KIEWIT WESTERN CANADA DISTRICT

Peter Kiewit Sons ULC Kiewit WCD Marine Yard Build-Out Project 1950 Brigantine Drive, Coquitlam, BC

VFPA PER No. 23-130

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

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1 INTRODUCTION

This Construction Environmental Management Plan (CEMP) is the primary document to reduce or eliminate effects on the environment and meet regulatory requirements for the Peter Kiewit Sons ULC (Kiewit) Marine Yard Build-Out Project (the Project) located at 1950 Brigantine Drive, Coquitlam, BC (see Figure 1).

The general objectives of the CEMP are:

- To protect valued ecological components and socio-economic features within the Project area during the design and construction phases of the project;
- to ensure compliance with the conditions of environmental approvals from regulatory authorities; and,
- to reduce potential environmental liabilities.

It is important to note that the CEMP and its component plans may need periodic revisions when further site-specific information becomes available or as Project conditions change. At a minimum, the CEMP will be reviewed prior to the start of construction to ensure mitigation measures within the CEMP are appropriate for the scheduled construction activities at the Project site. It is acknowledged that Vancouver Fraser Port Authority (VFPA) will make the final determination on the suitability, completeness and adequacy of the CEMP and any future revisions.



Figure 1: Project Location

2 LOCATION AND CURRENT SITE DESCRIPTION

As shown in Figure 1, the Project is located at the Vancouver Fraser Port Authority (VFPA) water lot lease at 1950 Brigantine Drive, Coquitlam, BC on the north side of the main arm of the Fraser River at the eastern end of Sapperton Channel approximately 2.2 km downstream of the Port Mann Bridge. At the Project location, the Fraser River is considered freshwater as the upper boundary of the Fraser River salt wedge is at the downstream end of Sapperton Channel.

Currently, the property is used to service Kiewit's marine fleet and other construction equipment. Yard operations generally consist of staging equipment and materials on land, transferring materials to/from barges and fabrication of materials required for our projects. A Disposal At Sea (DAS) operation is also conducted from the facility. The Marine Yard has several structures and fixed facilities that were installed by the previous owner, including an office building, truck weigh scale, boat ramp, and two marine bulkhead wall structures. At the eastern end of the site, the previous lease holder will maintain the use of an existing tugboat operation and fueling dock. This portion of the lease is not associated with the Build-Out Project.

All construction activities, excluding dredging and some shoreline works, are expected to be within the Vancouver Fraser Port Authority's standard work hours (i.e., Monday to Saturday, 7:00 am to 8:00 pm). The land construction that takes place along the shoreline will generally need to be completed above the water level, such as placing structural fills and riprap. Due to tide level fluctuations that impact the shoreline of the yard, some of this work may need to be completed during low tide periods when they fall outside of the Port Authority's standard work hours. Dredging operations will occur 24 hours a day, 7 days a week during the fisheries least-risk windows.

3 PROJECT COMPONENTS

Kiewit is planning to build-out the Marine Yard to ensure it meets modern environmental and engineering standards. This CEMP covers all phases of the project including but not limited to dredging, pile driving, infilling and habitat compensation. The following is a summary of the proposed project upgrades and are also shown in Figure 2.

3.1 Marine Yard Expansion

Marine Yard expansion will be achieved by:

- Excavating paved areas;
- Removal of layers of foreshore wood debris and other unsuitable soils;
- Infilling to replace the excavated pavement and soils and replacing them with dredge spoil and/or structural granular fills; and,
- Replacement of the stormwater system.

3.2 Marine Access Trestle and Pile Installation

The Trestle will be composed of two sections, a 12.0 m x 66.4 m access trestle (perpendicular to the shoreline) and a 14.4 m x 45.8 m work trestle (parallel to the shoreline). The Trestle's deck will be supported by concrete-filled steel pipe piles and precast concrete cap beams above the design flood

elevation. The structure will require a total of 4 x 42" diameter steel piles and 23 x 48" diameter steel piles, however two of the 42" piles will be located above the HHWLT outside of fish habitat. An additional 21 x 48" diameter steel piles are required for mooring of vessels adjacent to the structure and an additional 14 x 36" diameter steel piles constructed in two groups of seven piles are required as bow and stern mooring dolphins. Mooring structures at the Trestle are comprised of both individual-vertical mooring piles, as well as pile groups comprised of both vertical and battered piles that form mooring dolphins.

3.3 Conveyor Structure and Pile Installation

The Conveyor Structure will be composed of a 7.4 m x 81.4 m steel platform that supports a conveyor with safety walkway on one side, and maintenance vehicle access on the other side. The platform's steel superstructure will be supported by concrete-filled steel pipe piles and precast concrete cap beams above the design flood elevation. The structure will require a total of two 42" diameter steel piles and six 48" diameter steel pipe piles for vertical and lateral support, however the two 42" piles will be located above the HHWLT outside of fish habitat. An additional 12 piles of 48" diameter are required for mooring of vessels adjacent to the structure

3.4 Roll-on/Roll-off Ramp

The Roll-on/Roll-off (RoRo) Ramp will be composed of a two span approach structure 6.0 m wide by 38 m long, which is connected to a 3.8 m wide by 28 m long articulating ramp, that can rise and fall with the moored barge elevations influenced by tidal water levels of the river. The RoRo Ramp's deck will be supported by concrete-filled steel pile piles and precast concrete cap beams. A lifting system will be mounted on two structural towers located at the end of the 28 m long articulating ramp. A lifting system will be mounted on two structural towers located at the end of the 28 m long articulating ramp. The structure will require a total of six 48" diameter steel pipe piles and four 72" diameter steel pipe piles for vertical and lateral support, however, two of the 42" piles will be located above the HHWLT outside of fish habitat. An additional six piles of 48" diameter are required for mooring vessels adjacent to the structure.

3.5 Mooring Dolphins

Mooring dolphins are proposed to be installed in the water lot in two areas. There will be 18 mooring dolphins, each of which will be composed of three hollow, steel pipe piles driven in a triangular arrangement. The mooring dolphins will include both vertical and battered piles. A total of 36 piles of 48" diameter and 18 piles of 24" diameter will be installed for the mooring dolphin structures.

3.6 Dredging

Dredging is proposed to remove accumulated sediments, to a depth down to -6.5 m CD, to achieve safe operation of marine construction equipment, including barges and support vessels. The dredge pocket will total 71,231 m² and vary in depth between -2.5 m CD, -4.0 m CD, -6.0 m CD and -6.5 m CD. The total estimated volume of dredge removal is 220,000 m³, based on the currently available bathymetric survey obtained by Kiewit. Dredging will be conducted via barge and clamshell dredging methods. The dredging footprint is within areas currently characterized by subtidal and intertidal mud.

3.7 Pile Removal

To accommodate both the dredging and construction of the structures, the removal of both existing creosote-covered timber piles and existing steel pipe piles is required. Kiewit submitted an RFR to DFO in July 2022 (DFO File No. 22-HPAC-00713). DFO issued a Letter of Advice (File No. 22-HPAC-00713,October 22, 2022), which was valid for 1 year. During the validity period, 21 piles were removed. Removal of the remaining piles (63 steel, 37 creosote) is included as part of this Project.

3.8 Temporary Structures

Construction of the permanent structures and yard expansion earthworks will require the installation of temporary structures

Falsework will be required for the construction of the Trestle, Conveyor Structure and the RoRo Ramp. The extent and supporting conditions for falsework will be subject to the means and methods of the contractor who constructs the structures. It is anticipated that construction of the structures will be completed by direct installation from both the land side and from spud barges. Once permanent piles are installed from the land side, a temporary trestle will be placed on the completed piles. The temporary trestle will be used to install additional piles for the next several bents within reach. The temporary trestle would be jumped forward as piling progresses until the land-based side is complete.

Pile installation is also anticipated to be completed from the water side by use of a spud barge. The spud barge would be used as required to accelerate the piling schedule for the permanent structural platforms. The spud barge would also be used for the installation of mooring piles that are not reachable from temporary trestles. The use of a spud barge would result in two structural spuds being temporarily driven into the river bed to allow use of the barge. After the installation of a particular pile group is complete within the reach of the floating crane, the spuds would be pulled up and the barge would be floated to a new location. It is anticipated that the spud barge will be in a single location for approximately 10 days, but could be up to 20 days before relocating.

3.9 Fisheries Act Authorization Offsetting

Kiewit is proposing to create 5,215 m² freshwater tidal marsh bench habitat offsetting as a means of counterbalancing the predicted harmful alteration disruption or destruction (HADD) of fish habitat associated with the new barge facility. Construction of the offsetting habitat will include the following major components:

- The placement of dredge spoil for the base of the marsh;
- The capping of the dredge spoil base with 150 mm minus cobble/gravel/clean sand mix;
- The placement of a 700 mm thick layer of 100 kg riprap apron approximately 4 m wide along the southern leading edge of the bench;
- The placement of an additional 221 m2 of boulder habitat along the base of the apron; and,
- The planting of approximately 15,500 sedge and rush plants as march bench riparian vegetation.

In addition, two riparian planting zones (Figure 2) have been identified for riparian planting (riparian planting zones or RPZ) with native shrubs and trees to improve/expand the vegetative buffer in some areas (or establish a buffer in the areas where there currently is none), between landward industrial

activities and the foreshore environment (i.e., prevent encroachment). These RPZs will enhance overall riparian function (i.e., provide shade, nutrient input, and terrestrial prey items for fish) to the foreshore environment and are considered part of the Fisheries Act Authorization Offsetting components.

3.10 Foreshore Restoration

The natural expansion of an existing small intertidal marsh along the foreshore after log removal completed by Kiewit in 2022 demonstrates that, although historically disturbed, some natural habitat recovery is possible with intervention (i.e., the removal of wood waste resulting in natural vegetation growth in the intertidal zone). Kiewit has identified two areas of the Project Site that can be rehabilitated and protected from operations to allow for natural recovery (Figure 2). In these two restoration areas, the foreshore will be cleared of debris, wood waste, and logs. The areas will be protected from further debris accumulation from the Fraser River through the installation of a floating debris boom anchored to piles and will be protected from operations on the landward side by a barrier (e.g., chain-link fence or concrete barriers). The debris boom placement has been designed as far down the intertidal zone as site operations allow, to maximize the rehabilitation area. The debris boom pile anchors will be designed with sleeves that prevent the boom grounding at low tide and thus avoiding intertidal scour.



Figure 2. Proposed Project Upgrades and Offsetting Area.

3.11 Project Schedule

The Marine Yard Build-Out Project is planned to be a multi-year Project with various components broken down into separate components. In-water construction activities will utilize the Fisheries and Oceans Canada (DFO) least risk in-water work windows for the Fraser River over several construction seasons.

The anticipated construction schedules for the seven Project components are as follows:

• Dredging – December 2024 to August 2027;

- Fisheries Act Authorization Offsetting Construction December 2024 to August 2027;
- Yard Widening June 2025 to November 2025;
- DAS Platform December 2025 to April 2026;
- Ro-Ro Ramp June 2026 to November 2026;
- Trestle December 2026 to July 2027;
- Weigh Scale June 2025 to August 2025; and
- Paving and Final Utilities August 2027 to September 2027.

4 CONTACTS AND RESPONSIBILITIES

The successful implementation of the Project environmental program is a coordinated team effort that includes input and review by Project Management, Project environmental team, VFPA representatives, field staff and construction craft workers. Project personnel involved with the planning and implementation of Project construction and the Project environmental program are provided in Table 1. Further details on the roles and responsibilities of key personnel are provided below in Section 4.1.

Name	Role	Phone #
Oliver Kolough	Project Sponsor	604-999-6907
Rod Vanwerkhoven	Marine Yard Manager	604-345-4068
Andrew Allan	Environmental Manager	604-317-6886
Kelly Brignall	Engineering and VFPA Permitting Manager	778-877-5789
Ethan Officer	Project Environmental Coordinator	604-787-5818

Table 1: Key Project Construction Personnel

4.1 Environmental Roles and Responsibilities

4.1.1 Project Sponsor

The Project Sponsor will ensure that adequate resources are provided to develop and implement a successful environmental program and compliance with this CEMP.

4.1.2 Environmental Manager

The Contractor Environmental Manager will plan, administer and authorize the use of resources to run an effective environmental program. The Contractor Environmental Manager will be a qualified environmental professional (QEP) and may utilize the services of the on-site Project Environmental Coordinator (PEC) at their discretion. Responsibilities of the Environmental Manager include, but are not limited to the following:

- Be available throughout the duration of construction to represent the contractor in all matters related to protection of the environment;
- Overall environmental management of the Project;
- Implementation of environmental policies and procedures;
- Attend all key meetings at which environmental protection measures are to be discussed;
- Preparation of environmental documentation in support of environmental permitting/agency acceptance;
- Development of the Construction Environmental Management Plan (CEMP) and any revisions throughout the construction period;
- Advise the construction team if project activities have caused or are likely to cause an environmental incident and make recommendations for corrective actions;
- Liaise directly with project members and provide technical advice for the purpose of resolving situations that may impact the environment as they arise;
- Have the authority to issue a "stop work" order should it be deemed necessary by the EMan for the protection of the environment.

4.1.3 **Project Environmental Coordinator**

The Project Environmental Coordinator (PEC) will verify compliance with the CEMP through surveillance (field) monitoring. The PEC's duties will include, but not be limited to, the following:

- Ensuring that construction staff are aware of the environmental policies and requirements;
- Train field staff and construction craft workers of the implementation of mitigations measures used to protect the environment;
- Regularly monitoring fuel delivery and refueling procedures;
- Regularly checking all equipment and vehicles on site for hydrocarbon leaks;
- Ensuring that emergency spill and fire equipment caches are adequately supplied and dated;
- Checking the condition and operational efficiency of all water and sediment retention measures;
- Inspecting all activities during construction, especially in-water works, to ensure compliance with terms and conditions of this CEMP, permits and approvals and the protection of sensitive habitats;
- Develop and conduct environmental orientations;
- Environmental input into the site-specific work plans;
- Documenting construction activities by field notes and photographs; and,
- Monitoring water quality within the project area.

4.1.4 Environmental Discipline Specialists

Specialized environmental consultants may provide environmental services as needed to support environmental management of construction activities. It is anticipated that the following discipline consultants may be needed to support construction of the Project:

- Fisheries and aquatic consultant for providing input for fisheries habitat mitigation measures and for monitoring and documenting construction activities that have the potential to impact sensitive aquatic species and habitats;
- Contaminated sites consultant to develop a protocol for managing possible encounters with previously unknown contamination, provide or review contaminated site assessments, coordinate remediation, and other tasks;
- Wildlife/vegetation consultant to provide vegetation/wildlife surveys, define special mitigation and monitoring programs.

4.1.5 Kiewit Construction Team

A key component for the implementation of a successful environmental program is an understanding by field crews and supervision of how construction activities impact the environment and mitigations measures to reduce or eliminate those impacts. This CEMP is guidance to field supervision on those mitigation efforts. Environmental responsibilities of the construction team include:

- Becoming familiar with the CEMP, aspects of their work that could have a negative impact on the environmental and implementing appropriate mitigation measures to reduce or eliminate those impacts;
- Ensure the field staff and subcontractors are familiar with the CEMP and mitigation measures that are to be used for the construction activities they are responsible for;
- Understand the role of, and be able to take direction from the Environmental Manager with respect to environmental protection measures;
- Compliance with all Project permits and approvals; and,
- Report all environmental incidents, in a timely manner, to the Environmental Manager and be involved in the corrective actions to prevent re-occurrence of those incidents.

5 RELEVANT ENVIRONMENTAL LEGISLATION

Table 2 provides a list of the relevant environmental legislation and legal requirements applicable to the Project. This table will be revisited and updated as necessary throughout the life of the Project to capture any changes in environmental legislation or changes in construction activities that may trigger any additional regulatory requirements.

Act, Regulation or Bylaw	Description	Applicability	Approval or Permit in Place/Forthcoming; or Requirements Met
Federal			
Fisheries Act (FA) - administered by Fisheries & Oceans Canada (DFO)	The <i>FA</i> is the main federal legislation providing protection for fish, fish habitat and water quality in Canada. Also, the <i>FA</i> also prohibits the deposit of deleterious substances to water frequented by fish.	The work requires pile removal and installation in the Fraser River.	DFO has determined that the Project will require an Authorization under the <i>Fisheries</i> <i>Act</i> .
<i>Canada Shipping Act,</i> National Spill Response Protocol	The Canada Shipping Act is Transport Canada's regulatory framework surrounding marine pollution and its enforcement.	The Project has the potential for hydrocarbon spills to the Fraser River.	An Environmental Emergency and Spill Response Plan has been developed for the Project and is provided in Section 7.2 of this CEMP.
Migratory Birds Convention Act (MBCA)	The <i>MBCA</i> is the main federal legislation that protects migratory birds, eggs and nests.	There is the possibility of migratory birds (e.g., Canada geese) utilizing the barges and riparian vegetation for nesting.	Migratory bird nesting period for the Project site is late March to mid-August. An ongoing nesting monitoring program will be in place during this period.
Species At Risk Act (SARA)	SARA provides for the management and recovery of wildlife species that are extirpated, endangered, or threatened as a result of human activity.	Construction activities have the potential to impact some <i>SARA</i> listed species or their habitats.	A list of <i>SARA</i> listed species that may be encountered is provided in Section 6.7 on this CEMP. The Potential risks to those species have been evaluated and appropriate mitigation measures are provided in this CEMP.
Impact Assessment Act (IAA)	The <i>IAA</i> outlines a process for assessing the impacts of major projects and projects carried out on federal lands.	The majority of the development of the Marine Yard is under lease to the VFPA and hence, federal jurisdiction.	Not yet determined if the Project qualified as a major project under the IAA. To be determined during technical review by the VFPA.

Act, Regulation or Bylaw	Description	Applicability	Approval or Permit in Place/Forthcoming; or Requirements Met
Canadian Environmental Protection Act (CEPA)	The purpose of the <i>CEPA</i> is to contribute to sustainable development through pollution prevention. It provides the legislative basis for a range of federal environmental and health protection programs.	The development of the Marine Yard has the potential to release polluting substances into the environment.	The appropriate implementation of the mitigation measures in this CEMP will prevent or minimize pollutant releases and provides emergency response procedures in case of a release.
VFPA Non- Road Diesel Emissions (NRDE) Regulation	The NRDE program is aimed at reducing diesel particulate matter emissions associated with non-road equipment	The Non-Road Diesel Emissions Program requires tenants on port lands to label and report non-road diesel equipment.	All Project land-based equipment VFPA lease property will be Tier 2 or better.
Provincial			
Spill Reporting Regulations of the Environmental Management Act (EMA - administered by the Ministry of Environment)	The regulation establishes a protocol for reporting the release of substances into the environment as well as a schedule detailing reportable amounts for certain substances for sites having Provincial jurisdiction.	Substances (e.g., hydrocarbons) that may be harmful to the environment will be used during the construction period of the Project.	A comprehensive emergency and spill response plan has been developed for this CEMP (see Section 7.2). All spills over the limits specified in the regulation will be reported to the VFPA and BC Ministry of Environment and Climate Change.
Contaminated Sites and Hazardous Waste Regulations of the <i>EMA</i>	These regulations govern the handling, storage, transportation, treatment and disposal of contaminated material and hazardous waste.	Unexpected previously contaminated material may be found within Project boundaries. Hazardous waste (e.g., used oil) will be generated during construction.	Hazardous waste and contaminated material management plans are contained within this CEMP (see Section 9).

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Act, Regulation or Bylaw	Description	Applicability	Approval or Permit in Place/Forthcoming; or Requirements Met
Wildlife Act	The Wildlife Act protects a bird or its eggs, the nest of eagle, peregrine falcon, gyrfalcon, osprey, heron or burrowing owl and the nest of a bird when the nest is occupied by a bird or its egg.	There is the possibility of bird species listed in the BC Wildlife Act nesting within the Project area.	A pre-construction nest survey will be conducted to determine the presence of any eagle, peregrine falcon, gyrfalcon, osprey, heron or burrowing owl nest. An ongoing nesting monitoring program will be in place during the construction period.
Regional			
Metro Vancouver Municipal Solid Waste and Recyclable Material Regulatory Bylaw #181, 1996	Metro Vancouver administers and enforces the disposal of solid waste and recyclables that are received at their transfer stations and landfills.	The Project will be generating solid waste and recyclables during construction.	To minimize the production of solid waste from construction, all waste will be segregated on site and recyclables (e.g., treated wood, metal, and organic waste) will be transported to an appropriate facility. A Waste Management Plan is provided in Section 9 of this CEMP.
Metro Vancouver Non-Road Diesel Emissions (NRDE) Regulation	The NRDE program is aimed at reducing diesel particulate matter emissions associated with non-road equipment	The Non-Road Diesel Emissions Program requires commercial operators to label and report non-road diesel equipment.	All Project land-based equipment on freehold property within the City of Coquitlam will be Tier 2 or better.
Municipal			
City of Coquitlam (CoC) Noise Regulation Bylaw #2891	The City of Coquitlam Noise Bylaw restricts the continuous sound levels of construction equipment and the hours of construction activities.	Heavy construction equipment will be used during construction of the Project	Construction activities on property within the City of Coquitlam shall be conducted between Monday to Saturday between the hours of 7:00 am to 8:00 pm. No construction shall occur during Sundays or holidays.

Table 2: Environmental Legislation and Legal Requirements

6 PROJECT MITIGATION MEASURES AND ENVIRONMENTAL SPECIFICATIONS

6.1 General Practices

For this Project, environmental process, practice and risk management will be based on the concepts of "avoidance of impacts", "continual improvement" and "check and act" throughout the duration of the Project.

The first step in environmental risk management is the "avoidance of impacts" during design. Should avoidance in design not be feasible, then a feedback loop starts and input by the Environmental Manager is applied to minimize impacts. The revisiting of these impacts at the various design stages creates an adaptive management feedback loop aimed at "continual improvement".

The concept of "continual improvement" requires sequencing of tasks whereby Project team members are assigned the responsibility of "checking and acting" upon construction features that may impact the environment. Key stages in the "check and act" portion of the process during construction are environmental monitoring and reporting. Monitoring and reporting provides further opportunity for continual improvement during construction where environmental mitigation measures can be revisited and refined to provide the required environmental protection goals. Environmental monitoring and reporting and reporting identify the mitigation/avoidance strategies to ensure that goals and objectives set out in the CEMP, VFPA permit and applicable regulatory legislation are addressed.

Task sequencing for each stage in the process will aid in preventing lengthy delays in environmental review, regulatory permitting, day-to-day construction activities, and subsequent cost increases (i.e., risk management). This process facilitates environmental issue resolution while providing the mechanism for continual improvement.

Successful application of this procedure will depend on the execution of four general environmental processes: planning, training, monitoring and reporting.

6.1.1 Work Plans

It is critical that environmental protection and mitigation strategies developed by the Environmental Manager are appropriately conveyed to the field staff, in a timely manner. The development of activity and or site-specific environmental protection measures in the work plans for implementation in the field is an important step in communicating these measures to field crews. The Construction Team will develop specific construction work plans that identify and incorporate environmental constraints, regulatory commitments and mitigation strategies. The environmental input section is a component of the construction work plan and is a summary of the environmental mitigation measures related to the construction work being performed.

Once the work plan is complete, it will be reviewed by the Environmental Manager and site superintendent to ensure that environmental compliance is achieved. The final version of the work plan will be presented at the pre-activity meeting with construction staff in attendance.

6.1.2 Environmental Training

Environmental training, education and awareness of all Project personnel form the cornerstone of a strong environmental program. The Construction Team provides training for its workers, including subcontractors as applicable, designed to:

- Increase employee awareness and appreciation of the environment and the natural resources likely to be affected during construction activities; and
- Familiarize workers with the negative impacts their actions can have on the environment and how these can best be avoided or minimized.

The training program is intended to facilitate worker understanding of the environmental context of the Project and clarify the role of the trainees in achieving at least minimum environmental requirements of the Project. Training is intended to increase environmental accountability of individual workers respecting protection of the environment. Environmental training is mandatory for all personnel.

The environmental training and awareness program consists of three levels, each targeting a different audience:

- Advanced Training on the CEMP conditions, VFPA Permit requirements and applicable guidelines for construction managers as well as site supervisors;
- Basic Training for all other site workers (e.g., as part of more general Site Orientation); and
- Tailgate training sessions for individual crews to address specific construction methods or environmental issues.

Records will be kept for Advanced and Basic Training that summarize the objective or purpose of the training, the type of material covered, attendance, as well as minutes/notes where appropriate.

6.1.3 Environmental Monitoring

Environmental monitoring is a key step in environmental process and risk management for the Project. Not only is environmental monitoring used to review, observe and report on environmental impacts resulting from construction activities, but it is also a critical tool in assessing potential risk during preconstruction planning. To reduce environmental risk, environmental monitoring needs to anticipate potential impacts and identify mitigation/avoidance strategies to ensure that goals and objectives set out in the CEMP and regulatory agency approvals are addressed during all project phases.

Monitoring will be more intensive when construction activities occur in sensitive areas and full time when works have the potential to cause serious harm to fish or fish habitat. For the other activities, the intensity of environmental monitoring depends upon their sensitivity and potential impacts and will be set by the Environmental Manager in consultation with the VFPA and Construction Management Team.

Further details on the environmental monitoring roles and responsibilities of the Environmental Manager are provided in Section 4 of this CEMP.

6.1.4 Environmental Reporting

A large component of the environmental management for the Project is the production of effective environmental reports. These reports facilitate the transfer of information between the Construction Team, VFPA, and regulatory agencies. Clear, concise reporting during all Project phases and activities will form the basis for environmental issue identification, resolution, and compliance auditing. The Construction Team will implement an environmental reporting structure that addresses activities during Project construction as follows:

- Environmental incident and corrective action reports for each environmental incident;
- Weekly environmental monitoring reports; and,
- Environmental specialist reports specific to an activity or environmental feature.

These reports will be submitted to the VFPA and the applicable regulatory agency(s), where required.

6.2 Air Quality

Construction related impacts are generally of short-term duration but may still cause adverse air quality impacts. Air pollutants generated during construction generally fall into one of two categories – airborne dust and vehicular exhaust emissions.

Airborne and fugitive dust can be generated during dry periods and arise from disturbances of soil and construction aggregates, vehicular traffic on unpaved roads, and wind erosion of stockpiles. Fugitive dust and airborne particulates will be controlled and minimized by implementing best management practices including:

- Notify landowners and/or occupants of the potential to be affected by emissions from construction activities prior to commencement of these activities in proximity to lands owned by the respective landowners and/or occupants.
- Restrict the duration that vehicles and equipment are allowed to sit and idle when not in use to less than 5 minutes.
- Establish speed limits in the Laydown yard, parking and access roads. Post signs stating the applicable speed limits for construction traffic to avoid wildlife injury and mortality, maintain soil structure and reduce dust.
- Apply only water or non-toxic and non-persistent chemical products to access roads for dust control at the laydown yard.
- Do not apply dust control chemicals to roads during windy conditions.
- Site Preparation
 - Grade the construction site in phases.
 - Stabilize surfaces of completed earthworks with vegetation, if appropriate.
 - Compact distributed soil.
- Storage Piles and Material Handling
 - Minimizing the handling of soils and aggregates (e.g., by avoiding double handling of spoil, covering truckloads of fine-grained materials during hauling);
 - Minimize generation of road dust (e.g., minimize the time that unpaved surfaces are exposed and use watering or sweeping);

- During dry conditions and when necessary, control dust sources (e.g., minimize the time that unpaved surfaces are exposed, water or cover potential dust sources, sweep paved surfaces);
- As necessary, use environmentally acceptable dust suppressants or water to control dust on access roads, laydown areas, work areas, and disposal areas;
- No burning of material at the site;
- Stationary emission sources (e.g., portable diesel generators, compressors, etc.) should be used only as necessary and turned off when not in use;
- Compact disturbed soils;
- o Reduce activities that create fugitive dust during windy conditions;
- Manage storage piles (e.g., by shaping them, installing enclosures or coverings around piles, conducting storage pile activities downwind of sensitive receptors);
- o Control mud and dirt track-out from the site; and,
- Minimize drop height at material transfer locations (e.g., when loading soil onto haul trucks).

Construction equipment and processes that generally result in sizable non-fugitive emissions include drills, excavators, cranes, loaders, graders and marine vessels. BMPs that will be used to mitigate adverse air quality effects from construction include:

- Implement a vehicle/equipment anti-idling policy for construction equipment and vehicles;
- Make use of legislated best available technologies and practices to reduce emissions;
- Ensure that all non-road diesel equipment is Tier 2 or better;
- Minimize cold starts and operate equipment at and within load tolerances and rating;
- Maintain all equipment in good working order and use at optimal loads to minimize emissions; and,
- Perform routine checks of the exhaust system of all equipment to identify actual or potential deficiencies (daily visual inspection by operator, 500hr preventative maintenance performed by maintenance department).

A qualitative air quality monitoring program (i.e., visual observation of air quality) will be implemented on an ongoing basis to guide the implementation of BMPs and check on their success or failure. Qualitative monitoring will focus on activities that have the greatest potential impact to air quality.

6.3 Noise and Vibration

The goal of the Noise Management Program is to guide measures that minimize community impacts and also achieve community acceptance of unavoidable demolition, construction and operational noise.

Project construction will primarily entail the following noise generating activities:

• Operation of marine-based equipment;

- Operation of support boats;
- Material (e.g., plies) loading and off-loading; and,
- Operation of land-based equipment.

Mitigation measures will include the preparation and implementation of noise management procedures, best efforts to target noise emission levels of equipment, and selection and implementation of activity and location specific BMPs to control pile removal and installation noise emissions. Examples of key noise mitigation measures are as follows:

- Project-related vessels will be maintained in good working condition to reduce acoustic emissions (both above and below the water surface).
- Use vibratory methods of pile installation, to the extent feasible (*e.g.*, where geophysical conditions allow). Limit in-water impact pile driving to daytime only.
- Adhere to the City of Coquitlam Noise Regulation Bylaw;
- Maintain construction equipment in good working condition;
- Operate equipment at or within load tolerances and ratings;
- Focus maintenance on lubrication, replacement of worn parts, exhaust deficiencies;
- When practical, shut down heavy equipment not in active use;
- Avoid unnecessary engine revving and use of engine brakes;
- Minimize use of back-up beepers providing in compliance with WorkSafe regulations;
- Select travel routes to avoid noise-sensitive receptors;
- Relocate or reorient stationary equipment to engage natural noise screening/dampening features;
- Use special measures such as temporary noise barriers for noisier demolition and construction activities;
- Communicate with the public regarding work procedures and scheduling of noisy activities,
- Train all personnel on noise mitigation strategies within the noise mitigation plan and,
- VFPA will be notified of any complaints received from the community and stakeholders during construction.

6.3.1 Underwater Noise

Visual and hydrophone monitoring will be conducted during pile driving activities to assess impacts on fish and marine mammals. If sound pressures over 30 kPa are measured, or distressed, injured, or dead fish are observed following the initiation of pile driving, work will be halted immediately and measures (e.g., bubble curtain) to reduce the sound pressure waves will be implemented before the work is resumed.

Maximum allowable underwater noise levels, marine mammal monitoring requirements (including exclusion zones) and underwater noise monitoring efforts will be further refined depending upon the conditions of the *Fisheries Act* Authorization for the Project, once obtained.

6.4 Machinery and Equipment

A variety of equipment and machinery will be used on site during construction of the Project. Examples may include marine-based cranes, marine support boats, rubber-tired excavators, etc. A number of small pieces of equipment such as forklifts, generators, pick-up trucks and light plants may also be used during construction. All non-road diesel equipment would be subject to the VFPA Non-Road Diesel Emissions (NRDE) Program which prohibits the addition of Tier 1 and older diesel engines without prior Port Authority approval. All major equipment maintenance repairs will be done off site.

The implementation of some basic mitigation measures will avoid or minimize impacts resulting from operation and storage of equipment during construction. These include:

- Inspection of all equipment prior to mobilization to site to ensure they are in good operating order and maintained free from leaks, excess oil and grease, invasive species and noxious weeds;
- All equipment will undergo a preventative maintenance (PM) program. Preventative maintenance is typically scheduled for every piece of equipment on the project after a defined number of hours (typically every 250 or 500 hours). During these "PMs" the entire equipment is thoroughly checked and worn parts (though not defective) will be replaced. Preventative maintenance is carried out by qualified maintenance personnel.
- All construction equipment (including pick-up trucks) will have a spill containment kit onboard at all times;
- Refueling will only occur as outlined in the Fuel Management Plan in this CEMP (see Section 8);
- All equipment will undergo a documented daily inspection performed by the operator. These inspections can identify potential spill sources (e.g., defective hoses or fittings) at the start of each shift. These inspection forms are reviewed by the maintenance department and the observations by the operator will be addressed; and,
- When practical, light spill from light plants or temporary light poles will be minimized by directing lights downward and placing task lights as close to the operation as possible.

6.5 Erosion and Sediment Control

Although land based activities associated with the Project will be very limited in scope the following BMPs will be considered during any land-based activity.

6.5.1 Best Management Practices

The selection and implementation of environmental best practices will consider such factors as: the size of work sites; activity associated with construction sites; proximity to environmentally sensitive features such as fish-bearing watercourses; work site gradient; nature of disturbed soil material, predicted discharge volumes and flow rates; and other factors. Measures will be adjusted in response to changing conditions or to correct environmental protection deficiencies.

BMPs will be implemented mainly in the following contexts:

• To manage drainage and storm flows in and around work sites;

- To prevent discharge to the environment of water that may be produced as a result of various construction activities (e.g., from dewatering work sites, excess water from drilling, etc.);
- To prevent erosion at discharge points e.g., by maintaining or reducing existing flow velocities and/or by providing dissipation measures; and
- To maintain water quality and flow volume at discharge points.

As per the VFPA Project requirements, a Project specific Stormwater Pollution Prevention Plan will be developed prior to construction.

6.5.1.1 Dewatering Plan

Water discharged from a construction site into watercourses, ditches or stormwater drainage systems will be monitored to confirm that water quality parameters meet required environmental performance indicators. Water quality monitoring frequency and parameters requirements will follow the applicable permits and environmental legislation.

Water discharged from the site will be monitored to confirm that turbidity, total suspended solids and pH levels meet the BC Approved Water Quality Guidelines as outlined in Table 3. Table 3 provides specific criteria for monitoring these parameters to ensure compliance with environmental protection standards. Water quality monitoring sampling locations will be at the current outfalls during construction and then at the four new outfalls once construction is complete.

Parameter	Criteria
Nephelometric Turbidity Units	Clear Waters (During Clear Flows or in Clear Waters):
(NTU) ¹	 Change from background of 8 NTU at any one time for a duration of 24 hours. Change from background of 2 NTU at any one time for a duration of 30 days. Turbid Waters (During High Flows or in Turbid Waters): Change from background of 5 NTU at any time when background is 8 to 50 NTU. Change from background of 10% when background is >50 NTU at any time.
Oil and Grease ²	Not detectable by sight or odour
pH ¹	6.5-9.0

¹Values are from B.C. Approved Water Quality Guidelines (Criteria).

²Criterea from for Canadian Recreational Water Quality: Physical, Aesthetic and Chemical Characteristics, 2021.

Table 3 Water Quality Guidelines: Turbidity, Oil & Grease, and pH Standards

6.5.1.2 Erosion Prevention and Control

Best management practices for erosion prevention and control include, but are not limited to, the following:

- Minimize soil disturbance and soil compaction;
- Minimize the volume of overland flow entering, or flowing through, construction areas;

- Regardless of the proximity to watercourses, applicable BMPs for surface water quality and sediment and erosion control will be implemented;
- Divert surface water around disturbed construction areas, stockpiles or lay down areas. Diversion should avoid significant alteration of pre-existing down slope drainage;
- Roughen the surfaces of compacted, disturbed and exposed soils to increase infiltration to ground and break up or slow down sheet flows (e.g., implement "cat tracking");
- Minimize soil stockpile areas and volumes, where possible, particularly during inclement weather and/or when working in environmentally sensitive areas;
- Stockpile soils as far away as possible from watercourses or other flowing conveyances that have direct hydraulically connection to sensitive receiving waters;
- Minimize slopes of disturbed areas and stockpiled material; maintain the natural angle of repose;
- Ensure that sufficient filter cloth, rock, seed, drain rock, culverts, staking, and other materials used for erosion prevention or control are readily available on site;
- When installing or relocating utilities, minimize the length of trench exposed at any given time;
- Check erosion control measures regularly (at least once a week), with frequency based on weather conditions, risk, and sensitivity of the area, and correct deficiencies without delay;
- Minimize vehicle access routes into working areas;
- Discharge points have dissipation measures implemented; and,
- Maintain or reduce existing flow velocities to stop erosion at discharge points, by roughening the surface, (e.g., by placing boulders and rocks at hose outlets to disperse flow or have hoses discharge under water; for channel flow velocity reduction place check dams).

6.5.1.3 Sediment Control – Land Based

The construction team will implement appropriate sediment controls to achieve water quality requirements for discharge to local watercourses, drainage ditches or storm sewers. As required, guidance on sediment control implementation will be provided by the Environmental Manager. Measures may include, but are not limited to, the following:

- Silt fencing around stockpiled spoils or disturbed areas as necessary;
- Check-dams or gravel berms in drainage channels;
- Covering erodible materials with tarp or other appropriate impervious material;
- Storm drain inlet protection (e.g., using catch basin screens or filter socks);
- Temporary sediment control ponds or traps, or storm water interceptors;
- Infiltration galleries around dewatering pumps to remove sediment; and,
- Street sweeping to remove loose sediment from impervious or paved surfaces.

6.5.1.4 Sediment Control – Dredging

Although the dredging program is the Build-Out Project is not considered maintenance dredging, the mitigation measures for the prevention and control of dredged sediments provided in the DFO Code of Practice (CoP) for Routine Maintenance Dredging for Navigation (September 2022) will be implemented. This CoP is provided in Appendix A of this CEMP. All dredged sediment will be disposed of utilizing the site Disposal At Sea operation and will comply with the federal Disposal at Sea Regulations.

It is also anticipated that the *Fisheries Act* Authorization (FAA) for the Project may include additional sediment control mitigation measures and monitoring requirements. These will be included in a future revision of the CEMP once the FAA is received.

6.6 Contaminated Soil and Water Management

In all situations, contaminated soil and water will be handled, transported, disposed of and documented in accordance with the provincial *Environmental Management Act* including the Contaminated Sites Regulation and Hazardous Waste Regulation. A qualified environmental professional in contaminated sites management will oversee all contaminated soil and water activities.

6.6.1 Recognition and Response

6.6.1.1 Identification of Contamination

Soil and water contamination can generally be recognized by one or more of the following:

- Unusual, hydrocarbon or chemical odor;
- Visual sheen;
- Visual free product (oil or other product);
- Visual staining. and/or
- High soil vapour concentrations.

Stop work in the immediate area where contamination is identified during the construction phase of the Project to allow an assessment to be undertaken of the contaminated area.

6.6.1.2 Notification Framework

Upon the identification of contamination, work in the area will cease immediately and the Environmental Manager will be notified. A Contaminated Sites Resource Specialist with experience in contaminated sites may be contacted and required to be present at the identification site to verify the indications of potential soil and water contamination (i.e., sheen and adjacent soil staining) and assist in monitoring and mitigation. Any documentation pertaining to the contamination encountered including containment, testing and disposal will be submitted to the VFPA, as required.

6.6.1.3 Health and Safety

Upon discovery of contamination, the health and safety of personnel and the public is the first priority. Contractors and personnel on-site will suspend all work in the area, shut equipment down and immediately notify the Construction Manager and the Environmental Manager. Appropriate personal protective equipment will be worn and all reasonable measures will be taken to ensure that health and safety of anyone in the immediate area is preserved. Personnel and Contractors will employ all measures and requirements outlined in the Construction Health and Safety Management Plan as well as any other measures or requirements.

6.6.2 Interim Mitigation

The Environmental Manager must be consulted when determining the necessary mitigation measures that are to be implemented when it is safe to do so. In all instances, the migration of the contamination from the disturbed area must be minimized. Mitigation measures may include:

- Segregating contaminated soil for later sampling and/or analysis and disposal;
- Placing contaminated soil onto an impermeable surface;
- Covering contaminated soil with an impermeable cover in cases where precipitation may cause runoff;
- Constructing berms to control runoff, in cases where runoff is imminent;
- Stopping contaminated water discharge;
- Storing contaminated water in tanks for later sampling and/or analysis and disposal; and,
- If sampling is required, laboratory analytical parameters for soil and water will be based on site history and land use.

All contaminated soil and/or water that requires off-site disposal will be disposed of at a licensed facility permitted to accept the material.

6.7 Fish and Wildlife

Both marine and land-based activities have the potential to attract wildlife. The following BMPs will be followed to limit wildlife interactions.

- All in-water work will be conducted during the aquatic least risk window for the lower Fraser River of June 16 to February 28 or as required by the DFO and VFPA;
- Maintain all construction sites free of wildlife attractants such as food, garbage, petroleum products or other materials with a strong odor;
- It is noted that birds may nest in construction equipment (e.g., on cranes, formwork, machinery, temporarily stored materials and other construction infrastructure). Inspection of work areas will occur regularly throughout the bird breeding season to identify birds attempting to nest as early as possible. Should breeding behavior be identified, a specific management plan will be developed by a qualified specialist and in consultation with the VFPA and appropriate regulatory agencies to ensure compliance with the *Migratory Birds Convention Act*; and,
- Where garbage containers are required, ensure containers are inaccessible to wildlife.

6.7.1 Species at Risk

Aquatic Species at Risk Act (SARA) listed species with critical habitat in the upstream and downstream of the Project include White Sturgeon (Acipenser transmontanous) as threatened and Eulachon

(*Thaleichthys pacificus*) as endangered. However, Government of BC SBOT mapping tool indicates that critical habitat for White Sturgeon at any life stage or Eulachon spawning habitat does not occur at the Project location.

Also, Como Creek directly west of the Project boundary has been identified as critical habitat for the western painted turtle (*Chrysemys picta bellii*), Pacific Coast population which is a species listed on Schedule 1 of the *Species at Risk Act* (SARA). Subsection 58(1) of SARA contains prohibitions against destroying any part of critical habitat for at-risk species on federal land, including the VFPA lease area. An application for a SARA permit has been submitted to ECCC for the portion of the Marine Yard VFPA lease area that overlaps with western painted turtle critical habitat.

6.8 Vegetation Plan

A full inventory of the existing native and non-native vegetation species including invasive species on site was provided in the Project Environmental Overview Assessment (Hatfield 2022). The Environmental Overview Assessment included both a desktop review and field reconnaissance.

The following best management practices for vegetation clearing, handling and removal will be adhered to during construction.

- Schedule vegetation clearing outside of the bird nesting period of
- Keep vegetation clearing at a minimum with particular attention near watercourses and Environmentally Sensitive Areas (ESAs);
- No vegetation will be felled into a watercourse;
- Stage clearing to provide maximum erosion protection while still allowing construction to proceed.
- Conduct pre-clearing surveys for any rare or sensitive species;
- Prepare a clearing and grubbing plan in consultation with the Environmental Manager;
- Mark the clear and grub, "No Disturbance", and "Vegetation to Remain" boundaries on the environment construction drawings;
- Flag or sign "No Disturbance" and "Vegetation to Remain" areas (e.g. 30 m buffer around designated watercourses and ESAs) in the field prior to clearing and inspect weekly;
- Maintain the appropriate ESA-specific buffer zones for clear and grub around designated watercourses (30 meters) and ESAs (e.g. 30 meters for songbirds) during clear and grub activities until ready to proceed with earthwork and stabilization (i.e., staged approach);
- Do not fell timber into a watercourse unless safety considerations dictate otherwise or unless approved by Environmental Coordinator;
- The Construction Team will notify the Environmental Manager upon the discovery of rare or sensitive species the Environmental Manager will in turn notify the VFPA; and,
- If wood waste is stored on site, store it in a well-drained location, free of standing water.

6.8.1 Invasive Plant Species

Precaution shall be taken to prevent the spread of invasive species within the remaining sparse riparian vegetation, primarily through application of the BMPs outlined in the Best Practices for Managing Invasive Plants on Roadsides (MOTI and ISCBC 2019). Key BMPs include:

- Avoid parking, turning around, or staging equipment in areas with invasive species;
- Wash equipment before exiting areas with invasive species and entering areas without invasive species;
- Minimize disturbance of areas and retain desirable vegetation where feasible;
- Use only clean fill materials; and,
- Restore disturbed areas with non-invasive and quick-establishing native vegetation suited to site conditions.

Weekly environmental inspections will include reporting of invasive plant species identifying their location, life stage, and any plans for treatment or removal. Types or treatment or removal methods will depend upon the plant species and in accordance with established best management practices for each species.

For the riparian areas, three invasive species have been identified as potential colonizers due to their presence on the reference bench, including purple loosestrife (Lythrum salicaria), yellow iris (Iris pseudacorus), and reed canary grass (Phalaris arundinacea), but the abundance of these species is relatively low. The presence of invasive and exotic plant species shall be further assessed during effectiveness monitoring and active management and control measures shall be implemented if necessary.

All invasive plant species will be disposed of in accordance with the local municipal Green Waste Program and at a facility equipped to handle invasive plant waste.

6.8.2 Planting Plan

New vegetation plantings for the site will be limited to the plantings identified in the Fisheries Act Authorization Offsetting Plan (Hatfield 2024) submitted to the VFPA as Appendix J of the Per 23-130 Application. Specifically, Section 2.3 and Appendix A1 of the Offsetting Plan provides details on plant species and planting specifications.

6.9 Archeological Resources

Due to the limited scope of physical activities (i.e., no land-based ground disturbance and all pile removal and installation will be sub-tidal), a foreshore archeological activity is not required. Regardless, there is the potential for the discovery of previously unknown archeological resources.

The following procedure will be implemented to manage possible encounters with previously unknown archeological resources (also commonly referred to as a change find procedure).

If suspected archeological resource sites are discovered during construction, implement the measures listed below.

- Prohibit the collection of any historical, archaeological or paleontological resources by Project personnel except for qualified Heritage Resource Specialists acting as authorized by the appropriate regulator.
- Suspend work immediately in the vicinity (i.e., within 30 m) of any newly identified archaeological, paleontological or historical resource sites (e.g., modified bone, pottery fragments and fossils). Work at that location may not resume until the measures below are implemented. Clearly mark the site using fencing and flagging to secure avoidance where appropriate. Do not move or otherwise disturb the artifacts or other remains present at the site.
- Notify the Marine Superintendent and Environmental Manager, who will notify the VFPA and a qualified Heritage Resource Specialist (either an archaeologist or a paleontologist). If warranted, an appropriate government authority will be notified.
- Upon discovery, a qualified Heritage Resource Specialist (either an archaeologist or a
 paleontologist) will develop, if required, an appropriate mitigation plan in consultation with the
 Marine Superintendent, Environmental Manager, VFPA, the appropriate government authority
 and the appropriate First Nations communities.

An archaeological Chance Find Procedure has been developed for the Marine Yard and is provided in Appendix B of this CEMP.

6.10 Human Remains Discovered During Construction

If suspected human remains are discovered during construction, implement the mitigation measures listed below.

- Suspend work immediately in the vicinity of the newly identified human remains. Work at that location may not resume until the measures below have been implemented.
- Notify the Marine Superintendent and Environmental Manager, who will notify the VFPA, the Heritage Resource Specialist and, if warranted, the local police and appropriate government authority.
- If human remains are determined to be archaeological, the Heritage Resources Specialist will contact and collaborate with local First Nations regarding the treatment and management of the remain.
- If there is potential for disturbance to the site due to trafficability or high public visibility, assign employees to stand watch until the local police and Heritage Resource Specialist arrives.
- Stake or flag off the location to secure avoidance.
- Cover any exposed remains with clean plastic sheeting, tarpaulin, blanket or other covering until the local police and Heritage Resource Specialist is present.
- Do not backfill. If excavated fill has been loaded into a truck, empty the excavated fill at a nearby secure location for the local police and Heritage Resource Specialist to inspect.
- Work will only resume in that area once the archaeological and forensic studies are complete, clearance has been granted by the local police and appropriate government authority, and direction has been advised that work can continue.

7 EMERGENCY RESPONSE

During construction there are risks of potential accidents occurring, malfunctions of equipment, spills or general environmental incidents which all may require a level of emergency response. It is important to outline and train on procedures to follow in the event of emergencies to assist in making appropriate decisions at a time when tensions may be elevated, and personnel safety is of utmost concern. If accidents and malfunctions are not properly mitigated or responded to, they could have a significant impact on the Project.

7.1 Emergency Communication

It is important to note that quick and clear communication is essential to minimize potential impacts to workers, the public, property and the environment in emergency situations. The VFPA will be contacted for any release of a dangerous goods (as defined in the BC Spill Reporting Regulation) to water or any amount to land that is over the volume for the listed in the Schedule of the BC Spill Reporting Regulations. The phone numbers of key emergency responders are provided in Table 4.

Authority/Company Name	Phone Number
Emergency Services	911
VFPA Operations Centre	604-665-9086
Local Non-emergency police	604-985-1311
Local Non-emergency fire	604-980-5021
Emergency Management BC (formerly PEP)	1-800-663-3456
DFO Radio Room	604-666-3500
Canadian Coast Guard	604-775-8881
Western Canada Marine Response Corporation (3rd party marine spill response)	604-293-3387
Safety-Kleen Emergency Response (3 rd party land based spill response)	1-888-375-5336

Table 4. Key Emergency Response Contacts

7.2 Environmental Emergency and Spill Response Plan

7.2.1 Emergency Spill Response

A spill is defined as a discharge of a pollutant into the natural environment from or out of a structure, vehicle, or other container, that is abnormal in quality considering all the circumstances of the discharge. The purpose of this plan is to demonstrate compliance with applicable contractual and regulatory requirements governing incident prevention, incident response, notification, and reporting as well as fire response. More specifically, the Plan provides information on: Incident Response Procedure; Responsibilities in Case of an incident; Incident Notification and Reporting and Best Management

Practices. An example of a spill response flow chart is provided in Figure 3. The chart will be posted in lunchrooms, offices and key locations throughout the site.

Spill kits are to be readily available in all work areas and provided in all construction vehicles. The Marine Superintendent will ensure that an adequate spill response equipment inventory is always kept on site. Additionally, spill response trailers or spill response drums will be located at any high risk operation.

The Construction Team will immediately take the necessary steps, including reliance on external resources, to abate an uncontrolled discharge. They will provide the necessary labour, equipment, materials and absorbents to contain and remove the spill, clean up the affected area, dispose of waste materials at an approved disposal site, and restore the area.



Figure 3. Spill Response Flow Chart

Any individual who notices a potential spill, spill, or equipment malfunction is to stop work immediately and shut down equipment. The person involved will contact their Foreman and the Marine

Superintendent. Foremen or Marine Superintendent will respond with additional spill response equipment if necessary and notify the Environment Manager. All parties are to remain at the scene until required information is gathered.

Initial response to spills during the works will be as follows:

- Assess safety risks in the spill area;
- Notify Foreman/Superintendent;
- Stop the flow of the hazardous material if it is safe to do so;
- Secure and isolate the spill area;
- Assess the situation (identify product, equipment involved, affected area, spill status, time of spill);
- Begin containing and recovering the spill with on-site emergency spill equipment if it is safe to do so; and,
- Complete the spill notification and reporting procedure as described above.

7.2.2 Incident Clean Up

The spill responders will remain at the scene until incident cleanup is under control. Contaminated soil will be disposed of in the on-site contaminated soil bin and spent adsorbent material will be disposed of in the hazardous waste bin. All fluid contained in drip trays, will be disposed of in the used oil recycling container. The spill responders will document all clean-up activities with pictures.

Following clean-up of a significant spill, a debriefing will be held with all involved personnel. Debriefing will occur following any reportable spill as defined by the Spill Reporting Regulation. This debriefing will include review of the following:

- Root cause of the spill;
- Measures to prevent the spill from occurring again;
- Review with associated crew members; and,
- How the response could have been improved.

A more informal debriefing (e.g., one-on-one between Foreman and worker) may be held for lesser spills as part of ongoing on-site training in spill prevention and response.

7.2.3 Incident Investigation and Reporting

An initial investigation will be implemented at the scene and will address the following questions:

- Have there been injuries?
- Is there need for outside help?
- What was spilled?
- How much has been spilled?
- Has the source been isolated?

• Has the area in which the spill occurred been contained?

The Marine Superintendent will determine the amount of fluid released from the machine. Witness statements will be gathered from all parties involve. Both the Maintenance and Environment Manager will identify action items to reduce the risk of similar incidents occurring in the future.

A complete "Environmental Incident Report" will be completed by the Environmental Manger to communicate the incident accurately with the VFPA and any outside regulatory agencies, if required.

An "Environmental Incident Report" will also be required when any of the following activities occur:

- Hazardous material spill;
- Work beyond established boundaries or timing windows;
- Work resulting in direct harm or death to wildlife including birds or fish;
- Improper heritage resource mitigation;
- Improper hazardous materials management;
- Water quality issue;
- Air quality issue;
- Negative wildlife/human interaction and,
- Work occurred without proper permit or authorization.

7.3 Best Management Practices for Spill Control and Reduction

The Construction Team will employ best management practices as a prevention method to spills and a method to limit the environmental damage in the case that a spill or release does occur. The following are examples of mitigation measures that will be practiced on site.

7.3.1 Spill Kits

- Maintain a functional spill kit (e.g., containing sorbent materials, gloves and portable disposal container for used sorbent material) on each construction related vehicle;
- Station properly furnished spill kits at appropriate intervals throughout the work area and near main watercourses. At a minimum, each such kit should contain sufficient hydrophobic absorbent material (e.g., oil absorbent pads and socks) to contain and clean up potential drips, leaks, or spills (e.g., ruptured hydraulic line), gloves and heavy plastic bags to contain used absorbent materials and contaminated soils or wastes;
- Clearly sign the location of all large, drum style spill kits;
- Spill kits stationed for works in or about water will contain absorbent booms;
- Label spill kits to identify the spill capacity for which the kits are intended;
- Spill response procedures and relevant contact information will be posted on-site;
- A spill kit will be located where refueling occurs; and,

• Check spill kits on a regular basis to ensure all used contents of spill kits are replenished.

7.3.2 Clean Up

- Place used (contaminated) sorbent materials in spill kit bag provided for that purpose;
- Used materials can be temporarily stored on-site in a clearly labeled drum dedicated to that purpose drum contents must be emptied within reasonable time with contents disposed off-site in accordance with CSR requirements;
- Soil and/or water contaminated by spill(s) of hazardous materials must be remediated as per CSR requirements; and,
- Contact the Environmental Manager immediately when a spill of hazardous or deleterious substances enters the natural environment and a spill specific clean-up action plan will be developed and implemented in accordance with CSR and other applicable regulation.

7.3.3 **Preventative Maintenance**

• All equipment used on this project will undergo a maintenance program as described in Section 6.4 Machinery and Equipment of this CEMP.

7.3.4 Hazardous Materials Storage

- Bulk lubricating oils will be stored in a designated area that is configured for secondary containment and protected from the elements. All containers within the containment area will be labeled as to their contents; lids will be on and closed. Empty containers will be removed, labeled and stored for re-use or disposal, as applicable to each particular container;
- Lubricating oil dispersal locations (connex) will have secondary containment to minimize impact from potential releases;
- Solvents and degreasers will be stored in fire resistant, approved security cabinets to minimize risk of environmental and personnel injury impacts; and,
- Miscellaneous items such as aerosols, washer fluid, paints, roof patch, caulking and noncombustible items, when not in use, will be stored in containment shelters that are protected from the elements, or will use enclosed and vented connex enclosures.

8 FUEL MANAGEMENT PLAN

8.1 Refueling Procedures

The following best management practices will be following for all refueling operations. All construction personnel involved with refueling will undergo specific training on these practices.

8.1.1 Onshore Works

General measures include:

- Deliver fuel to construction site by approved mobile refueling tanks (either to on-site refueling tanks or directly into the equipment);
- All dispensing or transferring of fuel will be attended for the duration of the operation;
- The attendant will be trained in fueling procedure;
- Refuel excavators and other large tank capacity machines away from a water body and other ESAs (minimum 30m unless otherwise approved by the Environmental Manager);
- When transferring fuel from mobile tank to large machines, place sorbent material around the fuel inlet prior to dispensing, and use pumping equipment, an approved hose and top-fill nozzle;
- Verify that there is a proper connection between the fuel fill hose and the fill pipe of the tank, mobile refueling tank, or the equipment being filled, and verify that the fill valve is open;
- Do not overflow the receiving tank;
- While refueling, suspend operation of moving equipment in the immediate vicinity of the refueling; and,
- Maintain regular inspections of fuel systems and their components (check for leakage, deterioration or damage).

8.1.2 Refueling Marine Equipment

• Refueling procedures specific to marine based equipment will be developed as part of the marine work procedures.

8.1.3 Jerricans

- Smaller equipment can be refueled using CSA approved jerrican(s); and,
- When not in use, jerricans will be placed in portable secondary containment rather than placed directly on the ground;

9 WASTE MANAGEMENT PLAN

9.1 Non-hazardous Waste

Construction will produce various forms of solid non-hazardous waste including but not limited to land clearing debris, surplus or defective construction materials (e.g., scrap lumber and wood products, scrap steel, scrap plastic), garbage (e.g., waste food, paper and other garbage produced by workers), waste vegetation debris, topsoil and excavation spoil, demolition debris (e.g., old asphalt and concrete), and other non-hazardous solid waste. Construction waste management will comply with relevant regulatory requirements and institutional constraints. In addition, commercially reasonable efforts will be made to sort non-hazardous solid waste onsite for the purpose of reusing and recycling.

Collection, sorting and temporary on-site storage of non-hazardous solid waste will occur on the Project site while removal of non-hazardous solid waste from the Project site for off-site disposal is expected to rely mainly on licensed solid waste haulers. Off-site disposal will use existing Metro Vancouver or

municipal waste management processes or infrastructure (i.e., approved regional/municipal waste transfer stations and landfills).

A waste recycling program for office waste will be implemented for at the field office. Recyclable office wastes include, but are not limited to paper, cardboard, some metals, bottle and glass, and cans. Recycling bins will be maintained within the site. Site personnel will be responsible for recycling their own lunch waste at these or off-site facilities during each working day.

Field personnel will receive site orientation training in the implementation of the Waste Management Plan. Further hazardous waste handling training may be necessary depending on the duties of the individual. It is expected that all environmental, maintenance and logistics/material handling personnel will receive further training in this regard.

A list of relevant emergency contacts including internal environmental personnel, regulatory agencies, private spill clean-up companies and municipal contacts is provided in the Emergency Spill Response Plan (Section 7.2) of this CEMP.

General, non-hazardous waste mitigation measures include:

- a waste minimization policy for procurement of construction materials and services (e.g., request suppliers to minimize packaging);
- Maintaining general site cleanliness (i.e., "good housekeeping") by cleaning up construction debris, garbage and other non-hazardous solid waste materials on a regular basis;
- Removing non-hazardous solid waste for off-site disposal at an appropriate frequency (e.g., before on-site containment facilities become overfilled and before garbage becomes too smelly);
- Removing food and/or domestic waste from the construction site daily or, if such waste is to remain on-site overnight, store in animal resistant waste receptacles;
- · Posting key waste management information at each work site for easy reference;
- Providing site specific training on relevant waste management strategies and expectations;
- Construction personnel should provide feedback on waste management practices to correct methods that are not working or are too difficult to follow;
- Implementing site security and/or individually secured bins to prevent the public from gaining access to bins and possibly contaminating recyclables (e.g., by disposing of their garbage in recycling bins); and,
- Removing non-hazardous solid waste material that is discovered in or adjacent to watercourses
 or other environmentally sensitive areas within the project right-of-way and dispose off-site in
 compliance with applicable environmental requirements.

9.2 Hazardous Waste

Improper management of hazardous waste can pose a risk to the health and safety of personnel and the public. Release of hazardous waste can result in land and/or water contamination, be lethal to wildlife and fish, and harm or destroy habitat.

All hazardous waste will be handled in compliance with the Workplace Hazardous Materials Information System (WHMIS) and will be properly labeled; up-to-date Material Safety Data Sheets (MSDS) will be maintained and located in the site office easily accessible for all personnel. Efforts will be made to minimize the storage locations and duration of hazardous waste. Hazardous wastes will be disposed of in accordance with the BC Environmental Management Act and the Hazardous Waste Regulation.

9.2.1 Treated Piles

Apart from some limited production of hazardous waste for equipment maintenance activities (e.g., waste oil, filters, contaminated rags, etc.), the greatest volume of hazardous waste generated for the Project will be creosote treated wooden piles. Once extracted, the treated piles will be placed in large metal bins for transportation to a waste disposal facility licensed to handle creosote piles.

9.2.2 General Mitigation Measures

In additional to the hazardous waste generated during the demolition phase, certain types of hazardous waste may be generated during construction. Hazardous waste generated during construction may include, but are not limited to, fuels, bitumen, oils, lubricants, organic and inorganic contaminants, paints, solvents, cleaners, and used filters.

Maintenance wastes (e.g., batteries, by-product oils, oily rags) generated by the maintenance activities will be segregated from active work areas in a centralized location within the maintenance shop. Only drums that are actively being used will be in these locations.

Containers used to store hazardous by-products will meet the following criteria:

- Be in good condition with no visible defects that could result in leaking or spilling of by-products;
- Be leak-resistant and include seals containing liquid by-products;
- Will have removable tops if storing non-liquid by-products; and
- Be kept upright and closed at all times unless adding or removing contents.

Clearly label containers with the following information:

- "Hazardous By-Product" or "Used Oil For Recycle";
- Name of the by-product (e.g., Used Oil);
- Type of hazard (e.g., toxic, ignitable); and
- Once filled, the date the container was placed in the storage area.

All efforts will be made to immediately remove from site any full hazardous waste containers. However, there may be periods where short-term storage of these containers may be required. In this case, accumulations of full hazardous waste and used oil containers will be stored in a centralized area or building designed to ensure non-compatible by-products are segregated and located in designated areas to optimize control. Storage areas will be:

- Marked/signed to ensure proper segregation;
- Locate hazardous material storage areas on level ground located a minimum of 30m from streams and other Environmentally Sensitive Areas (ESAs);

- Secured (e.g., barricaded or fenced and locked) to keep unauthorized personnel out of the area;
- Protected with barriers/bollards as necessary to keep equipment, and vehicles from entering;
- Covered to keep out rainwater;
- Sized appropriately to store anticipated quantity of waste with sufficient space between drums to permit the required visual inspection;
- Signed to identify the hazard (e.g., Flammable No Smoking or Open Flame Within 15 Meters, Hazardous By-product);
- Provided with covered secondary containment (e.g., soil berm with a high density polyethylene (HDPE) liner or manufactured secondary containment system) designed to contain 125% of volume of the largest container;
- Equipped with fire extinguisher(s);
- Equipped with spill kits appropriate to the type and amount of hazardous waste stored; and,
- Located away from existing drainage paths to offsite areas to prevent accidental spills from reaching sensitive areas.

Manage the centralized hazardous waste storage area as follows:

- Only authorized personnel access the area;
- Log all incoming and outbound material such that an inventory of onsite hazardous materials can be kept;
- Environmental Coordinator and/or Maintenance personnel will maintain inspection records;
- Maintain sufficient space between drums/containers to allow access during emergency response situations; and
- Segregate incompatible materials from each other.

Hazardous waste will be transported and documented (i.e., bills of lading and manifesting, as required) in compliance with the Transportation of Dangerous Goods Act and the BC Hazardous Waste Regulation, by appropriately licensed waste transporters. Onsite personnel responsible for handling and receiving/shipping hazardous wastes will be appropriately trained.

Appendix A

DFO Code of Practice

Routine Maintenance Dredging for Navigation

Fisheries and Oceans Pêches et Océans Canada _____Canada _____

1.0 About this code of practice

This code of practice outlines Fisheries and Oceans (DFO)'s national best practices for routine maintenance dredging. Dredging is considered routine maintenance when it is required to maintain the design depths of navigation channels, harbours, marinas, boat launches, docking sites and port facilities, which all contribute to Canadian tourism, recreation and the transportation of goods. Navigation areas are typically dredged using clam buckets, draglines, backhoes or suction.

For the purpose of this code of practice, routine maintenance dredging includes the mechanical removal of accumulated sediment from the bed of a water body in an area where dredging for navigation purposes has previously occurred and was reviewed by DFO.

You can protect fish and fish habitat (including <u>aquatic</u> <u>species at risk</u>, their critical habitat and residences) when proceeding with a routine maintenance dredging by following the measures listed below. When implemented correctly, this can mitigate risks to fish and fish habitat associated with routine maintenance dredging, which can includes:

- disturbance of watercourse beds and banks
- release of sediments or other <u>deleterious substances</u>
- changes to aquatic habitat
- fish injury and mortality

DFO is responsible for the conservation and protection of fish and fish habitat across Canada. Under the <u>Fisheries</u> <u>Act</u>, no one may carry out works, undertakings and activities that result in the <u>harmful alteration</u>, <u>disruption</u> <u>or destruction (HADD)</u> of fish habitat, or the death of fish, unless it has been authorized by DFO. DFO's approval under the <u>Species at Risk Act</u> is also required if an activity affects an aquatic species at risk, any part of its critical habitat or the residences of its individuals.

The purpose of this code of practice is to describe the conditions under which the code can be applied to your project and the measures you are required to implement in order to prevent harmful impacts to fish and fish habitat and avoid contravention of the *Fisheries Act* and the *Species at Risk Act*. If you cannot meet all of the conditions and implement all of the applicable measures listed below,

your project may result in a violation of the *Fisheries Act* and the *Species at Risk Act* and you could be subject to enforcement action.

If you are uncertain about whether this code of practice is applicable to your project, it is recommended that you consult our <u>website</u> or a <u>qualified environmental</u> <u>professional</u> to determine if <u>other codes of practice</u> should also be implemented, or if further review by DFO may be necessary. For any remaining questions, please contact the <u>Fish and Fish Habitat Protection Program office</u> located in your area. It remains your responsibility to comply with the *Fisheries Act* and the *Species at Risk Act*.

It is your <u>duty to notify</u> DFO if you have caused, or are about to cause, the unauthorized death of fish by means other than fishing/harmful alteration, disruption or destruction of fish habitat. Such notifications should be directed to the <u>Fish and Fish Habitat Protection Program</u> <u>office</u> located in your area.

This code of practice does not remove nor replace the obligation to comply with the requirements of any other federal, territorial, provincial or municipal regulatory agency including guidance regarding species and habitats managed by these jurisdictions.

It is good practice to notify nearby Indigenous communities of the works, undertakings and activities.

A project review by DFO is not required when the project activities meet the description in <u>section 1</u> and the conditions in <u>section 2</u>, and when the measures to protect fish and fish habitat set out in <u>section 3</u> of this code of practice are applied. <u>Request a project review</u> if your project does not meet all of these requirements.



2.0 Conditions

The following conditions describe when this code of practice can be applied:

- You determine if there are aquatic species at risk within the <u>affected area</u> by consulting our <u>aquatic species at risk</u> <u>map</u>, and you confirm that the work is not taking place within:
 - the distribution area of molluscs listed under schedule 1 of the Species at Risk Act
 - \circ \quad the critical habitat or residences of any other aquatic species at risk
- You are dredging in an area that has been dredged within the past 10 years.
- Your project does not include propeller wash dredging.
- The amount dredged is restricted to the area and depth previously required for navigation.
- The project does not include bottom stockpiling or side casting of dredged material.
- You dispose of dredged material and stabilize it on land following provincial legislation or you dispose of dredged material in water by applying for a disposal at sea permit. Note: Environment and Climate Change Canada is responsible for ensuring that all dredged material meets environmental standards under the *Canadian Environmental Protection Act* and the *Disposal at Sea regulations*
- You implement the measures in <u>section 3</u> to protect fish and fish habitat when carrying out the works, undertakings and activities.

As a condition of this code of practice, please submit a <u>notification form</u> (PDF, 50 KB) to <u>your regional DFO office</u> 10 working days before starting work. Notification forms will inform the continuous improvement of the codes of practice over time.

You must download and save this PDF form to your computer before filling it out. <u>How to download and open a PDF form.</u>

3.0 Measures to protect fish and fish habitat

3.1 Protection of fish

- Plan in-water works, undertakings and activities to respect fish protection <u>timing windows</u>.
- Limit the duration of the in-water works, undertakings and activities.

3.2 Protection of the riparian zone

- Limit vegetation removal, pruning and grubbing to the area required for accessing the site of the works, undertakings and activities.
- Restore the banks and <u>riparian vegetation</u> affected by the works, undertakings and activities.
 - Re-vegetate the disturbed areas with native species suitable for the site.

3.3 Protection of aquatic habitat

 For water-based operations, avoid placing vertical spuds or other anchors into sensitive fish habitat outside the footprint of the dredge area (e.g., eelgrass or kelp beds, saltmarshes, shellfish harvesting areas and known spawning areas).

Riparian Zone





Code of Practice

Fisheries and Oceans Pêches et Océans Canada Canada

3.4 Protection of fish and fish habitat from sediment

- Operate machinery on land, from barges or on ice.
- Install erosion and sediment control measures prior to the beginning of the works, undertakings and activities.
- Develop and implement an erosion and sediment control plan.
 - Inspect the erosion and sediment control measures and structures regularly during all phases of the works, undertakings and activities.
 - Maintain the erosion and sediment control measures and structures during all phases of the works, undertakings and activities.
 - Monitor the water body regularly for signs of sedimentation during all phases of the works, undertakings and activities and take corrective action if required.
 - Use biodegradable erosion and sediment control measures on land whenever possible.
 - Keep the erosion and sediment control measures in place until all disturbed sediment has stabilized or resettled.
 - Remove all erosion and sediment control materials (unless biodegradable) once sediment has stabilized or resettled.

3.5 Protection of fish and fish habitat from other deleterious substances

- 3.5.1 Develop a prevention plan
 - Do not allow the deposit of deleterious substances in any water body.
 - Develop a plan to prevent deleterious substances from entering a water body.
 - Maintain all machinery on site in a clean condition and free of fluid leaks.
 - Wash, refuel and service machinery in such a way as to prevent any deleterious substances from entering a water body.
 - Store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering a water body.
 - Dispose of all waste materials on land in a designated area away from the <u>ordinary high</u> <u>water mark</u> of any water body.
- 3.5.2 Implement a response plan
 - Implement a response plan immediately in the event of a spill of a deleterious substance (including sediment).
 - Stop all works, undertakings and activities.
 - <u>Report</u> spill immediately when a deleterious substance enters a water body.
 - Contain water with deleterious substances.
 - Clean-up and dispose of water contaminated with deleterious substances.
 - Use an emergency spill kit.

4.0 Glossary

Affected area: The area within which all of the proposed project impacts are likely to occur either directly (i.e., project footprint) or indirectly (i.e., downstream or other surrounding areas).

Aquatic species at risk: Any aquatic species listed under schedule 1 of the Species at Risk Act as endangered, threatened, or extirpated.

Deleterious substance: Any substance that, if added to water, would degrade, alter, or form part of a process of degradation/alteration to the quality of that water so that it is possibly rendered deleterious to fish, fish habitat, or to the human use of fish that frequent that water. For example: fuel, lubricants, paint, primers, rust, solvents, degreasers, antifreeze, uncured concrete, creosote, chlorinated water, herbicides, etc.

Harmful alteration, disruption or destruction (HADD): Any temporary or permanent change to fish habitat that directly or indirectly impairs the habitat's capacity to support one or more life processes of fish.

Ordinary high water mark: The usual or average level to which a body of water rises at its highest point and remains for sufficient time to change the characteristics of the land. In flowing waters (e.g., rivers, streams) this refers to the "active channel/bank-full level" which is often the 1:2 year flood flow return level. In inland lakes, wetlands or marine environments it refers to those parts of the water body, bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For reservoirs this refers to normal high operating levels (i.e., full supply level).

Riparian vegetation: Occurs adjacent to the water body and directly contributes to fish habitat by providing shade, cover and areas for spawning and food production.

Riparian zone: Area located between a water body's ordinary high water mark and upland area.

Qualified Environmental Professional (QEP): A person who is experienced in identifying and assessing potential impacts to fish and fish habitat generated from various works, undertakings or activities conducted in or near water, and implementing management measures to avoid and mitigate them. QEPs possess a post-secondary degree or diploma in biological, geophysical or environmental sciences and are often referred to as:

- aquatic biologist
- fisheries biologist
- fluvial geomorphologist
- applied scientist
- fisheries technician
- environmental consultant or
- natural resource consultant

Ordinary High Water Mark



Ordinary High Water Mark





Appendix B

Marine Yard

Archaeological Chance Find Procedure

Chance Find Management Procedure for Dredging and Development Activities at 1950 Brigantine Drive, Coquitlam, BC

Prepared by Kleanza Consulting Ltd. 220-328 W Hastings St. Vancouver, BC V6B 1K6

June 2, 2022

Prepared for: Marek Downarowicz, P.Geo. Active Earth Engineering Ltd. 2250 Boundary Rd Unit 160, Burnaby, BC V5M 3Z3



Key Contacts

In the case of a chance archaeological find, please contact the Project Archaeologist and additional contacts (as applicable):

Kleanza Consulting Ltd. Kay Jollymore, Senior Archaeology Manager 778-847-7082 kay@kleanza.com	Archaeology Branch Paula Thorogood, Manager 250-953-3300 paula.thorogood@gov.bc.ca	x ^w məθk ^w əỷəm (Musqueam Indian Band) Kody Huard, Senior Archaeologist 778-828-1909 khuard@musqueam.bc.ca
səlilwəta l (Tsleil-Waututh Nation) Alessandria Testani, Cultural Heritage Resource Analyst, 604-356-0064 archaeology@twnation.ca	Stó:lō Nation Cara Brendzy, Project Archaeologist 604-858-3366 cara.brendzy@ stolonation.bc.ca	Kwantlen First Nation Chantelle Wegwitz Manager, Operations, 604-888-5556 ext. 206 chantelle@seyem.ca
Tsawwassen First Nation Tia Williams, Archaeology Coordinator 604-948-5305 ext. 258 twilliams@ tsawwassenfirstnation.com	Semiahmoo First Nation Don Welsh, Senior Archaeologist 778-867-2240 dwelsh@ semiahmoofirstnation.org	Katzie First Nation Heather Kendall, Senior Archaeologist 604-459-0374 hkendall@kdlp.ca
Kwikwetlem First Nation Jessica Blesch Special Projects Coordinator, Referrals & Stewardship 778-908-3383 Jessica.Blesch@ kwikwetlem.com	Active Earth Engineering Marek Downarowicz, P.Geo. 778-430-5475 marek@activeearth.ca	BC Coroners Service, Metro Vancouver Region 604-660-7708

Disclaimers:

- This CFMP is not meant to be used in-lieu of a formal archaeological assessment.
- Chance Find Management Plans are most effective when Project personnel involved with ground disturbance receive training, so they understand the implications of unanticipated archaeological site impacts, what to look for, and how to report and manage chance finds. The Chance Find Management Plan and procedures are also most effective when reviewed regularly (e.g., at regular tail gate meetings).
- On-site (or virtual) presentation of these guidelines, by a qualified archaeologist, is necessary for all staff performing ground disturbance. This Chance Find Management Plan must be presented to staff who were absent for the original presentation.

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1.0 Introduction

Kleanza Consulting Ltd. (Kleanza) prepared this Chance Find Management Procedure (CFMP) for Active Earth Engineering (the Client), on behalf of Peter Kiewit Sons ULC, for the proposed dredging and excavation activities at 1950 Brigantine Drive, Coquitlam, BC (the Project). The Project consists of dredging activities within the Vancouver Fraser Port Authority lease area (near 1950 Brigantine Drive) and future upland works to support marine operations potentially consisting of paving select areas, ramp structures, auxiliary buildings, and material storage areas.

The purpose of this document is to address the possibility of archaeological sites or artifacts/belongings¹ becoming exposed during ground-disturbing activities related to Project operations. Protocols are provided to follow in the case of a chance archaeological find, to aid in archaeological sites documentation and protection as required. Information on how to identify common types of archaeological materials is provided. The document describes STOP WORK procedures and explains when and how to contact the appropriate authorities. All personnel working in the Project area should review and follow the procedures outlined in this document.

According to iMapBC, the Project area is situated within the consultation areas of Katzie First Nation, Kwantlen First Nation, Kwikwetlem First Nation, x^wməθk^wəýəm (Musqueam Indian Band), Semiahmoo First Nation, Stó:lō Tribal Council including, Seabird Island Band, Shxw'ow'hamel First Nation, Skawahlook First Nation, Soowahlie First Nation, and Stó:lō Nation, as well as Tsawwassen First Nation, and səlilwətał (Tsleil-Waututh Nation). The Project area also overlaps with the consultation area for Hul'qumi'num Nations including Cowichan Tribes, Halalt First Nation, Penelakut Tribe, Lyackson First Nation, Stz'uminus First Nation, Ts'uubaa-asatx First Nation.

1.1 Objectives

This CFMP aims to promote the identification and management of archaeological sites while minimizing the disruption of development scheduling. All personnel and subcontractors working onsite should familiarize themselves in the application of this chance find procedure **prior** to the commencement of construction. If followed, this procedure will inform all personnel and subcontractors involved in construction activities that:

- heritage resources are protected by law on Provincial lands;
- any archaeological materials or human/Ancestral remains encountered during construction must be reported immediately; and,
- a STOP WORK order must be implemented right away, should any artifacts/belongings or remains be encountered.

¹ Artifact/Belonging - Portable objects or tools made and used by past peoples. Although the term "artifact" is generally used, some Indigenous groups prefer terminology to respect the continual Indigenous ownership of their traditional territories and material culture; therefore, the term "belonging" will also be used in this document.

1.2 Relevant Legislation

Archaeological sites are the physical remains of past human activity. In BC, all archaeological sites are protected by the *Heritage Conservation Act (HCA* 1996), on provincial Crown or private lands. Sites that have been designated by the Archaeology Branch, Ministry of Forests, include those that predate AD 1846, heritage wrecks (vessels or aircraft) abandoned for two or more years, and burial or rock art sites which are protected regardless of age. Protected archaeological sites can only be altered under a Section 12.4 Site Alteration Permit issued by the Archaeology Branch.

The majority of the province has not yet been surveyed for archaeological sites; thus, most archaeological sites have not been recorded. The *HCA* provides substantial penalties for the destruction or unauthorized disturbance of archaeological sites including imprisonment for up to two years and fines of up to \$1,000,000.

1.3 Potential Impacts to Archaeological Sites

Land-altering developments have the potential to impact archaeological and cultural materials. Such developments include the excavation or disturbance of soils or sediments. Anticipated excavations have the potential to negatively impact archaeological and cultural materials. Ground-disturbance may occur in the form of dredging, grubbing, machine excavation, and compaction (from heavy machine traffic).

Although there are no previously recorded archaeological sites overlapping the Project area, located at 1950 Brigantine Drive, Coquitlam, there is one archaeological site with 1 km of this location: DhRq-132, a site containing lithics and faunal remains.

1.4 First Nations Heritage Management Plans

First Nations in BC have a long and complex history dating back at least 14,000 years. Much of this history was not documented using written records like it was in other parts of the world. Instead, rich oral traditions and archaeological remains record the history of BC and the people who have populated it for millennia. These sources show that the First Nations had elaborate social structures, cultural practices, economies, laws, and material cultures.

According to British Columbia's Archaeology Branch archaeological sites, along with oral traditions, are "the only vestiges of a rich history, and protecting and conserving this fragile legacy and non-renewable natural resource is valuable to First Nations, local communities and the general public" (BC Archaeology Branch 2020). In particular, archaeological sites hold importance to BC's First Nations, in that they demonstrate continued land use over time. The people who occupied this area 14,000 years ago are not gone — they still collect traditional foods and materials, still own land and water according to their laws, and still record and tell their own histories. Archaeology is an important tool in helping to record and tell that history.

The majority of the recorded archaeological sites in BC are Indigenous in origin, and First Nations communities have special rights and responsibilities as caretakers of that inheritance. Some First Nations in BC have developed their own formal heritage management policies and plans in response to observed shortfalls in the *HCA*, in relation to community heritage interests and values. As the *HCA* does not extend to federal lands (such as reserves), heritage management plans can provide direction for managing heritage resources in the absence of federal heritage legislation and guidance.

An important part of First Nations heritage management plans is the issuance and management of First Nations heritage inspection permits. Obtaining these permits is a critical part of informing First Nations groups of work being conducted within their traditional territory, allowing them an opportunity to provide feedback on aspects of the work and the reporting, and allowing them a chance to participate in the fieldwork. Kleanza can apply for, and hold, relevant First Nations heritage permits should they prove necessary for the excavations of specific areas.

2.0 Archaeological Chance Find Procedures

If Project personnel believe they have encountered potential archaeological materials, deposits, features, or human remains (whether **intact or disturbed**) they should **<u>STOP WORK</u>** in the vicinity of the find and follow the procedures outlined below:

- 1) **STOP** all construction activities in the vicinity (within 10 metres) of the archaeological find immediately and secure the area. Do not move any soil from the vicinity of the find (including any spoil material).
- 2) Contact your site foreman or supervisor immediately and have them contact Active Earth Engineering Ltd. (778-430-5475) and Kleanza Project Consulting Ltd. (778-847-7082) immediately and notify them of the potential find.
- 3) After providing the archaeologist with a description of the find, the archaeologist may recommend:
 - a. The he/she conducts a site visit to inspect the potential find.
 - b. Further consultation with the Archaeology Branch and involved First Nation agencies.
 - c. That the location of the find be secured and left undisturbed until further communication with the Archaeology Branch can occur and involved First Nations can be notified.
 - d. Where, and to what extent, development activities may continue in other parts of the Project area (if at all).
 - e. After consultation with the Archaeology Branch and involved First Nations, further archaeological management options may be recommended (e.g., initiation of a formal inspection, detailed archaeological excavation, site capping and/or archeological monitoring)
 - f. In the case of especially significant and/or sensitive finds, the Project may need to be temporarily put on hold until further guidance from the Archaeology Branch and involved First Nations.

- 4) Special consideration must be given to human remains or bones that cannot be definitively determined to be non-human.
 - a. If human remains (Ancestral remains) or bones that cannot definitively be identified as non-human (despite the context or level of disturbance), the Project Archaeologist must be notified immediately (778-847-7082).
 - b. All work in the vicinity of the find must **STOP**, and the area of the find must be secured (with controlled access). No work that could potentially disturb the remains can be undertaken, including the removal of adjacent spoil piles or running soil compactors or other machinery. It is recommended that the remains be covered up (i.e., with a clean tarp or similar lightweight material).
 - c. The archaeologist will then notify involved First Nations, the Archaeology Branch, and the local police and/or coroner's office (as necessary).
 - d. An archaeologist or representative with specialized training in physical anthropology/osteology may be required for further onsite assessments.
 - e. If the remains are determined to be non-archaeological, the local policing authority and the coroner's office will provide further guidance. Otherwise, an appropriate course of action will be determined after consultation with involved First Nations and the Archaeology Branch.
 - f. Appropriate protocols for handling human/ancestral remains will require consultation with involved First Nations, with management options including the involved First Nations' Human Remains policies and the Archaeology Branch's Found Human Remains Policy (Archaeology Branch 1999).

It is important to note that the removal of human/ancestral remains (and their subsequent reburial) may involve certain ceremonies and procedures that may delay project activities and may require additional funding from the proponent/developer.

3.0 Archaeological and Cultural Site Types

Archaeological sites consist of artifacts/belongings, features, deposits, and other physical evidence of human habitation in the past. Often, artifacts/belongings on the ground surface are the clearest indicator that an archaeological site is present, especially to those not trained in the identification of archaeological sites.

For the purpose of this CFMP, archaeological and cultural site types have been organized under the nine site types expected within the Project area:

- Lithic artifacts/belongings (chipped stone, ground stone, waste flakes, and fire-altered rocks)
- Bone, shell, and antler artifacts/belongings
- Wet site materials

- Subsurface archaeological deposits (hearths, cultural depressions, cultural shell deposits, and other cultural deposits)
- Archaeological features
- Traditional Use Sites (CMTs, traditional harvest sites, clam gardens, fish weirs/traps, and canoe skids)
- Burials
- Shipwrecks / Plane wrecks
- Historical materials and sites

3.1 Lithic Artifacts

Stone tools, or lithic artifacts, are the most common type of artifact/belonging in BC. Stone was one of the primary materials used by Indigenous peoples to craft tools, ornaments, and other objects. Lithics are broadly divided into two categories:

- **Flaked artifacts** were carefully chipped to form sharp-edged tools like knives and projectile points (arrowheads or spear points). Raw materials include obsidian, chert, and quartz (Figure 1).
- **Groundstone artifacts** were pecked and ground smooth to form tools like axes and adze blades, or ceremonial objects like mauls. They were made from a variety of raw materials, including dacite, quartzite, slate, sandstone, and nephrite (Figure 2).

Lithic artifacts/belongings also include the waste materials produced as a result of forming stone tools, known as **lithic debitage** or **flakes** (Figure 3). Lithics may also be found in collections of two or more pieces, called **lithic scatters**. These collections represent a place where stone tools were made. Be aware of concentrations of stone not native to the area, such as obsidian (Figure 4) and chert, both types of rock that break with a glass-like fracture pattern.



Figure 1. Flaked stone spear points made from basalt and chert.



Figure 2. Groundstone adze blades made from a variety of materials.



Figure 3. Stone flakes, made out of chert and basalt.



Figure 4. Obsidian flakes — note the glass-like appearance. Obsidian is commonly black or grey but can also have red or green colouration.

Fire-cracked rock, or fire-altered rock (FAR) is any rock that has been reddened, burnt, or split from the intense heat of a cooking fire. The presence of FAR indicates the possibility of a hearth, earth oven, and/or prolonged occupation and use area (Figure 5).



Figure 5. Fire-Altered Rock (FAR).



Figure 6. Other examples of Fire Altered Rock (FAR)

3.2 Bone, shell, and antler artifacts

Another important raw material category includes organic artifacts/belongings made from bone, shell, and antler. While none of these materials preserve as well as stone in the archaeological record, they are often present in significant quantities at long-term habitations sites like villages.

Bone artifacts/belongings may include a variety of tools made from worked bone, such as needles, knives, points, awls and scrapers (Figures 7 and 8). This class of material includes processed and unprocessed animal bones, or faunal artifacts/belongings. Typical faunal artifacts/belongings include fishing hooks, and harpoons, awls, needles, and other items for which animal bone was the perfect carving medium. Sometimes, bones are found that have not been shaped into tools, but show evidence of cutting, butchering, or burning by humans. Cooked or burned bone preserves much better than uncooked or unburned bone. Unprocessed faunal material may include land or sea mammals, fish, and bird specimens.

A wide variety of tools and ornaments were produced using marine shell. Shell artifacts/belongings very often include beads and pendants. Types of shell artifacts may include, but are not limited to scrapers, cutting implements or ornamentation (Figure 9).



Figure 7. Worked bone artifacts.



Figure 8. Bone, claw, and tooth artifacts.



Figure 9. A collection of shell beads.

3.3 Waterlogged, well-preserved archaeological deposits (wet sites)

Prior to Euro-Canadian contact, most of the material items used by the Indigenous peoples of BC were made of materials that typically degrade and perish in the elements. Artifacts/belongings made of organic materials such as hardwood,

softwood, bark, roots, animal hides, bone, and even hair and fur typically only preserve in oxygen-free environments that exist in the water-saturated soils below the water table. In these environments, the lack of oxygen inhibits the growth of bacteria and fungi that feed on the organic materials. These sites are relatively rare and typically occur in wetlands, floodplains, intertidal setting, marshes, deltas, rivers, creeks, and bogs.

Wet site materials often include worked wood, worked bark, bark weaving, root weaving, clothing, cordage, ceremonial artifacts/belongings, and wood detritus from fishing weirs, fish hooks, and others (Figures 10 and 11).



Figure 10. Example of a woven bark artifact (left) and cordage (right).



Figure 11. Remains of fish trap in Burrard Inlet.

3.4 Subsurface archaeological deposits

Archaeological sites often contain distinct horizontal layers of cultural deposits that represent prolonged pre-contact period human activity. These include buried ground-surfaces that show evidence of being heavily used in the past, such as house-floors, occupation areas and activity areas, such as hearth features. These types of cultural deposits can all be identified by high compaction, a linear subsurface concentration charcoal, fire-reddened soil (Figure 12), rich layers of organic material, and/or fire-cracked rock. Subsurface cultural deposits may also include cultural shell deposits (midden), subsurface lithics, or other features such as cultural depressions, hearths, and partial structures.



Figure 12. Example of subsurface cultural layer. Note the band of blackened greasy soil.

Another type of distinct strata is **cultural shell deposit** (Figures 13 and 14). A cultural shell deposit is characterized by the presence of fragmented or whole shell suspended in dark brown greasy organic-rich matrix, which commonly contain charcoal, ash, fire cracked rock and burnt sediments, as well as stone, bone, shell and antler artifacts/belongings. Cultural shell deposit deposits vary from small pockets to very large sites several hundred meters square and are usually, but not always, found along or near the shoreline. Cultural shell deposits can also be very fine and at times hard to discern from the surrounding sediments, as shown in Figure 14.



Figure 13. Example of cultural shell deposit contained within an organic matrix, indicated by black, greasy sediment and thick, sharp shell deposits.



Figure 14. Example of fine cultural shell deposit and faunal remains in river sand, indicated by small, sharp shell fragments.

Additionally, cultural shell deposits can be located in areas that have previously experienced ground disturbance and/or re-deposition (Figure 15). It is important to note that such **disturbed cultural materials are still considered archaeological sites and still protected under the** *HCA*.



Figure 15. View of a disturbed cultural shell deposit. Note the metal hardware in the middle of the photo (and amongst the disturbed cultural shell deposit).

3.5 Archaeological Features

Archaeological features are non-moveable elements of an archaeological site. These can include remains of longhouses, hearths and **cultural depressions**. Cultural depressions include cache pits, roasting pits, house pits, or house depressions. Cache pits are the most common type and can be isolated or found in clusters (Figure 16). Most of these pits were used for storing food or other items and can be found on flat or sloping terrain. They were sometimes lined with stone or organic materials. They can be hard to distinguish from the surrounding landscape, so reliance on identifying their uniform (usually) round shape and distinct rim is key.

Round cultural depressions may also be roasting pits (Figure 17). Concentrations of charcoal, ash and fire-cracked rocks are all characteristics that may indicate a depression was used as a roasting pit.



Figure 16. Example of a round cache pit



Figure 17. Profile of an excavated roasting pit. This pit was lined with a band of charcoal and fire-reddened soil and was later partially filled in by flood-deposits (silts).

3.7 Traditional Use Sites

Traditional use sites are the tangible (physical) and intangible (non-physical) components of land and water used by First Nations, including places, objects, oral traditions, culture, history, concepts, and behaviors. These sites are cultural heritage sites that relate to a traditional societal practice, and include important resource gathering areas (both on land and in the water), sites of spiritual or historical significance, culturally modified trees, or ceremonial sites. Traditional use sites in BC are not automatically protected under the *HCA* (unless they pre-date 1846), though they may have significance for local First Nations communities.



Figure 18. Some traditional use sites are difficult to spot. They may be areas where a particular resource is abundant, such as plant or berry-picking areas

Traditional use sites can include harvest areas (Figure 18) that have been used for generations (sometimes extending back into the far past). **Culturally modified trees (CMT)** are an example of this continuous use (Figure 19).



Figure 19. A Culturally Modified Tree with a (recently) removed bark-strip on the right and an older removed bark-strip on the left.

Other traditional use areas can represent a significant investment in time to construct and maintain. Fish weirs/traps and clam gardens are good examples of traditional use areas with more permanent features on the landscape (Figure 20).



Figure 20. A clam garden on Vancouver Island, note the constructed low wall of rocks (closer to the water).

Some traditional use areas are locations where local First Nations conducted and continue to conduct culturally significant spiritual practices. These areas are intentionally unrecorded and are often not available to the public, and archaeologists. This is an important reason for archaeologists and First Nations to work closely together, as these areas of significance can be discussed in confidence prior to project commencement.

3.8 Burials

Any physical ancestral human remains, rectangular depressions, or whole or fragmented cedar box remnants may be an indication of a burial site. Cremations are often observed as dense concentrations of charcoal, ash, and fire-altered rock.

If possible Ancestral Remains or indicators of pre-contact period human remains (i.e., rectangular depressions, rock cairns, or cremations) are observed, all work **MUST STOP** and Project personnel must contact a qualified archaeologist who will assess the find and contact the Archaeology Branch, client, and involved First Nation agencies where appropriate. If obvious recent human remains are identified, the Police and coroner should be contacted directly. Respect is paramount when dealing with Ancestral Remains or other burial features — they should be shown the proper respect and dignity owed to any human being, living or deceased.

3.9 Historical materials and sites

This class of material includes historical (post-1846) structures, ceramics, wooden artifacts, metal artifacts, glass, trap boxes, historical structures, furnishings, clothing, and buttons, among others (Figure 21). Post-1846 materials are typically not protected under the *HCA* but may be protected by federal or municipal legislation.



Figure 21. Examples of historic materials post-dating 1846.

3.10 Heritage wreck sites

The HCA affords automatic protection to wrecked naval vessels or aircraft if two or more years have passed from the date that the vessel or aircraft sank, washed ashore, or crashed, or abandoned. This class of sites includes vessels that were accidently wrecked/crashed or purposefully sunk/scuttled (e.g., Figure 22). In addition to the HCA, some of these sites might be protected under municipal legislation.



Figure 22. Shipwreck site in Westham Island, Delta, BC.