



PORT of
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Vancouver Fraser
Port Authority

Portside Blundell Road Improvements Project

Construction Environmental Management Plan

Prepared for:
Vancouver Fraser Port Authority
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DOCUMENT REVISION HISTORY

Version	Date	Comments/Summary of Changes
R0	July 14, 2022	<ul style="list-style-type: none">• First issue
R1	December 13, 2022	<ul style="list-style-type: none">• Second issue• Incorporated details of historical landfill operations and updated the Contaminated Soil and Groundwater Management Section
R2	April 14, 2023	<ul style="list-style-type: none">• Third issue• Incorporated various updates throughout the document from initial PER technical review

LIST OF ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
AIA	Archaeological Impact Assessment
AOA	Archaeological Overview Assessment
BC	British Columbia
BMP	Best Management Practices
CCME	Canadian Council of Ministers of the Environment
CDC	BC Conservation Data Centre
CEMP	Construction Environmental Management Plan
CEPA	Canadian Environmental Protection Act
CEQG	Canadian Environmental Quality Guidelines
CN	Canadian National Rail Line
CoR	City of Richmond
CSR	Contaminated Sites Regulation
DFO	Fisheries and Oceans Canada
EM	Environmental Monitor
EMA	Environmental Management Act
ENV	BC Ministry of Environment and Climate Change Strategy
ESC	Erosion and Sediment Control
FEQG	Federal Environmental Quality Guidelines
FRIL	Fraser Richmond Industrial Lands
GVG	Greater Vancouver Gateway
HWR	Hazardous Waste Regulation
MUP	Multi Use Path
PBRI	Portside Blundell Road Improvements
QEP	Qualified Environmental Professional
PER	Project and Environmental Review
RMA	Riparian Management Area
SDS	Safety Data Sheets
Vancouver Fraser Port Authority	Port Authority
WHMIS	Workplace Hazardous Materials Information System

1 Introduction

The following Construction Environmental Management Plan (CEMP) is prepared for the Portside Blundell Road Improvements Project (the Project) led by the Vancouver Fraser Port Authority (Port Authority). The CEMP has been prepared in accordance with the Port Authority guidance on CEMP requirements and part of the Port Authorities' Project and Environmental Review (PER) process.

This CEMP is intended to mitigate project-related environmental effects and reduce the risk of unforeseen environmental incidents that may occur during construction activities. The CEMP provides guidance on best management practices to maintain regulatory compliance and to avoid or limit potential adverse environmental effects. The CEMP is a living document and is intended to be updated and refined with input from the Contractor on the Project work activities and schedule.

The following are the main objectives of this CEMP:

- Outline the best management practices (BMP) for construction and operational management to prevent or reduce the potential environmental impacts as associated with the Project; and
- Outline environmental protection and monitoring measures to be implemented on the Project site to detect potential environmental impacts and maintain regulatory compliance with applicable legislation and existing permits

The CEMP will be re-issued for construction as Project conditions, execution plans, and schedules are progressed. The CEMP will be reviewed and updated as required before works are undertaken and throughout construction of the Project.

2 Project Information

The Project is part of the Portside Blundell Road Improvements (PBRI), a package of road and rail infrastructure upgrades that are part of the wider Greater Vancouver Gateway (GVG) program currently being delivered by Port Authority.

The Port Authority is proposing to upgrade roadways in the Fraser Richmond Industrial Lands (FRIL). This location and its connections to major transportation routes and facilities make it an active industrial area for warehouse and transload businesses that pack and unpack shipping containers moving to and from the Port of Vancouver. This corridor has some of the most concentrated activity in the region for moving goods from marine terminals to rail lines and trucks, and then off to other destinations.

2.1 Project Location

The site is in the Port Authority's Planning Area 7, located within the FRIL on the south arm of the Fraser River in the City of Richmond (CoR). The geographical coordinates at the Project's approximate center are 49° 09' 18" North and 123° 02' 01" West. **Figure 1** below illustrates the Project location.

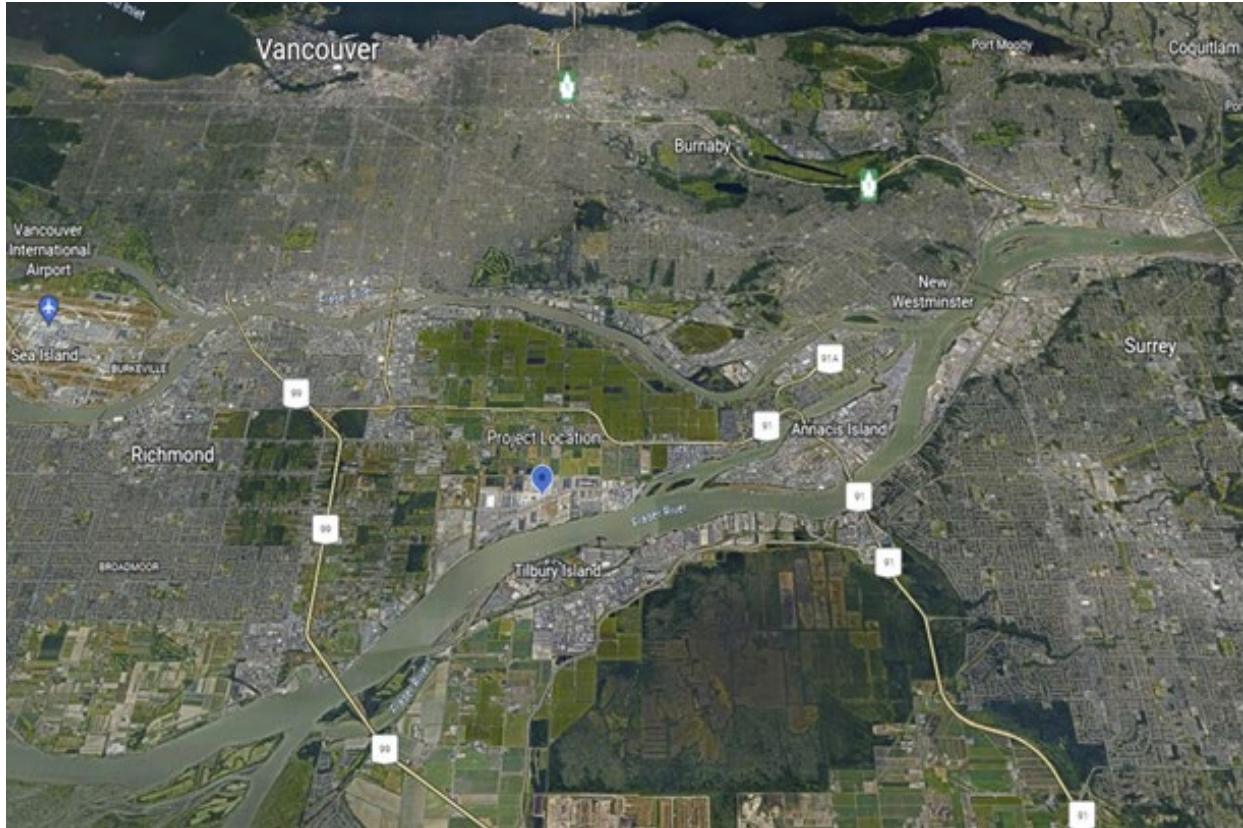


Figure 1. Project Location

2.2 Project Description

All construction works will be conducted at PBRI. The following is a general overview of the planned Project work:

- Building a new overpass over the Canadian National (CN) rail line, connecting Blundell Road and Portside Road.
- Widening Blundell Road from two lanes to four lanes between the No. 8 Road intersection and just west of York Road.
- Building a new bridge and extension of Portside Road over the No. 7 Road canal.
- Developing a new multi-use path (MUP) along the north side of Blundell Road and the south side of Portside Road.

2.3 Project Schedule

Subject to regulatory approvals, the preliminary Project schedule has construction activities starting 2023 and be completed by 2025.

Table 1 Project Schedule

Task	Preliminary Schedule
Clearing / stripping / grubbing	Q3 to Q4 2023
Preload placement	Q3 to Q4 2023
Preload removal	Q1 to Q2 2024
Pile driving	Q1 to Q2 2024

2.4 Site Description

The Project site lies within the historic Fraser River floodplains, an area that is now protected by a system of dikes for flood control, and sands dredged from the Fraser River have also been deposited within the Project footprint. The Project area is 5.0 m to 6.0 m above sea level and consists of level topography.

The environmental setting is described below in three sections: historical landfilling Operations, vegetation, wildlife and wildlife habitat and fish and fish habitat. These sections have been informed by available results from previous environmental assessments conducted by Sartori Environmental Services (2016), SNC Lavalin (2018) and a Phase II Environmental Site Assessment conducted by GHD in 2021 (GHD, 2021). Additional vegetation, wildlife and aquatic surveys were undertaken by Hatfield in August 2020 and McElhanney in May 2022 (McElhanney, 2022).

The site is not within nor adjacent to a federally or provincially protected area or park.

2.4.1 Historical Landfilling Operations

The Project site is located within an industrial zone in southeast Richmond that was historically used for various landfilling activities from the early 1960s up until the late 1980s. Based on a Phase II Environmental Site Assessment conducted by GHD in 2021, soil stratigraphy consists of shallow sand fill (0 to 2.3 mbgs¹), deeper sand/silt fill (2.3 to 6.8 mbgs), intermittent layers of wood waste fill material (3 to 10 mbgs), intermittent layers of native peat (4.6 to 7.62 mbgs), native silt/clay (4.6 to 10.7 mbgs), and landfill waste (2.3 to 5.4 mbgs).

Landfill leachate is currently collected and treated by a leachate treatment and collection system located northwest of the Project site.

2.4.2 Vegetation

The Project area is within the Coastal Douglas-fir bio geoclimatic zone, within the moist maritime subzone, which has climatic trends of warm, sunny summers and mild, wet winters (Green & Klinka, 1994). Areas within 100 m of the Project area are highly developed or altered landscapes. Within the industrial areas characterizing the Project footprint, vegetation is present in narrow corridors adjacent to the road and railway edges, either in landscaped areas associated with adjacent commercial properties, or in disturbed, low-nutrient soils, where non-native herbaceous species primarily dominate. Limited native species were observed within the Project area. Native species are found in the riparian areas along the No. 7 Canal, west of the Project footprint, however, there is no interaction anticipated with the riparian area with respect to road widening and MUP construction.

2.4.3 Wildlife and Wildlife Habitat

Immature trees and occasional shrubs have been installed adjacent to the commercial properties within the project footprint, and trees line both edges of the west portion of Blundell Road, all No. 8 Road, and the south side of Portside Road (Figure 1). These areas provide potential nesting sites for bird species. The gravel and sandy shoulders adjacent to the roads and railways within the site are potential ground nesting habitat. Species confirmed during the site assessment include house finch, red-tailed hawk, northwestern crow, American robin, and the non-native European starling. Nesting activity was not observed within the Project area at the time of the survey.

¹ mbgs = metres below ground surface

These landscaped areas provide potential habitat for small mammals. However, aside from the bird species observed, no other wildlife was observed in the Project area,

2.4.4 Fish and Fish Habitat

The Project area does not contain any watercourses providing fish habitat or potentially supporting fish populations. The ditches along Blundell Road, Portside Road, the north section of the overpass, and the CN rail tracks are ephemeral and were dry at the time of survey (McElhanney, 2022). No evidence of flow, such as flattened vegetation, was observed.

The nearest fish habitat to the Project is the No. 7 Canal, a watercourse west of the Project area, with 15 m riparian setbacks pursuant to the CoR's Riparian Management Area setback. A prior survey confirmed fish presence within this ditch, however, no salmonids were noted (SNC Lavalin, 2018). The No. 7 Canal connects to the Fraser River approximately 350 m south of the Project.

3 Contacts and Responsibilities

The effective environmental management of any project requires a coordinated effort from all individuals involved. The following sections outline the need to identify the responsibilities of key personnel involved in project construction.

3.1 Key Project Personnel

The key Project personnel involved in the planning and implementation of the CEMP are listed in **Table 2**, along with a description of their roles. All onsite personnel must work in accordance with applicable permits and engineering specifications. In addition, personnel must comply with the site-specific mitigation measures identified in this CEMP and/or provide suitable alternative approaches that have been approved by Port Authority and/or their environmental designate. Onsite crews and staff will be introduced to the CEMP and required to implement it properly as part of standard operating procedures.

Contacts will be updated during the detailed planning stages or as changes occur over the duration of the Project.

Table 2. Contact List

Role	Organization	Name	Phone
Environmental Manager	TBD	TBD	TBD
Environmental Monitor	TBD	TBD	TBD
First Nations Representative	TBD	TBD	TBD
Construction Manager (Contractor)	TBD	TBD	TBD
Project and Environmental Reviewer	Port Authority		
Other			

3.2 Environmental Monitor Responsibilities

A qualified Environmental Monitor (EM) will be required to inspect the project work, document compliance with the CEMP, environmental plans, and by-laws, and ensure that the environmental protection

objectives of the Port Authority, and applicable approvals/permits are met. Specific duties of the EM will include the following:

- Review the CEMP, permits, regulations, contractor work procedures, BMPs, emergency response procedures, and environmental incident reporting procedures to ensure functionality before the associated work activity begins.
- Attend pre-construction meetings, conduct routine monitoring on an approved schedule, be on site during works that have a higher potential of effecting environmental features and check erosion and sediment control measures after significant rain events.
- Work with the construction team and other project members to facilitate effective implementation of environmental mitigation measures described in this CEMP.
- Monitor all project activities to confirm their compliance with the CEMP, applicable permits, and regulations.
- Provide advice on corrective and preventative measures in response to non-conformance with the CEMP and ensure that such measures have been implemented in a timely manner.
- Ensure that tailgate meetings include discussion of relevant environmental issues.
- Document construction activities, mitigation measures, and environmental incidents through field notes, photo-documentation, incident reports and any measurements taken (e.g., pH, turbidity, temperature, conductivity).
- Provide recommendations for modifying and/or improving environmental mitigation measures, as necessary.
- Take field measurements, conduct analyses, and/or sample environmental media in accordance with the CEMP.
- Prepare environmental monitoring summaries during construction in accordance with this CEMP and report to the Port Authority, and other parties as required, outlining unanticipated adverse effects to the environment, their cause, mitigation and/or remediation implemented, and any stop work orders.
- Notify the Port Authority immediately in the event of non-compliance.
- Modify or halt any construction activity at any time if deemed necessary for the protection of the environment and confirm the acceptability of corrective actions before restarting work following a stop work order.

The EM has the authority to modify and/or halt any construction activity at any time if deemed necessary for the protection of the environment. The EM will assess the following general items while on-site:

- Construction activities to evaluate appropriate implementation of mitigation measures.
- Sediment and erosion control measures.
- Equipment available for managing leaks or spills.
- Cleanliness of equipment arriving on site or leaving site.
- Fuel storage facilities, if applicable, including monitoring of fuel deliveries and transfers.
- Adequacy of the emergency response and spill containment and recovery equipment, and spill response training programs.
- Construction waste and adequacy of construction waste management programs.

3.3 Environmental Monitoring Reports

An appropriate schedule for environmental monitoring for the Project will be confirmed by the EM, contractor, and regulatory considerations once construction activities commence. The appropriate

environmental monitoring frequency under current conditions are biweekly or monthly visits, however, frequency is dependent on environmental conditions on the site and is subject to change. The environmental monitoring reports will include the following:

- Description of construction activities.
- Description of environmental monitoring activities.
- Observations about the effectiveness of the mitigation measures.
- Description of any environmental issues and any additional mitigation measures taken.
- Photographs (accompanied by identifying information such as date and location) documenting construction activities, environmental issues, and corresponding mitigation measures.
- If quantitative sampling is carried out, the following information will be collected with the sample:
 - The location, date, and time of sampling.
 - The analyses performed and the dates they were performed.
 - The analytical techniques, methods, or procedures used in the analyses.
 - The names of the people who collected and analyzed each sample.
 - The results of the analyses.

3.4 Contractor Responsibilities

The contractor will be responsible for ensuring the Project is completed in accordance with all Project conditions including approvals, authorizations, PER permit, this CEMP, applicable legislation, and other permits related to the Project. The main responsibilities of the contractor are outlined below:

- Contractors will review the project CEMP with their staff and subcontractors prior to commencing work.
- Contractors will comply with the PER permit and any other agency permit or license issued for the project as well as all other applicable federal, provincial, and municipal laws, statues, by-laws, regulations, orders, and policies.
- Contractors will comply with Port Authority environmental and health and safety requirements.
- Obtain required permits prior to construction work and ensure that work complies with permits.
- Provide qualified personnel. Workers will be appropriately trained and qualified to complete the scope of work and be familiar with the operational area.
- Contractors must cooperate with the EM appointed for the work. They must comply with written or verbal instructions with respect to conducting activities in compliance with the mitigation measures outlined in the CEMP.
- Contractors will correct deficiencies and any non-compliance issues upon direction from the EM whether written or verbal. Corrections should be made as soon as reasonably possible, ideally within 24 hours of directions.
- Ensure copies of documentation, including but not limited to this CEMP, project approvals, authorizations, PER permit and other persons as well as the Contractor's Emergency Response Procedures, are on-site and readily available for implementation and inspection if requested; and
- Conduct and document environmental inspections, as required by this CEMP or as specified by Port Authority or EM.

4 Relevant Environmental Legislation

Federal and provincial legislation and legal requirements applicable to the Project are listed in **Table 3** below.

Table 3. Relevant Environmental Legislation

Act, Regulation, or Bylaw	Applicability	Requirements and Project Mitigation Measures
Federal		
<i>Canadian Environmental Protection Act</i>	Respects pollution prevention and the protection of the environment and human health to contribute to sustainable development.	<ul style="list-style-type: none"> Contaminated Soil and Groundwater Management
<i>Impact Assessment Act</i>	It outlines a process for assessing the impacts of major projects and projects carried out on federal lands or outside of Canada.	<ul style="list-style-type: none"> The port authority administers the Project and Environmental Review (PER) process within areas of port jurisdiction to ensure all developments and activities, meet applicable standards and minimize environmental and community impacts
<i>Canada Marine Act</i>	To make the system of Canadian ports competitive, efficient and commercially oriented, provide for the establishing of port authorities and the divesting of certain harbours and ports.	<ul style="list-style-type: none"> Same as above
<i>Fisheries Act</i>	Prohibits the release of deleterious substances in fish-bearing watercourses	<ul style="list-style-type: none"> Erosion and Sediment Control Emergency Response and Spill Response Plans Fuel and Hazardous Waste Management Plan Concrete Works and Grouting Management Surface Water Control Material Storage and Stabilization
<i>Species at Risk Act</i>	Provides protection of listed species and their critical habitat	<ul style="list-style-type: none"> Sensitive Habitat Features and Species Management Invasive Plant Management
<i>Migratory Birds Convention Act</i>	Provides periods during which bird nests may be damaged, destroyed, removed or disturbed	<ul style="list-style-type: none"> Sensitive Habitat Features and Species Management Vegetation and Wildlife Management
Provincial		
<i>BC Environmental Management Act – Spill Reporting Regulations</i>	Requires immediate reporting when certain quantities of substances are released into the	<ul style="list-style-type: none"> Emergency Response and Spill Response Plans Fuel and Hazardous Waste

Act, Regulation, or Bylaw	Applicability	Requirements and Project Mitigation Measures
	environment	Management Plan
<i>BC Environmental Management Act – Contaminated Sites Regulation</i>	Provides identification and management of contaminated sites, applicable to soil and groundwater to be disposed of off-site	<ul style="list-style-type: none"> • Emergency Response and Spill Response Plans • Fuel and Hazardous Waste Management Plan • Contaminated Soil and Groundwater Management
<i>BC Weed Control Act, Integrated Pest Management Act</i>	The <i>Weed Control Act</i> requires all land occupiers to control the spread of provincial and/or regional noxious weeds on their land and premises, and specifies provisions for transportation, movement, and cleaning of machinery.	<ul style="list-style-type: none"> • Sensitive Habitat Features and Species Management • Invasive Plant Management • Contaminated Soil and Groundwater Management
<i>BC Water Sustainability Act</i>	Required for pumping of groundwater encountered during excavation.	<ul style="list-style-type: none"> • Contaminated Soil and Groundwater Management
<i>BC Wildlife Act</i>	Provides protection and management of wildlife and wildlife habitat.	<ul style="list-style-type: none"> • Sensitive Habitat Features and Species Management • Invasive Plant Management • Waste Management
<i>BC Heritage Conservation Act</i>	To encourage and facilitate the protection and conservation of heritage property, be it public or private owned in BC	<ul style="list-style-type: none"> • Archaeological Resources
Municipal – City of Richmond		
<i>Soil Deposit and Removal Bylaw</i>	Required for removing soil from or depositing soil on a city property other than a landfill.	<ul style="list-style-type: none"> • Contaminated Soil and Groundwater Management • Erosion and Sediment Control • Soil Management Plan
<i>Pollution Prevention and Clean-up Bylaw</i>	Sets requirements regarding minimum discharge criteria and refers to any polluting substance which is being handled or stored within the CoR or released onto soil or into a drainage system and/or watercourse within the CoR	<ul style="list-style-type: none"> • Contaminated Soil and Groundwater Management • Concrete Works and Grouting Management • Surface Water Control • Fuel Management Plan • Surface Water Control • Material Storage and Stabilization
<i>Noise Regulation Bylaw</i>	Place limitations on noise generated by construction.	<ul style="list-style-type: none"> • Noise and Vibration
<i>Tree Protection Bylaw</i>	Applicable to privately-owned parcels of land in the CoR. A tree may not be cut or removed except in accordance with the terms and conditions of a valid permit issued.	<ul style="list-style-type: none"> • Vegetation and Wildlife Management

The CEMP shall be reviewed if the scope of the Project changes during construction to ensure that relevant legislation, standards, and guidelines are applied.

5 Project Mitigation Measures and Environmental Specifications

Without the implementation of mitigation measures, construction activities associated with the Project have the potential to cause adverse environmental effects.

Table 4 identifies the main environmental components and potential adverse effects which could potentially occur during the construction phases of the Project. Through the implementation of appropriate mitigation measures, potential effects associated with the Project can be avoided or limited.

Table 4. Project Environmental Components and Potential Adverse Effects

Environmental Components	Potential Adverse Effects
Groundwater and surface water	<ul style="list-style-type: none"> Change in localized water quality due to improper fuel management and/or improper erosion and sediment control
Wildlife and wildlife habitat	<ul style="list-style-type: none"> Temporary disturbance, harm, or mortality of wildlife, including breeding birds, amphibians, reptiles, and mammals resulting from construction activities, accidents, malfunctions and spills¹
Species at risk	<ul style="list-style-type: none"> Disturbance of species at risk that have the potential to be encountered within or in proximity to the Project site including great blue heron (<i>Ardea herodias fannini</i>) and barn swallow (<i>Hirundo rustica</i>)
Vegetation and Soils	<ul style="list-style-type: none"> Loss of native plant species resulting from Project activities, accidents, malfunctions and spills¹ Spread of invasive species Potential contamination of vegetation and soil due to improper fuel management Potential adverse effects on soils due to improper erosion and sediment control and soil management
Archaeology	<ul style="list-style-type: none"> Temporary disturbance of archaeological artifacts during ground disturbance activities Permanent alteration of archaeological artifacts during ground disturbance activities
Air Quality and Noise	<ul style="list-style-type: none"> Change of air quality and noise emissions resulting from traffic and Project activities
Human and Environmental Health	<ul style="list-style-type: none"> Detrimental effect on vegetation, wildlife and fish resulting from introduction of contaminated or hazardous waste Detrimental effect on human and environmental health resulting from Project activities, accidents, malfunctions and spills¹
Notes: ¹ Accidents, malfunctions and spills include hydrocarbon leaks (hydraulic lines on equipment), fuel spills (fueling skiffs/vessels, equipment, improper storage), structural failures, spills, or leaks of other contaminants (e.g., paint, chemicals, concrete).	

5.1 General Measures

Prior to the start of construction works, all workers, including the construction contractor and EMs will attend a pre-work orientation meeting to discuss environmental protection measures that will be implemented during construction. Many environmental mitigation measures are common to all components of the Project. **Table 5** provides general mitigation measures applicable to all Project activities.

Table 5. Project Wide Mitigation Measures

Category	Mitigation Measures
Permits	<ul style="list-style-type: none"> Copies of all issued permits will be on site and readily available. Construction-related restrictions, conditions, or mitigation measures that are part of the regulatory permits will be communicated to the field crew. All work will comply with the requirements of all applicable laws and legislation, the Port Authority PER and the CEMP.
CEMP	<ul style="list-style-type: none"> A copy of all the Project permits and approvals as required, as well as this CEMP will be on site and readily available.
Training	<ul style="list-style-type: none"> Personnel will be trained and will use appropriate personal protective equipment.
Tailgate meetings	<ul style="list-style-type: none"> The Port Authority permit conditions, CEMP, and environmental regulatory permit requirements will be reviewed by the Contractor and EM, followed by a briefing to crews.
Stop work	<ul style="list-style-type: none"> It is recommended that crews stop work and contact the EM for assistance prior to commencing or continuing any activities that may pose any environmental or archaeological risk not addressed in this document. The EM will have authority to issue a Stop Work order where activities are adversely affecting, or will adversely affect, the environment or archaeological resources. The EM will also make recommendations in the field for avoiding and mitigating effects.
Site cleanliness	<ul style="list-style-type: none"> Sites will be kept in good order, tidy during activities, and left in a good condition at the end of the Project. Solid waste will be managed to avoid conflicts with wildlife.
Waste disposal	<ul style="list-style-type: none"> The Contractor will collect all construction debris and other waste materials and dispose of at an approved upland facility, where applicable.
Contractors/ subcontractors	<ul style="list-style-type: none"> Contractors and subcontractors will comply with the mitigation measures outlined in the Port Authority permit conditions, the CEMP, and measures/controls identified within Project regulatory permits. The Contractor and EM will implement appropriate work procedures, instructions, and controls to prevent and/or reduce adverse environmental impacts.
Reporting	<ul style="list-style-type: none"> The EM will establish and maintain effective environmental reporting protocols.
Concrete Management	<ul style="list-style-type: none"> All work associated with the Project involving the use concrete (e.g., filling of forms or piles with concrete) will be conducted to prohibit sediment, debris, concrete (cured or uncured), and concrete fines from being deposited into the aquatic environment, either directly or indirectly. Water that has contacted uncured or partly cured concrete will not be permitted to enter the aquatic environment. Containment facilities shall be provided at the site for the wash-down water from concrete delivery, concrete pouring and other equipment as required.
Laydown Areas	<ul style="list-style-type: none"> The laydown area for the work will be adjacent to the construction footprint.
Ambient Noise	<ul style="list-style-type: none"> The contractor will monitor and control construction noise to approved levels and within hours that are permitted by the Port Authority.
Containment and Spill Management	<ul style="list-style-type: none"> An appropriate spill prevention, containment, and clean-up contingency plan for hydrocarbon products, sediment and other deleterious substances will be put in place prior to commencing work. Appropriate spill containment and clean-up supplies will be kept available on site whenever the works are underway. Personnel working on the Project should be familiar with implementing the spill clean-up plan and deployment of spill response materials. It is recommended that a large spill kit will be on site which contains enough booms to contain a major spill. Biodegradable hydraulic fluid will be used, where possible. The EM and Contractors will provide immediate response to emergencies and incidents and notify the Port Authority and other agencies of spills of deleterious substances and other emergencies. Preventative and corrective measures will be undertaken in response to non-conformance with regulatory approvals, the Port Authority permit conditions, the CEMP and/or, procedures, and plans.
Material safety data sheets	<ul style="list-style-type: none"> Chemical products will have their applicable material safety data sheets onsite and readily available.
Soils, erosion, and sediment control	<ul style="list-style-type: none"> Care should be taken to prevent soil from being exposed and mobilized into the nearby aquatic environment and may include the use of erosion and sediment control measures.
Water quality: oil and grease	<ul style="list-style-type: none"> Before allowing water to leave the work site, the Contractor will verify that water does not have detectable oil and grease (detectable by sight or smell).
Air quality/ emissions	<ul style="list-style-type: none"> Idling of equipment will be reduced, where possible Low Sulphur fuel will be used where possible. Work will be planned to optimize efficiency Equipment will be well-maintained. Smoking will only be permitted in designated areas. Fire suppressing equipment must be present. Fires and burning of waste and vegetation is not permitted on site.
Operation of Machinery	<ul style="list-style-type: none"> Machinery will arrive clean and will be maintained free of fluid leaks and invasive species. To the extent possible, machinery will operate on land above the high-water mark. Machinery will be washed, refueled, and serviced, and fuel and other materials will be stored in a manner to prevent deleterious substances from entering the water.
Excavated Soils	<ul style="list-style-type: none"> Excavated soil will not be deposited into the aquatic environment Suspected contaminated soils will be segregated for assessment and determination of handling, transport, and disposal requirements as per applicable regulations and contract specifications.
Archaeology/Heritage Resources	<ul style="list-style-type: none"> A chance find protocol for archaeology will be developed in tandem with the Project archaeologist.

5.2 Site Access, Mobilization and Laydown Areas

Prior to construction, site access, equipment mobilization, hauling access and routes, and laydown and stockpiling locations will be clearly delineated. Items to be addressed when planning site layout aspects include:

- Minimizing the number of trips to and from site when mobilizing, demobilizing, and hauling material.
- Locate laydown areas on flat, stable surfaces at least 30 m from any waterbody.
- Minimize the disturbance of existing vegetation and soil on the construction site.

5.3 Air Quality

Air emissions such as vehicle/equipment exhaust, dust, vapors, and greenhouse gases should be minimized to avoid adverse environmental effects along with adverse effects to health, safety, and nuisance both on and off site.

The following mitigation measures related to material handling, access, and vehicles will be applied to control emissions of fine particulate matter (PM_{2.5} and PM₁₀), dust and greenhouse gases:

- Equipment will be in good working order.
- Material stockpiles and work areas prone to wind erosion will be stabilized.
- Trucks will be loaded so loads do not spill during transport and covered as needed.
- Dust suppression agents such as mulch and water will be approved by the port authority for use with considerations made to storm water impacts.
- Vehicle track out will be minimized and dust will be controlled on paved roads by implementing street sweeping, as needed.
- The burning of oils, rubber, tires, or any other material will not occur on site.
- Stationary sources of emissions such as generators will be turned off when not in use.
- All equipment will be kept in well maintained condition, used at optimal loads, and repaired as required to minimize emissions.
- Engine idling will be minimized to the extent feasible.
- Truck loads will be optimized to reduce the number of trips between the source and destination.

For more details, please refer to the Air Quality Assessment report by Alex Schutte (Alex Schutte, 2021).

5.4 Noise and Vibration

Construction noise and vibration is expected during construction. Construction activities should adhere to the following best management practices (BMPs) and mitigation measures to address noise and vibration emissions:

- Adhering to the Port Authority permit requirements and CoR Noise bylaw, as applicable.
- Scheduling pile driving construction and decommissioning activities during the daytime.
- Piling noise and vibration levels may also be controlled by alternative techniques (e.g., above-ground noise-dampening shroud), or a saddle/pad to cushion hammer impacts on the pile.
- Turning off idling equipment such as diesel engines when not in use for more than 30 minutes.
- Fit gas or diesel-powered equipment with intake (if appropriate) and exhaust silencers (mufflers) meeting manufacturer's recommendations for optimal attenuation and maintain these silencers in effective working condition.
- Where more than one type/model of equipment or construction technique can be used to do a particular job with similar efficiency, use the quietest.

- Fit air-powered equipment with mufflers on the compressed air ports as per manufacturer's recommendations and consider using hydraulic-powered equipment.
- Supply and operate equipment with appropriate covers, hoods, shields etc., in place and latched shut.
- Carry out regular maintenance on equipment, including lubrication and replacement of worn parts, especially exhaust systems.
- Operate equipment at minimum engine speeds consistent with effective operation.
- Limit the use of back-up beepers where feasible and safe to do so. Consider the use of strobe lights, and/or radio communications or human spotters as alternatives to audible warning devices.
- If a noise source has pronounced directivity (e.g., the exhaust stack or intake air louvres of a fixed piece of equipment such as a generator) direct the noisy side away from potentially sensitive local receptors.
- Where feasible, the use of a close-fitting enclosure or shroud to partially contain noise emissions from the contact of the pile and hammer during piling operations.
- A stop-work procedure will be in place prior to construction to manage construction noise within permitted levels.

More details can be found in the Noise Study Report by BKL Consultants Ltd. in May 2021 (BLK, 2021).

5.5 Machinery and Equipment

The following are general BMPs for mitigation and management for machinery and equipment:

- Any fuel handling, storage, or refueling practice on site will be located on stable ground away from storm drains, or waterbodies, preferably a minimum of 30 m from access locations, taking topography and slope into consideration. Spill containment supplies will be available in the immediate vicinity of the refueling area. Additional details on fuel management are included in Section 6.4.
- Vehicles and equipment, including their hydraulic fittings, will be inspected daily to verify that they are in good condition and free of leaks, and excess oil or grease.
- Vehicles and equipment will arrive on site clean to prevent the introduction of invasive plants or noxious weeds.
- Equipment will be parked on level ground, secured with wheel chocks, and parking brakes at the end of the shift.
- Install drip trays with sorbent pads under stationary equipment. Inspect, clean out and replace sorbent pads regularly.
- Spill kit supplies will be available and labeled at designated locations and accompany each piece of equipment. All construction team members will be trained to avoid spills and in the emergency response procedures in the event of a spill. All spills must be reported to the Emergency Management BC Program 24-hour phone line at 1-800-663-3456.
- Light pollution will be reduced by pointing light down and placing light sources as close to the work area as possible and away from any sensitive receptors.
- Spill kits will be carried in all machinery and equipment. The required contents are to be carried in each machine inside a container marked "Spill Kit."

5.6 Erosion and Sediment Control

Erosion and sediment control (ESC) measures must be employed when the Project has the potential to introduce sediment to nearby waterbodies or generate dust during pre-construction, construction, and post-construction. ESC measures include use of erosion control fabric, plastic sheeting, straw wattles, gravel

check dams, use of silt curtain and silt fences, drain guards and covers. Additional site-specific protection measures may be required at the direction of the EM or their delegate.

The following general BMPs for mitigation and management for ESC will be followed:

- ESC measures will be installed, maintained, and disassembled based on ESC Plan design drawings for pre-construction, construction, and post-construction stages of the Project. ESC design drawings will be reviewed by a professional engineer or certified professional in erosion and sediment control based on the City of Richmond Riparian Management Area (RMA) Info-23 Bulletin.
- Activities will be completed in such a way as to limit the number of fines and organic debris that may enter nearby aquatic environments.
- Be prepared for rain or storm events by implementing additional control measures, including covering excavated material, stockpiles, and other erosion prone areas with organic or synthetic material.
- Disturbance to existing vegetation on and adjacent aquatic environments (e.g., ditches and drains) will be limited, as part of ESC measures to reduce sediment release.
- ESC measures may include berms, sub-drains, matting, and silt fencing. All materials needed for installation of ESC measures will be on site and in proper working order.
- Sediment control measures will be put into place before starting works that may result in sediment mobilization or cause erosion
- Construction is not to start until ESC measures are in place and deemed functional by the EM.
- When Project activities have the potential to release sediment, ESC control measures (e.g., erosion control fabric, plastic sheeting, straw waddles, silt fences, gravel check dams) will be installed by the Contractor between construction areas and aquatic environments. Additional site-specific protection measures may be required at the direction of the EM or their delegate.
- Where necessary, sediment control measures (e.g., silt curtain, drain guards and covers) will be installed to effectively limit the dispersal of sediments and sediment-laden waters beyond the construction boundaries.
- Coverings, such as tarps, synthetic material (e.g., polyethylene sheeting) or other protective material will be used to limit exposed erodible material.
- If ditches and diversions are constructed to control site construction water, they will not directly discharge sediment-laden surface flows into No. 7 Canal, ditches, drains, or other sensitive habitats. Flows will be diverted to a sediment and erosion control structure or a vegetated area where flow can slowly infiltrate.
- Where necessary, exposed soils and ditches may require seeding with a native mix, straw, or mulch, as a form of sediment and erosion control.
- Where necessary, mulches and other organic stabilizers (e.g., forest duff) will be used to reduce erosion until vegetation has been established.
- ESC measures will remain in place and be maintained throughout construction activities and weather conditions, and will only be removed once construction is complete, ground conditions have stabilized, and water quality (measured by turbidity) downstream of the control measures meets background conditions or water quality guidelines as measured by the EM.
- Erosion and sediment control measures will be maintained and repaired regularly by the Contractor and the EM will monitor the functionality and effectiveness of the measures.
- Excavated soils / spoil piles will be placed as far from ditches or drains as practicable.

5.6.1 Surface Water Control

The following BMPs for mitigation and management of surface water will be followed:

- If there is a potential for runoff near ditches, or drains, sediment and erosion control measures need to be installed prior to construction commencing.
- Drain guards and covers will be inspected, cleaned, and maintained regularly and after major rain events, as required.
- Surface water runoff outlets will need to be protected to prevent additional scour and erosion.
- During high rainfall (e.g., greater than 25 mm in 24-hour period) or when there is a risk of sediment and runoff entering ditches or drains, work may be stopped at the discretion of the EM.
- Post Construction remove all erosion and sediment control measures to restore natural drainage patterns.

5.6.2 Material Storage and Stabilization

Storage and disposal of excess, overburden, soil, or other substances will be done in such a manner as to reduce the potential for entry into any streams or watercourses including:

- Material stockpiles will be located more than 30 m from the high-water mark of any watercourse or wetland, unless otherwise reviewed by the EM and deemed to pose a minimal risk of sediment entry into any waterbody.
- Stockpiles of erodible materials such as soil that will be left in a stockpile for more than 24 hours will be contained using appropriate measures such as silt fence containment or covering with plastic sheeting or tarps.
- Soil stockpiles will be protected to reduce soil erosion (e.g., covered with plastic sheeting).
- Compaction of undisturbed soils will be minimized to the extent feasible.
- All non-vegetated soil areas will be stabilized when work is complete, to minimize the duration during which non-vegetated soils are susceptible to erosion.
- Site drainage patterns will be restored to natural flow conditions upon completion of the Project.
- Disturbed areas will be restored to a stable vegetated condition as soon as possible.

5.6.3 Rainfall Events

The following BMPs for mitigation and management of rain fall events will be followed:

- Earthworks will be scheduled to be conducted and completed during dry weather to the extent possible with additional ESC measures put in place during periods of precipitation.
- Work during heavy will be conducted at the direction of the site construction supervisor or EM as required to maintain water management structures and ESC measures.

5.6.4 Contingency Supplies

A contingency supply of ESC materials, such as silt fencing, straw, mulch, and non-erodible gravel will be available at the Project site for rapid deployment during and after extreme events and workers will be sufficiently trained in their appropriate installation and maintenance. The EM will be notified of changes to ESC controls to ensure that they are adequate and that measures are installed effectively.

5.6.5 Monitoring, Inspections and Maintenance

The EM will carry out routine inspections of all ESC measures installed during the Project. Supplementary inspections will be completed and documented during, or within 24 hours of heavy and/or prolonged rainfall (defined as >25 mm precipitation within any 24-hour period).

As part of the inspection process, ESC issues will be identified and documented, including documenting the steps taken to resolve the issues. Maintenance will also occur immediately after problems are identified and will be done in a manner that will prevent further sediment mobilization.

5.7 Contaminated Soil and Groundwater Management

5.7.1 Regulatory Framework

The *Canadian Environmental Protection Act* (CEPA, 1999) is one of the main federal laws to prevent and control pollution. Under the CEPA, there are Canadian Environmental Quality Guidelines (CEQGs) and Federal Environmental Quality Guidelines (FEQGs) developed by Canadian Council of Ministers of the Environment (CCME).

CEQGs and FEQGs provide science-based goals for the quality of aquatic and terrestrial ecosystems and thresholds of acceptable quality of the ambient environment. CEQGs/FEQGs are based solely on the toxicological effects or hazard of specific substances or groups of substances. These guidelines serve three functions: first, they can be an aid to prevent pollution by providing targets for acceptable environmental quality; second, they can assist in evaluating the significance of concentrations of chemical substances currently found in the environment (monitoring of water, sediment, and biological tissue); and third, they can serve as performance measures of the success of risk management activities. The use of CEQGs/FEQGs is voluntary unless prescribed in permits or other regulatory tools. Therefore, they are not effluent limits or “never-to-be-exceeded” values but may be used to derive them.

In B.C., the governing legislation on the management of contaminated sites is the *Environmental Management Act* (EMA, SBC 2003, Chapter 53 assented to 23 October 2003, updated to 1 February 2021) under the jurisdiction of B.C. Ministry of Environment and Climate Change Strategy (ENV). The key regulation under the EMA that relates to the assessment and remediation of contaminated sites is the Contaminated Sites Regulation (CSR; effective 1 April 1997 by BC Reg. 375/96 and last amended 1 February 2021 by BC Reg. 161/2020). The CSR provides numerical standards for the evaluation of soil, groundwater, sediment, and soil vapour quality for different land uses and numerical and risk-based standards for remediation.

For the Project, CSR numerical standards apply to the CoR street ROW as well as any soil and groundwater discharging from the Project area to an off-site provincial land or a certified soil/groundwater storage/treatment facility. Based on past use and future use of the subject site, the Industrial Land Use (IL) soil standards apply.

The soil standards are included in Schedule 3.1 of the CSR, and consist of three parts:

- Part 1 – Matrix numerical soil standards;
- Part 2 – Generic numerical soil standards to protect human health; and
- Part 3 – Generic numerical soil standards to protect environmental health.

For Part 1, the matrix standards, the following site-specific factors were considered to apply:

- Intake of contaminated soil;
- Toxicity to soil invertebrates and plants;
- Groundwater used for drinking water; and,
- Groundwater flow to surface water used by marine aquatic life.

Regional background soil quality estimates for Region 2 Lower Mainland, as outlined in CSR Protocol 4 – Establishing Background Concentrations in Soil would also apply.

Under the CSR, groundwater standards are grouped under four main water uses: freshwater/marine aquatic life, drinking water, irrigation water and livestock watering. Protocol 21 (P21) of the CSR provides details on determining when these four water-uses apply to a given site. Since the estuary section of Fraser River is present within 500 m from the subject site, marine aquatic life standards are applicable to the groundwater. The remaining groundwater standards are not considered applicable.

Generic Numerical Vapour Standards are specified in the CSR Schedule 3.3 which include those for residential, agricultural, urban park, commercial, industrial and parkade uses. For the subject site, Schedule 3.3 Industrial use (RU) standards would apply.

A soil relocation agreement needs to be filed to ENV for relocating contaminated soil to an off-site property other than a certified soil storage facility. If the quality of contaminated soil does not meet CSR standards for industrial land use, its movement to off-site areas will need a provincial permit/approval under the Waste Discharge Regulation (effective 8 July 2004 by BC Reg. 320/2004 and last amended 15 September 2019 by B.C. Reg. 154/2019).

Another related regulation under the EMA is the Hazardous Waste Regulation (HWR; effective 1 April 1988 by BC Reg. 63/88 and last amended March 11, 2021 by B.C. Reg. 64/2021). The role of the HWR in contaminated sites is limited to cases of off-site transport and disposal of material meeting the criteria of hazardous waste, and cases involving materials that do not meet the definition of on-site media (e.g., drums of hazardous waste, dumped hazardous waste, mine tailings and waste rock).

It should be noted that a new soil relocation policy under CSR Stage 14 amendments has been in effect since 1 March 2023. This new policy requires that a notice instead of an agreement be submitted to ENV for any “clean” soil removed from a contaminated site or a site with current/historical Schedule 2 activities and relocated to a land in BC that is neither a federal land nor a certified landfill. The quality of the soil to be relocated needs to be characterized in accordance with applicable protocols to confirm it meets the CSR numerical standards applicable to the receiving site. More requirements in the new soil relocation policy are discussed below.

If the substances in soil meet the relevant land use standards, then the person removing the soil must submit an online notification form to ENV. The completed forms will be available to municipal and Indigenous governments, and members of the public on a public-facing database maintained by ENV.

If soil characterization shows that the substance concentrations in soil exceed the land use standards of the receiving site, other CSR requirements (such as the impact on human health and ecological receptors/habitat by the contaminated soil) will apply.

Exemptions from the soil relocation requirements including if the soil is relocated outside of BC when soil is used as winter-maintenance sand and when less than 30 m³ of soil is relocated per project. Additional provisions relate to vapour analysis, high volume receiving sites, exemptions and administrative penalties will also apply.

Requirements for high-volume soil receiving sites include registration and a soil management plan. No high volumes of soil with prescribed organic substances are allowed within 10 m of a water body. Exemptions to the high-volume soil receiving site requirement for infrastructure include highways, transit systems, pipelines, water distribution systems and sewage collection systems.

5.7.2 Existing Soil, Groundwater, and Soil Vapour Conditions

A Phase II Environmental Site Assessment conducted by GHD in 2021 showed evidence of soil layers exceeding CCME Industrial criteria for various parameters in the sand and silt fill layers (including pH, phenanthrene, acenaphthalene, fluorene, naphalene and phenanthrene) and in the landfill waste layer (including benzene, petroleum hydrocarbons, zinc, fluorine, naphalene and phenanthrene). Soil analytical results also showed exceedances of CSR Industrial standards for chloride in the sand fill layer as well as chloride, benzene and chloride benzene in the landfill waste layer. Exceedances of CSR Agricultural and Park Land Use standards were found for various parameters in all soil units (GHD, 2021).

Groundwater was investigated in monitoring wells installed in the vicinity of the No. 8 Road and Blundell intersection, and at the western end of the Project site. Groundwater concentrations for several parameters

(pH, fluoride, hydrogen sulfide, dissolved aluminum, arsenic, barium, iron and PAHs [acenaphthene, acridine, anthracene, fluoranthene, fluorine, phenanthrene and pyrene]) were greater than the Federal Interim Groundwater Quality Guidelines. As a conservative measure, the groundwater data was also compared to the CSR Aquatic Life standards and all concentrations were less than the applicable standards (GHD, 2021).

Further investigation to evaluate the extent of contamination within the Project site (including soil vapor and groundwater) was undertaken in 2022 by Ledcor/McElhanney (McElhanney, 2022). The analytical results show chloride and metal contamination in the soil, particularly within the landfill layer beneath the entire Project site ranging in depths of approximately 0.6 m to 9.5 mbgs.

5.7.3 Management Procedures

The following subsections provide procedures for managing soil and groundwater during access, construction, excavation, and remediation works.

5.7.3.1 Monitoring Well Decommissioning

For the existing groundwater monitoring wells that are within the excavation area, they shall be decommissioned properly prior to the soil excavation. Typical practice is to remove the well cover, cut the top 1 m of the well casing (or pull out the entire well casing) and then fill the wellbore with bentonite or grout sealant, as recommended in B.C. Groundwater Protection Regulation.

5.7.3.2 Field Screening Methodology

All disturbed soil and water will be assessed visually or using a handheld gas detector for signs of potential contamination. The following signs may indicate the presence of contaminated soil or groundwater:

- Odors such as oils, chemicals, or fumes.
- Soils that are darker than surrounding soils or have unusual staining or coloration.
- Oily sheen on water, or sheen in soil when in contact with water.
- Free substances, such as oil or gasoline.
- Buried debris, such as tanks, containers, plastic, glass, treated wood, or other materials that could be associated with hazardous or toxic substances.
- High head space soil vapour readings

5.7.3.3 Management of Suspected Materials

If contaminated soil or groundwater is suspected, the EM will be contacted to initiate soil testing. If suspected contaminated soils are excavated, the following steps will be taken:

- Isolate the area from other non-contaminated soils.
- Segregate and place the contaminated soil on an impervious surface with a protective cover to manage erosion control.
- If an aquatic environment is nearby (e.g., ditch, watercourse), store the soil more than 30 m from the normal high-water mark.
- Regularly inspect the protective cover to maintain integrity, especially during and after rain events.
- Follow ENV Technical Guidance 1 (TG 1) for collecting soil samples, including investigative sampling at extent of excavations to delineate extent of suspected contamination or characterize soils remaining in place (ENV, 2009).
- Use of contaminated site specialists to determine when the site is within the applicable Provincial Contaminated Sites Regulation standards and determine appropriate disposal methods for suspected contaminated excavated soil based upon the established quality of the soil.

5.7.3.4 Stockpile Management and Sampling

Stockpiled soil should be tested following ENV TG 1 to confirm soil quality prior to its off-site disposal.

5.7.3.5 Water Management and Monitoring

There is potential to encounter groundwater contamination during construction from infiltration to excavation areas. Options for the management of potentially contaminated groundwater include:

- Transport to a licensed facility for offsite treatment and disposal
- Onsite treatment and discharge to Metro Vancouver sanitary system with a Metro Vancouver discharge permit, in compliance with permit criteria.
- Onsite treatment and discharge to CoR stormwater sewer system with a City of Richmond Non-Stormwater Discharge Permit, in compliance with permit criteria.
- Onsite treatment and discharge to the Fraser River with all relevant permits including those under the *Fisheries Act* and in compliance with criteria.

For the dewatering of groundwater during the excavation in the CoR owned right of way (i.e. Blundell Road), a provincial Water Use Approval under Section 10 of the *Water Sustainability Act* would be required. Appendix A provides the excavation and dewatering location plan. The *Water Sustainability Act* application would be prepared and submitted no later than 8 months from the start of construction dewatering. The application package would include:

- A Hydrogeological Assessment Report
- A Dewatering Plan
- A Legal Survey Plan
- Application fees
- Other requirements as prescribed by the Ministry of Forests

5.7.3.6 Backfill Procedure

Backfill materials for any excavation within the Project area can be either clean topsoil from the site or imported clean materials from gravel pits or residential lands.

5.7.3.7 Soil Disposal Plan

The soil from proposed cuts in the Project area, if removed, can be managed in multiple ways:

- If the soil meets CSR soil/soil vapour numerical standards for residential use, it can be relocated to any land. However, a notice will need to be filed to ENV and further soil characterization in accordance with applicable protocols will be required prior to relocating to a provincial land.
- If the soil meets CSR soil/soil vapour numerical standards for industrial use, it can be relocated to another area within Port Authority property (provided that it meets federal standards) or to city street ROW for landscaping or backfilling purposes. A notice will need to be filed to ENV and further soil characterization in accordance with applicable protocols will be required prior to relocating to the city land.
- If the soil exceeds CSR soil/soil vapour numerical standards for industrial land use, it must be disposed of at a certified soil storage/treatment facility.
- The clean topsoil found within the Project area can be reused for preloading/fill and if the topsoil were to be relocated to CoR or other provincial land, a notice needs to be filed to ENV and further soil characterization in accordance with applicable protocols will be required prior to relocation.
- Municipal/wood waste found beneath the topsoil should be segregated from topsoil and stockpiled at a designated area with asphalt/concrete paved or HDPE lined surface. The

stockpiles should be covered with tar paper or poly at the end of each day. All the municipal/wood wastes should be disposed of off-site at a certified soil storage/treatment facility.

- Municipal/wood wastes are biodegradable which may cause area or uneven settlement over a long period of time, as such, it is recommended that the waste be completely removed within the footprint of permanent structures (piers, embankments, abutments, etc.) to avoid uneven settlement over a long period of time.
- After the construction is completed, any area with exposed waste should be either covered with a minimum 1 m thick of clean topsoil with growing media or paved with asphalt/concrete to act as a physical barrier to protect on-site workers and wildlife.

Effective on 1 March 2023, relocating any “clean” soil (this is soil quality meets applicable CSR standards at a receiving site) to a non-federal, non-landfill site will require a Notice to ENV with additional soil testing in accordance with applicable protocols to ensure the soil relocation satisfies the requirements set forth in the Stage 14 CSR Amendments.

For soil with residential, agricultural, urban park, or wildland quality, the frequency of soil testing can be reduced from ENV TG 1 requirements, as shown in **Table 6** and **Table 7** below.

Table 6. In-Situ Sampling Frequency

Soil Volume (m3)	In-situ Sampling Frequency
≤10,000	1 sample for each 200 m ³
>10,000 - 40,000	1 sample for each 450 m ³
>40,000	1 sample for each 2,000 m ³

Table 7. Stockpile Sampling Frequency

Soil Volume (m3)	In-situ Sampling Frequency
130	3 samples for 130 m ³
130 - 2600	1 sample for each 130 m ³
>2600	1 sample for each 200 m ³

The exact volume of soil from proposed excavation is not confirmed but based on the indicative design drawings, there will be limited scale of excavation and most of the “clean” topsoil would be reused within the Project area.

There will be some contaminated soil (soil not meeting CSR industrial land use standards) to be excavated from the proposed overpass foundation. Any contaminated soil relocating to a non-federal land will need a waste discharge authorization from ENV unless it is disposed of at a permitted landfill.

5.7.3.8 Landfill Leachate

Landfill leachate is present in groundwater beneath the Project site. As such, it is critical that the excavation for the foundation does not inadvertently create new vertical preferential pathway for leachate to enter the deeper aquifer in the underlying sand unit.

It is recommended that nested groundwater monitoring wells, with screens separately intercepting the shallow saturated zone and the deep saturated zone beneath the silt/clay unit, be installed on the downgradient side of the Project area (i.e. on southern portion of the Port Authority owned Area V) to monitor and evaluate if the quality of the groundwater is impacted by the construction work.

5.7.3.9 Landfill Gas Management

During the field investigation in May/June 2022, elevated level of landfill gases (i.e. methane gas from 15 up to 17% LEL) were found in ADESA lot. In addition, based on the lab analytical results, soil vapour samples from ADESA lot contained VPHv with concentrations exceeding CSR Schedule 3.3 standards for both residential and industrial uses. Therefore, it is recommended that a landfill gas/VPHv monitoring and venting system be in place during the soil excavation to protect the construction workers from potential explosion or inhalation hazard posed by the buried waste. It is unknown if the former landfill gas collection network extends to the Project area. Any landfill gas vent/header encountered should be cut off and capped/sealed properly to prevent leakage of landfill gases.

5.7.3.10 Emergency Response/Health and Safety

Due to the presence of buried waste within the Project area, any excavation work should have a landfill gas monitoring and venting system in place and follow the safe work procedure:

- Point A: Turn on the landfill gas monitor prior to turning on the drilling equipment.
- Point B: If methane exceeds 3% LEL, cease work, turn off equipment, walk out of the exclusion zone to the Muster Station. Continue to monitor.
- Point C: Once the methane/H₂S gas has been removed from the exclusion area to safe working concentrations restart equipment and advance borehole one additional foot and monitor area.
- If gas is again present re-vent the location, follow Points A, B, C above.

5.7.3.11 Tracking and Record Keeping

Based on the analytical results, the material will be classified according to the CSR standards and the applicable outcome applied. Where the material (soil or groundwater) is found to be contaminated (i.e. exceeds applicable standards for off-site disposal), the Port Authority will be notified of the presence of the contaminated material and the costs associated with disposition of the material. Approval of such costs will be sought from the Port Authority prior to disposal unless the material (such as excavation water) must be managed immediately to prevent release and impact to the receiving environment. In this case, the Port Authority will be advised of the situation and the material will be managed immediately through collection and shipment to a suitably qualified and authorized management facility. All waybills or manifests from soil disposal facilities and any construction associated environmental monitoring reports will be stored at a secured place or a USB memory stick (if digitized) for at least five years.

5.8 Vegetation and Wildlife Management

Potential negative impacts to vegetation and wildlife during site preparation and construction related activities will be minimized through the following BMPs:

- The removal or alteration of vegetation and soils will be limited to required areas and large trees will be retained where possible.
- If vegetation removal is required, the area will be surveyed by a QEP prior to the start of work to identify breeding, nesting, roosting, or rearing areas for birds and other wildlife to determine appropriate mitigation measures.
- Vegetation removal which may impact birds or other wildlife will be avoided during the species' respective breeding, nesting, roosting, or rearing periods. Tree removal should be avoided during the general bird breeding season, which falls between April 1 and July 31.
- The disturbance of previously established plant communities will be minimized where possible.
- Vehicle and machinery movement will be limited to work areas to reduce seed dispersal and minimize damage to plant communities, both within and beyond the Project site.
- Garbage and waste will be stored in animal proof containers and disposed of regularly on an as

needed basis to avoid attracting wildlife to the site.

There is potential for wildlife and wildlife features to be discovered during construction activities. Discoveries may occur at the construction site, or on the commute to or from the construction site. The following types of wildlife or wildlife habitat features that may be discovered during construction activities include, but are not limited to:

- Trapped, sick, injured, or dead urban wildlife.
- Eagle, osprey, blue heron, or peregrine falcon nests are protected year-round under the BC *Wildlife Act*.
- Wildlife species at risk (i.e., provincial Red- or Blue-listed species or species on Schedule 1 of the *Species at Risk Act*).
- Amphibians in wetted areas.

If wildlife is discovered on or near the construction site, the following steps will be followed:

- Stop work without undue delay near any newly discovered wildlife; work may not resume until the measures listed below are followed.
- Do not approach, harass, or feed wildlife.
- Notify the EM.
- Report any incidents (e.g., aggressive or nuisance behavior from wildlife) to the EM.
- The EM will assess the discovery and will either authorize construction to resume or, in the event of a confirmed or potential discovery, proceed to notifying one or more of the following:
 - Applicable government agencies (e.g., BC Ministry of Forests, BC Ministry of Environment and Climate Change Strategy and/or Environment and Climate Change Canada).
 - The Port Authority Project Manager.
 - Richmond Public Works Office (for dead wildlife).
 - Local Police Detachment (e.g., for a motor vehicle collision with a deer).
- The EM will record the location, details of the encounter, assess the risk to wildlife, and implement a mitigation plan (e.g., disturbance setback, exclusion fencing) in consultation with applicable government agencies, and Port Authority representative, as required.
- If wildlife salvage is required (e.g., for amphibians), the EM will follow the conditions of the General Wildlife Permit.
- Follow-up visits may be required, depending on the discovery.

5.9 Concrete Works and Grouting

The residues of uncured construction materials may be alkaline or toxic to aquatic life. The following mitigation measures will be undertaken to manage construction materials such as concrete and grout:

- All rinse water should be isolated and contained within a temporary tank to prevent the release of deleterious substances such as cement, cementitious grout, engineered sealants, and adhesives.
- Ensure calculations are done to confirm the necessary size of settling tank.
- Provide containment options for wash water from vehicles and equipment. Wash water must not be introduced to any waterbody.
- Use pre-cast concrete instead of cast-in-place concrete whenever possible.
- If there is potential for uncured concrete or wash water to enter a watercourse the contractor must have a carbon dioxide diffuser on site for the duration of concrete work to neutralize the pH of the water, should a spill occur.
- Monitor the pH immediately downstream of the work site for the duration of concrete work, and

until concrete has cured.

- Monitor the pH frequently in any watercourses immediately downstream of isolated worksites until completion of the works. Emergency measures will be implemented if downstream pH has changed more than 1.0 pH unit, measured to an accuracy of +/- 0.2 pH units from the background level, or is recorded to be below 6.0 or above 9.0 pH units.
- Maintain complete isolation of all cast-in-place concrete and grouting from fish-bearing waters for a minimum of 48 hours if ambient air temperature is above 0°C and for a minimum of 72 hours if ambient air temperature is below 0°C.

5.10 Archeological Resources

An Archaeological Overview Assessment (AOA) was completed by Woods in 2020 with the following recommendations:

- No further archaeological assessment is recommended if construction impacts are conducted entirely within the existing fill, or within any new fill added in addition to existing fill.
- Additional archaeological assessment in the form of construction monitoring be undertaken where construction impacts are expected to extend into the native, undisturbed sediments underlying the existing fill.

Although no Archaeological Impact Assessment (AIA) is necessary, there is a potential to encounter heritage or archaeological artifacts where ground disturbance occurs. Should cultural materials be encountered during construction, the Project Archaeological Chance Find Procedure will be followed, and the following procedures will be followed:

- Step 1: Stop work in the immediate vicinity of the suspected find. Do not undertake further work that could disturb the immediate vicinity of the suspected find, including the transport of soil or rock to or from the immediate vicinity of the site.
- Step 2: Cordon off the area with stakes and flagging to prevent additional disturbance.
- Step 3: Immediately notify the port authority.
- Step 4: The Port Authority will contact a qualified Heritage Specialist as required and advise the site supervisor of any further action.

5.11 Sensitive Habitat and Species at Risk

The Project area is industrial and heavily developed. A search of the BC Conservation Data Centre (BC CDC) yielded no plant community or species at risk occurrences in the Project area (Hatfield, 2020).

There are no natural plant communities. The small, vegetated fragments that remain border transportation corridors and industrial development and constitute mowed lawn, disturbed ditches bordered by invasive species, rows of ornamental trees, and one small, manicured patch of non-native trees and shrubs at the entrance to Portside Road. Two rare plant species have a low potential for occurring along the roadside ditches. Except for urban bird species and common small mammals, wildlife is expected to be transient in the Project area. There are no fish-bearing watercourses in the Project area.

5.11.1 Sensitive Species

Of the wildlife species with potential to occur in the CoR (as noted by the BC CDC), the lack of wetlands and deciduous/mixed forest precludes all but the great blue heron, (may fly through the Project area during travels to and from the Fraser River or other nearby water features) and barn swallow (may potentially nest

in local buildings and fly through the Project area when foraging along the Fraser River and the No. 7 Road Canal).

Although the Pacific water shrew's range overlaps the Project area, no foraging or nesting habitat was noted in the Project area. The ephemeral ditches in the eastern portion of the Project lack cover, are bordered by industry, and are isolated from the nearest potential habitat for this species at No. 7 Road Canal by more than 200 m of pavement and exposed surfaces. Other than the No. 7 Road Canal, the nearest forest patches which could potentially sustain a population of Pacific water shrew are more than 800 m north.

The red-legged frog is unlikely to be present in No. 7 Road Canal based on surveys by Sartori (2016). The presence of invasive green frog and bullfrog is extensive in the City of Richmond. In the Project area there was a lack of living habitat for the red-legged frog, which is terrestrial during the summer, fall, and winter.

No watercourses providing fish habitat or that could potentially support fish populations were observed in the Project area.

5.11.2 Sensitive Habitat Features

The Project area consists of Port Authority owned industrial lands and city street right of way. There is no sensitive habitat identified in the project area.

5.12 Invasive Plant Management

Eleven invasive plant species were observed and documented during the field surveys, two of which (Japanese knotweed and wild chervil), were identified within 1 km of the Project site according to the Invasive Alien Plant Program (IAPP) online database. A site review will be completed by the EM prior to construction to ensure Japanese knotweed has not established within the project area.

The following invasive species have been previously located within 1 km of the site based on desktop review (Hatfield, 2020)²:

- Himalayan blackberry.
- Red canary grass.
- Japanese knotweed.
- Scotch broom.
- Common tansy.
- Yellow flag iris.
- Canada thistle.
- Cut-leaf blackberry.
- Wild chervil.
- English holly.

The following measures will be implemented to reduce the likelihood of establishment of these known species, as well as additional currently undetected invasive or noxious plants within work areas:

- Prior to the start of construction, a survey will be conducted to determine the presence of invasive plants and if present a plan will be developed for the safe handling and removal of the plants.
- To comply with the *Weed Control Act*, complete an invasive species management plan for the proper removal and disposal of invasive plants during the clearing and grubbing stage.
- Wash all machinery prior to mobilizing to site to minimize the spread of invasive species
- Any required fill or topsoil will arrive free of invasive plant seeds or other components.

² Hatfield, 2020. Biological Resources Baseline Report for Blundell Widening and Portside Overpass Project.

- Any removed soil will be disposed of properly if contaminated with invasive plant seeds or other components. Any soils that have the potential to be contaminated with Japanese knotweed will be handled according to the *Best Management Practices for Knotweed Species in the Metro Vancouver Region* (Metro Vancouver, 2021) and as directed by the EM.
- Exposed areas will be seeded to reduce the risk of invasive species colonization.
- Re-vegetate temporarily disturbed areas with native species to prevent the establishment of invasive species and provide suitable habitat for small wildlife species.
- Implement a vegetation monitoring program during the first two years following construction to determine whether supplemental planting is required and to monitor for weed growth and control

The following BMPs will be implemented:

- Best Management Practices for Knotweed Species in the Metro Vancouver Region (Metro Vancouver, 2021)
- Roadside invasive species management strategies and best practices, available on the Government of BC's driving and transportation website.
- Invasive Species Council of BC (ISC) Tips Factsheets.
- Develop with Care Guidelines (ENV, 2014)³.

6 Emergency Response

6.1 Emergency Communication

A comprehensive Emergency Response Plan allows for the rapid response of emergency services and/or containment and clean-up of environmental emergencies. Spills should be reported to external agencies as defined by permits and relevant legislation.

Efficient and concise communication reduces potential risk to crews, the public, property, and the environment in emergencies. In the event of a release of dangerous goods (as defined by the BC Spill Reporting Regulation) to water or to land that is over the volume for the listed schedule of BC Spill Reporting Regulations, the Port Authority will be contacted. Phone numbers of relevant emergency contacts are listed in **Table 8** below.

Table 8. Emergency Contacts

Authority/Company Name	Phone Number
Emergency services	911
Port of Vancouver Operations Centre	604-665-9086
Richmond non-emergency police	604-278-1212
Richmond non-emergency fire	604-278-0547
BC Provincial Emergency Program	604-5864390
Environment Canada Spill Reporting Line	800-663-3456
Richmond Hospital	604-278-9711
WorkSafe BC	604-276-6100

³ Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia.

6.2 Environmental Emergency Plan

Potential environmental emergencies that may occur during construction include but are not limited to:

- Reportable fuel spills.
- Sediment laden water leaving the site or entering a waterbody.
- The release of deleterious substances.

The EM should be notified as soon as practical of any environmental emergency, assess, and record all incidents, and determine appropriate action. Significant emergencies should be reported to Emergency Management BC and the Port Authority Operations Centre.

6.3 Spill Response Plan

Spill response, containment, recovery, and clean-up procedures are described in this section. The contractor will need to provide a spill response plan consistent with the equipment, substances and work procedures involved with this undertaking. The contractor will include a list of hazardous materials and products along with the appropriate Safety Data Sheets (SDS).

6.3.1 Spill Response Equipment

- Spill kits will be available and labelled at designated locations.
- Spill kits will be inventoried and re-stocked regularly, including immediately after a spill response incident.
- Spill response equipment (absorbent pads, pillows, oil sponges, socks) will be used to clean hydrocarbon spills.
- Absorbent booms and pads will be kept on-site to skim hydrocarbons if detected in water.
- Spill kits will be carried in Project vehicles. The required contents are to be carried in each vehicle inside a container marked "Spill Kit."
- The minimum required content of vehicle spill kits is:
 - Goggles, PVC gloves, 10 absorbent pads, 2 absorbent booms (3m), 1 container of emergency sealant, 3 heavy duty plastic bags.
- When working within 30 meters of a stormwater system access location or waterbody with equipment that may result in a spill of a hazardous substance, suitable absorbent and containment must be on site and available for deployment in the event of a spill.
- Appropriate training of workers in the use of spill response equipment, including the location, type, and correct deployment of spill response equipment relating to the nature and location of work and potential onsite spills.

6.3.2 Spill Response and Reporting

In the event of a release of any deleterious substances onsite, the following procedures shall be implemented:

Response:

- Stop work and evaluate the situation.
- Ensure that personnel are safe from the release, as well as the public, equipment, property, and environment are at no other immediate risk due to the release.
- Wear personal protective equipment to manage the release.
- Identify the spilled materials and refer to the material data safety sheet to determine if human health or ignition hazards exist.

- Notify people in the immediate vicinity of the incident.
- Secure the area by limiting access to the spill area.
- If the spill is a flammable material, ensure that there are no ignition sources in the area.
- If possible and safe to do so, contain the spill by any safe means possible (e.g., plug leak, close/isolate leaking valve).
- Obtain assistance of others.
- Begin containment of the spill and stop it from spreading.
- Clean up the spilled substance using available supplies from the on-site spill kits.
- If the spill is to water, use measures such as installing sorbent rolls as floating booms to contain the spill and sorbent pads to soak up the material.
- Report the spill to Environmental Monitoring personnel, who will notify the Port Authority.
- The Port Authority will determine if notification to regulatory agencies is required.

Reporting:

- The EM is responsible for notifying the Port Authority of all hazardous spills and to work with the Port Authority to confirm that the spill reporting meets provincial and federal requirements.
- The Spill Reporting Regulation under the EMA identifies externally reportable quantities for certain substances
- The EM will prepare an Environmental Incident/Non-Compliance Report in the event of a spill.

The following information should be collected as it may be required when reporting a spill to regulatory agencies and should be included in the Environmental Incident/Non-Compliance Report:

- Reporting person's name and telephone number.
- Name of the owner of the product that spilled or leaked and phone number.
- Name and phone number of the person who caused the spill or leak.
- Date and time of the spill or leak.
- Description of the spill or leak.
- Location of the spill or leak.
- Receiving environment description.
- Type of material spilled and quantity.
- Source of spill or leak.
- If the spill or leaked product is contained, and if not where is it flowing•
- Description of the response and when it occurred.
- Percent of material recovered.
- Details of further action required.
- Recommendations for preventative/mitigation measures.
- Names of other persons or agencies advised concerning the spill or leak.

6.4 Fuel Management Plan

Mitigation measures for fuel management should be implemented to adequately protect the environment from the potential release of construction-related fuels and products at the Project site. The following mitigation measures will be implemented to safely manage fuel:

- A spill coordinator who has knowledge of spill mitigation, containment, and reporting procedures will be appointed.
- The spill coordinator will keep an inventory of hazardous materials on site.
- On-site staff will be provided with training in the use of hazardous materials and the location and use of spill kits and containment booms.

- On-site personnel will know the location of spill kits, containment berms, and other spill control materials and that they are readily accessible.
- Fuel handling, storage, and labelling procedures shall be consistent with A Field Guide to Fuel Handling, Transportation and Storage (MWLAP, 2002).
- Where possible, fuel storage and equipment or machinery refueling, and servicing will occur a minimum of 30 m from waterbodies or open ditches in the Project area. Where operational constraints require fuel storage, equipment or machinery re-fueling and servicing within 30 m of or on the water (e.g., on a barge/vessel), measures to prevent the release or spill of hazardous materials (such as the use of secondary containment) will be discussed with the Port Authority and approved by the EM.
- Storage of fuels and petroleum products will comply with safe operating procedures, including containment facilities in case of a spill.
- Small equipment (e.g. generators) and portable fuel tanks (e.g., jerry cans) will be stored within leak-proof secondary containment with absorbent pads with a capacity of 110% of its volume.
- Fuel storage, including secondary containment, shall be kept free and clear of collected rainwater and snowfall. Accumulated water in the containment shall be removed regularly, to not diminish the capacity of the containment.
- While refueling, the operator will stay with the fuel nozzle.
- Vehicles and equipment will be shut off while refueling.
- All the fuel tanks must be equipped with the emergency shut off valve.
- Where possible, environmentally sensitive (e.g., biodegradable/food-grade/ environmentally friendly) oils, hydraulic fluids and lubricants that are non-toxic to aquatic life and that are readily or inherently biodegradable will be used in equipment and machines.

7 Waste Management Plan

7.1 Non-Hazardous Solid Waste Management

Non-hazardous solid waste shall be sorted into separate, clearly labelled bins and recycled if appropriate. Recyclable wastes include cardboard, wood, metal, and approved plastics. Non-hazardous, non-recyclable waste shall be included as general refuse and disposed of at the local landfill.

Waste material generated during construction will be handled using industry accepted BMPs such as:

- Waste disposal containers are to remain within the designated contractor laydown areas.
- Where practical, the segregation of recyclable materials before transport to the appropriate facility
- Waste materials must be secured to prevent the development of leachate from material contact with rain and surface water. Examples include placing lids over waste disposal containers or lining with poly sheeting.
- Municipal waste, including any food waste, should be stored in containers with a secured lid to avoid attracting wildlife.
- Removal of waste materials should be done on a regular basis to prevent buildup of waste and to prevent potential wildlife encounters.

7.2 Hazardous Waste Management

Hazardous Substances and Hazardous Products used on site will be transported, stored, removed, and disposed of in accordance with the Hazardous Waste Legislation Guide (ENV, 2005) and with all other relevant laws.

Hazardous materials may include any controlled or hazardous substances used on the Project site include, but are not limited to, asbestos, fuels, used fuels, oils, oil filters, greases, bitumen's, lubricants, solvents, cement, paints, solvents, batteries, cleaners, dust suppressants, PCBs, and used spill cleanup materials.

Hazardous waste that is spilled could affect surface water quality, air quality, fish habitat or wildlife habitat. Prevention of such occurrences is best undertaken by conformance with BMPs and spill prevention measures (e.g., secondary containment, spill kits). All hydrocarbon products and other hazardous wastes potentially present during Project activities will be identified and the associated Workplace Hazardous Materials Information System (WHMIS) and SDS made available to all construction team members. WHMIS labels must be on all controlled materials.

Hazardous waste generated by contractors must be stored and handled according to the BC Hazardous Waste Regulation. For temporary storage on-site, this will include:

- Covered containment using approved containers.
- Isolation from flammable and combustible materials (> 10 m).
- Proper labelling, inventory, and documentation.
- Storage at least 30 m away from storm drains or waterbodies.

Bringing hazardous waste onto the Project site is forbidden (e.g., waste lead-acid batteries, motor oil, etc.) and contractors are not permitted to perform equipment maintenance on-site which can generate hazardous waste (e.g., waste oil, hydraulic fluid, lead-acid battery replacement, etc.). Contractors are expected to use licensed waste carriers and authorized disposal facilities only.

All hazardous wastes shall be transported off-site with appropriate manifesting and record keeping for transport and disposal of Hazardous Wastes in accordance with provincial regulations. All manifests should be kept on-site and provided to the Project owner and made available to the EM upon request.

8 Closure

This CEMP has been created to protect environmental components within and adjacent to the Project site during construction, and to comply with conditions of regulatory approvals, legislative requirements and applicable regulations. The CEMP may be updated as Project conditions, execution plans, and schedules are implemented or revised. The CEMP will also be reviewed as required to address updates or potential changes in the Project and permit conditions prior to mobilization of construction and throughout construction of the Project.

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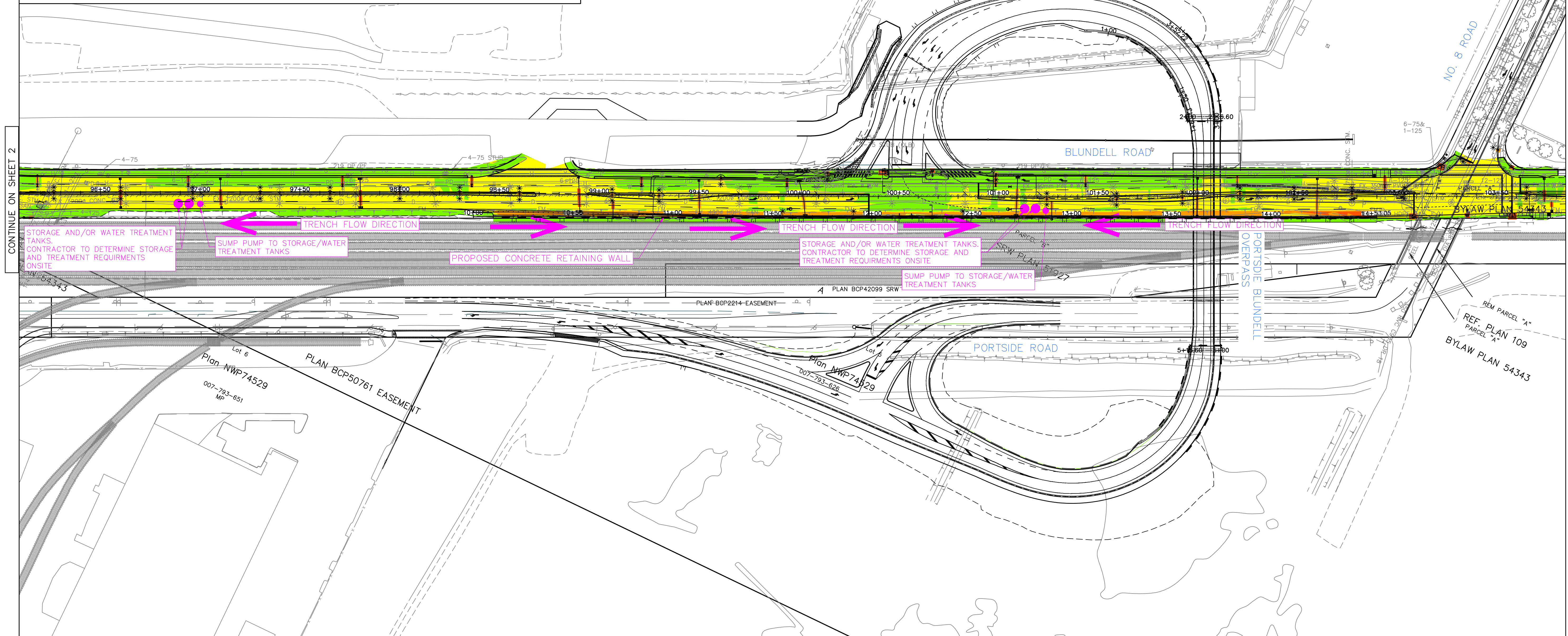
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10 Appendices

- Appendix A – Portside / Blundell Road Improvement Project Blundell Road and Overpass Dewatering Plan

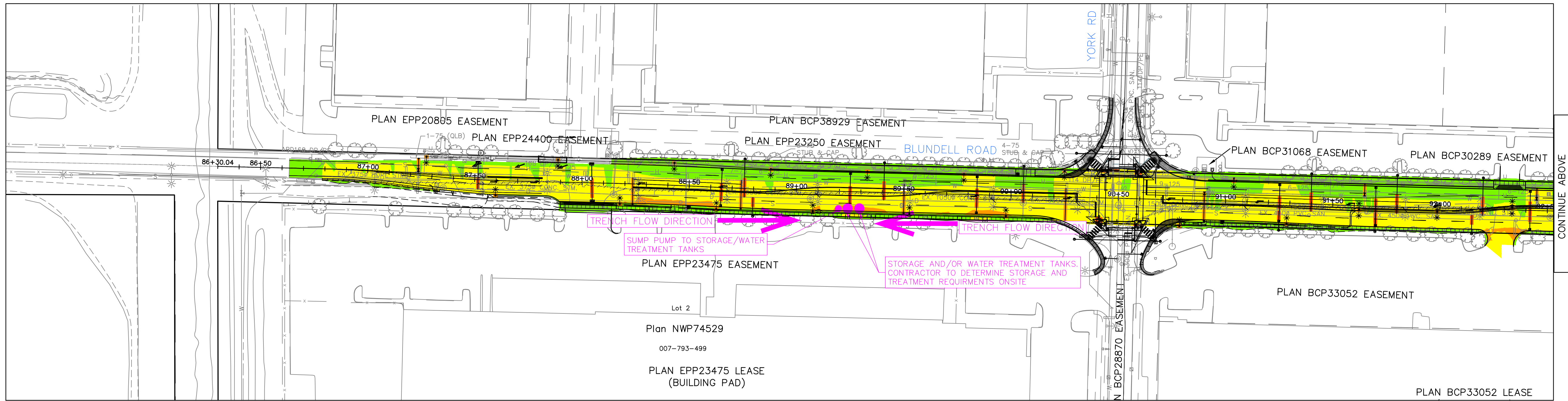
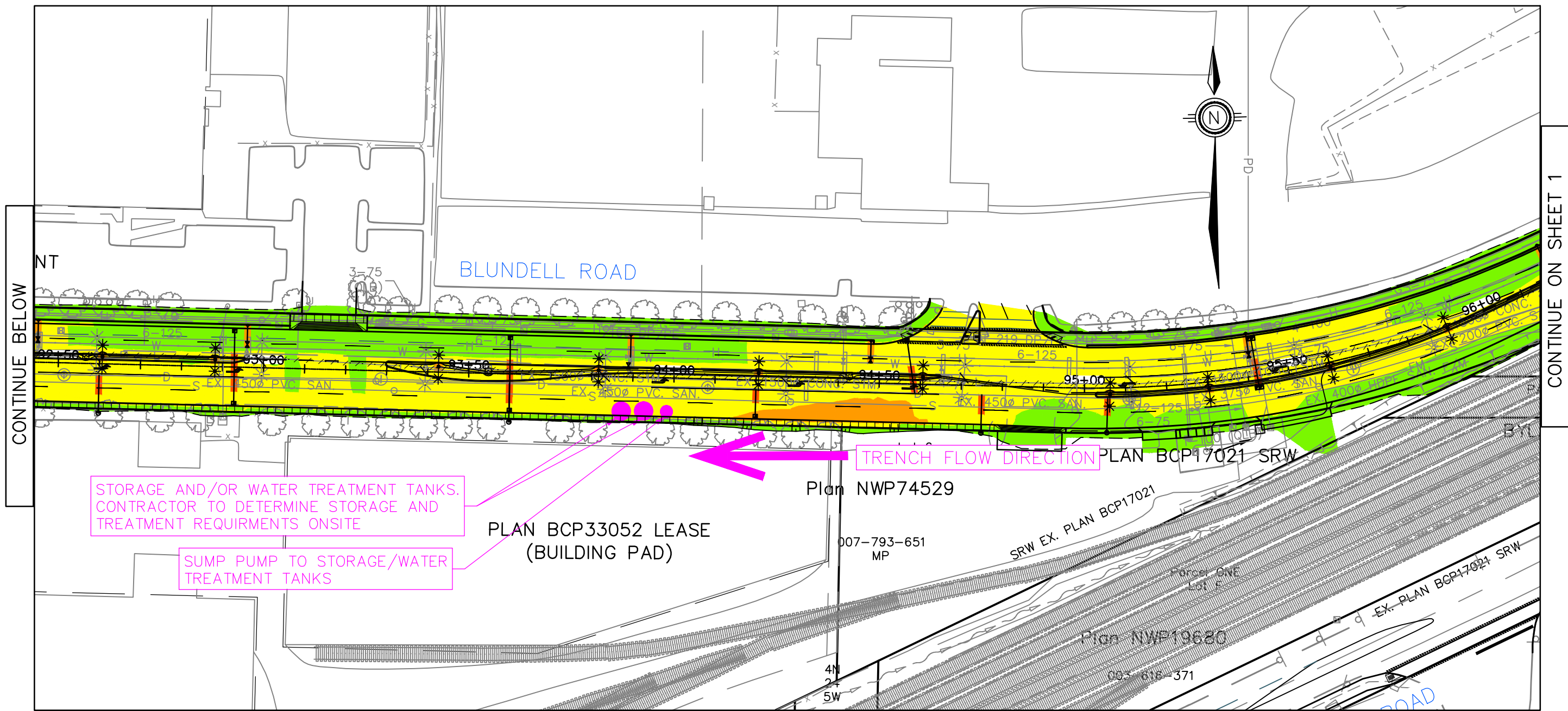
Elevations Table				LEGEND	
Number	Minimum Elevation	Maximum Elevation	Color		
1	-2.529	-2.000	Orange	TRENCH FLOW DIRECTION	SUMP PUMP AND STORAGE TANKS
2	-2.000	-1.000	Light Orange		
3	-1.000	-0.300	Yellow	NOTES	
4	-0.300	0.886	Green	1. STRIPPING DEPTH IS 0.3m 2. NEGATIVE VALUES INDICATE DEPTH BELOW GROUND LEVEL	



CONTINUE ON SHEET 2

Ref. No.	REFERENCE	 	PRELIMINARY NOT FOR CONSTRUCTION	Suite 2300 13450 102nd Avenue Surrey BC Canada V3T 5X3 T 604.596.0391	B 2022-11-16 ISSUED FOR DISCUSSION A 2022-08-18 ISSUED FOR DISCUSSION	EF TB EF TB	 Vancouver Fraser Port Authority	DESIGN BY E. FUERDERER DRAWN BY E. FUERDERER APPROVED L. ZAREI DATE 2022-09-14 SCALE 1:1000 VFPA SITE 356	GREATER VANCOUVER GATEWAY 2030 PORTSIDE BLUNDELL IMPROVEMENT PROJECT BLUNDELL ROAD AND OVERPASS DEWATERING PLAN	SIZE DWG D 356-135-SKT-40	SHEET 1 OF 2	REV B

Elevations Table				LEGEND	
Number	Minimum Elevation	Maximum Elevation	Color		
1	-2.529	-2.000	Orange	← TRENCH FLOW DIRECTION	● SUMP PUMP AND STORAGE TANKS 1. STRIPPING DEPTH IS 0.3m 2. NEGATIVE VALUES INDICATE DEPTH BELOW GROUND LEVEL
2	-2.000	-1.000	Yellow		
3	-1.000	-0.300	Light Green		
4	-0.300	0.886	Dark Green		



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