

Viterra-Cascadia Terminal Capacity Expansion Project – Phase 4 Marine Construction and Staging Plan

Prepared for:

Canadian Pacific
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1670 Lougheed Highway
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Project No. 104703-01

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ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
BC	British Columbia
CD	chart datum
CP	Canadian Pacific Railway Company
HHWM	high high-water mark
Port Authority	Vancouver Fraser Port Authority
Project	Viterra-Cascadia Terminal Capacity Expansion Project
Terminal	Viterra-Cascadia Grain Terminal

SYMBOLS AND UNITS OF MEASURE

Symbol / Unit of Measure	Definition
24/7	24 hours per day, 7 days per week
m	metre
m ²	square metres
m ³	cubic metres

1.0 INTRODUCTION

As part of the Vancouver Fraser Port Authority (Port Authority) Burrard Inlet Road and Rail Improvement Project, Canadian Pacific Railway Company (CP) is proposing Phase 4 of track expansion activities east of the Viterra-Cascadia Grain Terminal (Terminal) along the south shore of Burrard Inlet, approximately 1,000 metres (m) east of the Second Narrows in Burnaby, British Columbia (BC). Freight volumes in and out of the Terminal have resulted in a shortage of track capacity during the peak shipping season. In addition, the Terminal facility itself is expanding to prepare for the acceptance of increased grain volumes in unit trains. The purpose of the proposed extension is to improve overall mainline and switching operations at the Terminal facility. The increased track length will also add capacity for additional grain product unloading at the Viterra-Cascadia Terminal Capacity Expansion Project (Project).

2.0 PROJECT DESCRIPTION

This section presents a general summary description of the Project including information on the Project location, access, mobilization, and laydown areas.

2.1 Project Overview

The Project involves construction of a rail track extension to the Terminal along the south shore of Burrard Inlet, just east of the Second Narrows in Burnaby, BC. Phase 4 will require reconfiguration of the existing tracks associated with the Chevron Parkland Refinery and construction of a new control point at Mile 123.00. The increased track length will also add capacity for additional grain product unloading. The proposed track extension is located approximately 1,300 m east of the Terminal and would increase the length of the existing third track by approximately 1,750 m between CP Mile 122.93 and Mile 124.96, as shown on **Figure 1, Appendix A**.

The proposed track extension will be broken into 3 different zones, as shown in **Figure 1, Appendix A**. Each zone will have unique and specific construction sequencing. Zone 1 and 3 will require in-water work to construct the embankment above the high high-water mark (HHWM), at which point land operations will include construction of the out-of-water embankment (**Figures 2 and 4, Appendix A**). Zone 2 will be constructed from land using land-based equipment, and no in-water infilling work will be required (**Figure 3, Appendix A**).

2.2 Project Location

The Project is approximately centred at 49°17'25.6" N latitude and 123°00'13.2" W longitude, east of Viterra's Cascadia Terminal between CP Mile 122.93 and Mile 124.96 Cascade Subdivision within the City of Burnaby. The Project encompasses the area of construction required for the track expansion over a distance of approximately 1,750 m along the shoreline and extending into Burrard Inlet. The location of the 3 zones are as follows:

1. Zone 1 is the area between the western extent of the proposed alignment to approximately 450 m west of the existing Burrard Terminal.
2. Zone 2 is the area between Zones 1 and 3 and encompasses the Chevron Parkland Refinery.
3. Zone 3 is the area between approximately 294 m to the east of the existing Burrard Terminal to the west end of the parking lot at the Reed Point Marina.

2.3 Site Description

The Project footprint is primarily within the existing CP right-of-way and within the Port Authority lease area. Certain areas require work within Chevron's Parkland Refinery property. While the exact footprint will depend on the final design, the Phase 4 footprint is estimated to be approximately 40,000 square metres (m²). Approximately 30,000 m² of this footprint is anticipated to include approximately 5,000 m² of riparian habitat and 25,000 m² of intertidal and subtidal marine habitat.

The tidal range at this location is approximately 5 m from the lower low-water large tide at 0 m chart datum (CD) and the higher high-water large tide at + 5 m CD, with a mean water level of + 3 m CD. The intertidal zone (0 m – + 5 m CD) is primarily rocky, transitioning up to a steep riprap embankment, which in turn leads to approximately 5 m of patchy riparian vegetation that borders the edge of ballast for the existing, active CP tracks.

2.4 Access, Mobilization, and Laydown

The existing and proposed rail tracks run along the south shore of Burrard Inlet, with no residential access available to the 3 zones. As such, providing access to the Project site to perform construction work will involve a combination of:

1. Water-based access
2. Roadway access through Chevron Parkland Refinery
3. Hi-rail access on existing CP tracks.

The construction access for transport of construction materials, equipment, and supplies to and from the Project area will be primarily by marine barge, with the roadway and rail access used where available. Debris, wastes, and other materials will also be removed by barge. Access to the 3 zones will be as follows:

- **Zone 1:** Access will be primarily via a marine route, with barges entering from the west of Zone 1 and travelling along the shore to the intended staging/laydown position. Equipment will be brought to Zone 1 via a constructed Chevron Parkland Refinery road and hi-rail line. The anticipated marine and road access routes for Zone 1 can be seen in **Figure 2, Appendix A**.
- **Zone 2:** Access will be via land only and will involve construction of a new road to access the track from the Chevron Parkland Refinery. The anticipated road access routes for Zone 2 can be seen in **Figure 3, Appendix A**.

- **Zone 3:** Similar to marine access in Zone 1, barges will access Zone 3 from the west and travel along the shore, avoiding the petroleum loading jetty. Equipment will be brought to Zone 3 via rail and the roadways that are part of the Chevron Parkland Refinery. The anticipated marine and road access routes for Zone 3 can be seen in **Figure 4, Appendix A**.

Marine vessels will follow the applicable laws and regulations regarding the loading and transport of their materials, (e.g., *Transportation of Dangerous Goods Act*).

2.4.1 Laydown Areas

The linear, confined nature of the Project workspace does not provide a single point to accommodate laydown and staging areas for equipment and materials. Temporary laydown/staging areas are expected to be created along CP's right-of-way within and potentially beyond the immediate Project areas. Marine staging and laydown areas will be positioned within the areas shown in **Figures 2 and 4 of Appendix A**. Proposed work pads on the Burrard Inlet foreshore have been integrated into the Project design.

The construction and preparation of the temporary laydown and staging areas includes the following activities:

- Vegetation – clearing, grubbing, and general soil grading
- Water management – if needed, temporary modifications to existing culverts and drainage pathways
- Maintenance of areas and modifications throughout construction phase.

Marine barges are anticipated to be the main laydown point for construction equipment, materials, and machinery. Once a suitable work pad has been constructed above the HHWM in each zone, it is expected that heavy machinery (excavators, front loaders, rollers, etc.) will work and be stored overnight on the embankment.

3.0 PROPOSED CONSTRUCTION METHODOLOGY

This section presents the proposed methodology for Project development during the construction phase. It provides details on construction sequencing and in-water construction activities during construction of the toe and platform; installation of subgrade foundation; removal of the temporary work pad; development of the staging areas and embankments; and equipment demobilization.

3.1 General Construction Methods

The material used to construct the embankment (e.g., granular and rock fill) will be transported to the Project site via barge. The proposed construction activities are anticipated to occur primarily from the marine side of the Project area, supported by a barge anchored immediately offshore. The availability of the roadway in the Chevron Parkland Refinery for use in Zone 2 will provide the option for land-based operations; however, marine barges will hold the material used for construction.

A temporary work pad will be constructed to serve as a material unloading area, with the scow tied up adjacent to this pad. Marine equipment will include a derrick (a crane with a pivoting arm for lifting and moving heavy weights) with a track-mounted crane containing a clamshell bucket for riprap placement and removal. Land-based grading equipment will include rock trucks, excavators, and bulldozers, as well as a packer. An equipment list is provided in **Table 2**. A salvage of the marine intertidal and subtidal areas will be conducted prior to fill placement below the HHWM. Following fill placement, the new track grade will be constructed followed by installation of the new track and switch infrastructure. **Table 1** provides a summary of the volume of material involved with Project development.

Table 1 Volume of Material Handled in the Project

	Zone 1	Zone 2	Zone 3
Track length (m)	613	427	680
Fill (riprap and rockfill) above high-water mark (m ³)	10,682	335	15,295
Fill (riprap and rockfill) below high-water mark (m ³)	9,214	0	12,428
Length (m) / type of retaining structure	-	31	-
Length (m) / type of bridge structure	-	4	-

3.2 Construction Sequencing

The Project components and construction approach for each of the 3 zones are as follows:

- Early work to establish access to equipment and material laydown areas will include vegetation clearing, mobilization, and creation of a temporary work pad.
- The temporary work pad will be constructed of well-graded structural fill material with a flat top area surrounded by a 2:1 riprap slope.
- The temporary work pad will serve as an unloading area where a marine scow and derrick may be tied for efficient transfer of materials. This is the only component of the Project, apart from offsetting (see below), that will encroach into the subtidal zone.
- Construction materials will arrive to the site by marine scow and will be unloaded on the temporary work pad by a crane-mounted marine derrick.

- Additional vegetation (including riparian vegetation) will be removed along the construction corridor (i.e., clearing, grubbing, and stripping).
- Marine work is anticipated to include a derrick with a track-mounted crane containing a clamshell bucket (or alternatively an excavator with a long reach arm and bucket with a thumb), supply scow, marine tug, and small work vessels.
- If necessary, the existing land within the proposed embankment footprint will be prepared for fill placement. Any material excavated during grading of the footprint base will be transported to and disposed of at an approved facility.
- Well-graded structural fill will be used during infilling along the construction corridor to support rail sidings (i.e., on the seaward side of the existing rail mainline).
- Following fill placement, the new track grade will be constructed, followed by installation of the new track and switch infrastructure.
- The temporary work pad will be reduced in size and graded to conform to the footprint before riprap placement.
- Approximately 48,000 cubic metres (m³) of riprap will be placed at a 2:1 slope.
- Construction of all required offsetting will take place once the embankment has been constructed within the fishery window as set by the DFO.

Table 2 Anticipated Contractor Equipment List (To be Updated)

Equipment and Resources	Quantity
Ramp barges	X
Spud barges	X
Tugs	X
Transport boat	X
Excavator CAT 336	X
Excavator CAT 345	X
Dozer CAT D7	X
Articulated dump truck	X
Loaders	X
Compactor	X
Grader	X

3.3 In-water Construction

This section presents details on in-water construction of the toe, platform, staging areas, and the embankment, as well as information on installation of the subgrade, removal of the temporary work pad, and demobilization activities.

3.3.1 Toe Construction

The work expected to construct the toe involves excavating the required volume of material for offsite permitted disposal (if required), installing the required geo textile, and installing riprap protection material.

The toe of the embankment will be constructed during periods of low tide following salvage of the footprint by Qualified Environmental Professionals. Toe construction will involve extensive in-water work; daytime low tides will be considered when planning and executing toe construction activities during the construction phase.

3.3.2 Platform Construction

The installation of the platform (from higher high-water large tide to subgrade) will not be affected by tidal inundation and will only be limited by the daily placement limits of the Contractor.

3.3.3 Installation of Subgrade

The installation of the subgrade will not be influenced by tidal activity and will only be limited by the daily placement limits of the Contractor.

3.3.4 Removal of Temporary Work Pad

To the extent practicable, the temporary work pad will be reduced in size, then graded with riprap placed during lower tides. With consideration toward available daytime low tides during the anticipated construction period, it is understood that removal of the temporary work pad will involve extensive in-water work.

3.3.5 Staging Areas and Embankments

The proposed construction activities are anticipated to occur along the marine side of the Project area and will be supported by a barge anchored immediately offshore. Material excavation and placement below the higher high-water line will be limited by low tide windows. To facilitate barge access, a temporary work pad will be installed prior to slope construction to provide a stable working area for material unloading, temporary stockpiles, equipment setup and storage. Slope construction will commence after Contractor mobilization and will be staged in phases to minimize water turbidity while allowing for compaction of each lift.

It is expected that 2 barges carrying material for the embankment construction will be transported to site each day for the duration of the Project.

3.3.6 Demobilization

Demobilization of construction equipment and material will occur after the embankment being constructed (mostly via marine barge). Equipment will be loaded onto the barge before being transported to the Contractor's yard, utilizing the same navigational routes operated for mobilization to the site.

4.0 NAVIGATION HAZARDS AND RISK MITIGATION

The Project construction site is located east of the Second Narrows Bridge on the south shore away from the main shipping channel. In collaboration with the Port Authority, CP will establish the different areas needed for marine work and storage of marine equipment (anchorage, spuds, etc.) to ensure ongoing safety of marine traffic.

Vessel traffic in the Port of Vancouver comprises deep-sea vessels, tugs and tows, barges (aggregate, chip, log, crane), dredges, ferries, tour boats, fishing vessels, pleasure craft, and log operations. Commercial vessels and tugs are required to have a functioning Automatic Identification System on board that enables 24/7 monitoring and control of their movements. The Marine Communications and Traffic Management Services department of the Canadian Coast Guard monitors vessel movements within the navigation channels and keeps mariners abreast of any relevant information pertaining to safety, security, environmental protection, and emergency.

Several mitigations are in place to ensure the safety and security of marine activities. The Contractor's vessels are expected to be sailing through English Bay, Burrard Inlet, and Indian Arm. These 3 locations are under the Port Authority's jurisdiction, and they have developed practices and procedures to ensure navigation safety that utilize bathymetry, tide and current information. The Port Authority, Canadian Hydrographic Services, and the Canadian Coast Guard have programs and equipment (maintenance dredging, marine surveys, system to measure currents and water levels, etc.) to monitor and display updated information to mariners. In case of a depth concern, the Port Authority will issue a Notice to Mariners to inform the marine community of the situation and take actions to remediate the situation.

The navigation channel between English Bay and Indian Arm is marked with fixed and floating navigation aids managed by the Canadian Coast Guard. Range lights with leading beacons help mariners identify the channel centreline. The use of navigation marks and buoys is in accordance with the International Conventions on Buoyage. The Canadian Hydrographic Service regularly publishes hydrographic charts that clearly indicate channel fairways and navigational aids.

The Contractor is required to prepare a Project-specific Marine Activities and Operational Plan that addresses all anticipated marine navigation and operations activities related to all marine assets and equipment and have mitigation measures in place to alleviate potential impacts.

The travel routes for Contractor barges and marine transportation are presented in in **Figures 2 to 4, Appendix A**.

5.0 LIMITS OF DISTURBANCE

This section presents the limits of disturbance identified for staging areas and embankments, in-water structures, and offsetting habitat.

5.1 Staging Areas and Embankments

Construction of the embankments will require disturbance by way of vegetation clearing within the proposed footprint. However, construction activities are not expected to disturb any of the surrounding land as materials will be placed using a marine derrick. Once a temporary work pad has been constructed above the HHWM, land operations will commence from atop the embankment to construct each lift.

The marine barges will cause minor seabed disturbance when using the spuds to anchor down. This anticipated disturbance will be necessary and unavoidable given the high flow rates experienced in the Second Narrows channel. It is expected that the marine barges will be fitted with two 0.5 m diameter spuds, with the area of seafloor disturbance being roughly 0.5 m² each time the barge is moved into position and anchored down. The number of barge movements will be minimized to prevent unnecessary disturbance.

5.2 In-water Structures

A total of 18 culverts within the Project footprint will be modified during construction to accommodate the extension of the embankment into Burrard Inlet. The culverts will be extended by connecting a secondary segment with a neoprene gasket to ensure a watertight fit. Culvert extension activities will be undertaken from the land side.

5.3 Fish Habitat Offsetting

Construction of fish habitat for offsetting purposes will follow construction of the embankment. The offsetting component includes creation of intertidal and shallow rock reefs and riparian planting. Installation of the shallow rock reefs will involve in-water work (i.e., creating shallow subtidal reefs by placing rock via a barge-mounted crane). Intertidal work will be undertaken in the dry where practicable. Offsetting work will also involve soil placement and planting with native plants (shrubs and trees) along the foreshore, once all other construction activities have been completed.

Additional details on offsetting including potential effects (i.e., residual serious harm to fish) and recommended avoidance, mitigation measures, and monitoring are provided separately in the Offsetting Plan located in **Appendix A**.

6.0 PROPOSED SCHEDULE

Subject to receipt of all permits, licences, and approvals, construction is proposed for late 2021 and is estimated to take up to 18 months, with the exception of the offsetting construction (**Table 3**). Offsetting construction work will be undertaken in early 2023 under a schedule that is consistent with the Offsetting Plan (**Appendix A**). The hours of work will be consistent with the Port Authority’s standard work hours of Monday to Saturday, 7:00 am to 8:00 pm. If work outside of these hours is necessary, a request for extended work hours to the Port Authority will be submitted (after issuance of the Project and Environmental Review permit).

Table 3 Tentative Overall Construction Schedule

Task	Start	Finish
Pework – site preparation	Fall 2021	Early 2022
Construction – Infill, riprap	Late 2021	Early 2022
Grading	Early 2022	April 2022
Track construction	April 2022	Fall 2022
Offsetting construction	Early 2023	Early 2023

The following is a summary of the anticipated construction timing of each zone:

1. **Zone 1:** Infill to above the high-water mark will take place between January and February 2022, and the work in the dry will follow, continuing into late Spring 2022.
2. **Zone 2:** Construction will commence following infill portion of Zones 1 and 3.
3. **Zone 3:** In-water work will start in August 2022, and the work in the dry will follow and continue into late fall 2022.
4. **Offsetting:** Offsetting construction is expected to begin in early 2023 and will be completed before the end of the first quarter in 2023.

7.0 PROJECT COMMUNICATIONS

This section presents details on Project communications, including a summary of the Marine Communications Plan, as well as a list of Project contacts.

7.1 Marine Communications Plan

A comprehensive Cascadia-Viterra Communication Plan was developed June 18, 2019. It is attached in **Appendix C** and summarized below:

- **Quality and Reliability:** Ensure the approved plans and protocols are always in place.
- **Reporting:** Issue reports to the Port Authority and/or responsible parties if any event results in a near-miss, or deviation from established approved plans.
- **Regular Meetings and Port Authority / Other Parties:** As requested by the Port Authority, hold regular meetings to ensure alignment of objectives and actions.
- **Weekly Advisories / Notices:** Issue weekly advisories, advise mariners of the short-term work anticipated for the upcoming week, and provide notifications if any impediments are expected to navigation. These notices should include:
 - period covered by notice
 - description of activity
 - vessels and equipment involved
 - radio channel for communication
 - main contact information
 - additional information
 - relevant documentation (drawings, sketches, etc.)
 - summary of impacts to navigation (transits, time duration, etc.).

Note: The weekly notices are to be:

- emailed to key stakeholders and users including the Port Authority
- sent to the Canadian Coast Guard for radio diffusion and or posting on the active Notice to Shipping website.
- **Marine Notification:** As soon as possible, notify mariners of any marine-related incidents that may or will impede safe navigation.
- **Public Notification:** Post and Log Work Notices at Public Access Locations. Project Contacts log work notices at public access locations.

7.2 Project Contacts

The primary contracts for the Project are provided in **Table 4**. During construction, the Contractor will be responsible for maintaining a current emergency contact list.

In the event of an emergency, the initial reporting will be to the Contractor's Superintendent who will immediately assume the role of Incident Commander and will communicate the incident as required.

Table 4 Project Contact List

Company	Name	Role	Contact Information
CP	Chris Dane	Project Manager	Office: 604-944-5829 Mobile: 403-813-3941 Email: Chris_Dane@cpr.ca
	Kiley Gibson	Environmental Permitting Specialist	Office: 403-319-6234 Mobile: 403-813-6166 Email: Kiley_Gibson@cpr.ca
Port Authority	Deborah Renn	Port Authority Lead	Office: 604-665-9561 Mobile: N/A Email:deborah.renn@portvancouver.com
Hemmera	Joshua Jodoin	Environmental Project Manager	Office: 604-669-0424 Mobile: 604-317-1554 Email: Joshua.Jodoin@hemmera.com
Hatch Ltd.	Kelly McGarry	Project Engineering Lead	Office: 587-686-1095 Mobile: 403-471-7630 Email: Kelly.McGarry@hatch.com
Terra Archaeology Limited	Ewan Anderson	Consulting Archaeologist	Office: 250-361-7911 Mobile: 250-361-7911 Email: ewan@terraarchaeology.com
Contractor	TBD	TBD	Office: n/a Mobile: n/a Email: n/a
Environmental Monitor	TBD	TBD	Office: n/a Mobile: n/a Email: n/a
Cultural Monitor	TBD	TBD	Office: n/a Mobile: n/a Email: n/a
DFO	TBD	TBD	Office: n/a Mobile: n/a Email: n/a

8.0 CLOSURE

We sincerely appreciate the opportunity to have assisted you with this Project and if there are any questions, please do not hesitate to contact the undersigned by phone at 604.669.0424.

Report prepared by:
Hemmera Envirochem Inc.

Report prepared by:
Hemmera Envirochem Inc.

ORIGINAL SIGNED BY

ORIGINAL SIGNED BY

Nick van Voorthuysen, EIT
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Joshua Jodoin, B.Es.
Project Manager

Report reviewed by:
Hemmera Envirochem Inc.

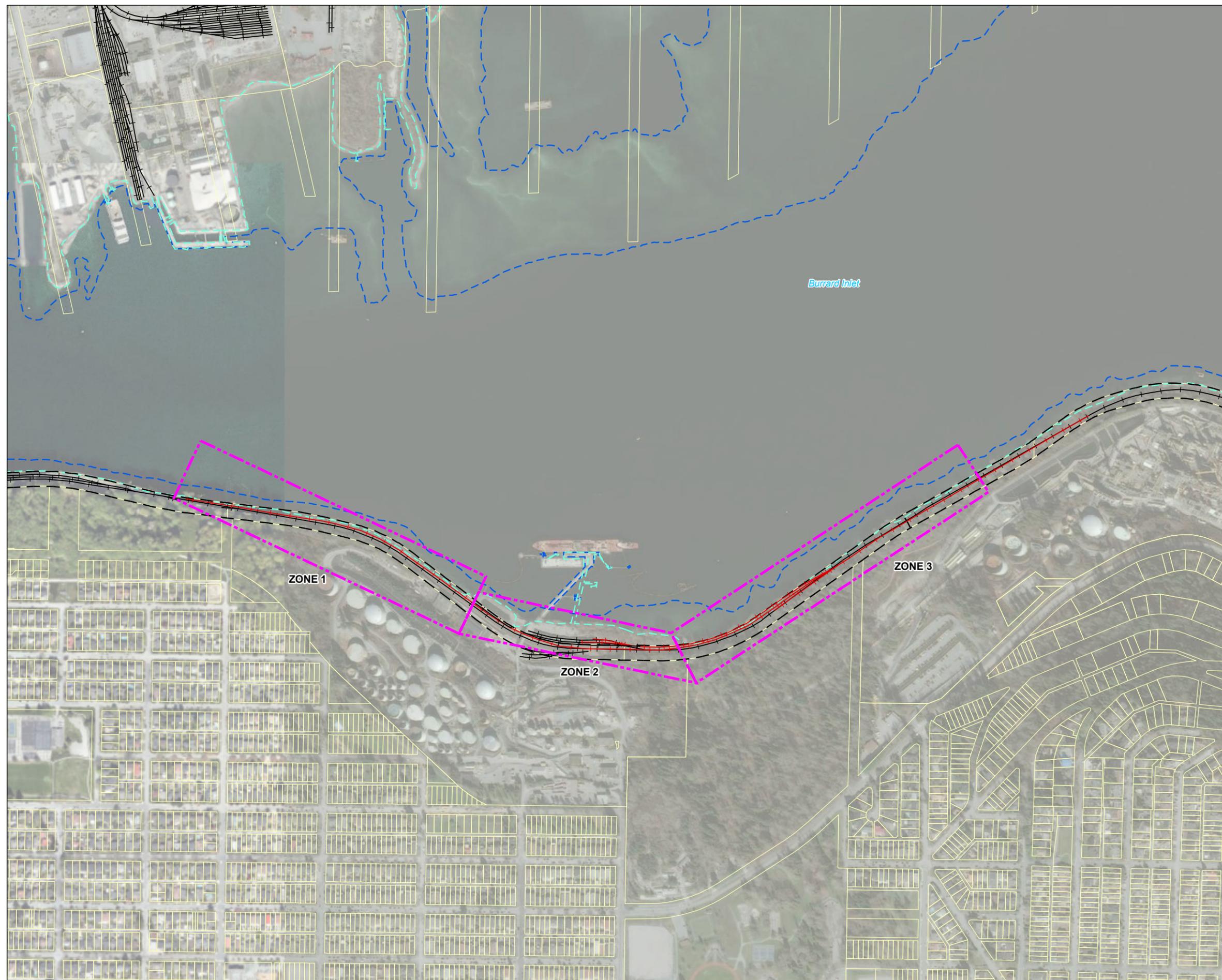
ORIGINAL SIGNED BY

Trevor Welton, R.P Bio
Vice President

APPENDIX A

Figures

Overview



Legend

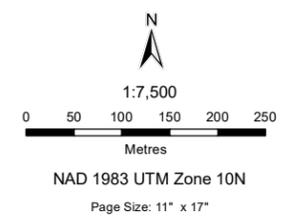
- CEMP Zone
- Proposed Track Extension
- Existing CP Railway
- CP Right-of-Way
- High Water Mark
- Low Water Mark
- Parcel Boundary

Notes

1. All mapped features are approximate and should be used for discussion purposes only.
2. This map is not intended to be a "stand-alone" document, but a visual aid of the information contained within the referenced Report. It is intended to be used in conjunction with the scope of services and limitations described therein.

Sources

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Zone 1



Legend

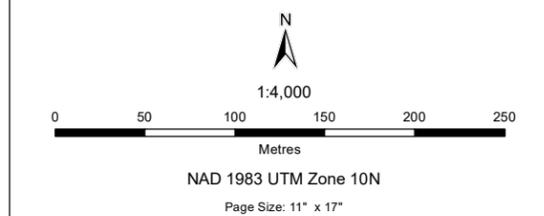
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- Land Based Laydown and Staging Area
- Marine Laydown and Staging Area
- ➔ Possible Ground Access Route
- ➔ Possible Marine Access Route
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Zone 2



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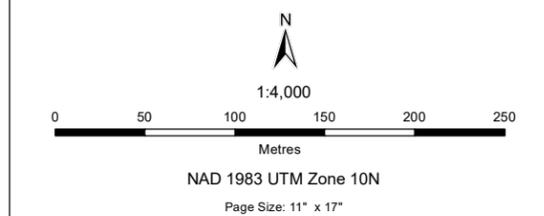
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- Land Based Laydown and Staging Area
- Marine Laydown and Staging Area
- ➔ Possible Ground Access Route
- +— Proposed Track Extension
- +— Existing CP Railway
- - - CP Right-of-Way
- - - High Water Mark
- - - Low Water Mark
- Parcel Boundary

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Zone 3



Legend

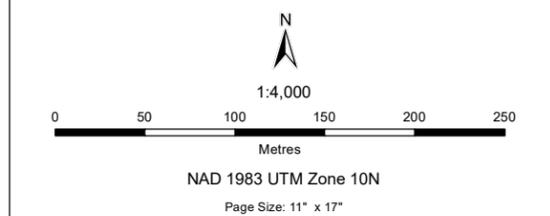
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