

Species at Risk and Invasive Species Assessments with Vegetation Overview Plan

Prepared for:

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ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
BEC	biogeoclimatic ecosystem classification
BC	British Columbia
CP	Canadian Pacific Railway Company
CWH	coastal western hemlock
EM	Environmental Monitor
Hemmera	Hemmera Envirochem Inc.
Project	Viterra-Cascadia Terminal Capacity Expansion Project
QEP	Qualified Environmental Professional
VFPA	Port Authority

SYMBOLS AND UNITS OF MEASURE

Symbol / Unit of Measure	Definition
°C	degrees Celsius
m	metre
km/h	kilometres per hour
m ²	square metres

1.0 INTRODUCTION

As part of the Vancouver Fraser Port Authority (Port Authority) Burrard Inlet Road and Rail Improvement Project, Canadian Pacific Railway Company (CP) is undertaking planning activities for Phase 4 of the Viterra Cascadia Terminal Capacity Expansion Project (Project) along the south shore of Burrard Inlet, east of the Second Narrows Bridge in Burnaby, British Columbia (BC) (**Figure 1-1**). As part of the expansion activities for the Project, CP is proposing to construct 1,500 metres (m) of new track between CP mileage marker 122.93 and 124.96.

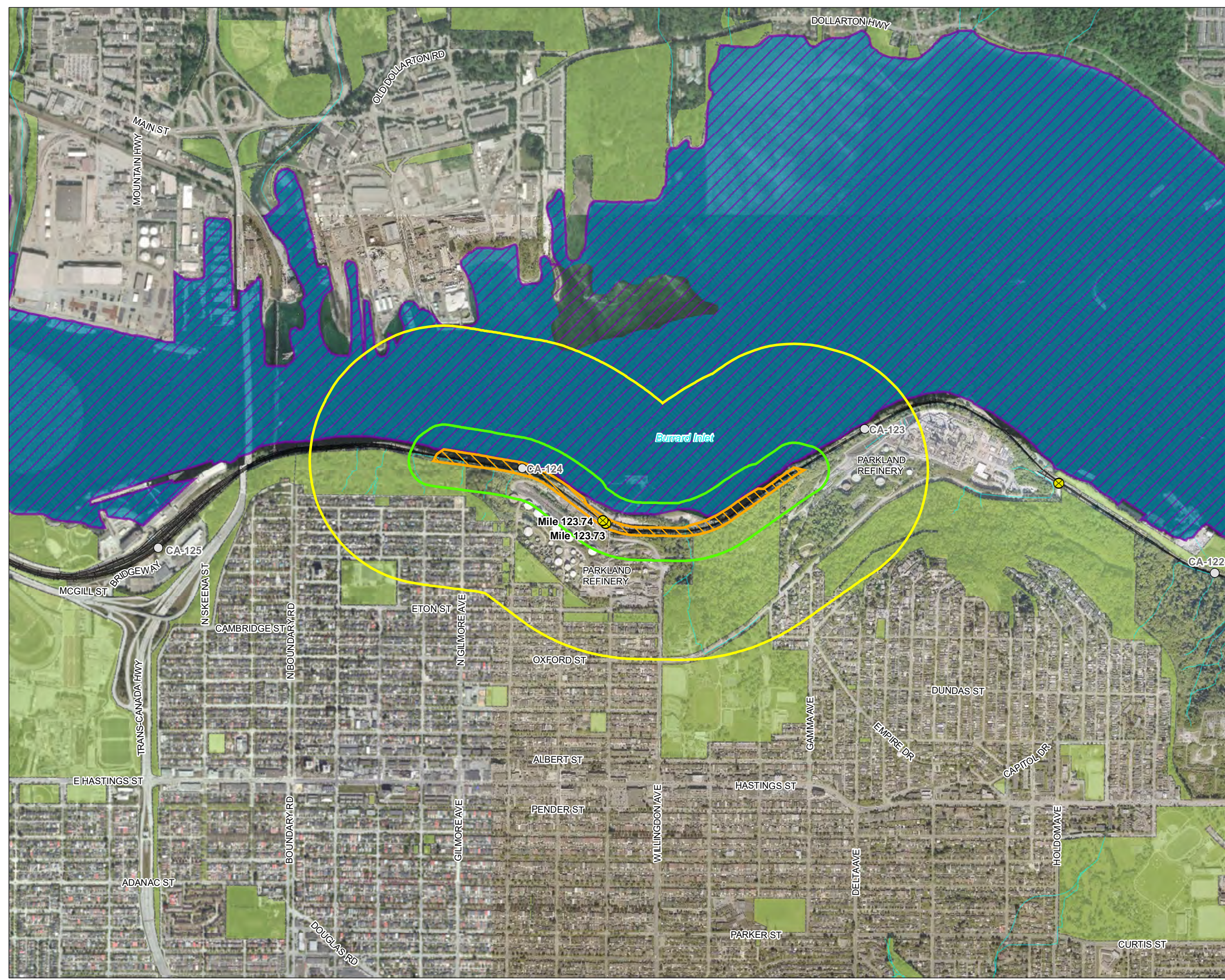
The Project will require approval from the Port Authority through its Project and Environmental Review process, as well as a lease with the Port Authority for the expanded track within their jurisdiction. This document has been developed to address the Project and Environmental Review mandated submission requirements.

On behalf of CP, Hemmera Envirochem Inc. (Hemmera), has developed this document, which outlines the following:

1. **Vegetation Plan**
 - a. Describe the topography, hydrology, and soil cover and quality.
 - b. Describe current vegetation types, characteristics, and relative abundance including native, listed, and invasive species.
 - c. Describe riparian vegetation removal and details as to proposed location, species, and ratio of replacement planting and include an adaptive vegetation management, monitoring, and control plan. Confirm locations and ratios with the Port Authority upon review of a complete application.
2. **Species at Risk Assessment**
 - a. Identify all federal and provincial listed species at risk associated with the Project.
 - b. Include a description of potential impacts and proposed mitigation strategies.
3. **Invasive Species Assessment**
 - a. Document existing invasive species types.
 - b. Develop a mitigation plan to prevent the spread of invasive species during construction.
 - c. Develop an invasive species monitoring and management plan.

This work was performed in accordance with a Supply of Services Agreement between Hemmera Envirochem Inc. (Hemmera), a wholly owned subsidiary of Ausenco Engineering Canada Inc. (Ausenco), and Canadian Pacific, dated May 24, 2017. This report has been prepared by Hemmera, based on fieldwork conducted by Hemmera, for the sole benefit and use by Canadian Pacific. In performing this work, Hemmera has relied in good faith on information provided by others and has assumed that the information provided by those individuals is both complete and accurate. This work was performed to current industry standard practice for similar environmental work within the relevant jurisdiction and same locale. The findings presented herein should be considered within the context of the scope of work and Project terms of reference; further, the findings are time sensitive and are considered valid only at the time the report was produced. The conclusions and recommendations contained in this report are based on the applicable guidelines, regulations, and legislation existing at the time the report was produced; any changes in the regulatory regime may alter the conclusions or recommendations.

**CP Cascadia East Extension
Pre-Engineering Assessment Areas**



Legend

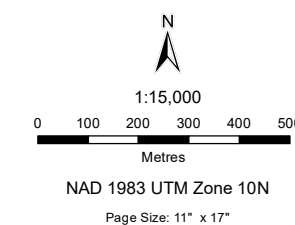
- Mile Marker
- ⊗ Crossing
- Railway
- ▨ Cascadia East Extension Pre-Engineering Impact Area (Boundaries are for discussion and will be refined with further design)
- ▭ Species at Risk Assessment Area
- ▭ Vegetation Assessment Area
- ▨ Important Bird Area - BC020: English Bay, Burrard Inlet & Howe Sound
- Marine Water
- Recreation, Open Space or Protected Natural Area

Notes

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

Sources

- Contains information licensed under the Open Government Licence - Government of British Columbia, City of Burnaby, Metro Vancouver.
- Important Bird Area: IBA Caanda, 2021
- Mile Markers and Crossings: CP, 2017
- Aerial Image: ESRI World Imagery
- Inset Basemap: ESRI World Topographic



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2.0 METHODS

This section presents a description of the methods used to conduct the vegetation and invasive species assessment and the species at risk assessment.

2.1 Vegetation and Invasive Species Assessment

A Hemmera Qualified Environmental Professional (QEP) reviewed available vegetation data sources (BC CDC 2021a, 2021b; E-Flora BC 2016; Government of British Columbia 2016) and previous work conducted in the area (Hemmera 2020a) within 100 m of the proposed Project area (**Figure 1-1**). The following biological and ecological characteristics were examined through a desk-based assessment:

- Biogeoclimatic ecosystem classification (BEC) zones and subzones
- Presence of federally identified critical habitat for plant species at risk
- Recorded occurrences of invasive plants
- Potential occurrences of at-risk plant species.

Information on BEC zone, old-growth management areas, federally identified critical habitat, and recorded occurrences of invasive plants from (DataBC 2021) was reviewed and compared against the geographic extent of the Project area.

2.2 Species at Risk Assessment

A Hemmera QEP examined wildlife occurrences within a 500 m buffer of the proposed Project area (**Figure 1-1**) using available data sources (BC CDC 2021a, 2021b; E-Flora BC 2016; Government of British Columbia 2016). The 500 m buffer was chosen to provide a conservative zone for identifying occurrence records of wildlife species at risk, especially highly mobile species such as birds. Relevant data were downloaded from (DataBC 2021) and other sources and compared spatially to the geographic extent of the Project area. The following records and features were examined and identified, after confirming their occurrence within the Project area:

- Federally identified critical habitat for species at risk (posted and proposed)
- Wildlife habitat areas
- Wildlife management areas
- Important Bird Areas
- Occurrence records of provincially Red- and Blue-listed species, and *Species at Risk Act*, SC 2002, c. 29 (SARA) listed species
- Species or habitat features afforded protection under the BC *Wildlife Act*, RSBC 1996, c. 488 (*Wildlife Act*), including documented nest occurrences of bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*), or great blue heron (*Ardea herodias fannini*) (historic or recently used).

The Project is located within the Coastal Western Hemlock BEC zone, specifically within the Dry Maritime subzone. To determine the potential presence of at-risk species, Hemmera conducted a query of the BC Conservation Data Centre Species and Ecosystem Explorer for the BC Environment Region 2 (Lower Mainland) and the coastal western hemlock (CWH) BEC zones to identify at-risk vegetation and wildlife species with the potential to occur in the Project area. From this query, Hemmera developed a comprehensive list of at-risk species known to occur in both BC ENV Region 2 or the CWH BEC zone. The

list included all provincially Red- and Blue-listed species and SARA-listed species (i.e., special concern, threatened, or endangered under Schedule 1). Red-listed species are species at risk of being lost (Extirpated, Endangered, Threatened) and Blue-listed species are species of special concern. Bird species whose nests are afforded year-round protection under section 34b of the *Wildlife Act* were also added to the list (**Table 4-1**).

3.0 VEGETATION PLAN

Due to the Project’s perpendicular location along the south shore of the Burrard Inlet, a significant portion of the Project footprint includes subtidal and intertidal zones. Totalling approximately 20,000 square metres (m²) of vegetated area, the intertidal zone is primarily rocky and transitions up to a steep rip-rap embankment, leading to approximately 10 m to 15 m of patchy riparian vegetation that borders the gravel bed of the 2 existing operational rail lines. The Project’s marine fish and fish habitat assessment (Hemmera 2020b) describes baseline conditions, potential effects (i.e., serious residual harm to fish), and recommended avoidance, mitigation measures, and monitoring for the core Project (i.e., placement of fill to widen the existing CP rail embankment).

The Project area includes the southern extent of the existing rail and rail right-of-way. The topography is relatively flat with sub-ballast and rail infrastructure as ground cover. Moving north and once beyond the rail right-of-way, a gentle, sloped, vegetated track of land (approximately 10 m to 15 m in width) consists of low-lying vegetation and a mature copse of trees. The soil generally consists of organics with sub-ballast and rip rap horizons below a decomposing leaf litter layer. Once beyond the vegetation, the embankment topography is steep toward the inlet with no vegetation nor any visible soil.

Vegetation within the Project area consists of predominantly mixed salmonberry (*Rubus spectabilis*) and Himalayan blackberry (*Rubus armeniacus*). Larger trees found throughout the area include red alder (*Alnus rubra*), western hemlock (*Tsuga heterophylla*), black cottonwood (*Populus trichocarpa*), and bigleaf maple (*Acer macrophyllum*) (Hemmera 2020a).

Table 3-1 lists plant species previously detected in the area during an aquatic effects assessment within the Project’s riparian areas (Hemmera 2020a). A desktop review was also conducted, but information is limited within the provincial and federal database (BC CDC 2021b; Government of British Columbia 2016; E-Flora BC 2016). A vegetation inventory of the Project area would be necessary to gather additional information on current vegetation types, characteristics, and relative abundance. A pre-construction site survey is planned for the summer of 2021 during the peak growth season.

Table 3-1 Species of Plants Recorded within the Project Area

Common Name	Species Name
American mountain ash	<i>Sorbus americana</i>
Aster	<i>Aster sp.</i>
Big leaf maple	<i>Acer macrophyllum</i>
Black cottonwood	<i>Populus trichocarpa</i>
Black medick	<i>Medicago lupulina</i>
Cherry laurel	<i>Prunus laurocerasus</i>
Common horsetail	<i>Equisetum arvense</i>

Common Name	Species Name
Common scotch broom	<i>Cytisus scoparius</i>
Deer fern	<i>Blechnum spicant</i>
Douglas maple	<i>Acer glabrum</i>
English ivy	<i>Hedera helix</i>
Goatsbeard	<i>Aruncus dioicus</i>
Himalayan balsam	<i>Impatiens glandulifera</i>
Himalayan blackberry	<i>Rubus armeniacus</i>
Large bindweed	<i>Convolvulus sepium</i>
Large vetch	<i>Vicia gigantea</i>
Nipplewort	<i>Lupsana communis</i>
Oak	<i>Quercus sp.</i>
Osoberry	<i>Omeleria cerasiformis</i>
Paper birch	<i>Betula papyrifera</i>
Perennial sow thistle	<i>Sonchus arvensis</i>
Purple fox glove	<i>Digitalis purpurea</i>
Red alder	<i>Alnus rubra</i>
Red berried elder	<i>Sambucus racemosa</i>
Red huckleberry	<i>Vaccinium parviflorum</i>
Rugose rose	<i>Rosa rugosa</i>
Salmonberry	<i>Rubus spectabilis</i>
Silverweed	<i>Argentina anserina</i>
Stinging nettle	<i>Urtica dioica</i>
Stink current	<i>Ribes bracteosum</i>)
Sweet vernal grass	<i>Anthoxanthum odoratum</i>
Sword fern	<i>Polystichum munitum</i>
Thimbleberry	<i>Rubus parviflorus</i>
Wall lettuce	<i>Mycelis muralis</i>
Western hemlock	<i>Tsuga heterophylla</i>
Western red cedar	<i>Thuja plicata</i>
Willow	<i>Salix sp.</i>

Project-related site preparation and construction activities can affect an area of approximately 20,000 m² of vegetation (plants and plant communities) in the Project area. The potential effects are related to vegetation clearing and compaction and damage caused by equipment and personnel during work activities associated with reconfiguration of existing tracks, construction of the new track extension, and construction of facilities and control points associated with the new tracks. Vegetation on the north side of the tracks along the shore (approximately 15,000 m²) will be removed. A detailed offsetting plan can be found under a different cover. **Section 5.0** provides detailed information on invasive species in the Project area, along with mitigation, monitoring, and a management plan.

4.0 SPECIES AT RISK ASSESSMENT

Project activities have the potential to interact with species at risk within and near the Project area. Hemmera conducted desktop research to assess the presence of all federal and provincial at-risk species and those protected under the *Wildlife Act* in the Project area. This section presents the results of the survey and assessment of species at risk and provides mitigation strategies for amphibians, reptiles, and turtles, as well as birds, terrestrial mammals, and marine mammals.

4.1 Existing Species at Risk

From the desktop research, 110 species were identified; however, suitable habitat at or near the Project area potentially exists for only 27 of the 110 species identified: 14 birds, 9 mammals, 3 amphibians, 1 snake, and 1 turtle (**Table 4-1**).

Critical habitat is defined under section 2 of SARA as: “the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species’ critical habitat in the recovery strategy or in an action plan for the species...” Section 49(1)(a) of SARA requires that a species’ Recovery Strategy/Action Plan include identification of the species’ critical habitat to the extent possible based on the best available information, including information provided by the Committee on the Status of Endangered Wildlife in Canada. Under SARA it is illegal to destroy any part of the mapped critical habitat of species at risk, and restrictions on development and construction may be imposed. No mapped critical habitat was found during the desktop research within and around 500 m of the Project area.

The species at risk identified during the desktop research (**Table 4-1**) face an elevated risk due to their rare occurrence and often specific habitat requirements. Most of these species are not expected to be affected by Project activities, however, due to their habitat preferences differing from most of the habitat located within the work area. The species at risk with a moderate to high potential to occur within the Project area are summarized in **Table 4-1**, including their habitat needs and potential impacts and interaction with Project activities.

Bald eagle, band-tailed pigeon (*Patagioenas fasciata*), common nighthawk (*Chordeiles minor*), great blue heron, and olive-sided flycatcher (*Contopus cooperi*) are species with a moderate to high likelihood of occurring within the Project area (**Figure 1-1, Table 4-1**). While these species may use the Project area for perching or foraging, there is no suitable nesting habitat reported on site, especially since the proposed Project involves expanding existing linear infrastructure. However, vegetation clearing and potential sensory disturbance from work activities could impact these species and other nesting birds. Additionally, potential nesting habitat can occur in the forested area upslope of the current railroad, adjacent to the Project area. Therefore, nest surveys are recommended prior to the start of construction activities. Also, vegetation clearing should be scheduled outside the nesting period (March 25 to August 18) to minimize the potential impact on nesting birds (see **Section 4.2.2** for detailed mitigation plan). If vegetation clearing must occur within the nesting period, a pre-clearing survey must be completed within 5 days of work beginning.

Nine listed mammal species, including marine and terrestrial species (**Table 4-1**), may occur near the Project area. These species are provincially Blue- or Red-listed or listed as threatened or endangered under SARA, (Government of Canada 2020; BC CDC 2021a).

Southern resident killer whale (*Orcinus orca pop. 5*) occasionally occurs in the Burrard Inlet to forage; however, this species is unlikely to use the shallow subtidal and intertidal areas of the Project area as hunting generally occurs in more open, deeper waters where salmon, the prey of choice, is most abundant.

Little brown myotis (*Myotis lucifugus*) and Townsend's big-eared bat (*Corynorhinus townsendii*) have moderate to high likelihood of occurring over the Project area while foraging for insects; however, they are anticipated to avoid interacting with Project equipment and will not be measurably affected by the Project activities. The forested area upslope from the tracks may contain potential roosting habitats for bats such as old or dying trees with signs of decay and cavities. Project activities are not expected to impact this forested area; however, sensory disturbance such as lights installed for night work and operations with heavy machinery could affect roosting and foraging behaviour, causing bats to abandon roosts within the forested area. A site inspection for potential roosting sites is recommended before Project work commences to identify potential roosting trees. **Section 4.2.3** provides detailed information on mitigation and management plan for mammals within the Project area.

Table 4-1 provides a summary of species at risk listed under Schedule 1 of SARA and Blue- and Red-listed species in BC that have potentially suitable habitat within and around the Project area.

Table 4-1 Species at Risk Potentially Occurring within the Project Site and Surrounding Areas

English name	Scientific name	BC list	SARA status	Potential to occur	Habitat suitability at site and potential impacts
Coastal tailed frog	<i>Ascaphus truei</i>	Yellow	Special Concern	Low	Project area within habitat range. Streams within the study area may provide suitable habitat. Occurs in drainages with catchment areas. Creeks draining these catchments usually display cascade or step-pool bedforms. Boulders and cobbles of these streams afford foraging sites for tadpoles and refugia for all life states. Tadpoles thrive best in basins with moderate levels of ruggedness and relief. Adults require older forests with stable moist microclimates and structural diversity. Potential impact if work is conducted within waterbodies or on riparian habitat (see Section 4.2.1 for mitigation and management plan).
Northern red-legged frog	<i>Rana aurora</i>	Blue	Special Concern	Low	Requires aquatic breeding and terrestrial foraging habitats, usually at low elevations (~500 m). Streams within the study area may provide suitable habitat. Lentic features (if present) should be checked for egg masses if construction work is happening. Potential impact if work is conducted within waterbodies or on riparian habitat (see Section 4.2.1 for mitigation and management plan).
Western toad	<i>Anaxyrus boreas</i>	Yellow	Special Concern	Low	Project area within habitat range. Streams within the study area may provide suitable habitat. Uses a wide variety of aquatic and upland habitats and breeds in a variety of wetlands including shallow, sandy margins of lakes, ponds, streams, river deltas, river backwaters, rivers, and estuaries. Potential impact if work is conducted within waterbodies or on riparian habitat (see Section 4.2.1 for mitigation and management plan).
Northern rubber boa	<i>Charina bottae</i>	Yellow	Special Concern	Low	Project area within habitat range but low suitable habitat. Inhabits woodlands, montane forests, and grasslands and is found in moist, sandy areas along rocky streams, preferring loose soil to burrow into and open habitats for thermoregulation. No anticipated direct impact from Project activities.
Painted turtle	<i>Chrysemys picta</i>	No Status	Endangered / Special Concern	Low	Project area within habitat range but low suitable habitat. Prefers margins and shallows of lakes and ponds, ditches, and sluggish streams with muddy bottoms and aquatic plants. Also requires nearby upland nesting areas without vegetation. No anticipated direct impact from Project activities.
Bald eagle	<i>Haliaeetus leucocephalus</i> <i>Haliaeetus</i>	Yellow	-	High	Project area within habitat range. Potential nesting and foraging habitat. Associated with aquatic habitats, especially estuaries and fjords along the coast and rivers, lakes, and reservoirs with forested shorelines. Uses large trees to build nests, which are typically re-used and enlarged every year. Most breed below 500 m of elevation. Potential sensory disturbance to nests (if present) in the forested area upland from the Project area. See Section 4.2.2 for mitigation and management plan.
Band-tailed pigeon	<i>Patagioenas fasciata</i>	Blue	Special Concern	High	Project area within habitat range. Potential habitat for foraging and breeding within the Project area. Nests on sturdy tree limbs in mid to upper canopy of mature coniferous trees in mature temperate forests. Potential sensory disturbance to nests (if present) in the forested area upland from the Project area. See Section 4.2.2 for mitigation and management plan.
Barn swallow	<i>Hirundo rustica</i>	Blue	Threatened	Low	Project area within habitat range, but low-quality habitat. Breeds in lowlands, valleys, and lower-elevation plateaus. Much more common in coastal than interior biogeoclimatic zones; occurs in open areas including agricultural land, lowland foreshores, floodplains, and alpine meadows. Nesting occurs on artificial structures (e.g. barns, bridges, porch doors) and natural locations like cliffs, steep embankments, and caves. No anticipated direct impact from Project activities.
Black swift	<i>Cypseloides niger</i>	Blue	Endangered	Low	Project area within habitat range, but low-quality habitat. Often forages at high altitude, flying over open country and forests in mountainous areas and lowland. Nests near or behind waterfalls and caves and sometimes on sea cliffs. Nest sites are characterized by presence of flowing water, high relief, inaccessibility, darkness, and unobstructed flight path. No anticipated direct impact from Project activities.
Common nighthawk	<i>Chordeiles minor</i>	Yellow	Special Concern	Moderate	Project area within habitat range. Potential nesting habitat along railroads and rocky areas. Common nighthawks require open areas for nesting habitat. Potential sensory and physical impact to nests within the Project area and surrounding open areas such as railroad, gravel bars, or beaches. See Section 4.2.2 for mitigation and management plan.
Great blue heron, fannini subspecies	<i>Ardea herodias fannini</i>	Blue	Special Concern	High	Project area within habitat range. Potential nesting habitat. Builds large conspicuous platform nests constructed within the upper canopy of deciduous and mature coniferous trees. Potential sensory disturbance to nests (if present) in the forested area upland from the Project area; see Section 4.2.2 for mitigation and management plan.
Northern goshawk, laingi subspecies	<i>Accipiter gentilis laingi</i>	Red	Threatened	Low	Project area within habitat range, but low-quality habitat. Prefers to breed in mature and old forests, particularly coniferous stands, but will also readily use trembling aspen groves, willow thickets, and mixed wood forests. Dry, coniferous forests tend to be preferred as nesting habitat. No anticipated direct impact from Project activities.
Olive-sided flycatcher	<i>Contopus cooperi</i>	Blue	Threatened	Moderate	Project area within habitat range, but low-quality habitat. The species reaches highest abundance in the Coastal Douglas-fir biogeoclimatic zone, but the core of the provincial population is in the spruce, hemlock, and Douglas-fir dominated biogeoclimatic zones at high elevations (between 1,250 m and 2,000 m). Potential sensory disturbance to nests (if present) in the forested area upland from the Project area. See Section 4.2.2 for mitigation and management plan.
Osprey	<i>Pandion haliaetus</i>	Yellow	-	Moderate	Project area within habitat range. Potential nesting and foraging habitat. Found near fresh or salt water, where large number of fish are present. Most common around major coastal estuaries and salt marshes; also found around large lakes, reservoirs, and rivers. Potential sensory disturbance to nests (if present) in the forested area upland from the Project area. See Section 4.2.2 for mitigation and management plan.

English name	Scientific name	BC list	SARA status	Potential to occur	Habitat suitability at site and potential impacts
Peregrine falcon	<i>Falco peregrinus</i>	-	Special Concern	Low	Project area within habitat range, but low suitable habitat. Mostly nests on cliffs ledges or crevices. No anticipated direct impact from Project activities.
Purple martin	<i>Progne subis</i>	Blue	-	Low	Project area within breeding range, but low suitable habitat. Most breeding occurs over water, clustered nest boxes on pilings in bays, major rivers, and estuaries. Natural nesting habitat occurs in cavities in snags close to water or in burned-over forest areas that have declined. No anticipated direct impact from Project activities.
Short-eared owl	<i>Asio flammeus</i>	Blue	Special Concern	Low	Project area within habitat range, but low-quality habitat. Prefers open areas such as grasslands, meadows in early succession, marshlands, sloughs, beaches, sedge fields, and previously forested areas that have been cleared. Wintering habitat includes marine foreshores, grasslands, and fallow fields with sufficient prey base and adequate roost sites. It has also been reported in suburban areas. No anticipated direct impact from Project activities.
Western Grebe	<i>Aechmophorus occidentalis</i>	Red	Special Concern	Low	Project area within habitat range, but low-quality habitat. Mostly restricted to low-elevation lakes in the dry Southern Interior, east to Creston. No anticipated direct impact from Project activities.
Western screech-owl, kennicottii subspecies	<i>Megascops kennicottii kennicottii</i>	Blue	Threatened	Low	Project area within habitat range, but low-quality habitat. Generalist in coastal forested habitats below 1,200 m (above sea level); however, general preference for riparian mixed wood and coniferous forested habitat with natural openings in mature forested ecosystems. Potential for nesting and foraging habitat in area around the site. No anticipated direct impact from Project activities.
Little brown myotis	<i>Myotis lucifugus</i>	Yellow	Special Concern	High	Project area within habitat range. Riparian areas, large trees, and anthropogenic structures in the area could provide suitable roosting and foraging habitat. Potential sensory disturbance to roosts (if present) in the forested area upland from the Project area. See Section 4.2.3 for mitigation and management plan.
Long-tailed weasel, altifrontalis subspecies	<i>Mustela frenata altifrontalis</i>	Red	-	Low	Project area within habitat range, but low suitable habitat. Found in open habitats, usually near water including shrub thickets, open woodlands, old-field and agricultural hedgerows, riparian areas, grasslands, swamps, and marshes. No anticipated direct impact from Project activities.
Pacific water shrew	<i>Sorex bendirii</i>	Red	Endangered	Low	Project within habitat range. Streams and riparian areas could provide suitable foraging and nesting habitat. Associated with skunk cabbage marshes, red alder riparian and stream habitats, and dense wet forests of western redcedar. Potential impact if work is conducted in a riparian areas or small waterbodies. See Section 4.2.3 for mitigation and management plan.
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	Blue	-	Low	Project area within habitat range, but low suitable habitat. Prefers regions that are relatively warm and dry in the summer. Will inhabit dry grasslands and coniferous and deciduous forests. Foraging habitat includes insect-rich riparian areas, wetlands, forest edges, and open woodland. Roosting habitat includes caves, old mines, and buildings. No anticipated direct impact from Project activities.
Trowbridge's shrew	<i>Sorex trowbridgii</i>	Blue	-	Low	Project area within habitat range, but low suitable habitat. Uses a wide variety of low-elevation coastal forest stands preferring habitats with dry, loose soil and deep litter that provide prey and other food sources. Also inhabit deciduous and mixed forests. No anticipated direct impact from Project activities.
Grey whale	<i>Eschrichtius robustus</i>	Blue	Special Concern	Moderate	Project area is within summer feeding grounds. Several sightings have been reported in the Burrard Inlet. No anticipated direct impact from Project activities.
Harbour porpoise	<i>Phocena phocena</i>	Blue	Special Concern	Moderate	Project within habitat range. Found in shallow regions, occupying coastal shelf waters less than 150 m deep with temperatures ranging between 6°C to 17°C, but also occupies deeper waters. No anticipated direct impact from Project activities.
Killer whale (southern resident population)	<i>Orcinus orca pop. 5.</i>	Red	Endangered	Moderate	Project within habitat range. Potential foraging habitat. Different distribution along the West Coast and shows different movements during the year, typically tied to the various runs of chinook and other salmon. No anticipated direct impact from Project activities.
Steller sea lion	<i>Eumetopias jubatus</i>	Blue	Endangered	Moderate	Project area within habitat range. Potential foraging and year-round haul-out habitat. Year-round haul-outs are widely distributed along the coast of BC. No anticipated direct impact from Project activities.

4.2 Mitigation Strategies

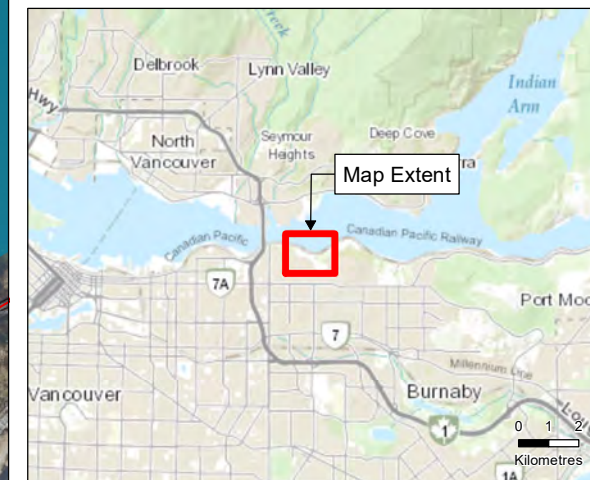
Minor impact to wildlife and their habitat is expected during Project activities (**Table 4-1**). However, some impacts are associated with potential habitat loss and physical injury or death of individuals. Therefore, the following mitigation steps are necessary to minimize these impacts.

- If any identified or previously unidentified species at risk or their potential habitat is encountered within the work area, immediately notify the Environmental Monitor (EM). All work in the immediate area will be suspended until an appropriate course of action has been determined.
- The EM will record the location of any species at risk encountered during construction activities in the daily monitoring report.
- Remove vegetation outside the potential nesting period (March 25 to August 18) to mitigate direct impacts on the nesting birds listed in **Table 4-1**.
- Where practical, retain adjacent old or dying trees with signs of decay and place conservation emphasis on those containing cavities greater than 3 inches in diameter.

4.2.1 Amphibians, Reptiles, and Turtles

During the desktop review, watercourses and their associated riparian areas were identified crossing the Project area (City of Burnaby 2020); these areas could provide suitable habitat for species at risk, such as northern red-legged frog (*Rana aurora*), western toad (*Anaxyrus boreas*), and coastal tailed frog (*Ascaphus truei*). However, no work is anticipated to be conducted along the watercourses. There will only be work to extend the existing 18 culverts (**Figure 4-1**), and it is unlikely that Project-related activities will interact with northern red-legged frog, western toad, and coastal tailed frog. Nonetheless, given the potential presence of these species in the area and the fact that culvert locations are associated with waterbodies, the EM should survey the work area before commencing work activities. Additionally, amphibian grates should be considered in the culvert extension design to provide habitat enhancement and protection to amphibians and reptiles within the Project area.

Culvert and Watercourses



Legend

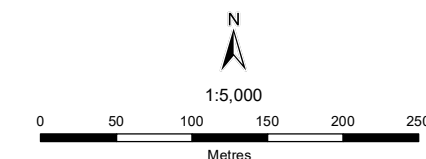
- Culvert
- Mile Marker
- X Crossing
- Proposed Track Extension
- Railway
- Watercourse
- Cascadia East Extension Pre-Engineering Impact Area (Boundaries are for discussion and will be refined with further design)
- Marine Water
- Recreation, Open Space or Protected Natural Area

Notes

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

Sources

- Contains information licensed under the Open Government Licence - Government of British Columbia, City of Burnaby, Metro Vancouver.
- Important Bird Area: IBA Caanda, 2021
- Mile Markers and Crossings: CP, 2017
- Aerial Image: City of Burnaby
- Inset Basemap: ESRI World Topographic



Path: S:\GIS\emissions\Projects\104703\101\mxd\fig_4-1_104703_01_Culverts_210324.mxd

4.2.2 Birds

The *Migratory Birds Convention Act, 1994*, SC 1994, c. 22, protects migratory bird species, including gamebirds, insectivorous birds, and non-gamebirds. This legislation restricts the possession of live and dead migratory birds and bird parts and prohibits the intentional or incidental take of migratory bird nests and the release of harmful substances in waters or areas frequented by migratory birds. The best management practices outlined for migratory birds (Parks Canada 2018) and provincial documentation [Develop with Care (Government of British Columbia 2014)] recommend tree and vegetation clearing outside the bird breeding period. While the breeding season for bird species varies by species, the nesting period in the Project area is considered to be from March 25 to August 28 (ECCC 2021) Vegetation clearing will be completed before the onset of the general federal bird breeding period (March 25).

The following are recommended mitigation measures to protect nesting birds if work is to be conducted within the breeding period.

Pre-construction phase:

- Confirm completion of pre-construction nest surveys by a QEP.
- During the “caution” nesting period (March 25 to August 18), conduct 2 surveys within a 5-day period prior to construction. Given no breeding activity is detected, the “free-to-work” period is 3 days. On the fourth day after the start of the “free-to-work” period, conduct an additional survey to extend the “free-to-work” period as needed.
- Document and provide results to the designated contact prior to work commencing.
- If breeding activity or nests are identified during the survey, leave the area undisturbed with a suitable buffer zone established (by a QEP) until the young have permanently left the vicinity of the nest.
- Flag limits of the buffer zone to clearly identify the area especially in the direction of approaching construction activities. Best management practices for migratory birds contain detailed information on buffer areas (Parks Canada 2018).
- Never mark individual nests using flagging tape or other similar material as this increases the risk of nest predation.

Construction phase:

- If bird breeding activity is identified during the construction phase, stop work immediately, notify the designated contact, and establish an appropriate buffer zone around the nest.
- The person with primary responsibility for the Project area is responsible for ensuring all personnel, including sub-contractors, are aware of the buffer zone and conduct activities as directed to minimize disturbance and remain outside of its boundaries.
- The EM will observe the area during construction to ensure the established buffer zone is effective.
- If there is evidence that a buffer zone is ineffective (e.g., continued agitation/guarding behaviour frequently leaving the nest), stop work immediately and the EM will adjust the buffer zone.
- Report incidents immediately to the designated contact and the EM.
- Remove the buffer zone only upon confirmation from the EM that the young have permanently left the vicinity of the nest.
- Minimize construction noise above ambient levels by installing temporary structural noise barriers such as sandbags, baffle boxes, or sound walls beyond the buffered area.

- Limit construction activities to the time between dawn and dusk to avoid the illumination of adjacent habitat.
- Avoid chemical contamination of nesting habitat (detailed information on management of hazardous materials can be found in the Construction Environmental Management Plan).

4.2.2.1 Raptor Nest Surveys

Raptors and most other birds are protected in BC under section 34 of the *Wildlife Act*, which specifies that a person commits an offence, except as provided by regulation, if he or she possesses, takes, injures, molests, or destroys a bird or its egg, or a nest that is occupied by a bird or its egg. Subsection 34(b) affords year-round protection to the nests of bald eagle, golden eagle (*Aquila chrysaetos*), peregrine falcon, gyrfalcon (*Falco rusticolus*), and osprey, whether the nests are active or not.

The Inventory Methods for Raptors (Government of British Columbia 2001) describes in detail the survey protocols for raptor species with the potential to occur within the Project area (**Table 4-1**). However, traditional methods for surveying raptor nests require climbing trees in some cases or flying over the Project area in a small airplane or helicopter. These methods can disturb the nest and nesting birds and could potentially pose risks to the surveyors as well.

Remotely piloted aircrafts or drones offer a viable alternative to traditional surveys and have shown to be more efficient than ground-based surveys, and more accurate than surveys using manned light aircraft (Junda et al. 2015; Canal and Negro 2018). The following best practices for raptor nest surveys using drones are recommended (Junda et al. 2015):

- Use drones where they are appropriate.
- Use drones only where ground surveys cannot be conducted due to visual obstructions (e.g., tall trees, dense canopy).
- Select or modify drone with additional safety features for both humans and wildlife.
- Conduct survey in favourable weather (temperatures above 0°C, wind below 20 km/h, no precipitation).
- Conduct survey with a minimum of 2 personnel (pilot and visual observer).
- Create a flight plan in advance.
- Immediately land or retreat if the drone is approached by a raptor.
- Conduct surveys before and after breeding season to identify nests and species before construction occurs.
- Conduct post-construction surveys to determine if nests are active and develop appropriate mitigation plans.
- Use transects when surveying large areas.
- Approach nest or birds at a shallow angle rather than coming straight down from overhead.
- Observe from maximum allowable distance.
- Launch at least 100 m from known nests.
- Fly drone as high as possible to minimize disturbance to raptors.
- Minimize hovering.
- Minimize abrupt maneuvers.
- Reduce speed or change course to avoid collisions.

4.2.3 Terrestrial Mammals

Terrestrial mammals of management concern (i.e., Blue- or Red-listed, and listed under Schedule 1 of SARA) have the potential to occur within the Project area based on literature review and desktop analysis (**Table 4-1**). Of the 5 identified species, only little brown myotis has a high potential to use the Project area as a fly path, foraging habitat, or potentially roosting habitat in the forested area upland from the current railway and in the large trees along the shoreline.

The little brown myotis is an endangered species, and it is expected to use the area as a flight path and as foraging and roosting habitat. Pre-construction site inspection to identify potential roosting sites such as old and decaying trees should be conducted to confirm habitat use and potential impacts of construction activities on roosting habitat. If potential roosts are identified, an emergency survey should be conducted to confirm the presence of a bat colony. Data collected on bat activity, habitat, and habitat use during the pre-construction phase can help identify high bat activity areas and potential roost identification. These data can be used to identify important areas and minimize potential impacts from construction activity.

Bat monitoring is designed to gather the following data:

- Bat species presence and activity within the Project area, especially little brown myotis
- Identification of potential maternity or day roosts (inspect large and old or dying trees)
- Physical properties of maternity roosts.

Pacific water shrew (*Sorex bendirii*) can occur within the riparian zones and watercourses in the Project area (**Table 4-1**). Since work is expected to extend only to the existing 18 culverts, Project activities are unlikely to interact with the Pacific water shrew. However, since the culverts are associated with riparian habitat and water courses, a QEP mammal specialist should conduct a site assessment to confirm if the biophysical attributes required for suitable Pacific water shrew habitat are present. Additional surveys should be conducted to confirm the presence of this species (i.e., eDNA collection) if the site displays the biophysical attributes for Pacific water shrew such as streams and skunk cabbage marshes with an abundance of shrubs and coarse woody debris and an extensive canopy closure.

4.2.4 Marine Mammals

Marine mammals, primarily harbour seals (*Phoca vitulina*), are known to frequent the Project area, although the risk of marine mammal interactions with Project activities is considered low as all barges and tugs will be stationary while construction is taking place. Additionally, the work will be occurring along a busy foreshore area (i.e., existing railway line corridor with frequent marine traffic) and is not adjacent to any particularly important marine mammal transiting or foraging areas. Therefore, Project traffic and activities such as demobilizing from site and moving barges and tugs are also expected to pose low risk to marine mammals. When on site, the EM will scan the work area prior to the commencement of and during works and will document the presence of marine mammals in the area, along with their numbers and details on their behaviour. If cetaceans (i.e., whales, dolphins, porpoises), sea lions, or harbour seals are sighted and appear disturbed, the EM will advise the contractor to stop or modify construction activities until they have cleared the area.

Vessel activity must follow Marine Mammal Regulations (Government of Canada 2018) when cetaceans, sea lions, or harbour seals are observed:

- Reduce vessel speed to less than 7.0 knots when within 400 m of the nearest marine mammal to reduce engine noise and vessel wake.
- Avoid abrupt course changes.
- Do not approach or position the vessel closer than 100 m to any marine mammal and keep the vessel at least 200 m away from any cetacean in a resting position or with its calf.

5.0 INVASIVE SPECIES ASSESSMENT

Introduction and dispersion of invasive plants is a potential effect of the Project. Movement of equipment and site personnel may transport seeds and propagules within the Project area and potentially to other sites. These effects are expected to be of moderate duration and may extend outside of the Project area. Project staff must follow proper mitigation and management to avoid the spread of invasive species.

5.1 Existing Invasive Species

Previous work conducted in the area (Hemmera 2020a) identified recorded occurrences of non-native and invasive species Himalayan balsam (*Impatiens glandulifera*), Himalayan blackberry, English ivy (*Hedera helix*), buttercup species, and Japanese wireweed (*Sargassum muticum*).

5.2 Mitigation Plan

- Before clearing any vegetation, confirm that a QEP has checked all areas of disturbance for the presence of invasive vegetation. Where invasive vegetation is present, a site-specific Invasive Species Management Plan will be required; include mitigation measures in the plan for working in and around areas of invasive vegetation.
- Minimize the vegetation clearing area to the extent possible. Minimize excessive soil disturbance when removing invasive species to avoid new introductions.
- Clear vegetation toward patches of invasive species to prevent spread into un-infested areas.
- Dispose of all aboveground parts of invasive species and any excavated soil containing roots at an approved landfill following protocols as described by the Invasive Species Council of Metro Vancouver (2020); do not compost or leave on site.
- Inspect footwear, clothing, and equipment to confirm they are free of invasive alien species, individuals, seeds, propagules (i.e., any other material that may cause the species' spread) and pathogens.
- Clean and inspect equipment before arriving and before leaving the worksite.
- Clean and inspect equipment daily and at a regular basis, especially when working near areas with invasive species.
- Obtain all untreated construction lumber, erosion and sediment control products (e.g., straw, mulch), or other applicable materials from outside the Project area from a certified weed-free source.
- Minimize bare soil exposure (e.g., cover stockpiled material with tarps, plant native species, cover with natural mulch/ground coverings etc.).

5.3 Invasive Species Monitoring and Management Plan

General guidelines for invasive plant management during vegetation removal are as follows:

- Dispose of invasive plant species material appropriately: use a bag or designated green waste bin and remove material off site to a landfill location. Do not compost on site.
- Remove blackberry prior to fruit development to prevent spread of seeds, ideally before late July.
- Use mechanical control such as hand-pulling and shovels to remove any invasive plants.
- Remove contents of waste containers and deposit at a municipal waste facility.
- Prevent the spread of invasive and noxious plant species on and off site by inspecting and cleaning vehicles and equipment or plant material prior to entering and leaving the Project area.
- Ensure any soil or fill coming into the Project area comes from a location that is free of noxious weeds, specifically Japanese knotweed (*Fallopia japonica*).
- Confirm that materials brought on site to be used for backfilling, site preparation, or other uses is from sources demonstrated to be clean and free of environmental contamination, invasive species, and noxious weeds.
- Monitor disturbed and re-vegetated areas for several growing seasons to ensure that native vegetation is growing successfully and invasive species spread is prevented.
- All water vessels should be inspected for aquatic invasive species

Additional information, including best management practices on invasive and noxious species that could occur in the Project area, is available via the Invasive Species Council of Metro Vancouver (2020).

6.0 CLOSURE

Hemmera's vegetation plan and species at risk and invasive species assessment provide the necessary steps to minimize the impact on vegetation and wildlife as well as the spread of invasive species during Project-related activities. Although some species at risk have been identified with a moderate to high potential to occur within the Project area, minor interactions with these species and Project-related activities are expected. The recommended pre-construction vegetation site survey and wildlife habitat assessments for species at risk and environmental monitoring work will help minimize potential impacts.

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