

Appendix C

Environmental Constraints Analysis Report



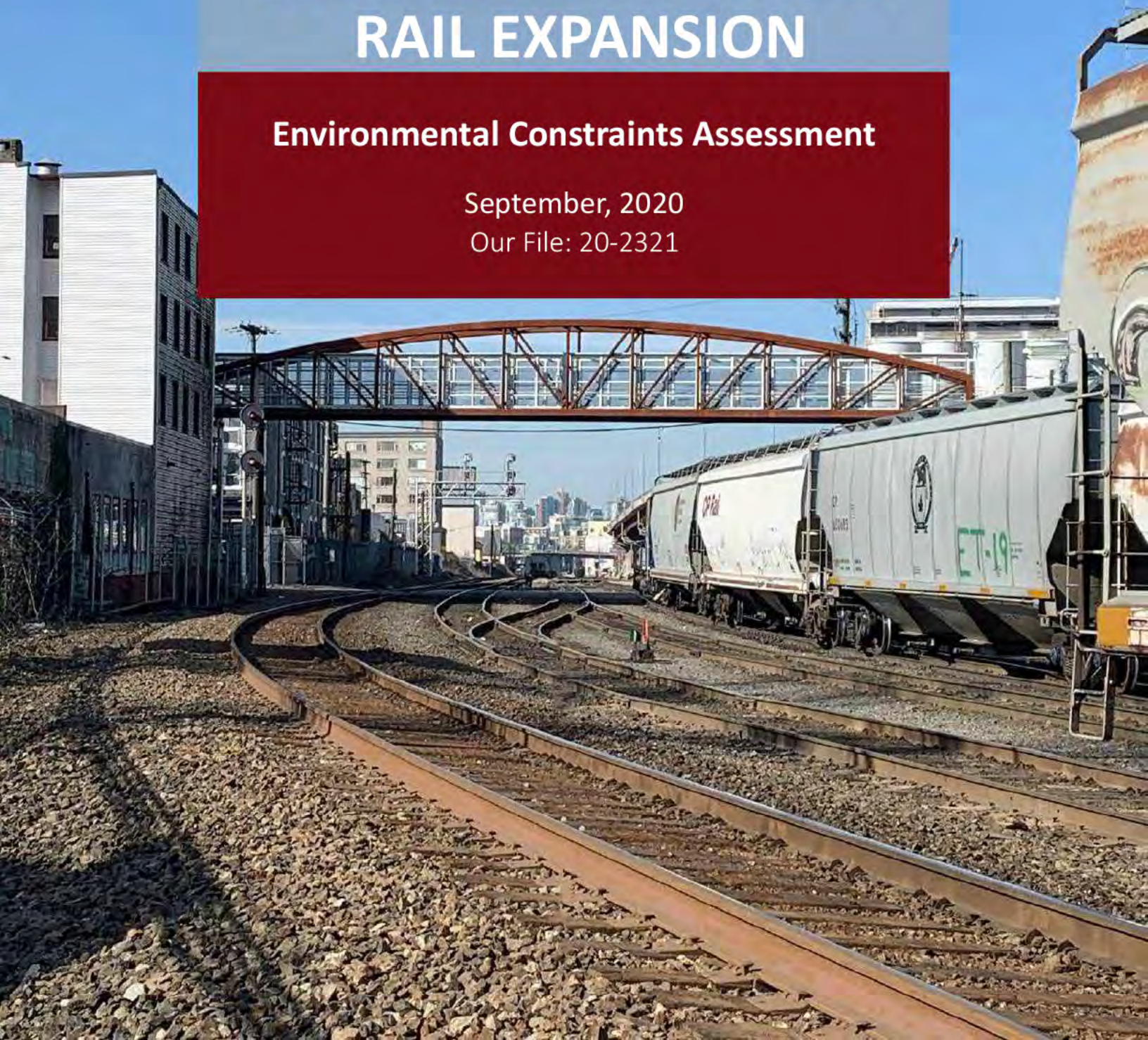


COMMISSIONER STREET RAIL EXPANSION

Environmental Constraints Assessment

September, 2020

Our File: 20-2321



September 11, 2020

Canadian Pacific
7550 Ogden Dale Road SE
Calgary, AB
T2C 4X9

Attention: Mr. Joe Van Humbeck
System Manager Environmental Assessment

Environmental Screening/Constraints Assessment – Commissioner Street Rail Expansion Project

Dear Joe:

Dillon Consulting Limited (Dillon) is pleased to provide our report for the above-referenced assignment. Our overview assessment of environmental constraints potentially influencing alignments and design options for expansion of rail infrastructure adjacent to Commissioner Street in the Port of Vancouver included both “desktop” information review, field survey and unmanned aerial vehicle (i.e., drone) overflight. The scope of the assignment did not include detailed environmental assessment or regulatory permitting support since a detailed alignment option has not been finalized.

Our overview assessment has not identified any significant environmental features or functions that would preclude the development of infrastructure options being considered. The vegetated embankment on the south side of CP’s right-of-way is dominated by invasive species (shrubs) and the sporadic presence of native species. Trees and shrubs present along the embankment are likely to provide habitat for a limited variety of bird species, however the overall habitat quality of the embankment vegetation is low. An Archeological Overview Assessment was completed for inclusion in this report [REDACTED]

[REDACTED]

While the level of our assessment is considered to be of overview level, Dillon does not believe that a more detailed assessment of biological characteristics of the embankment is necessary to obtain a thorough understanding of local biological



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conditions relevant to the proposed expansion of rail infrastructure. Upon finalization of rail infrastructure designs, it is recommended that a subsequent scan of environmental features in areas known to be affected by construction be completed to confirm project environmental impacts and regulatory compliance requirements. As well, appropriate environmental management plans should be prepared for implementation during construction.

We would be pleased to support CP with additional environmental management activities related to the delivery of this important rail infrastructure expansion project.

Please contact me directly to discuss any aspect of this report, environmental characteristics of the site, or future support for the project.

Sincerely,

DILLON CONSULTING LIMITED

Paul Schaap
Project Manager

JPH:js

Our file: 20-2321

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1.0 Introduction

As part of the Burrard Inlet Road and Rail Improvement Program (BIRRIIP), Canadian Pacific (CP) is proposing to expand existing trackage to improve fluidity along Commissioner Street and the adjacent Columbia Containers Terminal in the Port of Vancouver. More specifically, new trackage is proposed on the north side of the existing mainline tracks. The approximate eastern and western limits of the Project area are the Commissioner Street vehicle overpass and the Victoria Drive pedestrian overpass, respectively. These limits correspond with CP's Cascade Subdivision Miles 125.46 and 126.85, respectively for a total project length of 1.2 miles (**Figure 1**). For the purpose of this environmental screening, the area between Commissioner Street south to the CP property line was examined. Proposed trackage expansion is situated adjacent to other rail infrastructure improvements currently being planned and developed as part of CP's Cascadia track expansion project.

In February 2020, CP requested the technical support of Dillon Consulting Limited (Dillon) to assist with the completion of a preliminary environmental inventory/screening and constraints analysis identifying the presence of existing environmental and cultural features and functions that could influence the location of the new trackage and switching lead alignment options and/or designs. Specifically, Dillon was contracted to provide the following environmental services:

- "Desktop" review of existing background environmental and archaeological information published for the area by various sources;
- Preparation, coordination and implementation of on-site field assessment of existing conditions;
- Analysis of field information to determine significance of existing environmental features and functions observed and identification of data gaps and uncertainties; and
- Preparation and submission of an Environmental Constraints Assessment Report (this document).

Assignment Objective:

Identify the presence and significance of existing environmental and cultural features and functions that could influence the alignment options and/or designs of new trackage along Commissioner Street within the Port of Vancouver.

The scope of the assignment did not include detailed environmental assessment or regulatory permitting support since a decision to move forward with the expansion of existing infrastructure has not been made and final alignment of proposed trackage has not yet been determined.






CP Mainline
Cascade Subdivision Mile 125.46 -126.85

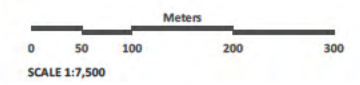


CANADIAN PACIFIC RAIL
CP COMMISSIONER STREET RAIL EXPANSION

FIGURE 1
PROJECT LOCATION

LEGEND

-  PROJECT CORRIDOR
-  RAILWAY
-  ROADWAY



MAP DRAWING INFORMATION
ESRI Basemaps, Fresh Water Atlas, City of Vancouver

MAP CREATED BY RBB
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2.0 Assessment Approach and Methods

The environmental constraints assessment comprised a high-level inventory and screening of existing environmental and cultural features potentially influencing CP rail infrastructure expansion options. The assessment included an initial desktop review of published and unpublished information and an on-site survey of existing environmental conditions focusing on the biophysical environment. An aerial overflight was completed using a camera-equipped drone to document current conditions. Overhead and oblique-angle video footage of the track and south embankment were obtained. Further discussion on the approach and methods of the overview environmental constraints assessment are provided below.

2.1. Biophysical Environment

A desktop review was undertaken to garner a general understanding of existing environmental features and conditions of the Project area. Background rare species occurrence and habitat information was gathered for an area within 1 kilometre (km) of the Project boundaries using publicly-available data current to March 2020. Marine environmental features were not investigated as the proposed Project does not include works within foreshore or marine environments. Additional findings outside of the primary 1 km study area which were deemed to be relevant to characterizing the environmental conditions of the study area were also noted. In addition to published literature outlined in the References section of this report, the following online databases were searched:

- BC Conservation Data Centre (Habitat Wizard/ iMap/ Species and Ecosystems Explorer);
- Wildlife Tree Stewardship Atlas; and
- Federal Species at Risk (SAR) Public Registry.

Following completion of the desktop review, Dillon environmental staff undertook a wandering pedestrian survey of the area on March 19, 2020. Over the course of four hours, Dillon staff made direct (i.e., visual) and indirect (e.g., auditory, wildlife sign) observations of study area features, functions and conditions to document potential biophysical constraints. Observations of terrestrial communities, habitats and species and their locations were recorded. Surface water drainage paths and ditches were also examined. The area assessed extended from the approximate western limit at Victoria Drive

pedestrian overpass (Mile 126.85) to the approximate eastern limit at the Commissioner Street vehicle overpass (Mile 125.46). Vegetation communities were divided into distinct units to facilitate reporting.

To supplement ground surveys, UAviation was contracted by Dillon to provide overhead perspective of existing Project area features and conditions using a camera-equipped unmanned aerial vehicle (UAV). A DJI Phantom 4 RTK (UAV/RPAS) UAV controlled by a Hemisphere GNSS S321+ ground control station captured overhead and oblique-angle video footage of the track and south embankment. Footage was analysed to identify habitats difficult to observe from the ground and to confirm the extent and/or composition of features documented during the pedestrian survey.

2.2. Cultural and Archaeological Resources

[Redacted text block containing multiple paragraphs of blacked-out content]





3.0 Assessment Findings

This section summarizes the most important and relevant results of existing biophysical conditions and potential biophysical and cultural resources identified adjacent to Commissioner Street where rail infrastructure expansion is being considered. More detailed environmental information resulting from the desktop review and overview field survey of the area is provided in **Appendices A and B**.

3.1. Physical Environment and Land Use

3.1.1. Physical Environment

The study area is located in the City of Vancouver on the south shore of Burrard Inlet - a shallow-sided coastal fjord that protrudes east from the Strait of Georgia (Pacific Ocean) to the City of Port Moody. The regional area is flanked by the Coastal Mountains to the north of Burrard Inlet (Armstrong 1990). Settler development in Vancouver began in 1862 with the establishment of Stamp's Mill (later called Hastings Mill) on the southern shore of Burrard Inlet (Hayes 2005:32–33). The mill was associated with major logging operations throughout the Burrard Peninsula. Residential housing arose in association with the logging industry, and the settlement known as Granville was established (Hayes 2005). Granville was incorporated as the City of Vancouver in April 1886 at the same time as construction of the Canadian Pacific Railway (CPR), whose terminus station reached Coal Harbour in 1887. The Port of Vancouver began developing the same year that the CPR reached Vancouver, establishing trade routes to Victoria and Seattle as well as to various ports in Asia (Hayes 2005:112). This activity transformed the southern shoreline of Burrard Inlet, where access points were built by dredging shallow portions of the Inlet as well as infilling the shoreline to build ports of entry. The shipping industry expanded further after the discovery of gold on the Klondike, and shipbuilding continued into the First World War as part of the war effort (Hayes 2005:113). In 1925, the first bridge over Second Narrows was built, connecting the North Shore by both rail and road. A new six-lane road bridge was constructed in 1960 and the original rail bridge replaced in 1968 (Terra Archaeology 2020).

Existing trackage in the area is situated just above sea level on an area of imported fill that has redefined the historic shoreline. To the south, terrain rises steeply to an elevated plateau approximately 30-50 metres above Burrard Inlet. Approximately half of the vegetated embankment at the southern limit of

CP's right-of-way (ROW) is estimated at a slope of 2:1 or greater (Photo 1, Figure 2). Several embankment areas were noted as undergoing slope erosion during the site visit on March 19, 2020 (Photo 2). Subsurface investigations are being completed independently by TetraTech to examine existing soil and groundwater conditions of the area and to collect samples for geotechnical analysis.

In March 2020 on behalf of CP, Dillon submitted a Category A Application to the Vancouver Fraser Port Authority (VFPA) to complete a geotechnical investigation of the Project area and adjacent Port lands. Results of the drilling program are not addressed in this report.



Photo 1: Looking southwest from approximately M125.8 at the steep, vegetated embankment adjacent to CP's mainline track.



Photo 2: Looking southwest at erosion occurring along the steep vegetated embankment on the south side of the CP ROW.

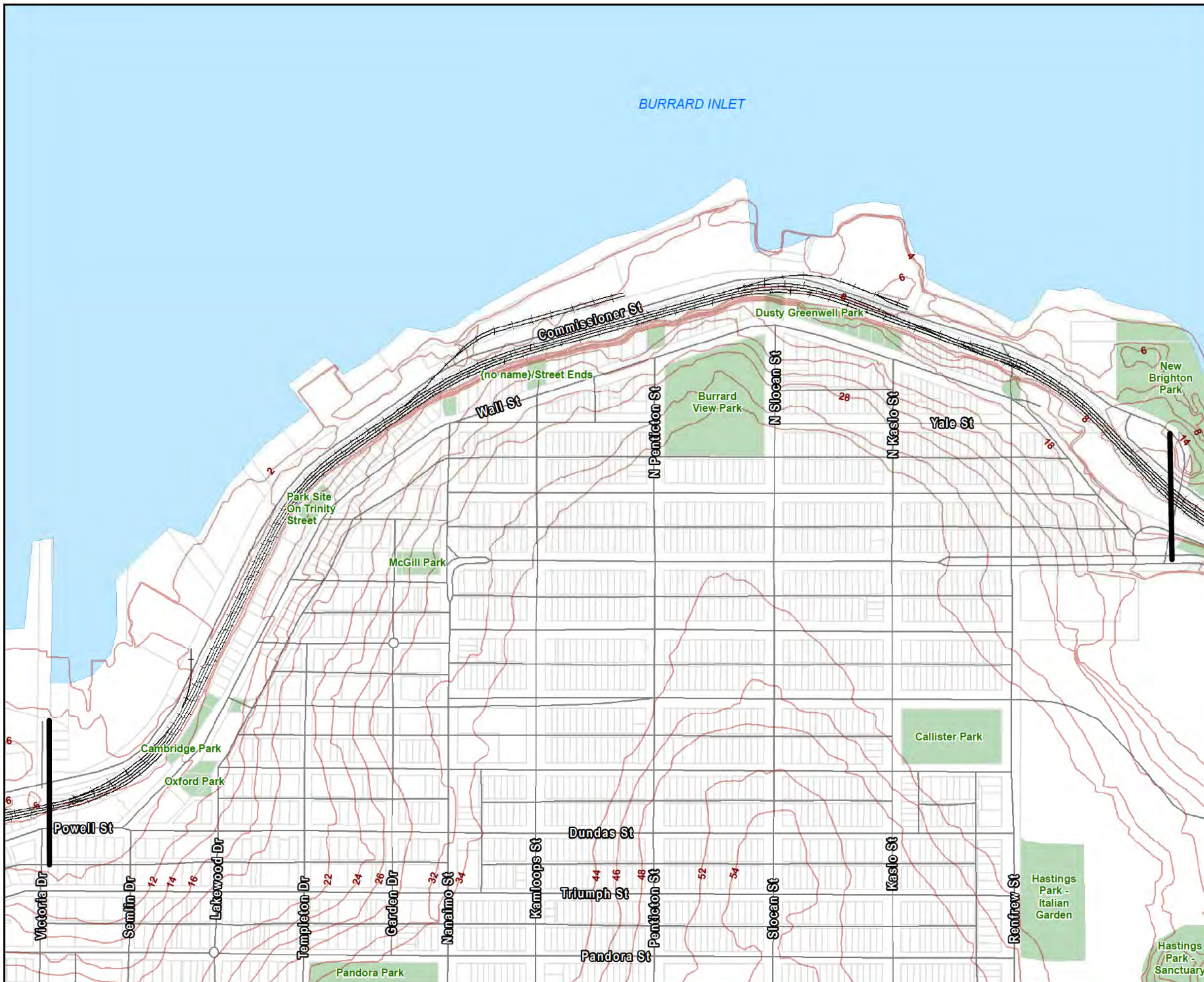


CANADIAN PACIFIC RAIL
CP COMMISSIONER STREET RAIL EXPANSION

FIGURE 2
SITE TOPOGRAPHY

LEGEND

- Contour (2m)
- Road
- Railway
- Parcel
- Parks
- Waterbody
- School



MAP DRAWING INFORMATION
ESRI Basemaps, Fresh Water Atlas, City of Vancouver

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3.1.2. Land Use

Burrard Inlet is Vancouver's primary port area and the Vancouver Terminal is one of CP's busiest terminals providing both freight and passenger service into and out of Vancouver's Port and downtown core. Areas located immediately north of the CP ROW are federal lands managed by the Vancouver Fraser Port Authority (VFPA). Long-term development of VFPA-managed lands are guided by the Port's Land Use Plan which designates virtually all areas north of the Project area as "Port Terminal". A very small section north of the Commissioner Street overpass is designated as "Recreation" in the Land Use Plan. The CP ROW within the Project Area is situated entirely in an area designated as Comprehensive Development in the City of Vancouver's Zoning Bylaw (City of Vancouver undated). In the vicinity of Commissioner Street, the south shore is largely developed with industrial and port-related properties located in areas zoned as Comprehensive Development, Commercial and Light-Industrial. These include but are not limited to:

- Columbia Containers Terminal
- Osprey Marine
- Mariner Seafoods
- SAAM SMIT Canada
- Lafarge Canada

The residential areas of Hastings-Sunrise and Grandview-Woodland are located to the south and west of the Project area, respectively and are designated as One-Family and Multi-Family (City of Vancouver, undated). Hastings-Sunrise is characterized as a quiet neighbourhood with the majority of housing stock comprising single detached homes, duplexes and small apartment buildings constructed prior to 1980. There are approximately 20 green spaces located within this neighbourhood. Grandview-Woodland, located towards the west end of the Project area, is a diverse neighbourhood with many small apartment buildings and pre-1980s single detached homes. A section of Commercial Drive, one of Vancouver's liveliest streets, as well as numerous parks and green spaces, are also found within this neighbourhood.

Figure 2 and **Table 1** identify the locations of schools and parks within 1.0 km of the Project Area that would represent potentially sensitive receptors to Project construction activities. There are no hospitals, retirement homes or other receptors that may be considered sensitive to potential impacts of the Project situated within 1.0 km of the Project area.

Table 1: Potential Sensitive Receptors within 1.0 km of the Project Area

Potential Receptor	Location	Approximate Distance from Project Site (km)
Parks		
New Brighton Park	East of the Project area	0.1 km
Burrard View Park	South of the Project area	0.1 km
Dusty Greenwell Park	South of the Project area	0.1 km
Trinity Park	South of the Project area	0.1 km
Hastings Park:	South and east of the Project area	0.1 km
Cambridge Park	South of the Project area	0.1 km
Oxford Park	South of the Project area	0.1 km
McGill Park	South of the Project area	0.2 km
Pandora Park	South of the Project area	0.5 km
Callister Park	South of the Project area	0.6 km
Slidey Slides Park	South and east of the Project area	0.7 km
Empire Fields	South and east of the Project area	0.7 km
Templeton Park	South of the Project area	0.9 km
Salsbury Park	South and west of the Project area	0.9 km
Woodland Park	South and west of the Project area	1.0 km
Hastings Community Park	South of the Project area	1.0 km
Schools		
Tillicum Community School Annex	South of the Project area	0.4 km
Xpey' Elementary School	South of the Project area	0.5 km
Templeton Secondary School	South of the Project area	0.8 km
Hastings Community Elementary School	South of the Project area	1.0 km
Other Receptors		
Hastings Racecourse	South and east of the project area	0.1 km
Pacific Coliseum Arena	South of the Project area	0.4 km
PNE Agrodome	South of the Project area	0.6 km
Playland at the PNE	South and east of the Project area	0.7 km

3.2. Biological Environment

Assessment results for the biological environment of the Commissioner Street study area are described below under the following two categories: Vegetation; and Wildlife. Eleven distinct vegetation units were identified during Dillon’s site visit to characterize vegetation composition and abundance. Figures 3a to 3d identify the extent of each vegetation unit, the locations of individual mature trees, as well as the locations of biophysical and other “Points of Interest” observed along the corridor. The Figure 3 series also provides a catalogue of the dominant species in each of the canopy, shrub and herb layers (where present) for each of the 11 units. Additional results are summarized in tabular format in Appendix B.

3.2.1. Vegetation

3.2.1.1. Forest Community

The Commissioner Street area is located within the Coastal Western Hemlock dry maritime (CWHdm) biogeoclimatic zone and characterized by mild winters and cool summers. Soils are typically moderately deep podzols and growing-season water deficit is a constraint to more robust forest growth. Forest communities of this zone are typically dominated by western hemlock and other native coniferous species such as Douglas fir, western redcedar, and Sitka spruce. Deciduous species in early successional forests comprise red alder, bigleaf maple, vine maple, western dogwood, and paper birch (BC Ministry of Forests 1991).

The March field assessment documented only sporadic native and non-native tree species and specimens on and at the top of slope along the embankment (Photo 3). In most cases, trees were located at the edge or outside of the CP ROW. Many mature trees were observed to have been recently or historically pruned to preserve vistas from residential properties.



Photo 3: Typical vegetation community on the south side of the CP right-of-way adjacent to Commissioner Street comprising an understory dominated by invasive species and sporadic native and non-native tree species.



Photo 4: Specimens of mature trees forming canopy along the embankment to the south of the CP right-of-way.

A canopy layer (*i.e.*, trees) was documented in 8 of the 11 units and often was characterized by an individual or small cluster of trees. Both coniferous (western redcedar, western hemlock) and deciduous (big leaf maple, red alder, cottonwood) mature trees were observed (Photo 4). These trees likely provide good quality habitat (e.g., nesting, feeding, perching) for bird species. A number of bird nests were observed in mature trees.



CP
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CP COMMISSIONER STREET RAIL EXPANSION

FIGURE 3a
 VEGETATION UNITS

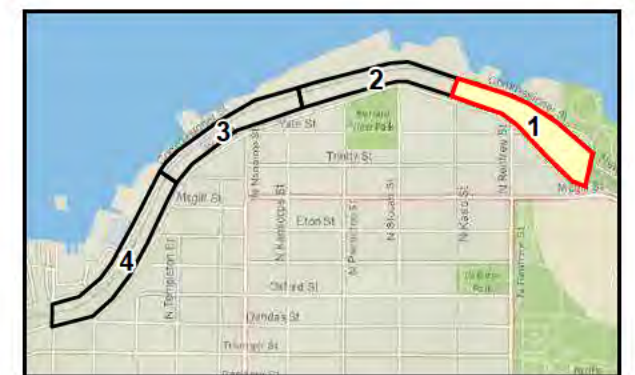
LEGEND

- T** Tree
- ★** Point of Interest
- ↔** Major Vegetation Unit
- +—** Railway
- Road
- NV** No Vegetation



Vegetation Layer	Unit 1	Unit 2
Dominant Layer Species	<ul style="list-style-type: none"> Himalayan blackberry* 	<ul style="list-style-type: none"> Himalayan blackberry*
Canopy Layer Species	-	<ul style="list-style-type: none"> Black Cottonwood Maple tree
Shrub Layer Species	<ul style="list-style-type: none"> Himalayan blackberry* 	<ul style="list-style-type: none"> Himalayan blackberry* Laurel shrub♦
Herb Layer Species	-	-

* Priority invasive species (Government of British Columbia); ♦ Other invasive or non-native species



0 12.5 25 50
 Meters
 SCALE 1:1,840



MAP DRAWING INFORMATION
 ESRI Basemaps, Fresh Water Atlas, City of Vancouver, Dillon Consulting Limited

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**CANADIAN PACIFIC RAIL
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**FIGURE 3b
VEGETATION UNITS**

LEGEND

- T** Tree
- ★** Point of Interest
- ↔** Major Vegetation Unit
- +—** Railway
- Road



*Priority invasive species (Government of British Columbia); ♦ Other invasive or non-native species



Meters
0 12.5 25 50
SCALE 1:2,000



MAP DRAWING INFORMATION
ESRI Basemaps, Fresh Water Atlas, City of Vancouver, Dillon Consulting Limited

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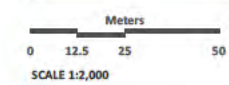
FIGURE 3c
VEGETATION UNITS

LEGEND

- Tree
- Point of Interest
- Major Vegetation Unit
- Railway
- Road



*Priority invasive species (Government of British Columbia); ♦ Other invasive or non-native species



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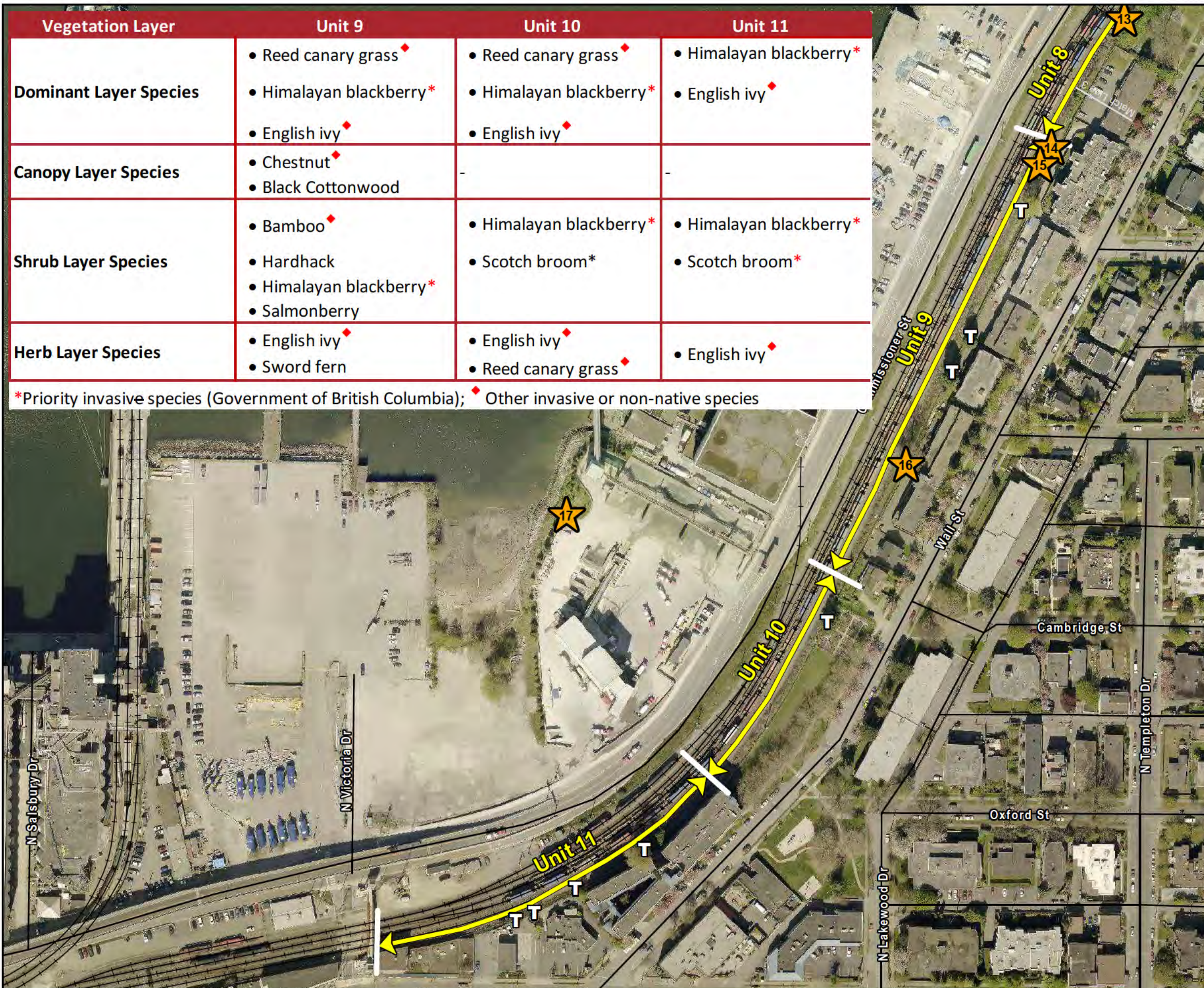
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Vegetation Layer	Unit 9	Unit 10	Unit 11
Dominant Layer Species	<ul style="list-style-type: none"> • Reed canary grass ♦ • Himalayan blackberry* • English ivy ♦ 	<ul style="list-style-type: none"> • Reed canary grass ♦ • Himalayan blackberry* • English ivy ♦ 	<ul style="list-style-type: none"> • Himalayan blackberry* • English ivy ♦
Canopy Layer Species	<ul style="list-style-type: none"> • Chestnut ♦ • Black Cottonwood 	-	-
Shrub Layer Species	<ul style="list-style-type: none"> • Bamboo ♦ • Hardhack • Himalayan blackberry* • Salmonberry 	<ul style="list-style-type: none"> • Himalayan blackberry* • Scotch broom* 	<ul style="list-style-type: none"> • Himalayan blackberry* • Scotch broom*
Herb Layer Species	<ul style="list-style-type: none"> • English ivy ♦ • Sword fern 	<ul style="list-style-type: none"> • English ivy ♦ • Reed canary grass ♦ 	<ul style="list-style-type: none"> • English ivy ♦

*Priority invasive species (Government of British Columbia); ♦ Other invasive or non-native species



CP
CANADIAN PACIFIC RAIL
CP COMMISSIONER STREET RAIL EXPANSION

FIGURE 3d
VEGETATION UNITS

LEGEND

- Tree
- Point of Interest
- Major Vegetation Unit
- Railway
- Road



0 12.5 25 50
Meters
SCALE 1:2,000



MAP DRAWING INFORMATION
ESRI Basemaps, Fresh Water Atlas, City of Vancouver, Dillon Consulting Limited

MAP CREATED BY RBB
MAP CHECKED BY JPWH, PRHS
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3.2.1.2. Understory Shrub and Forb Community

Dominant shrub species within the CWHdm zone typically include salmonberry and thimbleberry. On drier sites with poor soils, often under an existing tree canopy, common shrub species typically include salal, red elderberry, and dull Oregon-grape. Common ferns in the CWHdm zone include sword fern (nutrient rich soils), deer fern (soils with poorer nutrients) and, bracken fern (common in disturbed open areas). Other characteristics of a largely undisturbed CWH ecosystem include a sparse herb layer and predominance of several moss species including step moss and lanky moss (BC Ministry of Forests 1991).

The understory shrub and forb community of the Commissioners Street Project area is associated with a highly disturbed vegetation community. Few native shrub and forb species were observed during the field assessment and were limited to small and sporadic stands of salmonberry, red elderberry and sword fern and were almost always observed to be surrounded by dense stands of invasive (Photo 5).



Photo 5: Stand of native red elderberry surrounded by invasive Himalayan blackberry and English ivy observed on the south side of the CP right-of-way.

3.2.1.3. Invasive Species

Non-native invasive plant species occur widely throughout the urbanized landscape of BC's South Coast region. Common invasive plant species found in the Lower Mainland typically include, but are not limited to, Himalayan blackberry, English ivy, morning glory, common reed canary grass, thistle species and purple loosestrife. Some invasive plants are provincially and regionally-listed as noxious plants including Japanese knotweed (Invasive Species Council of BC undated).

Invasive species were consistently observed to be the dominant plants found on the embankment south of CP's mainline tracks and were documented in all eleven vegetation units identified. The most abundant species observed was Himalayan blackberry which occurred in large homogenous patches covering wide areas of the vegetated portion of the right-of-way. English ivy and morning glory were also pervasive throughout the corridor (Photo 6). These species are not listed as noxious weeds, but are listed as unregulated invasive plants of concern according to the BC Invasive Species Council (Invasive Species Council of BC undated).



Photo 6: Himalayan blackberry growing extensively along the embankment along the south side of the CP right-of-way.

Several patches of dead or dying Japanese knotweed were observed during the field survey (Photo 7) and it appears the majority of the patches had been previously chemically treated. Patches of knotweed were marked using GPS. No pockets of new Japanese knotweed growth were observed during the March site visit, however it is likely the growing season for this species had not yet started for the year. CP manages their right-of-way for this species which is designated as a noxious weed under the *BC Weed Act* and requires special handling and disposal if removal occurs. Regulatory requirements on the management of noxious weeds are further discussed in Section 4.0. No other regulated noxious weeds or regionally noxious weeds were observed during the field visit.



Photo 7: Stand of browned Japanese knotweed observed on the south side of the CP right-of-way

3.2.1.4. Sensitive or Rare Plant Species

No known occurrences of sensitive plant species or designated Critical Habitat areas for plants were identified within the study area according to the BC Conservation Data Centre or observed during the site visit. No potential concerns related to the proposed track expansion in the area were identified for sensitive or rare plant species.

3.2.1.5. Riparian Community

There are no aquatic features in the Project area and therefore no vegetation communities classified as riparian areas. Due to the considerable setback from the existing Burrard Inlet shoreline, vegetation in the Project area does not provide riparian habitat or value to the Inlet. No potential concerns related to riparian communities were identified as they relate to the proposed track expansion project.

3.2.2. Wildlife and Their Habitats

3.2.2.1. Mammals

Mammals that reside within the urban communities of the Lower Mainland include black-tailed deer, coyote, red fox, striped skunk, and raccoon. Other small mammals commonly found in the area include various species of bats and squirrels, rabbit, mole, vole and mice.

The Project area is considered marginal habitat for wildlife and field observations did not indicate extensive wildlife use of the area. No potential concerns related to the proposed track expansion on mammals or mammal habitat were identified.

3.2.2.2. Birds

Burrard Inlet has been identified as an *Important Bird Area* for many coastal and marine bird species by the Birdlife International conservation initiative. Vegetation within the project area offers a range of habitat and habitat features for number of bird species. Mature deciduous and coniferous trees provide good roosting and nesting habitat, with the majority of mature trees concentrated in the eastern half of the Project area. Shrub species and younger trees offer nesting habitat for smaller bird species. The shrub layer, including both native and non-native species, provides a food source for a wide range of bird species. The dominant fruit bearing vegetation found within the Project Area and likely used as a food source include salmonberry, red elderberry and Himalayan blackberry.

Birds observed within, adjacent and overhead of the Project area were common residents or visitors of habitats of the Vancouver waterfront area comprising

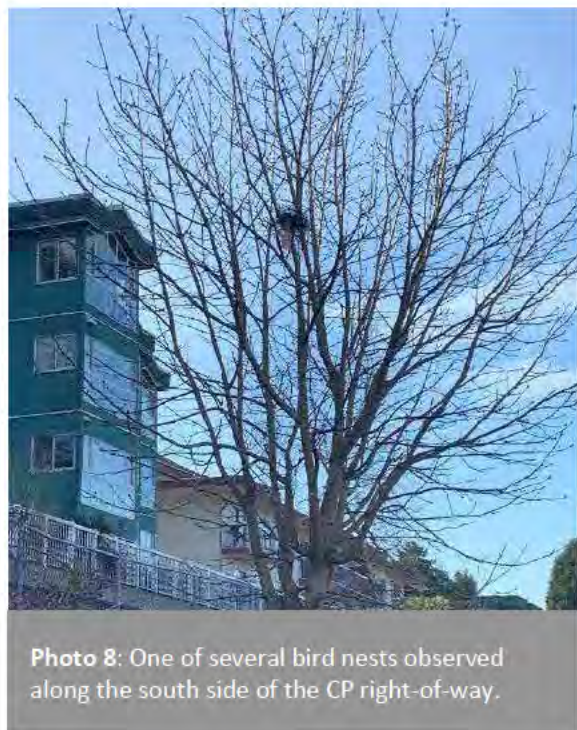


Photo 8: One of several bird nests observed along the south side of the CP right-of-way.

a range of waterbirds, raptors, and nonpasserine and passerine species. Birds observed during the field visit are identified in **Table 2**. Latin names of all observed species are provided in **Appendix D**. Dillon did not observe any birds, or their habitats, classified as Species-at-Risk under the federal or provincial *Species at Risk (SAR) Act* within the Project Area during the field assessment. It is unlikely that the Project Area serves as habitat for any SAR bird species. Any vegetation removal required for the proposed Project should be completed outside of the bird nesting window, or must be preceded by a nest sweep completed by a Qualified Environmental Professional.

Table 2: Birds observed in and around the Project Area

Canada Goose (OH)	Belted Kingfisher (OH)	American Robin (PA, AA, OH)
Glaucous-winged Gull (PA, OH)	Northern Flicker (A, OH)	Fox Sparrow (PA, AA)
Herring Gull (OH)	Northwestern Crow (PA, AA, OH)	Song Sparrow (PA, AA)
Bald Eagle (OH)	Bushtit (PA, AA)	Dark-eyed Junco (PA, AA)
Rock Dove (PA, AA OH)	Hummingbird (PA, OH)	House Finch (PA, AA)

Legend: PA= In *Project Area*; A= In *Immediately Adjacent Area*; OH=*Overhead* of Project Area

The Wildlife Tree Stewardship Atlas identified two historic bald-eagle nests located within a 150 m of the Project area boundaries. A nest adjacent to the western end of the Project area was recorded as active in 2012, while a nest located near CP’s Mile 126.0 marker was recorded as inactive as of 2008 (Wildlife Tree Stewardship Atlas undated). Two bald-eagles were observed flying in the vicinity of the western nest, but no nesting activity was observed. Due to the existing high level of human activity in the port surrounding the Project area, it is unlikely the proposed Project activities would have adverse impacts on nesting bald-eagles. Bald-eagles are yellow-listed, as a secure species and are not federally-listed under the *Species at Risk Act (SARA)*.

A number of other bird nests were observed in the trees south of the CP mainline track (**Photo 8**). While no bird SAR were observed, nesting birds in general are protected under federal and provincial regulations (**Section 4.0**). Depending on site construction plans, this has the potential to impact scheduling of activities. Potential bird and bird habitat concerns related to the proposed track expansion have not been identified.

3.2.2.3. Fish and Herptiles

No information was found for fish or herptile species utilizing the Project area during the desktop study. Shallow trackside ditches were observed on the south side of the CP mainline. Standing water was observed at various locations but no frogs or other amphibians were observed during the site visit. These trackside ditches were observed to provide very poor habitat quality and it is anticipated there is low potential for amphibian use. Potential concerns related to the proposed track expansion with fish and herptiles or their habitat were not noted.

3.2.2.4. Sensitive or Rare Wildlife Species

No known occurrences of sensitive or rare wildlife species were identified for the Project area from a search of the BC Conservation Data Centre database. Dillon completed a high level review of terrestrial SAR having the potential to occur in the vicinity of Commissioner Street based on habitat suitability;

these results are detailed in **Appendix C**. Based on habitat preferences of select SAR and existing site conditions, the possibility of occurrence for the majority of these species is extremely limited. No occurrences of sensitive or rare wildlife species were observed during Dillon’s site visit. While the proposed track expansion will result in the permanent alteration of habitats for birds and small mammals, and will be subject to regulatory requirements provided in **Section 4.0**, potential concerns related to sensitive or rare wildlife species have not been identified.

3.3. Points of Interest

A number of environmental “points of interest” along the CP ROW were identified during the site visit which are presented in **Table 3** and visually represented in **Figures 3a-d**. They are intended to highlight the key environmental values and/or other noteworthy features observed in the Project area that should be considered during project development.

Table 3: Points of interest identified along Project Area within and adjacent to CP ROW

Point of Interest (#)	Description
1	Manhole at base of embankment to south
2	Culvert outlet at base of embankment to south
3	Area of groundwater discharge from embankment to south
4	Area of bank erosion on slope to south
5	Stick nest in western hemlock tree
6	Area of bank erosion on slope to south
7	Ladder from private property providing access / trespass onto CP right-of-way
8	Potential location of surface drainage from embankment
9	Area of bank erosion on slope to south
10	Drainage pipes from private property discharging to slopes on the CP right-of-way
11	Slope erosion on the southern embankment
12	Stick nest found in a red alder tree
13	Potential surface drainage area from embankment
14	Stick nest found in horse chestnut tree
15	Concrete man hole
16	Stick nest found in big leaf maple tree
17	Bald eagle nest located on nest stand

3.4. Cultural and Archeological Resources

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]



The AOA report is presented in **Appendix A**.

3.5. Geotechnical Assessment

In support of the propose expansion to existing trackage a geotechnical investigation of the Project area and surrounding lands is being undertaken. A Category A application has been submitted to the Vancouver Fraser Port Authority for geotechnical sampling activities associated with the Project for test holes located on or adjacent to lands within the Port’s jurisdiction. Dillon submitted the VFPA Project Permit Application in March 2020 on CP’s behalf.

CP contractors are proposing to complete a subsurface exploration program at a number of locations along the Commissioner Street corridor. A total of 13 test holes (12 boreholes, and 1 cone penetration test hole) will be drilled along the north side of the mainline track between Mile 126.85 and 125.46 of the Cascade Subdivision (**Figure 2**). All test holes are located on the north side of the existing mainline tracks.

Subsurface investigations will be completed by ConeTec Inc., a full-service geotechnical and geoenvironmental site investigation company located in Richmond, British Columbia. This geotechnical drilling program will be coordinated and monitored by Tetra Tech, an engineering and multidisciplinary consulting firm located in Vancouver, British Columbia. Results of the investigation are pending and the geotechnical details of the Project area are not addressed in this report. The permit application is presented in **Appendix E**.



4.0 Regulatory Requirements

Various environmental regulatory requirements may apply to the proposed expansion of rail infrastructure adjacent to Commissioner Street. Table 4 provides a summary of regulatory legislation that may be applicable. Of note, as a federally-regulated entity, some or all of the provincial permitting requirements identified below may not apply to CP’s infrastructure development should it proceed.

Table 4: Summary of regulatory legislation that may be applicable

Legislation	Description and Permitting Requirements
Federal	
<i>Fisheries Act</i>	<p>The federal <i>Fisheries Act</i> provides protection for fish and fish habitat. Specifically, the <i>Fisheries Act</i> includes the following prohibitions:</p> <ul style="list-style-type: none"> • Section 34.4 (1) No person shall carry on any work, undertaking or activity, other than fishing, that results in the death of fish. • Section 35. (1) No person shall carry on any work, undertaking or activity that results in harmful alteration, disruption or destruction of fish habitat. • Section 36 (3) “Subject to subsection (4), no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water”. <p>No fish habitat was observed within the Project area during the field visit and therefore relevant prohibitions described in Sections 34 and 35 of the Act do not apply. However, given the presence of fish habitat in Burrard Inlet (i.e., downstream of the Project area), Project development must comply with Section 36(3) by ensuring that no deleterious substance generated through construction or operation of the new rail infrastructure be transported from the site to Burrard Inlet.</p>
<i>Migratory Birds Convention Act (MBCA)</i>	<p>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 migratory birds and other wildlife should be avoided during breeding, nesting, roosting or rearing young.</p>

Legislation	Description and Permitting Requirements
	<p>It is expected that impacts to migratory bird nests and eggs will be avoided during breeding, nesting, roosting, and rearing windows. Environment and Climate Change Canada has published detailed technical information on general nesting periods of migratory birds in Canada and has outlined broad regional nesting periods. The City of Vancouver generally recognizes March 1 to August 15 as the primary bird nesting season. Vegetation removal should be avoided during the bird nesting season, and where avoidance cannot be met, requires bird nest surveys conducted by a QEP. Though there are no permitting requirements under the MBCA, bird nest surveys can be an effective tool to reduce the risk of incidental take and contravention of the MBCA.</p> <p>Note that nests of some species are protected year-round, such as the Bald Eagle. Further details are listed below under <i>BC Wildlife Act</i>.</p>
Species at Risk Act	<p>The <i>Species at Risk Act</i> (SARA) comprises legislation that prohibits the killing, harming, harassing, capturing or taking of a species listed under SARA as extirpated, endangered, or threatened. SARA also prohibits the destruction of their Critical Habitats. SARA prohibitions do not apply to species listed as Special Concern.</p> <p>There are no known occurrences of extirpated, endangered, or threatened SAR or Critical Habitat identified in the BC Conservation Data Centre which are directly impacted by the proposed Project area. Although there are marine SAR that have the potential to reside or transit through the Burrard Inlet (e.g. white sturgeon, southern resident orca whale), no impacts to the marine environment are anticipated. SARA permitting requirements are not anticipated at this time.</p>
Provincial (British Columbia)	
Water Sustainability Act	<p>The <i>Water Sustainability Act</i> (WSA) is the main provincial statute regulating water resources in BC related to “changes in and about a stream,” which includes any modification to the nature of the stream including the land, vegetation, natural environment or flow of water within the stream, or any activity that has or may have an impact on a stream.</p> <p>As the possible infrastructure expansion would not occur on Crown land, a WSA permit is not expected.</p>
Wildlife Act	<p>Section 34 of the <i>BC Wildlife Act</i> prohibits the destruction of an egg or an active nest of any bird species and prohibits the destruction of a nest of a Bald Eagle, Osprey, Peregrine Falcon, Gyrfalcon, Great Blue Heron or Burrowing Owl, regardless of whether it is occupied.</p> <p>Destruction of nests protected under the <i>BC Wildlife Act</i> is not anticipated. Noise buffer zones and timing windows should be followed to minimize disturbance to wildlife. <i>Wildlife Act</i> permits are not expected for the proposed Project area.</p>
Environmental Management Act	<p>The <i>Environmental Management Act</i> (EMA) brings provisions provides an authorization framework and environmental management tools to protect human health and the quality of water, land and air in British Columbia. All waste management activities must comply with regulations under the EMA: Waste Discharge Regulations; Spill Reporting Regulations; and Hazardous Waste Regulations.</p>

Legislation	Description and Permitting Requirements
	<p>EMA specific permitting requirements are not anticipated for the proposed Project concept at this time.</p>
<p>Weed Control Act</p>	<p>Legislation related to the responsibility of managing weeds in the province. Any invasive species that are identified on site must be controlled and not allowed to spread and that any fill material imported to the site is clean and does not introduce any weed species to the site.</p> <p>There are no permit requirements under the BC <i>Weed Control Act</i>. However, at a minimum, noxious weeds regulated under the <i>Weed Control Act</i>, such as Japanese knotweed which was identified during Dillon’s initial site assessment, should be properly managed and/or disposed of.</p>
<p>Historical Conservation Act</p>	<p>All archaeological sites in B.C. are protected under the <i>Heritage Conservation Act</i> (HCA). This applies whether sites are located on public or private land, and whether the site is known or unknown. Protected archaeological sites may not be altered or changed in any manner without a permit.</p> <p>HCA specific permitting requirements are not anticipated for the proposed Project area at this time.</p>



5.0 Summary

Biologists from Dillon Consulting Limited completed a preliminary environmental inventory/screening and constraints analysis to assist CP in identifying the presence of existing environmental and cultural features and functions that could influence the location of new rail infrastructure proposed in the Project area. The assessment included a “desktop” review of publicly-available information and an on-site field assessment to document existing conditions. Vegetation community composition, wildlife, wildlife habitats, and other noteworthy biophysical and other features of relevance to Project development were identified during the field assessment. Seventeen (17) “points of interest” were noted.

Two bald-eagles were observed flying in the vicinity of a nest at the western end of the Project area, but no nesting activity was observed. Bald-eagles are not federally-listed. A number of other bird nests were observed in the trees south of the CP mainline track. While no bird SAR were observed, nesting birds in general are protected under federal and provincial regulations including the Migratory Bird Convention Act and the BC Wildlife Act. Buffer zones and construction timing windows may be applicable to the Project to reduce wildlife disturbance during sensitive seasons.

The vegetated embankment south of the existing mainline tracks was dominated by an understory of invasive and non-native species. Sporadic native and some non-native tree species were present on and at the top of the embankment. Specimens of both coniferous and deciduous mature trees were observed and are likely to provide good quality habitat (e.g., nesting, feeding, perching) for bird species.

No known occurrences of sensitive plant, fish, or wildlife species or designated Critical Habitat areas for plants were identified within the study area based on a review of the BC Conservation Data Centre database. **Appendix C** provides a list of SAR that have the *potential* to occur within and adjacent to the CP right-of-way. Based on professional opinion of species’ habitat preferences and understanding of existing site conditions, the possibility of occurrence for the majority of these species is extremely limited, particularly due to the highly disturbed state of the vegetation community and low habitat quality along the right-of-way and high level of human activity within the Port area.

[REDACTED]
[REDACTED] Results and recommendations from the AOA are presented in **Appendix A**.

This Environmental Constraints Assessment Report provides a high level overview of environmental constraints potentially influencing alignments and design options for expansion of rail infrastructure adjacent to Commissioner Street in the Port of Vancouver. While, the results of our assessment are considered cursory, more detailed assessments are not deemed to be necessary to obtain a comprehensive understanding of local environmental site conditions.

6.0 References

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Appendix A

Archaeological Overview Assessment

Appendix B

Summary of Potential Biophysical and Cultural Constraints

Table 5: Summary of potential biophysical and cultural constraints in the vicinity of the CP’s proposed Commissioner StreetRail Expansion Project

Feature/ Element	Potential Presence in Study Area Land- Based	Comments	Source of Information
Plant SAR	No	<ul style="list-style-type: none"> No known occurrences of Critical Habitat of Plant SAR in Study Area; none observed during field survey. 	BC CDC, field survey
Terrestrial and bird SAR	No	<ul style="list-style-type: none"> No known occurrences of terrestrial SAR in Study Area; none observed during field survey. 	BC CDC, field survey
Wetlands	No	<ul style="list-style-type: none"> Areas of standing water observed in CP ditches during site survey but no wetland vegetation observed. 	Field survey
Coniferous Forests	Limited	<ul style="list-style-type: none"> Sporadic occurrences of native western red cedar, western hemlock, spruce and horticultural cedars observed along the south side of the CP right-of-way. 	Field survey
Deciduous Forests	Limited	<ul style="list-style-type: none"> Sporadic occurrences of native alder, black cottonwood and big leaf maples along the south side of the CP right-of-way. 	Field survey.
Watercourses	No	<ul style="list-style-type: none"> No watercourses noted within the Project area during the desktop review or observed during the site survey. 	BC CDC; Field survey.
Steep/ unstable banks	Yes	<ul style="list-style-type: none"> A number of areas of steep and unstable slope occur along south side of right-of-way 	Topographic base data. Confirmed by field survey
Designated environmental areas	No	<ul style="list-style-type: none"> No designated environmental areas adjacent to the Project area. 	BC CDC
Parks	Yes	<ul style="list-style-type: none"> New Brighton Park, Commissioner Park, Trinity Park, Dusty Greenwell Park and Cambridge Park (municipal parks) adjacent to CP right-of-way. 	City of Vancouver
Land Use	N/A	<ul style="list-style-type: none"> Adjacent land uses include: Industrial (Columbia Containers, Lafarge Canada); Parks; Residential (upslope to the south). 	City of Vancouver
Shoreline	No	<ul style="list-style-type: none"> Burrard Inlet shoreline situated to the north of the CP right-of-way, but not directly adjacent to the Project area; BC ShoreZone Map¹ characterizes area as “Man-made.” 	BC Marine Conservation Analysis

Feature/ Element	Potential Presence in Study Area Land- Based	Comments	Source of Information
Cultural/ Archaeological	No	<ul style="list-style-type: none"> • [REDACTED] 	Terra Archeology Limited
Important Bird Areas (IBAs)	No	<ul style="list-style-type: none"> • English Bay/Burrard Inlet/Howe Sound IBA situated north of CP right-of-way. 	Birdlife International
Zoning	N/A	<ul style="list-style-type: none"> • Port Terminal – immediately north of CP ROW across full extent of east-west Project limits • Light Industrial (I-2) – west of Commissioner Street overpass and south of CP’s ROW; south of CP’s ROW between Victoria Dr and Semlin Dr. • Industrial (M-2) – west of Victoria Dr. • Comprehensive Development (CD-1(258)) – extends from CP’s ROW southern property line and extends north to VFPA shoreline. • One-Family Dwelling (RS-1) – south of CP’s ROW between N. Renfrew St and N. Nanaimo St; north of Wall St and between N. Nanaimo St and Trinity St; west of Wall St at Oxford St intersection. • Multi-Family Residential (C-2) - west area (I-2) and south of CP’s ROW. 	Vancouver-Fraser Port Authority City of Vancouver

¹ [British Columbia ShoreZone Map undated](#)

Appendix C

Potential Species at Risk

Table 6: Species at Risk Having the Potential to Occur in the Study Area

Common Name	Scientific Name	SARA Ranking	BC Ranking	Comments
Bird Species at Risk				
Band-tailed Pigeon	<i>Patagioenas fasciata</i>	Special Concern	Blue	Potential to occur within Project area.
Barn Owl	<i>Tyto alba</i>	Threatened	Red	Potential to occur within Project area.
Barn Swallow	<i>Hirundo rustica</i>	Threatened	Blue	Potential to occur within Project area for aerial feeding.
Common Nighthawk	<i>Chordeiles minor</i>	Threatened	Yellow	Unlikely to occur within Project area.
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	-	Blue	Potential feeding in Burrard Inlet. Unlikely to occur within Project area.
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	Special Concern	Yellow	Unlikely to occur within Project area.
Marbled Murrelet	<i>Brachyramphus marmoratus</i>	Threatened	Blue	Potential feeding in Burrard Inlet. Unlikely nesting in Project area.
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Threatened	Blue	Potential to occur within Project area.
Rough-legged Hawk	<i>Buteo lagopus</i>	-	Blue	Unlikely to occur within Project area.
Short-eared Owl	<i>Asio flammeus</i>	Special Concern	Blue	Unlikely to occur within Project area.
Terrestrial Fauna Species at Risk				
Little Brown Myotis	<i>Myotis lucifugus</i>	Endangered	Yellow	Unlikely to occur within Project area.
Monarch	<i>Danaus plexippus</i>	Special Concern	Blue	Potential to occur within Project area.
Northern Rubber Boa	<i>Charina bottae</i>	Special Concern	Yellow	Unlikely to occur within Project area.
Pacific Water Shrew	<i>Sorex bendirii</i>	Endangered	Red	Unsuitable habitat within Project area.
Herptile Species at Risk				
Norther Red-legged Frog	<i>Rana aurora</i>	Special Concern	Blue	Unlikely to occur within Project area.
Western Toad	<i>Anaxyrus boreas</i>	Special Concern	Yellow	Unsuitable habitat within Project area.
Plant Species at Risk				
Streambank Lupine	<i>Lupinus rivularis</i>	Endangered	Red	Unsuitable habitat within Project area.

² Source of information: 1) BC CDC search criteria: MOE Regions: 2- Lower Mainland (Restricted to Red, Blue, and Legally designated species) and Habitat Types: Ocean (Restricted to Red, Blue, and Legally designated specie

Appendix D

Scientific Species Names

Table 6. Scientific name of plant species found within the Project Area

Common Name	Scientific Name
Native Species	
Big leaf maple	<i>Acer macrophyllum</i>
Birch	<i>Betula sp.</i>
Black Cottonwood	<i>Populus trichocarpa</i>
Cherry Tree	<i>Prunus sp.</i>
Douglas Fir	<i>Pseudotsuga menziesii</i>
Hardhack	<i>Spiraea douglasii</i>
Maple Tree	<i>Acer sp.</i>
Red alder	<i>Alnus rubra</i>
Red elderberry	<i>Sambucus racemosa</i>
Salmonberry	<i>Rubus spectabilis</i>
Spruce Tree	<i>Picea sp.</i>
Sword fern	<i>Polystichum munitum</i>
Vine maple	<i>Acer circinatum</i>
Western redcedar	<i>Thuja plicata</i>
Priority Invasive Species¹	
Himalayan blackberry	<i>Rubus armeniacus</i>
Scotch broom	<i>Cytisus scoparius</i>
Other invasive or Non-native species	
Bamboo	<i>Bambusoideae sp</i>
Chesnut	<i>Castanea sp.</i>
Crab apple	<i>Malus sp.</i>
Deadnettle	<i>Lamium sp.</i>
English Ivy	<i>Hedera helix</i>
Holly	<i>Ilex sp.</i>
Laurel shrub	<i>Laurus sp.</i>
Morning glory	<i>Convolvulacea sp.</i>
Reed canary grass	<i>Phalaris arundinacea</i>
Yew	<i>Taxus sp.</i>

¹ Priority Invasive Species (Government of British Columbia)

Table 7. Scientific name of bird species observed in the Project Area

Common Name	Scientific Name
Native Species	
American Robin	<i>Turdus migratorius</i>
Bald Eagle	<i>Haliaeetus leucocephalus</i>
Belted Kingfisher	<i>Megaceryle alcyon</i>
Brushtit	<i>Psaltriparus minimus</i>
Canada Goose	<i>Branta canadensis</i>
Dark-eye Junco	<i>Junco hyemalis</i>
Fox Sparrow	<i>Passerella iliaca</i>
Glaucous-winged Gull	<i>Larus glaucescens</i>
Herring Gull	<i>Larus argentatus</i>
House Finch	<i>Haemorhous mexicanus</i>
Hummingbird	<i>Trochilidae sp.</i>
Northern Flicker	<i>Colaptes auratus</i>
Northwestern Crow	<i>Corvus caurinus</i>
Rock Dove	<i>Columba livia</i>
Song Sparrow	<i>Melospiza melodia</i>

Appendix E

VFPA Category A Application



DILLON
CONSULTING

PORT OF VANCOUVER

Information Support Package for Category A Approval Application

Geotechnical Investigation

Canadian Pacific Commissioner Street Rail Expansion

Submitted to:

Port of Vancouver

(via online application portal:

<https://eper.portvancouver.com/SignIn?ReturnUrl=%2fper-applications%2f>)

Submitted by:

Dillon Consulting Limited

3820 Cessna Drive

Suite 510

Richmond, BC V7B 0A2

On Behalf of:

Canadian Pacific

7550 Ogden Dale Road S.E.

Calgary, AB T2C 4X9

March 2020

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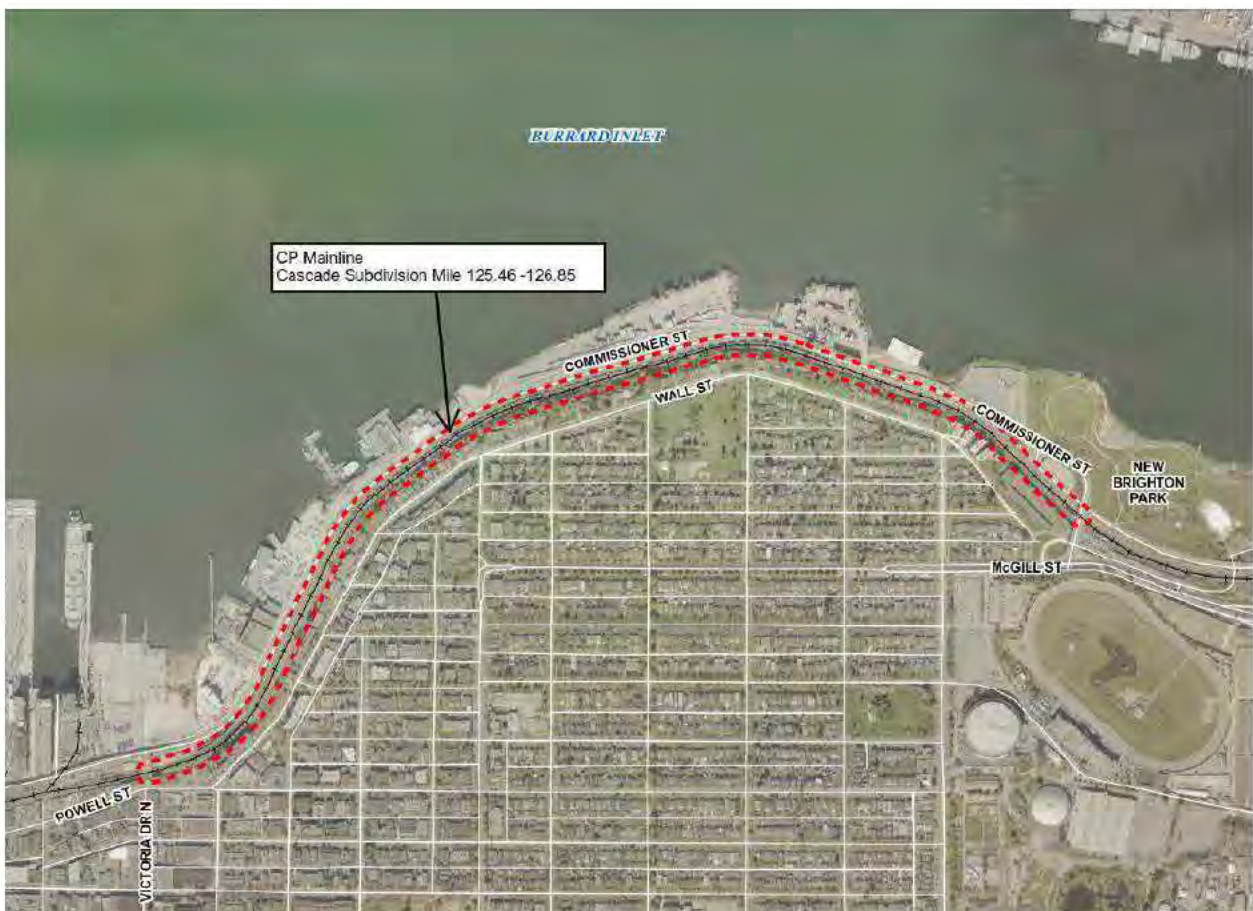
- A Subsurface Exploration Summary (prepared by Tetra Tech)
- B Environmental Protection Plan (prepared by ConeTec Inc.)

1.0 Introduction

As part of the Burrard Inlet Road and Rail Improvement Program (BIRRIIP), Canadian Pacific (CP) is proposing to expand existing trackage to improve fluidity around the Columbia Containers Terminal in the Port of Vancouver (VFPA). More specifically, new trackage is proposed on the north side of the existing mainline tracks: the approximate eastern and western limits of the project area are the Commissioner Street vehicle overpass and the Victoria Drive pedestrian overpass, respectively. These limits correspond with CP's Cascade Subdivision Miles 125.46 and 126.85, respectively for a total project area length of 1.2 miles (Figure 1).

This document provides information and materials to support a Category A application to the VFPA for geotechnical sampling activities associated with the Project for test holes located on or adjacent to lands within the Port's jurisdiction. The VFPA Project Permit Application Form for Category A Reviews has been completed and submitted through the Port's online portal.

Figure 1: Project Location



2.0 Proposed Works

CP contractors are proposing to complete a subsurface exploration program at several locations along the Commissioner Street corridor. A total of 13 test holes (12 boreholes, and 1 cone penetration test hole) will be drilled along the north side of the mainline track between Mile 126.85 and 125.46 of the Cascade Subdivision (Figure 2). All test holes are land-based and will be accessed from land. Figures 3 - 7 provide an overview of the testhole locations relative to CP's Cascade Subdivision tracks.

The drilling will be completed by ConeTec Inc., a full-service geotechnical and geoenvironmental site investigation company located in Richmond, British Columbia. This geotechnical drilling program will be coordinated and monitored by Tetra Tech, an engineering and multidisciplinary consulting firm located in Vancouver, British Columbia.

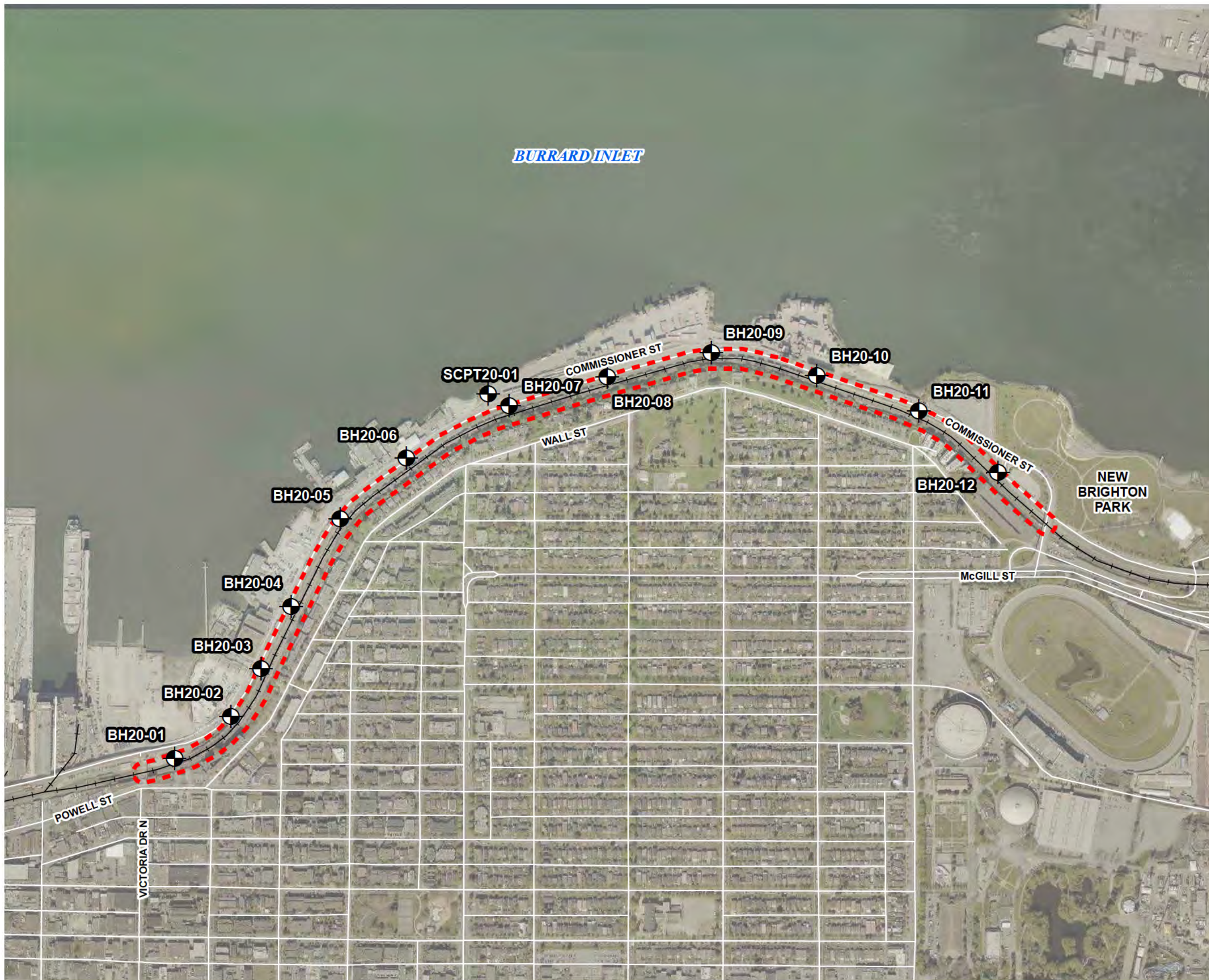
2.1 Proposed Borehole Locations

A geotechnical investigation is proposed to advance the Project Team's understanding of subsurface conditions and to inform the preparation of a detailed design for the proposed CP Commissioner Street Rail Expansion. The investigation is proposed at 13 locations with six (6) of these located within VFPA property, and one (1) located close to the VFPA boundary (i.e., BH20-02) (Figure 2). All other test holes are located on CP property. Drilling operations for all test hole locations will be completed using standard equipment. Table 1 below provides a summary of each test hole location.

Table 1: Proposed Boreholes and Drilling Requirements

Testhole #	Location (x,y coordinates)	Estimated Depth of Borehole Below Grade (m)	Within Port Jurisdiction
BH20-01	5459183, 495304	6	No
BH20-02	5459267, 495418	6	No
BH20-03	5459363, 495478	6	No
BH20-04	5459489, 495539	6	No
BH20-05	5459667, 495639	6	No
BH20-06	5459789, 495773	6	Yes
BH20-07	5459896, 495980	6	Yes
BH20-08	5459953, 496178	6	Yes
BH20-09	5460003, 496388	6	No
BH20-10	5459957, 496602	6	Yes
BH20-11	5459885, 496808	6	Yes
BH20-12	5459761, 496968	6	No
SCPT20-01	5459919, 495937	15	Yes

The figures that follow identify the locations of all proposed test holes relative to the Project area.



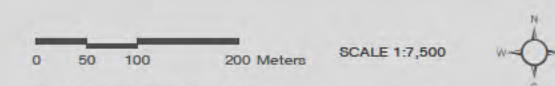
CANADIAN PACIFIC

CP COMMISSIONER STREET RAIL EXPANSION

TEST HOLE LOCATIONS

FIGURE 2

- ROADWAY
- +— RAILWAY
- ▬ PROJECT LOCATION
- ⊕ TEST HOLE



MAP DRAWING INFORMATION:
 DATA PROVIDED BY DILLON CONSULTING LIMITED,
 ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS,
 CNES/AIRBUS DS, USDA, USGS, AEROGRIID, IGN,
 AND THE GIS USER COMMUNITY

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

FILE LOCATION: \\DILLON.CA\DILLON_DFS\CALGARY
 \CALGARY CAD\GIS\202321



PROJECT: MK1813-01-03
 STATUS: DRAFT
 DATE: MARCH 2020

Figure 3: Proposed Borehole Locations – BH20-01 through BH20-04



Figure 4: Proposed Borehole Locations – BH20-04 through BH20-06

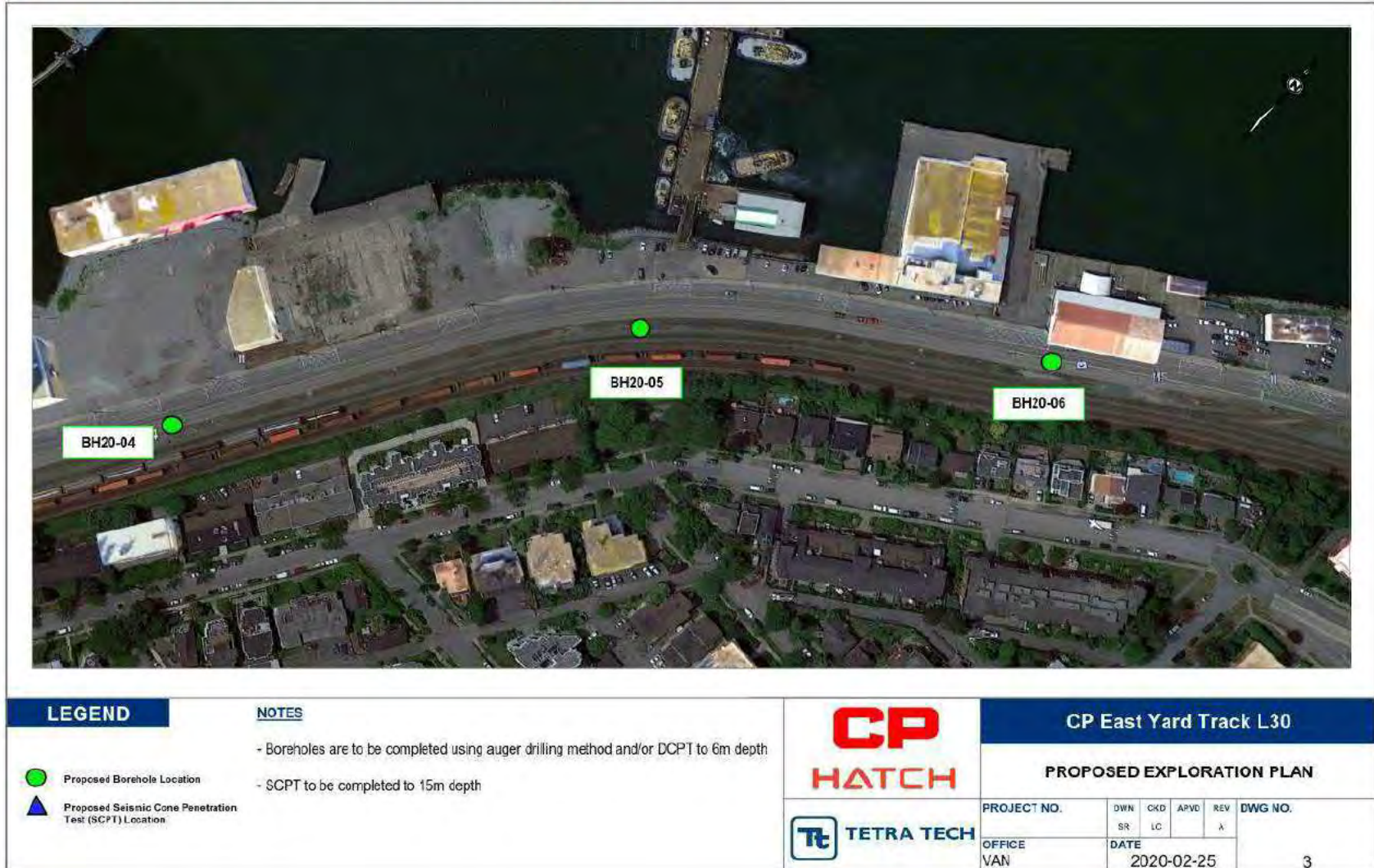


Figure 5: Proposed Borehole Locations – BH20-06 through BH20-08, and SCPT20-01





LEGEND	<u>NOTES</u>	 	CP East Yard Track L30				
<p>● Proposed Borehole Location</p> <p>▲ Proposed Seismic Cone Penetration Test (SCPT) Location</p>	<p>- Boreholes are to be completed using auger drilling method and/or DCPT to 6m depth</p> <p>- SCPT to be completed to 15m depth</p>		PROPOSED EXPLORATION PLAN				
		PROJECT NO.	DWN SR	CKD LC	APVD X	REV X	DWG NO.
		OFFICE VAN	DATE 2020-02-25		4		

Figure 6: Proposed Borehole Locations – BH20-08 through BH20-10





LEGEND		NOTES		 	CP East Yard Track L30					
●	Proposed Borehole Location	- Boreholes are to be completed using auger drilling method and/or DCPT to 6m depth	- SCPT to be completed to 15m depth		PROPOSED EXPLORATION PLAN					
▲	Proposed Seismic Cone Penetration Test (SCPT) Location				PROJECT NO.	DWN SR	CND LC	APVD A	REV A	DWG NO.
					OFFICE VAN	DATE 2020-02-25			5	

Figure 7: Proposed Borehole Locations – BH20-10 through BH20-12



2.2 Test Hole Drilling Overview

The drilling program is anticipated to take approximately four days to complete all 13 test holes, with approximately three test holes being completed per day. Drilling will take place during the day only (regular working hours of 7 am to 5 pm, Monday through Friday). Further details on drilling methodology, monitoring, and utilities and traffic management can be found in the Site Exploration Plan attached as **Appendix A**. Additional information on drilling scope and duration can be found in Section 4.2 of the Environmental Protection Plan (EPP) prepared for the geotechnical investigations, and included as **Appendix B**.

2.2.1 Drilling Methodology

All 13 test holes will be advanced using a solid stem auger drilling rig.

Twelve solid stem auger boreholes will be completed in conformance with ASTM D1452, and to a depth of approximately 6 metres per hole. *In-situ* tests and hand sampling techniques will be conducted on-site; soil samples will also be collected for laboratory testing off-site.

One SCPT will be completed in conformance with ASTM D5778, and to a depth of approximately 15 metres.

Groundwater levels will be measured where possible upon completion of each test hole. All test holes will be backfilled in conformance with the BC Groundwater Protection Regulation under the *Water Sustainability Act*.

2.2.2 Monitoring

Geotechnical engineers from Tetra Tech will be on site to provide supervision during geotechnical drilling activities.

2.2.3 Utilities and Traffic Management

Tetra Tech will be on site to verify test hole locations in the field, complete utility locates, log subsurface soil conditions and collect representative geotechnical soil samples in conformance with ASTM D2487 and ASTM D2488.

A BC One-Call request will be submitted to obtain available utilities drawings for each test site. Prior to the onset of geotechnical drilling on-site, Tetra Tech will coordinate utility clearance for each testing location. Utility clearance will be confirmed via underground facility locates using Electromagnetic Scan, line locating methods and Ground Penetrating Radar.

All test holes have been located outside the road ROW to minimize disturbance to traffic as much as possible. Prior to the onset of drilling activities, each test hole location will be delineated using traffic

cones and caution tape. Where test hole locations are located within or immediately adjacent the travelled road, traffic control will be required and will be provided by the project.

2.3 **Special Considerations Associated with Proposed Geotechnical Investigations**

During the geotechnical sampling program, several special considerations associated with the proposed borehole locations will be respected.

All subsurface explorations will be undertaken in general conformance with Tetra Tech's project-specific Health and Safety Plan, Health and Safety Manual and Safety Handbook. Tetra Tech will meet with the drilling crew at the beginning of each work-shift to ensure that the crew is familiar with the requirements at each testing location, and the specifics of each drilling and sampling method.

There is potential that drilling and/or associated activities may temporarily occur on or require use of VFPA lands: the project team will notify and coordinate with VFPA Land Operations as required during the geotechnical investigation. It is understood that this requirement will be confirmed at the discretion of the Port Authority following the Port Authority's review of this application.

Consultation with Port Authority staff has been initiated, and will be ongoing throughout the project to ensure alignment with VFPA approaches and requirements for the geotechnical sampling program and as the Project continues to move forward.

Mitigation measures will be employed as required/where needed to minimize potential negative effects of temporary activities associated with the drilling operations that occur as part of geotechnical investigations, as detailed below.

3.0 Potential Environmental Impacts and Mitigation

3.1 Vegetation Management

As noted above, all test hole locations are land-based, and situated north of the existing north mainline track. There is very limited, if any, vegetation at each drilling location and it is not anticipated that vegetation removal will be required.

3.2 Species-at-Risk

A screening of provincial records/databases was undertaken to assess the potential for species of risk presence in or around the proposed borehole locations. There are no recorded occurrences of species at risk or provincially listed (yellow, blue, or red) species within or near the project area. While no recorded SAR or critical habitat occurrences were noted on the databases, the BC Species and Ecosystem Explorer indicates that there is potential for some provincially-listed (yellow, blue or red) species to utilize the project area.

3.3 Cultural

[REDACTED]

An Archaeological Overview Assessment (AOA) is being undertaken for the Project.

3.4 Best Practices

Standard mitigation measures and industry best practices will be used to minimize potential environmental impacts of test hole drilling activities. ConeTec has extensive experience completing drilling activities and have developed and implemented a suite of appropriate Best Management Practices (BMPs) and mitigation measures for past drilling projects of similar scope and context. The *Environmental Protection Plan: Commissioner Street East Yard Track* prepared by ConeTec outlines the BMPs/mitigation measures to be implemented during drilling under the proposed conditions (**Appendix B**). These include consideration of sediment and erosion control; groundwater management; general environmental protection and mitigation measures; waste management; oil and fuel management; spill prevention and response; wildlife management; and noise, air quality and lighting management.

3.5

Residual Effects

Potential temporary effects associated with the proposed geotechnical investigations are expected to be short-term and of limited magnitude and extent. With the application of standard best management practices, anticipated project impacts can be effectively avoided or minimized such that any residual environmental effects of the work are predicted to be minimal (i.e., not significant).

Appendix A

Subsurface Exploration Summary (prepared by Tetra Tech)

Date: February 25, 2020
Project: Geotechnical Subsurface Exploration Program for CP East Yard Track L30
Location of Project: Commissioner Street, Vancouver, B.C.

SUBSURFACE EXPLORATION WORK SCOPE

The scope of work includes a subsurface exploration at several locations selected along Commissioner Street in Vancouver, British Columbia. The exploration program consists of a total of 13 test hole locations between Commissioner Street Overpass and Victoria Drive. Site exploration plans indicating the proposed test hole locations are presented on Figures 1 through 6.

As part of the subsurface exploration plan, geotechnical engineers from Tetra Tech will be on site to provide supervision, including verifying the test hole locations in the field, completing utility locates, logging the subsurface soil conditions, and collecting representative geotechnical soil samples. The soils will be sampled and logged in general conformance to ASTM D2487 and D2488. Groundwater levels will be measured, where possible, upon the completion of each test hole. Following completion of drilling, the test holes will be backfilled in conformance with the current BC Groundwater Protection Regulation.

The subsurface explorations will be undertaken in general conformance with Tetra Tech's project-specific Health and Safety Plan, and Tetra Tech's Health and Safety Manual and Safety Handbook. In order to achieve a safe and efficient workplace, a Tetra Tech engineer will meet with the drilling crew at the beginning of each work-shift to ensure that the crew is familiar with the requirements at the testing location and the specifics of each drilling and sampling method.

The subsurface exploration delineated in this project include the following activities:

Survey and Utility Clearance

BC One-Call request to obtain available utilities drawings for each project site will be submitted. Prior to field investigation, utility drawings for each site will be reviewed to ensure that the proposed testing locations are marked away from any existing installations. The coordinates for each of the sounding locations will be obtained and will form the reference for the site access application. In the field, the proposed sounding points will be located and marked using a hand-held GPS (accurate to +/- 5 m) that will be verified against known points with surveyed coordinates.

Prior to mobilizing to the project site, the proposed testing locations will be cleared for public utilities. Utility clearance will be coordinated by Tetra Tech and qualified 3rd party locators will perform the underground facility locates at each of the sounding location and mark all detected underground facilities using Electromagnetic (EM) Scan, line locating methods and Ground Penetrating Radar (GPR).

Clearance for private utilities located within the CP property is expected to be carried out by CP.

Cone Penetration Testing (CPT)

A total of one (1) Seismic Cone Penetration Testing (SCPT) to a depth of 15 m will be performed by a qualified contractor in general accordance to ASTM D5778. For this test an electric piezocone is used to record tip resistance (q_c), sleeve friction (f_s), and pore pressure (u_2) measurements every 2.5 cm depth interval with a data acquisition system. For the seismic cone penetration test (SCPT) a shear wave is produced at the surface for every 1m depth interval, and then recorded with geophones installed in the CPT probe.

Solid Stem Auger Drilling

Twelve (12) solid stem auger boreholes to a depth of about 6 m will be completed by the drilling contractor at various locations to conduct in-situ tests and collect soil samples for laboratory testing. All test holes will be advanced using a solid stem auger drilling rig and will be carried out in general conformance with ASTM D1452. This method involves rotating a continuous flight of augers into the ground, and then pulling the flight to surface. A soil column is retained on the flights of the auger and are sampled by hand. Upon completion of the drilling activities at each test hole location, the test holes will be fully backfilled with soil cuttings to near ground surface. A 0.3 m thick upper hydrated bentonite chip will be placed above the backfill and the borehole will be sealed to surface in conformance with the BC Groundwater Protection Regulations. Where applicable, cold patch asphalt will be placed and compacted in layers to patch the pavement surface.

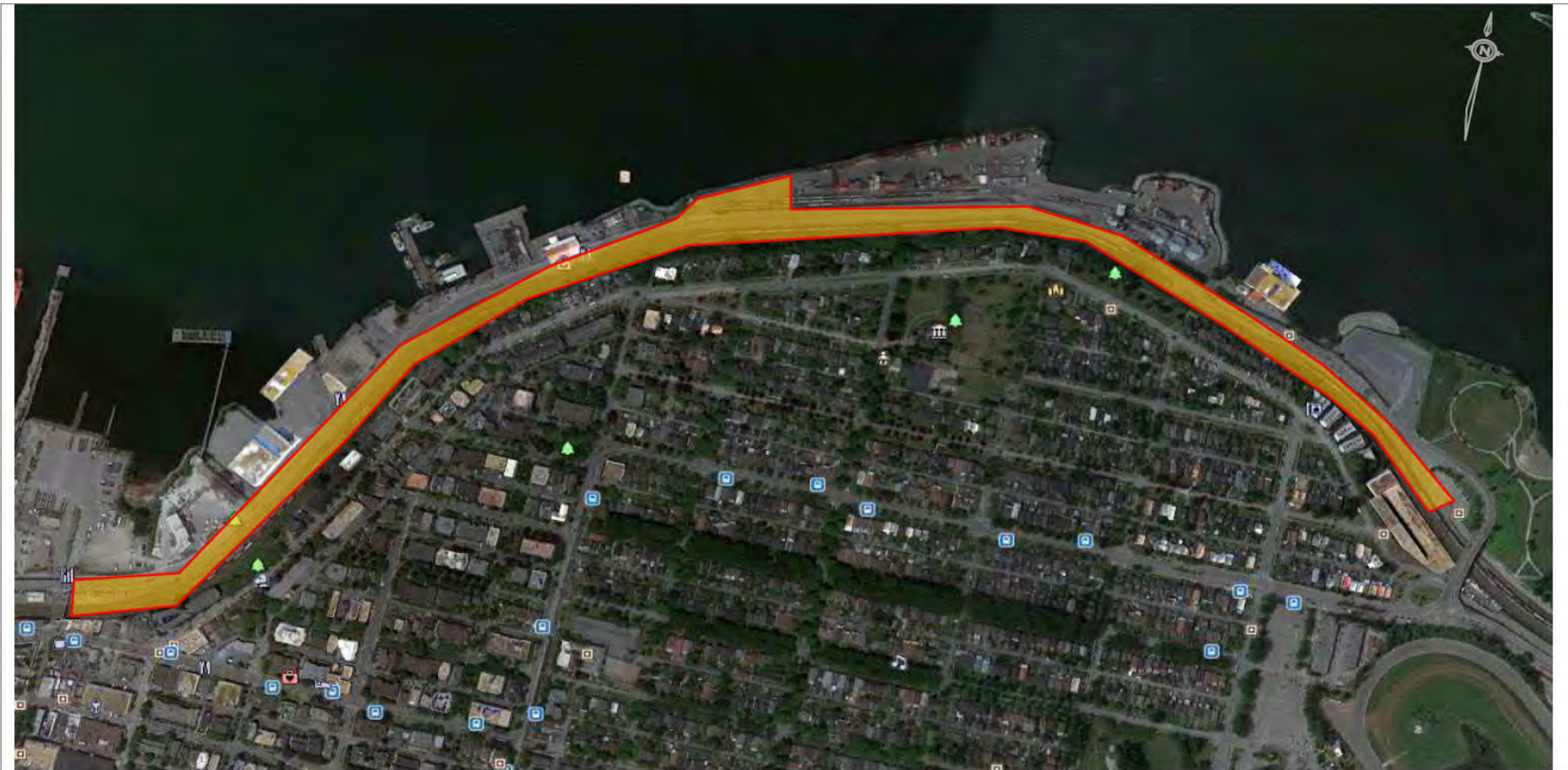
Working Hours

The field work is estimated to require 4 days to complete is planned to be conducted from 7:00AM to 5:00PM.

Traffic Control

Test holes have been marked outside of the road right-of-way to minimize disturbance to traffic as much as possible. The work area at each testing location will be delineated using traffic cones and caution tape. At locations where test holes are located within the travelled road, traffic control will be required and is expected to be provided by the project.

FIGURES



LEGEND

 Project Site

NOTES



CP East Yard Track L30

PROPOSED EXPLORATION PLAN

PROJECT NO.	DWN	CKD	APVD	REV	DWG NO.
OFFICE	SR	LC		A	
VAN	DATE				1
	2020-02-25				



LEGEND

- Proposed Borehole Location
- ▲ Proposed Seismic Cone Penetration Test (SCPT) Location

NOTES

- Boreholes are to be completed using auger drilling method and/or DCPT to 6m depth
- SCPT to be completed to 15m depth



CP East Yard Track L30

PROPOSED EXPLORATION PLAN

PROJECT NO.	DWN SR	CKD LC	APVD	REV A	DWG NO.
OFFICE VAN	DATE 2020-02-25			2	



LEGEND

- Proposed Borehole Location
- ▲ Proposed Seismic Cone Penetration Test (SCPT) Location

NOTES

- Boreholes are to be completed using auger drilling method and/or DCPT to 6m depth
- SCPT to be completed to 15m depth



CP East Yard Track L30

PROPOSED EXPLORATION PLAN

PROJECT NO.	DWN SR	CKD LC	APVD	REV A	DWG NO.
OFFICE VAN	DATE 2020-02-25			3	



LEGEND

- Proposed Borehole Location
- ▲ Proposed Seismic Cone Penetration Test (SCPT) Location

NOTES

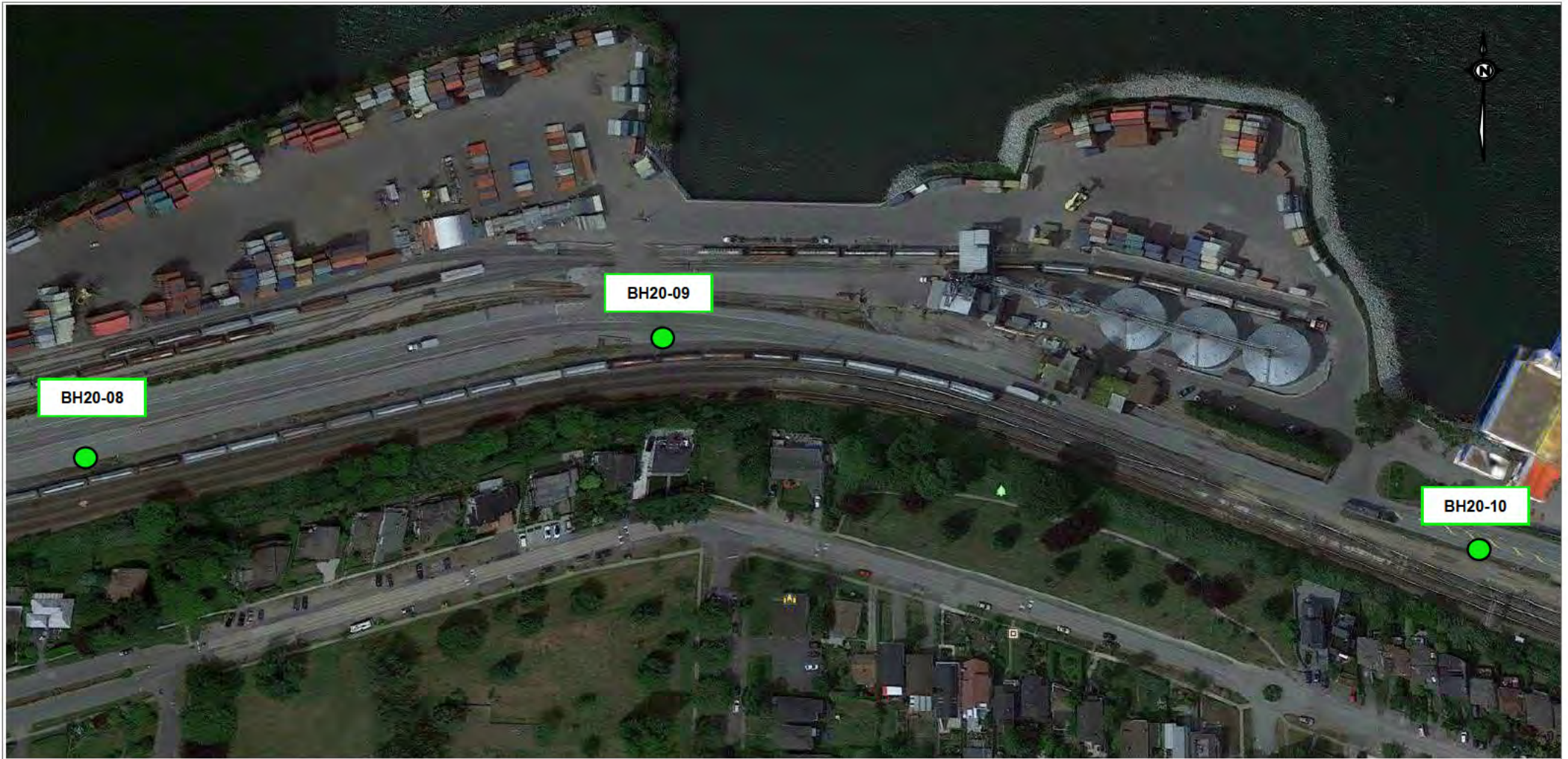
- Boreholes are to be completed using auger drilling method and/or DCPT to 6m depth
- SCPT to be completed to 15m depth



CP East Yard Track L30

PROPOSED EXPLORATION PLAN

PROJECT NO.	DWN SR	CKD LC	APVD	REV A	DWG NO.
OFFICE VAN	DATE 2020-02-25			4	



LEGEND

- Proposed Borehole Location
- ▲ Proposed Seismic Cone Penetration Test (SCPT) Location

NOTES

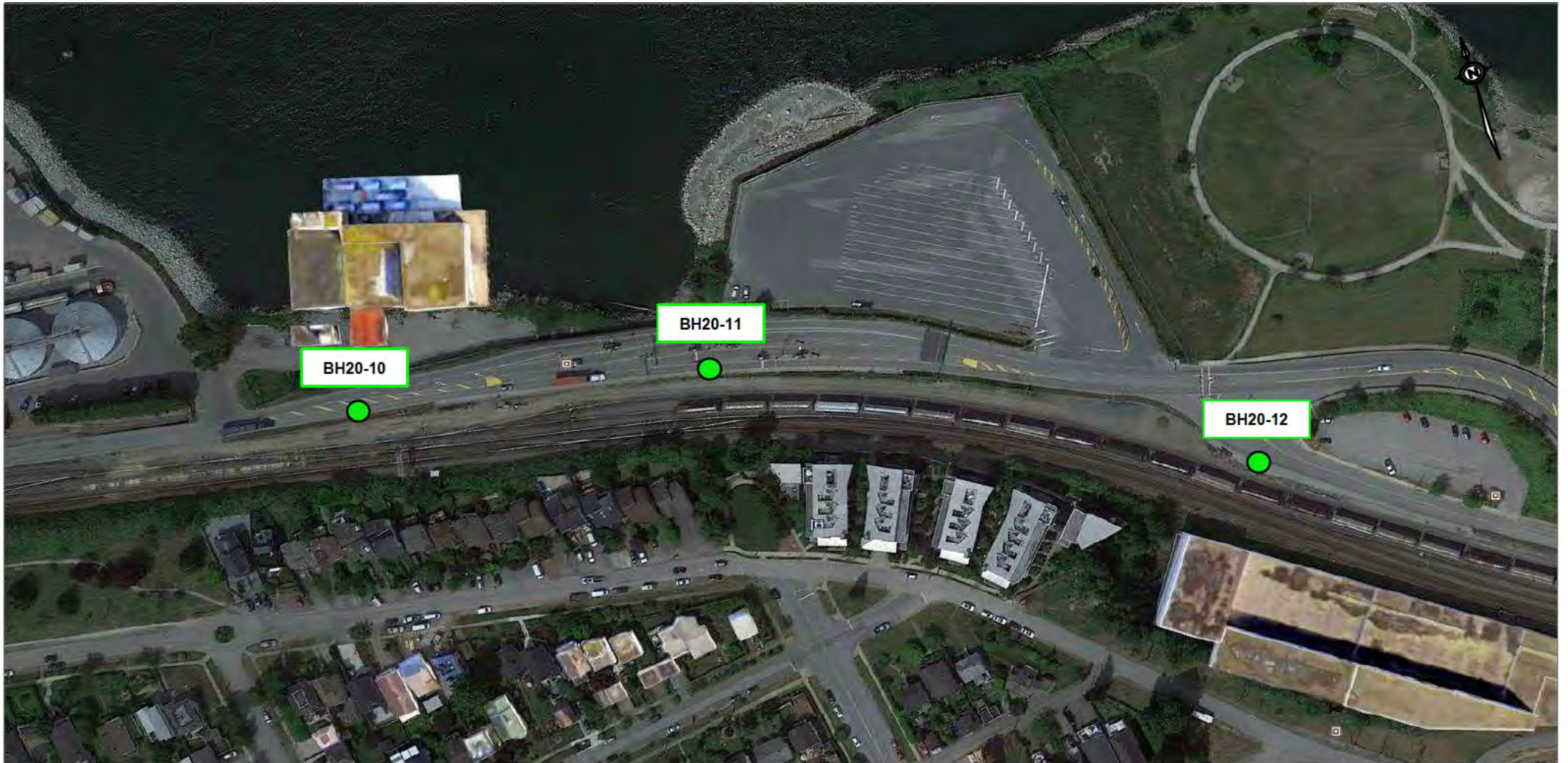
- Boreholes are to be completed using auger drilling method and/or DCPT to 6m depth
- SCPT to be completed to 15m depth



CP East Yard Track L30

PROPOSED EXPLORATION PLAN

PROJECT NO.	DWN	CKD	APVD	REV	DWG NO.
OFFICE	SR	LC		A	
VAN	DATE				
	2020-02-25				5



LEGEND

- Proposed Borehole Location
- ▲ Proposed Seismic Cone Penetration Test (SCPT) Location

NOTES

- Boreholes are to be completed using auger drilling method and/or DCPT to 6m depth
- SCPT to be completed to 15m depth



CP East Yard Track L30

PROPOSED EXPLORATION PLAN

PROJECT NO.	DWN	CKD	APVD	REV	DWG NO.
OFFICE	SR	LC		A	
VAN	DATE				
	2020-02-25				6

Appendix B

***Environmental Protection Plan
(prepared by ConeTec Inc.)***



CALIFORNIA PUSH
TECHNOLOGIES
INCORPORATED

ENVIRONMENTAL PROTECTION PLAN

COMMISSIONER STREET EAST YARD
TRACK

MARCH 12TH, 2020

REV 0



Tristan Dyke
tdyke@conetec.com

Preface

ConeTec / Mud Bay Drilling 2015 Ltd has a responsibility of the protection of the natural environment and of archaeological sites/objects. Through adherence to applicable legislation, best industry standards, and guidance from clients, as well as consultants, we hope to greatly reduce the potential for adverse environmental effects through mitigation measures. We intend to educate our workforce as to the policies, responsibilities and procedures within this document.

This document will include the following plans to be implemented during all drilling operations:

- [Archaeological Management](#);
- [Water Quality](#);
- [Sediment and Erosion Control](#);
- [Groundwater Management](#);
- [Construction Waste Management](#);
- [Concrete Handling and Wash Water Management](#);
- [Vehicles and Equipment](#) ;
- [Spill Prevention and Emergency Response](#);
- [Noise, Air Quality and Dust Control Management](#);
- [Wildlife Protection and Site Restoration](#);
- [Fire Prevention](#); and,
- [Environmental Incidents](#).

ConeTec / Mud Bay Drilling employees will follow all the details and procedures in this plan.

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1.0 Roles and Responsibilities

It is essential for everyone involved in the project to understand the assigned roles and responsibilities outlined in the scope of work in the safe work plan. This section defines and describes those responsibilities associated with the EPP. These responsibilities are regarding implementation, inspecting, and reporting on the effectiveness of environmental and archaeological protection and mitigation measures during projects.

1.1 Project Manager/Engineer (Client)

- Responsible for overall management, engineering, construction and environmental performance of the project;
- Ensures that the EPP is prepared, communicated, accepted and implemented by the Construction Services or Contractor (ConeTec) (or delegates this responsibility);
- Ensures that the EPP is revised, as necessary (or delegates the responsibility);
- Ensures that environmental and archaeological incidents are addressed and reported (or delegates the responsibility);
- Delegates the responsibility for environmental and archaeological site protection performance of the project to the environmental manager

1.2 Environmental Monitor (EM) (Client)

The Environmental Monitor (EM) who will report to the Prime Consultant, Project Manager and the Environmental Manager. Communications while on site will be through the Contractor Site Manager. The EM will be a qualified environmental professional (QEP) with appropriate experience to undertake monitoring. The primary responsibility of the EM is to assure compliance with environmental best practices and the conditions of the applicable approvals/permits. The EM will:

- Attend pre-job and/or tailboard meetings to convey the environmental sensitivities and environmental requirements of the work to Contractors' personnel;
- Be present periodically during drilling to monitor drilling activities through visual inspections and real-time quantitative monitoring;
- Assess the effectiveness of the mitigation measures being applied;
- Assess compliance with the environmental control strategies and mitigation measures specified in this EPP, and with terms and conditions specified by all applicable legislation, guidelines and best management practices;
- Provide recommendations to the Geotechnical Investigation Project Manager and Geotechnical Investigation Sub-contractor, Mud Bay, Project Managers for installing, maintaining and/or improving control and mitigation measures, as necessary;

- Anticipate potential environmental issues and provide advice to avoid and limit potential for environmental incidents;
- Make visual inspections including those to:
 - Verify that emergency spill response materials are available on site and appropriately stocked
 - Inspect drilling equipment for potential leaks
- Monitor for and identifying fish, wildlife and other sensitive receivers (e.g., nearby residents) that may be affected by the drilling activities, and making the Geotechnical Investigation Project Manager aware of all notable observations; and
- Report in accordance with the agreed reporting parameters.

1.3 Site Manager (Client or Site Owner)

- Ensures that commencement of work at new locations and/or prior to new activities does not occur until authorized to proceed
- Reports and assists in addressing all non-conformances with regards to this EPP and any directions, orders, or recommendations made by the Environmental Monitor; and,
- Reports and assists in addressing non-conformances with the EPP

1.4 ConeTec & Mud Bay Drilling

- Provides oversight and complies with the requirements of the EPP; and,
- Reports and assists in addressing all non-conformances with the EPP.

2.0 Planning and Regulatory Requirements

Table 1 lists key considerations of environmental legislation relevant to the geotechnical investigations. Tetra Tech will be responsible for the geotechnical investigation program's compliance to environmental and regulatory requirements.

Table 1: Key Environmental & Regulatory Consideration for Geotechnical investigations

Legislation	Responsible Authority	Project Considerations
Navigation Protection Act	Transport Canada	Notifications of responsible agencies
Marine Act	Port of Vancouver	<ul style="list-style-type: none"> - Consultation with PMV to define requirements - Preparation of a Preliminary Project Inquiry and PER application
Fisheries Act	Fisheries and Oceans Canada	Demonstrates the work methods and mitigations employed will sufficiently avoid or minimize risk of serious harm to fish
BC Environmental Management Act, Hazardous Waste Regulation and Spill Reporting Regulation	Ministry of Environment and Climate Change Strategy	Adherence to all applicable legislation for handling, transportation and/or disposal of all materials related to this investigation (waste or otherwise)
BC Water Sustainability Act	Ministry of Forests, Lands, Natural Resource Operations, and Rural Developments	Groundwater Protection Regulations ensures activities related to wells and groundwater are performed in an environmentally safe manner and outline requirements for well construction and decommissioning
BC Wildlife Act (for wildlife not managed under federal legislation)	Ministry of Forests, Lands, Natural Resource Operations, and Rural Developments	Demonstrates the work methods and mitigations employed will sufficiently avoid or minimize risks to wildlife, in accordance with the Act.
Transportation of Dangerous Goods Act	Transport Canada	<p>Regulates the transport of all dangerous goods in Canada and establishes safety standards and compliance requirements for all containers, packages, and means of transport to be clearly marked with applicable prescribed safety information and symbols.</p> <p>The act also establishes requirements regarding emergency response assistance plans.</p> <p>Dangerous goods will be managed, handled, and used in accordance to the Transportation of Dangerous Goods Act.</p>
Canada Migratory Birds Convention Act and Migratory Birds Regulation	Environment and Climate Change Canada	Protect migratory birds, their eggs and nests

Canadian Environmental Protection Act	Ministry of Environment and Climate Change Strategy	Addresses "cradle-to-grave" management of persistent toxic substances
Species at Risk Act	Canadian Endangered Species Conservation Council	Prevents Canadian indigenous species, subspecies, and distinct populations from becoming extirpated or extinct, provides for the recovery of endangered or threatened species, and encourages the management of other species to prevent them from becoming at risk

3.0 Archaeological Management (**if deemed required)

The following BMPs will be applied as part of the archaeological resources management:

- Provide awareness training to equipment operators so that they know what artifacts might look like; and
- Should archaeological or heritage materials be encountered (e.g., archaeological artifacts, cultural sediments and ancestral remains, either in intact or disturbed contexts), Vancouver Fraser Port Authority, the Project Archaeologist and the relevant First Nations will consider the following chance find approaches in order of precedence:
 - Avoidance through relocation of the testing site;
 - Mitigation through application of site protection measures; or
 - Mitigation through salvage or emergency excavation.

4.0 Drilling

Many boreholes will be drilled in support of engineering investigations. This work will be completed by drill rigs suitably designed for the anticipated depth, subsurface material, and proximity to watercourse, the community, and local wildlife (e.g., fish, marine life, birds). If available, the drill rig will be transported on a truck to the study areas through existing roadways or in the case of over water work, the equipment will be loaded at a facility appropriate for the project.

4.1 Prior to drilling ConeTec / Mud Bay Drilling will:

1. Review project requirements and specifications;
2. Review proximity for work next to surface water. Any work near surface water requires secondary spill containment.
3. Review Archaeological Assessments of the project (if applicable).

4.2 Drilling Scope of Work and Estimated Durations

Table 2: Geotechnical investigation scope of work and estimated durations

Test Hole No.	Description	Depth (m)	Rig	Duration (hours)
BH-1	Solid Stem Auger + DCPT	6	M5T	3
BH-2	Solid Stem Auger + DCPT	6	M5T	3
BH-3	Solid Stem Auger + DCPT	6	M5T	3
BH-4	Solid Stem Auger + DCPT	6	M5T	3
BH-5	Solid Stem Auger + DCPT	6	M5T	3
BH-6	Solid Stem Auger + DCPT	6	M5T	3
BH-7	Solid Stem Auger + DCPT	6	M5T	3
BH-8	Solid Stem Auger + DCPT	6	M5T	3
BH-9	Solid Stem Auger + DCPT	6	M5T	3
BH-10	Solid Stem Auger + DCPT	6	M5T	3
BH-11	Solid Stem Auger + DCPT	6	M5T	3
BH-12	Solid Stem Auger + DCPT	6	M5T	3
SCPT-1	SCPTu sounding (Vs)	15	M5T	2

5.0 Sediment and Erosion Control

The following sections summarize the elements of a robust set of Sediment and Erosion Control measures and the soil erosion and sediment control measures associated with site activities.

5.1 Soil Erosion and Sediment Control Measures

The implementation of sound sediment and erosion control practices includes the following:

- Procedural BMPs (often called good housekeeping) that identify minimum measures that are non-structural. These include measures such as work scheduling (i.e., to avoid work in wet conditions), controlled site access, and dust management. Many of these procedural BMPs are discussed in further detail in following sections of this EPP,
- Erosion control BMPs typically apply to exposed soils where risk assessment indicates a need to reduce erosion potential due to wind, rain-splash, or flowing water. The intent of such erosion control BMPs is to prevent erosion at the source by protecting exposed surfaces and reducing the quantity or velocity (runoff control) of eroded materials,

Specific examples of BMPs which, may be applied to the work site are outlined:

- Exposed soils which are anticipated to be exposed temporarily will be covered with a plastic covering or with erosion control mats within 24 hours, or immediately during wet conditions.
- Soil stockpiles will be located as far as possible from watercourses, at a minimum 30 m from top of bank.
- Excavated soil stockpiles are to be covered (e.g., by plastic or geotextile) when left for more than 24 hours or at any time during inclement weather.
- Sediment traps may be required to prevent sediment-laden waters from leaving the site. These may be constructed using sand bags, gravel-berms, hay bales, filter cloth and drain rock-berms or equivalent. Sediment traps will be cleaned out on a regular basis and at completion of the work.
- Pumps may be required to remove sediment-laden water from the site, as necessary, to prevent contaminated water from entering watercourses.
- If needed, silt fencing will be placed along the edges of areas where soils are exposed until completion of investigation activities. Silt fences will follow the contour as much as possible.
- Sediment control measures, such as plastic silt fencing, will be removed in their entirety when no longer required.
- During the course of work, the Contractors and EM will inspect and maintain soil erosion and sediment control measures to ensure that sediment-laden water does not leave the site.
- Surface water runoff from excavations, work areas and other operations will not be discharged directly into the Marine Water environment unless they meet the water quality criteria.

Additionally, the following mitigation measures will be implemented:

- Transfer drill cuttings and used drilling fluids into sealed barrels for transport and disposal at a designated facility.
- Should material be suspected to be contaminated (through visual inspection or by smell), notify the EM immediately and isolate the suspected material (on a tarp or bagged) for testing.
- Following drilling and at the end of each day, debris associated with the drill program will be removed and the site left in a clean and tidy condition. Surface conditions along access routes and in work areas will be restored.
- Schedule operations to avoid wet, windy and rainy periods or very dry periods that may increase erosion and sedimentation or make unpaved surfaces susceptible to damage.
- Install erosion and sediment controls during wet, windy and rainy periods or as required to prevent the release of sediment-laden water or other deleterious substances from the drilling program into surface waters.

- Install erosion and sediment control measures in advance of Work within 15 m of waterbodies, including wetlands.
- Use erosion and sediment control products made of 100% biodegradable materials (e.g., jute, sisal or coir fiber).
- If hay or straw is contemplated for erosion and sediment control, obtain approval of this use from appropriate authorities (e.g., Port of Vancouver) to ensure no issues with wildlife. Products must be certified weed-free, where available. Cover any stockpiled material with heavy-duty plastic or filter cloth to prevent erosion during inclement weather (e.g., winter conditions, heavy rain).
- Control all drilling fluids/wastes and sediment-laden water such that there is no release to the environment.

Should topsoil be required to dress disturbed areas, contact project team to confirm specifications for topsoil.

6.0 Groundwater Management

Groundwater may be encountered during operations. If groundwater is encountered, ConeTec will prevent discharge from work areas and other operations entering directly into the aquatic and Marine Water environment, including surface drainage watercourse with the use of secondary containment. For each drilling location, the EM will review the existing drainage conditions around the location and discuss implementation and/or modifications to the surface drainage control measures. Drilling is not to commence until appropriate mitigation measures are implemented.

7.0 General Environmental Protection and Mitigation

To minimize environmental impacts:

1. ConeTec will confirm all staff know how to properly install any protection measures and understand BMPs used for the work. Improperly installed measures do not perform their intended functions and subsequently do not provide environmental protection.
2. Site Supervisors should be prepared to change existing measures and BMPs should they fail, or if additional measures are required. The EM should be notified of any changes to ensure they are adequate and installed properly.
3. All work with the potential for spills of oil or fuel will be done within suitable containment;
4. The Site Supervisors and/or the EM will be in attendance at all times during high-risk operations such as fueling equipment or handling and disposal of hazardous waste so that this work can be immediately shut down in an emergency situation;
5. Leaks and spills will be promptly stopped at their source and all residues will be cleaned up and disposed of in an appropriate manner and

6. The work site will be clean of waste and other construction related equipment to the satisfaction of ConeTec and the EM prior to the contractor leaving the construction site.
7. Ensure the borehole surface and any surrounding area is to be returned as closely as possible to original condition.

8.0 Waste Management

Waste materials will be removed and disposed of in accordance with BC Environmental Management Act, BC Hazardous Waste Regulation, and Transportation of Dangerous Goods Act and Regulations. All activities will be conducted in an environmentally responsible manner in accordance with Tetra Tech and ConeTec's Environmental Policy.

The following steps will be implemented:

- Ensure that an adequate number of appropriate waste containers are available;
- Designate a safe area for temporary waste storage with adequate containment, secure and protected from weather and vandalism until removal and disposal can be arranged;
- Categorize and label all waste materials appropriately. Sampling and analysis of waste materials may be required to determine the appropriate disposal option;
- Check to ensure that Hazardous Waste registration, storage, permit and transportation requirements are met, if applicable;
- Remove all waste materials from the site as soon as possible in accordance with all applicable standards and regulations;
- Contact the EM in the event a wild animal is found trapped on-site or has taken up residence therein, **and will not leave "willingly"**;
- Hazardous/Contaminated soils will be assessed and disposed of at an approved facility.

8.1 General Wastes

The Site Manager and ConeTec will maintain a neat and tidy work site. Garbage bags will be located on site, with their contents disposed of regularly. The following measures will be carried out for the collection and disposal of general wastes (wood, paper, metals, plastics, etc.):

- Ensure an adequate number of appropriate waste bags are available;
- Designate a safe area for temporary waste storage with adequate containment, secure and protected from weather and vandalism until removal and disposal can be arranged;
- Categorized and label all waste materials appropriately. Sampling and analysis of waste materials may be required to determine the appropriate disposal option;

- Check to ensure that hazardous waste registration, storage, permit and transportation requirements are met, if applicable; and
- Remove all waste materials from the site as soon as possible in accordance with all applicable standards and regulations.

Non-hazardous waste may be disposed of at authorized landfills.

8.2 Hazardous Waste Materials Management

It is ConeTec's responsibility to determine whether waste generated or encountered in the course of the investigation activities is hazardous in nature. Hazardous materials include:

- "Dangerous Goods" as defined under the [Transportation of Dangerous Goods Act](#)"
- "Controlled Products" as defined under the [Transportation of Dangerous Goods Act](#);
- "Hazardous Waste" as defined [under the Hazardous Waste Regulation of the Environmental Management Act](#)'

ConeTec's operations require the use of equipment which requires fuels, lubrication oils and hydraulic fluids. The mitigation of these compounds either from spills during operations or later through seepage from saturated soils can negatively impact both the terrestrial and aquatic environments. Hazardous materials encountered during investigation activities may include, but are not limited to asbestos, fuel, oils, greases, lubricants, solvents, dust suppressants, batteries, polychlorinated bisphenyls (PCBs), paints used spill cleanup materials, soils contaminated by petroleum products or chemicals, and treated wood waste.

- Site personnel will be adequately trained in handling and transportation of "Dangerous Goods" and "Controlled Products";
- Material Safety Data Sheets (MSDS) for hazardous materials used during the investigation will be made available by ConeTec
- Hazardous materials will be stored and handled to minimize loss and allow containment and recovery in the event of a spill
- Suspected hazardous materials used or generated in the course of the investigation activities will be disposed of in compliance with applicable legislations and regulations

8.3 Food and Sanitary Waste

The following measures will be carried out by ConeTec;

- ConeTec food waste and domestic garbage will be collected daily from work access areas, and will be disposed of in an appropriate manner; and

- Temporary sanitary facilities in the form of portable toilets will be provided for the use of workers. Sanitary facilities will be secured so they do not fall over and will be located at least 30 m from top of bank of water-bodies.

9.0 Oil and Fuel

Spills and leaks of oils and fuels can adversely affect terrestrial and aquatic environments if not managed properly. In addition to absorbent materials required to cleanup drips, leaks and minor spills, a fully stocked spill kit must be located on site to deal with any emergency spill situations.

Spill kits shall be easily available where oil and fuel filled equipment will be working, and staff and contractors on site will be trained in the proper use of spill kits. Due to the risk of spill and fire, fuels and/or other petroleum or combustible products will not be stored in any large quantity on site if possible. If it is necessary to store fuels on site during water operations, appropriate double walled storage containers will be used, and all containers will be placed inside appropriate environmental protection berms.

The following procedures will be utilized to reduce the risk and the impact of spills:

- Implement the spill prevention and emergency response measures;
- Inspect all machinery for leaks or worn hoses, fittings, etc., daily throughout the course of the work. Make repairs to hoses and fittings and equipment prior to arriving onto the site;
- Place oil sorbent sheets and/or containers under vehicles and equipment parked in high risk areas (i.e., adjacent to riparian area) for longer than 2 hours or immediately under any vehicle or equipment that is leaking or located over a watercourse.
- Provide adequate containment for fuel and oil products and ensure that all containers are properly labeled according to WHMIS and TDG requirements;
- Ensure that all fuel and oil handling and on-site storage meets the requirements of BC Fire Code (1998) and the BC Summary of Environmental Standards for Fuel Handling Transportation and Storage (2nd Edition);
- Ensure that any employees and/or contractors fueling equipment understand the environmental risks of the area, are equipped with adequate spill prevention and response equipment/supplies, have appropriate training, and are following fueling practices deemed acceptable by Tetra Tech and ConeTec / Mud Bay Drilling;
- Ensure that all fuel vehicles are parked only in designated areas on site with brakes applied and wheels chocked;
- Vehicle and equipment refuelling will be done at least 30 m from any waterway, including drainage ditches;
- During fuel transfers from tanker trucks to equipment, all drains and hatchways between the truck and receiving tank will be covered with a neoprene mat or a tarp, all hose connections will be wrapped with sorbent material, and a

representative from the Contractor must be in attendance to monitor the entire operation; and

- Locate emergency spill response kits in accessible areas where oil filled equipment will be working and provide additional spill response materials in sufficient quantities on site to catch drips, minor leaks and spills (minimum spill kit contents are found at the end of this document). Note: the spill response kits should only be used in the event of a spill incident and not for day to day equipment/tool management.

10.0 Vehicles and Equipment

The following requirements relate to the use of vehicles and equipment:

- Vehicle and equipment refueling or servicing (including fluid changes such as oil, coolant, or hydraulic fluid) shall be undertaken in such a way that contaminants do not enter any drainage, groundwater or water bodies;
- All vehicles and equipment placement on site including fuel containment areas, parking areas, etc., will be finalized and approved in the pre-job meeting based on discussion between client representatives and the EM.
- Vehicle idling shall be kept to a minimum and any equipment not in use for an extended period of time will be shut off.
- Vehicles and equipment are to be well maintained and only operated by experienced and trained personnel;
- All daily inspection documents will be kept onsite during the drilling program;
- Any equipment (including pumps) within 30m of creeks/streams will be placed in secondary spill containment to reduce the chance of contamination.
- A crew member is to remain in attendance while refueling is being carried out. Refueling of equipment and refueling of small field containers will be carried out a minimum of 30 m from any water way if possible;
- Small portable equipment (e.g. pumps and generators) and fuel containers will be placed inside spills trays or containment at least 1.5 times the fluid volume capacity
- Machinery shall be free of excess oil and grease and be in good mechanical order. Equipment is to be inspected daily, checking that it is leak free. Any leaks should be contained immediately and the appropriate repairs undertaken to remedy the leak
- Spill kits, and personnel trained in their deployment and use, must be onsite when work is taking place. Spill response protocols must be posted onsite. Further details are contained in the Spill Prevention and Emergency Response section of this document

The Emergency Response and Spill Prevention protocols will be communicated to field crews at the start of work.

11.0 Spill Prevention and Emergency Response

Spills of petroleum and non-petroleum contaminants can occur through improper handling and disposal of these products. To prevent environmental contamination, this Spill Prevention and Emergency Response protocol has been developed. This protocol includes aspects of:

- Petroleum products transportation, storage, use and disposal;
- Other non-petroleum materials that are considered environmental contaminants and therefore risks;
- Equipment maintained to reduce risks of spills.

11.1 Spill Prevention

The following spill prevention measures will be carried out by ConeTec:

- Storage, including temporary storage, of tanks, barrels, and containers greater than 23 L (5 Gallons), containing hydrocarbon products will be within impermeable containment berms;
- Operation of the storage area(s) will be such that the containment system remains effective during wet weather;
- Containers used to carry petroleum products will be designed for that purpose, and will not be more than 5 years old;
- Containers will be leak free, and will be sealed with proper fitting cap or lid;
- Containers will be labeled according to Transportation of Dangerous Goods Act regulations;
- Containers that are 23 liters (5 Gallons) or less will be stored and transported in an equipment box of a vehicle that can contain the total quantity of fuel in the container(s) should they leak or spill;
- Refueling of equipment and refilling of small field containers will be carried out a minimum of 30m from water bodies or drainage ditches if possible; if not possible, a small portable containment berm will be placed under the fueling area and absorbent pads will be on hand for drips.
- Vehicles and equipment, including their hydraulic fittings, will be inspected daily for maintenance issues or leaks;
- All vehicles brought on site will contain a spill kit appropriate for the vehicle type;
- Waste materials will be securely stored to prevent leakage

11.2 Emergency Spill Response

This protocol contains the procedures to facilitate rapid deployment of resources in the event of a spill and minimize the impact and risk to the environment, the public and personnel on the jobsite. The spill response protocol contains emergency contact information and will remain on site for the duration of the project.

Fire extinguishers and other emergency response equipment and supplies must be kept in a known and visible locations and access to them will not be blocked by other materials or equipment. A list of emergency contacts will be posted at pre-determined, accessible and visible locations, as well as kept with the emergency response equipment. The locations of such equipment will be made known during site orientations as locations may vary or change as Project progresses.

ConeTec will follow and implement the Spill Response Protocol outlined below in the event of a spill of petroleum or other hazardous material. The Environmental Monitor will inspect, evaluate, and ensure compliance with the implementation of the Spill Prevention and Emergency Response protocol.

Spill Response Protocol

If a spill of fuels, oils, unmixed cement, lubricants or other harmful substances occurs, the following procedures will be implemented.

Spill Response Steps

- Ensure Safety
- Stop the Flow (when possible)
- Secure the area
- Contain the spill
- Notify/Report
- Clean up

Circumstances may dictate another sequence of events

Ensure Safety

- Ensure personal/public, electrical and environmental safety;
- Wear appropriate PPE;
- Never rush in, always determine the product spilled before taking action;
- Warn people in immediate vicinity;
- Ensure no ignition sources if spill is of flammable material.

Stop the Flow (when possible to do so)

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

Secure the Area

- Limit access to spill area;
- Prevent unauthorized entry onto the site.

Contain the Spill

- Block off and protect drains and culverts;
- Deploy spill boom
- Prevent spilled material from entering drainage structures (ditches, culverts, drains);
- Use spill sorbent material to contain the spill;
- If Necessary, use a dyke or any other method to prevent any discharge on site;
- Make every effort to minimize contamination.

Notify/Report

- For all spills, regardless of spill volume, within 24 hours of discovery, notify ConeTec's Health, Safety and Environment Manager or Operations Manager of the incident (provide spill details); and complete a ConeTec Incident Report.
- Notify Environmental Monitor and Client Supervisor.
- Provide necessary spill details to the Client. All external reporting will be conducted by the Client.

Clean-Up

- Determine clean-up options;
- Replenish spill response kits and equipment

12.0 Wildlife Protection

12.1 Wildlife Resource Protection

ConeTec shall minimize disturbances to wildlife and habitat resources during the investigation activities. ConeTec should remain vigilant for the presence of wildlife prior to, and during investigation activities.

[The Canadian Migratory Birds Convention Act](#) prohibits "The taking of nests or eggs of migratory, game, or insectivorous or non-game bird". Under the Migratory Birds Convention Act, it is an offence to "kill, capture, injure, take or disturb migratory birds, or damage, destroy, remove, or disturb their nests". [The Wildlife Act](#) (if applicable; for wildlife not managed under federal legislation) makes it an offence to "destroy nests occupied by a bird, its eggs or its young or the nests of eagles, peregrine falcons, gyrfalcons, ospreys, herons or burrowing owls".

If nesting is occurring, then appropriate setbacks and buffers for disturbance will be applied, as determined by provincial BMPs (typically 25-30 m from songbirds nests; typically greater than 50 m setbacks from raptor and heron nests).

Additional considerations are summarized below:

- Where a wildlife residence or bird nest is suspected, within or adjacent to the work area notify the EM and a specific assessment will be conducted by the QEP to determine activity and appropriate mitigation required. Should a potential active wildlife residence or nest be identified, site-specific measures will be established. This will likely involve avoidance of disturbance until the residence or nest has been vacated by the occupant.
- Avoid geotechnical investigation activities in the vicinity of raptor nests. If a stick nest is observed it should be reported to the EM.

- Retain vegetation where possible, especially trees and shrubbery which serve as a source of food and habitat.
- Clearly mark, cover or fence boreholes left unattended to reduce the potential for wildlife injury.
- Wildlife shall not be approached or harassed in any way (e.g., feeding, baiting, luring).
- Secure all materials that might attract wildlife (e.g., petroleum products, human food, recyclable food and drink containers and garbage).
- ConeTec Mud Bay will ensure that on site workers receive any required wildlife awareness training.

12.2 Access Management

Wildlife habitat in the investigation areas should be protected where possible through minimization of new access. Measures to reduce access include:

- Minimize travel to and from work areas by increasing work effort over reduced time periods, leaving heavy equipment on site, and using a transport vehicle to bring employees to site, or other actions to reduce travel to and from the Project area.
- Minimize disturbance by remaining within the investigation footprint
- When using water from the Ocean / Marine environment for drilling purposes, all pump systems shall be equipped with suitable fish screening to eliminate risk to local fish habitat.

13.0 Noise, Air Quality, and Lighting Management

13.1 Noise Control

ConeTec will act reasonably to minimize noise. ConeTec will take steps to maintain mufflers in good working order to meet their warranted operating efficiency.

Estimated Noise levels (Actual noise levels will depend on site conditions)

MDXL drill rig ~ 85 dB

M7 drill rig ~ 85 dB

M5T drill rig ~ 85 dB

To mitigate noise effects on nearby receptors, the following mitigation options will be implemented if required:

- Installing temporary noise barriers (e.g. plywood barrier)
- Maintaining drilling equipment in good working order to limit generated noise

- Conducting noise measurements to clarify impacts (provided by EM)
- Taking additional measures as required in response to public inquiries or complaints

13.2 Air Quality

Construction equipment and processes that generally result in non-fugitive emissions include drills, cranes, generators and marine vessels. BMPs used to mitigate adverse air quality effects from construction include but are not limited to:

- Implement a vehicle/equipment anti-idling policy for construction equipment and vehicles;
- Make use of legislated best available technologies and practices to reduce emissions;
- Minimize cold starts and operate equipment at and within load tolerances and ratings;
- Maintain all equipment in good working order, especially the exhaust system; and
- Perform routine checks of all equipment to identify actual or potential deficiencies (daily visual inspection by operator, 500hr preventative maintenance performed by maintenance department). Correct deficiencies corrected within a reasonable time frame (usually within a week but depending on characteristics of the deficiency).

13.3 Lighting

Geotechnical site investigations will take place largely during daylight hours. However, if work is done outside of daylight hours, night-time lighting will be directed as feasible (without compromising worker safety) away from private residences. Additionally, the lighting configuration will be reviewed by the Geotechnical Site Manager and the EM to determine whether there could be adverse effects on residents and whether additional mitigation measures are necessary.

14.0 Fire Prevention

ConeTec is required to meet the legal requirements of [the Wildfire Act](#). ConeTec will implement the following measures and procedures to prevent the possibility of fires:

- ConeTec shall provide adequate firefighting and suppression equipment. Firefighting equipment is to be inspected on a regular basis and maintained at the required level. Fire prevention measures will be communicated to work crews in daily tailgate sessions;
- No open fires or burning will be permitted;

All ConeTec employees are trained in the use of Class ABC fire extinguishers. The correct number and size of fire extinguishers are kept on Mud Bay sites as per the appendix in the OH&S/OSHA regulations. If a worker believes he can extinguish the fire himself safely in a timely manner, he may do so. Otherwise seek assistance, secure the area, and evacuate to a safe designated area. Emergency procedures and evacuation routes are discussed before every job during the morning tailgate meeting.

After calling appropriate emergency personnel, should evacuation be necessary, all staff will gather at the muster point if possible to account for onsite personnel. Once accounted for all staff will evacuate using work vehicles along the planned escape route.

15.0 Restoration of Disturbed Areas

ConeTec shall make all reasonable efforts to minimize the areas of disturbance to soils. Areas disturbed during the work shall be restored to a stable condition that conforms to the surrounding terrain in terms of both physical makeup and vegetation. Other general restoration requirements include:

- Removal of surplus materials and wastes from the worksites; and
- Re-contouring of disturbed areas to their original condition, wherever possible.

16.0 Potential Site Environmental Impacts and Mitigation

ISSUE	Potential IMPACT	MITIGATION
Aquatic habitat	Discharge of suspended solids to nearby watercourse	-Limit the amount of exposed soils, waste water and drilling mud during drilling -isolate work site from the watercourse using gravel berms, filter cloth and silt screen fencing -Pump return fluids from borehole annulus to suitable containment (drum or tote) -incident reporting procedures -spill reporting procedures
Soil Handling and Protection	-Discharge of suspended solids or waste water nearby watercourse after event of rain -Erosion	-Cover exposed soil/mud pit/waste water tanks with tarps or plastic if needed to prevent collection or rain water. - Solids immediately drummed upon return. _filter cloth or silt screen if needed.
Wildlife	Disturbance to of wildlife	-No impact anticipated if BMP's are followed

Fuel and oil handling and storage. Potential hydraulic oil leaks	Spills and/or leaks of fuel, lubricating oil, and coolants resulting in soil and/or water contamination	-Presence and use of proper spill kits -appropriate liquid storage -Incident and Spill reporting procedures -Spill response steps -Inspect equipment daily
Cement/grout handling	Wet cement is highly toxic to aquatic organisms	-no wash water shall be allowed to discharge to any creek or watercourse -remove excess concrete from site -isolate all cast in place concrete and grout from watercourses
Waste Protection	Improper transport and/or disposal of soil, waste water or drilling mud, contaminated soil, waste oil, contaminated sorbents resulting in soil and water contamination	-Spill and EAMP response and steps and procedures -Incident reporting procedures
Protection of Archaeological and Heritage resources	Disturbance or destruction of archaeological or heritage resources	-Not anticipated -stop work immediately if any heritage resources discovered -incident reporting procedures
Drill rig noise and air quality	Public disturbance from drilling activity -production of dust and exhaust emissions from operation of equipment	-adherence to Vancouver Fraser Port Authority noise requirements where applicable -Ensure equipment is in good working order -Inspect equipment daily

17.0 Vehicle emergency spill response kit contents

Table 5: Sill Response Kit

Spill Response Kit (Complete Kit)	
1 each	Oil Sorbent Roll (16 in x 115 in x 3/8 in)
1 each	Polyethylene Overpack Drum
5 each	Boom Socks
5 each	Oil Sorbent Pillows (12 in x 13 in)
50 each	Sorbent Pads (16 in x 20 in x 3/8)
1 each	Drain Cover (36 in x 36 in x 1/16 in)
2 each	8 Quart Cellulose Sorbent Material
1 roll	Barrier Ribbon, Red "Danger" Tape
5 each	Poly Disposal Bags (Clear)
1 each	Blank Labels for poly disposal bags
5 each	Plastic Bag Tie
1 lb	Plug and Dike Patties (Plug Compound)
1 each	Skill Kit Container Marked "Spill Response Kit"
2 pairs	Nitrile Gloves
1 each	Felt Marker, Box Labels
1 each	List of kit Contents

ATTENTION

** IMMEDIATE REPLACEMENT OF ANY CONTENTS USED IS ESSENTIAL **

18.0 Emergency/ Non-Emergency Contact List

Emergency Numbers	#
Canadian Coast Guard	(800) 567-5111
Air or Marine Emergency	(800) 567-6111
Marine Pollution- Incident Report	1-800-889-8852
Environment and Climate Change Canada	
Emergency Reporting-Oil or Chemical Spills-24hrs	(604) 666-6100
Other	
Food Poisoning and Food Safety	(604) 666-3350
Rescue Co-Ordination Centre	(800) 567-6111
Weather Information	
Weather One on One Marine	(900) 565-6565
Workplace Health and Safety	(800)263-8466
Forest Fire Reporting	(800) 663-5555
Power Outages and Emergencies	(888) 769-3766
RCMP Coastal Watch	(888) 855-6655
Fisheries and Oceans Canada	(604) 666-3500
Non-Emergency Numbers	#
Provincial Conservation Office Service	(604) 582-5200
ConeTec / Mud Bay Drilling Emergency Contacts	#
TBD	TBD
Tetra Tech	#
TBD	TBD
Industry Emergency Contacts	#
B.C One Call	1-800-474-6886
Emergency	911
B.C Hydro	1-800-224-9376
Fortis BC	1-800-663-9911
ICBC	1-800-910-4222
Toll Free	1-800-910-4222
Other	
WorkSafeBC	1-800-621-7233
Telus	1-800-663-0333

*Contact information will be updated each time personnel or contact information changes.

