Highway 1 Selkirk Mountain Four-Laning

Environmental Impact Assessment Report (100% Detailed Design)

(v.3)

Ministry of Transportation and Infrastructure

Oct 31, 2023

TRITON
Environmental Consultants

1326 McGill Road, Kamloops, BC V2C 6N6 | tel 250 851 0023 | fax 250 851 0074 | triton-env.com

Revision History and Approvals			
Project Name		Hwy 1 Selkirk Mountain 4-Laning	
Project Number		11618.14	
Report Title		Hwy 1 Selkirk Mountain Four-Laning Environmental Impact Assessment Report (100% Detailed Design)	
Document #		K4641	
Date	***Version***	***Review Type***	***Reviewed by***
October 09, 2019	1	Senior Review	Ralph Heinrich R.P. Bio
February 18, 2020	2	Senior Review	David Schmidt, R.P. Bio
September 15, 2020	2	Peer Review	Rachel Boyetchko
October 6, 2020	2	Senior Review	Greg Sykes, R.P. Bio
October 9, 2020	2	Client Review	Brent Persello, MOTI
December 15, 2020	2	50% Functional Report	Greg Sykes, R.P. Bio
October 31, 2023	3	100% Design Report	Amanda Schmidt, R.P. Bio
Nov 10, 2023	3	Client Review	Brent Persello, MOTI
Nov 10, 2023	3	Senior Review	Greg Sykes, R.P. Bio

Disclaimer

This report is rendered solely for the use of the Ministry of Transportation and Infrastructure (MOTI) in connection with Highway 1 Selkirk Mountain Four–laning, and no person may rely on it for any other purpose without Triton Environmental Consultants Ltd.'s (Triton) prior written approval. Should a third party use this report without Triton's approval, they may not rely upon it. Triton accepts no responsibility for loss or damages suffered by any third party as a result of decisions made or actions taken based on this report.

- The objective of this report is to address the following scope requirements:
  - Provide a detailed environmental impact assessment for the Highway 1 Selkirk Mountain Four-laning project;
  - Provide mitigation strategies that focus on adhering to relevant best management practices; and
  - Provide recommendations to minimize impacts to terrestrial and fisheries resources within the study area.
- This report is based on facts and opinions contained within the referenced documents and facts. We have attempted to identify and consider relevant facts and documents pertaining to the scope of work, as of the time period during which we conducted this analysis. However, our opinions may change if new information is available or if information, we have relied on is altered.
- We applied accepted professional practices and standards in developing and interpreting data obtained by our field measurements, sampling, and observations. While we used accepted professional practices in interpreting data provided by MOTI or third-party sources, we did not verify the accuracy of data provided by MOTI or third-party sources.
- This report should be considered as a whole and selecting only portions of the report for reliance may create a misleading view of our opinions.
- This report is based on the **Selkirk Designs Issued for Environmental Regulatory Approvals June 19, 2023**.

1.0 Executive Summary

The 3.9 km Project Area (Figure 1) corresponding to the proposed four-laning of Highway 1 at the north end of the Selkirk Mountain Range, between Wiseman Creek and the Red Grave Rest Area of the Trans-Canada Highway (TCH) supports terrestrial habitat that is used by a variety of bird and wildlife species. Paved highway and mature forest are the dominant habitat types, encompassing approximately 29.7% and 26.1%, respectively, of the Project Area. Young forest and old growth forest are the subdominant type, making up approximately 13.2% and 12.6%, respectively, of the Project Area. Regen forest (9.5%), non-forested disturbed right-of-way (ROW) (8.0%), shrub (0.7%) and meadow (0.2%) comprise the remaining areas. One wetland (Wetland 1) is situated in the Project Area on the north side of the TCH between streams 12 and 13. The current studies were completed in 2019, 2020 and 2022 by Triton with a preliminary assessment undertaken in 2018 by Stantec.

The BC Conservation Data Center (CDC) lists 31 wildlife, ten plant and one tree species-at-risk with the potential to occur within or around the Project Area. Additionally, the CDC database identifies four potential listed ecosystems for which suitable habitat occurs within the Project Area. There are no recorded occurrences of any of these species in the Project Area. No species-at-risk were observed in the Project Area during the 2018 or 2019 field assessments. In addition, the Project Area is situated within mapped population units for two other species-at-risk: Caribou and Grizzly Bear. The Wildlife Accident Reporting System (WARS) records show that the stretch of Highway that corresponds with the Project Area is a moderate wildlife collision prone area. From 2006-2015 there were 30 confirmed wildlife mortalities (the majority involving White Tail Deer and Elk) within or immediately adjacent to the Project Area (Pers. Comm. Brent Persello, MOTI).

One record of invasive plant species was documented within the Project Area; it includes Spotted knapweed (*Centaurea* biebersteinii) and common tansy (*Tanacetum* vulgare). Invasive Species observed in the Project Area include Canada thistle (*Cirsium arvense)*, oxeye daisy (*Leucanthemum vulgare lam.)*, and hawkweed species (*Hieracium spp.*).

Aquatic habitat within the Project Area is limited to two streams (Stream 12 and 13) along with three tributaries to Stream 13 (labelled 13a, 13a1, and 13b) and a Wetland 1. Due to the lack of fish observed or captured during sampling and the limited distribution of high-value habitat observed within the Project Area, Stream 12 (WSC: 300-890400) is considered non fish bearing (S6). Cutthroat Trout were captured in Stream 13 (WSC: 300-892200) ~400 m downslope of the highway. About 200 m upstream of where they were captured (approx. 300 m downstream of the highway) there is an area of 30% gradient. Fish were not detected by electrofishing or eDNA sampling between the highway and this point, therefore; the section of stream between where the fish were caught and the 30% gradient area is inferred fish bearing, and the section between the 30% gradient area and the TCH, including the 13a and 13a1 tributaries, are considered non fish bearing (S6). Gradient barrier, ephemeral discharge, and poor channel definition would preclude fish passage upstream of the highway.

Overall, long-term effects of the project are considered mitigatable. DFO reviewed the project and issued a letter of advice on Oct 23, 2023 (File #23-HPAC-00769) concluding no harmful alteration, disruption, or destruction (HADD) of fish habitat. Any residual cumulative effects of the project would be limited to the loss of vegetation and the potential foraging and nesting habitat associated. Given the abundance of forested areas within the surrounding region the incremental loss and associated impact is considered minor in nature.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

2.0 Introduction

It is anticipated that the major works contract for the Highway 1 Selkirk Mountain Four-Laning Expansion Project (the Project) will be awarded in February 2024, and that an early works indigenous contract will be in place prior with site clearing and tree removal to begin in early January 2024. Triton Environmental Consultants Ltd. (Triton) was retained by the Ministry of Transportation and Infrastructure (MOTI) to complete an Environmental Impact Assessment (EIA) of the Project. This EIA included background literature review, as well as three field assessments of the EIA Study Area (the Project Area) to review existing environmental conditions. Two previous studies were completed in relation to this project:

- *Selkirk Mountain Four-Laning Environmental Overview Assessment (Stantec, 2018)*. This report included desktop review and field assessment of the preliminary project design (approximately 5 km) between the Quartz Creek and Columbia River bridge crossings on Highway 1.

- *Mitigation assessment for the Trans-Canada Highway (Revelstoke to Golden) (Clevenger, A.P., M.A. Sawaya, E.L. Landguth, B.P. Dorsey, and R. Klafki 2019)*. In 2019, this group of experts completed an assessment of the Potential for Mitigating Impacts on Wildlife with the goal of improving motorist safety and meeting wildlife movement needs across the Columbia Mountains, British Columbia.

The assessment completed by Triton builds upon and updates the work previously completed with additional field assessment components. This EIA report outlines the environmental issues identified regarding terrestrial (mammals, cavity nesting birds, amphibians, and plants) and aquatic habitats associated with an approximate 3.9 km section of the proposed Project Area (LKI segment 1818 km 16.1 to 20.0) and provides recommendations and mitigation strategies to be considered.

2.1 Project Area

The Project Area (Figure 1) is located at the north end of the Selkirk Mountain range, between Wiseman Creek and the Red Grave Rest Area on the Trans-Canada Highway (TCH). The Project Area covers approximately 4.0 km of the TCH right-of-way (ROW), and is located approximately 40 km west of Golden, British Columbia (LKI Segment 1818). The footprint of the project area extends from km 16.14 to 20.00 and is situated on Crown land within provincial jurisdiction.

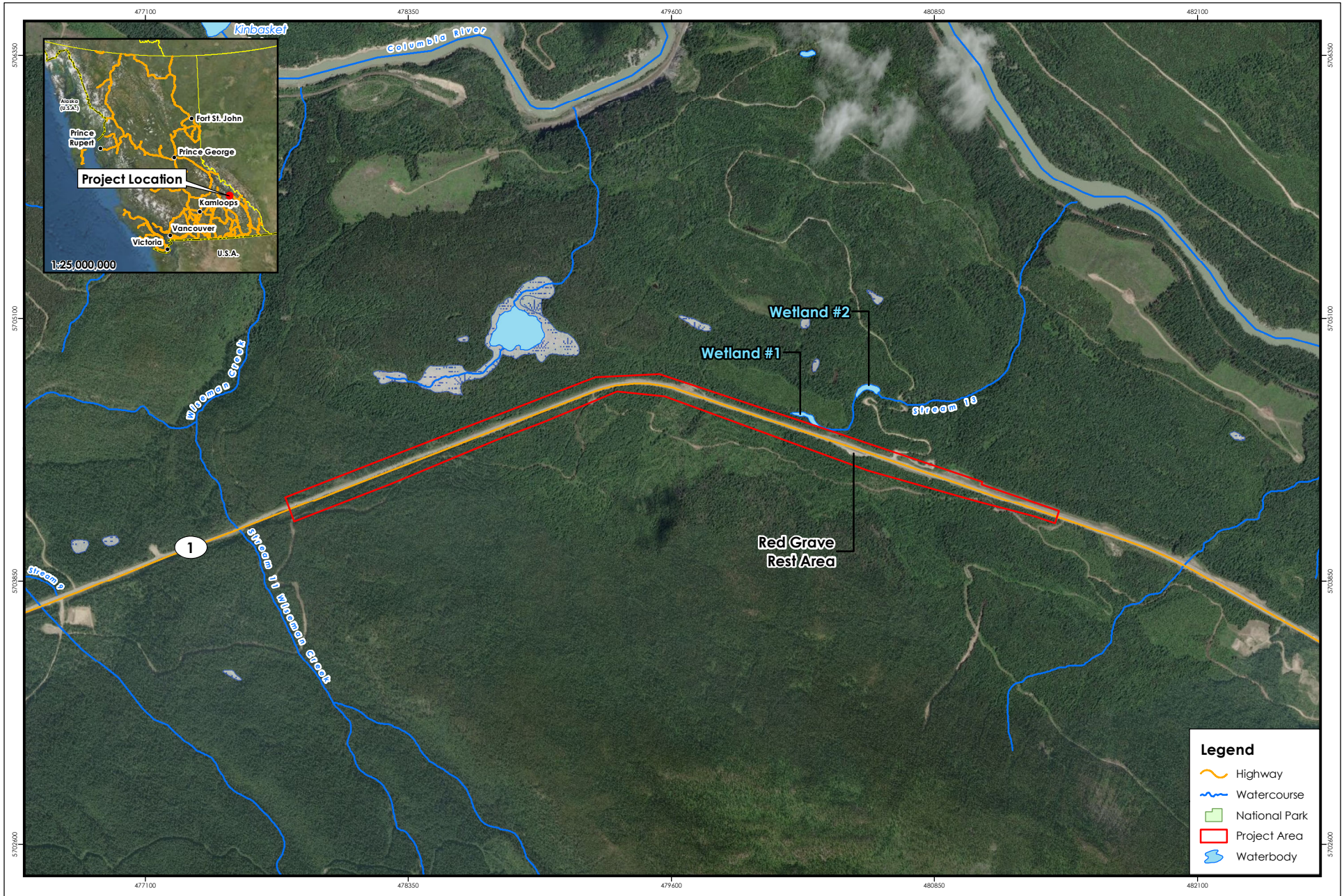
The proposed Project Area is located between Glacier National Park to the south and the Columbia River to the north, approximately 5 km from the northeast corner of the park and 1.5 km from the Columbia River. The Project is within the Big Bend Trench Ecosection and the Columbia Reach Watershed. The biogeoclimatic ecosystem classification (BEC) zone and subzone are within the Kinbasket variant of the Interior Cedar-Hemlock moist warm (ICHmw1) (Meidinger and Pojer, 1991; Table 1). This Ecosection has relatively high amounts of precipitation as moisture rises over the Rockies

to the east. This zone has the greatest diversity of tree species of all BEC zones in BC and consists predominantly of Western Red Cedar (*Thuja plicata*) and Western Hemlock (*Tsuga heterophylla*) trees with an understory dominated by Black Huckleberry (*Vaccinium membranaceum*), Queen's Cup (*Clintonia uniflora*) and Bunchberry (*Cornus canadensis*) (MOF, 2002).

Table 1. Project Area administrative and physiographic setting

Classification	***Description***
Administrative Boundary	
Natural Resource Region	Kootenay/Boundary
Natural Resource District	Selkirk
FLNRORD Resource District	Selkirk
Watershed Group	Columbia Reach
Regional District	Columbia-Shuswap
UTM Western Limit	11U 477789 E, 5704187 N
UTM Eastern Limit	11U 481442 E 5704157 N
Ecosystem Classification	
Ecodomain	Humid Temperate
Ecodivision	Humid Continental Highlands
Ecoprovince	Southern Interior Mountains
Ecoregion	Southern Rocky Mountain Trench
Ecosection	Big Bend Trench
Biogeoclimatic Zone Subzone Variant	Interior Cedar -Hemlock (ICH) Moist Warm (mw) Kinbasket (1)
Elevation Range (m)	~1055 - 1100 m

Source: Province of British Columbia, 2019a.



Highway #1 Selkirk Mountain 4-Laning

Figure 1 - Project Area

Sources and Disclaimer

1. Basemap Image: ESRI World Imagery
2. Inset Basemap Image: ESRI World Imagery
3. Disclaimer: This map is a visual aid only to be used together with the accompanying report, including and incorporating any disclaimer contained therein. This map has been prepared to illustrate the results of Triton Environmental Consultants Ltd. work, and is **not intended to be used for navigational purposes**. Information displayed on this map is based, in whole or in part, on geographic information that may have been provided by third parties, including government data. Triton Environmental Consultants Ltd. disclaims (without limiting the generality of the foregoing) all responsibility for the accuracy of any such third party information, regardless of the source.

N W E S

Meters

0 90 180 360 540 720

File Path:
N:\ACTIVE\5917_MOTI_As_and_When_2018\MXD\Phase24\5917-24_Fig1_20201201.mxd

Project No:	5917-24
Date:	Dec 01, 2020
Scale:	1:25,000
Map Projection:	UTM Zone 11 (NAD 1983)

TRITON Environmental Consultants

3.0 Environmental Assessment Methodology

3.1 Desktop Environmental Constraints Analysis

An analysis of potential environmental constraints was performed for terrestrial and aquatic resources which involved performing a desktop review of government databases for the most current information on rare and endangered species/ecosystems, fisheries information and other existing data pertaining to environmentally sensitive features located within the proposed Project Area. Databases reviewed included:

- DataBC iMapBC mapping tool (iMapBC) (Province of British Columbia, 2019);
- Habitat Wizard (Province of BC, 2019a);
- Fisheries Inventory Data Queries (FIDQ) (Province of BC, 2019b)
- BC Conservation Data Centre (CDC) BC Species and Ecosystems Explorer. (CDC, 2019);
- British Columbia Invasive Alien Plant Program (IAPP) application (FLNRORD, 2019); and
- Wildlife Accident Reporting System (WARS) Program (Province of British Columbia, 2019c).

In addition, Triton reviewed the results of the previous assessments (Stantec, 2018; Clevenger, et.al. 2019; Timberland, 2001) to understand the environmental features and considerations identified during that assessment.

3.2 Field Assessment

3.2.1 Terrestrial Assessment

As a detailed terrestrial assessment was completed by Stantec in 2018, a full terrestrial assessment was not required in 2019. Surveys were meant to build on the surveys completed by Stantec and focused on the current Project Area footprint. Surveys utilized visual incidental and auditory observations. On August 20th and 21st, 2019, and November 1st, 2019, a crew of two biologists were onsite completing stream assessments and recorded incidental terrestrial observations during that time. The crew also visited the proposed wildlife underpass locations and assessed them for wildlife suitability. Additionally, one wetland within the project boundary was surveyed for amphibians. The objective of the pond-dwelling amphibian survey was to establish presence/absence of amphibians within the mapped wetland. Surveys were completed by wading through shallow water, where possible, or from the edge of the wetland.

3.2.2 Aquatic Assessment

Two streams (Stream 12 & 13[1]) were originally identified in the Project Area and one stream (Stream 14) was identified just outside of the current project footprint; all are tributaries to the Columbia River. Aquatic surveys were included in the Stantec 2018 assessment although fish sampling was limited to minnow trapping within stream 12 due to low water levels. The field surveys conducted by Triton on August 20th & 21st, 2019, focused on additional assessments of the streams, where each stream was assessed for fish presence/absence and fish habitat potential. This involved the completion of a more comprehensive assessment that included additional fish capture techniques, such as electrofishing and trapping and more extensive stream surveys. An additional survey of Stream 13 was completed on November 1, 2019, to further assess habitat suitability upstream of the TCH and fish access of that drainage. On August 4th, 5th and 6th, 2021, Triton completed additional aquatic assessments including one which was completed by hiking a 1.5 km section of Stream 13. For this work fish habitat cards (RIC, 2008) were completed, and stream/wetland connectivity, potential obstructions, and culverts were assessed. In August 2021 five eDNA sites were sampled on Stream 13, including Wetlands 1 and 2 and this work was summarised in a memo dated April 21, 2022.

[1] Stream designations were taken from Stantec (2018) and used in this report for consistency.

4.0 Desktop Constraints Analysis Results

4.1 Terrestrial Assessment

The project area includes approximately, 0.09 ha of meadow, 0.27 ha of shrub, 3.7 ha of regenerating forest, 5.11 ha of young forest, 10.1 ha of mature forest, 4.9 ha of old growth forest, 3.1 ha of non-forested disturbed ROW and 11.5 ha of existing highway. Paved highway and mature forest are the dominant habitat types, encompassing approximately 29.7% and 26.1%, respectively, of the Project Area. Young forest and old growth forest are the subdominant types, making up approximately 13.2% and 12.6%, respectively, of the Project Area. Regenerating forest, non-forested disturbed ROW, shrub and meadow comprise the remaining areas (Table 2; Figures 2 and 3).

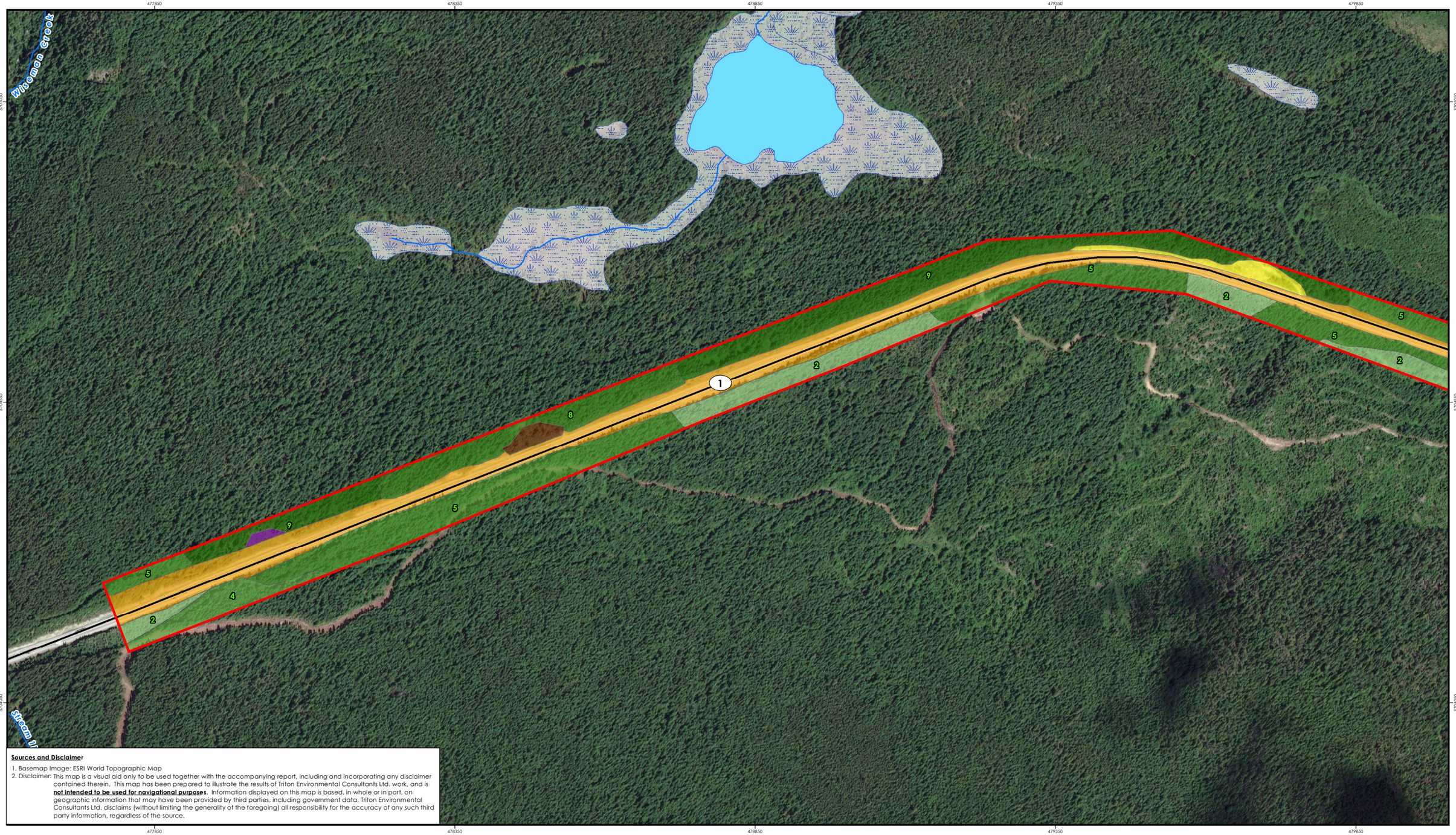
Table 2. Habitats within the Project Area

Description	*Project Area (ha)*	*% of Project Area*
Non-forested disturbed ROW	3.1	8.0
Meadow	0.09	0.2
Shrub	0.27	0.7
Paved highway	11.5	29.7
Regen Stand Age 0-20	3.7	9.5
Young Stand Age 21-80	5.11	13.2
Mature Stand Age 21-140	10.1	26.1
Old Growth Stand Age >141	4.9	12.6
Total	38.77	100.0

4.1.1 Terrestrial Species-at-Risk

Federal and Provincial Government Agencies are working to identify and ensure the protection of Species-at-Risk in Canada. Federally, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the *Species at Risk Act* (SARA) (Federal Lands only) assess and designate Species-at-Risk in Canada. Provincially, the Wildlife Act and the CDC protects and collects information on plants, animals and ecosystems-at-risk in BC.

The BC Species and Ecosystems Explorer was used to perform a CDC background search for species and habitats, including species-at-risk, with potential to occur in and around the Project Area (CDC, 2019). During the search, the CDC listed 31 wildlife species-at-risk, 10 plant species-at-risk and one tree species known to be associated with the BEC zone (ICHmw1) and vegetation type within the Project Area (Tables 3 & 4). eBird (2019) was also consulted for point sightings and species information. Additionally, a query of the CDC database identified four potential listed ecosystems known to occur within the ICHmw1 for which suitable conditions are present within the Project Area (Table 5). There were no records of existing occurrences of either red or blue listed ecosystems within the Project Area nor were any species assemblages or communities noted during the field assessments conducted.



Sources and Disclaimer

1. Basemap Image: ESRI World Topographic Map
2. Disclaimer: This map is a visual aid only to be used together with the accompanying report, including and incorporating any disclaimer contained therein. This map has been prepared to illustrate the results of Triton Environmental Consultants Ltd. work, and is **not intended to be used for navigational purposes**. Information displayed on this map is based, in whole or in part, on geographic information that may have been provided by third parties, including government data. Triton Environmental Consultants Ltd. disclaims (without limiting the generality of the foregoing) all responsibility for the accuracy of any such third party information, regardless of the source.

Highway #1 Selkirk Mountain 4-Laning

Figure 2 - Clearing and Grubbing Limits Map 1 of 2

Legend

- Highway
- Watercourse
- Clearing and Grubbing
- Waterbody
- Wetland

Vegetation Resources Inventory Stand Age Class

- 1 (Age 0 - 20)
- 2 (Age 21 - 40)
- 3 (Age 41 - 60)
- 4 (Age 61 - 80)
- 5 (Age 81- 100)
- 8 (Age 141 - 250)
- 9 (Age > 250)

Habitat Type

- Highway
- Meadow
- Non-Forested Disturbed ROW
- Shrub

N W E S

Meters 0 20 40 80 120 160

File Path: N:\ACTIVE\5917_MOTI_As_and_When_2018\MXD\5917-24_ClearingAndGrubbing_Map1of2_20191011.mxd

Project No:	5917-24
Date:	Oct 25, 2019
Scale:	1:6,000
Map Projection:	UTM Zone 11 (NAD 1983)

TRITON Environmental Consultants

479350 479850 480350 480850 481350

5705050 5704550 5704050

9 5 2 2 5 1 5 9 5 3 5 1

Sources and Disclaimer

1. Basemap Image: ESRI World Topographic Map
2. Disclaimer: This map is a visual aid only to be used together with the accompanying report, including and incorporating any disclaimer contained therein. This map has been prepared to illustrate the results of Triton Environmental Consultants Ltd. work, and is **not intended to be used for navigational purposes**. Information displayed on this map is based, in whole or in part, on geographic information that may have been provided by third parties, including government data. Triton Environmental Consultants Ltd. disclaims (without limiting the generality of the foregoing) all responsibility for the accuracy of any such third party information, regardless of the source.

Highway #1 Selkirk Mountain 4-Laning

Figure 3 - Clearing and Grubbing Limits Map 2 of 2

Legend

- Highway
- Watercourse
- Clearing and Grubbing
- Waterbody
- Wetland

Vegetation Resources Inventory Stand Age Class

- 1 (Age 0 - 20)
- 2 (Age 21 - 40)
- 3 (Age 41 - 60)
- 4 (Age 61 - 80)
- 5 (Age 81- 100)
- 8 (Age 141 - 250)
- 9 (Age > 250)

Habitat Type

- Highway
- Meadow
- Non-Forested Disturbed ROW
- Shrub

N W E S

Meters 0 20 40 80 120 160

File Path: N:\ACTIVE\5917_MOTI_As_and_When_2018\MXD\5917-24_ClearingAndGrubbing_Map2of2_20191011.mxd

Project No:	5917-24
Date:	Oct 25, 2019
Scale:	1:6,000
Map Projection:	UTM Zone 11 (NAD 1983)

TRITON Environmental Consultants

Table 3. Wildlife Species-at-risk with potential to occur within or near the Project Area

Common Name	***Scientific Name***	***BC Status***	***COSEWIC Staus[1]***	***SARA Status[2]***	***Potential to occur in the study area***	***Rationale***	***Mitigations/Follow-up***
Wildlife							
Bald Eagle	*Haliaeetus leucocephalus*	Yellow	-	-	Moderate	No identified stick nests, Columbia River 1-2 km from project area	Dedicated stick-nest survey prior to construction. See Section 6.1.1
Barn Swallow	*Hirundo rustica*	Blue	T	1-T	Low	No identified nests, no bridges or building structures within project footprint	Bird nest survey prior to clearing any vegetation. See Section 6.1.1
Bighorn Sheep	*Ovis canadensis*	Blue	Not Listed	Not Listed	Low	Open areas with steep escape terrain are limited	No follow-up required.
Black Swift	*Cypseloides niger*	Blue	E	E	Low	No suitable nesting habitat	Bird nest survey prior to clearing any vegetation. See Section 6.1.1
Broad-winged Hawk	*Buteo platypterus*	Blue	Not Listed	Not Listed	Low	No identified nests, rare in BC though sightings during nesting season have occurred in the area.	Dedicated stick-nest survey prior to construction. See Section 6.1.1
Caribou (Southern mountain pop)	*Rangifer tarandus pop.1*	Red	E	1-T	Nil	Project area is within extirpated range, however central Rockies population is 12km to the northwest; and the Columbia South population is approximately 14km southwest of the project area.	Not likely, but if encountered notify EM immediately if Caribou observed around the project area. Reclaim disturbed areas as soon as practical following construction. See Section 6.1.3.3
Coeur d'Alene Salamander	*Plethodon idahoensis*	Yellow	SC	1-SC	Low	Project lies at the upper range of the documented population distribution.	Limit vegetation removal near streams, wetlands and other wet areas. See Section 6.1.2

Common Name	***Scientific Name***	***BC Status***	***COSEWIC Staus[1]***	***SARA Status[2]***	***Potential to occur in the study area***	***Rationale***	***Mitigations/Follow-up***
Common Nighthawk	*Chordeiles minor*	Yellow	SC	1-T	Moderate	Open gravel stockpile area located approximately 1km southeast of the project area offers suitable nesting habitat (Stantec 2018).	Survey for common nighthawk nests in clearings, fields, open areas prior to construction/vegetation clearing. See Section 6.1.1
Eared Grebe	*Podiceps nigricollis*	Blue	Not Listed	Not Listed	Low	Outside of documented breeding range, possible occurrences during migration	Limit vegetation removal near streams, wetlands and other wet areas. Follow Best Management Practices (BMPs) for protection of aquatic environments. See Sections 6.1.2 & 6.1.4
Evening Grosbeak	*Coccothraustes vespertinus*	Yellow	SC	Not Listed	Moderate	No identifed nests. However, documented occurrences within 5km radius of project area (eBird 2019).	Bird nest survey prior to clearing any vegetation. See Section 6.1.1
Fisher	*Pekania pennanti*	Blue	Not Listed	Not Listed	Low	Distribution in project area is considered rare or nil; possibly some Old Growth Areas with large (>40cm diameter) snags may be used for denning. Openings and creek draws used for foraging.	Retain large dbh (>50 cm) snags and wildlife trees where possible. Inspect trees prior to removal for active dens. See Section 6.1.3.2
Great Blue Heron	*Aredea herodias herodias*	Blue	Not Listed	Not Listed	Low	No identified nests. However, documented occurrences within 5km radius of project area (eBird 2019).	Bird nest survey prior to clearing any vegetation. See Section 6.1.1
Grizzly Bear	*Ursus arctos*	Blue	SC	1-SC	Moderate	Denning habitat is low, foraging occurrences are likely dependant on season and food source availability.	Survey all steep north facing slopes that are in or within 30m of ROW prior to vegetation clearing during the denning season. See Section 6.1.3.4

Common Name	***Scientific Name***	***BC Status***	***COSEWIC Staus[1]***	***SARA Status[2]***	***Potential to occur in the study area***	***Rationale***	***Mitigations/Follow-up***
Little Brown Myotis	*Myotis lucifugus*	Yellow	E	1-E	Moderate	Old Growth forests with large diameter snags may be used for day roosts or maternity roosts.	Avoid clearing forested habitat during bat maternity season (June 1-September 1); conduct bat surveys prior to tree removal. See Section 6.1.3.1
Long-billed Curlew	*Numenius americanus*	Blue	SC	1-SC	Low	No documented occurrences within the project area, lacks open grassland for nesting.	Bird nest survey prior to clearing any vegetation. See Section 6.1.1
Mountain Goat	*Oreamnos americanus*	Blue	Not Listed	Not Listed	Low	No documented occurrences, no alpine/subalpine habitat with steep escape terrain present.	No follow-up required.
Northern Goshawk	*Accipiter gentilis atricapillus*	Blue	NAR	Not Listed	Moderate	Some large stands of mature coniferous trees with open understory. Documented occurrences within 10km radius of project area (eBird 2019)	Dedicated stick-nest survey prior to construction. See Section 6.1.1
Northern Myotis	*Myotis septentrionalis*	Blue	E	1-E	Moderate	Old Growth forests with large diameter snags may be used for day roosts or maternity roosts.	Avoid clearing forested habitat during bat maternity season (June 1 - September 1); conduct bat surveys prior to tree removal. See Section 6.1.3.1
Olive-sided Flycatcher	*Contopus cooperi*	Blue	SC	1-T	Moderate	May be present in Riparian coniferous stands.	Bird nest survey prior to clearing any vegetation. See Section 6.1.1
Osprey	*Pandion haliaetus*	Yellow	Not Listed	Not Listed	Low	No identified stick nests, Columbia River 1-2km from project area	Dedicated stick-nest survey prior to construction. See Section 6.1.1

Common Name	***Scientific Name***	***BC Status***	***COSEWIC Staus[1]***	***SARA Status[2]***	***Potential to occur in the study area***	***Rationale***	***Mitigations/Follow-up***
Painted Turtle (Intermountain Rocky Mountain Pop)	*Chrysemys picta pop.2*	Blue	SC	1-SC	Low	No documented observations; closest documented occurrence is over 30km from the project area.	Install exclusion fencing to isolate construction site and survey for amphibians/reptiles prior to construction and salvage as required. See Section 6.1.2
Sandhill Crane	*Antigone canadensis*	Yellow	Not Listed	Not Listed	Low	No documented occurrences; lacks suitable nesting habitat.	Bird nest survey prior to clearing any vegetation. See Section 6.1.1
Western Grebe	*Aechmophorus occidentalis*	Red	SC	1-SC	Low	Outside of documented breeding range, possible occurrences during migration	Limit vegetation removal near streams, wetlands and other wet areas. Follow BMPs for protection of aquatic environments. See Sections 6.1.2 & 6.1.4
Western Toad	*Anaxyrus boreas*	Yellow	SC	1-SC	Moderate	Suitable breeding habitat in wetland on the northside of the TCH; also, terrestrial dispersal during migration	Install exclusion fencing to isolate construction site and survey for amphibians/reptiles prior to construction and salvage as required. See Section 6.1.2
Wolverine	*Gulo gulo luscus*	Blue	SC	1-SC	Moderate	Wide ranging species. Wolverines are habitat generalists and may forage in the project area.	No follow-up required.

[1]Source: CDC, 2019.

[2]Search Criteria: Animals, AND BC Conservation Status:Red (Extirpated, Endangered, or Threatened) OR Blue (Special Concern) OR Yellow (Not at Risk); AND Forest Districts: Columbia Forest District (DCO) (Restricted to Red, Blue and Legally designated species) AND MOE Regions: 4- Kootenay (Restricted to Red, Blue and Legally designated species) AND Regional Districts: Columbia-Shuswap (CSRD) AND BGC ZONE: Interior Cedar-Hemlock (ICH)

Table 4. Vascular plant species-at-risk with potential to occur in and around the Project Area[1,2]

Common Name	*Scientific Name*	BC Status	Cosewic Status	Sara Status
Cup clover	*Trifolium cyathiferum*	Blue	–	–
Dark lamb's-quarters	*Chenopodium atrovirens*	Blue	-	-
Joe-pye weed	*Eutrochium maculatum var. bruneri*	Red	-	-
Lance-leaved figwort	*Scrophularia lanceolate*	Blue	-	-
Macoun's fringed gentian	*Gentianopsis virgate ssp. Macounii*	Blue	-	-
Mountain moonwort	*Botrychium montanum*	Blue	-	-
Peduncled sedge	*Carex pedunculata*	Blue	-	-
Purple meadowrue	*Thalictrum dasycarpum*	Blue	-	-
Seep-spring arnica	*Arnica longifolia*	Blue	-	-
Whitebark pine	*Pinus albicaulis*	Blue	E	1-E
Yellow widelip orchid	*Liparis loeselii*	Blue	-	-

[1]Source: CDC, 2019.
[2]Search Criteria: Search Type: Plants AND Species Groups: Vascular Plants AND BC Conservation Status: Red (Extirpated, Endangered, or Threatened) OR Blue (Special Concern) AND Forest Districts: Columbia Forest District (DCO) (Restricted to Red, Blue, and Legally designated species) AND Regional Districts: Columbia-Shuswap (CSRD) (Restricted to Red, Blue, and Legally designated species) AND BGC Zone: Interior Cedar-Hemlock ICH.

Table 5. Potentially Occurring Ecological Communities of Concern

Common Name	*Scientific Name*	*BC Status*
Black spruce / buckbean / peat-mosses	*Picea mariana / Menyanthes trifoliata / Sphagnum* spp.	Blue
Slender sedge / common hook-moss	*Carex lasicocarpa / Drepanocladus aduncus*	Blue
Swamp horsetail – beaked sedge	*Equisetum fluviatile – Carex utriculata*	Blue
Tufted clubrush / golden star-moss	*Trichophorum cespitosum / Campylium stellatum*	Blue

[1]Source: CDC, 2019.
[2]Search Criteria: [1]Search parameters: Ecosystem Realm-Groups: Forest OR Grassland Group (G) OR Rock Group (R) OR Hydrogenic Group (H) OR Rock Group (R) OR Subalpine Shrub Group (S) OR Mineral Wetland Group or Peatland Group AND Forest Districts: Columbia Forest District (DCO) (Restricted to Red, Blue, and Legally designated species) AND MOE Regions: 4- Kootenay (Restricted to Red, Blue, and Legally designated species) AND Regional Districts: Columbia-Shuswap (CSRD) AND BGC Zone, Subzone, Variant, Phase: ICHmw1 AND Ecosections: BBT

In addition to the CDC search which identified the species-at-risk with potential to occur at or near the Project Area, iMapBC was used to search for known occurrences of species-at-risk within the Project Area, as well as designated critical habitat for species-at-risk (Province of BC, 2019). A search of iMapBC revealed that the Project Area was within the Spillamacheen Grizzly Bear Population Unit (GBPU) (Unit ID 1095). There were an estimated 98 grizzly bears in the Spillamacheen GBPU and the GBPU was considered viable (MFLNRO, 2012). There were no Wildlife Habitat Areas, Ungulate Winter Ranges or Important Bird Areas that overlapped the project area. Caribou were not expected to occur within the project area as the project was situated within an extirpated caribou

herd range (Population ID 1906). The Project Area did not overlap any parks or other protected areas.

No wildlife species of concern had been previously documented within the Project Area. There were no occurrence records within the Project Area of Osprey, Bald Eagle or Great Blue Heron nests, which otherwise would be protected year-round under the BC Wildlife Act (CMN, 2019).

Additional details on wildlife species-at-risk are provided in the following sections.

4.1.1.1 Caribou (Southern Mountain Population)

The Southern Mountain population subspecies of Woodland Caribou (*Rangifer tarandus* pop. 1) is a provincially Red-listed species in British Columbia, federally listed under COSEWIC as Endangered, and Threatened under SARA. The Southern Mountain population of Woodland Caribou occur in the southern two-thirds of British Columbia and have been sub-divided into local population units. In some areas, they have been further organized into sub-populations or individual herds, which reflect historically larger subpopulations that have declined in numbers (Environment Canada, 2014).

Southern Mountain Caribou occupy diverse habitats and rely on ranges which consist of undisturbed and relatively un-fragmented habitat. During the winter they require large patches of mature and old growth forests with abundant lichens for food, and typically utilize high elevation mature and subalpine forests. During other times of the year they are known to use lower elevation mature and old forests; some subpopulations may travel to cedar-hemlock forest types in valley bottoms (Environment Canada, 2014). The Caribou require their seasonal ranges to be connected by lands that provide forage and security from predators and disturbance, which can also facilitate their movement. Such ranges are referred to as "Matrix Ranges" (Environment Canada, 2014).

The Project Area does not fall within designated Critical Habitat for Federally Listed Species at Risk but does coincide with an extirpated population of Southern mountain Caribou population 1 (Caribou Population ID 1906). Given that the works will occur within an extirpated population and outside ungulate critical winter range, a permit under the *Species at Risk Act* will not be required.

4.1.1.2 Grizzly Bear

The Grizzly Bear is a provincially Blue-listed species which is listed by COSEWIC as Secure and is not listed under SARA. The Project Area falls within the Spillamacheen GBPU (Unit ID 1095). The range of Grizzly Bears in British Columbia has been divided into 56 GBPUs that delimit individual populations for conservation and management purposes. In southern British Columbia the boundaries follow natural and anthropogenic fractures in distribution (e.g., large rivers and settled valleys), and in some cases, genetic isolation from other populations (MFLNRO, 2012). In 2012 the Grizzly Bear population in British Columbia was estimated to be approximately 15,000 bears. GBPUs are assigned a status

as either being Threatened or Viable. Of the 56 GBPUs, 9 GBPUs were considered Threatened in 2012. The Spillamacheen GBPU was estimated to consist of 98 bears in 2012, and was designated as a Viable population (MFLNRO, 2012).

Grizzly Bears are known to utilize a variety of different habitat types throughout the year, and move around seasonally in search of food sources, mates, and denning sites. It is estimated that sow grizzlies have home ranges between 25 km^2 to 200 km^2, and adult males can have home ranges between 60 km^2 to 700 km^2 or more, and the abundance of bears in any particular area depends on the abundance of the habitat. In the Interior, during spring and early summer months, bears tend to be found in moist, low elevation sites such as wetlands or lower avalanche tracks where they search out lush vegetation. The diet generally switches to berries in the summer months, and they forage in a variety of locations ranging from valley bottoms to alpine meadows. Grizzlies are omnivores and will also make use of alternate food sources, such as ungulate carcasses, ground squirrels, and may prey on ungulate calves born in the spring. Denning generally occurs on steep north facing slopes, at or near tree line, with deep, persistent snow cover (MWLAP, 2002).

There are north-facing, steeply sloped areas of old forest within the Project Area that are suitable denning habitat. Bears may be unlikely to use these areas for denning due to sensory disturbance from the TCH and snowmobile trails (Stantec 2018). No Grizzly Bears or bear sign were observed during the 2019 site visit; bear scat was observed in 2018 which could also be from Black Bear (*Ursus americanus*), the more common of the two bear species in the area.

4.1.1.3 Northern Goshawk

The northern goshawk (*Accipiter gentilis atricapillus*) is a provincially Blue-listed species that is listed as Not at Risk by COSEWIC and not listed under SARA. Northern goshawks forage and hunt below the canopy in open forests. They build large stick nests in large trees in old-growth or mature coniferous forests or mixed coniferous and deciduous forests of similar mature age and structure. A pair will use the same nesting territory for multiple years.

There are known occurrences of northern goshawks within 4 km of the Project Area (eBird, 2019). Suitable habitat including large stands of mature coniferous trees with open understory are present in the Project Area (Stantec, 2018). No goshawks stick nests or sign were observed during site visits in either 2018 or 2019.

4.1.1.4 Northern Myotis

The Northern Myotis *(Myotis septentrionalis*) is a provincially Blue-listed species that is listed as Endangered by COSEWIC and SARA. The Northern Myotis is generally associated with old-growth forests composed of trees of 100 years or older and snags (standing dead timber both deciduous and coniferous), which provide day or nursery colony roosting

habitat. Hibernation occurs primarily in caves, mines, deep cracks, and tunnels (CDC, 2014; Environment Canada, 2015).

A desktop search of the CDC database revealed that the species has not been documented within the Project Area. However, four occurrences were recorded for the Northern Myotis between Revelstoke, BC and Golden, BC along Highway 1 with the closest noted approximately 17 km southwest of the Project Area (CDC, 2019). Suitable habitat including old growth trees or snags were identified within the Project Area and could be used for day or maternity roosts. No evidence of bats within the project area was noted during either site visit completed in 2018 and 2019.

4.1.1.5 Little Brown Myotis

The little brown myotis (*Myotis lucifugus*) is a provincially Yellow-listed species that is listed as Endangered by COSEWIC and SARA. The little brown myotis uses a wide range of habitats including caves, hollow tree cavities, and often man-made structures for resting and maternity sites. Maternity roosts that are found in large diameter trees can be used annually by females for up to 10 years, whereas roosts in anthropogenic structures for maternity, hibernation, and resting can be used for 50 or more years. Some anthropogenic roosts are used fully throughout the year while others will be switched in the year depending on the bats needs (thermoregulation for the season). Little Brown Myotis are also known to be selective of roosting habitats (day and maternity) and can choose good roosting habitats over foraging habitats, resulting in distances of travel between the two habitats. Foraging occurs in wooded areas near water including margins of lakes and streams (CDC, 2015; Environment Canada, 2015).

Bridges and old growth forests with large diameter snags are present in the Project Area (Stantec, 2018) and could potentially be used for day roosts or maternity roosts. No evidence of bats within the project area was noted during either site visit completed in 2018 and 2019.

4.1.1.6 Western Toad

The western toad (*Anaxyrus boreas*) is a provincially Yellow-listed species that is listed as Special Concern by COSEWIC and SARA. Western toads have been observed in a variety of aquatic habitats and will migrate one to two km between aquatic breeding sites, upland summer ranges, and overwintering areas in spring and fall. They breed in shallow, littoral zones of lakes, temporary and permanent pools, and wetlands, bogs, fens, and roadside ditches. In addition, they utilize riparian habitats, especially lotic habitats with little to no flow. Toads utilize a variety of terrestrial habitats, including forest and woodland types, shrubland/chaparral, savanna, cropland/hedgerow, grassland/herbaceous cover, old fields, and suburban/orchard (CDC, 2010a).

There are no known occurrences of Western Toads within the Project Area; however, both suitable aquatic and terrestrial habitats are present. No western toads were observed during either the 2018 or 2019 site visits.

4.1.1.7 Fisher

The fisher (*Pekania pennanti*) is a provincially Blue-listed species that has not been designated by COSEWIC or SARA. Fishers inhabit upland and lowland forests, including coniferous, mixed, and deciduous forests. Studies have shown that fishers are associated with riparian areas. Riparian areas may be important to fishers because they provide important rest site elements, such as broken tops, snags, and coarse woody debris. Young are often born in a den in a tree hollow between March and mid-April before becoming mobile eight weeks later; therefore, large snags (> 50 cm dbh) are important as maternal den sites (CDC, 2010b).

There are no known occurrences of fisher within the Project Area; however, old growth forests with large diameter snags are present in the Project Area (Stantec 2018) and could potentially be used for maternal den sites. One potential mustelid den that did not appear to be in use, was observed by Stantec in 2018; however, no Fisher or sign were observed in the Project Area.

4.1.2 Wildlife Accident Reporting Data (2005 – 2015)

WARS is a database maintained by MOTI which stores information on the location and species of animals involved in accidents with vehicles, excluding trains. During the report preparation, the WARS system was down but the MOTI provided the following wildlife collision statement for the section of Highway 1 associated with the Project. This is a moderate wildlife collision area. From 2006 to 2015, there were 30 confirmed wildlife mortalities (the majority involving White Tail Deer and Elk) within or immediately adjacent to the Project Area. Given that not all animals succumb to their injuries on the ROW, this number is likely higher than that recorded. The lands adjacent to the Project Area have been heavily logged in recent years. As a result, the collision rate is expected to increase in the coming years due to the availability of higher-quality forage opportunities in the area. Wildlife collision mitigation opportunities are being actively investigated for this section of the TCH. The design drawings illustrate the locations of two proposed wildlife underpasses (Figure 4) and wildlife exclusion fencing will be utilized to continue to build off the adjacent Quartz Creek Fencing Project (Pers. Comm. Brent Persello, MoTI).

4.1.3 Invasive Plant Species

The IAPP application was searched for records of invasive plant occurrences in the Project Area. Spotted knapweed (*Centaurea* biebersteinii) and common tansy (*Tanacetum* vulgare) have been documented in the study area (WEED-S-05) (FLNRO, 2019). Stantec included one additional noxious weed site on their map for spotted

knapweed (WEED-S-03) which is located outside the current Project Area as it is located east of Stream 14 (Table 6).

Table 6. Documented Noxious Weed Occurrences in the Project Area

Site ID[1]	*Location*	*Common Name*	*Scientific Name*	*Year of Record*	*Jurisdiction*
WEED-S-05	West of bend in the TCH; north side of the TCH	spotted knapweed	*Centaurea biebersteinii*	2015	MOTI
		common tansy	*Tanacetum vulgare*	2015	MOTI
WEED-S-03	East of Stream 14	spotted knapweed	*Centaurea biebersteinii*	2015	MOTI

4.1.4 Aquatic Resources

Existing information on aquatic resources in the vicinity of the Project is primarily focused on the Columbia River (Watershed Code 360), which is located immediately north of the Project Area. Two watercourses drain north to the Columbia River within the Project Area and a third lies just to the east of the current footprint. A query of the *Fish Inventory Data Query* (FIDQ – Province of British Columbia, 2019b) database identified little information on the small watercourse but found that 44 fish species have been documented as occurring within the Columbia River (Table 7). Two of the species, Umatilla Dace and White Sturgeon, are Red-listed and six of the species, Bull Trout, Chiselmouth, Columbia Sculpin, Northern Mountain Sucker, Shorthead Sculpin, and Westslope Cutthroat Trout, are Blue-listed. The remaining species are either Yellow-listed or not listed.

Table 7. Freshwater fish species documented to occur within the Columbia River

Common Name	*Latin Name*	*BC Status*
Bridgelip Sucker	*Catostomus columbianus*	Yellow
Brook Trout	*Salvelinus fontinalis*	Exotic
Brown Trout	*Salmo trutta*	Exotic
Bull Trout	*Salvelinus confluentus*	Blue
Burbot	*Lota lota*	Yellow
Carp	*Cyprinus carpio*	Not Listed
Chinook Salmon	*Oncorhynchus tshawytscha*	Yellow
Chiselmouth	*Acrocheilus alutaceus*	Blue
Columbia Sculpin	*Cottus hubbsi*	Blue
Cutthroat Trout	*Oncorhynchus clarkii*	Not Listed
Dace	*Leuciscus leuciscus*	Not Listed
Dolly Varden	*Salvelinus malma*	Yellow
Kokanee	*Oncorhynchus nerka*	Yellow
Lake Chub	*Couesius plumbeus*	Yellow
Lake Trout	*Salvelinus namaycush*	Yellow
Lake Whitefish	*Coregonus clupeaformis*	Yellow
Largescale Sucker	*Catostomus macrocheilus*	Yellow
Leopard Dace	*Rhinichthys falcatus*	Yellow
Longnose Dace	*Rhinichthys cataractae*	Yellow

Common Name	***Latin Name***	***BC Status***
Longnose Sucker	*Catostomus catostomus*	Yellow
Mottled Sculpin	*Cottus bairdii*	Not Listed
Mountain Whitefish	*Prosopium williamsoni*	Yellow
Northern Mountain Sucker	*Catostomus platyrhynchus*	Blue
Northern Pike	*Esox Lucius*	Yellow
Northern Pikeminnow	*Ptychocheilus oregonensis*	Yellow
Peamouth Chub	*Mylocheilus caurinus*	Yellow
Perch	*Perca fluviatilis*	Not Listed
Prickly Sculpin	*Cottus asper*	Yellow
Pumpkinseed	*Lepomis gibbosus*	Exotic
Pygmy Whitefish	*Prosopium coulterii*	Yellow
Rainbow Trout	*Oncorhynchus mykiss*	Yellow
Redside Shiner	*Richardsonius balteatus*	Yellow
Shorthead Sculpin	*Cottus confuses*	Blue
Slimy Sculpin	*Cottus cognatus*	Yellow
Smallmouth Bass	*Micropterus dolomieu*	Exotic
Steelhead	*Oncorhynchus mykiss*	Yellow
Trench	*Tinca tinca*	Exotic
Torrent Sculpin	*Cottus rhotheus*	Yellow
Umatilla Dace	*Rhinichthys umatilla*	Red
Walleye	*Sander vitreus*	Yellow
Westslope (Yellowstone) Cutthroat Trout	*Oncorhynchus clarki lewisi*	Blue
White Sturgeon	*Acipenser transmontanus*	Red
White Sucker	*Catostomus commersonii*	Yellow
Yellow Perch	*Perca flavescens*	Unknown

Source: Province of British Columbia, 2019b.

5.0 Field Assessment Results

5.1 Terrestrial Assessment

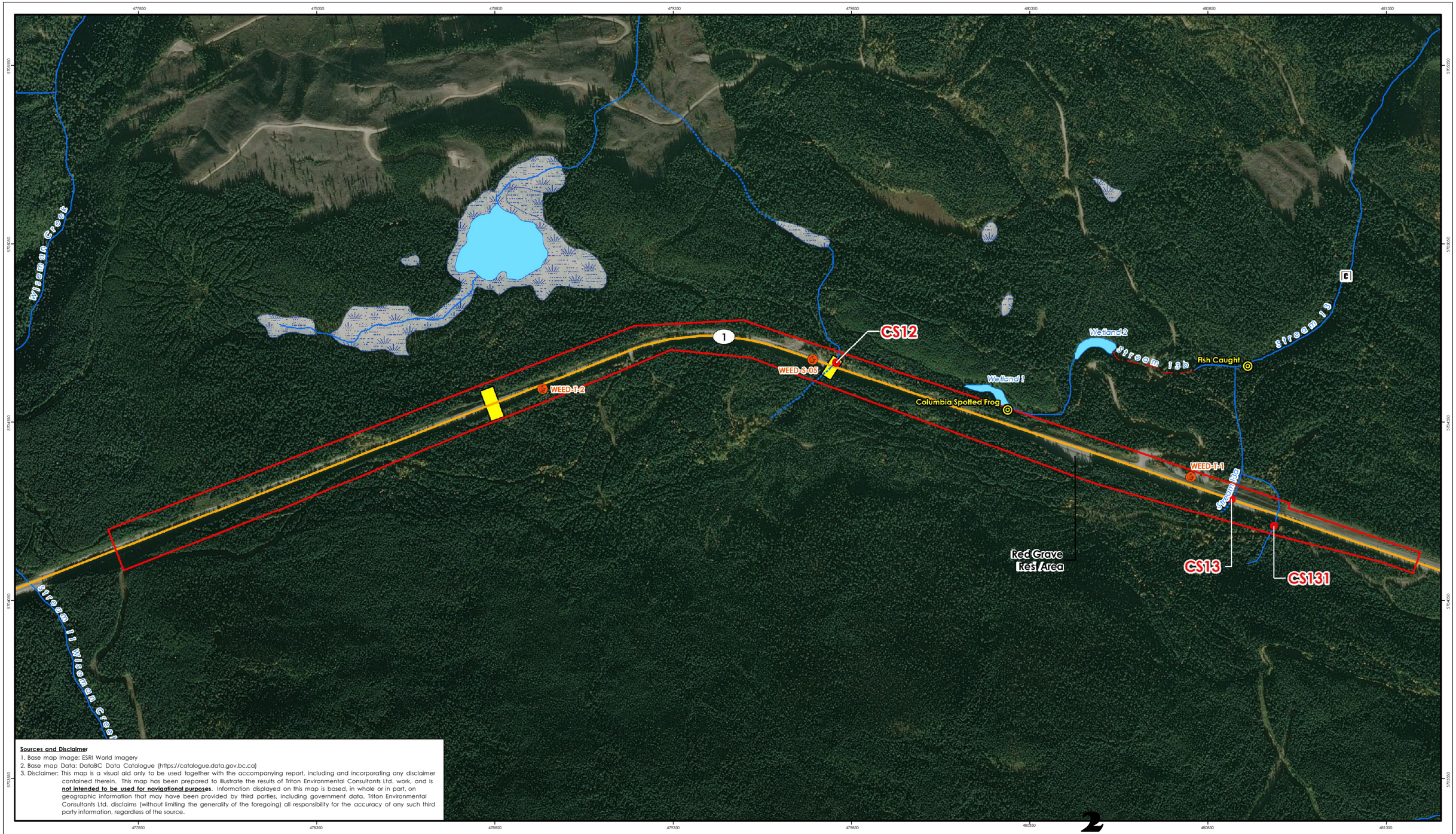
The Project Area was assessed by Stantec in 2018 and was concluded to be within the Golden moist warm Interior Cedar Hemlock Biogeoclimatic variant (ICHmw1), dominated by coniferous forest, with a mix of old, mature, and young forest. Old forest was adjacent to the north side of the Project from the western limit of construction to around the Red Grave Rest Area, while the south side is generally young forest. Stantec also concluded that there were three non-legal Old Growth Management Areas (OGMAs) that appear to minimally intersect with the northern border of the project footprint (Stantec 2018).

During the 2018 surveys, the key findings indicated that no wildlife species of conservation concern were detected within the study area, and no mineral licks, potential bat roosts, wildlife trails, movement corridors or bear dens were observed, but one potential mustelid den was identified. It was determined that the north-facing, steeply sloped areas of old forest within the Project Area were suitable bear denning habitat; however, the likelihood was low due to sensory disturbance from the TCH and snowmobile trail. It was also concluded that Bald Eagle and Osprey had the potential to occur within the study area; however, no protected stick nests were observed (Stantec, 2018).

The crew visited the proposed wildlife underpass locations (Figure 4), which were determined to be suitable for safer wildlife passage across the corridor. The crew identified three noxious weed species: Canada thistle (*Cirsium arvense)*, oxeye daisy (*Leucanthemum vulgare lam.)*, and hawkweed species (*Hieracium spp.*) within the Project Area (Table 8; Appendix 1, Photo 1). Incidentally, an adult Osprey was observed circling above the Project Area, though no stick nests were located. No species at risk, unique or rare plants or communities were identified during the 2019 surveys.

Table 8. Observed Noxious Weed Occurrences in the Project Area

Site ID	*Location*	*Common Name*	*Scientific Name*	*Year of Record*
WEED-T-1	West of Stream 13 TCH crossing; north side of TCH	Canada thistle	*Cirsium arvense*	2019
		hawkweed species	*Hieracium spp.*	2019
WEED-T-2	In proximity of the proposed wildlife underpass arch location	Canada thistle	*Cirsium arvense*	2019
		Oxeye daisy	*Leucanthemum vulgare lam.*	2019
		Hawkweed species	*Hieracium spp.*	2019



Sources and Disclaimer

1. Base map Image: ESRI World Imagery
2. Base map Data: DataBC Data Catalogue (https://catalogue.data.gov.bc.ca)
3. Disclaimer: This map is a visual aid only to be used together with the accompanying report, including and incorporating any disclaimer contained therein. This map has been prepared to illustrate the results of Triton Environmental Consultants Ltd. work, and is **not intended to be used for navigational purposes**. Information displayed on this map is based, in whole or in part, on geographic information that may have been provided by third parties, including government data. Triton Environmental Consultants Ltd. disclaims (without limiting the generality of the foregoing) all responsibility for the accuracy of any such third party information, regardless of the source.

Highway #1 Selkirk Mountain 4-Laning

Figure 4 - Stream and Environmental Features Map

Legend

- Cascade
- Noxious Weeds
- Observations
- Watercourse Crossing
- Highway
- Estimated Stream Location
- Non-Classified Drainage
- Watercourse
- Clearing and Right of Way Boundary
- Waterbody
- Wetland
- Wildlife Underpass

Meters
0 25 50 100 150 200 250

File Path: N:\ACTIVE\5917_MOTI_As_and_When_2018\MXD\Phase24\5917-24_Fig4_20201201.mxd

Project No:	5917-24
Date:	Dec 01, 2020
Scale:	1:10,000
Map Projection:	UTM Zone 11 (NAD 1983)

TRITON Environmental Consultants

5.2 Aquatic Assessment

In 2018, Stantec completed an assessment including Streams 12, 13, and 14 within the 2018 project footprint (Stantec, 2018)[2]. A subsequent assessment of potentially fish bearing watercourses (i.e. Stream 12, and 13) and one associated wetland (Wetland 1), was completed in the summer of 2019 by Triton, with a follow-up assessment in November on Stream 13. An additional study was completed in August 2021 to help determine if fish and amphibians were or could be present within watercourses and wetlands connected or adjacent to the Project area. The results from the aquatic assessments are described below. Two additional unmapped tributaries to Stream 13 were identified during the August 2019 and November 2019 assessments – Stream 13a and 13b; and a third was identified during the August 2021 assessment – Stream 13a1. Figure 4 and Figure 5 show the locations of the streams and additional environmental features. Wetland 1 is situated in the Project Area on the north side of the TCH between Stream 12 and Stream 13 and was visited in 2019 observe for amphibian presence. During the August 2021 work, Triton completed additional aquatic assessments on Stream 13 including fish habitat cards (RIC, 2008) and evaluation of stream/wetland connectivity, potential obstructions, and culverts. Five sites were also sampled on Stream 13 for fish and amphibian eDNA, including Wetlands 1 and 2.

5.2.1 Amphibian Observations and Wetland Assessment

The wetland between Streams 12 and 13 was visited to observe for amphibian presence and consider potential impacts from future construction works in the area. For the purposes of this report, this wetland has been labeled Wetland 1 (Figure 4). Wetland 1 is immediately adjacent to the existing highway and is largely a shallow, open-water wetland (Photo 2 – Appendix 1). Water depths were mostly shallow (<1 m) although areas of deeper water were present (>1 m). A variety of terrestrial and aquatic plants were present providing a diverse riparian area.

Adult Columbia Spotted Frogs (*Rana luteiventris*) were observed in and around the edge of the wetland near the outlet and a small back channel on the southeast end of the wetland (Photo 3). Wetland 1 is connected by Stream 13b, which connects to a second wetland (Wetland 2) approximately 320 m downstream of Wetland 1. The outlet of Wetland 2 connects to Stream 13, 390 m downstream. The presence (and species) of amphibians remains somewhat uncertain after eDNA sampling, however; during sampling for that work eight globular masses (potentially hatched out/broken down amphibian egg masses) were observed at both wetland sites.

In 2018, Stantec observed fish in Wetland 2. No observable barriers to fish migration into Wetland 1 were noted, except for what appears to be an old beaver dam at the outlet of Wetland 1 (Photo 4 – Appendix 1). However, during periods of higher water, overland flow connects the wetland to Stream 13b.

[2] Stream 14 is no longer included within the Project Area.

TRITON
Environmental Consultants

1326 McGill Road P 250.851.0023
Kamloops, BC V2C 6N6 F 250.851.0074

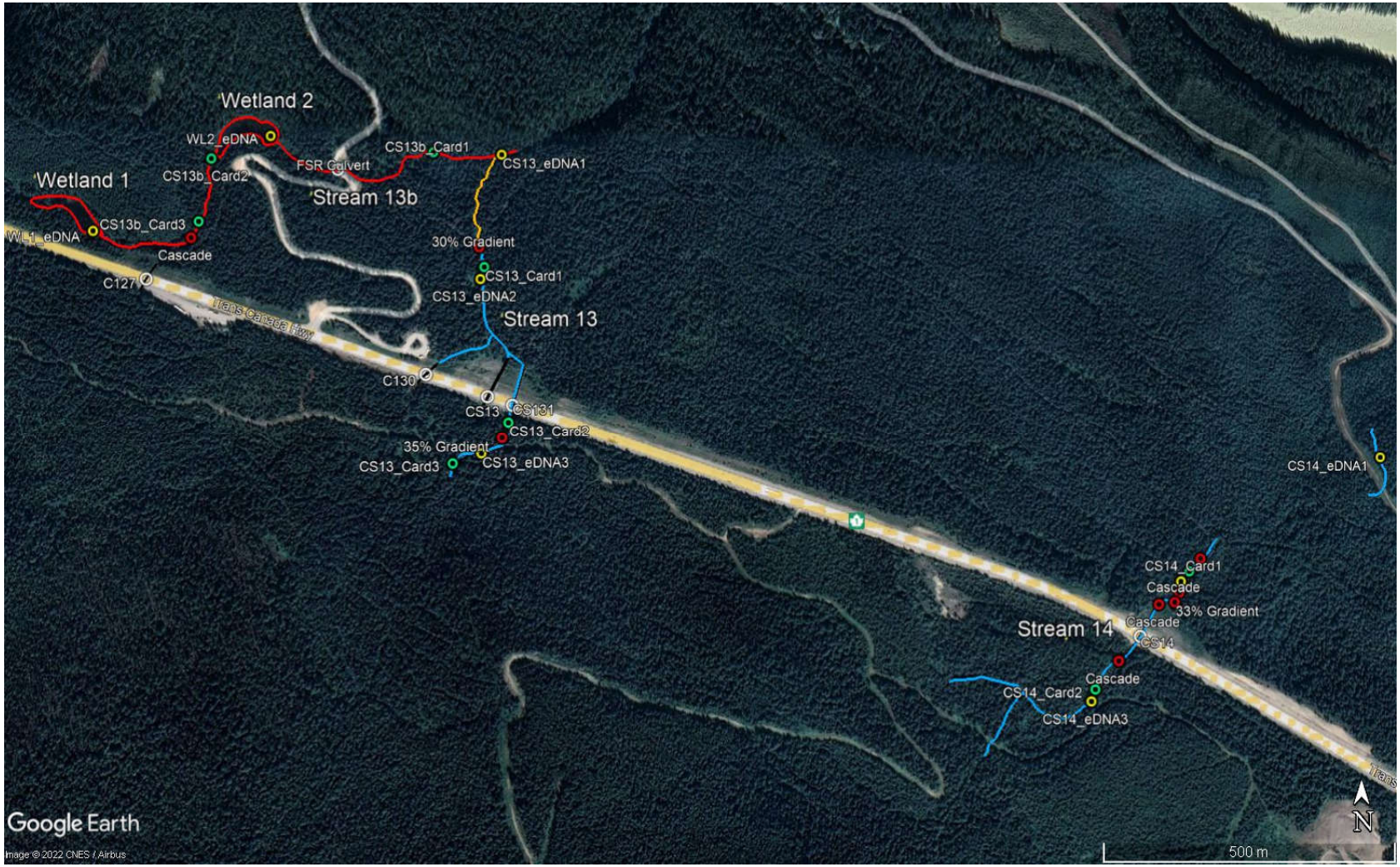


Figure 5. **Highway 1 – Selkirk Four-Laning Aquatic Assessment (August 4-6, 2021)**

Note: Fish bearing status: Fish-bearing = **red**, Inferred fish-bearing = **orange**, Non-fish-bearing = **blue**

5.2.2 Stream and Watercourse Assessment

The Project Area contained two streams (Streams 12 & 13) with a third (Stream 14) just outside of the current footprint to the east. All streams were tributaries to the Columbia River (Table 9). During the August and November assessments in 2019, two additional streams were identified, both connecting directly to Stream 13 (Stream 13a and 13b). The streams had widths ranging from 0.5 m to 2.5 m and gradients ranging from 2% to 15%. During the 2021 assessment a third tributary to Stream 13 was noted – Stream 13a1. This stream did not have water during the Nov 2019 assessment and is not considered fish bearing down to its confluence with Stream 13 due to a steep, poorly defined channel.

Stream 13 was confirmed fish bearing downstream of its confluence with Stream 13b, while the section between the confluence and an area of 30% grade ~150 m upstream was inferred fish bearing, and the final section between that location and the TCH, including tributaries 13a and 13a1 were classified as non fish bearing (Figure 5). The remaining Streams, 12 and 14, were also considered non fish bearing. Streams 12, 13, 13a and 13a1 crossed the THC through existing culverts and drained downslope 1.25 km - 2.04 km to the Columbia River. In the upper reaches, all watercourses were ephemeral in nature and would only contain significant flow during spring freshet or high rainfall events.

Table 9. Watercourses located during field assessments, August 20-21 and November 1, 2019; and August 4-6, 2021.

Unnamed tributaries to Columbia River	*Crossing Structure*	*Zone*	*Easting*	*Northing*	*Channel Width*	*Stream Class*
Stream 12 (300-890400)	CS12	11U	479736	5704814	>1.0 m	S6
Stream 13 (300-892200)	CS13	11U	480968	5704379	2.5 m	S3/S6
Stream 13a	C131	11U	481000	5704366	0.5 m	S6
Stream 13a1	C130	11U	480846	5704354	< 1.0 m	S6
Stream 13b	N/A	11U	480948	5704717	1-2.5 m	S3
Stream 14 (300-893035)	CS14	11U	447225	5670784	>1.5 m	S6

Stream 12: Unnamed Tributary to the Columbia River; WSC 300-890400

Stream 12 is an unnamed tributary which flows from south to north, under the TCH and eventually, into the Columbia River. Stream 12 was assessed in two locations. The first section assessed began at the outlet of the existing 900 mm TCH culvert on the north side of the highway and continued downstream for approximately 200 m. Habitat at the crossing was marginal and deteriorated further downstream (Photo 5). The stream lacked connectivity and channel definition throughout the assessed length with subterranean sections and areas where little or no scour was present. Where the channel was defined, it had a gradient of 3%, the bankfull width averaged 0.52 m and pool depths ranged from 0.03 m to 0.06 m. Fines were considered the dominant substrate with some small gravels present. Crown closure downstream of the TCH was 41% to 70%. Stream cover was primarily overhanging shrubs with undercut banks providing secondary cover.

Fish habitat critical to life history processes was considered poor near the TCH crossing. Rearing habitat was poor to moderate, with overhanging vegetation and small woody debris providing some stream cover. The major limiting factor is the shallow pools and channel being unlikely to support fish overwinter. Spawning habitat was very limited as substrate was dominated by fines. Further, reduced water levels, poor connectivity, and channel definition reduced the spawning and migration potential.

Electrofishing was performed downstream of the TCH crossing. The electrofishing effort was 122 seconds over a span of 103 m, capturing no fish. Very little water was present in the stream and overall connectivity was low. Fish access to the TCH is not considered likely due to frequent underground sections and lack of scour or continuous channel definition. As such, the stream is classified as non fish bearing (S6). This classification is consistent with the conclusion of Stantec (2018) which also reported no fish captured at Stream 12 during their sampling as well as sampling completed by Timberland (2001).

Stream 13: Unnamed Tributary to Columbia River; WSC 300-892200-

Stream 13 as mapped in Stantec 2018, was assessed on two separate occasions in 2019. During the initial assessment, the portion from the TCH to a bedrock cascade feature located 700 m downstream was assessed. During that assessment, an unmapped tributary (labelled 13b) was identified approximately 250 m from the TCH. That tributary provides connectivity to the wetlands discussed in section 5.2.1. The November assessment surveyed the stream upstream of the TCH to assess the potential for fish habitat upstream of the road. During that assessment, an additional unmapped tributary was identified which crosses the TCH at CS 131 and actually conveys the bulk of the flow for system and the mapped alignment of Stream 13 (Stantec 2018), which crosses the TCH at CS13 was found to be a non-classified drainage (NCD) upslope of the road with no defined channel and no potential fish habitat. For this reason, the stream flowing through CS13 is referred to and labelled as Stream 13a and the stream crossing through CS131 is referred to and labelled Stream 13. No fish access was possible at culvert CS13 as the culvert had a gradient of 24% and the water level was too low at the time of survey to allow fish passage. Gradients upslope of the culvert were 44%, too steep for fish access. Figure 4 shows the approximate alignment of Streams 13 and 13a and additional details on the downstream and upstream conditions are provided in the following sections.

Stream 13: Habitat Summary

Approximately 32 m downstream of the TCH crossing, Stream 13 is joined by a tributary, Stream 13a. The CS131 culvert was installed at approximately 15% which is too high a gradient to allow fish passage. Additionally, a "beaver buster" or debris catcher was installed on the inlet (Photo 7). Large boulders at the outlet also prevented access upstream (Photo 8). The channel of Stream 13 upslope of the TCH is incised to 1m. Just upstream of the inlet, the gradient increases to 45%. The channel width is 1.9 m, over widened due to large boulder/cobble substrate armouring the channel. At 30 m

upstream of the culvert, the gradient decreases to 28%, further decreasing to 10% at 40 m from the culvert. Upstream of this point, the substrate changes to fines/gravel and the channel width decreases to average 1.0 m. A rough logging road is crossed at 55 m upstream from the culvert. Sections of the stream in this area are well incised with banks to 1.0 m high. The morphology is a long riffle/run with few pools. Pools are maximum 10 cm deep where present. The stream roughly parallels the logging road for 80 m, flowing west. At 80 m, it turns to the southwest and continues with similar morphology for another 120 m where gradient increases to 20%. The substrate changes to boulder/cobble with some small woody debris present. Upstream 14 m, the gradient increases further to 35% with a boulder cascade morphology and continues at this gradient further upstream.

The habitat downstream of the TCH crossing to the confluence with Stream 13b was considered poor. The frequently undefined channel and low ephemeral water flow are not conducive to fish presence. Dewatered sections of channel were observed and present seasonal barriers to fish passage, although during periods of high flow, these sections would be passable. Habitat downstream of Stream 13b to the cascade was moderate with pools for holding and few small areas of spawning gravels were noted. This channel was well defined with cut and undercut banks. Substrates were gravel and fines with gravel dominating. At approximately 480 m downstream of the confluence, gradient increased to 40% and a bedrock cascade was encountered with a 55% gradient over 7 m (Photo 6). This feature is considered a barrier to upstream fish migration. The downstream assessment ended at the cascade.

Fish sampling was conducted upstream of the cascade feature to determine if the stream was fish bearing. Electrofishing for 144 seconds captured one Westslope Cutthroat Trout (Oncorhynchus clarkii lewisi). The fish was captured approximately 50 m downstream of the confluence of Stream 13 and 13b. Positive fish detections were also indicated by eDNA sampling at this point. Based on this result, Stream 13 is considered inferred fish bearing from the confluence upstream to a point approximately 300 m downstream of the TCH crossing at an area of 30% gradient. Upstream of this area fish have not been observed, caught, or detected (by eDNA) therefore this section of Stream 13 is considered non fish bearing including tributaries Stream 13a and 13a1. Stream 13b was not sampled, but due to the proximity of the confluence to the fish observation location in Stream 13, and historical records of fish observed in the upstream wetlands (Stantec, 2019) both of which also had positive detections for fish with eDNA sampling, Stream 13b is considered fish bearing. While fish are present upstream of the cascade on Stream 13, it is likely that feature is a barrier to upstream fish migration from the Columbia River. It is thought that the fish present above the cascade migrate down Stream 13b from the wetlands, where water depths are sufficient to provide year-round habitat.

Stream 13a: Downstream Habitat Summary

Habitat of Stream 13a at the TCH crossing was poor with undefined banks and large angular boulders adjacent to the culvert outlet. The channel became somewhat confined until the confluence with Stream 13, 32 m downstream from the culvert.

Downstream of this point, the channel became braided, disappeared underground intermittently, and water flow was low. The habitat improved downstream as the channel gained more definition. Water levels were reduced at the time of the assessment with depths ranging from 8 cm to 20 cm. The average channel width, where it was confined, was 2.5 m and the average gradient was 3%. The stream cover was predominantly overhanging vegetation and some undercut banks, and the substrate was dominated by gravel and fines. Downstream approximately 400 m from the CS131 culvert outlet, the flow increased due to the confluence of an unnamed tributary (labelled Stream 13b). This tributary was found to flow from a series of small upstream wetlands (labelled Wetland #1 and #2; Figure 4). The stream cover was predominantly overhanging vegetation and undercut banks, and the bed substrate was dominated by gravel and fines.

Stream 13a: Upstream Habitat Summary

The gradient of Stream 13a upstream of the TCH was 45% with a boulder/cobble substrate (Photo 9). This continued for 30 m where the gradient decreased to 10%. Substrates from this point onwards were fines/gravel and continued for approximately 200 m where the gradient increased to 35% (Photo 10). Habitat was minimal in this area with some very small spawning areas and shallow pools present. It is likely that this stream freezes in the winter, which when coupled with the steep gradient, precludes resident fish upstream of the highway.

Fish passage is not possible for either stream above the TCH. Currently, culverts CS13 and CS131 are installed at a very steep angle, precluding fish passage. Assessing the topography, it is likely that there was a steep slope or barrier before the road was constructed. This is further supported by the steep 45% gradient immediately upslope of the highway, which would be a barrier to fish passage.

Stream 13a1: Downstream Habitat Summary

This stream flows under the highway through culvert C130 (Figure 5) at a gradient of 25%. Stream 13a1 m did not have water during the Nov 2019 assessment and is considered non fish bearing down to its confluence with Stream 13 due to a steep, poorly defined channel.

<u>Stream 14: Unnamed Tributary to Columbia River; WSC 300-893035-</u>

Triton did not visit Stream 14 during the 2019 assessment due to time constraints and reduced priority with the stream being outside the Project Area. The Stantec assessment completed in 2018 visited Stream 14 upstream of TCH and found low habitat potential due to lack of connectivity and channel definition. This is congruent with the Timberland (2001 – See Stantec, 2018) assessment of inferred non fish bearing (S6).

6.0 Site-specific Recommendations and Mitigation

6.1 Site-Specific Recommendations

In addition to the general and site-specific recommendations and mitigation measures outlined in the following sections, it is critical that a Construction Environmental Management Plan (CEMP) be prepared for the Project prior to construction. The CEMP will be the responsibility of the major works contractor and will be submitted following contract award. This document will provide detailed site-specific and general mitigation measures and Best Management Practices which pertain the works, and that are beyond the scope of this EIA. In addition to measures outlined below, and those to be provided in the CEMP, measures to protect the environment during construction which are outlined in *Section 165 of the Ministry of Transportation and Infrastructure's 2016 Standard Specifications for Highway Construction* (MOTI, 2016) will be adhered to during construction.

6.1.1 Birds

The proposed works will result in the clearing of additional vegetation to allow for the highway to be widened. As a result, there will be the potential for loss of foraging and nesting habitat which that vegetation may have provided. To reduce the potential effects, vegetation clearing will be minimized and completed outside of the breeding bird period where possible (see section 6.1.1). Clearing and grubbing limits will be clearly flagged in the field to ensure there is no additional encroachment on surrounding areas. The clearing will parallel the existing highway. The destruction of active bird nests is prohibited under the *Migratory Birds Convention Act* and the *Wildlife Act*. If it is not possible to schedule all vegetation clearing activities outside of this window (Zone A3 - Forested, approximately April 11 – August 23) (ECCC, 2016), a bird nest survey is required to identify any active nests and establish appropriate setback distances before clearing any vegetation.

In addition, the stick-nests of certain species (eagle, Peregrine Falcon, Gyrfalcon, Osprey, and heron) as well as burrows of the Burrowing Owl are protected even when unoccupied under the *Wildlife Act*. No stick nests were observed within the Project's right-of-way during this or any of the previous surveys, however given the proximity to the Columbia River a dedicated stick-nest survey prior to construction is required. If active stick nests are present during construction, an appropriate setback distance will be established by a Qualified Environmental Professional (QEP) and an Environmental Monitor (EM) will be required during construction activities to ensure that the birds are not disturbed. Activities such as blasting have the potential to disturb active nests within a 1 km radius (Province of British Columbia, 2013). As a result, behavioral monitoring and acoustic monitoring during blasting may also be required. Where possible, the removal of vegetation, especially large trees and snags must be minimized as these provide important nesting habitats.

6.1.2 Wetlands

One wetland (Wetland 1) was identified within the Project Area, west of the Red Grave Rest Area (Figure 4). This wetland will be identified in the contract tender documents as an Environmentally Sensitive Area (ESA). Although Project drawings show the Project Area extending into mapped wetted area of Wetland 1, highway expansion will occur in the other direction from the wetland, clearing and grubbing is always planned to occur ~13 m (or more) from the mapped wetted boundary, and no wetland vegetation is expected to be lost. Photo 2 and Photo 11 in Appendix 1 show Wetland 1 with trees growing to the edge. Several other wetland areas are located north of the project footprint (Stantec 2018) however none are expected to be impacted by the proposed works given that they are more than 250 m away. Mitigation measures required for any wetland areas potentially impacted would include:

- Install exclusion fencing to isolate the construction site and prevent additional amphibians from reaching moving into the construction area.
- Sediment control (i.e. silt fencing) will be installed at the outer limits of the construction area to prevent sediment from entering the wetland.
- A QEP will perform an amphibian survey prior to any construction to identify and salvage any amphibians which may be present.
- Limit vegetation removal or grubbing near streams, wetlands, and other wet areas where feasible.
- Direct grading away from wetlands and stockpile materials away from wetlands.
- If construction is close to the wetland/stream areas, to prevent ground disturbance in softer soils or wetlands, use a protective material such as matting or geotextile between construction equipment and ground surface or vegetation. All protective material to be removed at the completion of construction.

6.1.3 Species-at-Risk

No species-at-risk were observed in the Project Area during the field assessment. However, there is potential for species-at-risk to be present. In the event site personnel encounter a species-at-risk within the construction footprint, the following general procedures will be implemented:

- Flag the location and notify the EM or Construction Supervisor.
- Cease operations until directed by the EM or Construction Supervisor.
- Additional mitigation measures or a new construction approach (e.g., relocation of certain activities) may be necessary, and will be developed in consultation with the EM, Ministry Representative and Construction Supervisor.
- Observations of species-at-risk within the Project Area will be reported to the EM, the Construction Supervisor, and to the BC Conservation Data Centre.

6.1.3.1 Little Brown Myotis & Northern Myotis

The range of the SARA listed little brown myotis and northern myotis is known to overlap within the Project Area, though there are no recorded sightings of either species in the Project Area. These species may utilize the old growth forests close to the Project Area and the Columbia River north of the Project Area. Appropriate mitigation strategies will be required within the Project Area during construction. *Best Management Practices for Bats in British Columbia* (MOE, 2016) outlines general phases involved in Environmental Management Plan (EMP) implementations: assessment, planning, avoidance, and mitigation. EMPs will include:

- Timing windows: Removal of trees can result in the loss of roosting habitat for bats. Where possible, avoid clearing forested habitat during the bat maternity season when females and their pups are present (June 1 – September 1) to reduce bat fatality.
- Inspection: Prior to removing trees during maternity season, it is recommended that a sweep of large live, dead, or dying trees with hollows and cavities be completed for bat colonies. Do not cut trees that are used by bats during the season of use. The sweep can be completed in conjunction with any bird nest surveys for efficiency. Any identified roosting trees will be flagged and buffered for remainder of maternity season.
- During construction ensure that there is proper drainage around areas to be cleared so as not to create wetted areas of pooled water that might increase insect populations and attract bats.

6.1.3.2 Fisher

The Fisher is a Blue-listed species in British Columbia. Fishers occur primarily in dense coniferous or mixed forests and are associated with riparian areas. Dens are constructed in tree hollows, and large snags are important for maternal den sites. The following measures will be applied to the Project to mitigate any potential negative effects to Fishers that may be located in the Project Area:

- Retain large dbh (>50 cm) snags and wildlife trees, especially black cottonwood, outside of the immediate project footprint wherever possible.
- Inspect trees prior to removal to ensure that no dens are present.
- Clear and grub lines will be tightened as much as practical to avoid unnecessary clearing/mature tree removal.

6.1.3.3 Caribou

Due to the disturbed and fragmented nature of potential Caribou habitat within the Project Area, as well as the extirpated status of the local population unit, it is unlikely that Caribou will be directly impacted by the proposed Project development. However, mitigation strategies to reduce the effects of Project development on Caribou should they exist in the Project Area will include:

- In the event that Caribou are observed within the vicinity of the Project Area, the Contractor's EM will be notified immediately and a site-specific Caribou management plan will be developed to be implemented during periods of active construction.
- Reclaim disturbed areas as soon as practicable following construction.
- Report sightings of Caribou to the CDC.

6.1.3.4 Grizzly Bear

Grizzly Bears are known to utilize several different habitat types throughout the year, and move around seasonally in search of food sources, mates, and denning sites. Specific mitigation measures to reduce the effects of the Project during and post-development will include:

- Pre-clearing bear den surveys will be undertaken if clearing work is scheduled to occur within the denning period (November1 to March 31) (MOECC, 2018).
- Removal of attractants such as food wastes from the Project Area on a routine basis.
- Use vegetation clearing to reduce berry species that may attract bears to the edge of the highway during late summer.
- Report problem animals to a Conservation Officer.

6.1.4 Aquatic Resources

The Project design factors in 200 year returns for structures which includes substantially larger capacity than is currently in place. This mitigates the risk of impacts from future flood events. The hydrology of the systems in general includes low discharge with no evidence of previous high flow events suggesting overall risk is low in that regard. Project activities have the potential to cause direct impacts to fish habitat including habitat loss or alteration of habitat through widening of the right-of-way into aquatic habitat or altering connectivity to upstream or downstream habitat. Indirect impacts such as sensory disturbance during construction are also possible. Construction works have the potential to impact water quality from sedimentation or other deleterious substances being released into watercourses during construction activities. All necessary approvals and/or authorizations for works in and around watercourses are required to be obtained and activities will comply with the terms and conditions of approvals. This includes, but is not limited to, the following:

- *Water Sustainability Act* Section 11 authorization or approval
- *Water Sustainability Act* Section 10 short term use permit
- Scientific Fish Collection Permit

In addition to project approvals, instream works will adhere to regional instream works windows for the Kootenay Region. All the streams are either fish bearing or are tributaries to fish bearing streams downstream of the Project Area. BMPs for protection of the aquatic environment will be adhered to during instream works. This will include

Requirements and Best Management Practices for Making Changes In and About a Stream in British Columbia (Government of BC, 2022). Site specific erosion and sediment control plans as well as a plan to manage and protect water quality during construction will need to be developed as part of the project CEMP. Although none of the streams or tributaries within the project area are considered fish bearing, and construction may not impact these streams, sediments may be transported downstream during construction and mitigation measures should be implemented.

Due to the proximity of the project footprint to, and resulting potential to disturb, Stream 12, and 13, and/or the Stream 13 tributaries, a request for review of the Project was submitted to DFO. DFO reviewed the project and issued a letter of advice on Oct 23, 2023 (File #23-HPAC-00769) concluding no harmful alteration, disruption, or destruction (HADD) of fish habitat.

Other mitigation measures will be employed to protect water quality and prevent the introduction of deleterious substances to instream habitats, including spills of hydrocarbons. BMPs outlined in *A Field Guide to Fuel Handling, Transportation, and Storage 3rd Edition* (MWLAP and MOF, 2002) and in *Section 165 of the Ministry of Transportation and Infrastructure's 2016 Standard Specifications for Highway Construction* (MOTI, 2016) will be followed to ensure adequate fuel handling and spill response during Project Activities. Further, the CEMP shall have a section dedicated to proper fuel handling and emergency spill response.

6.2 Site-specific mitigation measures

6.2.1 Vegetation Clearing

Clearing and grubbing is expected to occur on both sides of the ROW throughout all Segments of the Project (101-107). As per MOTI (2018) Section 165.05, a cutting permit will be required prior to the removal of any timber.

Drawing R2-1041-106-(Station 182+60) shows the 18 m long 900mm CSP is being replaced with a new 27 m long clear span bridge. This will result in temporary vegetation clearing 12 m upstream and 20 m downstream beyond the new structure to facilitate construction. The new bridge will accommodate the unnamed tributary stream, large mammal passage on either side of the stream and see 18 m of closed culvert converted to open vegetated channel. Drawing R2-1041-110-(Station 193+80) shows culvert CS130 will be replaced. This will in additional temporary vegetation clearing 5 m upstream and 5 m downstream beyond footprint of culvert to facilitate installation. Drawing R2-1041-110-(Station 195+60) shows a new culvert will replace both CS13 and CS131. This work will result in additional temporary vegetation clearing 3m upstream and 5m downstream beyond footprint of culvert to facilitate installation.

All temporary riparian clearing areas will be re-vegetated upon completion of works. When taking into consideration the 3 crossings combined, ~80m of culvert is being

converted from closed system to open vegetated channel; mostly attributable to the deep culverts being abandoned on Drawing R2-1041-110

The following mitigation strategies will be applied to clearing and grubbing activities during and after development to mitigate potential effects to wildlife:

- Clearing and grubbing limits will be clearly flagged in the field to ensure there is no encroachment outside of project boundaries and a boundary of ~13 m will be maintained between the mapped boundary of Wetland 1 and clearing and grubbing limits at all points.
- Vegetation clearing must occur outside of the breeding bird window (April 11 – August 23). If clearing is to happen within the window, a nest survey will be completed by a QEP proficient in bird breeding surveys prior to all clearing works.
- If tree falling is to occur after March 1, stick nest surveys should be performed to identify any potential nests for raptors and herons. Species like bald eagles do start nesting earlier in the season. If nests are found, they need to be marked and brought to the attention of the construction supervisors and MOTI.
- Use vegetation clearing to reduce browse plant species along edge of Highway that may attract ungulate species during winter months.
- Use vegetation clearing to reduce berry species that may attract bears to the edge of the highway during late summer.
- Any wildlife trees (particularly black cottonwood) and snags outside of the project footprint will be retained as these provide valuable habitat for cavity nesting birds, bats, and small mammals.

6.2.2 Blasting

Blasting is expected to occur within several Segments of the Project Area following the guidelines of MOTI (2018) Section 165.07.03. The following considerations apply to blasting activities:

- Prior to blasting activities, a dedicated stick nest survey will be performed to identify any stick nests that may be located within 1 km of blasting activities.
- Should an active stick nest be identified, an appropriate setback distance must be established by a QEP. An EM will be required to conduct behavioural and acoustic monitoring during blasting activities to ensure that birds are not disturbed.
- A general wildlife sweep will be conducted prior to the blast to determine if any wildlife is present in the vicinity (200 m radius) of the blast.

6.2.3 Culvert Removal and Installation

Culvert works are anticipated to occur within all segments of the Project following guidelines set out in MOTI (2018) Section 165.10. To protect fish habitat in the fish bearing streams and downstream fish habitat from the introduction of sediments and other deleterious materials, the following BMPs and mitigation measures will be employed:

- Follow BMPs outlined in the Requirements and Best Management Practices for Making Changes In and About a Stream in British Columbia guidance and the Appendix to the same (Government of BC, 2022).
- Follow BMPs outlined in Standards and Best Practices for Instream Works (MOTI, 2018).
- Maintain downstream flow at all times.
- Avoid in-stream works during periods of high flow (spring).
- Ensure that appropriate and effective sediment and erosion control methods and materials are put in place to reduce the risk of sediment introduction to downstream habitats.
- Incorporate spillways, armouring and check dams as required to mitigate the potential for erosion and conveyance of deleterious substances to downstream aquatic habitats.
- A wildlife underpass arch and a wildlife underpass bridge are to be installed at two locations along the Project Area (Stations 17+300 and 18+200) to allow for potential wildlife passage. Install will adhere to the Selkirk Designs Issued for Environmental Regulatory Approvals and in consultation with the project EM.

6.2.4 Fuel Storage and Handling

- Ensure proper fuel handling and storage methods are employed and follow BMPs and guidelines set forth in CEMP and *A Field Guide to Fuel Handling, Transportation, and Storage 3rd Edition* (MWLAP and MOF, 2002), and *Section 165.13 of the Ministry of Transportation and Infrastructure's 2016 Standard Specifications for Highway Construction* (MOTI, 2018).
- Ensure all refuelling and fuel storage occurs at least 30 m from watercourses and wetted areas.

Invasive Plant Species

To reduce the spread of noxious weeds and other invasive species within the Project footprint, the following mitigation strategies will be employed following guidelines set out in MOTI (2018) Section 165.14:

- A QEP will perform a site sweep prior to any construction to identify any noxious or invasive plants which may be present.
- Undercarriages, tracks, and blades of equipment will be visually inspected prior to entry onto the construction site and when vehicles are leaving the site, and all weed matter must be removed and disposed of appropriately.
- Invasive plant species will be contained separately from other vegetative refuse and placed in containment which is identified as invasive species prior to off-site disposal at an approved facility.
- Disturbed soils will be re-vegetated where required and as soon as possible, with appropriate seed mixes.

7.0 Conclusion

The proposed Project footprint includes an area that is largely disturbed and is classified as a "maintained corridor" and consisting largely of existing Highway ROW. Potential harmful effects to the environment due to project development can be mitigated through the use of Best Management Practices and the implementation of effective site-specific mitigation measures developed for specific project activities, some of which are outlined above. Development and implementation of a project-specific CEMP which addresses all environmental concerns that apply to the scope of the Project is critical. A QEP will be available throughout the duration of the Project to aid in the development of such mitigation strategies for the protection of wildlife and aquatic resources, and to address specific situations as they arise. Downstream hydrology will not be changed, and all flows will be maintained downstream of the Project Area during construction. Overall, long-term effects of the Project are considered mitigatable. Any residual cumulative effects of the Project would be limited to the loss of vegetation and the potential foraging and nesting habitat associated. Given that no unique features that would be considered limiting on the landscape were identified, and the abundance of forested areas within the surrounding region, the incremental loss and associated impact of the Project is considered minor. In addition, the implementation of wildlife fencing along the project area will improve safety for both motorists and wildlife alike.

8.0 References

[CDC] BC Conservation Data Centre. 2010a. Species Summary: *Anaxyrus boreas*. BC Ministry of Environment. Available: http://a100.gov.bc.ca/pub/eswp/speciesSummary.do?id=16554 (accessed Oct 30, 2019).

[CDC] BC Conservation Data Centre. 2010b. Species Summary: *Pekania pennanti.* BC Ministry of Environment. Available: http://a100.gov.bc.ca/pub/eswp/speciesSummary.do?id=17481 (accessed Oct 20, 2019).

[CDC] BC Conservation Data Centre. 2014. Species Summary: *Myotis septentrionalis*. BC Ministry of Environment. Available: http://a100.gov.bc.ca/pub/eswp/speciesSummary.do?id=16442 (accessed Oct 20, 2019).

[CDC] B.C. Conservation Data Centre. 2015. Species Summary: *Myotis lucifugus*. B.C. Ministry of Environment. Available: http://a100.gov.bc.ca/pub/eswp/speciesSummary.do?id=14375 (accessed Oct 30, 2019).

[CDC] BC Conservation Data Centre. 2019. BC Species and Ecosystems Explorer. B.C. Ministry of Environment. Victoria, B.C. Available: http://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/conservation-data-centre/explore-cdc-data/species-and-ecosystems-explorer (accessed Aug 15, 2019).

BC Ministry of Environment, Lands and Parks. Western Grebe: Low breeding numbers and threats to their nesting colonies put these birds at risk. Accessed at: http://www.env.gov.bc.ca/wld/documents/westgrebe.pdf

Clevenger, A.P., M.A. Sawaya, E.L. Landguth, B.P. Dorsey, R. Klafki. 2019. Mitigation assessment for the Trans-Canada Highway (Revelstoke to Golden): Improving motorist safety and meeting wildlife movement needs across the Columbia Mountains, British Columbia. Final report to British Columbia Ministry of Transportation and Infrastructure, Kamloops, British Columbia.

[CMN] Wildlife Tree Stewardship Program (2019). Nest Tree Report. The Community Mapping Network. Available: http://www.cmnmaps.ca/wits/ accessed: August 2019.

Davidson, P.J.A., R.J. Cannings, A.R. Couturier, D. Lepage, and C.M. Di Corrado (eds.). 2015. The Atlas of the Breeding Birds of British Columbia, 2008-2012. Bird Studies Canada, Delta, B.C. < http://www.birdatlas.bc.ca/ e > [2019 Sep 30].

[DFO] File 23-HPAC-00769, Letter of Advice (2023) Highway 1 – Selkirk Mountain Four-Laning Project – Implementation of Measures to Avoid and Mitigate the Potential for Prohibited Effects to Fish and Fish Habitat.

eBird. 2019. eBird: An online database of bird distribution and abundance [web application]. eBird, Ithaca, New York. Available: http://www.ebird.org. (Accessed: September 30 2019).

[ECCC] Environment and Climate Change Canada. 2016. General Nesting Periods of Migratory Birds in Canada. Available at: https://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=4F39A78F-1#_fig02_1

Environment Canada. 2015. Recovery Strategy for Little Brown Myotis (Myotis lucifugus), Northern Myotis (Myotis septentrionalis), and Tri-colored Bat (Perimyotis subflavus) in Canada [Proposed]. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. ix + 110 pp.

Environment Canada. 2014. Recovery Strategy for the Woodland Caribou, Southern mountain population (*Rangifer tarandus caribou*) in Canada [Proposed]. *Species at Risk Act* Recovery Strategy Series. Environment Canada, Ottawa. viii + 68 pp.

Meidinger, Del and Pojar, Jim. 1991. Ecosystems of British Columbia. B.C. Ministry of Forests.

[MOF] BC Ministry of Forests. 2002. A Field Guide for Site Identification and Interpretation in the Nelson Forest Regions, Ministry of Forest, Forest Science Program, Victoria, BC. Accessed at: http://best-practices.ltabc.ca/media/resources/baseline-documentation/BC_GOV_Field_Guide_Book_Nelson_Forest_Region.pdf

[MFLNRO] BC Ministry of Forests, Lands and Natural Resource Operations. 2012. British Columbia Grizzly Bear Population Estimate for 2012. Accessed at: http://www.env.gov.bc.ca/fw/wildlife/docs/Grizzly_Bear_Pop_Est_Report_Final_2012.pdf

[FLNRO] British Columbia Ministry of Forests, Lands and Natural Resource Operations, Invasive Alien Plant Program. 2019. Invasive Alien Plant Program Application Web tool. Accessed December, 2019 at: https://maps.gov.bc.ca/ess/hm/iapp/

[MOE] Ministry of Environment. 2016. Best Management Practices for Bats in British Columbia. Accessed at: http://a100.gov.bc.ca/pub/eirs/viewDocumentDetail.do?fromStatic=true&repository=BDP&documentId=12460

Ministry of Environment and Climate Change Strategy, Ecosystems Branch. 2018. Wildlife Habitat Features Field Guide (Kootenay Boundary Region). Accessed at: https://www2.gov.bc.ca/assets/gov/environment/natural-resource-policy-

legislation/legislation-regulation/frpa-pac/wildlife-habitat-features/whf_field_guide_kootenay_boundary_grizbearden.pdf

[MOTI] Ministry of Transportation and Infrastructure and Infrastructure. 2018 Standard Specifications for Highway Construction. Volume 1. Section 165 - Protection of the Environment.

[MWLAP] BC Ministry of Water, Land and Air Protection. 2002. Grizzly Bears in British Columbia. Ecology, Conservation, and Management. Accessed at: http://www.env.gov.bc.ca/wld/documents/grzzlybear.pdf

[MWLAP and MOF] British Columbia Ministry of Water, Land, and Air Protection and Ministry of Forests. 2002. A Field Guide to Fuel Handling, Transportation, and Storage 3rd Edition. Victoria, BC.

Government of British Columbia. 2022. Requirements and Best Management Practices for Making Changes In and About a Stream in British Columbia. Version 2022.01. https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/wsa-cias-requirements-bmps.pdf

Province of British Columbia. 2013. Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia (2013). http://www.env.gov.bc.ca/wld/BMP/bmpintro.html#second_

Province of British Columbia, 2019. iMapBC. Accessed at: https://maps.gov.bc.ca/ess/hm/imap4m/

Province of British Columbia, 2019a. Habitat Wizard. Accessed at: http://maps.gov.bc.ca/ess/hm/habwiz/

Province of British Columbia, 2019b. Fisheries Inventory Data Query. Accessed at: http://a100.gov.bc.ca/pub/fidq/viewWatershedDictionary.do

Province of British Columbia, 2019c. Wildlife Accident Reporting System. Accessed at: https://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/environmental-management/wildlife-management/wildlife-accident-reporting-system

Stantec Consulting Ltd. 2018. Selkirk Mountain Four-Laning Environmental Overview Assessment. Prepared for: Ministry of Transportation and Infrastructure.

Timberland (Timberland Consultants Ltd.). 2001. Reconnaissance (1:20,000) Fish and Fish Habitat Inventory of West Bench Study Area. WSC: 300. Prepared by Timberland Consultants Ltd. Prepared for Evans Forest Products Ltd. Golden BC.

Triton, 2019. Selkirk 4-laning – Stream Assessment Memo. Selkirk 4-lane expansion – Stream 13 Assessment. Prepared for Brent Persello, Provincial Manager, Environment, Ministry of Transportation and Infrastructure.

Triton, 2019. Selkirk 4-laning – Stream Assessment Memo. Re: Aquatic Resources Review and Recommendations. Prepared for Brent Persello, Provincial Manager, Environment, Ministry of Transportation and Infrastructure.

Triton, 2022. Highway 1 - Selkirk Four-Laning Aquatic Assessment Follow-up Memo. Prepared for Brent Persello, Provincial Manager, Environment, Ministry of Transportation and Infrastructure.

Personal Communication:

Mr. Brent Persello, Provincial Manager, Environment, Ministry of Transportation and Infrastructure.

Appendix 1
Photographs

Photo 1: Patch of Canada Thistle (*Cirsium arvense*) located near the proposed wildlife underpass arch location.

Photo 2: Wetland 1. SE section looking NW.

Photo 3: Adult Columbia Spotted Frog observed in Wetland 1.

Photo 4: Potential old beaver dam at the outlet of Wetland 1. Overgrown with vegetation. Signs of overland flow.

Photo 5: Stream 12 downstream of the TCH crossing looking upstream. Start of the dewatered section.

Photo 6: 55% bedrock cascade on Stream 13.

Photo 7: Beaver buster or debris catcher installed on the inlet of culvert C131, Stream 13.

Photo 8: Large boulders at the outlet of culvert C131, Stream 13.

Photo 9: Stream 13a upstream of the TCH - 45% gradient with boulder/cobble substrate.

Photo 10: Increase in gradient to 35% of Stream 13a.

Photo 11. View of Wetland 1 from Highway 1 looking NW.