MEMORANDUM

Date:	June 23, 2021
To:	Kiley Gibson, Environmental Specialist, Canadian Pacific
From:	Felix Martinez-Nunez, M.Sc., R.P.Bio
File:	104703-01
Re:	Species at Risk and Invasive Species Assessments with Vegetation Overview Plan: Pacific Water Shrew Critical Habitat and Raptor Nest Survey

1.0 INTRODUCTION

Canadian Pacific (CP) is undertaking a track expansion in north Burnaby as part of the Cascadia Terminal Extension Project (the Project). The track expansion will require vegetation removal along the existing railway corridor and work around culverts and associated watercourses, potentially impacting species at risk (Hemmera 2021b). As a result, CP retained Hemmera Envirochem Inc. (Hemmera) to conduct two surveys aiming to:

- Identify potentially suitable Pacific water shrew (*Sorex bendirii*), a federally listed species on the *Species at Risk Act*, habitat within watercourses located within the track expansion area.
- Determine if stick nests from provincially protected species under Section 34b of the *Wildlife Act* were present within the track expansion area and associated vegetated areas.

The Project, including the track expansion, is located within Pacific water shrew distribution range, which in British Columbia (BC) is limited to the Lower Mainland region (Craig et al. 2010). Some of the work associated with the Project consists of improvements to culverts and work around riparian areas and watercourses crossing the Project area. There are no known records of Pacific water shrew within the track expansion area; however, riparian areas and associated waterbodies may provide suitable habitat. Therefore, a habitat assessment was necessary to better understand the potential for Pacific water shrew to occur within the track expansion area.

Work associated with the track expansion involves use of heavy machinery and vegetation clearing, which could impact nesting birds. Osprey (*Pandion* haliaetus), bald eagle (*Haliaeetus leucocephalus*), and great blue heron (*Ardea herodias*) are three species provincially protected under the *Wildlife Act* known to nest along Burrard Inlet (British Columbia Great Blue Heron Atlas 2021 and Wildlife Tree Stewardship Atlas 2021). The nests of these species are protected year-round under Section 34b of the provincial *Wildlife Act*. To reduce potential interactions with these protected nests, a survey of the track expansion area was conducted to determine nest presence.

2.0 METHODS

2.1 Pacific Water Shrew Habitat Assessment

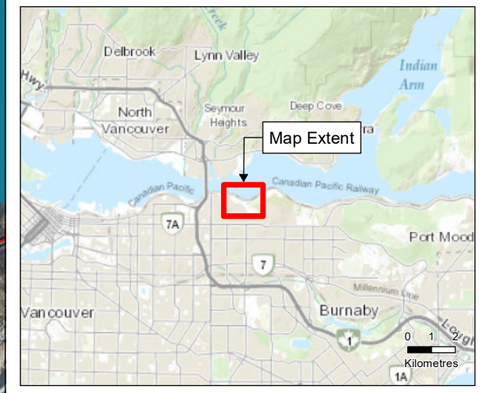
The Pacific water shrew habitat assessment was conducted on May 11, 2021. Five streams and six culvert crossings within the Project area (**Figure 1**), and described in detail in the Aquatic Environmental Assessment report (Hemmera 2021c), were assessed for suitable habitat for Pacific water shrew using a Habitat Suitability Rating Scheme developed by Hemmera (**Table 1**).

Table 1 Pacific Water Shrew Habitat Rating Scheme

% of Provincial Best	Intermediate Knowledge – 4 Class		Indicators or Key Biophysical Attributes
	Rating	Code	
100 to 76%	HIGH	H	**WATER** = Bankfull width of 5 to 10 m, bankfull depth of <2 m, and gradient of <45^0. Good connectivity. Permanent presence of water. **RIPARIAN** = Riparian area around and including a permanent stream or creek (<10 m wide) or wetland with a mature coniferous forest (Structural Stage 5 to 7 as per Land Management Handbook #25; British Columbia 2010) of Western Redcedar and/or Western Hemlock, or a mature deciduous or mixed forest (Structural Stages 4 to 7). Dense riparian cover, vegetation overhanging water, and leaf litter also abundant. Indicators such as rich soils, moist habitat, and riparian plant species are present (i.e., rich to very rich and moist to wet on edatopic grids in Land Management Handbook #28; Green and Klinka 1994). **CWD** = Downed woody debris in all decay classes (British Columbia 2010) is abundant and in diameters similar to vegetation. **ACCESS** = Gentle to moderate slopes (<35° from horizontal) between WATER and RIPARIAN
75 to 26%	MODERATE	M	**WATER** = Can include a natural or modified channel, 1 to 10 m wide, bankfull depth of <2 m and gradient of <45^0. Limited to good connectivity. Permanent or ephemeral presence of water. **RIPARIAN** = As for High above, but younger Structural Stages, primarily broadleaf, and/or 50% or greater vegetation cover. Some indicators such as rich soils, moist habitat, riparian plant species present. **CWD** = Downed woody debris present but not abundant and with limited decay classes and diameter distributions. **ACCESS** = Gentle to moderate slopes (35 to 50° from horizontal between WATER and RIPARIAN
25 to 1%	LOW	L	**WATER** = A ditch, channelized watercourse, or a natural watercourse with a width of 1 to 20 m, a bankfull depth of >2 m, and/or a gradient of >45^0. No to limited connectivity. Ephemeral presence of water. **RIPARIAN** = Limited shrub understorey cover/density (i.e., <50%). Limited canopy cover / young forest (i.e., <50%). Invasive species dominance. Very few indicators such as rich soils, moist habitat, or riparian plant species present (previously or currently disturbed). Maximum Structural Stage of 5. **CWD** = Downed woody debris sparse or absent. One to two decay classes and very limited diameter distributions. **ACCESS** = Steep to moderate slopes (50 to 70° from horizontal) between WATER and RIPARIAN
0%	NIL	N	**WATER** = No water and/or >100 m from a waterbody or heavily managed (e.g., mowing, cultivated, or grazed) habitat >75% of watercourse length. Culverted, or isolated reach with culverts >30 m in length, or a bankfull width of >20 m or banks >65 degree gradient. No connectivity. Ephemeral or no presence of water. **RIPARIAN** = No riparian cover for >75% of watercourse, exposed soil or bryophytes are dominant vegetation. Structural Stages 1 to 2. **CWD** = Downed woody debris absent. **ACCESS** = Steep slopes (70 to 90° from horizontal) between WATER and RIPARIAN

Cascadia Track Expansion
Burnaby, BC

Pacific Water Shrew Habitat Assessment and Stick Nest Survey



Legend

- Pacific Water Shrew Survey Location
- Mile Marker
- 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

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Metres

NAD 1983 UTM Zone 10N

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2.2 Raptor Nests Survey

The nest survey was conducted using visual observation when the tree canopy was not obstructed and a remotely piloted aircraft system (also known as a drone) to document vegetated areas obstructed by dense vegetation or anthropogenic structures. The drone flight path followed the shoreline and on top of the canopy to determine if conspicuous stick nests from species afforded year-round protection were present. The drone was equipped with an iPad to improve live feed from the drone and maximize visual detection of stick nests within the track expansion area on site. Additionally, aerial imagery (including photos and videos) was retained and later reviewed at the office.

The drone survey was conducted by a certified Hemmera pilot following Transport Canada regulations (Government of Canada 2019) and best management practices for raptor nest surveys (Junda et al. 2015) summarized in Hemmera 2021b.

3.0 RESULTS

3.1 Pacific Water Shrew Habitat Assessment

The track expansion area was surveyed on May 11, 2021 for biophysical attributes that could provide suitable habitat for Pacific water shrew at 18 locations including streams and at culvert crossings (**Figure 1**). The streams and culvert crossing provided nil to low suitable habitat for Pacific water shrew, due to lack of course woody debris, limited shrub understory cover/density, steep bank slopes, and minimal presence of freshwater (**Photos 1 to 5**). The only stream that was determined to have low rating was Rainbow Creek. This is a natural permanent watercourse with an average wetted width of 1.2 metres (m), a bankfull depth of less than 1 m, and a gradient of approximately 5°. The other watercourses were ephemeral with steep banks and gradients of more than 45°, and little freshwater flow (i.e., standing water). The riparian community contained a limited shrub understory cover/density, limited canopy cover/young forest, and/or dominated by invasive species. Invasive species consisted of Himalayan blackberry (*Rubus armeniacus*) and English ivy (*Hedera helix*). Native species present consisted of bigleaf maple (*Acer macrophyllum*), black cottonwood (*Populus trichocarpa*), salmonberry (*Rubus spectabilis*), sword fern (*Polystichum munitum*), red alder (*Alnus rubra*), horsetail (*Equisetum* sp.), thimbleberry (*Rubus parviflorus*), and stinging nettle (*Urtica dioica*). Rich soils and moist habitat were generally not observed. The watercourses and culvert crossings contained coarse woody debris that was either sparse or absent and generally the slopes were steep to moderate.

3.2 Raptor Nests Survey

On May 11, 2021, two drone flights were conducted to locate and identify protected nests from osprey, bald eagle, and great blue heron). The combined area of both flights was approximately 20 hectares, covering most of the vegetated areas within the Project area, except for a small patch of small trees along the shore near mile 123.74 (**Figure 2**), which were inspected visually from the ground. No nests of afforded legal protection were observed during the drone surveys (See **Photos 6 to 8** for examples of the vegetated areas surveyed).

Cascadia Track Expansion
Burnaby, BC

Stick Nest Drone Survey

Legend

- Flight Path
- Mile Marker
- Crossing
- Proposed Track Extension
- Railway
- Watercourse
- Cascadia East Extension Pre-Engineering Impact Area (Boundaries are for discussion and will be refined with further design)
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0 50 100 150 200 250

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NAD 1983 UTM Zone 10N

Page Size: 11" x 17"

104703-01	Production Date: Jun 8, 2021	Figure 2

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4.0 CONCLUSION

The results from the surveys conducted on May 11, 2021, to assess habitat suitability for the Pacific water shrew and identify stick nests afforded protection under the BC *Wildlife Act* within the track expansion area indicate that the Project will have minimal to no interaction with these species.

Suitable habitat for the Pacific water shrew was not observed within the project area; the surveyed watercourses and culvert crossings were assessed as not having habitat characteristics suitable for Pacific water shrew (**Table 1**). Therefore, we assume that Pacific water shrew has a low likelihood of occurring within the track expansion area. Thus, work can proceed following recommendations from the CEMP (Hemmera 2021a), and Species at Risk and Invasive Species Assessment with Vegetation Overview Plan (Hemmera 2021b).

The track expansion area and the canopy of associated vegetated areas were surveyed entirely by a qualified professional biologist using ground-based visual observations and a drone. During the day of the survey, the live feed from the drone and subsequent review of the videos and images detected no stick nests of osprey, bald eagle, or great blue heron. Therefore, we expect that work associated with the track expansion will not affect the nests of these species afforded legal protection.

5.0 CLOSURE

This Work was performed in accordance with Canadian Pacific between Hemmera, a wholly owned subsidiary of Ausenco Engineering Canada Inc., and Canadian Pacific, dated February 11, 2020. This Report has been prepared by Hemmera, based on fieldwork conducted by Hemmera, for 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 upon the applicable guidelines, regulations, and legislation existing at the time the Report was produced; any changes in the regulatory regime may alter the conclusions and/or recommendations.

6.0 REFERENCES

Craig, V.J., R.G. Vennesland, and K.E. Welstead. 2010. Best management practices guidelines for Pacific water shrew in urban and rural areas. Prepared for the Pacific Water Shrew Recovery Team. British Columbia Ministry of Environment Ecosystems Standards and Planning Biodiversity Branch.

Government of Canada. 2019. Flying your drone safely and legally (current rules). Transport Canada. Available at https://www.tc.gc.ca/en/services/aviation/drone-safety/flying-drone-safely-legally-current-rules.html.

Hemmera Envirochem Inc. (Hemmera). 2021a. Phase 4 Viterra-Cascadia Terminal Capacity Expansion Project - Construction Environmental Management Plan. Prepared for Canadian Pacific.

Hemmera Envirochem Inc. (Hemmera). 2021b. Species at Risk and Invasive Species Assessments with Vegetation Overview Plan. Prepared for Canadian Pacific.

Hemmera Envirochem Inc. (Hemmera). 2021c. Viterra Cascadia Terminal Track Expansion Phase 4 - Aquatic Effects Assessment (DRAFT). Prepared for Canadian Pacific.

Junda, J., E. Greene, and D.M. Bird. 2015. Proper flight technique for using a small rotary-winged drone aircraft to safely, quickly, and accurately survey raptor nests. Journal of unmanned vehicle systems 3(4):222–236.

PHOTOS

Photo 1 View of the standing water near culvert 4 (May 11).

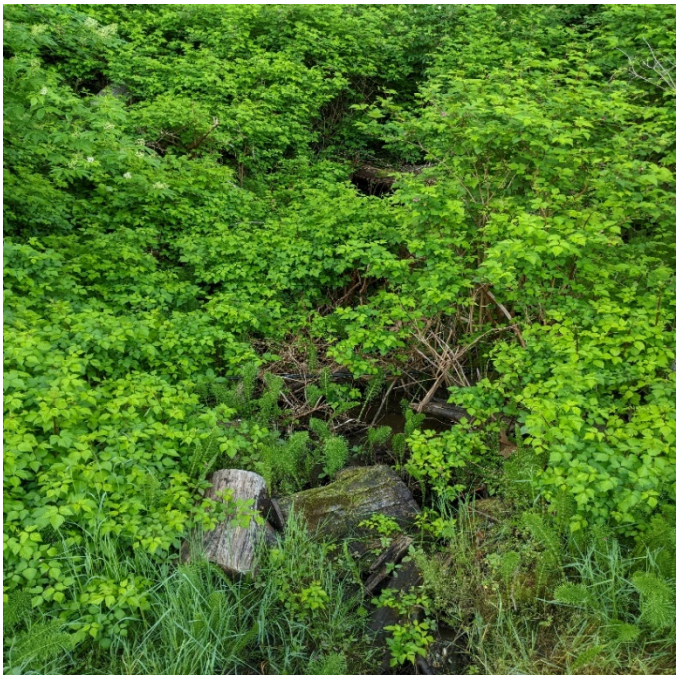

Photo 2 View of the vegetation and coarse woody debris near culvert 5 (May 11).

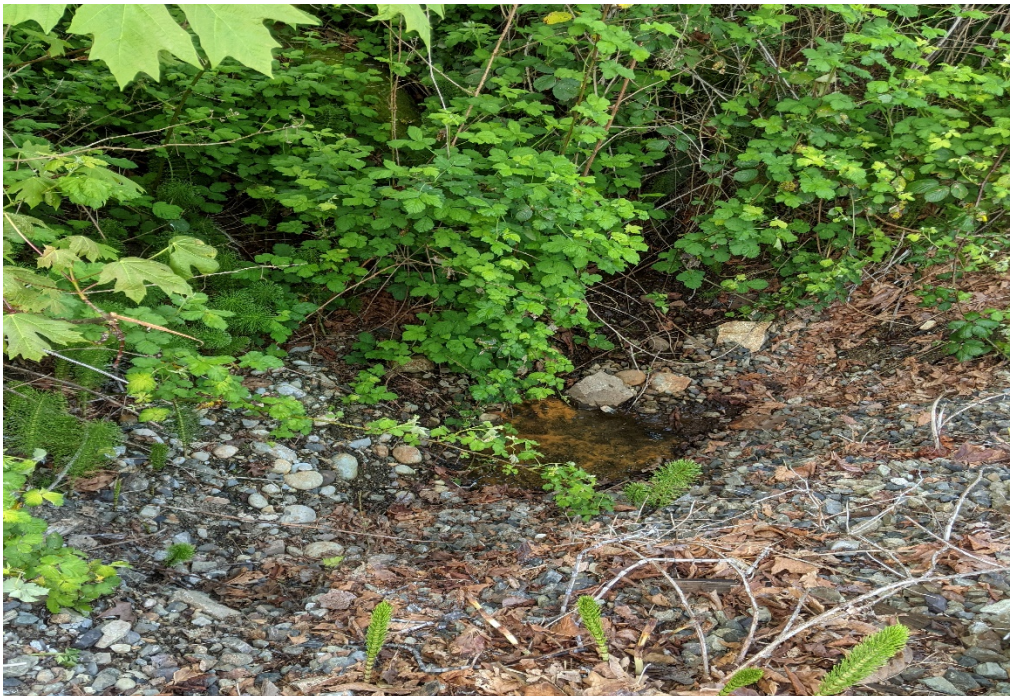

Photo 3 View of the vegetation associated with culvert 6 (May 11).

Photo 4 View of the habitat at Rainbow Creek (May 11).

Photo 5 View of the habitat near the unnamed watercourse (May 11).

Photo 6 View of the foreshore habitat looking south (May 11).

Photo 7 Eastward view of the tree canopy (May 11).

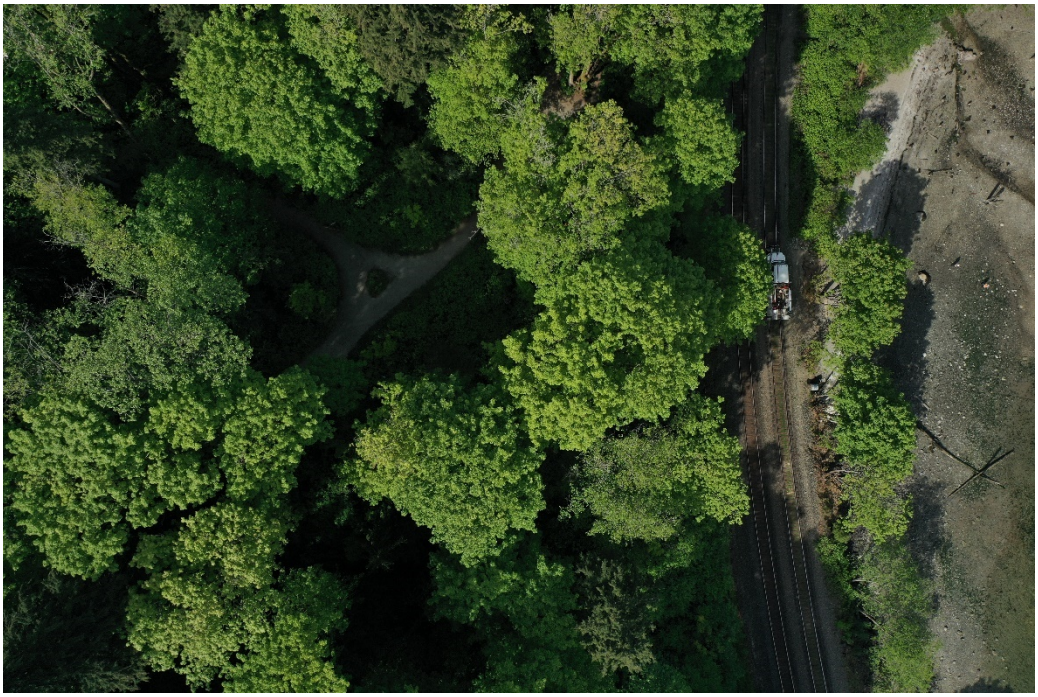

Photo 8 Arial view of the tree canopy (May 11).