CANADIAN PACIFIC RAILWAY

Construction Environmental Management Plan

Cascade Capacity Expansion Project

Updated October 2019 – 18-7764

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1.0 Introduction

Canadian Pacific Railway (CP) is proposing to expand existing railway infrastructure to increase capacity along a section of their mainline right-of-way (ROW) on the Cascade Subdivision. The Cascade Subdivision is one of CP's busiest subdivisions and the proposed Project will expand rail capacity into and out of the Port of Vancouver. Growth in freight volumes into and out of port facilities on the south shore of the Burrard Inlet requires an increase in rail capacity on the west end of CP's Cascade Subdivision. A section of third track will increase track capacity and will reduce potential delays to both freight and passenger train traffic through the area on the mainline tracks.

The proposed lead/service track will be situated within CP's ROW on the north side of the existing mainline tracks. The addition of the proposed switching lead/service track will require extending the embankment by the addition of structural fill and large rock rip rap into the riparian and foreshore areas of Burrard Inlet at several locations. The Project will also include the construction of three beaches on two sites as fish habitat offsetting: two beaches situated east of Barnet Marine Park in Burnaby; and one west of New Brighton Park in Vancouver. The construction of offshore reefs is also proposed at both locations.

1.1 Purpose of the Construction Environmental Management Plan

The Construction Environmental Management Plan (CEMP) describes the environmental performance standards and responsibilities of the Contractor(s) in executing the Project. This CEMP describes the site-specific mitigation measures and Best Management Practices (BMPs) which will be implemented by CP and any Contractors on-site.

The following sections are contained within this CEMP:

- Identify Project information location, scheduling, and contact information. Specify environmental roles and responsibilities. (**Section 1.0**);
- Identify key environmental features and values in the area that could be potentially affected by Project construction (**Section 2.0**);
- Identify environmental regulatory requirements (**Section 3.0**);
- Identify elements of the work that could present a risk to the receiving environment and identify BMPs and/or work procedures that will be followed to minimize environmental risks (**Section 4.0**);
- Provide site-specific mitigation and BMPs to be applied throughout the identified phases of construction (**Section 5.0**);
- Provide a protocol to respond to chance archaeological finds (**Section 6.0**);
- Provide a protocol to respond during emergency situations or spills (**Section 7.0**);
- Provide direction regarding post-construction follow-up and conclusion (**Sections 8.0**);
- Provide direction on management of Japanese knotweed (**Appendix A**); and

- Provide environmental spill response planning and incident reporting procedures (**Appendix C**).

The guidelines and procedures addressed herein apply to all on-site activities. CP and Contractors will undertake Project activities in strict compliance with the direction provided in this CEMP and the conditions contained in the applicable authorizations, permits, licenses, and approvals from the environmental regulatory agencies. In addition, CP and Contractors will rely on Dillon to assist in the implementation of BMPs as appropriate. Overall, the intent of this CEMP is to provide guidance to CP and Contractors to help them meet or exceed environmental compliance requirements. This will also assist CP in achieving its overarching goals and standards in relation to environmental management and sustainability.

This CEMP is not intended to address health and safety issues during the construction of the Project. Work by Dillon, CP or other Contractors on-site will be conducted in accordance with WorkSafe BC Standards.

1.2 Project Location and Scope

The proposed Cascade Capacity Expansion Project is located between Reed Point Marina and Mile 118.82 along the shoreline of Burrard Inlet (**Figure 1**) and crosses the municipalities of the City of Port Moody and the City of Burnaby. The proposed service track is to be 1,100 metres (3,600 feet) in length and situated on the north side of the existing mainline tracks, and include the intertidal and riparian zones. The proposed offsetting areas are situated east of Barnet Marine Park in Burnaby, as well as west of New Brighton Park in Vancouver and include the subtidal, intertidal and riparian zones.

The Project Area extending approximately 450 metres to the west from the existing Burrard Terminal to the western extent of the proposed alignment is hereafter referred to as Area 1; the Project Area extending approximately 294 metres to the east from the existing Burrard Terminal to the west end of the Reed Point Marina parking lot is referred to as Area 2. The area between Areas 1 and 2 is referred to as Area 3 (**Figure 2**).

Canadian Pacific

Cascade Capacity Expansion Project

Figure 1.
Project Location

0 25 50 100 Meters

N W E S

SCALE 1:3,500

MAP DRAWING INFORMATION:
ESRI Basemaps, City of Burnaby (Imagery - 2017), and City of Port Moody (Imagery - 2012)

MAP CREATED BY: RBB
MAP CHECKED BY: RD,CN,PS
MAP PROJECTION: NAD_1983_UTM_Zone_10N

DILLON CONSULTING

PROJECT: 18-7764
STATUS: DRAFT
DATE: 2018-10-02

Canadian Pacific

Cascade Capacity Expansion Project

Figure 2
Assessment Areas

Legend

- Assessment Area
- Existing Track
- Existing Waterway
- Municipal Boundary

0 30 60 120 Meters

SCALE 1:4,000

N W E S

MAP DRAWING INFORMATION:
ESRI Basemaps, Dillon, City of Vancouver, and AECOM

MAP CREATED BY: BS
MAP CHECKED BY: RD
MAP PROJECTION: NAD 1983 UTM Zone 10N

DILLON CONSULTING

PROJECT: 18-7764
STATUS: DRAFT
DATE: OCTOBER 2019

1.3 Project Description

CP is proposing to expand existing railway infrastructure to increase capacity along a section of their Cascade Subdivision from Port Moody to Burnaby on the west end of CP's Cascade Subdivision. A section of third track will increase track capacity and will reduce potential delays to both freight and passenger train traffic travelling on the mainline tracks through the area. The proposed new lead/service track will be situated on CP property on the north side of the existing mainline, and will require the widening of the existing slope/embankment onto the Burrard Inlet foreshore at several locations. The completed embankment and new track will be permanent structures. Three new beaches and a number of offshore reefs will also be constructed as fish habitat offsetting and will be permanent structures.

While the ultimate approach to construction of the Project will be determined by the selected Contractor, it is anticipated that construction of the rail embankment will include the following activities:

- Site mobilization including establishment of temporary access pads, access roads and rail crossings;
- Clearance of vegetation as required;
- Installation of riprap toe/base material;
- Installation of approximately 22,800 m^3 of fill material below the high water mark, including structural fill and riprap; and
- Site clean-up, restoration and demobilization.

Both road and marine-based (i.e., barge) options, or a combination thereof, have been identified for access and egress to/from the Project site for the inbound and outbound movement of construction materials and equipment. Temporary road access is required as established vehicular access from the road network/rail corridor to the Project area is not available. The road option includes the development of temporary access routes and laydown areas along the south side of the CP mainline tracks to access the Project area and for the delivery and storage of equipment and materials. The marine option includes the installation of a temporary unloading pad at the west end of the Project area facilitating the delivery/removal of materials by marine barge. Barge operations will be managed by the Contractor following Transport Canada requirements to minimize potential interference with active commercial and recreational navigation. Some materials (e.g., pre-manufactured materials) may be delivered by rail. CP continues to work with adjacent leaseholders to identify other potential access and egress opportunities. All temporary work areas will be removed following the completion of construction; the temporary work areas at the Suncor site will be converted to fish habitat offsetting (see Section 8).

Upon completion of the embankment, rail infrastructure will be installed and connected to Suncor's private trackage at the Burrard Products Terminal. This phase of construction is anticipated to occur following completion of the sub-ballast platform that will support the rail for the new lead/service track.

Construction of fish habitat offsetting will be completed strategically to align with other construction activities where appropriate equipment and materials are being used.

1.4 Project Scheduling and Timing

Construction is anticipated to take approximately nine months to complete. CP is anticipating the start of construction to occur on December 1, 2019 and will align as much of the in-water work with the Burrard Inlet "fisheries window" when fish are at least risk to potential construction impacts. The annual fisheries window extends from August 16 to February 28/29.

A summary of the project schedule and milestones is provided in **Table 1,** below.

Project work is scheduled to occur daily and within the Port of Vancouver's regular hours from Monday through Saturday between 7:00 am and 8:00 pm. For a number of scheduling reasons that include the duration of the "fisheries window", unfavourable tides during daytime hours, and peak recreation use of local facilities and Burrard Inlet, CP has applied to the VFPA for authorization to undertake construction of the proposed Project with extended work hours following the Port's *Guidelines – Requests to Conduct Construction Outside of Regular Work Hours* (February 2018).

Table 1. Proposed Project Schedule and Milestones

Project Activity	Anticipated Timing
• Mobilization, start of construction[1]	• December 1, 2019
• Construction ○ Temporary isolation barriers for in-water works[2] ○ Temporary work areas[2] ○ Habitat offsetting areas ○ Embankment[3]	• December 1, 2019 – December 31, 2020
• Demobilization	• December 31, 2020
• New service/lead track in service	• May 1, 2020

[1] Mobilization, site facilities and temporary working areas, and access routes/track crossing.
[2]In-water temporary isolation barriers and temporary work areas below the high high water mark (HHWM) are anticipated to remain in place until December 31, 2020 to complete removal activities within the in-water work timing window (*i.e.,* August 16 – February 29).
[3]Includes track work which will occur above the HHWM or within temporary isolation structures.

1.5 Roles and Responsibilities

1.5.1 Proponent Responsibilities

CP is responsible for compliance with the requirements of applicable environmental legislation and other applicable legal requirements and the practices and procedures identified in the CEMP. CP is responsible for ensuring that all staff and subcontractors working on-site are familiar with and comply

with the contents of the CEMP and environmental BMPs and that their employees and contractors and their subcontractors have appropriate environmental training including:

- Environmental Legislation and Regulations Awareness;
- Spill Prevention and Response;
- Working In and Around Water; and
- Archaeology and Cultural Resources Awareness.

Prior to the start of any construction activities, CP will confirm that the CEMP prepared by Dillon has been fully reviewed and checked, and complies with the requirements of the Contract and applicable laws. **Table 2** identifies the responsibilities of key personnel on the Project. For the duration of construction activities and following Project completion, CP will:

- Ensure that all appropriate environmental safeguards are planned and executed in the course of performing the work. This includes the timely acquisition and handling of any required permits, licenses, and notifications as required and executing the requirements of those permits appropriately;
- Keep environmental disturbances to the minimum necessary for accomplishing the proposed Project activities in compliance with BMPs outlined in the CEMP and as directed by the Environmental Monitor;
- Comply with any written or verbal directions given by Dillon's Representative or the Environmental Monitor to protect and preserve the environment as outlined in the CEMP or as deemed otherwise necessary;
- Take every precaution to avoid unnecessary impacts to the natural environment, both within and adjacent to the Project footprint;
- Ensure that good housekeeping practices are implemented for the duration of the Project; and
- Leave the job site in a safe, clean, and environmentally stable condition.

Table 2. Responsibilities of Key Personnel

Role	Responsibility	Name	Organization
CP's Representative	• Promotes and supports adherence to the requirements set out in the CEMP and other applicable legislation. • Communicates environmental responsibilities and requirements of the CEMP to CP staff and contractors and their subcontractors. • Ensures that applicable CP staff and contractors and their subcontractors are appropriately trained to prevent or mitigate environmental impacts. • Addresses deficiencies and any non-compliance items raised by the Environmental Monitor through CP staff and contractors and their subcontractors.	Chris Dane (Project Manager) Joe Van Humbeck (Manager, Environmental Assessment) Alex Sartori (Project Environmental Manager)	CP

Role	Responsibility	Name	Organization
Environmental Monitor	• Reviews and understands the CEMP and communicates requirements to contractors and their subcontractors. • Ensures compliance with the CEMP through regular and appropriate monitoring according to conditions and planned activities at the site. • Advises on issues of non-conformity to the CEMP. • Has the ability to stop work if environmental damage is imminent. • Maintains appropriate records/photos of site visits, activities, compliance with the CEMP and risks to the environment. • Completes environmental monitoring reports at an agreed upon frequency. • Ensures appropriate regulatory bodies are notified as needed or appropriate in the event of CEMP non-compliance or an environmental incident.	To be determined	Sartori Environmental Inc.
Construction Contractor	• Provides oversight on day-to-day implementation of the CEMP. • Interacts with the Environmental Monitor to ensure environmental protection through effective implementation of CEMP mitigation and by responding to non-conformances that may arise. • Coordinates appropriate response in the event of a spill or environmental incident.	To be determined	To be determined

1.5.2 Environmental Monitor Responsibilities

The Environmental Monitor is responsible for ensuring the environmental protection objectives established by CP, DFO, and VFPA are met by ensuring compliance with the CEMP and applicable environmental legislation. The Environmental Monitor is responsible for ensuring that all staff and subcontractors working on-site are familiar with and comply with the contents of the CEMP and Environmental BMPs.

Primary responsibilities of the Environmental Monitor are outlined in Table 2; however, they are subject to change according to the methods, needs and scope of the Project. For the duration of construction activities and following Project completion, the Environmental Monitor will:

- Review and understand the CEMP;
- Communicate the requirements of the CEMP to CP and its contractors and their subcontractors and assists with implementation of mitigation and BMPs;
- Ensures compliance with the CEMP through regular and appropriate monitoring according to conditions and planned activities at the site;
- Advise on issues of non-conformity to the CEMP;
- Be present during key monitoring stages such as during activities conducted below the high water mark, installation of erosion and sediment control measures and during Project start-up;

- Adjust monitoring frequency according to weather conditions, planned site activities and in consultation with permit holders and regulatory agencies;
- Conduct routine and random inspections of construction activities and practices at an appropriate frequency based on the work planned;
- Be available on-call in case of emergency environmental concerns during low risk work activities;
- Attend environmental pre-job meetings with CP staff as required;
- Stop work if environmental damage is imminent or occurring;
- Maintain appropriate records including photos and documentation of site visits, activities, compliance with the CEMP and risks to the environment;
- Complete environmental monitoring reports at an agreed frequency to the permit holder, VFPA and other regulatory bodies as required for permit conditions. An example Monitoring Report is provided in **Appendix B**; and
- Ensure appropriate regulatory bodies (i.e., VFPA, DFO) are notified in the event of an environmental incident (*e.g*. discharge of deleterious substances into a waterbody; work and/or removal of vegetation in or near waterbodies without regulatory approval; death of fish or wildlife, etc.).

1.5.3 Contractor Responsibilities

Prior to the start of any construction activities, the Contractor(s) will review and familiarize themselves and any subcontractors with the CEMP, Port permit and DFO Authorization. For the duration of construction activities and following Project completion, Contractor(s) will:

- Ensure that appropriate environmental safeguards are executed in the course of performing the work;
- Comply with the Project permits and authorizations as well as any applicable federal, provincial and municipal laws, regulations or policies;
- Keep environmental disturbances to the minimum necessary for accomplishing the proposed Project activities in compliance with BMPs outlined in the CEMP and as directed by the Environmental Monitor;
- Comply with any written or verbal directions given by Dillon's Representative or the Environmental Monitor to protect and preserve the environment as outlined in the CEMP or as deemed otherwise necessary;
- Correct any deficiencies and non-compliance issues, as soon as reasonably possible, ideally within 24 hours of written or verbal instruction;
- Take precautions to avoid unnecessary impacts to the natural environment, both within and adjacent to the Project footprint;
- Ensure that good housekeeping practices are implemented for the duration of the Project; and
- Leave the job site in a safe, clean, and environmentally stable condition.

Aquatic life salvage is to be conducted by the contractor/and or its environmental representative.

A Project contact list will be maintained and circulated to key personnel throughout the construction phase of the Project. It will include the regulatory bodies that have input to the Project and other relevant contacts. A preliminary Project contact list has been prepared below (**Table 3**) and will be finalized and circulated before construction begins.

Table 3. Project Contact List

Name	Role/Company	Phone Number
Joe Van Humbeck	CP Proponent	403-319-6530
Paul Schaap	Environmental Lead at Dillon	604-351-1174
Kiley Gibson	CP Environmental Specialist	403-319-6234
Regan Elley	VFPA Contact	604-665-9594
Vance Mercer	DFO Contact City of Port Moody Contact	604-666-2427
	City of Burnaby Contact	
	Construction Foreman	
	Site Engineer Environmental Monitor	

1.5.4 Communication

Communication between all parties involved during each phase of construction is paramount to timely and efficient implementation of the CEMP. The following communication measures will be implemented:

- The CEMP will be made available to key representatives of the Project/Construction team prior to commencement of the proposed work and will be available at all times at the work site during construction;
- A pre-construction meeting(s) will be convened between CP, Dillon and those undertaking the construction of the Project to review the CEMP and to outline the roles and responsibilities of each party; and
- The construction lead and contractors and their subcontractors will ensure that the CEMP is accessible to their employees at all times over the duration of the construction period.

Construction and environmental monitoring reports outlining site activities will be prepared at an agreed upon frequency and forwarded to the appropriate CP Representatives.

Environmental incidents will be reported to CP's Representative and the Environmental Monitor immediately, so that appropriate notifications can be made and site management personnel can ensure that incidents are handled appropriately. For response to spill emergencies, refer to **Appendix C** (General Emergency Spill Response Plan). Spills will be promptly cleaned up and reported in accordance with regulatory agency requirements.

Representatives of the Indigenous communities, regulators and stakeholders will be informed immediately in the event of a spill, accident or malfunction potentially affecting the environment.

2.0 Environmental and Cultural Features of the Project Area

Elements of the environment potentially affected by construction of the proposed Project include the intertidal and subtidal zones of Burrard Inlet (marine habitat), riparian vegetation (i.e., trees, shrubs and herbaceous plants) situated between Burrard Inlet and CP's existing mainline tracks, and freshwater drainage pathways that convey surface and groundwater from areas south of the CP right-of-way to Burrard Inlet via culverts. Biotic diversity in both areas of the Project (i.e., Areas 1 and 2) is low with common species of barnacle, clam and crab being the most abundant within the intertidal/subtidal zones. Rockweed, sea lettuce and sugar kelp were the most common vegetation species. Five species of fish were observed during field surveys.

A preliminary archaeological assessment identified lands with high archaeological potential; however, local alterations of the area for industrial development have significantly reduced the archaeological potential. An archaeological impact assessment (AIA) was subsequently conducted through completion of a field program. The AIA indicated that the footprint of construction generally had low archaeological potential due to the sloping terrain and landscape alterations. One site with high potential was tested, but results were negative.

The Species at Risk that were observed during field investigation was the Great Blue Heron (*Ardea herodias*). The Great Blue Heron (*fannini)* subspecies is Blue-listed in BC and may be found within the Project Area; however, its presence in the Project Area is considered transitory. No colonies were observed during the site assessments.

Although the likelihood of occurrence in the Project Area is low, Species at Risk considered in the Fisheries Authorization and Vancouver Port Authority applications include the following:

- Leatherback sea turtle (Pacific population) (*Dermochelys coriacea*) – Endangered
- Northern abalone (*Haliotis kamtschatkana*) – Endangered
- Basking shark (Pacific Population) (*Cetorhinus maximus*) – Endangered
- Killer whale (Northeast Pacific Transient Population) (*Orcinus orca*) – Threatened
- Killer whale (Northeast Pacific Southern Resident Population (*Orcinus orca*) – Endangered
- Harbour porpoise (Pacific Ocean population) (*Phocoena phocoena*) – Special Concern
- Humpback whale (North Pacific population) (*Megaptera novaeangliae*) – Special Concern
- Grey whale (Eastern North Pacific population) (*Eschrichtius robustus*) – Special Concern
- Stellar sea lion (*Eumetopias jubatus*) – Special Concern
- Green sturgeon (*Acipenser medirostris*) – Special Concern

Detection of any of these or other Species at Risk on-site within the Project Area or immediately adjacent to activities occurring in the Project Area that may cause harm to the Species at Risk would

require immediate cessation of activities and reporting to the Environmental Monitor and the appropriate regulatory authorities. Impact mitigation plans would then be developed prior to the re-initiation of construction.

3.0 Regulatory Background and Requirements

As a federally-regulated entity, CP is required to comply with the following applicable federal environmental legislation (**Table 4**):

Fisheries Act

The *Fisheries Act* is the primary federal legislation providing protection for all fish, fish habitat, and water quality and is administered by DFO and Environment Canada. The overarching goal of the *Fisheries Act* is to prevent a "harmful alteration, disruption or destruction (HADD)" of fish and fish habitat.

Dillon has submitted a "Request for Project Review" to DFO for the proposed Project.

Species at Risk Act

The federal *Species at Risk Act* (SARA) comprises legislation that prohibits the killing, harming, harassing, capturing or taking of species at risk, or destruction of their critical habitats. Background review and site assessments of the area have indicated that there is a low risk for rare and/or endangered species to be present in the Project Area. However, a grass microhabitat east of the Suncor facility has been identified that will require salvage and relocation to accommodate construction.

Migratory Birds Convention Act

The *Migratory Birds Convention Act* prohibits the taking or killing of migratory bird nests and eggs, and the deposition of harmful substances in areas frequented by migratory birds. Vegetation removal that will affect trees used by all birds and other wildlife must be avoided while they are breeding, nesting, roosting or rearing young.

Other Guidance Documents

Other applicable federal and other environmental standards, guidelines and Best Management Practices are available for application during the proposed capacity expansion Project.

Table 4. Summary Table of Relevant Environmental Legislation

Act, Regulation or Bylaw	Applicability	Approval or Permit in Place/Forthcoming
Fisheries Act	The proposed work will include vegetation clearing and re-planting, minor excavation of soils, placement and grading of structural fill, use of industrial equipment, and placement of riprap shoreline protection material below the high water mark, as well as the construction of three beaches as fish habitat offsetting. Instream work within isolation barriers will also be completed.	Application for Authorization under Paragraph 35(2)(b) of the *Fisheries Act* currently under review by DFO. Scientific Fish Collection Permit

Act, Regulation or Bylaw	Applicability	Approval or Permit in Place/Forthcoming
Species at Risk Act	Although the potential is unlikely, several Species at Risk have been identified as potentially occurring on or near the Project Site.	QEPs have completed surveys and background review for Species at Risk and developed appropriate BMPs and mitigation measures.
Migratory Bird Convention Act	Vegetation clearing required for proposed work at Project Site.	Vegetation clearing will take place during the window of least risk; appropriate BMPs will be in place and enforced by Environmental Monitor on-site.
VFPA Fee Schedule	VFPA fees are applicable to all parties granted the right by VFPA to occupy lands owned, managed, or administered by VFPA.	VFPA Category C application in progress; any activities that have associated fees (*e.g.*, operation of non-road diesel engines) will require approval by VFPA and applicable fee payment.

Although not required to comply, CP has considered provincial, municipal and other regulations when developing this CEMP and has integrated the associated BMPs to reduce the environmental impact of the Project and as a measure of good faith to comply with other stakeholder's legislation and regulations. Other legislation and regulations considered during development of this CEMP include the following:

- *Environmental Management Act*;
- BC *Wildlife Act*;
- BC *Weed Control Act*;
- *Water Sustainability Act*;
- *Heritage Conservation Act*; and
- Relevant City of Port Moody and City of Burnaby Bylaws.

4.0 Best Management Practices for Construction

The Project has the potential to result in negative effects to fish and fish habitat; this includes the potential for HADD to the broad definition of fish and their habitats under the *Fisheries Act*. This section outlines the impact avoidance and mitigation measures and BMPs that will be applied during construction of the proposed Project and which will be overseen by the Environmental Monitor. The specific practices to be applied at any one area of the construction site are detailed in Section 5 of this CEMP.

Regarding the frequency of environmental monitoring, it is anticipated that the Environmental Monitor will have a significant presence on-site during Project initiation, the establishment of environmental controls, and key activities taking place in areas where sensitive environmental features/functions may be affected. Initially, frequent monitoring is anticipated to assess the efficacy of environmental controls. The requirement for visits to the Project site will subsequently be reduced as construction proceeds and, in particular, once construction activity is above the high water level of Burrard Inlet.

4.1 General Practices

The following general measures and best-practices will be implemented:

- A Pre-construction Meeting will occur before site construction begins to ensure CP, Environmental Monitors and contractors on-site are familiar with the CEMP and associated BMPs and ensure appropriate equipment and personnel are in place to execute the CEMP and BMPs, as required;
- Contractors and site managers will review the CEMP and applicable guidelines and regulations prior to each Project phase or new activity;
- Contractors must be able to properly install any protection measures and understand BMPs used on the Project. If measures are not properly installed, they will not provide the necessary environmental protection; therefore, the measures will not be in compliance with the CEMP;
- Contractors will undertake regular maintenance of the implemented BMPs to ensure that they remain in compliance with the CEMP;
- Appropriate supplies (*e.g.*, rock, gravel, grass seed, silt fencing, staking, polyethylene sheeting) required to execute BMPs (*e.g.*, erosion and sediment control measures) must be readily available on-site in sufficient quantities for the site;
- Project activities with the potential to cause environmental harm during inclement weather will be scheduled for dry or fair weather whenever possible to minimize the environmental impact. Project works that will not cause environmental harm may be permitted during times of extreme precipitation (*i.e.,* storm events of 25 mm of rain within a 24-hour period); and
- Site managers and contractors will be prepared to change existing mitigation measures and BMPs should they fail or be deemed inadequate by the Environmental Monitor or a regulatory

agency. The Environmental Monitor will be notified of the changes to ensure they are adequately addressing the environmental concerns.

4.2 Site access, Mobilization and Laydown Areas

Prior to construction, details of access to the site, mobilization of equipment, hauling access and routes, equipment laydown areas, and re-fueling stations will be described and mapped in detail. There are five possible access routes that may be implanted to access the site as detailed in Section 5.1. Laydown and refueling areas are discussed in **Section 5.2**. Regardless of the chosen options, the following measures will be integrated into the design and designation of access routes and laydown areas and BMPs will be in place during construction to minimize the environmental impacts associated with access, mobilization and laydown:

- Mobilization will be planned to minimize the number of trips to and from the Project site;
- The identified laydown areas for equipment and materials are located on flat, stable areas where environmental risk will be minimized;
- Stockpiling of rock containing fines, erodible sediment or fill material will not occur on-site unless it is covered and other appropriate BMPs applied to mitigate offsite runoff;
- Track out of vehicles from site will be managed (*i.e.*, sweeping of road ways and the use of large gravel at the road access points) to reduce dispersion of sediment and material offsite;
- Material brought to site by barge will be delivered under appropriate tidal conditions; and
- Grounding of barges will not be permitted.

4.3 Air Quality

Equipment will be utilized throughout the duration of construction activities. Construction activities can cause adverse impacts to local air quality. The following mitigation measures will be implemented during all phases of construction to mitigate concerns regarding the potential degradation of local air quality during construction:

- No on-site burning of cleared vegetation or other construction-related materials will be permitted;
- Mechanical equipment that is required on-site will be in good working order and will comply with local emissions standards;
- Idling of vehicles and equipment will be kept to a minimum;
- Low-sulphur fuels will be used for on-site machinery;
- CP's contractor will visually inspect vehicles and equipment. Vehicles or equipment producing excessive exhaust pollution will be repaired or replaced at their cost prior to being used on the Project;
- Loads of dusty material will be covered when entering or leaving the site;
- Track out of vehicles from site will be managed (*i.e.*, sweeping of road ways and the use of large gravel at the road access points) to reduce dispersion of debris and dust; and

- Dust-generating activities will be minimized as much as possible during windy periods to minimize airborne dust emissions. Water or some other environmentally acceptable dust suppressant and appropriate application equipment will be available to be used as needed. Chemical dust suppressants will not be used. Runoff from dust suppressant agents will be considered under **Sections 4.6, 4.7**, and **4.8**.

4.4 Construction Noise

Short-term noise generation will result from construction equipment and associated activities during all phases of Project construction. The following general measures will minimize the potential for construction-related noise effects:

- Equipment will be properly maintained to limit noise generation and fitted with functioning exhaust and muffler systems;
- Equipment and machinery will be turned off (as appropriate and in compliance with Section 4.3 Air Quality) when not in use;
- As much as possible, construction activities will be coordinated with daytime periods;
- CP will consider municipal and regional (*e.g.*, VFPA) noise bylaws. An exemption to allow for night work has been submitted; and
- Noise monitoring will be conducted during noisy activities to ensure the predicted impacts are not exceeded, particularly during any marine aquatic pile driving.

4.5 Machinery and Equipment

It is anticipated that heavy equipment and machinery will be necessary for on-site Project activities during all phases of construction. The Contractor(s) shall provide a list of equipment and machinery to be used on-site during construction and identify the equipment type, fuel type, year of manufacture, and engine power rating for each piece of equipment. This list will be provided to CP and the Environmental Monitor to ensure distribution to the relevant regulatory agencies. Mitigation measures in place to reduce the impact of machinery and equipment on-site are as follows:

- Equipment will be properly maintained and in good working order to prevent leaks or transmission of noxious fumes;
- Equipment should be inspected daily, and any identified wearing parts will be replaced and leaks repaired;
- Equipment will be cleaned prior to arrival on-site and before demobilization from the site in order to reduce the potential for the spread of invasive plant species;
- Machinery working in or around water will have marine grade fluids and oils;
- Machinery working in or around water will utilize biodegradable hydraulic fluid where its use is compatible with the manufacturer's specifications of construction equipment required to achieve project-specific construction objectives;
- A spill containment kit will be readily accessible on equipment and at a central location within the site (See Section 7.3);

- Equipment will be operated at optimum rated loads and turned off when not in use;
- Refueling of equipment will occur on land and at least 30 metres from any waterbody where possible. Tow-vessels bringing barges to site will not be refueled within the Project Area. Appropriate spill prevention and containment measures will be in place at all times during refueling or during the use of petroleum or other harmful chemicals on-site; and
- Light pollution during night work will be minimized by pointing lights downward and placing task lighting as close to the work area as possible.

4.6 Erosion and Sediment Control

CP will comprehensively address erosion and sediment control (ESC) issues as directed by the Environmental Monitor and outlined in this CEMP throughout the duration of the Project to prevent the mobilization and deposition of sediment. The following mitigation measures have been developed to minimize the effects of construction on the aquatic habitat of Burrard Inlet:

- Erosion and sediment control equipment and devices will be readily available and in sufficient quantity on-site. Construction team members will be trained in the appropriate installation and use of ESC equipment. The Environmental Monitor will review installation and approve placement prior to work beginning;
- Construction team members will be prepared to install ESC equipment and measures quickly to minimize sediment entering receiving waterbodies. The overall goal is to isolate the work area and prevent any potential sediment laden runoff from entering a waterbody;
- Isolation barriers (*e.g.*, floating silt curtain, coffer dam, or equivalent) will be installed during periods of in-water work in areas where fine-grained substrates are present to isolate the site and contain sediment that may be conveyed from the construction footprint (the installation of large rip rap associated with the offsetting habitat in areas of coarse-grained substrate will occur without isolation);
- Filter bags will be used within catch basins on paved surfaces at Reed Point Marina, ChemTrade and Suncor;
- Rock to be placed below the high water mark of Burrard Inlet will be washed prior to arrival onsite and free from silt prior to installation;
- Silt fence will be installed parallel to watercourse crossings, set at a distance of 15 metres from the top-of-bank. Silt fence will be embedded 300 mm within a trench compacted with backfill or small gravel. Ends of silt fence will overlap by 400 mm;
- Exposed soil and sediment on-site will be minimized through phasing of construction activities, retaining as much vegetation as possible, or covering erodible exposed areas with an appropriate temporary material (*e.g.*, plastic sheeting or filter cloth);
- Disturbed areas with exposed soil will be stabilized at the end of construction through the effective use of soil cover (*e.g.*, vegetation, straw mulch, erosion control blankets) to minimize soil erosion;
- Project activities with the potential to cause environmental harm during inclement weather, will be scheduled for dry or fair weather, whenever possible, to minimize erosion and sediment

concerns. Additional ESC measures may need to be erected during or in anticipation of heavy precipitation. Minimal or no Project works will occur during times of extreme precipitation (*i.e.,* storm events of 25 mm of rain within a 24-hour period);

- Areas that are not part of the final footprint of construction will be re-vegetated to prevent potential surface erosion and siltation of aquatic habitat;
- Exposed soil on steep grade will be protected at the end of construction from surface erosion (*e.g.*, hydroseeding with a heavy mulch, tackifier, and seed mix or by installing erosion blankets);
- ESC structures will be inspected regularly and after storm events of 25 mm of rain within a 24-hour period. Repairs will be completed as required;
- Machinery will not enter a wetted area unless appropriate approvals have been obtained to do so and proper site isolation, if required, has been installed;
- Site grading activities with the potential to cause environmental harm, will not be completed during periods of inclement weather; and
- Sediment-laden water exceeding discharge limits will be retained or treated on-site until concentrations reach an acceptable level.

Turbidity levels observed outside of marine containment areas that exceed 8 NTU (Nephelometric Turbidity Units) above background or 10% above background when background is >80 NTU, will be halted until levels return to background.

4.7 Soil Management

Only small areas of soil will be managed during the proposed Project construction. Suitable soils and other materials will be repurposed for the construction of the fish habitat offsetting (*e.g.*, beaches). Excavated unsuitable soils will be excavated by machinery, removed from the site by truck and disposed of at an approved facility. It is not anticipated for there to be contaminated soils on-site, stockpiling of soils, or fill on-site. Imported materials will be structural fill and railway-specific materials such as ballast and riprap that will be sourced from CP's pits and quarries.

4.8 Water Management

Surface water management will be required – particularly during months of precipitation. Surface water leaving the Project site will be required to meet or exceed Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines for the Protection of Aquatic Life. A primary source of potential water quality degradation is related to erosion and sedimentation; however, other sources of deleterious substances include equipment, machinery, and construction materials and substances. General mitigation measures to assist in preserving water supply and quality are provided below:

- The Environmental Monitor will regularly search for visual evidence of deleterious substances affecting freshwater and marine environments of the Project site;
- Works within the marine environment will be undertaken in isolation. This will consist of the use of a floating silt curtain around areas utilized for marine access (see Section 5.1). The curtain will

be opened periodically as required to allow access for barges bringing material to site or leaving the site but will be immediately closed once they have passed the opening;

- Isolation of the freshwater watercourses draining off the slope to the south of the right-of-way will be required if flow is present in order to accommodate temporary access culverts. This will consist of the installation of a sandbag barrier (or approved equivalent) upstream of the culvert inlet. Water will be allowed to build up behind the barrier and then be directed around the site to screened pump. The outlet of the hose will extend underneath the rails and between the ties. The outlet of the hose will discharge to a hard surface for dissipation of erosive energy on the marine side of the right-of-way (see Section 5.1 for additional detail). Low volume flows may be discharged to vegetated areas;
- Isolation will be removed slowly from the streams once the temporary access culverts are no longer required. This will consist of keeping the pump running while removing sections of the isolating barrier to allow water to slowly refill the channel. The pumps will be shut off and the remainder of the barrier removed once it is confirmed that sedimentation is limited;
- Controls (*e.g.*, floating silt curtain, sand bags, silt fence, or equivalent) will be monitored for effectiveness and maintained as necessary; and
- The spill response protocol will be initiated if fuel, oil, coolant, or deleterious substance spills are observed; this may include vacuuming the contaminated material into a vacuum truck or secure container for off-site disposal at an approved facility.

4.9 Vegetation Management

Removal of riparian vegetation will be limited only to what is required to construct the proposed infrastructure, access roads, and to provide adequate working space. Select areas of riparian vegetation not within the construction footprint (*e.g.*, at the western Project limit) will be protected by snow fence, silt fence or some other barrier. In addition, the silt fence installed adjacent to all watercourses and set back 15 metres from the top-of-bank (see Section 4.6) will serve the added purpose of demarcating vegetation which is to be avoided during construction. No removal of this vegetation will occur. In addition, the following mitigation measures have been developed for vegetation management:

- Identification of a rare or sensitive plant or vegetation community on-site will require immediate notification to the Environmental Monitor and appropriate regulatory authorities;
- Vegetation will not be removed during bird nesting season (March 1 to August 31st) or will be done so only with approval by the Environmental Monitor or other QEP after completion of a nesting bird survey (see Section 4.10);
- Visible work area boundaries will be maintained for the duration of construction;
- Vegetation clearing will be assessed by the Environmental Monitor;
- Burning and burying of vegetation and/or woody materials on-site will be prohibited; and
- Equipment will be maintained in a clean and weed-free condition.

A number of invasive plant species have been observed within and adjacent to the marine terrestrial vegetation at the site, including Japanese knotweed (*Polygonum cuspidatum*), Himalayan blackberry

(*Rubus armeniacus*), policeman's helmet (*Impatiens glandulifera*), orchard morning glory (*Convolvulus arvensis*), and reed canary grass (*Phalaris arundinacea*). Reed canary grass is native to North America; however, it has tended to hybridize with Asian and European cultivars[1] and, as such, there is debate on whether it may truly be considered invasive in this region. Japanese knotweed is listed as provincially noxious under the Weed Control Regulation of the *Weed Control Act*. It is a particularly aggressive species with the ability to become the dominant plant in an area that excludes native vegetation. It can also spread from fragments of stem and rhizome. As such, a Japanese knotweed management plan has been developed (see **Appendix A**).

Species-specific mitigation plans will be developed and integrated into the CEMP if removal of invasive species is necessary. Each plan will provide a series of mitigation measures to minimize the potential for the spread of invasive species both on- and off-site. The Environmental Monitor will work with the Contractor to ensure that employees have an understanding of requirements with respect to invasive species management. The Monitor will also assess the implementation of plans and adjust accordingly in response to conditions at the time of construction.

4.10 Wildlife Species Management

Habitat in and around the Project site provides nesting opportunities for numerous bird species. The nesting window for these species extends from March 1st to August 31st. As such, clearing of vegetation during this window is restricted unless a nest sweep is completed by a Qualified Environmental Professional following standard procedures to ensure that no active nests occur in the area identified for clearing. If a nest is observed, the Environmental Monitor will establish a species-specific buffer around the nest that will be maintained until all young have fledged.

Construction personnel will not feed, harass or otherwise interact with wildlife species at the Project site. Organic and food waste will be managed to avoid attracting wildlife to the site.

Identification of a rare or sensitive species on-site requires immediate notification to the Environmental Monitor and appropriate regulatory authorities. Work will halt in proximity to the species observed and management plans will be developed as appropriate, before work resumes.

4.11 Working In or Near Water

The Project will occur within and adjacent to Burrard Inlet as well as drainage pathways that convey surface and groundwater from upland areas to marine habitat. Working in or near the marine and freshwater environment is applicable to the proposed Capacity Expansion Project.

[1] e-Flora BC atlas: http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Phalaris%20arundinacea

The map in **Figure 3** provides an indication of the distribution of coarse and fine-grained nearshore sediments. Regardless of the grain-size, Contractors should know that they cannot exceed the standard of releasing any compound deleterious to fish or fish habitat. Sediment control and the sequencing required for its implementation may or may not be required depending on the approach taken by the selected Contractor.

Work activities will occur below the high water mark of Burrard Inlet, and within the annual window of least risk to Marine/Estuarine fish and fish habitat (August 16 – February 28 for Burrard Inlet). Due to the seasonal tide cycles at the time of proposed instream works, working at low-tide will be restricted to night time hours. CP is seeking an exemption to work within this timeframe. Regardless, mitigation measures for construction works in or near water have been developed for working under high-tide conditions. A summary of these mitigation measures is provided below:

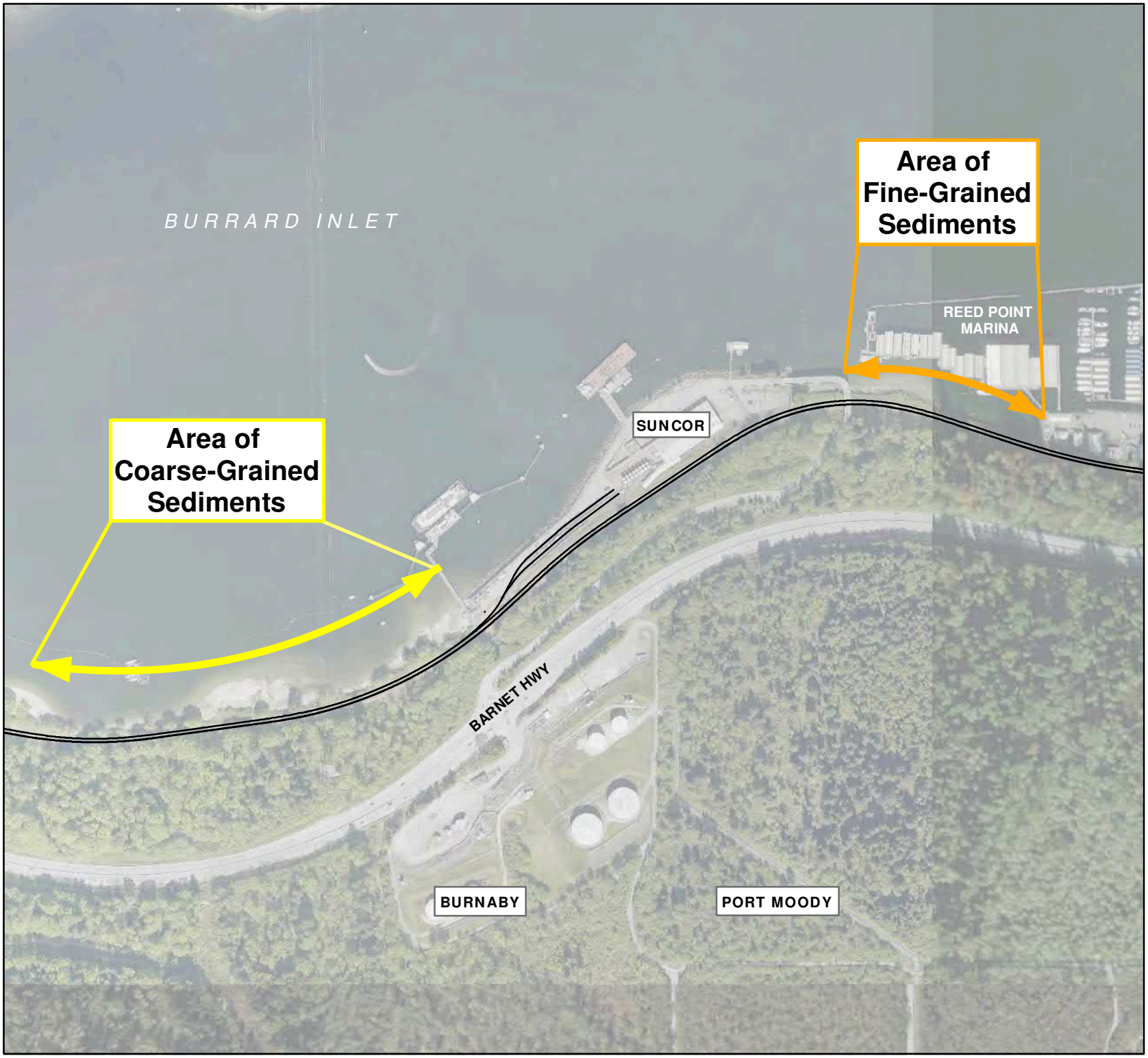
Works occurring in or near marine water with fine-grained substrate

Fine-grained substrates tend to dominate the eastern section of the site (Area 2) near Reed Point Marina (see **Figure 3**). The Contractor will be required to implement mitigation that addresses the site-specific conditions at this section to avoid the offsite migration of sediment, which is considered a deleterious substance per the federal *Fisheries Act*. As such, the Contractor will implement the following:

- Installation of an isolation barrier (*e.g.*, floating silt curtain or equivalent) to isolate construction activities from Burrard Inlet. Floating silt curtains are typically constructed from a woven material that offers permeability for water but also serves to retain the sediment. In addition, silt curtains reduce wave and current action such that silt is retained within the isolated area to allow it to settle;
- A fish and marine life salvage will be conducted within the isolated area prior to the commencement of in-water works;
- Turbidity monitoring will be conducted by an Environmental Monitor; and
- The isolation barrier will be removed following the completion of in-water construction activities.

Works occurring in or near marine water with coarse-grained substrate

Coarse-grained substrates tend to dominate the western section of the site (Area 1) (see **Figure 3**). Substrates at this location tend to be less mobile and, as such, are less likely to be conveyed offsite. Regardless, the Contractor will be required to implement mitigation that addresses the site-specific conditions at this section to avoid the offsite migration of sediment, which is considered a deleterious substance per the federal *Fisheries Act*. As such, the Contractor will implement the following:



Canadian Pacific

Cascade Capacity Expansion

Figure 3

Areas of Fine- and Coarse-Grained Sediments

Legend

Railroad

Note: Areas are approximate

0 25 50 100 150 Meters

SCALE 1:6,000

MAP DRAWING INFORMATION:
ESRI Basemaps, Dillon Consulting Limited, Canvec (2018)

MAP CREATED BY: RBB
MAP CHECKED BY: PS, NG
MAP PROJECTION: NAD 1983 UTM Zone 10N

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PROJECT: 18-7764
STATUS: FINAL
DATE: 2019-09-11

- Installation of an isolation barrier (*e.g.*, rock wall or equivalent) including the placement of both the "wave trips" (see Appendix B of CP Cascade Capacity Expansion Project - Project and Environmental Review Document (submitted to the Vancouver Fraser Port Authority)) for the outer edges of the East and West Beach offsetting habitat and the rock required to form the toe of the new embankment. A two barrier system (wave trip for the offsetting beaches and new toe of the embankment) would be expected to reduce wave and current action such that the coarse-grained material in this section would not become mobile;
- The embankment and offsetting (*i.e.*, beach and wave trip structures) will be constructed using large excavators with thumb bucket attachments or a barge using a clam-shell bucket to place the riprap on the coarse-grained substrate in a manner that minimizes sediment mobilization;
- If the embankment or beaches are constructed in a manner that isolates in-water areas (*e.g.*, the beach wave-trip is constructed first), a fish and marine life salvage will be conducted within the isolated area prior to infilling within this area; and
- Turbidity monitoring will be conducted by an Environmental Monitor.

Works occurring in or near freshwater

- Isolation barrier (*e.g.*, dam and pump or equivalent) will be installed to isolate construction activities from freshwater;
- To divert flow, the upstream isolation barrier will be installed first to divert flow around the work site; flow will be bypassed around the site;
- Sediment-laden water from within the isolation area will be discharged to a vegetated area to allow sediment to settle prior to water returning to the watercourse downstream; other sediment and erosion control measures will be utilized, as needed; and
- Turbidity monitoring will be conducted by an Environmental Monitor.

See Section 4.8 for additional detail on water management.

Fish and Aquatic Life Salvage

- Fish and aquatic life will be excluded to the extent possible from active work areas through the installation of isolation barriers;
- Within in-water isolated work areas, fish and aquatic life (*e.g.*, sea stars, crabs) will be removed and relocated, as feasibility and safety allow; due to the seasonal tide cycles, removal of aquatic life during low-tide will likely not be feasible; and
- Visual monitoring and hydrophone monitoring for the presence of free-ranging marine mammals and impacts on fish will be conducted during impulse-generating activities such as pile driving. Should a cetacean/marine mammal species at risk, or harbour seal, be observed within a species-specific exclusion zone, that activity will be temporarily suspended until the individual has left the exclusion zone or does not reappear within 30 minutes. If sound pressures over 30kPa are measured or distressed, injured or dead fish are observed following the initiation of

pile driving, work will be halted and additional measures established to reduce the sound pressure waves before the work may resume.

Turbidity Monitoring

- Turbidity monitoring will be conducted during in-water construction activities; and
- Turbidity monitoring will be conducted daily during work with the potential to generate sediment. This will be during pile driving and placement of embankment material below the high water mark in the immediate vicinity of the activity to the extent feasible based on conditions and site safety. Turbidity must be in compliance with standards outlined in the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life (8 NTU above background or 10% increase when background is >80 NTU) or specifics within the issued permits. The frequency of monitoring may be reduced should the mitigation applied be demonstrated to by functional. However, the frequency will be at once per week minimum.

Other mitigation measures to be implemented during construction activities in or near Burrard Inlet include:

- Equipment will not operate beyond the Project footprint on the intertidal foreshore; and
- A large spill clean-up kit, sufficient for use in Burrard Inlet (*i.e.*, including sufficient booms to contain a major spill), will be on-site during all construction work adjacent to the marine environment.

In the drainage pathways of the Project Area upslope of Burrard Inlet, fish habitat is limited to the contribution of food and nutrients to downstream habitat (*i.e.*, Burrard Inlet). Existing culverts are perched above the high water mark and habitat conditions and value of upslope pathways are limited by the absence of defined pathways, flow and other factors. Where appropriate, construction activities in and around freshwater will follow BMPs described in the sections above and below (*e.g.*, erosion and sediment control, water management, hydraulic connections).

4.12 Storage of Petroleum Products

Petroleum products (*i.e.*, fuels, hydraulic fluids and lubricants) will be used during construction. Effective mitigation will be required to ensure that these materials are stored and managed appropriately and are not accidentally discharged to the environment. The following BMPs will be applied during construction:

- Petroleum products used on-site will be stored in a designated location that poses no risk of soil or surface water contamination. We anticipate possible locations to include at the entrance to Reed Point Marina, the western end of Reed Point Marina, and the Chemtrade facility associated with the western site access. Designated storage areas will be secure and clearly labelled and managed in accordance with local safety regulations;
- Impervious containment structures able to contain 110% of the maximum capacity of storage vessels will be installed and maintained around the storage vessels;

- Petroleum products will be handled in such a manner as to minimize leakage and spillage and to facilitate containment and recovery in the event of a spill. Petroleum products no longer required during construction will be removed from the site;
- Containers will be appropriately labelled and designated to be used for the temporary storage of used petroleum products. These containers will not be used for disposal of garbage or construction debris; and
- The site will be inspected on a regular basis to ensure that waste petroleum products and waste materials (*e.g.*, oil cans, grease tubes, oily rags) are collected and properly disposed of at a location approved by regulatory authorities.

Storage areas for petroleum products will be inspected and monitored on an on-going basis during construction by the Environmental Monitor and/or Site Engineer.

Project construction will involve the operation of vehicles, equipment and machinery using petroleum products (*i.e.*, fuels, hydraulic fluids, lubricants). There is, therefore, the potential for environmental damage to occur from accidental spills of petroleum to the surrounding environment with the resulting potential for soil or waterbody contamination. A re-fueling station will be designated on the site plan. To minimize the likelihood and potential environmental impact of a spill event, BMPs specific to fuel management to be implemented during construction include:

- On-site fuel and lubricant storage will adhere to applicable regulations and technical specifications (*e.g.*, appropriate containment, areas away from drainage pathways, etc.), will not be stored within 30 meters of a waterbody where possible, and will be stored within appropriate secondary containment (an impermeable containment facility capable of holding 110% of storage tank contents);
- Vehicles, equipment and machinery will be kept in good repair to avoid leakage of petroleum products. Emergency spill response materials will be carried by equipment working on-site. Leaking equipment and/or equipment and machinery requiring maintenance will be immediately removed from the active work site to a maintenance area located at a suitable location approved by the Environmental Monitor and/or Site Engineer;
- Equipment will be monitored throughout the construction period to ensure that it is well-maintained and that there are no signs of leaking;
- Machinery working in or around water will have marine grade fluids and oils;
- Vehicle and equipment refueling, lubrication and maintenance will be conducted on flat surfaces in designated areas using appropriate spill prevention procedures;
- Equipment will not be refuelled within 30 metres of a waterbody where possible;
- Waste materials and liquids from servicing equipment will be properly packaged and removed from site daily;
- Refuelling equipment and tanks will be clean and in good working order;
- A controlled containment structure (*e.g.*, drip tray) will be used when refueling/servicing equipment, as appropriate. Equip refuelling hoses with safety nozzles and automatic shut-off

valves. Retain an on-site supply of synthetic absorbent material and/or spill kits on-site at fuelling locations; and

- Work areas will be inspected following construction for the visual presence of potentially contaminated soil (*e.g.*, fuel or oil stains on the ground).

4.13 Spill Prevention and Readiness

Project construction will involve the operation of vehicles, equipment and machinery using petroleum products (*i.e.*, fuels, hydraulic fluids, lubricants) and other substances that may be deleterious if released into the surrounding environment. There is, therefore, the potential for environmental damage to occur from accidental spills of petroleum or other products to the surrounding environment with the resulting potential for soil or waterbody contamination. To minimize the likelihood and potential environmental impact of a spill event, BMPs to be implemented during construction include:

- Review and approval of the Contractor's Project-specific Emergency and Spill Response Plan by CP or their Representative prior to commencement of site preparation and/or construction activities by the Contractor to ensure compliance with Project-specific environmental protection measures and commitments;
- Materials of a deleterious nature that could be spilled will be identified during the pre-construction meeting;
- Contractor's Emergency and Spill Response Plan must identify hazardous materials and products that will be used on-site and include their Material Safety Data Sheets on-site and make them available to construction team members;
- The names and contact information of persons responsible for the implementation of the Emergency and Spill Response Plan (Section 7.0) shall be made available to workers on-site including the Site Engineer and Environmental Monitor;
- Contractor personnel will be trained in proper spill containment and remediation procedures;
- On-site storage areas will be monitored throughout the construction period for signs of spillage or leakage of stored product; and
- Inspection and monitoring of equipment, storage, refueling/maintenance and construction areas will be regularly completed by the Environmental Monitor and/or the Site Engineer.

4.14 Concrete Works and Grouting

Concrete work is anticipated for the construction of the retaining wall at the Suncor trestle bridge, the slip-lining of culverts, and the installation of micropiles at the pipe bridge, if required. Concrete works and grouting will employ the following BMPs to prevent and minimize the potential for impacts on the receiving environment:

- Concrete will be carefully poured and distributed to minimize spillage. Work will be completed in isolation of flowing water or other waterbodies (*i.e.*, when working near or below the high water mark);

- Proper housekeeping and appropriate work site isolation techniques will be employed to minimize the potential for spills;
- Recently poured concrete will be kept covered for a minimum period of 72 hours if in contact with water or if precipitation is anticipated;
- Appropriate spill cleanup materials will be readily available, easily accessible, and in sufficient quantity on-site at all times during construction;
- If micropiles are required, a culvert will be installed vertically into the subsurface of Burrard Inlet. Concrete will be poured directly into the culvert to maintain isolation from the surrounding water column; and
- An Environmental Monitor will take pH readings immediately adjacent to all areas of recent concrete pours or grout work to determine if pH remains in compliance with CCEM guidelines for the Protection of Marine Aquatic Life.

4.15 Solid Waste Management

Solid wastes generated during the Project will be removed from the site for recycling, where possible, or disposal. CP's Contractor will adhere to applicable legislation/regulation with respect to the handling, transportation, and/or disposal of all Project materials including waste by implementing the following measures:

- Garbage will be removed from site on a regular basis;
- Recyclable or compostable materials will be collected separately from general waste according to Metro Vancouver Regional District requirements;
- Contractors will adhere to applicable legislation with respect to the handling, transportation, and/or disposal of all materials related to the Project. Regulations include, but are not limited to the BC Hazardous Water Regulations, Spill Reporting Regulations, Workers Compensation Board Regulations, Transportation of Dangerous Goods Regulations, etc.;
- The construction contractor will provide portable sanitary facilities on-site for workers' use throughout the duration of the construction period. The facilities will be serviced regularly by a qualified Contractor; and
- The construction contractor will provide properly labeled separate container(s) for potentially hazardous waste such as oily rags and hydrocarbon absorbent pads. Absorbent materials or soils contaminated with oil (greater than 3% by weight) or any quantity of gasoline will be handled and transported as Hazardous Waste. Contaminated soils will be excavated and hauled off-site to an authorized treatment/disposal area in accordance to the BC *Hazardous Waste Regulations*.

Upon completion of construction, CP will inspect the site to ensure that waste material has been removed and managed as described above.

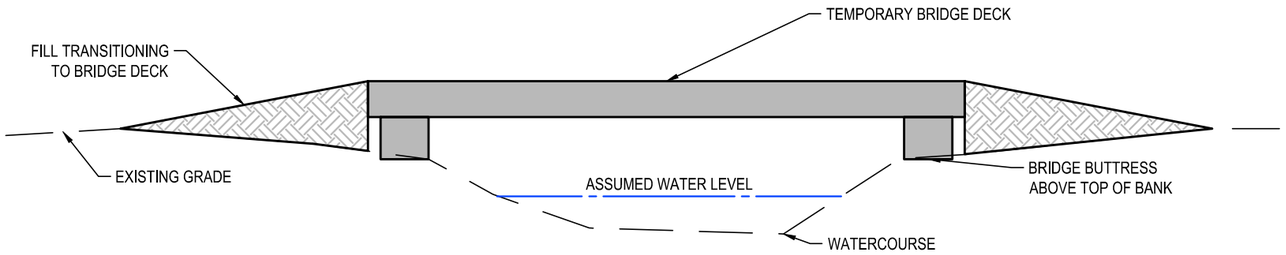
5.0 Mitigation Measures Proposed for Construction Components

Because the specific construction activities, techniques and phasing for the Project are to be decided by the construction Contractor selected by CP, and because the Contractor has not yet been selected, CP has prepared a comprehensive set of mitigation measures for all possible construction options that ***could*** be implemented at the Project site. These options, and corresponding mitigation measures, have been organized below under seven (7) construction components as follows:

- Site Access
- Laydown and Staging Areas
- Pile-Driving
- Material Placement (Grade)
- Structures
- Habitat Offsetting
- Temporary Works Removal

It is expected that the environmental management commitments made below will address the management of all potential construction-related environmental impacts generated by the construction activities, techniques and phasing proposed by the selected Contractor.

Spill prevention and readiness has been outlined in **Section 4.13** of this document. Emergency response in the event of a spill is outlined in **Section 7**. These mitigation measures – as well as the mitigation typical details illustrated in **Figure 4** – will apply to all aspects of construction as outlined below. As a component of spill readiness, all refuelling will occur above the high high water mark of any watercourse or the marine environment.



BRIDGE CROSSING - CROSS SECTION

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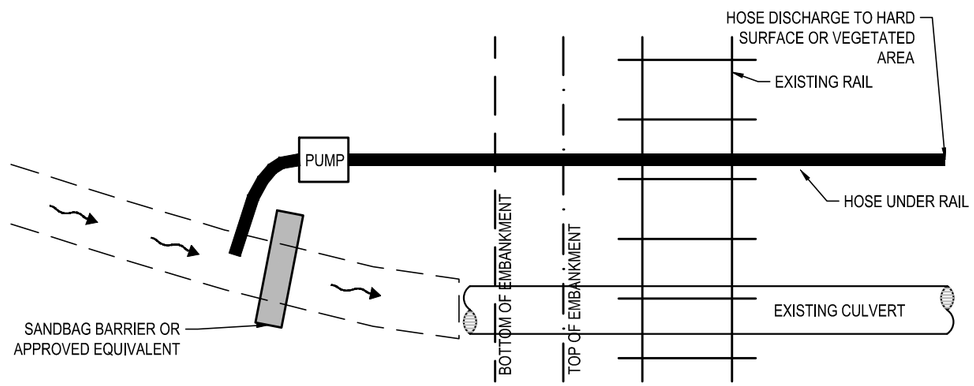

ISOLATION FOR TEMPORARY CULVERT INSTALLATION - PLAN VIEW

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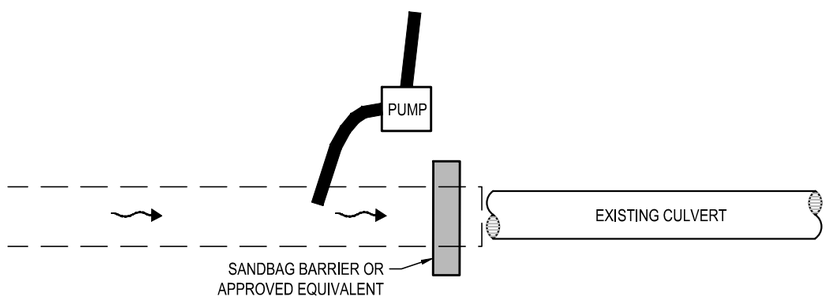

WATER MANAGEMENT FOR INFILLED DITCHES - PLAN VIEW

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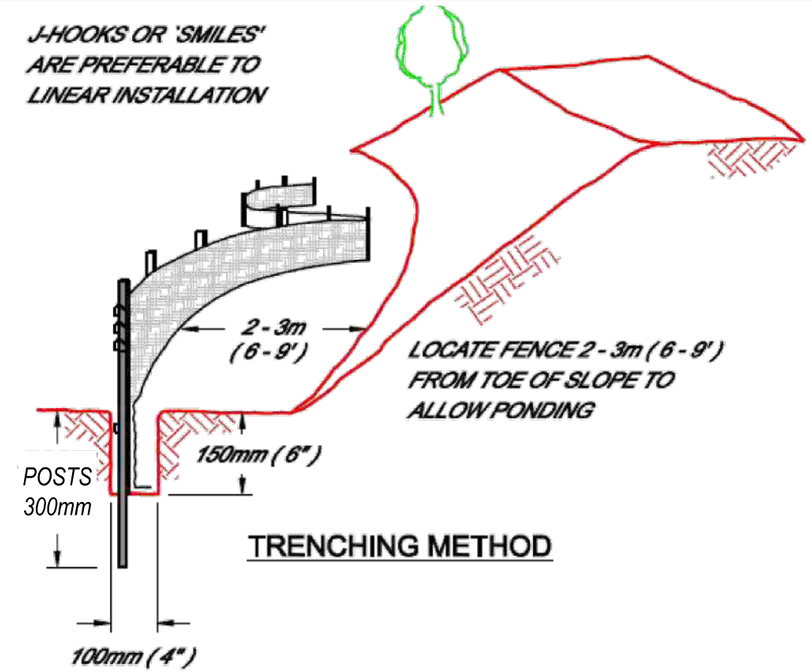
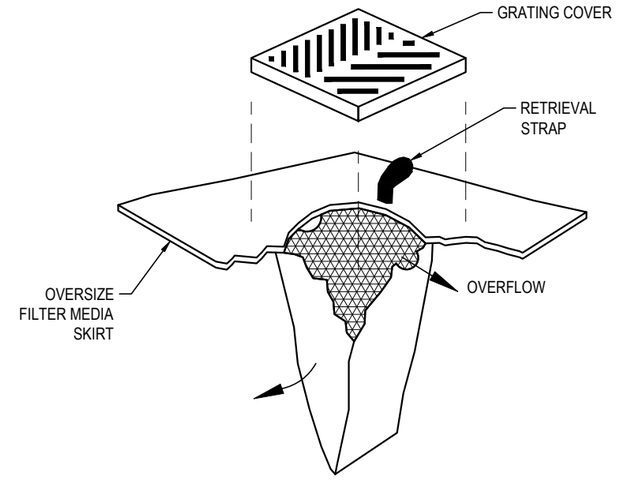


SILT FENCE INSTALLATION

NOT TO SCALE



CATCHBASIN FILTER SOCK

NOT TO SCALE

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NOT FOR CONSTRUCTION

DILLON CONSULTING	PROJECT CASCADE CAPACITY EXPANSION PROJECT	PROJECT NO. 18-7764
DATE October 2019	TITLE MITIGATION TYPICAL DETAILS	FIGURE NO. 4

FileName:c:\projectwise\working directory\projects 2018\43bqs\dms24389\187764-01-detail-dsgn.dwg

5.1 Site Access

There is no public road access to the Project area. Therefore, access to the Project area requires the use of Suncor's private road to the Burrard Terminal, Reed Point Marina's private road network/parking area, construction of new temporary access roads from the east and/or west along the CP right-of-way, or access from Burrard Inlet (*i.e.,* marine access). These access options are identified in **Figure 5**. Details of each of these access routes, and potential impacts and specific mitigation measures that would apply to each, are provided in the sections below.

5.1.1 East Access

The East Access option would entail the construction of a temporary access road along the south side of the CP right-of-way from the public road (Reed Point Way) used to access Reed Point Marina. The new road would parallel the mainline tracks some distance to a maximum of Mile 118 where a crossing to the north side of the mainline tracks would be established. It is possible that the crossing to the north side be established at some point before Mile 118 and that the new temporary access continue along the north side of the right-of-way to the eastern Project limit at Mile 118.

If the East Access option was selected by the Contractor, the following construction activities would be required:

- Clearing of trackside and riparian vegetation;
- Extension of existing culverts;
- Grading and temporary road building;
- Road use during construction in other Project areas.

If the East Access option was selected by the Contractor, mitigation measures that would be implemented for this route option are presented below with details regarding their implementation referenced in **Section 4**. Proposed mitigation is presented graphically in **Figure 6a** and **Figure 6b.**

East Access Construction Activity	Mitigation Details
Clearing of trackside and riparian vegetation	• Limits of vegetation removal shall be clearly demarcated • Clearing shall be limited to what is required for site access, and shall be completed within the window of least risk • Raptor surveys shall be completed by a QEP • Cleared material shall be removed from site and composted where possible • Invasive vegetation shall be treated per standard CP protocols
Extension of existing culverts	• There are five culverts (2 box culverts, 2 CSP, 1 unconfirmed) between Reed Point Way and the Project area that require temporary extensions • The installation of a temporary bridge above the top-of-bank of any watercourse crossing is an acceptable alternative to temporary culvert extensions

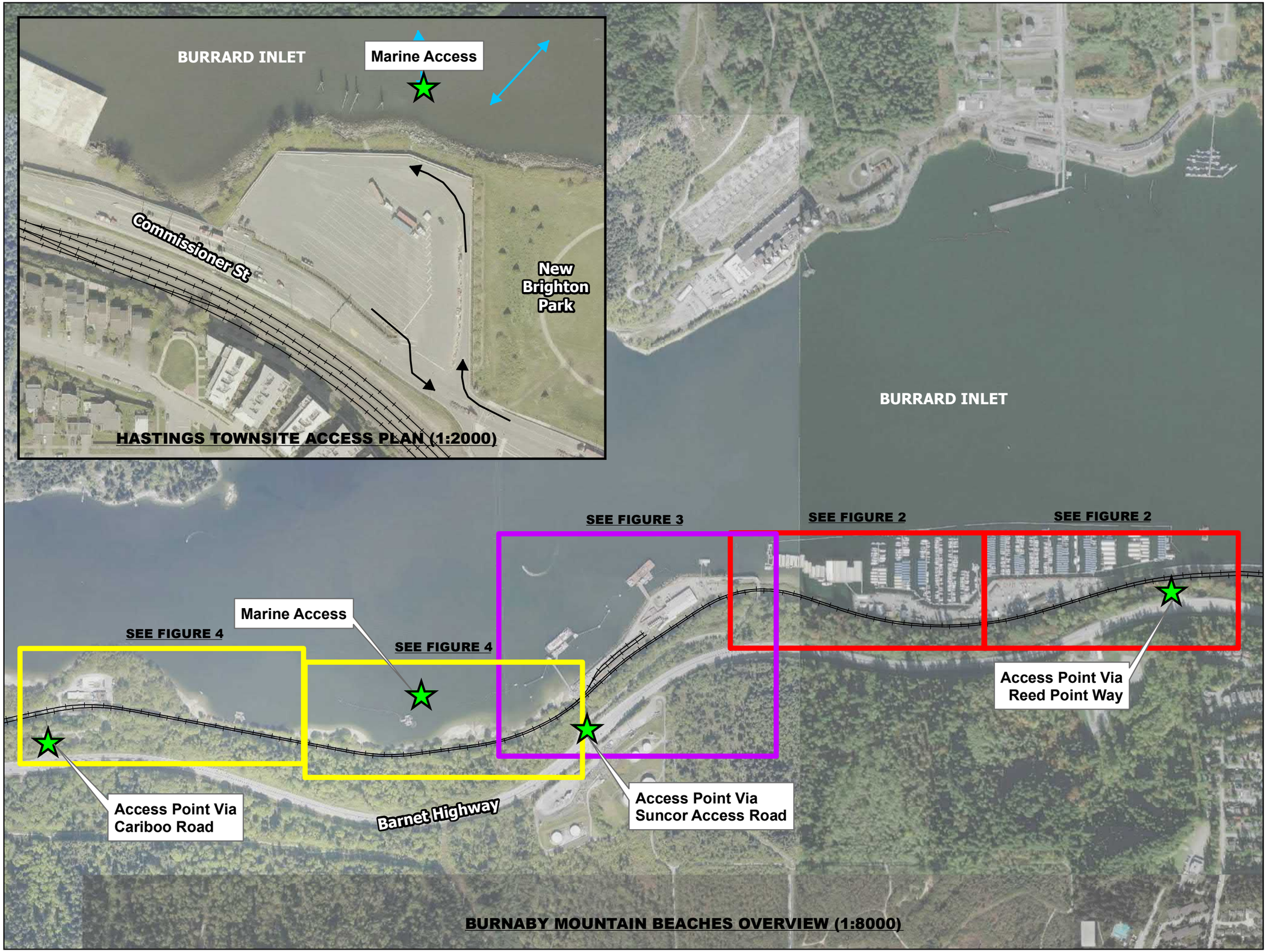
East Access	Mitigation Details
Grading and temporary road building	• Installation of culvert extensions shall occur in isolation of flowing water • Dam and pump techniques shall be used during installations • Erosion and sediment control techniques shall be applied both upstream and downstream (*i.e.*, hose outlet) • Limits of grading and cuts/fills shall be clearly identified • Silt fence shall be installed parallel to the proposed road where there is potential of offsite migration to adjacent watercourses • Street sweeping shall be conducted at the entrance to the access road off Reed Point Way
Road use during construction in other Project areas	• Installed silt fence shall be monitored regularly for effectiveness • Access to the site shall be restricted to designated routes

5.1.2 Reed Point Marina Access

Temporary access through Reed Point Marina has been negotiated with the Owners as an option. Conditions for access apply and must be understood and respected by the Contractor. Access from Reed Point Way would follow a designated route through the Marina on the existing paved road network to the western limit of the property where a connection to the Project area would occur.

If the Reed Point Marina access option was selected by the Contractor, temporary access would not require any construction activities; however, use of the road to access the Project area would require the implementation of mitigation measures presented in the following table and which are described in **Section 4**. Proposed mitigation is presented graphically in **Figure 6a** and **Figure 6b.**

Reed Point Marina Road Use	Mitigation Details
Reed Point Marina road use during construction in other Project areas	• Silt fence, berming or other appropriate sediment control measure shall be installed at the terminus of the access road to ensure that sediment-laden runoff does not enter Burrard Inlet • Filter bags or other appropriate sediment control measure shall be installed in catch basins along the designated access route and regularly monitored and maintained • Street sweeping shall be conducted on asphalt surfaces within Reed Point Marina • Access to the site shall be restricted to designated routes only • Timing of access to the site shall follow the approved schedule required by Reed Point Marina



Canadian Pacific

Cascade Capacity Expansion Project

Figure 5a
Access, Laydown & Staging Area Key Plan

Legend

- Existing Track
- Possible Ground Access Route
- Possible Marine Access Route

0 65 130 260 Meters

SCALE 1:8,500

N W E S

MAP DRAWING INFORMATION:
ESRI Basemaps, Dillon, City of Vancouver, and AECOM

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MAP CHECKED BY: RD
MAP PROJECTION: NAD 1983 UTM Zone 10N

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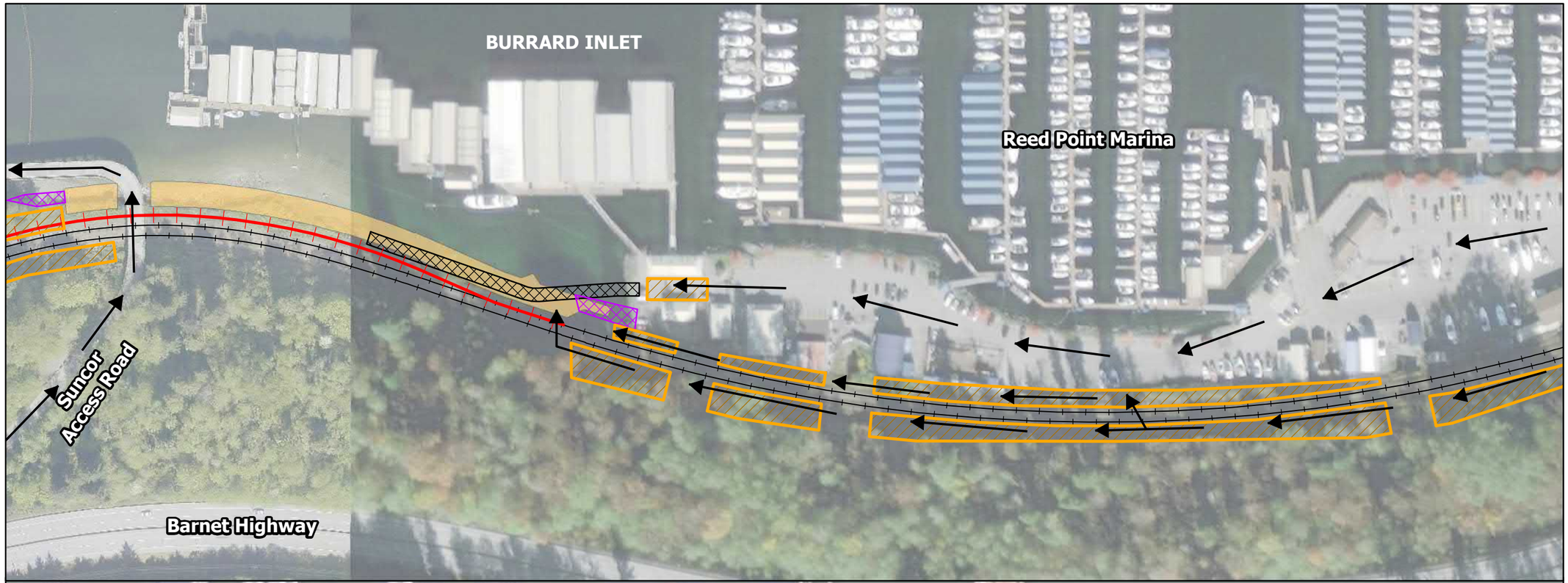
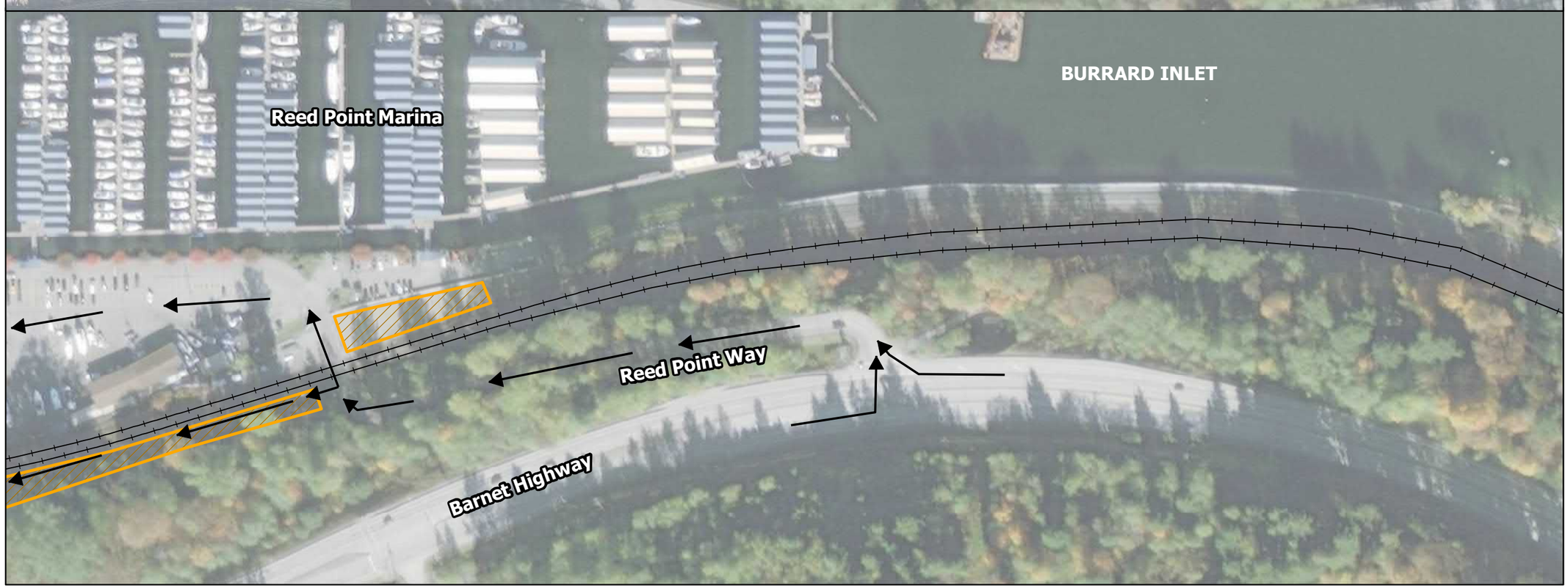
DATE: OCTOBER 2019





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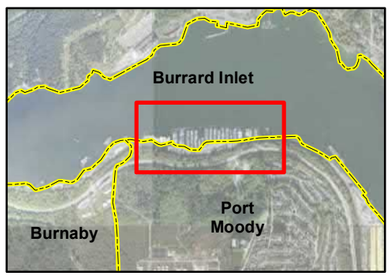
Cascade Capacity Expansion Project

Figure 5b
Access, Laydown & Staging Area Plan - East

Legend

- Existing Track
- Proposed Track
- Proposed Embankment
- Possible Temporary Work Pad
- Possible Temporary Access Road
- Possible Laydown & Staging Area
- Possible Ground Access Route
- Possible Marine Access Route



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SCALE 1:2,000

N W E S

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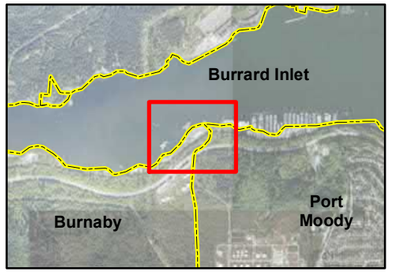
Cascade Capacity Expansion Project

Figure 5c
Access, Laydown & Staging Area Plan - Suncor

Legend

- Existing Track
- Proposed Track
- Proposed Embankment
- Possible Temporary Work Pad
- Possible Temporary Access Road
- Possible Laydown & Staging Area
- Possible Ground Access Route
- Possible Marine Access Route



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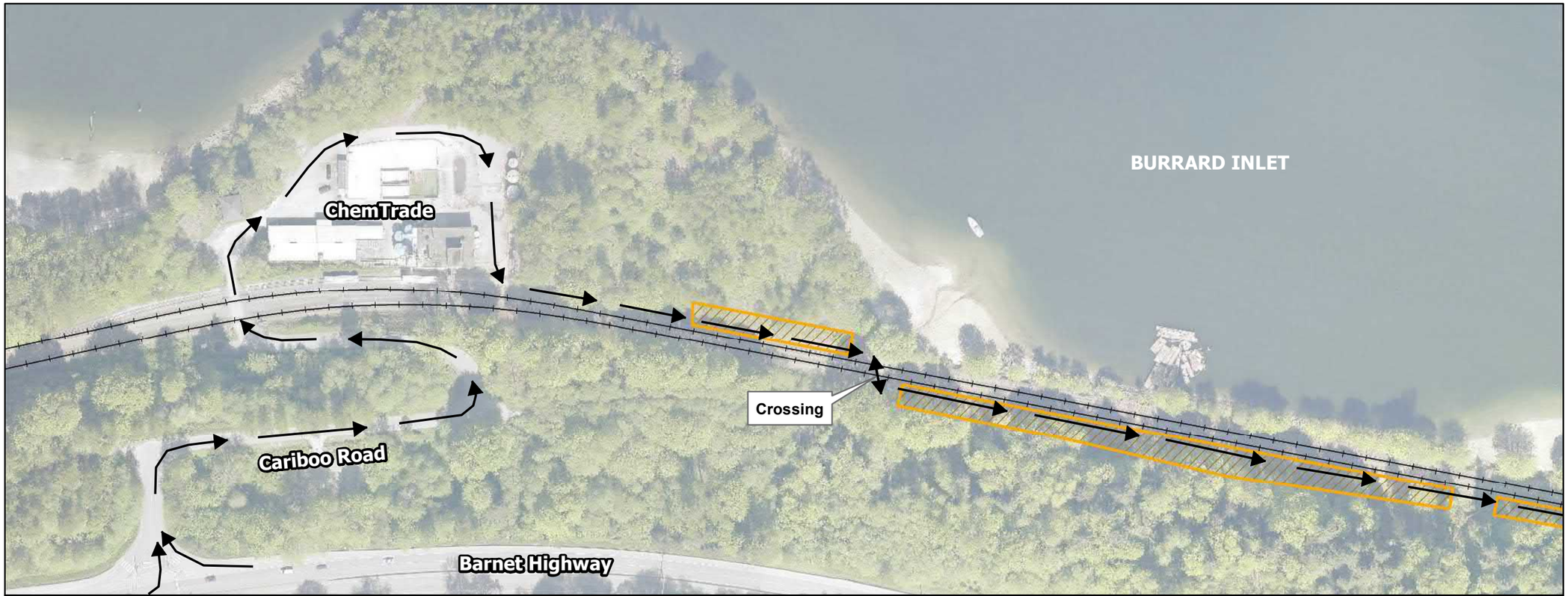
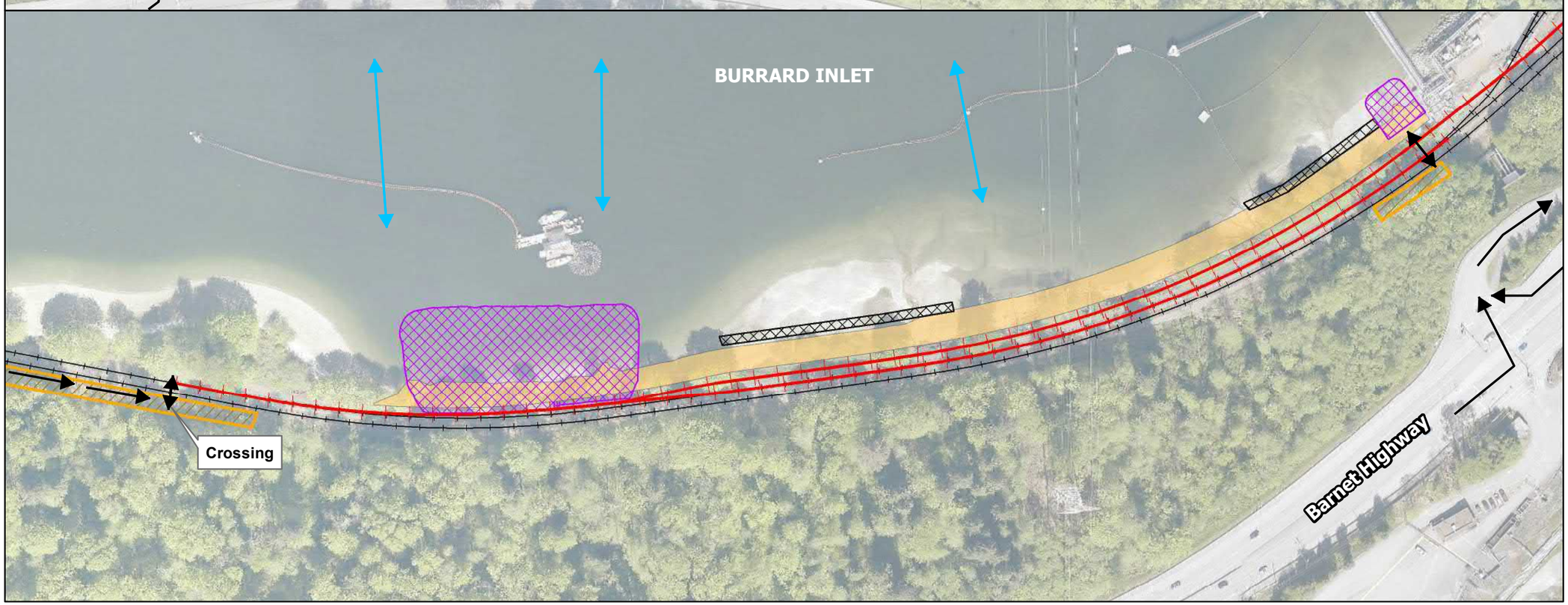




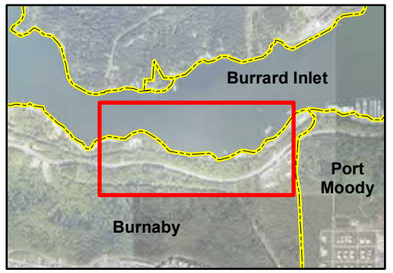
Canadian Pacific

Cascade Capacity Expansion Project

Figure 5d
Access, Laydown & Staging Area Plan - West

Legend

- Existing Track
- Proposed Track
- Proposed Embankment
- Possible Temporary Work Pad
- Possible Temporary Access Road
- Possible Laydown & Staging Area
- Possible Ground Access Route
- Possible Marine Access Route



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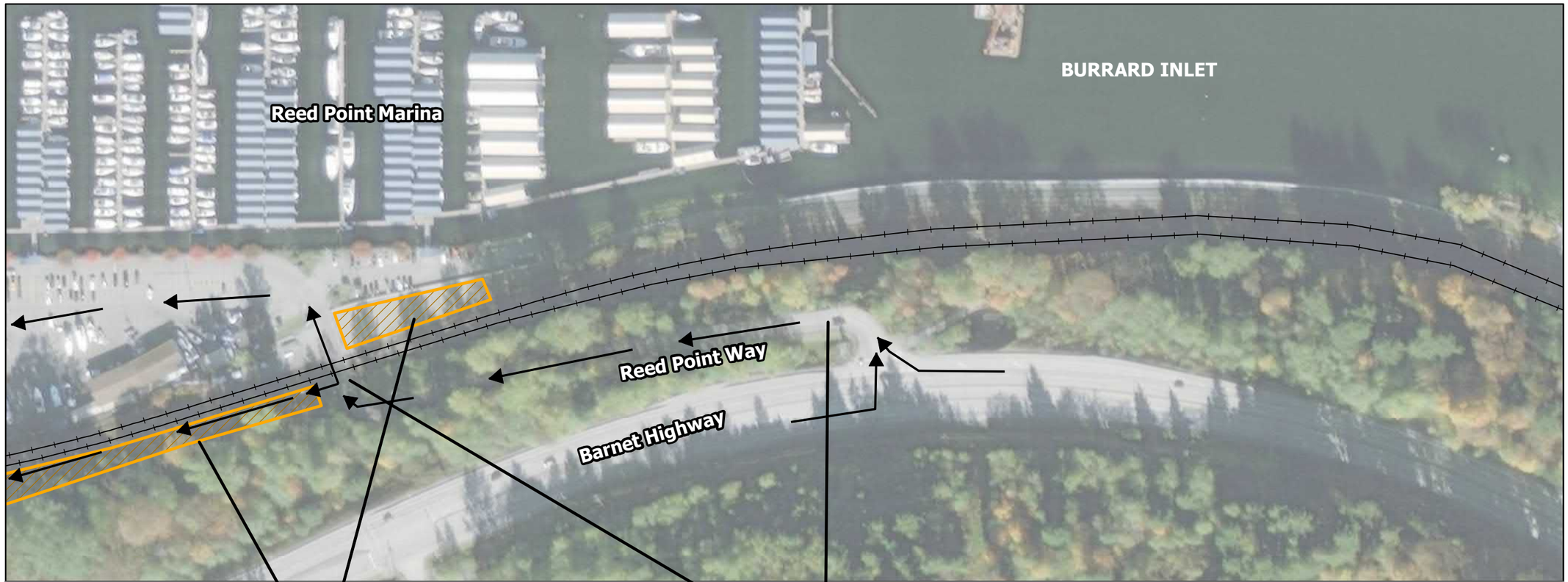


NEW ACCESS and LAYDOWN/STAGING AREAS

- Clearly demarcate area to be cleared
- Clear only vegetation required for access/laydown
- Retain 15m vegetated buffer around watercourses bisected by laydown/staging areas
- Remove all cleared vegetation from site paying special attention to requirements for transport/disposal of invasive plants
- CP infrastructure in conflict with access/laydown (e.g., signal mast, switch heater) to be moved by CP forces
- Limits of grading and cuts/fills to be clearly identified and not exceeded during construction
- Silt fence to be installed at appropriate locations where disturbed soils occur to avoid off-site movement of sediment
- Silt fence and other mitigation measures to be regularly monitored for effectiveness

EXISTING ACCESS and LAYDOWN/STAGING AREAS

- Access through Reed Point Marina to follow designated routes and timing windows
- Sweeping of paved surfaces to remove accumulated dirt to be undertaken on an as-needed basis
- Catch basins on paved surfaces to be fitted with filter bags to capture sediment transported by construction vehicles
- Materials to be stored within existing CP laydown area not to extend beyond property boundaries and not obstruct traffic flow to Reed Point Marina
- Implemented mitigation measures to be regularly monitored for effectiveness

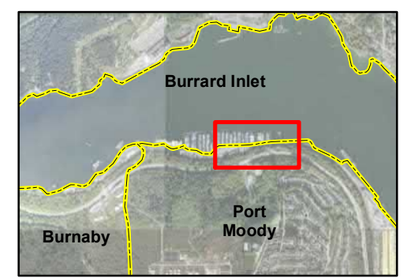
Canadian Pacific

Cascade Capacity Expansion Project

Figure 6a
Access, Laydown & Staging Area
- Mitigation Measures

Legend

- Existing Track
- Possible Laydown & Staging Area
- Possible Ground Access Route



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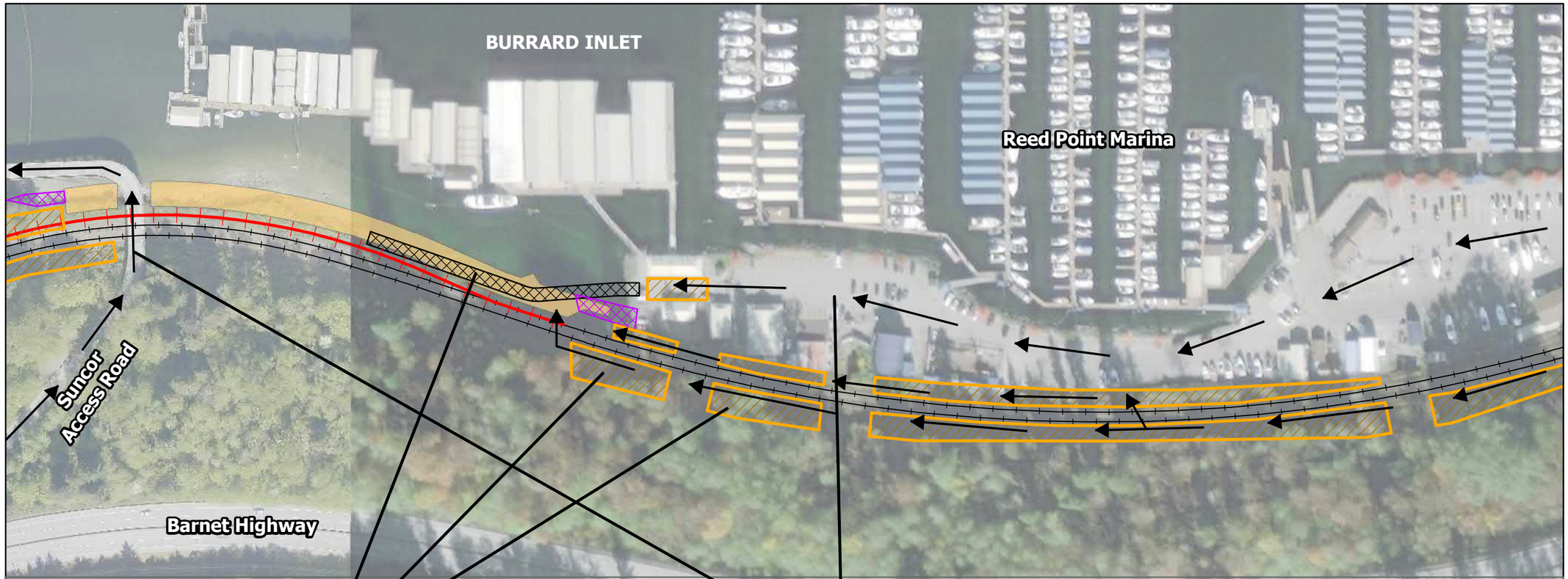


NEW ACCESS and LAYDOWN/STAGING AREAS

- Clearly demarcate area to be cleared
- Clear only vegetation required for access/laydown
- Retain 15m vegetated buffer around watercourses bisected by laydown/staging areas
- Remove all cleared vegetation from site paying special attention to requirements for transport/disposal of invasive plants
- Extent of disturbance to marine foreshore from temporary access from Reed Point Marina access point to be minimized
- Limits of grading and cuts/fills to be clearly identified and not exceeded during construction
- Silt fence to be installed at appropriate locations where disturbed
soils occur to avoid off-site movement of sediment
- Stockpiles of erodible materials occurring on paved surfaces to be covered or surrounding by berms, silt fences or other controls to minimize the off-site transport of sediment or other deleterious substances
- Implemented mitigation measures to be regularly monitored for effectiveness

EXISTING ACCESS and LAYDOWN/STAGING AREAS

- Access through Reed Point Marina and Suncor Terminal to follow designated routes and timing windows
- Sweeping of paved surfaces to remove accumulated dirt to be undertaken on an as-needed basis at both Reed Point Marina and Suncor Terminal
- Catch basins on paved surfaces to be fitted with filter bags to capture sediment transported by construction vehicles
- Implemented mitigation measures to be regularly monitored for effectiveness

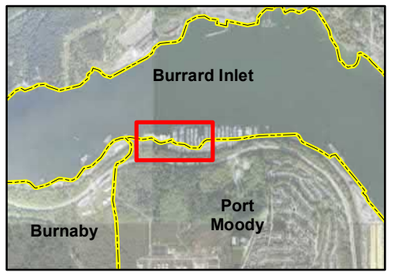
Canadian Pacific

Cascade Capacity Expansion Project

Figure 6b
Access, Laydown & Staging Area
- Mitigation Measures

Legend

- Existing Track
- Proposed Track
- Proposed Embankment
- Possible Temporary Work Pad
- Possible Temporary Access Road
- Possible Laydown & Staging Area
- Possible Ground Access Route
- Possible Marine Access Route



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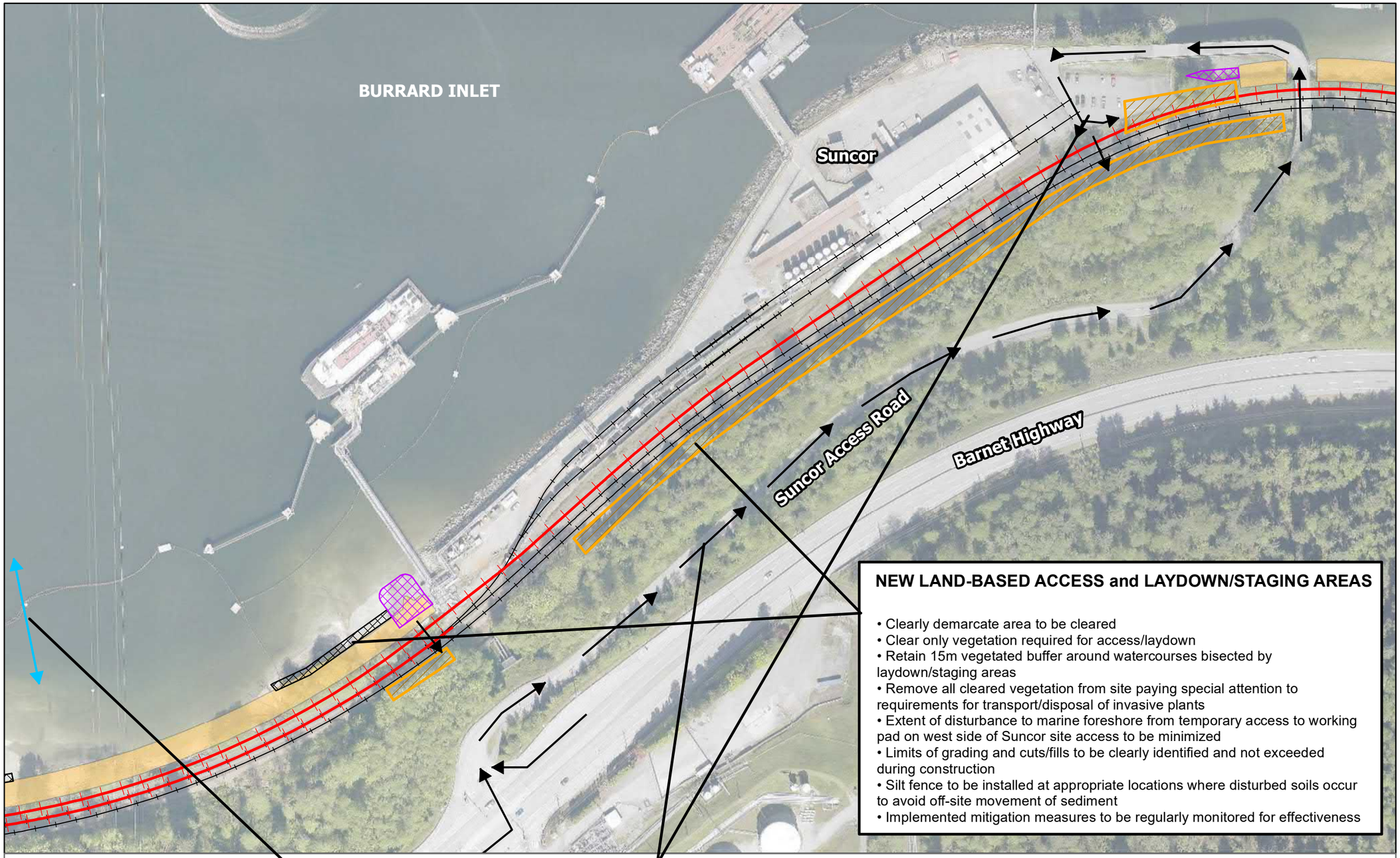


NEW LAND-BASED ACCESS and LAYDOWN/STAGING AREAS

- Clearly demarcate area to be cleared
- Clear only vegetation required for access/laydown
- Retain 15m vegetated buffer around watercourses bisected by laydown/staging areas
- Remove all cleared vegetation from site paying special attention to requirements for transport/disposal of invasive plants
- Extent of disturbance to marine foreshore from temporary access to working pad on west side of Suncor site access to be minimized
- Limits of grading and cuts/fills to be clearly identified and not exceeded during construction
- Silt fence to be installed at appropriate locations where disturbed soils occur to avoid off-site movement of sediment
- Implemented mitigation measures to be regularly monitored for effectiveness

NEW MARINE-BASED ACCESS and LAYDOWN/STAGING AREAS

- Barge access to occur under appropriate tidal conditions to avoid grounding
- Marine access inside of Suncor-boomed areas to follow Suncor conditions
- Extent of disturbance to marine foreshore from temporary access to working pad on west side of Suncor site access to be minimized
- Silt fence to be installed at appropriate locations where disturbed soils occur to avoid off-site movement of sediment
- Implemented mitigation measures to be regularly monitored for effectiveness

EXISTING LAND-BASED ACCESS and LAYDOWN/STAGING AREAS

- Access through Suncor Terminal to follow designated routes and any timing windows
- Sweeping of paved surfaces to remove accumulated dirt to be undertaken on an as-needed basis
- Catch basins on paved surfaces to be fitted with filter bags to capture sediment transported by construction vehicles
- Implemented mitigation measures to be regularly monitored for effectiveness

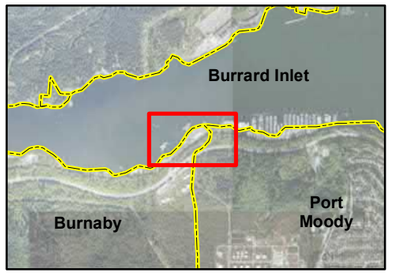
Canadian Pacific

Cascade Capacity Expansion Project

Figure 6c
Access, Laydown & Staging Area
- Mitigation Measures

Legend

- Existing Track
- Proposed Track
- Proposed Embankment
- Possible Temporary Work Pad
- Possible Temporary Access Road
- Possible Laydown & Staging Area
- Possible Ground Access Route
- Possible Marine Access Route



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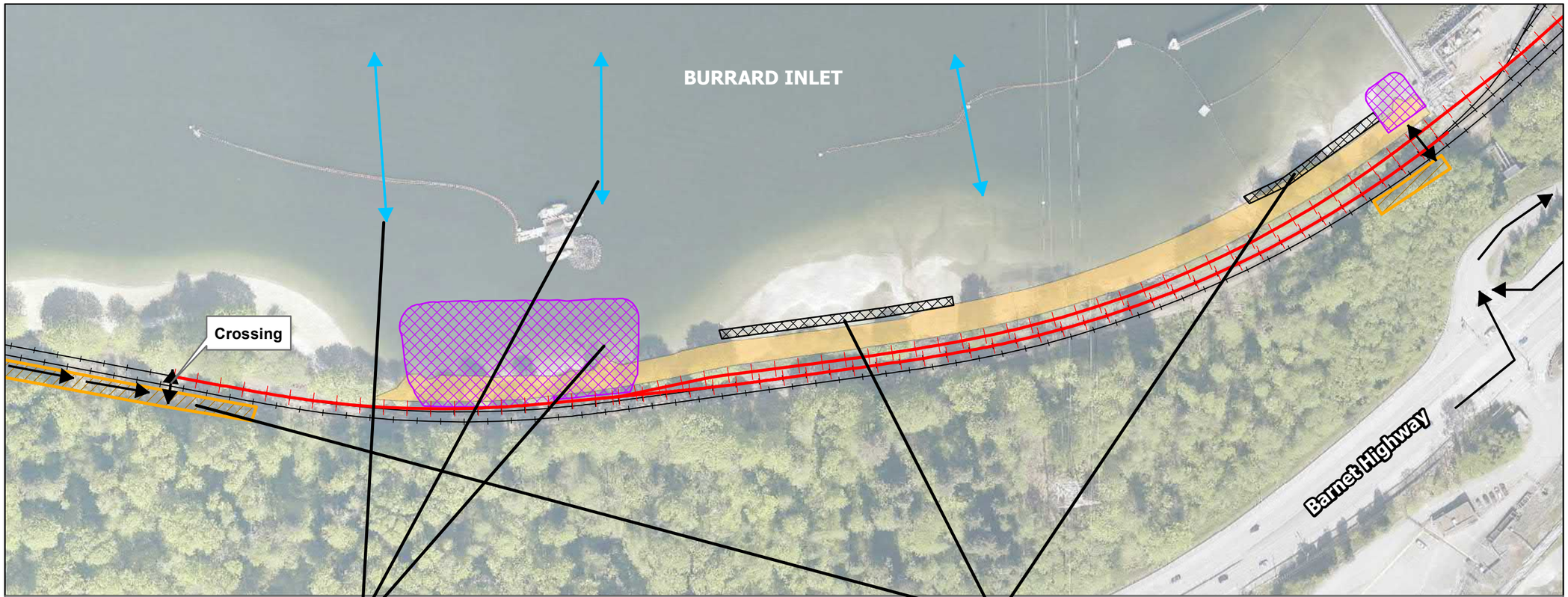


NEW MARINE-BASED ACCESS and LAYDOWN/STAGING AREAS

- Barge access to occur under appropriate tidal conditions to avoid grounding
- Marine access inside of Suncor-boomed areas to follow Suncor conditions
- Extent of disturbance to marine foreshore from temporary access to working pad on west side of Suncor site access to be minimized
- Silt fence to be installed at appropriate locations where disturbed soils occur to avoid off-site movement of sediment
- Implemented mitigation measures to be regularly monitored for effectiveness

NEW LAND-BASED ACCESS and LAYDOWN/STAGING AREAS

- Clearly demarcate area to be cleared
- Clear only vegetation required for access/laydown
- Retain 15m vegetated buffer around watercourses bisected by laydown/staging areas
- Remove all cleared vegetation from site paying special attention to requirements for transport/disposal of invasive plants
- Extent of disturbance to marine foreshore from temporary access to working pad on west side of Suncor site access to be minimized
- Limits of grading and cuts/fills to be clearly identified and not exceeded during construction
- Silt fence to be installed at appropriate locations where disturbed soils occur to avoid off-site movement of sediment
- Implemented mitigation measures to be regularly monitored for effectiveness

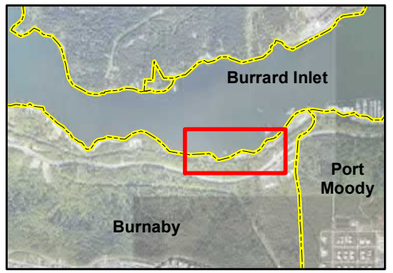
Canadian Pacific

Cascade Capacity Expansion Project

Figure 6d
Access, Laydown & Staging Area
- Mitigation Measures

Legend

- Existing Track
- Proposed Track
- Proposed Embankment
- Possible Temporary Work Pad
- Possible Temporary Access Road
- Possible Laydown & Staging Area
- Possible Ground Access Route
- Possible Marine Access Route



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SCALE; 1:2,000

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ESRI Basemaps, Dillon, City of Vancouver, and AECOM

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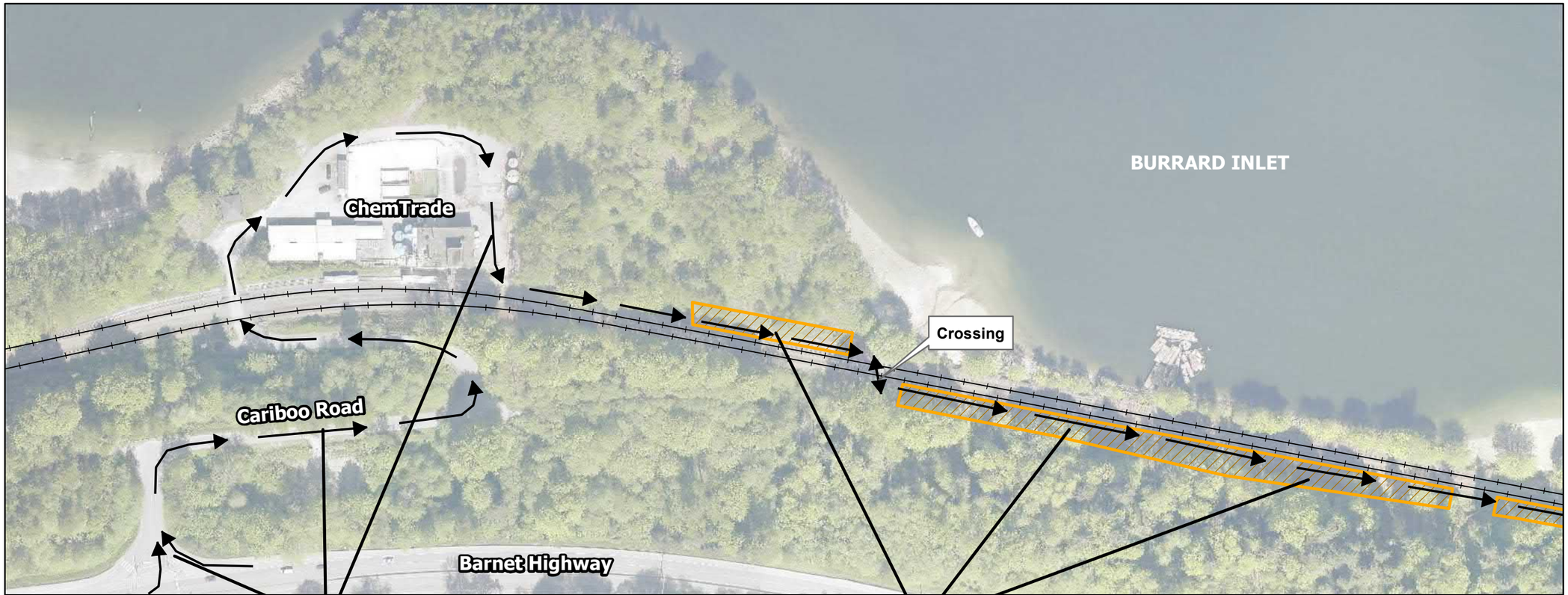


EXISTING ACCESS and LAYDOWN/STAGING AREAS

- Access through ChemTrade property to follow designated routes and any timing windows
- Sweeping of paved surfaces to remove accumulated dirt to be undertaken on an as-needed basis
- Catch basins on paved surfaces to be fitted with filter bags to capture sediment transported by construction vehicles
- Implemented mitigation measures to be regularly monitored for effectiveness

NEW ACCESS and LAYDOWN/STAGING AREAS

- Clearly demarcate area to be cleared
- Clear only vegetation required for access/laydown
- Retain 15m vegetated buffer around watercourses bisected by laydown/staging areas
- Remove all cleared vegetation from site paying special attention to requirements for transport/disposal of invasive plants
- Limits of grading and cuts/fills to be clearly identified and not exceeded during construction
- Silt fence to be installed at appropriate locations where disturbed soils occur to avoid off-site movement of sediment
- Implemented mitigation measures to be regularly monitored for effectiveness

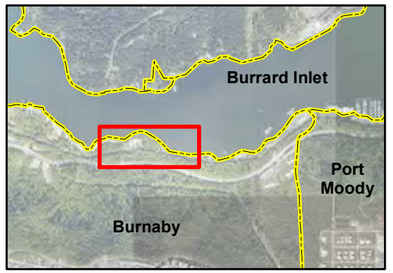
Canadian Pacific

Cascade Capacity Expansion Project

Figure 6e
Access, Laydown & Staging Area - Mitigation Measures

Legend

- Existing Track
- Possible Laydown & Staging Area
- Possible Ground Access Route



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5.1.3 Suncor Burrard Terminal Road Access

Temporary use of Suncor's private road to their Burrard Terminal has been negotiated with Suncor as an option to access the Project area. Conditions for access apply and must be understood and respected by the Contractor. Access from Suncor's road would follow a designated route through the Terminal's paved parking area to Suncor's south property limit where access to the central portion of the Project area could be achieved.

If the Suncor Terminal access option was selected by the Contractor, temporary access would not require any construction activities however use of the road to access the Project area would require the implementation of mitigation measures presented in the following table and which are described in **Section 4**. Proposed mitigation is presented graphically in **Figure 6c.**

Suncor Burrard Terminal Road Use	Mitigation Details
Suncor road use during construction in other Project areas	• Silt fence, berming or other appropriate sediment control measure shall be installed at the west end of the marina to ensure that sediment-laden runoff does not enter Burrard Inlet • Filter bags or other appropriate sediment control measure shall be installed in catch basins along the designated access route and regularly monitored and maintained • Street sweeping shall be conducted on paved surfaces within the Suncor facility • Access to the site shall be restricted to designated routes

5.1.4 West Access

The West Access option would originate from Cariboo Road (public road), then through the ChemTrade Solutions (private) property, then on to the north side of the CP right-of-way. Temporary use of ChemTrade's property has been negotiated as an option to safely access the CP right-of-way and ultimately the Project area. Conditions for access apply and must be understood and respected by the Contractor. Access through ChemTrade's paved property would follow a designated route to the southeast corner of the property then on to the CP right-of-way. A diagonal crossing to the south side of the mainline tracks would occur at the existing culvert at approximately M119.3. The new road would then parallel the mainline tracks some distance to at least the western Project terminus at Mile 118.92 where a crossing to the north side would occur. It is possible that the crossing to the north side be established at some point east of Mile 118.92 and that the new temporary access continue along the south side of the right-of-way to that crossing location.

If the West Access option was selected by the Contractor, the following construction activities would be required:

- Clearing of trackside and riparian vegetation;
- Extension of existing culverts;

- Grading and temporary road building; and
- Road use during construction in other Project areas.

If the West Access option was selected by the Contractor, mitigation measures that would be implemented for this route option are presented below with details regarding their implementation referenced in **Section 4**. Proposed mitigation is presented graphically in **Figure 6e.**

West Access Construction Activity	Mitigation Details
Clearing of trackside and riparian vegetation	• Limits of vegetation removal shall be clearly demarcated • Clearing shall be limited to what is required for site access, and shall be completed within the window of least risk • Raptor surveys shall be completed by a QEP • Cleared material shall be removed from site and composted where possible • Invasive vegetation shall be treated per standard CP protocols
Extension of existing culverts	• There are 4 culverts (2 CSP) between the ChemTrade property and the Project area that require temporary extensions • The installation of a temporary bridge above the top-of-bank of any watercourse crossing is an acceptable alternative to temporary culvert extensions • Installation of culvert extensions shall occur in isolation of flowing water • Dam and pump techniques shall be used during installations • Erosion and sediment control techniques shall be applied both upstream and downstream (*i.e.*, hose outlets)
Grading and temporary road building	• Limits of grading and cuts/fills shall be clearly identified • Silt fence shall be installed parallel to the proposed road where there is potential of offsite migration to adjacent watercourses • Street sweeping shall be conducted at the entrance to the access road at the ChemTrade property
Road use during construction in other Project areas	• Installed silt fence shall be monitored regularly for effectiveness • Access to the site shall be restricted to designated routes

5.1.5 Marine Access

With no existing road access to the Project area, the selected Contractor could be expected to access the Project area entirely from the ocean side (*i.e.,* marine access). This would entail the use of tugs, scows and other marine vessels to transport equipment, supplies and materials to and from the Project area. In anticipation of the use of marine access to the Project area, CP incorporated temporary working pads into the Project design. Temporary access to the working pad adjacent to Suncor's pipe bridge has been negotiated with the leaseholder. Conditions for access apply and must be understood and

respected by the Contractor. Marine access to the foreshore will maintain Suncor's floating boom system.

If the marine access option was selected by the Contractor, the following construction activities would be required:

- Temporary work pad building.

If the Marine Access option was selected by the Contractor, mitigation measures that would be implemented for this route option are presented below with details regarding their implementation referenced in **Section 4**. Proposed mitigation is presented graphically in **Figure 6d.**

Marine Access Construction Activity	Mitigation Details
Temporary work pad building	• Limits of grading and cuts/fills shall be clearly identified • Barge access shall occur under appropriate tidal conditions to avoid grounding • Rock used for the pads shall be free of sediment prior to placement • A floating silt curtain shall be used in areas of fine-grained substrate (*i.e.*, Reed Point Marina and the trestle bridge) to contain any sediment that does occur • Access to the site shall be restricted to designated routes only

5.2 Laydown and Staging Areas

There is limited area within the Project area for laydown and staging of equipment and materials. Further, the linear nature of the Project does not benefit from a single, large central laydown/staging location. Temporary laydown/staging areas are therefore expected to be developed at a number of locations within CP's right-of-way and property within and potentially beyond the limits of the proposed service/lead track construction. Proposed work pads on the Burrard Inlet foreshore have been integrated into the Project design and construction plan. A laydown/staging area has also been negotiated with Reed Point Marina.

The development and use of new temporary laydown and staging areas within the Project area would comprise the following construction activities:

- Clearing, grubbing and grading;
- Water management including temporary modifications to existing culverts and drainage pathways; and
- On-going maintenance throughout construction duration.

For the development and use of temporary laydown/staging areas, applicable mitigation measures are presented below with details regarding their implementation referenced in **Section 4**. Proposed mitigation is presented graphically in **Figure 6.**

Temporary Laydown/Staging Areas	Mitigation Details
Clearing, grubbing and grading	• Limits of vegetation removal shall be clearly demarcated • Clearing shall be limited to what is required for site access, and shall be completed within the window of least risk • Cleared material shall be removed from site and composted where possible • Raptor surveys shall be completed by a QEP • Vegetative buffers shall be maintained at 15 m from the top-of-bank of any watercourse crossing • Invasive vegetation shall be treated per standard CP protocols • Limits of grading and cuts/fills shall be clearly identified • Silt fence shall be installed parallel to the proposed road where there is potential of offsite migration to adjacent watercourses
Water management	• Installation of culvert extensions shall occur in isolation of flowing water • Dam and pump techniques shall be used during installations • Erosion and sediment control techniques shall be applied both upstream and downstream (*i.e.*, hose outlet)
On-going maintenance	• Installed silt fence shall be monitored regularly for effectiveness

5.3 Pile-Driving/Installation

While not expected to be used widely during construction of the Project, there is a possibility that pile-driving/installation may be used by the selected Contractor for one of several functions. Potential pile driving locations, along with other structures to be considered during construction, are illustrated in **Figure 7**.

Examples where pile-driving may be used are:

- the small retaining wall section beneath Suncor's overhead trestle; and
- the foreshore area situated immediately west of the proposed Suncor work pad/pipe bridge.

Given the anticipated locations of pile installation, it would be expected that equipment would be barge-based. The installation of piles can be accomplished using a variety of techniques (e.g., driving, vibrating, micropiles) and it is unclear at this time which technique could be proposed. Noise-related concerns to humans and aquatic life associated with high-impulse energy techniques such as pile-driving are well known and would be expected to require conditions of use.

If pile-driving/installation was selected by the Contractor as a construction technique to be used, the following construction activities would be required:

- Mobilization of equipment and materials to the Project site;
- Positioning of equipment (land/water) for installation;
- Installation of piles; and
- Demobilization from the Project area.

If pile-driving/installation was selected by the Contractor, mitigation measures that would be implemented for this construction activity are presented below with details regarding their implementation referenced in **Section 4**. Proposed mitigation is presented graphically in **Figure 8b**, **Figure 8c** and **Figure 8d.**

Retaining Wall at Trestle Bridge	Mitigation Details
Vibration or impact piles	• Barge access shall occur under appropriate tidal conditions to avoid grounding • A floating silt curtain shall be used to contain any sediment that may occur • If the installation of 3 or more piles are required in a single day and noise levels exceed 160 dB, bubble curtains shall be employed to disperse sounds waves • Work shall stop in the event that free-ranging marine mammals are observed in the area regardless of the level of noise • Work shall be reinitiated after free-ranging marine mammals have not been observed for a period of 30 minutes
Concrete micropiles	• Barge access shall occur under appropriate tidal conditions to avoid grounding • A floating silt curtain shall be used to contain any sediment that may occur • Containment shall be placed around micropiles to minimize leaks of cementous material during pouring

Pipe Crossing and West Area Marine Access Pad	Mitigation Details
Vibration or impact piles	• Limits of laydown areas shall be clearly delineated • Erosion and sediment control (silt fence) shall be established adjacent to watercourses in the vicinity of staging areas • Filter bags or other appropriate sediment control measure shall be installed in catch basins in the vicinity of the laydown area and regularly monitored and maintained • Sweeping of paved surfaces shall occur around laydown area regularly and as required
Concrete micropiles	• All equipment shall be kept out of access routes as required • Equipment shall not idle when not in use

5.4 Material Placement

The primary construction activity completed within this component is the building of the new embankment that will support the new lead/service track. The embankment will extend into riparian and foreshore areas of Burrard Inlet and be constructed of well-graded structural fill with slope protection provided by rip rap. With restrictions on access, working room, tides and proximity to a very active rail corridor, as well as commitments to limiting the area of Project disturbance, it is anticipated that construction of the embankment will progress along the embankment footprint from the eastern and/or western Project limits. Once above the HHWM, it is anticipated that trucks will use the constructed embankment as a haul route to active material placement locations. Heavy equipment typically used for the transport, handling/placement and compaction of materials use in road construction are expected.

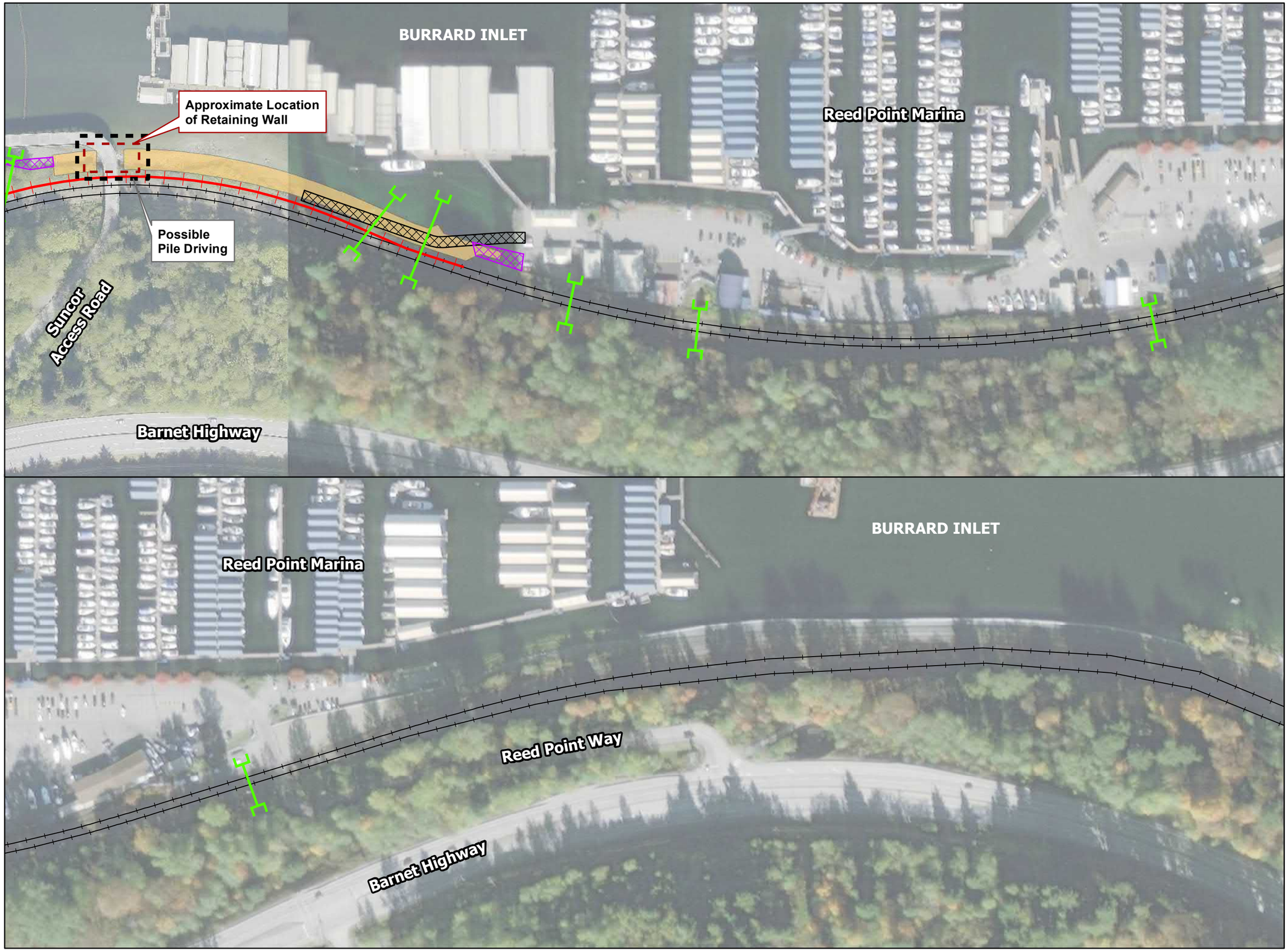
The development and use of the new embankment within the Project area would comprise the following construction activities:

- Placement of rip rap and structural fill; and
- On-going maintenance of the embankment during use as a movement corridor.

Applicable mitigation measures are presented below with details regarding their implementation referenced in Section 4. Proposed mitigation is presented graphically in **Figure 8**.

Installation of Embankment Material – East Area	Mitigation Details
Placement of material	• Limits of placement shall be clearly delineated • Placement shall occur during favourable tides to the extent possible • Floating silt curtain shall be installed within marine environment to contain sediment that may be generated • Rock fill (*i.e.,* base rock shall be placed below the high high water mark) brought to site shall be free of sediment • Aquatic life salvages of mobile invertebrates and fish shall be completed within the footprint of the new embankment material • A barrier (*e.g.,* no-post or approved equivalent) shall be installed near the base of the new embankment material to exclude re-entry by mobile invertebrates

Installation of Embankment Material – West Area	Mitigation Details
Placement of material	• Limits of placement shall be clearly delineated • Placement shall occur during favourable tides to the extent possible • Rock fill (*i.e.,* base rock shall be placed below the high high water mark) brought to site shall be free of sediment • Aquatic life salvages of mobile invertebrates and fish shall be completed within the footprint of the new embankment material • A barrier (*e.g.,* no-post or approved equivalent) shall be installed near the base of the new embankment material to exclude re-entry by mobile invertebrates



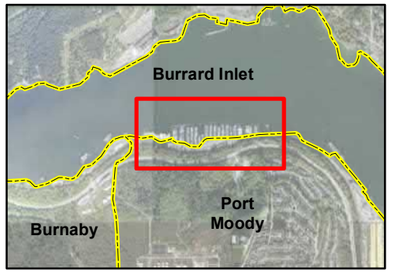
Canadian Pacific

Cascade Capacity Expansion Project

Figure 7a
Structures Plan - East

Legend

- Existing Track
- Proposed Track
- Existing Culvert
- Proposed Embankment
- Possible Temporary Work Pad
- Possible Temporary Access Road



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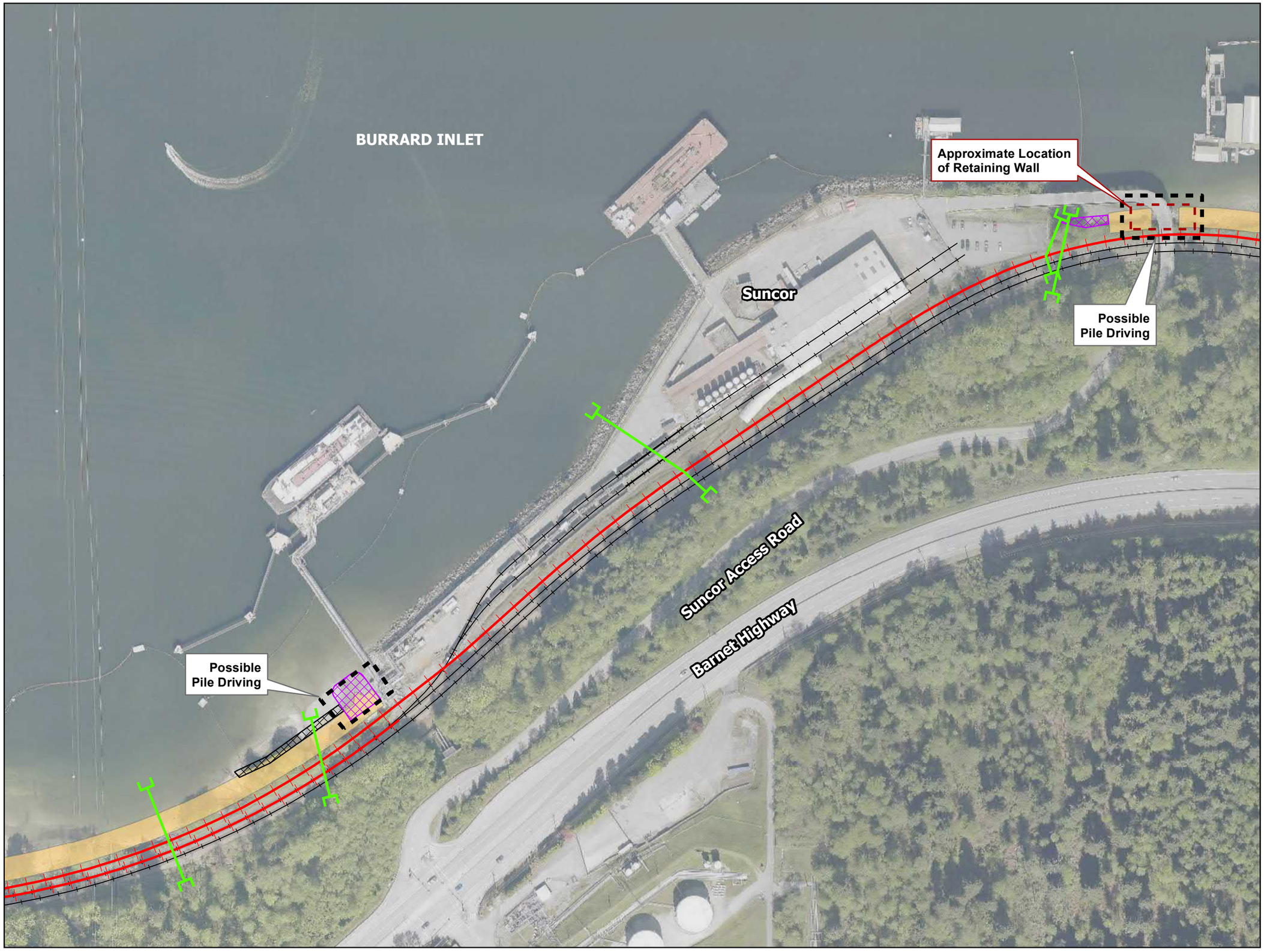

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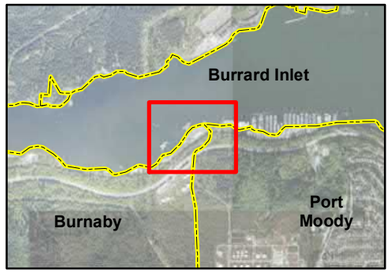
Cascade Capacity Expansion Project

Figure 7b
Structures Plan - Suncor

Legend

- Existing Track
- Proposed Track
- Existing Culvert
- Proposed Embankment
- Possible Temporary Work Pad
- Possible Temporary Access Road



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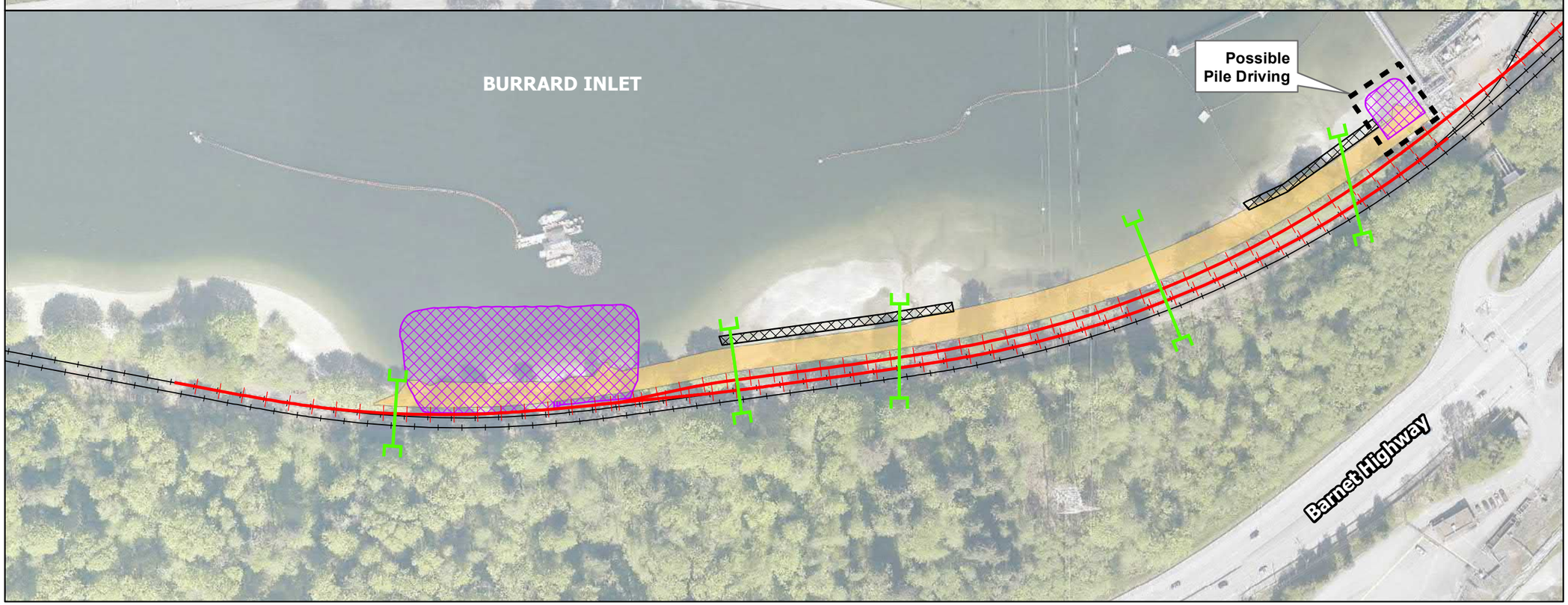

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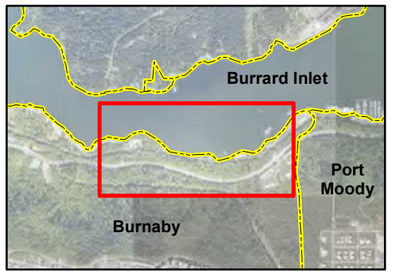
Cascade Capacity Expansion Project

Figure 7c
Structures Plan - West

Legend

- Existing Track
- Proposed Track
- Existing Culvert
- Proposed Embankment
- Possible Temporary Work Pad
- Possible Temporary Access Road



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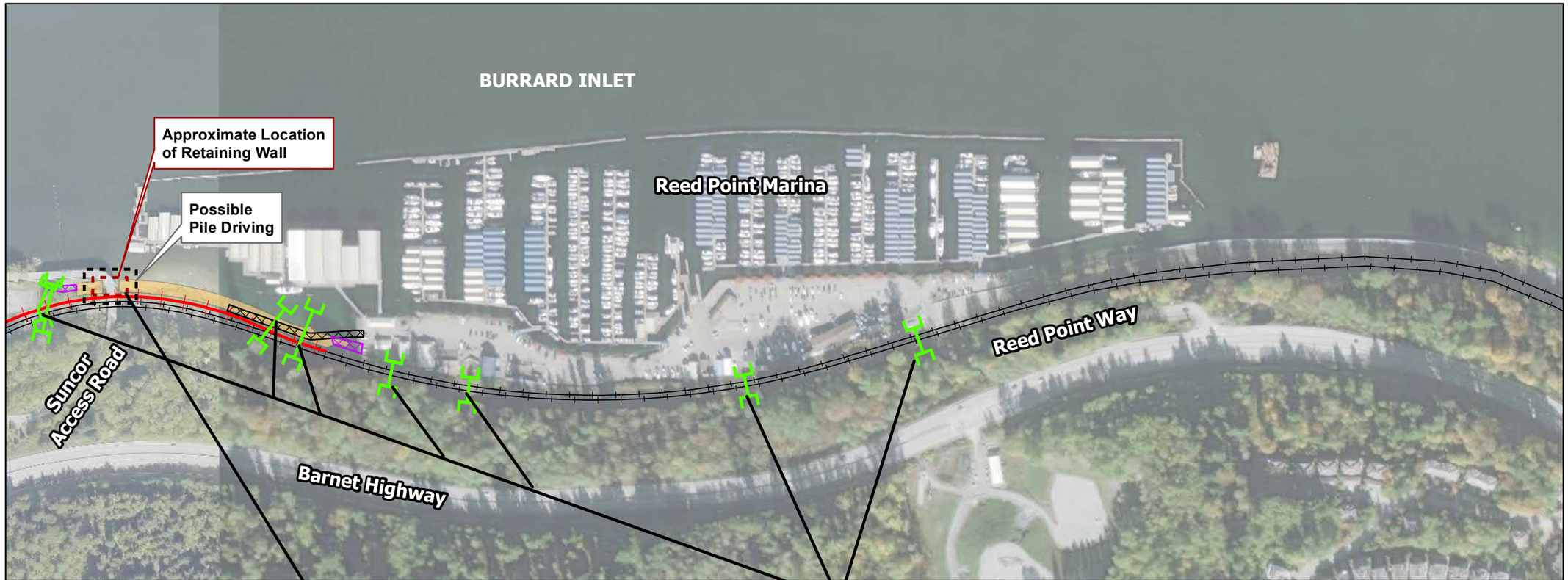

RETAINING WALL & POSSIBLE PILE DRIVING

- Install floating silt curtain offshore
- Install vertical culvert to contain concrete for micropiles
- Test pH that comes in contact with newly poured concrete
- Conduct aquatic life salvage within footprint of retaining wall
- Install barrier to exclude aquatic life after completion of salvage
- Conduct concrete pours during low tides
- Conduct pile driving work within VFPA standard work hours

CULVERTS

- Place outlet hose beneath rail
- Install isolation barrier upstream
- Pump from upstream of barrier via screen pump intake to bypass pipe

Canadian Pacific

Cascade Capacity Expansion Project

Figure 8a
Structures - Mitigation Measures

Legend

- Existing Track
- Proposed Track
- Existing Culvert
- Proposed Embankment
- Possible Temporary Work Pad
- Possible Temporary Access Road

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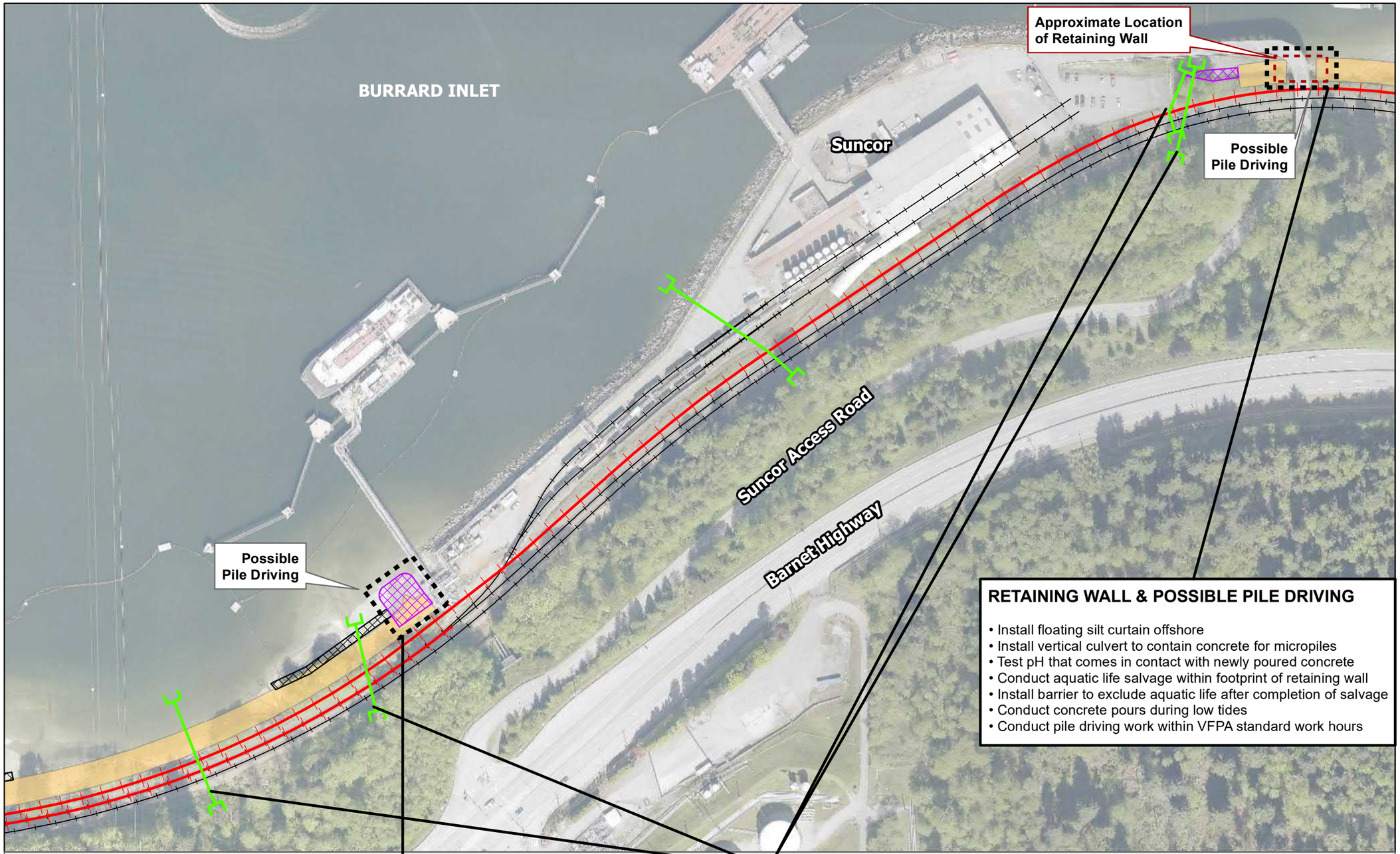


RETAINING WALL & POSSIBLE PILE DRIVING

- Install floating silt curtain offshore
- Install vertical culvert to contain concrete for micropiles
- Test pH that comes in contact with newly poured concrete
- Conduct aquatic life salvage within footprint of retaining wall
- Install barrier to exclude aquatic life after completion of salvage
- Conduct concrete pours during low tides
- Conduct pile driving work within VFPA standard work hours

POSSIBLE PILE DRIVING

- Conduct concrete pours during low tides
- Install vertical culvert to contain concrete for micropiles
- Test pH that comes in contact with newly poured concrete
- Conduct pile driving work within VFPA standard work hours

CULVERTS

- Place outlet hose beneath rail
- Install isolation barrier upstream
- Pump from upstream of barrier via screen pump intake to bypass pipe

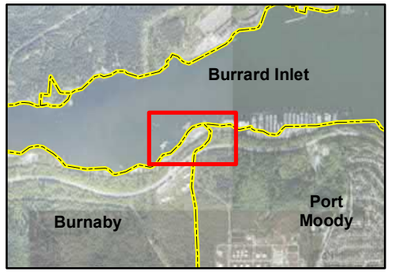
Canadian Pacific

Cascade Capacity Expansion Project

Figure 8b
Structures - Mitigation Measures

Legend

- Existing Track
- Proposed Track
- Existing Culvert
- Proposed Embankment
- Possible Temporary Work Pad
- Possible Temporary Access Road



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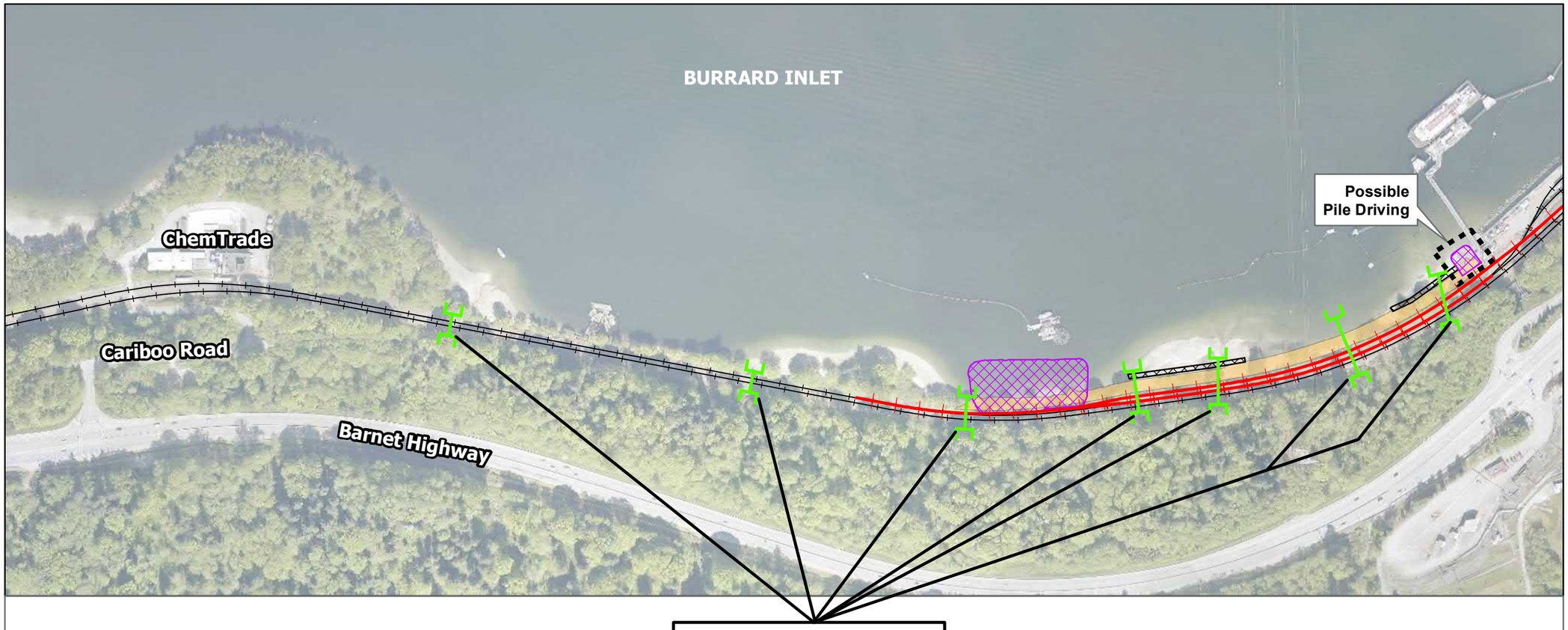

CULVERTS

- Place outlet hose beneath rail
- Install isolation barrier upstream
- Pump from upstream of barrier via screen pump intake to bypass pipe

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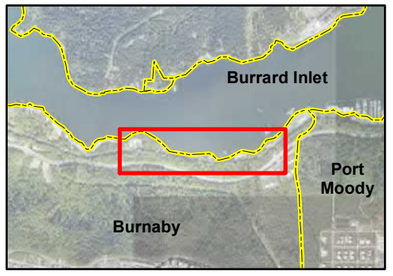
Cascade Capacity Expansion Project

Figure 8c
Structures - Mitigation Measures

Legend

- Existing Track
- Proposed Track
- Existing Culvert
- Proposed Embankment
- Possible Temporary Work Pad
- Possible Temporary Access Road



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5.5 Structures

A number of structures are proposed as elements of the proposed Cascade Capacity Expansion Project. Modifications to or replacement of existing culverts are proposed at a number of locations within the Project area and potential temporary access routes and laydown/staging areas. Spanning of watercourses with temporary bridge structures, as an alternative to culvert extensions, may also occur. Other structures proposed by the Project are a small retaining wall in the vicinity of Suncor's overhead trestle access road and a siding bridge proposed to span product delivery pipes currently running beneath the CP right-of-way to Suncor's terminal on Burrard Inlet.

Anticipated construction activities and applicable mitigation measures are described for each structure below.

5.5.1 Culverts

Eight culverts within the Project area will be modified through the construction of extensions or by slip-lining the existing culvert with a new pipe of slightly smaller diameter. Temporary extensions to other culverts located east and/or west of the Project area may be required to accommodate temporary access or laydown/staging areas. Culvert extensions would comprise the following construction activities:

- Water management to temporarily convey flow around the culvert locations;
- Culvert installation including cast-in-place extensions to concrete box culverts and slip-lining and grouting of new pipes within existing pipes; and
- On-going maintenance of extended culverts during the construction period.

Applicable mitigation measures are presented below with details regarding their implementation referenced in **Section 4**. Proposed mitigation is presented graphically in **Figure 8**.

Culvert Extension	Mitigation Details
Installation	• The outlet hose shall be installed under the rail and discharge onto an armoured surface or into a vegetated area • Isolation barriers shall be installed upstream of culvert inlets • Pump intakes within flow upstream of barriers shall be screened • Culvert extensions shall be installed in isolation of flow • Monitoring of pH shall take place for all culverts extensions requiring slip-lining • Testing of pH once tide contacts culvert extensions shall be conducted to determine if pH is within CCME guidelines (7.0-8.7)

Culvert Extension	Mitigation Details
Operations	• Culvert inlets shall be monitoring for debris accumulation and maintained as required • Pumps shall be regularly checked to ensure sufficient gas is present to maintain function
Removal	• Temporary culverts shall be removed when work is completed • Upstream isolating barriers shall be removed slowly with pump still running • Pump shall be turned off when water levels drop below intake • The remainder of the barrier shall then be removed

5.5.2 Temporary Bridge

The selected contractor may choose to install temporary bridge structures over Project area watercourses for the development of temporary access routes. These may include prefabricated components such as abutments and spans. The on-site construction of temporary bridges is not expected. The following construction activities would be anticipated for the use of temporary bridges:

- Ground improvements for approaches;
- Installation of prefabricated abutments and spans using heavy equipment;
- On-going maintenance of structures during the construction period.

Applicable mitigation measures are presented below with details regarding their implementation referenced in **Section 4**. Proposed mitigation is presented graphically in **Figure 8**.

Temporary Bridge Installation	Mitigation Details
Installation	• Bridge buttress shall be installed above top-of-bank • Temporary bridge shall be installed above high water mark • Fill shall be placed that allows transition from existing grade to bridge deck
Removal	• Fill shall be removed back to existing grade • Discharge to watercourses shall be avoided • Bridge deck and buttresses shall be removed • Disturbed ground shall be covered with 5-10 cm of scattered straw

5.5.3 Retaining Wall

A small section of retaining wall is required in the vicinity of Suncor's overhead trestle bridge. Details regarding the type and construction technique for the retaining wall are at the discretion of the selected Contractor. Piles or micropiles may be used at this location.

The following construction activities would be expected for construction of the retaining wall:

- Ground preparation;
- Installation of retaining wall elements; and
- Back-filling.

Applicable mitigation measures are presented below with details regarding their implementation referenced in **Section 4**. Proposed mitigation is presented graphically in **Figure 8b** and **Figure 8c.**

Retaining Wall Installation	Mitigation Details
Sediment Control	• A floating silt curtain shall be installed in the water
Concrete Management	• Vertical culverts or pipes shall be installed to contain concrete during pours if micropiles are used • Testing of pH once tide contacts culvert extensions shall be conducted to determine if pH is within CCME guidelines (7.0-8.7)
Aquatic life salvage	• Aquatic life salvages of mobile invertebrates and fish shall be completed within the footprint of the retaining wall • A barrier (*e.g.,* no-post or approved equivalent) shall be installed near the base of the new retaining wall to exclude re-entry by mobile invertebrates
Timing	• Concrete pours shall be conducted during low tides • If pile driving is required, it shall occur during VFPA standard work hours

5.5.4 Pipe Bridge

A small siding bridge is proposed in the Project area at the western limit of the Suncor property. Details regarding the type and construction technique for the siding bridge are at the discretion of the selected Contractor. Piles or micropiles may be used at this location and may include one or more piles on the foreshore. The following construction activities would be expected for construction of the siding bridge:

- Ground preparation;
- Installation of bridge foundation and supports; and
- Installation of bridge abutments and span.

Applicable mitigation measures are presented below with details regarding their implementation referenced in **Section 4**. Proposed mitigation is presented graphically in **Figure 8c** and **Figure 8d.**

Pipe Bridge Installation	Mitigation Details
Concrete Management	• Concrete pours shall be conducted during low tides • Vertical culverts or pipes shall be installed to contain concrete during pour if micropiles used • Testing of pH once tide contacts piles shall be conducted to determine if pH is within CCME guidelines (i.e., 7.0-8.7)
Timing	• Concrete pours shall be conducted during low tides • If pile driving is required, it shall occur during VFPA regular work hours

5.6 Habitat Offsetting

5.6.1 Beach Creation

Forage fish spawning beaches are proposed, as habitat offsetting, at the Burnaby Mountain Beaches site (Project area) and at the Hastings Townsite (Vancouver). The location of the proposed offsetting habitat is fixed however the approach to constructing the spawning beaches could vary depending on the Contractor selected by CP (e.g., method of beach material delivery).

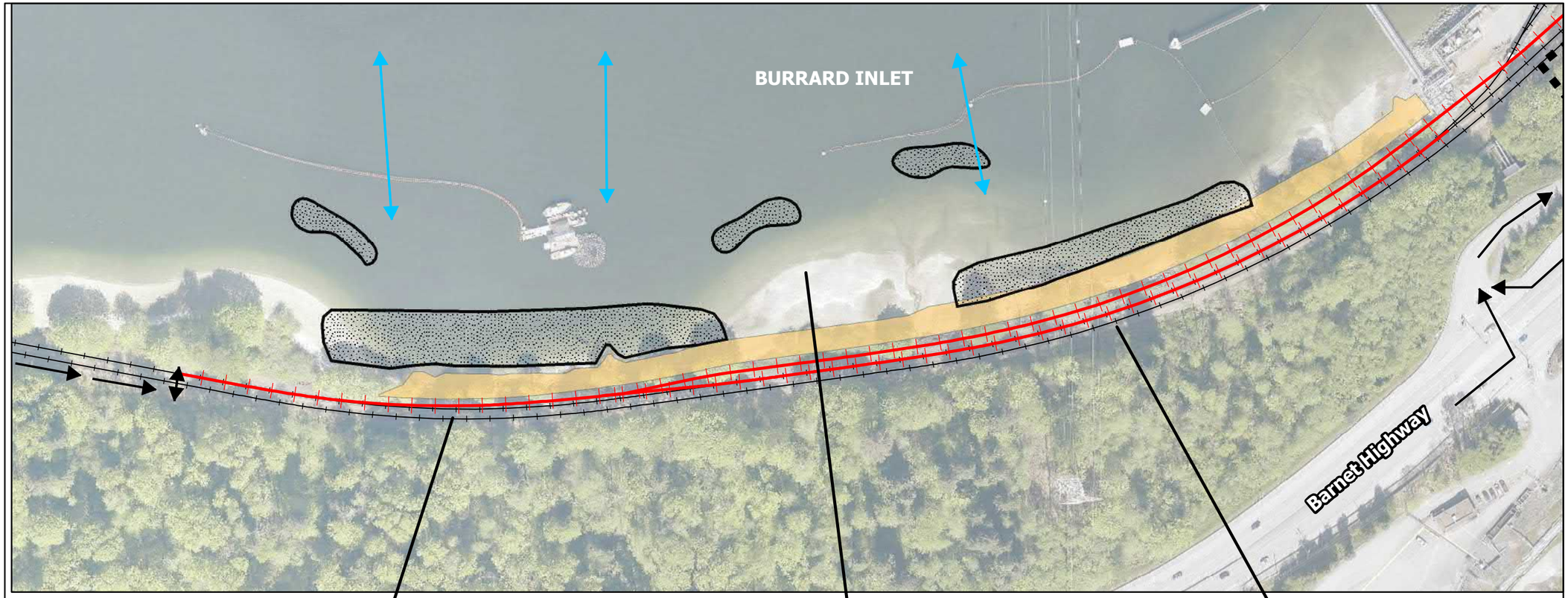
The following construction activities would be required:

- Delivery and possible storage of materials for beach creation; and
- Placement and grading of materials on the foreshore.

Mitigation measures that will be implemented for the construction of spawning beaches are presented below with details regarding their implementation referenced in **Section 4**. Proposed mitigation for the beach creation component of habitat offsetting is presented graphically in **Figure 9.**

Beach Creation	Mitigation Details
Delivery and possible storage of materials for beach creation	• Delivery of material and equipment to the Burnaby Mountain Beach site shall be by marine access only • Delivery to the Hastings site shall be marine access or parking lot for material and via the parking lot for equipment • Marine access shall be timed to coincide with favourable tidal conditions

Beach Creation	Mitigation Details
Placement and Grading of Beach Materials	• Installation shall occur during favourable tides to the extent possible • Barge access shall be conducted at higher tides to avoid grounding • Material placement shall not occur if free-ranging marine mammals are observed in the vicinity • Work shall be reinitiated after free-ranging marine mammals have not been observed for 30 minutes • All beach grading shall occur above the tide line • Wave trips shall be constructed first to reduce the erosive potential on newly installed beach material
Sediment Control	• All rock brought to site shall be free of sediment prior to placement • Street sweeping shall be conducted in the Hastings parking lot • Filter bags shall be placed in catch basins at the Hastings parking lot
Timing	• Work shall occur during VFPA standard working hours for all work above the high water level
Equipment storage	• All equipment shall be stored above the high high water mark
Refuelling	• Refueling shall take place above the high high water mark of any watercourse or the marine environment



Land-Based Mitigation

- Erosion and sediment control to be placed at laydown/staging areas
- Offsite sediment discharge to be minimized
- Spill response readiness to be implemented, including having sufficiently stocked spill kits on site at all times
- Work to be conducted within VFPA standard work hours only

In-Water Mitigation

- Barges to access site under appropriate tidal conditions to avoid grounding
- Barges to be equipped with sufficiently stocked spill response kits
- All material placed to be free of sediment
- Salvage for motile invertebrates to be conducted if access required through the intertidal area
- Equipment used to place material to be free of oils, grease and other substances deleterious to aquatic life
- Work to be conducted within VFPA standard work hours only

Site Restoration

- Spill kits to be maintained at all times during demobilization
- Temporary piles to be removed upon completion of construction
- All construction debris to be removed from site during demobilization
- Exposed soils to be stabilized (compaction, seeding and/or covering with straw or erosion control blanket)
- Disturbed areas to be restored with native riparian vegetation to restore habitat function

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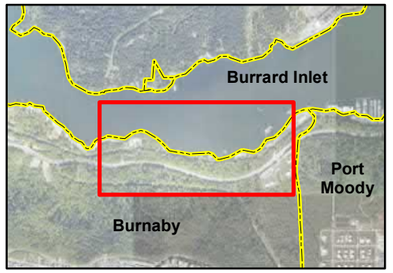
Cascade Capacity Expansion Project

Figure 9a
Burnaby Mountain Beaches Habitat Offsetting - Mitigation

Legend

- Existing Track
- Proposed Track
- Proposed Habitat Offsetting Area
- Proposed Embankment



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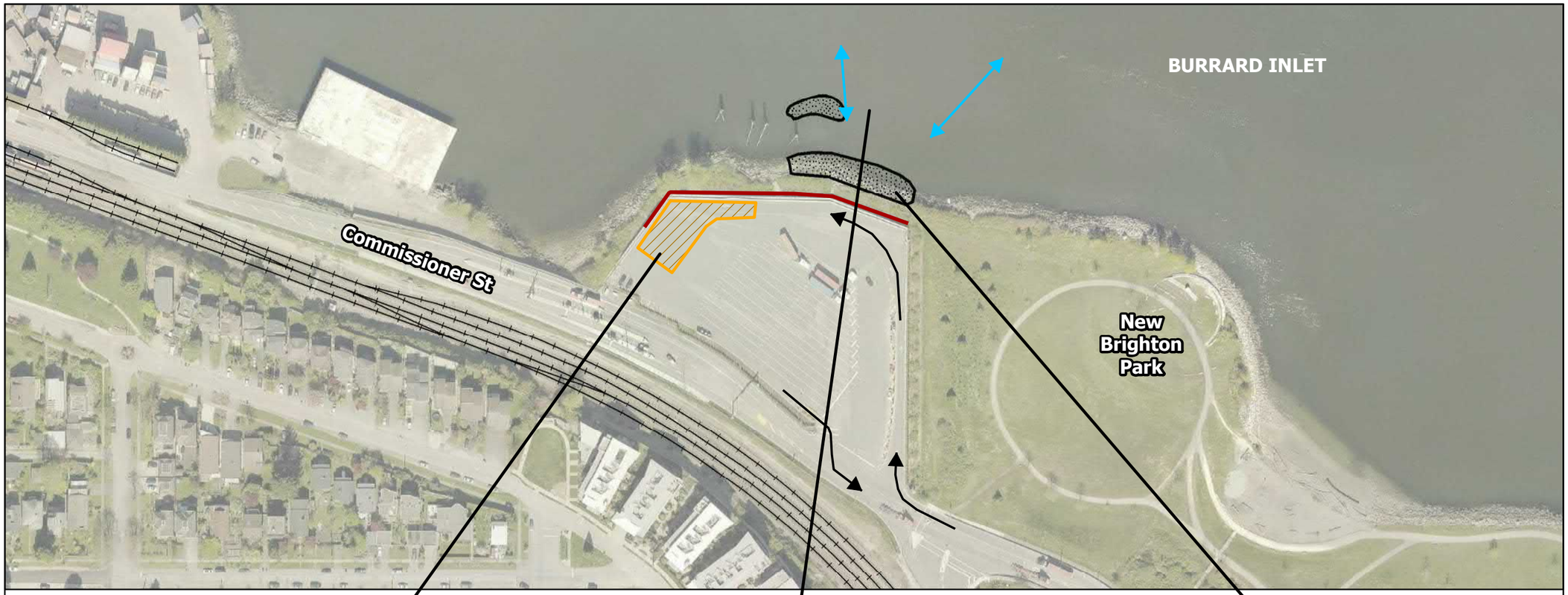

Land-Based Mitigation

- Filter bag or approved equivalent to be installed at all catch basins
- Sweeping of parking lot to be conducted regularly as required
- Offsite sediment discharge to be minimized
- Spill response readiness to be implemented, including having sufficiently stocked spill kits on site at all times
- Work to be conducted within VFPA standard work hours only

In-Water Mitigation

- Barges to access site under appropriate tidal conditions to avoid grounding
- Barges to be equipped with sufficiently stocked spill response kits
- All material placed to be free of sediment
- Salvage for motile invertebrates to be conducted if access required through the intertidal area
- Equipment used to place material to be free of oils, grease and other substances deleterious to aquatic life
- Work to be conducted within VFPA standard work hours only

Site Restoration

- Spill kits to be maintained at all times during demobilization
- Temporary piles to be removed upon completion of construction
- All construction debris to be removed from site during demobilization
- Exposed soils to be stabilized (compaction, seeding and/or covering with straw or erosion control blanket)
- Disturbed areas to be restored with native riparian vegetation to restore habitat function

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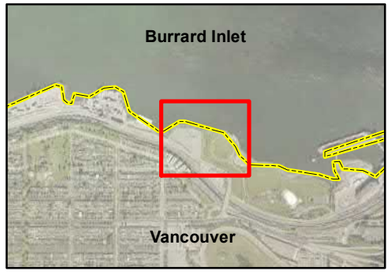
Cascade Capacity Expansion Project

Figure 9b
Hastings Townsite Offsetting - Mitigation

Legend

- Existing Track
- Existing Retaining Wall
- Possible Laydown & Staging Area
- Possible Ground Access Route
- Possible Marine Access Route
- Proposed Habitat Offsetting Area



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5.6.2 Offshore Reefs

Offshore reefs are also proposed as habitat offsetting at the Burnaby Beaches site (Project area) and at the Hastings Townsite (Vancouver). The locations of the proposed offshore reefs will be "field fit" within the immediate vicinity offshore from the Project area. It is expected that rock material to be used for the construction of the offshore reefs at both the Burnaby Beaches and Hastings Townsite locations will be delivered by barge. Further, it is expected that a clam-shell or other similar barge-mounted equipment will be used to place individual rocks for the creation of each of the reefs proposed.

The following activities will be required for the construction of the reefs:

- Delivery of materials (i.e., rock) to the two sites;
- Possible storage of materials and/or equipment at the sites; and
- Placement of materials in subtidal areas of the nearshore.

Mitigation measures that will be implemented for the construction of reef structures are presented below with details regarding their implementation referenced in **Section 4**. Proposed mitigation for the beach creation component of habitat offsetting is presented graphically in **Figure 9.**

Offshore Reef Placement	Mitigation Details
Installation	• Installation shall occur during favourable tides to the extent possible • Installation shall occur entirely in the subtidal zone • Barge access shall be conducted at higher tides to avoid grounding • Placement of material shall not be conducted if free-ranging marine mammals are observed in the immediate vicinity • Work shall occur during VFPA standard working hours
Sediment Control	• All rock brought to site shall be free of sediment prior to placement

5.6.3 Riparian Planting

Following construction, restoration of the Project area will be completed and will include the planting of vegetation between the edge of the new track and the unarmoured portion of the new track embankment as well as on the Hastings Townsite shoreline. It is expected that soil and plants used for site revegetation will be delivered by land access however could also be delivered by barge.

The following activities will be required for the riparian planting component of the habitat offsetting:

- Delivery and storage of plants, soil and equipment/supplies to the two sites; and
- Installation of soil and plants in the riparian zone of both sites.

Mitigation measures that will be implemented during riparian planting are presented below with details regarding their implementation referenced in **Section 4**. Proposed mitigation for the riparian planting component of habitat offsetting is presented graphically in **Figure 9.**

Riparian Planting Activity	Mitigation Details
Delivery and Storage of Plants, Soil and Equipment	• Materials shall be delivered and placed in previously created laydown areas • Topsoil shall be covered with plastic sheeting or approved equivalent before being placed onsite • Equipment used shall be well maintained and free of oils and grease • Fertilizer shall be stored onsite such that there is no potential for runoff
Installation of Plants within the Riparian Zone	• Installation shall occur during favourable time of the year (*i.e.*, fall or early spring) • Fertilizer shall only be placed around rootballs
Removal of invasive species	• Removal of the top 500-750 mm of existing topsoil and invasive plant material shall be completed
Sediment control	• Topsoil stored onsite for more than 24 hours shall be covered with plastic sheeting or tarps to minimize runoff • Topsoil shall be stored in appropriate low-traffic areas • Silt fences shall be maintained along previously constructed access roads while riparian planting is being undertaken
Timing	• Work shall occur during VFPA standard working hours for all work above the high water level
Equipment storage	• All equipment shall be stored above the high high water mark
Refuelling	• Refueling shall take place above the high high water mark of any watercourse or the marine environment

5.7 Removal of Temporary Works

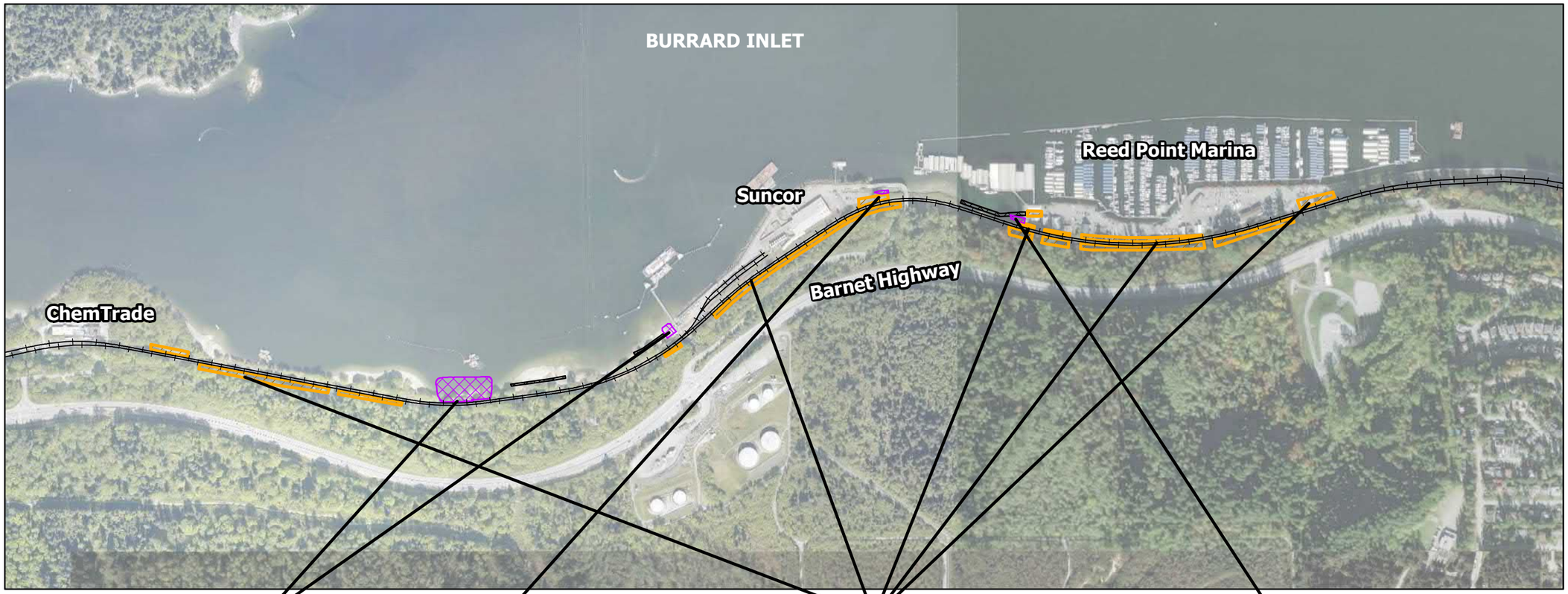
5.7.1 Access Roads and Laydown/Staging Areas

Following the completion of construction, temporary access roads and temporary laydown/staging areas will be appropriately decommissioned, removed and restored. Removal of these temporary works will generally comprise the following activities:

- Breaking of compacted soils;
- Removal of culvert extensions and reinstatement of pre-construction drainage paths;
- Regrading of disturbed areas and stabilization through revegetation; and
- Removal of all garbage, construction waste and non-biodegradable materials.

Mitigation measures that will be implemented during the removal of temporary access roads and laydown/staging areas are presented below with details regarding their implementation referenced in **Section 4**. Proposed mitigation for the riparian planting component of habitat offsetting is presented graphically in **Figure 10.**

Removal of Temporary Access Roads/Laydown/ Staging Areas	Mitigation Details
Breaking of Compacted Soils	• Equipment used shall be free of oils and grease • Erosion and sediment control shall consist of the placement of straw or approved equivalent on disturbed areas
Removal of Culvert Extensions	• Silt fence at 15-m buffers from watercourse crossings shall be retained in place • Temporary culvert extensions shall be removed in isolation of flowing water • Exposed soils shall be stabilized (compaction, seeding and/or covering with straw or erosion control blanket) • Equipment used shall be free of oils and grease
Regrading/Stabilization of Disturbed Areas	• Equipment used shall be free of oils and grease • Disturbed areas shall be regraded to promote positive drainage and stability • Exposed soils shall be stabilized (compaction, seeding and/or covering with straw or erosion control blanket) • An appropriate coastal reclamation grass seed mix shall be placed on all exposed areas
Garbage Removal / Demobilization	• All debris shall be removed from the site and placed in appropriate containers for offsite disposal • Street sweeping shall be conducted at access points to the road network upon completion of construction
Timing	• Work shall occur during VFPA standard working hours



Removal of West Temporary Pads

- Removal to occur during favorable tides to the extent possible
- Equipment used to be free of oils and grease
- Spill kit to be retained onsite at all times
- Exposed soils to be stabilized (compaction, seeding and/or covering with straw or erosion control blanket)

Removal of Suncor Work Pad

- Equipment used to be free of oils and grease
- Spill kit to be retained onsite at all times
- Catch basin protection to be removed and disposed of offsite
- Laydown Area to be swept prior to demobilization

Removal of Laydown and Staging Areas

- Silt fence at 15-m buffers from watercourse crossings to be retained in place
- Temporary culvert extensions to be removed in isolation of flow
- Spill kit to be retained onsite at all times

Removal of East Temporary Pad and Access Road

- Removal to occur during favorable tides to the extent possible
- Silt curtain extending from Suncor to Reed Point Marina to be retained in place during removal
- Equipment used to be free of oils and grease
- Spill kit to be retained onsite at all times
- Exposed soils to be stabilized (compaction, seeding and/or covering with straw or erosion control blanket)

Canadian Pacific

Cascade Capacity Expansion Project

Figure 10
Removal of Temporary Works

Legend

- Existing Track
- Possible Temporary Work Pad
- Possible Temporary Access Road
- Possible Laydown & Staging Area

0 65 130 260 Meters

SCALE 1:8,500

MAP DRAWING INFORMATION:
ESRI Basemaps, Dillon, City of Vancouver, and AECOM

MAP CREATED BY: BS
MAP CHECKED BY: RD
MAP PROJECTION: NAD 1983 UTM Zone 10N

DILLON CONSULTING

PROJECT: 18-7764
STATUS: DRAFT
DATE: OCTOBER 2019

5.7.2 Work Pads

Temporary work pads constructed on the Burrard Inlet foreshore to facilitate construction activities will be also be decommissioned and removed following the completion of construction. There are four work pads located across the Project area. Removal of these work pads would be expected to be completed from the marine-side of the project (i.e., by barge) but could be removed over land access. Removal of the temporary work pads will generally entail the following activities:

- Excavation of placed materials and placement/storage on marine scow;
- Removal from the Project area; and
- Regrading of disturbed areas.

Mitigation measures that will be implemented during the removal of temporary access work pads are presented below with details regarding their implementation referenced in **Section 4**. Proposed mitigation for the riparian planting component of habitat offsetting is presented graphically in **Figure 10.**

Removal of Temporary Work Areas	Mitigation Details
Removal of Placed Materials	• Removal shall occur during favourable tides to the extent possible • Equipment shall be free of oils and grease • A floating silt curtain shall be used to surround excavation during material removal in fine-grained substrate areas
Removal from the Project Area	• Loads shall be secured and transported during favourable conditions using appropriate erosion and sediment control measures (*e.g.,* perimeter berm, tarps) to minimize deposition of sediment-laden water to Burrard Inlet
Regrading of Disturbed Areas	• Equipment used shall free of oils and grease • Exposed soils shall be stabilized (compaction, seeding and/or covering with straw or erosion control blanket)
Garbage Removal / Demobilization	• All debris shall be removed from the site and placed in appropriate containers for offsite disposal • Street sweeping shall be conducted at access points to the road network upon completion of construction
Timing	• Work shall occur during VFPA standard working hours

6.0 Archaeological and Cultural Resources

In the event that buried archaeological or cultural resources are encountered during site operations, the contractor will immediately stop construction, notify CP's Representative and the Project Archaeologist, and comply with the procedures identified below as indicated in the Project-specific Archaeological Chance Find Procedures (Project CFP) prepared by Terra Archaeology Limited. The Project CFP is one of several impact management recommendations made by a professional archaeologist, or is part of the proponent's broader heritage management policies. Project managers should consult these additional documents before implementing the Project CFP. All on-site personnel involved in ground altering activities should be familiar with this policy, *including* the types of sites described in Appendix A of the Project CFP before starting on-site work. The Project CFP, including the content in Appendix A of the document, should be presented to all on-site personnel by a professional archaeologist familiar with the project, in collaboration with local First Nations.

Any item of particular archaeological, cultural or scientific interest found on the Project site will be the property of CP until further notice. CP will work with the Project Archaeologist and appropriate authorities having jurisdiction to properly manage and protect such resources.

6.1 Archaeological/Cultural Sites Chance Find Guidelines

For land-altering activities outside of known site areas it is important to note that work in the area of the discovery must stop immediately no matter what type of archaeological material or feature has been encountered by the proponent or their contractors. The following emergency impact management guidelines apply to archaeological and cultural sites. Emergency management procedures for suspected human burial sites are presented separately below.

Initial Action by Proponent and Contractors

Step 1: Stop Work – If archaeological materials are believed to have been encountered, all work in the area of the discovery should cease and the site area safely secured. Do not move any soil from the vicinity of the site, including any spoil material.

Step 2: Contact an Archaeologist – An archaeologist should be contacted as soon as possible. If possible, e-mail notification of chance finds should include photographs of the finds from several angles, from close-up (with an everyday object, such as a pen, for scale), and from a short distance away.

Step 3: Seek Guidance from the Archaeologist – The archaeologist will provide guidance on further action. Where possible a solution will be arrived at over the phone, perhaps supplemented by digital images of the find forwarded to the archaeologist's office. If the archaeologist cannot determine the exact nature of the discovery, and/or it cannot be satisfactorily resolved over the telephone or by e-mail, a visit will be arranged so the site can be assessed and mapped. Prior to visiting the area of the discovery, the Archaeology Branch of the Ministry of Forests, Lands, Natural Resource Operations and Rural Development will be notified of the discovery.

Archaeological Site Management Options

If the archaeologist confirms that an archaeological site has been discovered, there are several management options. Proponents should work collaboratively with First Nations and the archaeologist to determine a management plan if a conflict with an archaeological site is identified. If a *Heritage Conservation Act* inspection, investigation, or alteration permit is not in place either for the development, or in connection with a known archaeological site, this must first be applied for and obtained. The archaeologist can prepare the application for the appropriate permit which must be signed by an individual representing the development prior to submission. Once the permit has been granted by the Archaeology Branch there are three main archaeological site management options:

1. **Avoid**: If the boundaries of the site have been delineated, an attempt will be made to redesign the proposed development to avoid the site. It will likely be necessary to have a Heritage Inspection Permit in place to properly delineate site boundaries. Site avoidance is normally the fastest and most cost-effective management option for archaeological sites.
2. **Mitigate**: If it is not feasible to avoid the site through development redesign, it will be necessary to effectively sample it utilizing a systematic data collection program prior to its loss. This could include a systematic surface collection and/or excavation. Mitigative work is normally the most expensive and time-consuming management option.
3. **Protect:** It may be possible to protect the site through the installation of barriers during the time of the development and possibly for a longer term. This could include the erection of high visibility fencing around the site or covering the site area with a geotextile and then capping it with fill. The exact prescription would be site-specific.

6.2 Possible Human Remains Identified

Procedures in the event of the discovery of human remains during development are covered in depth by the Tsleil-Waututh Ancestral Remains Policy (Appendix B of the Project CFP) and an Archaeology Branch Policy Statement (see Appendix C of the Project CFP). A summary of these procedures is presented below.

Initial Action by Proponent and Contractors

If definite or possible human remains are encountered:

Step 1: Stop Work – Immediately cease all development activities in the area of the suspected human remains.

Step 2: Contact an Archaeologist – An archaeologist should be contacted as soon as possible.

Step 3: Seek Action from the Archaeologist – The archaeologist will provide guidance regarding further action.

Initial Action by Archaeologist

Step 1: Contact Authorities – Archaeologist will contact the Archaeology Branch, and if warranted, municipal police or RCMP, and/or the Office of the Coroner.

Step 2: Contact First Nations – Archaeologist will contact local First Nation community and inspect the site.

Step 3: Plan Site Management – If the remains are deemed to be archaeological, the archaeologist will begin negotiations to appropriately manage them.

Human Remains Management Options

The handling of human remains believed to be archaeological in nature requires communication with, and cooperation of, the relevant First Nations groups. Generally, there are two possible courses of action that are followed. More detailed information with respect to the process is presented as Appendix C of the Project CFP.

1. **Avoid**: The development project is redesigned to completely avoid the found human remains. An assessment should be made as to whether the remains may be affected by residual or accumulative impacts associated with the development, and properly addressed by a comprehensive management plan.
2. **Exhume**: Exhume the remains in a manner considered appropriate by the First Nation groups. This will involve the predetermination of a site suitable for the reburial of the remains. Certain ceremonies or procedures may need to be followed before development activities can resume in the area of the discovery.

First Nations' (Indigenous Peoples') ancestral remains are of the utmost importance to descendant communities. First Nations expect all developers and their contractors to follow specific cultural protocols any time ancestral remains are identified in development areas. In cases where no specific protocols exist, local First Nations should be involved in the development of a culturally appropriate and respectful ancestral remains management plan.

7.0 Emergency Response

In the event of an emergency, the contractor is to follow the procedures and protocols outlined in CP's Integrated Contingency Plan (ICP) Emergency Preparedness and Response (i.e., Section 2: Core Plan), as well as any applicable Annexes (Section 3).

7.1 Emergency Communication

Clear and rapid communication is essential to reduce the impact of an emergency situation on personnel and/or the surrounding environment. The following table identifies the key personnel that should be contacted in the event of an emergency.

Agency	Contact Number
Emergency Services	911
CP Police Communications Centre	1-800-716-9132
CP Network Management Centre (NMC)	1-800-795-7851
Burnaby RCMP Non-emergency	604-646-9999
Port Moody Police Department Non-emergency	604-461-3456
Burnaby Fire Dispatch Non-emergency	604-294-7190
Port Moody Firehall No.2 Non-emergency	604-931-1163
Port Moody Hospital (Eagle Ridge)	604-461-2022
VFPA Operations Centre	604-665-9086
Emergency Management BC Program (24-hour Report a Spill)	1-800-663-3456
Canadian Coast Guard (Kitsilano Station)	604-666-0295

7.2 Environmental Emergency Plan

Environmental emergencies that might occur during Project construction or on the Project site may include, but are not limited to:

- Reportable fuel spills;
- Sediment laden water leaving the site or entering a waterbody;
- Unauthorized harm or destruction to fish or fish habitat;
- Negative wildlife interactions; and
- Observation of a previously unidentified sensitive environmental feature.

In the event of one of these events, the Environmental Monitor and appropriate regulatory authorities should be notified as quickly as possible. The Environmental Monitor will assess and record all incidents and determine appropriate action.

7.3 Spill Response Plan

There is the low potential for environmental damage to occur from the accidental spillage of hazardous substances to the surrounding environment. Regardless, adequate spill response measures must be in place at all times during Project construction activities. To minimize the potential environmental impact and ensure the proper management of a spill event, BMPs to be implemented during construction include:

- In the event of an accidental spill, initial response will be by the Contractor's designated on-site personnel and will follow these steps: 1) ensure safety; 2) stop the flow; 3) secure the area; 4) contain the spill (identification of product, equipment involved, affected area(s) and spill status); 5) Clean up the spill and 6) record and report the spill (Appendix C);
- Initial response will focus on minimizing the saturation of spilled material into the soils by using appropriate absorbent materials (e.g., pads);
- **All spills, regardless of quantity, are required to be reported to CP at 1-800-795-7851, as well as the Site Engineer and Environmental Monitor;**
- CP staff will liaise with the appropriate government agencies as required;
- **Any spill of a substance that is toxic, polluting or deleterious to aquatic life of reportable quantities must be immediately reported to the Emergency Management BC Program 24-hour phone line at 1-800-663-3456;**
- The Contractor will have the appropriate equipment available on-site to clean up the contamination and properly manage its removal and disposal; and
- Each piece of equipment must carry a 45L Spill Kit having the contents (or equivalent) described below. A 240L Rolling Bin Spill Kit having the contents (or equivalent) described below must be available at the designated equipment refueling location.

Table 5. Spill Supplies Necessary for Equipment Kit and On-Site Rolling Bin Spill Kit

TSKO/U Oil/Universal 45 Litre Truck Spill Kit Contents:	SRK 240 Litre Medium Rolling Bin Spill KitContents:
1 only Zippered Yellow All Weather Bag Part#: S46 15 only Oil Only White Perforated Pads Part#: WPB 100GL 15 only Universal Grey Perforated Pads Part#: GB100H 1 only 3” x 4’ Oil Only Socks Part#: WSO 430 1 only 3” x 8’ Oil Only Socks Part#: WSO 815 1 only 3” x 4’ Grey Socks Part#: GSO 430 1 only Orange Disposal Bag Part#: OB3550 1 only Epoxy Stick for Metal Repair Part#: P1500	1 only Yellow rolling bin c/w lid Part#: GMT-240 1 only Large White Spill Kit Label Part#: A-KITLABEL 50 only Oil Only White Perforated Pads Part#: WPB 100ML 50 only Universal Grey Perforated Pads Part#: GB100H 2 only 3” x 4’ Oil Only Socks Part#: WSO 440 2 only 3” x 8’ Oil Only Socks Part#: WSO 815 2 only 3” x 4’ Universal Socks Part#: GSO 440 2 only 3” x 8’ Universal Socks Part#: GSO 815 1 only Orange Disposal Bag Part#: OB3550 2 only White Oil Only Pillows Part#: WPIL818 1 pair Green Nitrile Gloves Part#: 316 1 only Solid-A-Sorb Granular Sorbent, 2 lbs. Bag Part#: 715-2 1 only Epoxy Stick for Metal Repair Part#: P1500 1 only Plug N Dyke Plug Pattie, 10 oz. Part#: P2 1 only Chemical Splash Goggles Part#: 315 1 only Nitrile drain cover Part#: NDC36

Monitoring will be undertaken during regular environmental monitoring visits by the Site Engineer and/or the Environmental Monitor. Additional monitoring will be required if a spill occurs on-site to verify reporting and clean-up methods. Compliance with this directive will be monitored during site visits. The contractor shall observe the spill or release response measures identified in Section 2.2.8 of CP’s ICP (Mitigating Action/Containment of Release).

8.0 Post-Construction Follow-Up

Upon completion of construction activities, CP will leave all areas of the Project site stable and free of waste materials. As appropriate, disturbed areas outside of the Project footprint will be stabilized through seeding or another form of surface protection, as required.

Subsequent to completion of construction, CP will conduct five years of post-construction monitoring consisting of three monitoring objectives:

- ***Objective 1***: Document that Project activities have been completed in accordance with the applicable sections of the CEMP. This will include the following:
  - Establish permanent monitoring locations;
  - Identify monitoring criteria (e.g., quantity/quality) for "success" measurement; and
  - Evaluate the level of success achieved.
- ***Objective 2***: Document that Project off-setting habitat has been constructed in accordance with off-setting plans as follows:
  - Compare "as constructed" observations of completed Project with design plans including quantities, quality, species, etc. for "success" measurement; and
  - Evaluate the level of success achieved.
- ***Objective 3***: Document long-term functioning of off-setting habitat as follows:
  - Establish permanent monitoring locations;
  - Identify monitoring criteria (e.g., quantity, quality, evidence of use) for "success" measurement; and
  - Annually evaluate the level of success achieved culminating in a final evaluation of off-setting habitat function in Year 5.

If deficiencies are identified at any stage of the post-construction monitoring period, Dillon will provide an update to CP along with a series of suggestions for addressing these deficiencies in order to achieve the objectives of the Off-setting Plan. CP will address these deficiencies at their cost per the requirements of the CEMP.

9.0 Conclusion

Information presented in this CEMP is based on information provided in the *Request for Project Review* document submitted to DFO, discussions between CP and Dillon Representatives, and the knowledge and experience of Dillon staff. Should additional information become available that is relevant to environmental protection during construction of the proposed Capacity Expansion Project, the recommendations and findings of this CEMP will be revised.

Appendix A

Japanese Knotweed Management Plan

Japanese knotweed is found at select locations along the CP right-of-way within the Project area. Japanese knotweed is an extremely aggressive noxious weed that can spread through the distribution of stem fragments or rhizomes. As such, manual removal of living plants by mowing or cutting is not recommended due to the increased risk of dispersing material that could establish new plants or populations. The proper application of a herbicide, followed by careful removal of the dead plant material?, is the preferred eradication protocol. This requires the herbicide to be applied into an actively growing plant with at least one meter of vertical growth in order to promote absorption[1] (*i.e.*, from April 1 to September 30). Due to the timing of proposed construction of the Project, the appropriate timing of herbicide treatment cannot be achieved. The following knotweed management protocol is therefore recommended for implementation during construction.

- Plant material should be cut, carefully collected and placed in heavy-duty trash bags
- Where possible, knotweed removal should occur on a windless day to avoid the dispersal of stem sections or rhizomes that may be viable
- Collection of cut material should occur in the immediate vicinity of the knotwood stand (*i.e.*, do not have a central location where all material is stored prior to being placed in bags)
- All collected knotweed material should be removed offsite and disposed of at a designated facility where it can be incinerated
- If working in a knotweed-infested area, personnel should wear gloves and coveralls that can be removed, sealed in a trash bag and taken from site for washing to avoid offsite dispersal
- Equipment coming in contact with knotweed should be cleaned of any stems, roots or other materials at the completion of work by washing to avoid spreading invasive plant material offsite
- Knotweed re-establishing in the CP right-of-way will be subject to CP's ongoing vegetation management protocols.

[1] 2016 Herbicide Guidelines for Control of Knotweed Species on Crown Lands. Accessed December 2016 and available on the web at:
https://www.for.gov.bc.ca/hra/Plants/publications/2016_Herbicide_Summary_for_Control_of_Knotweeds_on_Crown_Lands.pdf

Appendix B

Template Environmental Monitoring Report

ENVIRONMENTAL MONITORING REPORT

PROJECT INFORMATION

PROJECT NO. & NAME	18-7764 CP Cascade Rail Expansion
DILLON PROJECT MANAGER	Paul Schaap
SITE LOCATION	CP Rail between Mile 118.06 and 118.67
DATES OF VISITS	
WEATHER	
ENVIRONMENTAL MONITOR(S)	
REPORT SUBMITTED ON	
REPORT SUBMITTED TO	
CONTRACTORS WORKING ON SITE	

Construction Activities Performed

DATE: ACTIVITY

Construction Activity	Environmental Mitigation Observations, BMPs in place and Other Details
	•
	•
	•

DATE: ACTIVITY

Construction Activity	Environmental Mitigation Observations, BMPs in place and Other Details
	•
	•
	•

DATE: ACTIVITY

Construction Activity	Environmental Mitigation Observations, BMPs in place and Other Details
	•
	•
	•

Personnel Onsite

Name	Role/Company	Date(s)

Aquatic Salvage

Date	Number and Species Salvaged
	•
	•
	•

Water Quality

Were any turbidity or pH samples taken during the site inspection? YES NO
If yes, please provide sample location and reading:

Date	Location	Reading

Marine Mammal, Fish or Wildlife Observations and Interactions

•

Meetings/Communications and Issues Discussed

•

Issues or Concerns Raised and Measures taken to Address

Issue/Concern	Mitigated or Addressed through:
	•
	•
	•

Environmental Incidents

Detail any Environmental Incidents, Outcome and Reporting

Maps and Photos of Site

Include Photos and Maps as appropriate with appropriate descriptions

Appendix C

Spill Response Plan

General Spill Response Plan

If a spill of fuel, oils, lubricants, or other harmful substances occurs, the following procedures will be implemented:

1. Ensure safety.
2. Stop/contain the flow (when possible).
3. Secure the area.
4. Contain the spill.
5. Notify/report to CP's Representative and/or the Environmental Monitor.
6. Clean-up.

1) Ensure Safety

1. Ensure personal/public, electrical, and environmental safety.
2. Wear appropriate Personal Protective Equipment (PPE) and consult Material Safety Data Sheets.
3. Never rush in, always determine the product spilled before taking action.
4. Warn people in the immediate vicinity.
5. Ensure no ignition sources are present if spill may be a flammable material.
6. Only appropriately trained personnel should be responsible for cleaning up and managing the spill.

2) Stop the Flow (When Possible and Safe to Do So)

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

3) Secure the Area

1. Limit access to the spill area.
2. Prevent unauthorized entry onto the site.

4) Contain the Spill

1. Block off and protect drainage pathways. In the event of a spill onto the ground, a spill boom will be placed on the downslope side. The containment boom will be placed downstream where there is a spill to water. If on water, place booms around the spill to prevent the spread.
2. Prevent spilled material from entering drainage structures (i.e., local watercourses).
3. Use spill absorbent material to contain the spill.
4. If necessary, use a constructed dam or other method to prevent any discharge off-site.
5. Make every effort to minimize contamination.
6. Contain as close to the source as possible.

5) Clean Up

1. Use appropriate equipment to clean-up the spill based on the material spilled.
2. Technical assistance is available from the Environmental Monitor on clean-up procedures and residue sampling.
3. All equipment and/or material used in clean-up (e.g., used absorbent, oil containment materials, etc.) will be disposed of in accordance with regulatory requirements.
4. Accidental spills may produce hazardous wastes (e.g., material with >3% oil) and contaminated soil. All waste disposals must comply with the *Environmental Management Act* and Regulations.
5. Contaminated soil will be treated and dealt with as required on a site-specific basis.

6) Notify / Report

Once the spill is contained, contact the Environmental Monitor and inform them of the issue at hand (see **Table 3** in **Section 0** of the CEMP document). All spills, regardless of quantity, are required to be reported to the CP Network Management Centre (NMC) at 1-800-795-7851 as well as the Site Engineer and Environmental Monitor.

For spills in amounts requiring external notification, the person who had possession, charge or control of a substance immediately before its spill will immediately report details of the spill to the Environmental Monitor who will subsequently contact Emergency Management BC (EMBC) (24-hour Report a Spill) at 1-800-663-3456.

Spill reports to EMBC must include:

- Name and contact phone number of the person reporting the spill;
- Name and phone of the person(s) responsible for the spill;
- Location, time, and date of spill;
- Material spilled and quantity;
- Cause and effect of the spill;
- Action taken to contain the spill;
- Description of spill location and surrounding area;
- Duration of occurrence;
- Weather conditions;
- Planned follow-up;
- Government agencies on the scene; and
- Persons or agencies advised or to be advised.

Environmental "*Near Misses*" are also to be reported to the Environmental Monitor.