed and any post-construction monitoring requirements outlined, especially where a potential impact may not be realized immediately. Reporting will also include any deficiencies, correction measures implemented and subsequent compliance with the environmental protection plan. Non-compliance will be documented and the measures taken to correct such deficiencies will be tracked.

Formal monitoring reports will be prepared by the Project EM following weekly/or bi-weekly site visits for the duration of the Project.

Environmental monitoring will be conducted on a weekly basis between October to April, and on a bi-weekly basis between May to September. Pile installation below the HWM will be monitored on a daily to full-time basis depending on observed impacts of the activity.

3.16 Contractor Awareness and Education Plan

The construction Contractor shall develop an awareness and education plan which will include an orientation session for each new worker. Training will include site-specific guidance on environmental regulatory requirements and best management construction and protection practices around sensitive areas (drainages and river waters, vegetation and wildlife habitats) and the protection approaches to be taken for each type. The Contractor will ensure that individuals requiring specialized training due to their responsibilities within the Project,



or employees new to this type of work, receive additional training on their work functions, impacts and roles for achieving environmental compliance. Emergency response and waste management will be discussed and appropriate sites for contingency supplies and disposal areas identified as well.

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. Only if the project activity, environmental conditions, or employees changes, will an updated tailgate meeting document be required for employee sign-off and retained as record. On days that are scheduled to be near or associated with environmentally sensitive areas or impact environmental values, the EM will attend to identify the location of, outline mitigative strategies for site-specific environmental requirements.

All training sessions with the names of the Contractor, sub-Contractor(s), and other attendees will be properly documented. Environmental monitoring reports will include compliance reporting, how effective the mitigative strategies were, and opportunities for activity and training improvement.



4. STATEMENT OF LIMITATIONS

Findings presented in this CEMP 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 construction, and (iii) observations of the sites and surrounding lands. 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, practicing under similar circumstances in the area at the time of the performance of the work, this CEMP is intended to provide information and to suggest mitigative strategies to reduce, but not necessarily eliminate, the potential for environmental impacts to occur as a result of planned construction activities at the Project site. This CEMP is meant to be a living and flexible document that can be used to provide guidance in environmental protection measures that can be implemented during routine construction activities, as well as unanticipated events or requirements that may arise during the course of construction.

This report has been prepared solely for the internal use of Summit Earthworks Inc. pursuant to the agreement between Keystone Environmental Ltd. and Summit Earthworks Inc. By using this report, Summit Earthworks Inc. agrees that they will review and use the report in its entirety. 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.



5. PROFESSIONAL STATEMENT

This report titled Construction Environmental Management Plan, Soil Transfer Facility Development, New Westminster, BC has been prepared by Michaela Burke, and reviewed by Craig Patterson.

July 18, 2019

Date

Statterso

Craig S. Patterson, R.P.Bio. Project Biologist

Jason Christensen, P.Eng. Senior Engineer



APPENDIX A

SITE PLANS PROVIDED BY SUMMIT EARTHWORKS INC.





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LEGEND:

STRIPPING AND GRUBBING BOUNDARY EXTENTS

	LIMITS OF STRIPPING AND GRADING AREAS
	LEGAL PLAN RIGHT OF WAYS (R/W)
+++++++++++++++++++++++++++++++++++++++	EXISTING CENTERLINE OF RAIL
X X	EXISTING FENCELINE
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	EXISTING DECIDUOUS TREES ON EMBANKMENT TO REMAIN
	EXISTING TREES TO BE REMOVED
	EXISTING TREE AREA TO REMAIN (ALONG RIVER EMBANKMENT AND WITHIN 10m OF HIGHWATER MARK
	EXISTING CONTOURS (0.5m INTERVALS)

QUANTITIES TABLE						
DESCRIPTION	2D AREA (m²)	VOLUME (m³)				
TOPSOIL STRIPPING AREA #1 (AVERAGE DEPTH OF TOPSOIL = 200mm)	4386	877				
TOPSOIL STRIPPING AREA #2 (EXISTING STOCKPILE)	650	800				



**TETRA TECH** 



					RIVER EMBANKMENT		
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)==	==	NEW U/G DRAINAGE CULVERT (CONCRETE)
	-	LIGHT POLE
-	©	DRAINAGE CATCHBASIN c/w BURIED PVC PIPE (TO TREATMENT FACILITY)

QUANTITIES TABLE							
DESCRIPTION	2D AREA (m²)	VOLUME (m³)					
TOPSOIL STRIPPING AREA #1 (AVERAGE DEPTH OF TOPSOIL = 200mm)	4550	910					
TOPSOIL STRIPPING AREA #2 (EXISTING STOCKPILE)	650	800					

EARTHWORKS QUANTITIES – ROUGH GRADE (	CUT / FILL
DESCRIPTION	VOLUME (m³)
EARTHWORKS CUT	3,975
EARTHWORKS FILL (PLACED AND COMPACTED)	475

![](_page_45_Figure_0.jpeg)

![](_page_45_Figure_1.jpeg)

REFERE	NCE DRAWINGS		REVISIONS		NOTES	PERMIT AND ENGINEER STAMF
NUMBER	TITLE	NO. ISSUE	DATE BY CHK'D	ENG APP'D		
		A ISSUED FOR 50% DESIGN	2017.AUG.15 MOH CT	DM CT		
		B ISSUED FOR 90% DESIGN	2017.NOV.10 MOH CT	DM CT		
		C ISSUED FOR PERMIT	2018.MAY.29 MOH CT	DM CT		
		D ISSUED FOR PERMIT	2018.JUN.15 MOH CT	DM CT		
		E ISSUED FOR PERMIT	2019.JAN.09 MOH CT	DM CT		
		F ISSUED FOR PERMIT	2019.JUL.18 MOH CT	DM CT		
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NOTES:

1. GENERAL NOTES FOR CIVIL CONSTRUCTION SEE DRAWING 03082-01 2. ALL COORDINATES, ELEVATIONS, AND DIMENSIONS ARE IN METERS, U.N.O.

![](_page_45_Picture_6.jpeg)

![](_page_46_Figure_0.jpeg)

![](_page_46_Figure_1.jpeg)

FILE: C:\ODSI\TT - DERWENT\AUTOCAD\03082-07.DWG

![](_page_47_Figure_0.jpeg)

![](_page_47_Figure_1.jpeg)

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			NOTES	PERMIT AND ENGINEER STAM
D	ENG	APP'D		
	DM	СТ		
			1:600 1:600 10 10 1:600	

03082-08

SCALE

AS NOTED

E

![](_page_48_Figure_1.jpeg)

![](_page_49_Figure_1.jpeg)

LAS LAS

NOTES:
<ol> <li>GENERAL NOTES FOR CIVIL CONSTRUCTION SEE DRAWING <u>03082-01</u></li> <li>ALL COORDINATES, ELEVATIONS, AND DIMENSIONS ARE IN METERS,</li> </ol>
U.N.O. 3. TOPOGRAPHY DATA IS DERIVED FROM HIGHMARK SURVEY AND ENGINEERING LTD. NOV. 2015. DRAWING NUMBER: TOOOO6D
LEGEND:
LOCK-BLOCK RETAINING WALLS
+++++++++ EXISTING CENTERLINE OF RAIL
NOISE BARRIER & TREE PLANTING ZONE
$\succ = =$ New U/G drainage culvert (concrete)
LIGHT POLE
VEGETATED AREAS (GRASS/PLANTS)
SHRUB/HERB PLANTING AREAS
EXISTING TREES TO REMAIN (ALONG RIVER EMBANKMENT AND WITHIN 10m OF HIGHWATER MARK)
TREES AND SHRUB/HERB PLANTING AREAS (CONCEPTUAL OUTLINE)
DRAINAGE CATCHBASIN c/w BURIED PVC PIPE

CADFILE	03082-12	DRAWING NO.	REV
SCALE	1: 300	03082-12	G

![](_page_50_Figure_1.jpeg)

LAS LAS

![](_page_50_Figure_6.jpeg)

![](_page_50_Figure_11.jpeg)

![](_page_51_Figure_1.jpeg)

PERMIT AND ENGINEER STAN	NOTES			REVISIONS			REFERENCE DRAWINGS		
		APP'D	CHK'D ENG	BY	DATE	ISSUE	NO.	TITLE	NUMBER
		СТ	СТ	мон	2018.MAY.29	ISSUED FOR PERMIT	А		
		СТ	СТ	мон	2018.JUN.15	ISSUED FOR PERMIT	В		
		СТ	СТ	мон	2019.JAN.09	ISSUED FOR PERMIT	С		
		СТ	СТ	мон	2019.JUL.18	ISSUED FOR PERMIT	D		
	0 1:250 10								

FILE: C:\ODSI\TT - DERWENT\AUTOCAD\03082-100.DWG

## **GENERAL NOTES:**

#### 1. GENERAL

- 1.1 DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE. ELEVATIONS ARE IN METRES AND ARE REFERENCED TO GEODETIC ELEVATION.
- 1.2 GEOTECHNICAL DESIGN IS BASED ON INFORMATION PROVIDED BY TETRA TECH LTD.

#### 2. WATER LEVELS

DESIGN RIVER ELEVATIONS AT THE SITE ARE AS FOLLOWS	(DFO):
EXTREME HIGH WATER LEVEL (EHWL)	+2.9 m
HIGHER HIGH WATER LEVEL (HHWL)	+1.8 m
LOWER LOW WATER LEVEL (LLWL)	-1.8 m

3. MAXIMUM BARGE SIZE DIMENSIONS

BARGE DWT = 3 100 TONNES HULL LENGTH = 67.0 m HULL WIDTH = 17.0 m HULL LOADED DRAFT = 1.62 m

- 4. DESIGN CODE
  - 4.1 CANADIAN HIGHWAY BRIDGE DESIGN CODE (CAN/CSA S6-14)
  - 4.2 WORKSAFE BC OCCUPATIONAL HEALTH AND SAFETY STANDARDS
- 4.3 BRITISH STANDARD BS639-4
- 4.4 UNIFIED FACILITIES CRITERIA (UFC) DESIGN: PIERS AND WHARVES (UFC 4-152-01)
- 4.5 PIANC (WORLD ASSOCIATION FOR WATERBORNE TRANSPORT INFRASTRUCTURE)
- 5. DESIGN LOADS
- 5.1 SELF-WEIGHT OF STRUCTURE COMPONENTS
- 5.2 MAINTENANCE ACCESS LOADS AS PER CL 3.8.10 OF CSA S6-14.
- 5.3 CONVEYOR MECHANICAL COMPONENTS
- 5.4 WIND LOADING TO CAN/CSA S6-14

5.5 SEISMIC DESIGN FOR THE ONSHORE TERMINAL WORKS ONLY. SEISMIC DESIGN HAS NOT BEEN CONSIDERED FOR THE MARINE STRUCTURES DESIGN (BERTHING DOLPHINS AND CONVEYOR SUPPORT PIER).

- 5.6 BERTHING LOADS
- 5.6.1 LARGEST VESSEL FULLY LADEN DISPLACEMENT = 3100 TONNES AT MAXIMUM BERTHING SPEED OF 0.33 m/s
- 5.7 MOORING LOADS
- 5.7.1 MOORING LOADS FROM WIND ARE BASED ON NOTE 5.4
- 5.7.2 MOORING LOADS FROM RIVER CURRENT ARE BASED ON MAXIMUM ANNUAL FRASER RIVER CURRENTS NOT INCLUDING ANNUAL FRESHET EVENTS.

#### 6. MATERIALS

- 6.1 STEEL PIPE PILES TO BE ASTM A252 GRADE 3
- 6.2 ALL STEEL TO BE CSA G40.21M GRADE 350W
- 6.3 CAST-IN PLACE CONCRETE TO BE CSA A23.1 EXPOSURE CLASS C1, fc = 35 MPa AT 28 DAYS.
- 6.4 REINFORCING STEEL TO BE CSA G30.18M GRADE 400R

McElhanney

McElhanney Consulting Services Ltd.

![](_page_51_Picture_36.jpeg)

![](_page_51_Picture_37.jpeg)

VGEO03082-01

![](_page_51_Picture_39.jpeg)

LOT 3, PLAN 13803 & BLOCK 9, PLAN 2602

NEW WESTMINSTER, BC

# DERWENT WAY TRANSFER STATION

BARGE LOADING MARINE FACILITY - GENERAL ARRANGEMENT

CADFILE	03082-100	DRAWING NO.	REV.
SCALE	1:250	03082-100	D

![](_page_52_Figure_1.jpeg)

		NOTES	PERMIT AND ENGINEER STAM
ENG	APP'D		
	СТ		
	СТ		
	ENG	ENG APP'D CT CT CT	ENG         APP'D           CT         CT           CT

![](_page_52_Picture_16.jpeg)

LOT 3, PLAN 13803 & BLOCK 9, PLAN 2602 NEW WESTMINSTER, BC BARGE LOADING MARINE FACILITY OPERATIONAL LOADING - GENERAL ARRANGEMENT REV. CADFILE 03082-101 DRAWING NO. 03082-101 SCALE В AS NOTED

![](_page_53_Figure_1.jpeg)

PROFILE AT CENTRE OF CONVEYOR - LOADED BARGE SCALE 1: 300

![](_page_53_Figure_3.jpeg)

PROFILE AT CENTRE OF BARGE - LOADED BARGE SCALE 1: 300

REFE	REFERENCE DRAWINGS		REVISIONS		NOTES	PERMIT AND ENGINEER STAMP	
NUMBER	TITLE	NO.	ISSUE	DATE BY CHK'D	ENG APP'D		
		A	ISSUED FOR PERMIT	2018.MAY.29 MOH CT	СТ		
		В	ISSUED FOR PERMIT	2018.JUN.15 MOH CT	СТ		
		С	ISSUED FOR PERMIT	2019.JAN.09 MOH CT	СТ		
		D	ISSUED FOR PERMIT	2019.JUL.18 MOH CT	CT		

PROFILE AT CENTRE OF CONVEYOR - UNLOADED BARGE

SCALE 1: 300

![](_page_53_Figure_11.jpeg)

PROFILE AT CENTRE OF BARGE - UNLOADED BARGE SCALE 1: 300

![](_page_53_Picture_16.jpeg)

![](_page_54_Figure_0.jpeg)

![](_page_54_Figure_1.jpeg)

B ISSUED FOR PERMIT

C ISSUED FOR PERMIT

D ISSUED FOR PERMIT

FILE: C:\ODSI\TT - DERWENT\AUTOCAD\03082-103.DWG

![](_page_54_Figure_4.jpeg)

SCALE

AS NOTED

![](_page_54_Figure_5.jpeg)

						NOTES	PERMIT AND ENGINEER STAM
	DATE	BY	CHK'D	ENG	APP'D	1 PILES TO BE INSTALLED OPEN-ENDED BY COMBINATION OF VIBRATORY HAMMER	
	2018.MAY.29	мон	СТ		СТ	AND IMPACT HAMMER PILE DRIVING METHODS	
	2018.JUN.15	мон	СТ		СТ	2. TOTAL PILE EMBEDMENT IS ANTICIPATED TO BE 15 M.	
	2019.JAN.09	мон	СТ		СТ		
	2019.JUL.18	мон	СТ		СТ		
-					1		

![](_page_55_Figure_0.jpeg)

![](_page_55_Figure_1.jpeg)

NOTES PERMIT AND ENGINEER ST/	NOTES			REVISIONS			REFERENCE DRAWINGS	
		ENG APP'D	BY CHK'D	DATE	ISSUE	NO.	TITLE	NUMBER
		СТ	э мон ст	2018.MAY.29	ISSUED FOR PERMIT	A I		
		СТ	5 МОН СТ	2018.JUN.15	ISSUED FOR PERMIT	B I		
		СТ	э мон ст	2019.JAN.09	ISSUED FOR PERMIT	C 1		
		СТ	з мон ст	2019.JUL.18	ISSUED FOR PERMIT	D 1		
0 1:20 1	0 1:20							
		• •		·				

![](_page_55_Figure_5.jpeg)

![](_page_55_Figure_6.jpeg)

SPILLAGE CAPTURE AND CONTAINMENT. WASH-DOWN WITH WATER SYSTEM

> - MAINTENANCE WALKWAY SECTIONS ALONG BOTH SIDES AND HEAD END OF CONVEYOR

![](_page_55_Figure_11.jpeg)

SCALE

![](_page_55_Picture_12.jpeg)

1:20

# **APPENDIX B**

PERMITS AND APPROVALS (PROVIDED ONCE ISSUED)

![](_page_56_Picture_2.jpeg)