



**REPORT**

# Cariboo Road Recovery Project

*Quesnel-Hydraulic Environmental Overview Assessment for Online Option -  
Bank Erosion Protection Works*

Submitted to:

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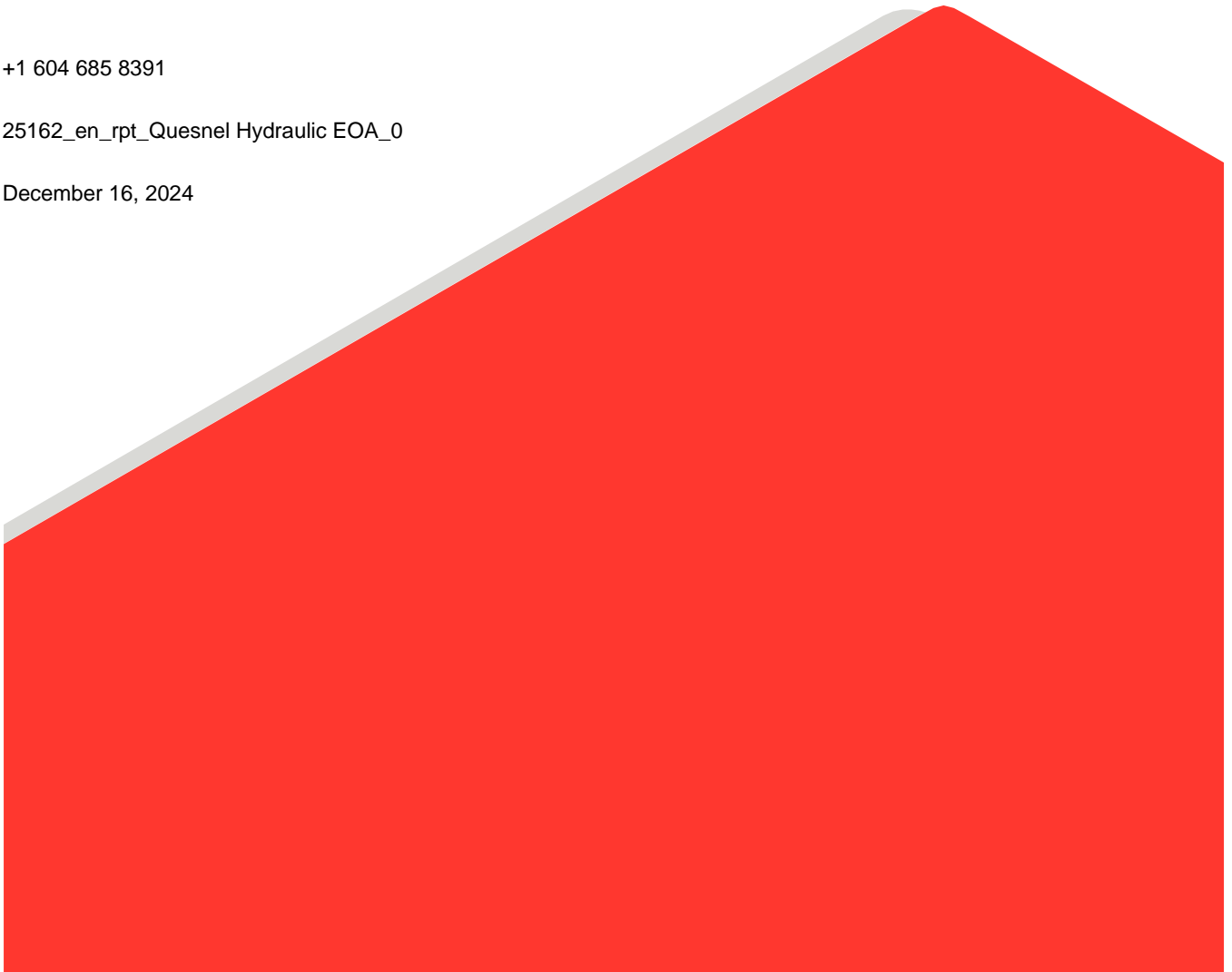
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## 1.0 INTRODUCTION

WSP Canada Inc. (WSP) has prepared an Environmental Overview Assessment (EOA) for the Quesnel-Hydraulic Road Online Option (the Project) near Quesnel, BC. The Project is part of the Cariboo Road Recovery Projects (CRRP) program that is being undertaken by the British Columbia Ministry of Transportation and Infrastructure (MoTI). The Project is located near Quesnel BC, within the Cariboo Regional District, along the Quesnel River, approximately 20 km southeast of the City of Quesnel (the Site).

This document summarizes the results of desktop findings and a biological field assessment, discusses potential sensitive environmental features and mitigation to protect those features during Project works, and outlines the environmental regulations and processes that are applicable to the Project.

### 1.1 Project Description

Bank erosion protection work at the Quesnel River was conducted by MoTI in 2023 in response to a slide event from Spring 2020 that caused the closure of Quesnel-Hydraulic Road. The work involved recontouring of the bank and placement of rip rap along an approximately 450 m linear section of the left downstream bank (LDB) of the Quesnel River. This interim work was completed to enable MoTI to reopen the road as a single lane alternating traffic (SLAT) road while alternate route options were investigated. It has now been determined that the best access option is to keep Quesnel-Hydraulic Road open through the slide area; this will be accomplished by realigning the road to the east (i.e., towards the river). As part of the realignment, MoTI is proposing to conduct additional rip rap placement along an approximately 130 m linear section downstream of the existing work area (Figures 1 and 2).

## 2.0 OVERVIEW ENVIRONMENTAL ASSESSMENT METHODS

### 2.1 Establishment of Environmental Assessment Areas

The environmental assessment areas considered in this EOA are as follows:

- **Site:** consists of the instream bank protection alignment footprint in the Quesnel River and the section of Quesnel-Hydraulic Road where realignment of the road is proposed. The Project Footprint encompasses the area where direct potential Project interactions with environmental features are possible.
- **Project Area:** consists of the Site extents plus a 100 m buffer. The Project Area is used to characterize the existing environmental setting of the Project.
- **Study Area:** consists of the Site extents plus a 5 km buffer. The Study Area represents a wider area to gain context about the Site and Project Area and potential for species at risk and species of conservation concern.

The background information review considered both the broader Study Area and Project Area. Field surveys were limited to the Project Area.

### 2.2 Review of Existing Information

Information and data used in this OEA was collected through a review of publicly available databases and search engines, including local, regional, and federal government reports, websites, and databases. The information review focused on the following resources:

- Province of BC Habitat Wizard (Government of BC (GOV BC) 2023a)
- Province of BC iMap BC (GOV BC 2023b)
- Fisheries Inventory Data Query (GOV BC 2032c)
- DFO Critical Habitat Mapping (DFO 2023)
- BC Ministry of Environment Species and Ecosystem Explorer (BC CDC 2023a) and individual species Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Conservation Reports and Recovery Strategies
- Federal Species at Risk Act Public Registry (Government of Canada 2023)
- eBird online database of bird observations (eBird 2023)
- Wildlife Tree Stewardship (WiTS) Atlas of Raptor Nests (WiTS 2018) and Great Blue Heron Nesting Atlas (GBHMT 2018)

A desktop assessment was conducted to identify the presence of watercourses within the Project Area using 1:20,000 maps obtained from iMapBC (GOV BC 2023b). The desktop assessment also identified fish species that have been historically identified in Quesnel River using the Habitat Wizard and Fisheries Information Summary System (FIDQ) GOV BC 2023a, 2023c). Critical habitat and potential for fish species at risk to occur was considered within the Project Area using DFO Critical Habitat Mapping (DFO 2023).

## 2.3 Species at Risk

Species at risk (SAR) and species of management concern information in BC is available from both provincial and federal sources. Federal species ranking is conducted by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), established under Section 14 of the *Species at Risk Act* (SARA). Schedule 1 of SARA provides the official list of SAR (Government of Canada 2002). Under the COSEWIC system, species are ranked as Extinct, Extirpated, Endangered, Threatened, Special Concern, Data Deficient, or Not at Risk. The BC CDC assigns a provincial rank or listing of red, blue, or yellow to a species based on its status within BC. The BC CDC also assigns these rankings to plant communities. Definitions of federal and provincial conservation statuses for SAR and species of management concern is provided in Table 1 below.

**Table 1: Provincial and Federal Conservation Status Definitions**

Agency	Status	Definition
COSEWIC and SARA (Federal)	Endangered (E)	A species facing imminent extirpation (no longer exists in Canada) or extinction (no longer exists).
	Threatened (T)	A species likely to become endangered if limiting factors are not reversed.
	Special Concern (SC)	A species that is particularly sensitive to human activities or natural events but is not endangered or threatened.
	Not at Risk (NAR)	A species that has been evaluated and found to be not at risk.
	Data Deficient (DD)	A species for which there is insufficient scientific information to support status designation.
BC CDC (Provincial)	Red	Any indigenous species, subspecies, or plant community that is extirpated, endangered, or threatened in BC.
	Blue	Any indigenous species, subspecies, or community considered to be of special concern in BC. Blue-listed elements are at risk, but are not extirpated, endangered, or threatened.
	Yellow	Any indigenous species, subspecies, or community considered to be secure in BC. Encompasses all those not listed as red or blue.

Source: BC CDC 2023.

Spatial data of the locations of previously recorded SAR occurrences (referred to as element occurrences) and designated critical habitat parcels are available from the BC Conservation Data Centre (CDC) through the Government of BC iMapBC mapping tool. iMapBC contains layers for both masked secured occurrences and non-sensitive element occurrences for SAR sightings. Sensitive element occurrence records (i.e., masked records) are SAR sightings that have no information provided on the species recorded in the public database and masks the precise locations of the observation to protect the species or for proprietary reasons. For example, known snake hibernacula are preferentially kept hidden from the public to protect these sensitive habitat features. Additional information can be requested from the BC CDC for masked occurrence records if required for a project and by signing a confidentiality agreement. Non-sensitive occurrence records are still SAR sightings but are for species that have less sensitivity from public harm (e.g., amphibian sightings). An initial query to identify SAR occurrences and critical habitat within the Study Area was conducted prior to the field assessment.

A second query for SAR was conducted on November 3, 2023 using the BC CDC BC Species and Ecosystems Explorer. A user defined polygon was uploaded to the web-based system which then provides a list of all SAR with the potential to occur within the user defined polygon or “area of interest”. This query is different, in that it is not strictly based on observation records within the area of interest but returns a list all species with known ranges that overlap the user-defined polygon using BC CDC occurrence data as well as other publicly available data, and expert opinion (BC CDC 2023a). In this case, the “area of interest” was the Quesnel-Hydraulic Online Option Study Area.

The probability of SAR and species of management concern occurrence within the Study Area was assigned by WSP Appropriately Qualified Professionals (AQPs) using a combination of the information derived from the existing information desktop review, professional experience, and the findings of the October 2023 field reconnaissance. Each potentially occurring wildlife and plant SAR and species of management concern was reviewed and assigned a rating for potential of occurrence, based on the following definitions:

- **Unknown:** insufficient data and/or information is available for this species to make determination of potential.
- **Not expected:** those species with known range that does not overlap the Project Area or required habitat features are not present.
- **Low potential:** those species with a known range that does overlap the Project Area but for which suitable habitat (e.g., critical habitat) is not likely to be within 5 km of the Project Area (based on the sources listed above and professional knowledge of the Study Area and species).
- **Moderate potential:** those species with a range that overlaps the Project Area and for which suitable habitat (e.g., critical habitat) is likely to be present but is not known within 5 km of the Project Area (based on the sources listed above and professional knowledge of the Study Area and species).
- **High potential:** those with a range that overlaps the Project Area and for which suitable habitat (e.g., critical habitat) is likely to be present in the Project Area and/or are known to occur within 5 km of the Project Area (based on the sources listed above and professional knowledge of the Study Area and species).
- **Confirmed:** species is confirmed within the Project Area, either as a recent element occurrence in the BC CDC mapping / iMapBC, by WSP, or by another trusted source of data.

An assessment of the potential presence of federally and provincially listed SAR and species of management concern within the Study Area, based on a regional list generated by the BC CDC query (BC CDC 2023), is provided in Appendix B.

Those species and ecological communities with confirmed, expected and potential to occur within the Project Area are described further in Sections 3.3.4, 3.4.2, and 3.4.4.

## 2.4 Field Assessment

A field assessment was conducted on 17 October 2023 by suitably trained and experienced environmental professionals under supervision of a Registered Professional Biologist. The objectives of the site assessment were to verify and supplement information gathered during the information review and search for terrestrial and aquatic resources within the Project Area that could potentially be affected by Project activities. Photos from the Site assessment survey can be found in Appendix A. Areas potentially affected by the works within the Project

Area were searched for raptor nests, and visual assessments were completed in accessible areas to search for wildlife habitat, wildlife and wildlife signs.

A fish habitat assessment was conducted generally consistent with Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures (RISC 2001). No fish sampling was conducted. Data collected during the assessment included the following:

- Channel measurements (channel width, wetted width and gradient; water depths were not collected due to the size of the river and for safety consideration the surveyors only entered the water up to knee depth);
- Cover (instream vegetation, overhanging vegetation, deep pools, boulders, large woody debris (LWD) and small woody debris [SWD], undercut banks);
- Morphology (riffle-pool, cascade-pool, step-pool, large channel);
- Substrate composition (fines, gravels, cobbles, boulders, bedrock);
- Habitat type and quality (spawning, rearing, holding, overwintering, migration);
- Water quality and signs of flooding;
- Channel and stream bed morphology;
- Fish passage obstructions (fall, cascades, chutes, beaver dams, culverts, log jams, etc.); and
- Photo documentation.

Supplemental habitat information was recorded for spawning, rearing, overwintering, and migratory activities, and included assignment of a ranking (“none”, “poor”, “good”, “excellent”) for all expected and confirmed fish species (and accompanying rationale). Definitions of the habitat quality rankings are shown in Table 2.

**Table 2: Definition of Habitat Quality Rankings**

Habitat	Definition
Poor	Fish are unlikely to be successful in carrying out a given life function anywhere at any time in this habitat.
Moderate	Fish may successfully carry out a given life function in this habitat under certain limited conditions or in specific limited areas.
Good	Fish can successfully carry out a given life function in this habitat.
Excellent	Fish are more likely to successfully carry out a given life function in this habitat than in functionally similar habitats typical of the region.

## 3.0 RESULTS AND DISCUSSION

### 3.1 Ecological Setting

The plant species and communities of an area relate to its biogeoclimatic zone (BEC). The Project Area and Study Area are located within the Sub-Boreal Spruce, Moist Hot, ecosystem with frequent stand-initiating events (SBSmh, NDT3) BEC zone.

The SBSmh occurs between 450 m and 750 m above sea level (asl) (BC Ministry of Forests and Range [MOFR] 2023). Characteristic zonal forested areas are dominated by hybrid white spruce (*Picea engelmannii x glauca*), Douglas-fir (*Pseudotsuga menziesii*), and subalpine fir (*Abies lasiocarpa*). Seral stands are comprised mainly of Douglas-fir, trembling aspen (*Populus tremuloides*) and paper birch (*Betula papyrifera*). The understory is typically characterized by well-developed shrub layers featuring red-osier dogwood (*Cornus sericea*), Douglas maple (*Acer glabrum* var. *douglasii*), and beaked hazelnut (*Corylus cornuta*) with numerous herbaceous species (BC MOFR 2023).

Wildlife commonly associated with riparian areas, wetlands, floodplains and streams in the SBSmh include fur bearing mammals such as moose (*Alces alces*), mule deer (*Odocoileus hemionus*), and black bear (*Ursus americanus*) and a variety of rodent species (BC MOFR 2023).

Bird species associated with riparian areas, wetlands, floodplains and streams in the SBSmh include bald eagle (*Haliaeetus leucocephalus*), peregrine falcon (*Falco peregrinus anatum*), ruffed grouse (*Bonasa umbellus*), sandhill crane (*Antigone canadensis*), and a variety of ducks (BC MOFR 2023).

### 3.2 Species at Risk

As part of baseline data compilation, the BC Species and Ecosystems Explorer (BCSEE) and iMapBC were queried to determine the potential for wildlife species or their habitat features to occur within the Project Area. Signs of the presence of any species at risk identified as having the potential to occur in the Project Area was a focus of the assessment. According to BC CDC (2023a)<sup>1</sup>, there are two red-listed, seven blue-listed, and five wildlife species listed under schedule 1 of SARA (but with yellow or no provincial listing) of management concern listed by the CDC with moderate to high potential to occur within the Project Area. The full list of species of management concern that occur within 5 km of the Site can be found in Appendix B. Table 3 lists the species of management concern that have moderate to high potential to occur within the Project Area. Species observations during the assessment are shown in Figure 1.

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<sup>1</sup> BC CDC search completed 3 November 2023

**Table 3: Wildlife Species of Management Concern with Potential to Occur Within the Project Area**

English Name	Scientific Name	BC List <sup>1</sup>	COSEWIC <sup>2</sup>	SARA <sup>3</sup>	Habitat	Likelihood
<b>Mammals</b>						
Hoary Bat	<i>Lasiurus cinereus</i>	Blue	E		Occurs in a variety of forest conditions. Forages in open areas including riparian zones. Roosting most often in dense foliage, but sometimes in rock crevices.	Moderate Potential: Species with ranges that overlap the query search area and for which suitable habitat is likely to be present but are not known within the Study Area; roosting habitat could be present in snags and trees and foraging may occur over agricultural fields and the Quesnel River within the Project Area.
Little Brown Myotis	<i>Myotis lucifugus</i>	Blue	E	1-E (2014)	Little brown myotis are common in a wide range of forest types across BC. They appear more abundant in older forest stands, which is likely related to increased snag availability for roosting and ease of foraging under closed canopy. Females establish maternity colonies typically in buildings or cavities in large-diameter trees. Little brown myotis typically forage over still water, rivers, and in forest gaps, edges or along trails. During the winter months, they hibernate in caves.	Moderate Potential: Species with ranges that overlap the query search area and for which suitable habitat is likely to be present but are not known within 5 km of the Study Area; roosting habitat could be present in snags and trees and foraging may occur over agricultural fields and the Quesnel River within the Project Area.
<b>Birds</b>						
Bobolink	<i>Dolichonyx oryzivorus</i>	Red	SC	1-T (2017)	The bobolink breeds from BC and Alberta east to Newfoundland and in the northern United States. Individuals nest in tall or mixed grass prairie areas. Nesting will occur in cultivated fields with grasses and forbs and abandoned fields.	Moderate Potential: Species with ranges that overlap the query search area and for which suitable habitat is likely to be present but are not known within 5 km of the Project Area; could nest in nearby agricultural fields.
Common Nighthawk	<i>Chordeiles minor</i>	Blue	SC	1-SC (2023)	Breeding extends from the southern Northwest Territories and the Yukon, south throughout BC, east to southern Labrador, throughout the United States and into Mexico. The common nighthawk inhabits open and semi-open habitat including grasslands, coniferous forests, logged or slash-burned forests, prairies and plains, farm fields, rock outcrops, sand dunes and beaches, and urban/suburban areas. This species nests on the ground in open habitat such as short grasslands and gravel areas.	Moderate Potential: Species range overlaps the Project Area, and suitable habitat is likely to be present (i.e., agricultural fields). Nearest citizen science records within 15 km of the Project Area (eBird 2023).
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	Yellow	SC	1-SC (2019)	Breeds mainly throughout the southern and central interior of BC at mid-elevations. Coniferous and mixed forests are preferred for nesting and breeding is frequently associated with outbreaks of forest-defoliating insects such as spruce budworm (Martell 2015).	High Potential: Species range overlaps the Project Area, and suitable habitat is likely to be present. Citizen science records within 500 m of the Project area (eBird 2023).
Great Blue Heron, herodias subspecies	<i>Ardea herodias herodias</i>	Blue			The great blue heron herodias subspecies is found throughout southern Canada, the United States, and in coastal Mexico. In BC, it is found year-round east of the Coast Mountains. It forages along water margins including marine habitat, slow moving freshwater, and grasslands. Stick nests are located in tall coniferous and deciduous trees.	Moderate Potential: Species breeding range overlaps the Project Area, and suitable habitat is likely to be present along the Quesnel River. Citizen science records within 5 km of the Project area (eBird 2023).
Long-billed Curlew	<i>Numenius americanus</i>	Yellow	SC	1-SC (2005)	Breeding occurs in western North America from southern BC, Alberta and Saskatchewan south to California, Nevada, Utah, Colorado, and New Mexico. In BC, breeding occurs in the southern interior from the Thompson-Okanagan Plateau and Chilcotin-Cariboo region, north to Quesnel, and the eastern Kootenay region. This species nests in prairie habitat including short-grass and mixed prairie sites. Nesting does not occur in areas of dense vegetation. The long-billed curlew overwinters along the southern Pacific Coast in salt marshes, tidal estuaries, and moist pastures.	High Potential: Species range overlaps the Project Area, and suitable habitat is likely to be present. Recorded within 5 km (efauna 2023). Citizen science records within 5 km of the Project area (eBird 2023).
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Yellow	SC	1-SC (2023)	Breeds in montane and northern coniferous forests from sea-level to timberline but is usually found in mid- to high-elevation forests. This species is associated with forest openings and edges near natural openings (e.g. streams, lakes, wetlands, meadows), human-made openings (i.e. logged areas), burned forest, and open to semi-open forest.	Moderate Potential: Species with ranges that overlap the query search area and for which suitable habitat is likely to be present but are not known within 5 km of the Project Area.

English Name	Scientific Name	BC List <sup>1</sup>	COSEWIC <sup>2</sup>	SARA <sup>3</sup>	Habitat	Likelihood
Rusty Blackbird	<i>Euphagus carolinus</i>	Blue	SC	1-SC (2009)	The breeding range for the rusty blackbird occurs from Alaska across Canada east to Newfoundland; however, it is absent from the Canadian Arctic and southern British Columbia, Alberta, Saskatchewan and Manitoba. In BC, this species is known in the south central and northern areas during the breeding season. This species inhabits low-elevation wetland habitat in coniferous and mixed forests, including fens, bogs, muskeg, beaver ponds and other wet forest openings. Individuals nest almost exclusively near water, in the branches of deciduous trees or among emergent vegetation. The rusty blackbird is an opportunistic feeder and may feed on insects, seeds and some fruits.	Moderate Potential: Species range overlaps the Project Area, and suitable habitat is likely to be present (e.g., wet depression near Quesnel River). Citizen science records outside the breeding season within 15 km of the Project (eBird 2023).
Short-eared Owl	<i>Asio flammeus</i>	Blue	T	1-SC (2012)	Breeding for the short-eared owl occurs from Alaska, throughout Canada (except the Arctic Islands), and northern United States. This species breeds from high arctic to mid-latitudes, including off-shore islands, in open habitats with low vegetation. Nests are built near a reliable source of small mammal prey. They use fresh and saltwater marshes, gravel pits, rock quarries, shrub thickets, and woodlots outside of the breeding period.	Moderate Potential: Species range overlaps the Project Area, and suitable habitat is likely to be present nearby (e.g., open fields for foraging). Citizen science records within 15 km of the Project (eBird 2023).
Swainson's Hawk	<i>Buteo swainsoni</i>	Red			Breeding occurs east of the Cascades in western North America, east to Manitoba and south to Nevada, Arizona, New Mexico, Texas, and northern Mexico. In BC, it is found in the Okanagan and Thompson valleys and in the Bulkley Basin from Hazelton to Smithers. It inhabits savannah, open pine-oak woodland and cultivated lands (e.g., alfalfa and other hay crops, and certain grain and row croplands) with scattered trees. Typically nest in solitary trees, bushes, or small groves.	Moderate Potential: Species range overlaps the Project Area, and suitable habitat is likely to be present nearby (e.g., cultivated lands). Citizen science records outside the breeding season within 15 km of the Project (eBird 2023).
Fish						
Bull Trout	<i>Salvelinus confluentus</i>	Blue	SC		The range extends from the southern Yukon south to the Columbia River drainage in Nevada and McCloud River drainage in California. In BC, bull trout generally occur in the interior of the province. It inhabits streams and coastal habitats where large rivers traverse the Coast Mountains to the Pacific Ocean.	Moderate Potential: species with ranges that overlap the query search area and for which suitable habitat is likely to be present but are not known within 5 km of the Project Area. Bull Trout are documented to occur in the Quesnel River, however no known fish points for Bull Trout are recorded within the Project Area (Gov BC 2023a, Gov BC 2023c).
White Sturgeon	<i>Acipenser transmontanus</i>	No Status	E/T	1-E	Most British Columbia sturgeon live in large rivers; however, several populations are either restricted to large lakes or spend a certain amount of time within them.	Moderate Potential: species with ranges that overlap the query search area and for which suitable habitat is likely to be present but are not known within 5 km of the Project Area. Sturgeon are documented to occur in the Quesnel River, however no known fish points for Sturgeon are recorded within the Project Area (Gov BC 2023a, Gov BC 2023c).
Amphibians						
Western Toad	<i>Anaxyrus boreas</i>	Yellow	SC	1-SC (2018)	The historical range extends from Alaska and southern Yukon south to Baja California. In BC, it is found from low to high elevations throughout the province and on Haida Gwaii. It is absent from the northern interior. The western toad breeds in shallow littoral zones of lakes, temporary and permanent pools, ditches, slow moving streams, and wetlands. Adults use terrestrial habitat, including forests and woodlands, with ample cover such as shrubs, woody debris, and rocks.	Moderate Potential: species with ranges that overlap the query search area and for which suitable habitat is likely to be present but are not known within 5 km of the Project Area.

## 3.3 Aquatic Habitat

### 3.3.1 Quesnel River

The Quesnel River (1:50K WSC: 160, and 1:20K FWA code: 100-458399) is a salmonid fish-bearing system and is also reported to contain several other non-salmonid fish species (GOV BC 2023 a,b,c). The Quesnel River originates at Quesnel Lake approximately 55 km southeast of the Site and flows northwest from the Site for approximately 35 km before entering the Fraser River at the City of Quesnel.

During the site assessment, the instream and riparian habitat of the Quesnel River was visually assessed from the banks. At the time of assessment, the river was slightly turbid and at low flow stage. A 1:20,000 RISC site card was completed for a 150 m long section immediately downstream of the existing bank erosion protection work area (Figure 2).

The Quesnel River is characterized by a large channel morphology; it has a gradient of 1% with an average channel width of 132 m and wetted width of 102 m. This section of the river is straight and lacks habitat complexity (i.e., it is comprised of one long riffle). Along the left downstream bank (LDB) where the work is proposed, the visible substrate was predominantly cobble with fines throughout and few boulders observed. Fast flow was noted along the LDB with limited margin habitat. Channel characteristics and riparian vegetation were similar throughout the surveyed section of river; riparian vegetation was comprised of mixed mature forest. The bank was sloping, and no crown closure was observed over the channel. There was limited instream cover provided by boulders; no instream vegetation or pools were observed.

The right downstream bank (RDB) had a side gravel bar and was bordered by a narrow strip of mature spruce dominated forest in the riparian area. Sloping banks and cobble substrate were similar to the LDB, however substrate was slightly smaller along the LDB. Limited instream cover was provided by boulders.

Fish habitat quality for overwintering was considered poor (marginal) with limited deep pools, lack of habitat complexity and almost no instream cover. The amount and suitability of cover is an important function for spawning site determination of salmonid species that spend several weeks maturing near spawning sites (Bjornn, T.C. and D.W. Reiser 1991). Spawning substrate for larger salmonids such as Chinook, Coho, and Sockeye Salmon was available throughout the Site, however lack of cover and refuge areas coupled with faster deeper moving water indicate poor (marginal) spawning habitat for salmon. No gravel areas or tributaries were observed that would support trout or char (Bull Trout/Dolly Varden) spawning. The assessment was conducted during low flow conditions; signs of fall spawning species (i.e., salmon and char redds) would have been apparent, if present but none were observed along either bank. The margin areas along the shoreline could provide poor (marginal) rearing habitat for the fry of a variety of species, but lack of cover could leave fry susceptible to predation and warmer temperatures. No barriers to fish migration were noted within the assessment area. Overall, the lack of cover and refuge areas within this extensive riffle section result in poor (marginal) to good fish migration habitat.

No fish were observed in the Project area during the assessment, however one carcass presumed to be of a salmon (unidentifiable species) was observed on the bank within the Project area.

### 3.3.2 Resident Fish

Resident fish (i.e., complete life cycle within freshwater) are integral to the health of freshwater ecosystems as they provide linkages between vegetation, benthic communities, and wildlife and the cycling of nutrients within the aquatic and terrestrial habitats. Resident fish species documented to occur within the Quesnel River are listed in Table 4.

**Table 4: Resident Fish Species Recorded in the Study Area**

English Name	Scientific Name
Bull Trout	<i>Salvelinus confluentus</i>
Burbot	<i>Lota lota</i>
Dolly Varden	<i>Salvelinus malma</i>
Kokanee	<i>Oncorhynchus nerka</i>
Lake Trout	<i>Salvelinus namaycush</i>
Lamprey (General)	<i>Lampetra</i> spp.
Largescale Sucker	<i>Catostomus macrocheilus</i>
Leopard Dace	<i>Rhinichthys falcatus</i>
Longnose Dace	<i>Rinichthys cataractae</i>
Longnose Sucker	<i>Catostomus catostomus</i>
Mountain Whitefish	<i>Prosopium williamsoni</i>
Northern Pikeminnow	<i>Ptychocheilus oregonensis</i>
Peamouth Chub	<i>Mylocheilus caurinus</i>
Rainbow Trout	<i>Oncorhynchus mykiss</i>
Redside Shiner	<i>Richardsonius balteatus</i>
Slimy Sculpin	<i>Cottus cognatus</i>
Sturgeon (General)	<i>Acipenser transmontanus</i>

Note: Fisheries Inventory Data Query species query conducted 3 November 2023 (Gov BC 2023c)

### 3.3.3 Anadromous Fish

Anadromous fish are an important component of freshwater ecosystems, providing a food source for a variety of groups of freshwater and terrestrial animals, and a key redistributor of marine nutrients to freshwater and terrestrial ecosystems.

Anadromous fish present in the Quesnel River include Steelhead Trout (*Oncorhynchus mykiss*), Sockeye Salmon (*O. nerka*), Pink Salmon (*O. gorbuscha*), Coho Salmon (*O. kisutch*), and Chinook Salmon (*O. tshawytscha*).

Although Pink Salmon are documented within the Quesnel River, there is a canyon upstream of the Barlow Creek and Quesnel River confluence, approximately 17 km downstream of the Site near the city of Quesnel, that acts as a gradient barrier to Pink Salmon (GOV BC 2023c). Pink Salmon are not expected to occur within the Study Area.

The Project area is a migration corridor for adult salmon returning to spawning sites further upstream. Chinook, Coho and Sockeye Salmon use the system as a migration corridor to their spawning beds off Quesnel Lake and in the Mitchell and Horsefly rivers (COSEWIC 2017, Cariboo Envirotech Ltd. 2007, and Pederson 1998). Steelhead are documented within the Quesnel River and Cariboo River (Cariboo River being the furthest confirmed upstream occurrence of Steelhead spawning in the Fraser watershed) downstream of Quesnel Lake (COSEWIC 2020).

Similarly, the Project area is an outmigration corridor for salmon smolts returning to the ocean. Fish habitat within the Project area is characterized by a long straight riffle; the Project area does not provide any key habitat features such as cover, back channel resting areas, pools or instream structure such as LWD or boulder habitat.

Salmon species generally return to natal streams in the fall, with the exception of Steelhead which can return to freshwater anytime of the year. Winter run Steelhead will return from November to April and Summer run will return between May and September (Withler 1966). Winter run fish are almost fully mature when they enter freshwater whereas summer run are immature when they enter freshwater and will hold in freshwater for several months until spawning in the spring (McPhail 2007).

Sockeye fry typically emerge from late March to late May with peak emergence observed during the first two weeks of May (COSEWIC 2016). Fry generally migrate downstream into adjacent lakes to rear and overwinter, and subsequently migrate to sea as yearlings (COSEWIC 2016).

Coho salmon spawn downstream of Quesnel Lake to Likely Fish Hatchery (Pederson 1998). Spawning in the Quesnel River watershed occurs between October and December (McRae et al. 2012). The distribution of spawning habitat for Coho Salmon is usually clumped within watersheds. Juveniles tend to cluster in areas of suitable habitat in shallow gradient streams and occasionally lakes. They usually remain in fresh water for a year before migrating to sea as smolts during April-June (COSEWIC 2016). Coho also move into groundwater-fed off channels, lakes, groundwater ponds and old oxbows to overwinter. Oxbows often need rising water associated with the freshet to reconnect them and allow the fish out into the river to migrate downstream. Smaller tributaries may provide only summer rearing habitat due to low winter flows and lack of suitable winter habitat. The juveniles are believed to migrate into the lower mainstems or lakes to overwinter. These habitats are characterized by flooded plains and off channels during high water which provide a vital, early rearing habitat for these stocks. Much of the interior Fraser watershed where Coho Salmon are found has been impacted through logging and other human disturbances and is now used for a variety of agricultural activities (COSEWIC 2016).

Chinook salmon spawn in the Cariboo River and in the narrows of the Quesnel River and at the bridge near Likely (Pederson 1998). Rearing of juvenile Chinook occurs in both natal streams and lakes. The major lakes provide an important summer rearing habitat for the ocean type Chinook and an overwintering habitat for the stream type Chinook. Some populations also utilize the larger natal streams for overwintering (COSEWIC 2016).

### 3.3.4 Fish Species at Risk

The reported fish community in the Quesnel River includes 22 species (Government of BC 2023c). Four observations of fish species with either federal designation as Endangered, Threatened or Special Concern, or provincial Red or Blue listed designation have been recorded in the Quesnel River:

- Bull Trout (*Salvelinus confluentus*; provincially blue-listed and Special concern by COSEWIC)

- Coho Salmon – Interior Fraser Population (*Oncorhynchus kisutch pop.7*: not ranked in BC and Threatened by COSEWIC)
- Sockeye Salmon – Quesnel-S Population (*Oncorhynchus nerka pop.21*: not ranked in BC and Endangered by COSEWIC)
- White sturgeon (*Acipenser transmontanus*; not listed in BC and Endangered /Threatened by COSEWIC, and Schedule 1 Endangered on SARA)

Bull Trout have a provincial status of S3S4 (special concern, vulnerable to extirpation or extinction to apparently secure). The species is widespread, but there is sensitivity to access development and habitat degradation. Small individual population sizes and long-term population declines also support the designation, although populations have appeared to stabilize (BC CDC 2011 and COSEWIC 2012a). The nearest documented Bull Trout observations in the Quesnel River are near the confluence with the Fraser River and upstream approximately 17 km near Beaver Creek (Gov BC 2023a and b).

The Interior Fraser Coho Salmon population declined drastically in the 1990s because of a reduction in marine survival, changes in freshwater habitats, and overexploitation, which resulted in a designation of Endangered in 2002 (BC CDC 2023b). The population increased between 2005 and 2012 but escapement in 2014 and 2015 was very low. Marine survival rate has declined, and other threats include invasive species affecting freshwater habitat, drought, increased water temperatures, land use, and increased urbanization. The status was updated from Endangered to Threatened in 2016 (COSEWIC 2016).

The Quesnel-S Population of Sockeye Salmon faces a number of threats in both freshwater and marine areas, which are causing habitat quality to decline. A potential new threat to the population is the failure of a mining tailings pond that drained into Quesnel Lake in 2014. The population has declined consistently since 2000 (COSEWIC 2017).

White Sturgeon have a provincial status of S2 (imperiled). If a population of sturgeon were present in the Quesnel River, it would be part of the Upper Fraser population lineage. There is only one point observation record location of Sturgeon documented at the confluence of the Quesnel River with the Fraser River in the city of Quesnel. No record of sturgeon within 5 km of the Project area has been documented (Gov BC 2023a and b).

No fish species at risk were observed in the Project Area during the assessment. There are no aquatic critical habitat parcels documented within the Study Area (DFO 2023).

## 3.4 Terrestrial Habitat

### 3.4.1 Vegetation

Given the timing of the assessment, not all understory herbaceous vegetation at the Site could be identified.

The riparian area of the Quesnel River was a steeply sloped bank on the LDB within the Project area. Riparian vegetation consisted of a narrow, steep section of mature mixed forest below Quesnel-Hydraulic Road. There were mature trees (> 50 cm diameter at breast height [dbh]) scattered throughout; species consisted of black cottonwood, Douglas fir, and hybrid white spruce. The understory was primarily willow (*Salix* spp.) and red-osier dogwood. The forest was similar upslope of the road, but with thicker understory vegetation.

### 3.4.1.1 Invasive Plants

There are no invasive plant records within the Project Area, however there are 21 observations of invasive plant species recorded within 5 km of the Site (GOV BC 2023b):

- Bull thistle (*Cirsium vulgare*)
- Burdock
- Canada thistle (*Cirsium arvense*)
- Common tansy (*Tanacetum vulgare*)
- Curled dock (*Rumex crispus*)
- Field scabious
- Hoary alyssum (*Berteroa incana*)
- Leafy spurge (*Euphorbia esula*)
- Meadow goats-beard (*Tragopogon pratensis*)
- Meadow hawkweed (*Hieracium caespitosum*)
- Orange hawkweed (*Hieracium aurantiacum*)
- Oxeye daisy (*Leucanthemum vulgare*)
- Scentless mayweed<sup>2</sup> (*Matricaria maritima*)
- Spotted knapweed (*Centaurea biebersteinii*)
- Tall hawkweed (*Pilosella piloselloides*)
- Yellow hawkweed (*Hieracium pratense*)

Targeted invasive plant surveys were not completed during the assessment; invasive plants were not observed during the Site assessment.

### 3.4.2 Plants and Ecological Communities

Based on CDC records, there are no non-sensitive “element occurrences” for vegetation or fungus species at risk or ecological communities at risk recorded within the Study Area (BC CDC 2023a). Also, after initial review of the provincial iMap system (GOV BC 2023b), no critical habitat parcels for SARA-listed plant species were identified within the Study Area.

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<sup>2</sup> Scentless mayweed has several synonyms, including false mayweed, scentless chamomile, false chamomile, and Baldr's brow and is referred to under the Weed Control Regulation as scentless chamomile (*Matricaria maritima*). For the purposes of this report, the latest taxonomy from the BCSEE is used.

Ecological communities with potential to occur in the SBSmh BEC zone include:

- Douglas-fir – hybrid white spruce/thimbleberry (*Pseudotsuga menziesii* - *Picea engelmannii* x *glauca* / *Rubus parviflorus*); Blue-listed in BC
- Douglas-fir - lodgepole pine / clad lichens (*Pseudotsuga menziesii* - *Pinus contorta* / *Cladonia* spp.); Blue-listed in BC
- Douglas-fir / Douglas maple / step moss (*Pseudotsuga menziesii* / *Acer glabrum* / *Hylocomium splendens*); Red-listed in BC
- Hybrid white spruce - paper birch / devil's club (*Picea engelmannii* x *glauca* - *Betula papyrifera* / *Oplopanax horridus*); Blue-listed in BC
- Hybrid white spruce / ostrich fern (*Picea engelmannii* x *glauca* / *Matteuccia struthiopteris*); Red-listed in BC

No listed plant species or ecological communities of concern were observed during the assessment. Targeted plant surveys were not conducted during the assessment.

### 3.4.3 Wildlife

The area to be affected by the proposed bank erosion protection works is largely restricted to the area east of Quesnel-Hydraulic Road and the approximate 130 m linear section of the LDB of the Quesnel River. These areas generally provide marginal habitat for wildlife given the presence of vehicle traffic with potential for vehicle strikes and the sensory effects of traffic noise. However, some species of birds and mammals likely use the riparian area of the Quesnel River and areas with trees, shrubs and understory vegetation which likely contain potential nesting habitat for birds as well as living and foraging habitat for other mammal species adapted to human presence.

#### 3.4.3.1 Birds

Bird species use a variety of habitat types depending on life requisites such as nesting sites and food sources. A variety of passerines (songbirds) may forage on seeds and fruit produced by trees and shrubs within the Study Area. Sections of forest habitat is located within and adjacent to the Project Area and is expected to provide nesting habitat for a variety of birds including passerines, owls, and woodpeckers. Areas of agricultural land (i.e., fields) are also found throughout the Study Area and adjacent to the Project Area and could provide suitable nesting habitat for a variety of ground nesting bird species. A search of the *Wildlife Tree Stewardship (WiTS) Atlas* (WiTS 2018) and the *Great Blue Heron Nesting Atlas (GBHMT 2018)* did not return any bald eagle, osprey (*Pandion haliaetus*) or great blue heron (*Ardea herodias fannini*) nests within the Study Area.

Waterfowl and wading birds use a variety of stream, wetland, shore, pond, and lake habitats for nesting and foraging depending on the life requisites of individual species. Suitable nesting and foraging habitat for waterfowl and wading birds occurs in the Study Area along the Quesnel River. Waterfowl observed overhead during the assessment included Canada geese (*Branta canadensis*; Yellow-listed in BC).

Woodpecker species may use large diameter trees and snags as nesting habitat. One pileated woodpecker (*Dryocopus pileatus*; Yellow-listed in BC) was observed along Quesnel-Hydraulic Road within the Project Area during the assessment. There were trees of appropriate size (pileated woodpeckers use large [typically > 40 cm dbh solid trees with heart rot for nesting] (ECCC 2023) for nesting scattered throughout the Project Area between Quesnel-Hydraulic Road and the Quesnel River. This area also had mature trees capable of supporting raptor stick nests, although no raptors or stick nests were observed during the assessment.

Upland game birds use a variety of habitats for nesting and foraging depending on the life requisites of individual species. Suitable nesting and foraging habitat exist for upland game birds within forested habitat in the Study Area. Examples of upland game birds that may occur in the Study Area are ruffed grouse, sooty grouse (*Dendragapus fuliginosus*; Yellow-listed in BC) and spruce grouse (*Canachites canadensis*; Yellow-listed in BC). Several ruffed grouse (Yellow-listed in BC) were observed in the forested area between Quesnel-Hydraulic Road and the river within the Project Area during the assessment.

Ground nesting passerines such as killdeer (*Charadrius vociferus*; Blue-listed in BC), western meadowlark (*Sturnella neglecta*; Yellow-listed in BC), vesper sparrow (*Poocetes gramineus*; Yellow-listed in BC), and savannah sparrow (*Passerculus sandwichensis*; Yellow-listed in BC) could use agricultural field habitat for nesting within the Study Area (Haddow et.al 2013).

Previous bird observations on site during the 2023 emergency bank protection works included American robin (*Turdus migratorius*), black-capped chickadee (*Poecile atricapillus*) and downy woodpecker (*Dryobates pubescens*). No bird nests or nesting cavities were observed on Site during the October 2023 assessment. It is emphasized that the absence of observed nests during the assessment does not eliminate the potential for new nests to be established in the 2024 breeding season and beyond.

### 3.4.3.2 Mammals

Mammals are a varied group of wildlife generally consisting of land-based carnivores, omnivores, ungulates, and herbivores, as well as bats.

The Project Area is expected to support a variety of mammal species typically associated with rural areas. Small mammals, such as rodents, and mobile and opportunistic species such as mule deer, black bear, moose, and coyote (*Canis latrans*) could use the forested riparian habitat within and adjacent to the Project Area for foraging, shelter and movement corridors. Deer and bear tracks were observed during the field assessment.

In addition, small mammals, such as deer mouse (*Peromyscus sp.*), Columbian ground squirrel (*Spermophilus columbianus*), and meadow vole (*Microtus pennsylvanicus*) are likely to breed and forage in the nearby agricultural fields, riparian and forest ecosystems throughout the Study Area. Snowshoe hare (*Lepus americanus*) likely occurs in the Study Area; this species utilizes coniferous, deciduous, and mixed forests with dense canopy cover and abundant understorey vegetation, which provides shelter, and thicket openings. However, areas without canopy cover and mature forests, which have a sparse understorey layer, are generally avoided (e.g., disturbed residential areas, agricultural fields; BC CDC 2023a).

Numerous bat species may forage in open areas throughout the Study Area, while trees, buildings, and other infrastructure may provide suitable roosting habitat. Species such as silver-haired bat (*Lasionycteris noctivagans*; Yellow-listed in BC and unlisted by COSEWIC and SARA) may occur within the Study Area.

No mammals were observed during the field assessment.

The Project Area overlaps with Ungulate Winter Range (UWR) # U-5-001. UWR are defined areas of provincial crown land that contain habitat necessary to meet winter requirements of specified ungulate species. UWR # U-5-001, U-5-002 and U-003 – Ungulate Winter Ranges Cariboo Chilcotin Land Use Plan, Transition and Deep Snowpack was legally established in December 2004 with amendment to the order made in 2007 for mule deer (BC Ministry of Environment [MoE] 2007), under authority of sections 9(2) and 12(1) of the *Government Actions Regulation* (B.C. Reg. 582/2004) of the *Forest and Range Practices Act* (FRPA) (BC MoE 2023).

The assessment of the Project Area, specifically within the forested area between Quesnel-Hydraulic Road and the Quesnel River, concluded that it did not contain suitable habitat to support overwintering of mule deer. The steep slope, east aspect and proximity to the road are not ideal for mule deer overwintering. Mule deer are primarily migratory, using upper elevation and alpine habitats during the summer and lower valleys and south facing slopes during the winter (BC Ministry of Water Land and Air Protection [MWLAP] 2005, BC Ministry of Environment Lands and Parks [MELP] 1996). Winter feeding, thermal and security habitat attributes are the factors that support mule deer winter habitat. Areas with tall shrubs and trees available above snowpack and south and west facing slopes are ideal zones of lower temperature and shallower snow depths for foraging. Areas with well-developed layers of trees and shrubs provide thermal cover and security from predators as well as reduce snow depth (easier movement in shallow snow) (MELP 1996). Mule deer are expected to frequent the Project Area to browse and access the river but are unlikely to overwinter in the forested area between the road and the river.

### **3.4.3.3 Amphibians**

Amphibians in BC include aquatic breeding obligates (i.e., frogs, toads, newts, and mole salamanders / Ambystomatidae) and terrestrial breeding obligates (i.e., lungless salamanders / Plethodontidae; BC FLNR and BC MOE 2014). Adult amphibians occurring in the terrestrial environment generally require moist habitat with cover objects such as logs, shrubs, tree hollows, and rock crevices to provide thermoregulatory and shelter sites. The riparian area of the Quesnel River may provide suitable breeding, rearing and adult living habitat for aquatic amphibian species.

No amphibians were observed during the field assessment.

### **3.4.4 Wildlife Species at Risk**

Based on CDC records, there were no non-sensitive, “element occurrences” and no critical habitat parcels for wildlife species at risk recorded within the Study Area (Government of BC 2023b). “Element occurrences” and critical habitat parcels outside of the Project Area are not anticipated to be impacted by the Project.

#### **3.4.4.1 Bird Species at Risk**

The BC CDC Species and Ecosystems Explorer search results for provincially and federally listed species included 39 bird species at risk within the Study Area. Based on habitat requirements and range, ten bird species at risk have potential to occur within the Project Area (Table 3). The complete BC CDC Species and Ecosystems Explorer search results can be referred to in Appendix B. There is no critical habitat documented for any bird

species within the Study Area (Gov BC 2023b). WSP field observations and citizen science records of SAR (Species at Risk) birds within 5 km of the project include great blue heron, long-billed curlew (*Numenius americanus*) (eBird 2023), and barn swallow (*Hirundo rustica*) (observed by WSP south of the Project Area near Bastin Road, October 2023).

There is potential for great blue heron to frequent the Project Area for foraging, roosting and nesting. Suitable nesting trees were observed including mature Douglas fir, hybrid white spruce, paper birch, and older black cottonwood trees in the riparian area of the Quesnel River. Nests were not observed during the Site assessment, but new nests could be established in the area in future seasons.

The *Migratory Birds Convention Act* (MBCA) prohibits the damage or destruction of listed threatened migratory bird nests with eggs and/or birds. To maintain compliance with this legislation, proponents have a responsibility to minimize the risk of accidental bird mortality. Pre-clearing nesting surveys should be considered if work will be conducted outside of the least risk work window for birds to avoid individuals from nesting within work areas (Table 9).

No bird species at risk or nests were observed during the assessment, but new nests could be established in the area prior to the work.

#### **3.4.4.2 Mammal Species at Risk**

The BC CDC Species and Ecosystems Explorer search results for provincially and federally listed species included two mammal species at risk with potential to occur within the Study Area. The detailed BC CDC Species and Ecosystems Explorer search results is included in Appendix B. Based on habitat requirements and range, two mammal species at risk are considered to potentially occur in the Study Area; both the hoary bat (*Lasiurus cinereus*; Blue-listed in BC and Endangered on COSEWIC) and the little brown myotis (*Myotis lucifugus*; Blue-listed in BC and Endangered on Schedule 1 of SARA and Endangered on COSEWIC) are found in forested areas.

Canadian bat species have four primary habitat requirements: roosts, hibernacula, swarming sites, and foraging areas. Maternity roost sites and, especially, hibernacula are considered to be the main limiting habitat features for little brown myotis within their ranges (COSEWIC 2013). In BC, little brown myotis occurs in a range of habitats, such as coastal and boreal forest, arid grasslands, and ponderosa pine forests (Klinkenberg 2023) as well as in urban areas. They are often associated with old-growth mixed forests and edge habitats, such as those adjacent to water and clear-cuts (Crampton and Barclay 1998; Furlonger et al. 2010; Kalcounis and Hecker 1995; Patriquin 2001; Thomas 1998). Hoary bats use both deciduous and coniferous forests of any age class for daytime roosting (O'Keefe et al. 2009), maternity roosts are primarily in large diameter trees reaching or exceeding the surrounding canopy (COSEWIC 2023).

The hoary bat habitat requirements are open areas for foraging and dense foliage or crevices for roosting (COSEWIC 2023), while the little brown myotis forages under closed canopy preferably of an older forest and roosts in snags and cavities. No mapped occurrences of little brown myotis are present within the Study Area; however, that is more of an indication of the lack of targeted survey effort than actual absence. Both species could be present in snags and older trees within the Project Area.

The Study Area overlaps critical habitat for the Woodland Caribou (*Rangifer tarandus caribou*) (Southern Mountain Caribou Population) (Government of British Columbia 2023b). However, the critical habitat is on the east side of the Quesnel River adjacent to the Project Area and does not overlap current subpopulation ranges (Environment Canada 2014; Government of British Columbia 2023b).

The Study Area overlaps with Central Interior grizzly bear (*Ursus arctos*) population unit, extirpated population (BC MOF 2020). Grizzly bear is provincially blue-listed, and federally listed as Special Concern under SARA. No sign (e.g., scat, tracks) of grizzly bear or suitable denning habitat were observed during the field assessment.

No mammal species at risk were observed during the field assessment.

#### **3.4.4.3 Amphibian Species at Risk**

The BC CDC Species and Ecosystems Explorer search results for provincially and federally listed species included one amphibian species at risk within the Study Area. Based on habitat requirements and range, Western toad have potential to occur in and around the Quesnel River (Table 3).

Western toad breeding habitat includes shallow littoral zones of lakes, temporary and permanent pools, ditches, slow moving streams, and wetlands (COSEWIC 2012b). Breeding habitat for Western toad was not observed within the Project Area. Terrestrial habitat requirements for adult Western toad include forests and woodlands, with ample cover such as shrubs, woody debris, and rocks (COSEWIC 2012b), which was observed within the riparian area of the Quesnel River.

No amphibians were observed during the assessment.

## **4.0 ENVIRONMENTAL LEGISLATION, PERMITS, APPROVALS AND AUTHORIZATIONS**

A summary of relevant federal, provincial, and municipal statutes and approvals applicable to the Project are provided in Table 5.

**Table 5: Screening of Applicable Federal and Provincial Environmental Legislation**

Applicable Legislation	Government Agency	Permits, Approvals, and Authorizations	Probability	Timeline for Review / Approval	Description / Relevance to Project
Federal					
Fisheries Act Section 34.4[1] and 35[1]	Fisheries and Oceans Canada (DFO) – Fish and Fish Habitat Protection Program	Request for Project Review	Unlikely	Likely 2 months (up to 3) to receive response and Letter of Advice	<p>Under the <i>Fisheries Act</i>, the Minister of Fisheries and Oceans and the Canadian Coast Guard may issue an authorization in relation to a proposed work, undertaking or activity that may result in key prohibitions in the <i>Fisheries Act</i>. The key prohibitions of the <i>Fisheries Act</i> include (Government of Canada 1985a) are:</p> <ul style="list-style-type: none"> <li>■ Subsection 34.4(1) No person shall carry on any work, undertaking or activity, other than fishing, that results in the death of fish.</li> <li>■ Subsection 35(1) No person shall carry on of a work, undertaking or activity that results in harmful alternation, or destruction, or disturbance (HADD) of fish habitat.</li> <li>■ Section 36(1)(3) No person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance<sup>3</sup> may enter any such water.</li> </ul> <p>The nature of the proposed bank protection works is expected to cause a HADD through the alteration or disturbance of riparian and instream habitat. Habitat offsetting will be required as a condition of the Authorization.</p>
		Request for Authorization	Required	Process to develop offsetting plan and then enter into regulated timelines – typically takes 6 – 8 months.	
Canadian Navigable Waters Act (CNWA) and Minor Works Order (Government of Canada 2021)	Transport Canada - Navigation Protection Program	Notification of Minor Works	Required	30-day timeline for review and comment	<p>The Quesnel River is not a scheduled waterway of the CNWA.</p> <p>Section 4.1 (Major Works in any Navigable Water and Works in Navigable Waters Listed in Schedule) of the CNWA states: An owner who proposes to construct, place, alter, rebuild, remove or decommission one of the following works may do so if the work, or its construction, placement, alteration, rebuilding, removal or decommissioning, would not interfere with navigation and the owner, before beginning the construction, placement, alteration, rebuilding, removal or decommissioning, deposits any information specified by the Minister in any place specified by the Minister and publishes a notice in any manner, and including any information, specified by the Minister (a) a major work in, on, over, under, through or across any navigable water.</p>
Species At Risk Act (SARA) – Schedule 1 Sections 32 (1), 33 and 58(1)	Environment and Climate Change Canada (ECCC) – Canadian Wildlife Service (CWS) or DFO	Permit under Section 73 of SARA	Unlikely	Up to 3 months for the minister to issue a permit or notify the applicant of the refusal to issue a permit after the date of the notice indicating that the application has been received	<p>Project location is not on federal lands or within streams with designated critical habitat for aquatic species. On non-federal lands, a SARA Section 73 permit would only be required if there is the potential to affect the nest of an MBCA and SARA listed bird species.</p> <p>The Site assessment did not find any SAR or any bird species nesting within 300 m of the Project Area (e.g., raptors and herons). Pre-works (tree and shrub clearing and ground disturbance) surveys will still be required to check for active SAR and active nests.</p>

<sup>3</sup> Deleterious substances include soils/sediment, hydrocarbons, contaminated materials and hydraulic fluids.

Applicable Legislation	Government Agency	Permits, Approvals, and Authorizations	Probability	Timeline for Review / Approval	Description / Relevance to Project
<p><i>Migratory Birds Convention Act</i> (MBCA) Sections 5.1(2) and 5.2(2) Migratory Birds Regulations Section 5 Section 12 (h1)</p> <p>Migratory Birds Regulation Schedule 1</p>	ECCC – CWS	<p>Damage or Danger Migratory Bird Permit Disturbance or destruction of migratory birds, their nests or eggs is prohibited (Government of Canada 1994).</p>	Unlikely	N/A	<p>Permit only required if MBCA listed bird species nest is removed while actively in use. Tree clearing outside of breeding bird window avoids this.</p> <p>Due diligence measures to reduce the risk of contravention of the MBCA include conducting pre-clearing nest surveys if vegetation removal, ground disturbing activities or activities affecting bird nests on structures will occur during the breeding bird window, and enacting no-disturbance buffers around active nests.</p> <p>At the time of the site assessment no MBCA-listed bird species were found nesting in the surrounding area. Pre-works nest surveys will still be required in the immediate work area prior to initiation of work.</p> <p>Note that this permit application does not cover bird species that are also listed under SARA, in which case additional SARA Section 73 permits may be required.</p> <p>The Site assessment did not find any Pileated woodpecker nesting cavities within the Project Area; however, a pileated woodpecker was observed foraging within the Project Area during the assessment. Pre-works nest cavity surveys will still be required in the immediate work area prior to initiation of work.</p> <p>If there is a need to damage, disturb, destroy, or remove a nest of a species listed in Schedule 1, this can be done when: a notice regarding the unoccupied nest has been received by ECCC, and the nest has remained unoccupied by a migratory bird from the time the notice is received by ECCC for the duration of time indicated in the Schedule 1 for that species and can therefore be deemed abandoned (36 months for Pileate woodpecker nesting cavities).</p>
		<p>Submission of notification of nesting cavities to the nest registry</p>	Unlikely	3 years	
Provincial					
<p><i>Water Sustainability Act</i> (WSA) Section 11 and Water Sustainability Regulation</p>	BC Ministry of Water, Land and Resource Stewardship (MWLRS)	<p>Notification</p>	Unlikely	Minimum 45 days in advance of works	<p>Given the current design of the Project including bank protection work, the need for review or involvement of WLRS for approval of the works is anticipated for changes in and about a stream (Quesnel River).</p> <p>The existing bank protection work was conducted in 2023 under a WSA Emergency Order under Section 93 of the WSA.</p> <p>It is anticipated the new proposed bank protection works will not fall under an emergency authorization. An authorization is required under Section 11 of the WSA to make changes in and about a stream. Changes in and about a stream include any modification to the nature of the stream, including any modification of the land, vegetation and natural environment of a stream or the flow of water in a stream, or any activity or construction within a stream channel that has or may have an impact on a stream or stream channel.</p> <p>Mitigation measures for instream work should include working within the least risk timing windows for the Quesnel River (22 July – 15 August)</p>
		<p>Change Approval</p>	Required	4.5 months for MOTI projects	

Applicable Legislation	Government Agency	Permits, Approvals, and Authorizations	Probability	Timeline for Review / Approval	Description / Relevance to Project
<p><i>Wildlife Act, 1996</i></p>	<p>BC Ministry of Environment and Climate Change (MENV), Environmental Stewardship Division</p>	<p>Protects wildlife and wildlife habitat. Section 34 prohibits possessing, taking or destroying:</p> <p>(i) A bird or its egg.</p> <p>(ii) The nest of an eagle, peregrine falcon, gyrfalcon, osprey, heron or burrowing owl.</p> <p>(iii) The nest of a bird not mentioned in (ii), when the nest is occupied by a bird or its egg unless authorized under permit.</p> <p>Section 75 describes the requirement to report accidental killing of wildlife:</p> <p>(1) A person who kills or wounds wildlife, other than prescribed wildlife, either by accident or for the protection of life or property, must promptly report to an officer.</p> <p>(a) The killing or wounding.</p> <p>(b) The location of the wildlife.</p> <p>(2) A person who fails to report as required under subsection (1) commits an offence.</p> <p>(Government of BC 1996b).</p>	<p>Unlikely</p>	<p>Minimum 30 days in advance of works</p>	<p>Due diligence requires implementation of best management practices to protect wildlife and their residences. Many bird nests have recommended buffer zones to prevent disturbance during the nesting period. (i.e., the recommended setback for short-eared owl nests ranges from 1.5 tree lengths for urban areas, 200m for rural and 500m for undeveloped. During the breeding season, an additional 100 m “quiet” setback is recommended (BC MOE 2013)).</p> <p>The site assessment did not find any suitable cavities or nests (e.g., heron, raptors, pileated woodpecker or other species). An individual pileated woodpecker was observed within the Project Area during the assessment. However, there is potential for new nests/cavities to be built within the Project Area prior to works and pre-work surveys for year-round protected nests/cavities should be conducted before any work.</p> <p>It is recommended that call playback surveys for pileated woodpecker be conducted during the breeding season (April – June) to identify any potential nesting cavities within the work area (i.e., area requiring tree removal for Site access). In addition, if work cannot be conducted within the least risk window for birds in general (i.e., passerines), then pre-clearing bird nest sweeps would need to be conducted prior to any vegetation removal.</p>
<p><i>Environmental Management Act</i> Spill Reporting Regulation (SRR)</p>	<p>BC Ministry of Environment and Climate Change Strategy (BC ENV)</p>	<p>No Permit Required</p>			<p>Required in the event of a reportable spill as outlined in the Spill Reporting Regulation. Spill to be reported immediately after a reportable spill occurs.</p>

## 5.0 PROJECT – ENVIRONMENT INTERACTIONS

WSP has determined that the works have the potential to affect existing environmental resources, defined as valued environmental components (VECs), in and adjacent to the Quesnel River. These VECs are: riparian vegetation, birds, water quality, fish (individuals), and fish habitat.

Table 6 provides a summary of the pathway of effects on VECs, a description of the pathways of effects (potential interaction between works and VECs), proposed mitigation measures, and determination of residual effects following implementation of mitigation measures.

**Table 6: Potential Environmental Effects of the Works and Required Mitigation**

VEC	Potential Interaction	Recommended Mitigation Measures	Residual Effects
Riparian Vegetation	<p>Pathway of Effects: Tree and shrub removal within the Project footprint as part of site preparation.</p> <p>Construction of new access roads or widening of existing access roads requiring vegetation clearing.</p>	<p>Removal of trees and vegetation adjacent to the Quesnel River should be minimized to the extent required. Where possible, pruning of branches should occur instead of tree / shrub removal.</p> <p>Disturbed areas should be revegetated immediately upon completion of construction to prevent erosion or colonization by invasive weed species.</p> <p>Trees and shrubs to be removed should be replaced in accordance with tree replacement criteria as developed in the Offsetting Plan (Section 7.0).</p> <p>Replacement trees / plants will be native species and of a variety expected to contribute to a functioning riparian zone.</p>	<p>Losses of riparian vegetation may need to be offset as conditions of the <i>Fisheries Act</i> Authorisation.</p> <p>No residual effects are anticipated for riparian vegetation if the tree and shrub replacement criteria are followed.</p>
Birds	<p>Pathway of Effects: Potential mortality of individual birds or nest destruction during tree and shrub removal. Loss of nesting habitat.</p>	<p>If site preparation activities will be within the breeding bird window, a pre-clearing nest sweep will be required.</p> <p>Pileated woodpecker call playback surveys should be conducted in spring 2024 to rule out nesting cavities in trees within the removal area.</p> <p>Removal of trees and vegetation adjacent to Quesnel River should be minimized to the extent required. Where possible, pruning of branches should occur instead of tree / shrub removal.</p> <p>Replacement trees / plants should be native species and of a variety expected to contribute to a functioning riparian zone (including bird nesting habitat).</p>	<p>No residual effects on birds are anticipated if pre-clearing bird nest sweeps are conducted to confirm no active nests in areas to be cleared and no-disturbance buffers are erected around active nests, until they are inactive.</p> <p>Replacement planting of trees and shrubs will offset losses of trees currently being used for nesting activity.</p>
Water Quality	<p>Pathway of Effects: Elevated suspended sediment concentrations beyond WQG.</p> <p>Elevated contaminant concentrations (in event of spill of equipment fuel or hydraulic fluids) beyond WQG.</p>	<p>An onsite full time environmental monitor (EM) should monitor works in proximity to the Quesnel River and confirm the effective implementation of mitigation measures. The EM should also conduct water quality sampling (including turbidity) and if turbidity measurements exceed thresholds outlined in Table 8 work will be suspended until turbidity returns to baseline levels.</p> <p>Hazardous and waste materials (such as fuel or hydraulic fluid for machinery) should be stored 30 m from the HWM of Quesnel River and contained within appropriate secondary containment to prevent entry to the river.</p> <p>Machinery should arrive onsite in a clean / maintained condition, free of fluid leaks and invasive species. Equipment will be inspected daily.</p> <p>Refer to Section 6.0 for a more comprehensive list of mitigation measures associated with water quality.</p>	<p>No residual effects on water quality are anticipated based on the spatial and temporal extent of work, isolation of the work area, and implementation of mitigation measures.</p>
Fish and Fish Habitat	<p>Pathway of Effects: Suspended sediment concentrations (affecting gills and smothering eggs / affecting spawning habitat).</p> <p>Contaminant concentrations (in event of spill of equipment fuel or hydraulic fluids) causing health effects.</p> <p>Habitat loss.</p>	<p>Works should occur within the provincial fisheries Least Risk Work Window for the Quesnel River (22 July – 15 August) (GOV BC 2023f).</p> <p>Works should occur during low water to reduce instream disturbance.</p> <p>Effective erosion and sediment control measures should be installed before starting work to prevent sediment from entering the water body.</p> <p>Refer to Section 6.0 for full list of mitigation measures associated with fish and fish habitat.</p>	<p>There are no residual effects anticipated on fish and fish habitat caused by suspended sediment or contaminants in water following the implementation of mitigation measures.</p> <p>There are anticipated to be residual effects on fish habitat caused by the placement of rip rap. These losses will need to be quantified and offset as part of an offsetting plan under the <i>Fisheries Act</i> Authorization.</p>

## 6.0 RECOMMENDED ENVIRONMENTAL MITIGATION

Potential effects of the proposed Project on environmental resources can be avoided, mitigated, or managed through implementation of recommended measures described in the sections below, which have been developed from the following Best Management Practices (BMP) guidelines, industry standards and other documents:

- DFO's Measures to Protect Fish and Fish Habitat (DFO 2019b).
- Land Development Guidelines for the Protection of Aquatic Habitat (Chilibeck et al. 1993).
- A User's Guide for Changes In and About a Stream in British Columbia (Government of BC 2023e).
- Requirements and Best Management Practices for Making Changes In and About A Stream in British Columbia (Government of BC 2023d).
- Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (2013).
- BC Summary of Water Quality Guidelines: Aquatic Life, Wildlife and Agriculture (Ministry of Environment and Climate Change Strategy [BC MOE] 2019).
- Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Developments in British Columbia (BC MOE 2014a).
- Guidelines to Reduce Risk to Migratory Birds (ECCC 2020).
- Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia: A companion document to Develop with Care (BC MOE 2013).

The mitigation measures described below are intended to be followed by the Contractor carrying out the Project construction. At MoTI's discretion, a detailed Construction Environmental Management Plan (CEMP) shall be developed by the Contractor and their EM. The plan will address their Project-specific activities and methods as required by *Standard Specifications for Highway Construction, Protection of the Environment SS 165* (MOTI 2020a).

At MoTI's discretion, an EM shall be present during construction to evaluate and report on compliance of the Contractor(s) work procedures and practices with the environmental requirements of the Project.

### 6.1 Air Quality and Dust Control

Air quality, idle reduction and dust control management is a mandatory requirement of MoTI projects and shall be implemented following SS 165.16.02 and as outlined in Table 7. Drivers and equipment operators should employ reduction of vehicle idling. Vehicles and equipment will be operated and maintained according to manufacturer's guidelines and monitored for potential air quality and emission concerns. If required, access routes will be watered to reduce dust generation and cleaned to avoid mud and dust movement into public roads.

**Table 7: Air Quality Emissions Management Options and Triggers**

Source Description	Options for Emissions Management	Triggers for Management
Construction Vehicles	<p>Avoid engine idling. In colder weather, where possible, use electrical engine heaters rather than idling to prevent engine freeze.</p> <p>Maintain construction fleet vehicles according to manufacturers' guidelines.</p>	<p>Periodic maintenance of construction vehicles. In addition, excessive or consistently black exhaust is a signal that an engine is not operating optimally. If black exhaust is noted, the Environmental Monitor (EM) shall be notified immediately.</p>
Vehicle Traffic Fugitive Dust	<p>On dry days consider watering unpaved access roads that are in frequent use.</p> <p>Where possible, fit 'upswept' exhausts to construction vehicle fleet.</p> <p>Implementation of a speed limit to slow vehicles and therefore reduce fugitive dust emissions.</p> <p>Cover vehicle loads that are fine grained, especially on windy days.</p> <p>Where access roads join public roads, there is the potential for material to be tracked onto the paved road. If a considerable volume of material is tracked onto a public road, consideration will be given to cleaning the paved road surface by sweeping or using a wet vacuum sweep.</p>	<p>Visual cues would be the primary trigger for mitigative action to be taken with respect to vehicle traffic fugitive dust emissions.</p> <p>If the weather forecast indicates dry weather and strong winds are likely, this is also a trigger for preventative dust management action to be taken.</p>
Heavy Equipment Activities	<p>Move as little material as possible. While placing material, this translates to keeping drop heights as low as possible.</p> <p>Wet material before handling if possible.</p> <p>Sweep or water roads as necessary for dust control and maintaining public road cleanliness.</p> <p>Implementing a speed limit to slow vehicles and reduce noise generation near residences.</p>	<p>If construction activities are occurring within 300 m of residences and:</p> <p>If visible dust is being generated by activities such as bulldozing, excavation, backfilling; and/or</p> <p>If the weather forecast indicates dry conditions and strong winds are likely.</p> <p>Visual cues would be the primary trigger for mitigative action to be taken with respect to vehicle traffic fugitive dust emissions.</p> <p>If the weather forecast indicates dry weather and strong winds are likely, this is also a trigger for preventative dust management action to be taken.</p>

## 6.2 Site Access, Mobilization and Laydown Areas

Site access and mobilization will be conducted and planned to minimize ground disturbance within and adjacent to the Project Area, to the extent possible. Equipment and other materials will be brought in using public roads, when possible. Project work activities will be undertaken on non-MoTI owned land; therefore, permission to enter will be required. One or more laydown areas is anticipated to be required, but the location of these is not known yet. Laydown area(s) will be sited a minimum of 15 m from the HWM of the Quesnel River.

### 6.3 Noise Control

Potential effects on wildlife and local residents resulting from noise associated with the Project can be mitigated by implementing the strategies described below:

- The Contractor(s) will act reasonably to reduce noise through the use of "Best Available Control Technology" noise control on construction equipment as well as noise level regulations or guidelines established by WorkSafe BC and other regulatory agencies and jurisdictions having authority for noise levels.
- The Project Area is located within the Cariboo Regional District. The Contractor will follow noise bylaws including CRD Bylaw #4713 Noise Regulation and Prohibition and limit high noise generating activities to occur between 7:00 AM and 10:00 PM, where possible (CRD 2012).

### 6.4 Erosion and Sediment Control

A detailed site-specific Erosion and Sediment Control (ESC) Plan should be prepared as a component of the Contractor's CEMP and implemented during Project works. The Contractor(s) ESC measures shall be in compliance with SS 165.04 (BC MOTI 2020a). The following general ESC measures should be considered when developing the site-specific ESC Plan:

- Erosion and sediment control provisions implemented will be in accordance with measures provided in Land Development Guidelines for the Protection of Aquatic Habitat (Chilibeck et al. 1993) and BMPs.
- As required, based on the degree of ground disturbance, sediment (silt) fences, gravel check dams, straw bales and/or other measures will be installed as appropriate to reduce the potential for soils or sediment-laden water entering the Quesnel River. If used, silt fences should follow the ground contour and will be properly keyed-in (see Figure 3.3 in Chilibeck et al. 1993).
- Erosion and sediment control requirements should be evaluated throughout construction of the Project and identified issues addressed as they arise.
- Erosion and sediment control measures should be inspected weekly, and frequently during rain events, and repaired or replaced within 48 hours, as required.
- Erosion and sediment control measures, such as silt fences, filter fabric, or check dams, should be removed from the Project Area for appropriate disposal when no longer needed.
- The Contractor(s) should ensure that all machinery used within the Project Area will arrive free of excess external soil, mud, and debris prior to working at the site.
- The Contractor(s) will be responsible for the maintenance and any necessary changes to the erosion and sediment control measures and will confirm they are working effectively and comply with the CEMP.

## 6.5 Spill and Emergency Response

The Contractor's spill mitigation and response measures in their CEMP shall be in compliance with SS 165.04 (BC MOTI 2020a). The release of deleterious substances, such as hydrocarbons, can impact soil and water quality, aquatic birds, mammals, and fish as well as vegetation and other wildlife found in the Project Area. It is recommended that the Project CEMP include the following general mitigation measures to minimize the potential of a release of deleterious substances and guide response to an emergency situation:

- Spill containment kits must be available on every piece of portable or heavy equipment/vehicles and contain sufficient materials for addressing the anticipated maximum spill from a given piece of equipment. Equipment containing ethylene glycol (antifreeze), or other water-soluble chemicals will carry an appropriate number of water-soluble chemical absorbent pads in addition to absorbent pads used for petroleum products.
- All field personnel will be made aware of the location of Emergency Spill Response materials and the procedures necessary to contain spills of any fluid.
- Mobile equipment will be inspected prior to use and daily for signs of leakage. Daily visual inspections will include confirming that all personal protective equipment and other emergency response equipment are in place.
- It is anticipated that fuel trucks will be used to refuel equipment and machinery on site. Where on site fuelling or maintenance of vehicles and equipment is required, the following mitigation measures will be implemented:
  - Spill kits will be readily available during refueling.
  - Personnel will be knowledgeable in the use of spill response materials.
- If there is a spill of a hazardous or deleterious product in quantities equal to or greater than those listed in the Spill Reporting Regulations under the *Environmental Management Act* the EM will report the release within 24 hours of the event occurring at 1-800-663-3456 (24 hours). Spills that enter a watercourse or water body or if they have the potential to enter a watercourse, water body or drainage ditch, must be reported immediately.
- Be aware of fire hazard ratings during work by regularly checking <http://bcwildfire.ca> for updates. Follow legal and reporting requirements for wildfires.
- Communicate fire prevention techniques during tailboard meetings, which include:
  - Prohibiting smoking near fuel sources, including dry grass, hazardous materials, and dry forests.
  - Installing spark arrestors on combustion sources in areas with Fire Danger Classes III-V (moderate to extreme).
  - Removing debris and litter from work sites.
  - Identify work-related fire ignition hazards such as sparks, catalytic converters, mufflers, open flames, electrical hazards, and cigarettes, and take precautions when using them.
- Have firefighting equipment (e.g., shovels, Pulaski or mattocks, full hand-tank pumps, and fire extinguishers) available at work sites, when and where applicable (e.g., during moderate to extreme fire hazard ratings). The location and content of required firefighting equipment is to be inspected and maintained on a regular basis by the Contractor(s).

## 6.6 Material Storage, Handling and Waste Management

The Contractor's spill mitigation and response measures in their CEMP should be in compliance with SS 165.14 (BC MOTI 2020a). Recommended mitigation measures for material storage, handling, and waste management related to proposed road works include:

- Any wastes and hazardous materials, including suspected contaminated or hazardous debris and soils (such as sorbent material, air and oil filters, hydraulic fluids and petroleum products generated during the servicing of equipment) will be stored in an environmentally acceptable location greater than 30 m away from any watercourses or wetlands until disposal at a qualified facility is coordinated. Precautions will include placing the material on plastic or poly sheeting or in appropriate containment to prevent runoff or spills to the environment.
- Suspected contaminated or hazardous materials will be segregated and stockpiled separately a minimum of 30 m from any watercourse or wetland.
- All wastes will be disposed of in compliance with applicable legislation such as the *Environmental Management Act*.
- Food waste and domestic garbage will be collected daily from work and access areas and will be disposed of off-site in an appropriate and safe manner. Other construction waste will be collected daily and placed in the appropriate receptacle.
- The Contractor(s) will be responsible for maintaining Safety Data Sheets (SDS) for all potentially hazardous products used during the work.
- On site burial or burning of wastes will not occur.
- Temporary sanitary facilities in the form of portable toilets will be provided, secured so they do not fall over, and located more than 30 m from any waterbody.

## 6.7 Protection of Water Quality

Water quality guidelines for the protection of aquatic life should be maintained in the Quesnel River during all works. If necessary and deemed warranted by the EM, monitoring of water quality in the Quesnel River, downstream of the Project site and the potential zone of influence, should focus on monitoring of the parameters in Table 8.

**Table 8: BC Water Quality Guidelines for the Protection of Aquatic Life**

Parameter	Maximum Allowable
Turbidity	<ul style="list-style-type: none"> <li>▪ Change from background of 8 NTU at any one time for a duration of 24 hours in all waters during clear flows or in clear waters.</li> <li>▪ Change from background of 2 NTU at any one time for a duration of 30 days in all water during clear flows or in clear waters.</li> <li>▪ Change from background of 5 NTU at any time when background is 8 – 50 NTU during high flows or in turbid waters.</li> <li>▪ Change from background of 10% when background is &gt;50 NTU at any time during high flows or in turbid waters.</li> </ul>
pH	6.5 – 9.0
Temperature	Hourly change not to exceed 1°C
Oil and Grease	The surface water should be free of hydrocarbons

Adapted from: BC Approved Water Quality Guidelines (BC MOE 2021), Canadian Water Quality Guidelines (CCME 2013), and A Compendium of Working Water Quality Guidelines for British Columbia (BC MOE 2006).

Mitigation measures for the protection of water quality (particularly to avoid effects to the Quesnel River) include the following:

- Activities requiring disturbance of the riverbank should be completed at low flow, where practicable.
- ESC measures (e.g., silt fence, compost socks, etc.) should be installed along the downgradient boundary of the Project Area to minimize the mobilization of sediment off-site.

## 6.8 Vegetation Protection

The Contractor's vegetation and invasive plant management measures in their CEMP shall be in compliance with SS 769 (BC MOTI 2020b). The following mitigation measures should be implemented to prevent, reduce, or manage potential effects on vegetation:

- Natural vegetation should be retained as much as possible. Construction limits should be physically delineated with snow fencing or flagging tape or another visible barrier during construction to minimize disturbance to retained vegetation.
- Limit heavy equipment use to the work area wherever possible to avoid unnecessary disturbance and soil compaction.
- Avoid parking equipment or placing materials within the rooting zone of trees and shrubs (generally to edge of canopy drip line).
- The BC *Weed Control Act* imposes a duty on all landowners and occupiers to control designated noxious plants, some of which are of concern throughout the province, others are only of concern within specific regional districts. The Contractor should control the introduction and proliferation of invasive plant species by implementing the following:
  - Any imported fill material should be clean and free of any contaminants and invasive species.

- Vehicles and equipment should be inspected for weeds and mud that may contain seeds prior to mobilizing to the Project, and if required, cleaned prior to entering the Site to reduce the potential for introduction and proliferation of invasive plants.
- Re-vegetate disturbed areas as quickly as possible after completion of the Project. If possible, plan seeding and planting to allow establishment to occur before the end of the growing season. If there is insufficient time remaining in the growing season for seeds to germinate, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.
- Disturbed areas should be seeded with MoTI's North-East General Seed Mix (Table 757A; BC MOTI 2020b).
- Riparian vegetation losses due to the Project footprint will be accounted for in an offsetting plan (see Section 7.0).

## 6.9 Wildlife Protection and Least Risk Windows

The general recommendations to avoid contravening the MBCA, Migratory Birds Regulation, or the BC *Wildlife Act* are as follows:

- If tree clearing is proposed outside of the least risk windows identified in Table 9, a pre-clearing nest survey should be conducted to identify and avoid any active bird nests in the Project Area.
- Construction activities should be avoided in the vicinity of osprey, falcon, eagle, heron and/or other raptor nests with year-round protection. Pileated woodpecker nesting cavities are also protected year-round, until it has been demonstrated that the nest cavity has been abandoned for 36 months. Regardless of tree removal timing, at least one round of a pre-clearing nest survey for raptors and other species with year-round protection will be required immediately prior to work. If active nests are found, buffer / setback zones for specific species shall be enacted based on guidelines outlined in the Develop with Care 2014 BMP (BC MOE 2014a) and the Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia complementary document (BC MOE 2013). Generally, buffers for raptor nests in a rural setting have a recommended buffer of 100-200 m radius but could be greater distance depending on the species. An additional 100 m breeding season 'quiet' buffer is recommended when the nest is active (BC MOE 2014a).
- Buffers should be established based on recommendations of the EM following identification of a nest and remain in place until the young have naturally and permanently left the vicinity of the nest. It should be noted that some bird species nesting near existing anthropogenic activities may be accustomed to and have chosen to nest within proximity to disturbance. In certain cases, if buffers are not possible due to on site activities, the EM should conduct monitoring to determine the distance at which migratory birds show signs of stress and recommend additional management measures to avoid contravention of the MBCA.

Relevant environmental least risk timing windows are provided in Table 9, with green denoting the least risk window periods, and red denoting the periods when wildlife species are more sensitive to disturbance. To reiterate; nests for raptors and other species (like pileated woodpecker) are protected year-round from removal, even when inactive.

**Table 9: Summary of Least Risk Windows for Wildlife including SAR<sup>1</sup>**

Month:		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Migratory Birds</b>													
Passerine	ECCC (Nesting Zone A4)				18					24			
Great blue heron <sup>2</sup>		14									16		
Long-billed curlew <sup>3</sup>				31					1				
<b>Raptors<sup>4</sup></b>													
Bald eagle										1			31
Osprey				31							16		
Short-eared owl				14							16		
Other raptors			28								1		
<b>Mammals</b>													
Bats (tree maternity roosting)				31							1		
<b>Fish<sup>5</sup></b>													
RB, BT, KO, CH, CO, SK, MW <sup>6</sup>									22	15			

<sup>1</sup>Numbers indicate days of the month in which the window applies. Green cells denote least risk period.

<sup>2</sup>Develop with Care Guidelines for Great Blue Heron (BC MOE 2014b).

<sup>3</sup>Nesting and breeding window taken from Birds of the World (Dugger, B.D. and K.M. Dugger 2020).

<sup>4</sup>Least risk windows for Cariboo Region taken from Develop with Care Guidelines for Raptor Conservation (BC MOE 2013)

<sup>5</sup>Least risk instream work windows for Quesnel River taken from Regional Timing Windows ([GOV BC 2023f](#))

<sup>6</sup>Note: RB= Rainbow Trout, BT = Bull Trout, KO= Kokanee, CH= Chinook Salmon, CO= Coho Salmon, SK= Sockeye Salmon, MW= Mountain Whitefish

## 7.0 REQUIREMENTS FOR OFFSETTING PLAN

Adverse effects on riparian vegetation and in-water habitat are predicted as a result of the works. It is anticipated that a detailed offsetting plan to compensate for the residual impacts to fish habitat and riparian vegetation will be developed once the final road design is available (the offsetting plan will also account for the previous 2023 erosion protection footprint).

The offsetting plan will describe measures to enhance riparian and instream fish habitat in the vicinity of works as well as other nearby areas on the Quesnel River that can benefit from offsetting. Habitat enhancement will be proposed in the Quesnel River with focus on salmonid habitat enhancement. WSP anticipates that the offsetting plan will be developed in collaboration with DFO and will be included in the *Fisheries Act* Authorization application to DFO.

The site-specific offsetting plan will include a riparian replanting plan, that will outline the required number of replacement trees and shrubs to offset losses of riparian vegetation during site clearing for the works.

A summary of the disturbance areas associated with the works, inclusive of riparian areas and instream areas below the HWM of the Quesnel River will be required to inform the offsetting requirements in the offsetting plan to be developed.

## 8.0 CONCLUSIONS

In general, this section of the LDB of the Quesnel River exhibits large channel morphology lacking functional habitat features and is likely utilised to a lesser extent compared to other locations in the river containing more habitat variability and cover. The river can freeze during winter months and there may be areas of deeper water in the channel that were not identifiable from shore that could provide holding areas for overwintering, but the lack of habitat features and cover would indicate that this section of river is likely used by salmonids mainly as a migration corridor to access preferred spawning, rearing and overwintering habitat upstream in the Quesnel River, Cariboo River, Quesnel Lake, and other tributaries.

No fish species were confirmed at the Site as no fish sampling was conducted. Based on habitat preferences and life history stages, fish that could be using the margin habitat here would likely be non-salmonid species. At higher flows, this habitat could be utilised by all fish species, likely as migratory habitat and refuge from higher flows in the margins, small pools and eddies that could be present. Instream work should be conducted within the least risk window for fish to the extent possible.

Terrestrial disturbances including vegetation removal for road realignment should consider least risk timing windows. Specifically, vegetation removal should occur outside of the general breeding bird window where possible or a QEP should conduct pre-clearing nest sweeps if required (i.e., if clearing is proposed within the breeding bird window). Consideration for recent (2022) updates to the Migratory Birds Regulations (MBR) should be incorporated into the Project in 2024 (Government of Canada 2022). The recent updates include the addition of Schedule 1 for year-round nest protection for 18 bird species and conditions that must be met prior to disturbing or destroying nests (i.e., removal of trees with pileated woodpecker nesting cavities). WSP recommends that pre-clearing surveys for pileated woodpecker be conducted prior to construction activities commencing to check for any nesting cavities in the immediate vicinity of the Project Area.

Environmental permitting for proposed work in the Quesnel River will need to be obtained prior to work. A WSA Section 11 Change Approval and DFO Fisheries Act Authorization will be required. Permit applications should be submitted as soon as the detailed engineering designs are available.

## 9.0 CLOSURE

We trust the information contained in this report is sufficient for your present needs. Should you have any questions or concerns, please do not hesitate to contact the undersigned.

### WSP Canada Inc.



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EJH/RJ/asd

[https://wsponlinecan.sharepoint.com/sites/ca-221-11730-04/shared documents/06. deliverables/001\\_issued/25162\\_en\\_rpt\\_quesnel hydraulic eoa\\_0/25162\\_en\\_rpt\\_quesnel hydraulic eoa\\_0.docx](https://wsponlinecan.sharepoint.com/sites/ca-221-11730-04/shared%20documents/06_deliverables/001_issued/25162_en_rpt_quesnel%20hydraulic%20eoa_0/25162_en_rpt_quesnel%20hydraulic%20eoa_0.docx)

## 10.0 REFERENCES

- BC Conservation Data Centre (BC CDC). 2011. Conservation Status Report: *Salvelinus confluentus*. B.C. Minist. of Environment. Available: <https://a100.gov.bc.ca/pub/eswp/> . Accessed Nov 15, 2023.
- BC CDC. 2023a. Species and Ecosystem Explorer. Available at: <http://a100.gov.bc.ca/pub/eswp/>. Accessed January 2023.
- BC CDC. 2023b. Species Summary: *Oncorhynchus kisutch* pop. 7. B.C. Minist. of Environment. Available: <https://a100.gov.bc.ca/pub/eswp/> . Accessed Nov 16, 2023.
- Bjornn, T.C. and D.W. Reiser. 1991. Habitat Requirements for Salmonid Streams, Ch. 4 in *Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats*. American Fisheries Society Special Publication 19:83-138, 1991.
- BC Ministry of Environment, Lands and Parks (MELP). 1996. Deer in British Columbia. British Columbia Ministry of Environment, Lands and Parks. Victoria, BC. 7 pp. <http://www.elp.gov.bc.ca/wld/pub/deer.htm>
- BC Ministry of Environment and Climate Change Strategy (ENV). 2021. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture - Guideline Summary. Water Quality Guideline Series, WQG-20. Prov. B.C., Victoria B.C.
- BC Ministry of Forests, Lands, Natural Resource Operations (FLNR) 2012. Fish-Stream Crossing Guidebook. Revised Edition. September 2012.
- BC FLNR and BC MOE. 2014. Guidelines for Amphibian and Reptile Conservation during Urban and Rural Development in British Columbia. Available at: [https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/standards-guidelines/best-management-practices/herptilebmp\\_complete.pdf](https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/standards-guidelines/best-management-practices/herptilebmp_complete.pdf), Accessed November 2023.
- BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD). 2017. BECdb: Biogeoclimatic Ecosystem Classification Codes and Names, Version 10, 2017. Forest Analysis and Inventory Branch, Victoria, B.C. Available at: <https://www.for.gov.bc.ca/hre/becweb/resources/codes-standards/standards-becdb.html>. Accessed November 2023.
- BC MOE. 2006. A Compendium of Working Water Quality Guidelines for British Columbia. Updated August 2006. [accessed November 2023]. [http://www.env.gov.bc.ca/wat/wq/BCguidelines/working\\_wq\\_guidelines.pdf](http://www.env.gov.bc.ca/wat/wq/BCguidelines/working_wq_guidelines.pdf)
- BC MOE. 2013. Guidelines for Raptor Conservation during Urban and Rural Land Development. A companion document to Develop with Care 2014. [accessed November 2023]. [https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/best-management-practices/raptor\\_conservation\\_guidelines\\_2013.pdf](https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/best-management-practices/raptor_conservation_guidelines_2013.pdf)
- BC MOE. 2014a. Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development In British Columbia. [accessed November 2023]. <http://www.env.gov.bc.ca/wld/documents/bmp/devwithcare/index.html>.
- BC MOE. 2014b. Develop with Care 2014: Fact Sheet #14 Great Blue Herons in Environmental Guidelines for Urban and Rural Land Development In British Columbia. [accessed November 2023]. <http://www.env.gov.bc.ca/wld/documents/bmp/devwithcare/index.html>.

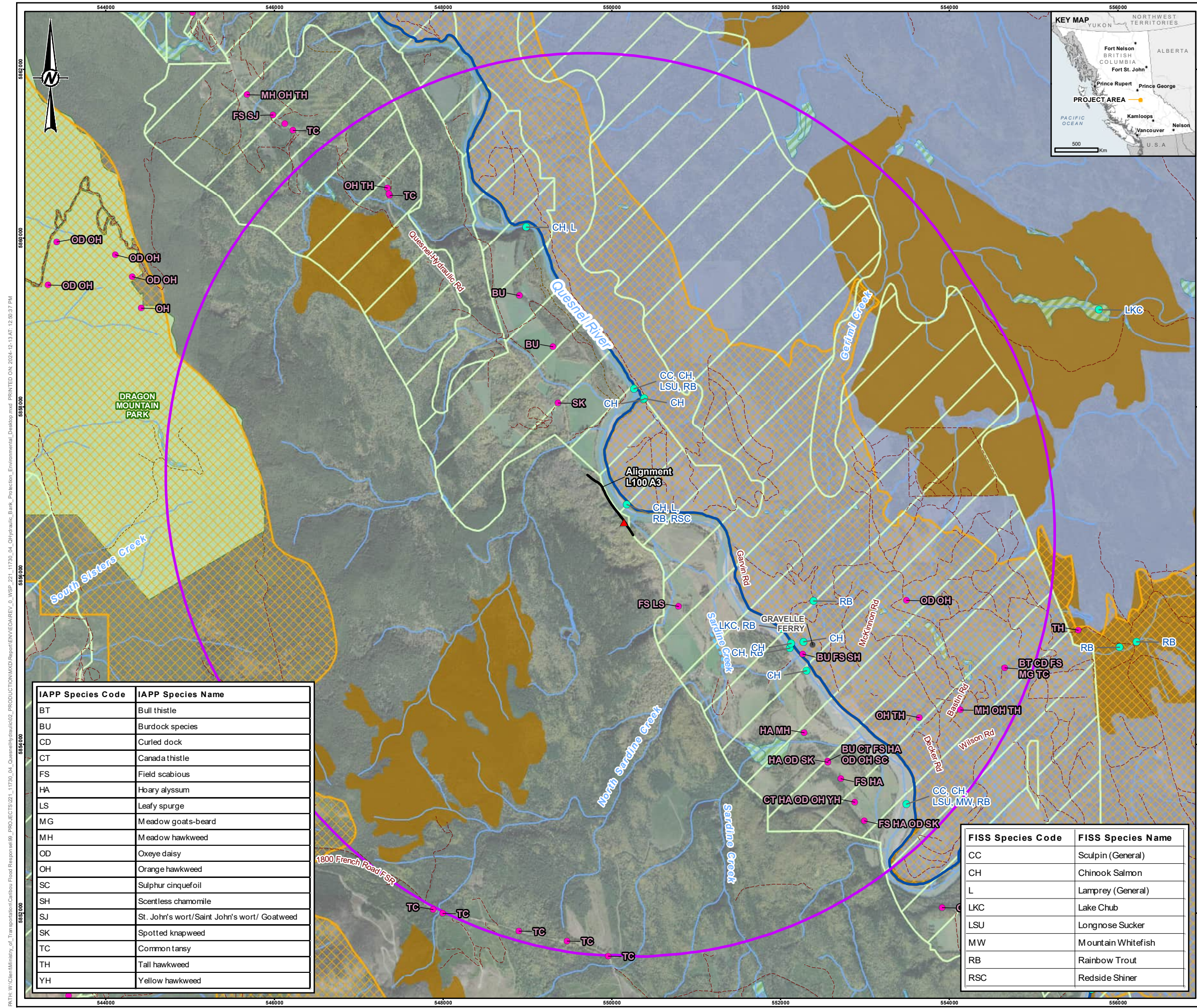
- BC MOE. 2019. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife and Agriculture. Available at: [https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg\\_summary\\_aquaticlife\\_wildlife\\_agri.pdf.%20Accessed%20January%202023](https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf.%20Accessed%20January%202023)
- BC MOE 2023. Ungulate Winter Ranges. Available at: <https://www.env.gov.bc.ca/wld/frpa/uwr/index.html>. Accessed 7 November 2023.
- BC MOF 2020. BC Grizzly Bear 2020 Population Units. <https://maps.gov.bc.ca/ess/hm/imap4m/?catalogLayers=7744,7745>
- BC Ministry of Forests and Range (MOFR). 2023. Biogeoclimatic Ecosystem Classification Program. Zone and Subzone Descriptions. Available: <https://www.for.gov.bc.ca/hre/becweb/resources/classificationreports/subzones/index.html>. Accessed November 2023.
- BC MOTI (BC Ministry of Transportation and Infrastructure). 2018. Environmental Best Practices for Highway Maintenance Activities. [accessed November 2023]. [https://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/engineering-standards-and-guidelines/environment/references/envir\\_best\\_practices\\_manual\\_complete.pdf](https://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/engineering-standards-and-guidelines/environment/references/envir_best_practices_manual_complete.pdf).
- BC MOTI. 2020a. 2020 Standard Specification for Highway Construction Volume 1. Adopted 1 November 2020. Construction and Maintenance Branch
- BC MOTI. 2020b. 2020 Standard Specification for Highway Construction Volume 2. Adopted 1 November 2020. Construction and Maintenance Branch
- BC MWLAP 2005. Ungulate Winter Range Technical Advisory Team. Desired conditions for Mule Deer, Elk, and Moose winter range in the Southern Interior of British Columbia. B.C. Minist. Water, Land and Air Protection, Biodiversity Branch, Victoria BC. Wildl. Bull. No. B-120. 18pp.
- Cariboo Envirotech Ltd. 2007. The 2006 Adult Coho Assessment of Tributaries Located on Quesnel Lake WSC 160 Waterbody I.D. 00431QUES. Prepared for Tolko Industries Ltd. January 19, 2007.
- Cariboo Regional District. 2012. Noise Regulation and Prohibition Bylaw No. 4713, 2012. CRD, Williams Lake, BC. Available at: <https://www.cariboord.ca/Modules/Bylaws/Bylaw/Download/5c95cc87-b848-484a-be92-e7c9f31936c4>. Accessed November 2023.
- CCME (Canadian Council of Ministers of the Environment). 2013. Canadian Environmental Quality Guidelines. Available at: [http://www.ccme.ca/en/resources/canadian\\_environmental\\_quality\\_guidelines/](http://www.ccme.ca/en/resources/canadian_environmental_quality_guidelines/). Accessed November 2023.
- Chilibeck B, Chislett G, and Norris G. 1993. Land Development Guidelines for the Protection of Aquatic Habitat. Produced by Fisheries and Oceans Canada and Ministry of Environment. Available at: <http://www.dfo-mpo.gc.ca/Library/165353.pdf>. Accessed November 2023.
- Cornell Lab of Ornithology. 2020. Birds of the World. Long-billed Curlew (*Numenius americanus*). Bruce, D. Dugger and Katie M. Dugger. Version 1.0, Published March 4, 2020. Text last updated January 1. 2002. Available <https://birdsoftheworld-org.proxy.birdsoftheworld.org/bow/species/lobcur/cur/breeding>. Accessed November 21, 2023.

- COSEWIC. 2012a. COSEWIC assessment and status report on the Bull Trout *Salvelinus confluentus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. iv + 103 pp. [[www.registrelep-sararegistry.gc.ca/default\\_e.cfm](http://www.registrelep-sararegistry.gc.ca/default_e.cfm)].
- COSEWIC. 2012b. COSEWIC assessment and status report on the Western Toad *Anaxyrus boreas* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xiv + 71 pp. ([www.registrelep-sararegistry.gc.ca/default\\_e.cfm](http://www.registrelep-sararegistry.gc.ca/default_e.cfm)).
- COSEWIC. 2013. COSEWIC Assessment and Update Status Report on the Little Brown Myotis *Myotis lucifugus*, Northern Myotis *Myotis septentrionalis* and Tri-coloured Bat *Perimyotis subflavus* in Canada. COSEWIC. Ottawa. xxiv + 93 pp.
- COSEWIC. 2016. COSEWIC assessment and status report on the Coho Salmon *Oncorhynchus kisutch*, Interior Fraser population, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 50 pp. [<https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html>]
- COSEWIC. 2017. COSEWIC assessment and status report on the Sockeye Salmon *Oncorhynchus nerka*, 24 Designatable Units in the Fraser River Drainage Basin, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xli + 179 pp
- COSEWIC. 2020. COSEWIC assessment and status report on the Steelhead Trout *Oncorhynchus mykiss* (Thompson River and Chilcotin River populations) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xvi + 104 pp.
- COSEWIC. 2023. COSEWIC assessment and status report on the Hoary Bat *Lasiurus cinereus*, Eastern Red Bat *Lasiurus borealis* and Silver-haired Bat, *Lasionycteris noctivagans*, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xxi + 100 pp.
- Crampton LH, Barclay RM. 1998. Selection of roosting and foraging habitats by bats in different-aged aspen mixedwood stands. *Conservation Biology*, 12:1347–13
- Fisheries and Oceans Canada (DFO). 2018. Pathways of Effects. [accessed November 2023]. <https://www.dfo-mpo.gc.ca/pnw-ppe/pathways-sequences/index-eng.html>.
- DFO. 2017. Dolly Varden *salvelinus malma* species profile. Aquatic species at risk search. Accessed November 2023. [<http://dfo-mpo.gc.ca/species-especes/profiles-profil/dolly-varde-eng.html>].
- DFO. 2019. Measures to Protect Fish and Fish Habitat. [accessed November 2023]. <http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html>.
- DFO. 2023. Aquatic species at risk map. [accessed November 2023]. <https://www.dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html>.
- Dugger, B.D. and K.M. Dugger. 2020. Cornell Lab of Ornithology. Birds of the World. Long-billed Curlew (*Numenius americanus*). Bruce, D. Dugger and Katie M. Dugger. Version 1.0, Published March 4, 2020. Text last updated January 1, 2002. Available <https://birdsoftheworld.org.proxy.birdsoftheworld.org/bow/species/lobcur/cur/breeding>. Accessed November 21, 2023.
- eBird. 2023. eBird Database. [accessed November 2023] <https://ebird.org/home>.

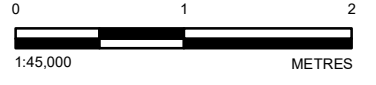
- Environment Canada (EC). 2014. Recovery Strategy for the Woodland Caribou, Southern Mountain population (*Rangifer tarandus caribou*) in Canada. *Species at Risk Act Recovery Strategy Series*. Environment Canada, Ottawa. viii + 103 pp.
- Environment and Climate Change Canada (ECCC). 2020. Guidelines to Reduce Risk to Migratory Birds. [accessed November 2023]. <https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/reduce-risk-migratory-birds.html>.
- ECCC. 2023a. Pileated Woodpecker Cavity Identification Guide. Available at: <https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/pileated-woodpecker-cavity-identification-guide.html>. Accessed November 2023.
- ECCC. 2023b. Nesting Zone Calendars. Available at: [https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods/nesting-periods.html#\\_zoneA\\_calendar](https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods/nesting-periods.html#_zoneA_calendar). Accessed November 2023.
- Furlonger CL, Dewar HJ, Fenton MB. 2010. Habitat use by foraging insectivorous bats. *Canadian Journal of Zoology*, 65:679–682.
- GBHMT (Great Blue Heron Management Team). 2018. British Columbia Great Blue Herons Atlas. [accessed November 2023]. <http://cmnmaps.ca/GBHE>.
- Government of BC. 1996a. *BC Wildlife Act, 1996*. R.S.B.C. 1996, c. 488. Current to 30 August 2023. Victoria BC: Queen's Printer. [accessed November 2023]. [https://www.bclaws.ca/civix/document/id/complete/statreg/96488\\_01](https://www.bclaws.ca/civix/document/id/complete/statreg/96488_01).
- Government of BC. 1996b. *BC Weed Control Act*. RSBC 1996, Chapter 487. Current to 22 November 2023 [accessed November 2023]: [https://www.bclaws.ca/civix/document/id/complete/statreg/96487\\_01](https://www.bclaws.ca/civix/document/id/complete/statreg/96487_01).
- Government of BC. 2003. *Environmental Management Act, 2003*. S.B.C. 2003, c. 53. Current to 29 March 2023. Victoria BC: Queen's Printer. [accessed November 2023]. [https://www.bclaws.ca/civix/document/id/complete/statreg/03053\\_00](https://www.bclaws.ca/civix/document/id/complete/statreg/03053_00).
- Government of BC. 2004. *Forest and Range Practices Act, 2004*. B.C. Reg. 14/2004. Last amended June 26, 2023 by B.C. Reg. 163/2023. Current to July 11, 2023. Available at: [https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/14\\_2004#section92.1](https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/14_2004#section92.1).
- Government of BC. 2014a. *Water Sustainability Act*. SBC 2014, Chapter 15. Current to 30 August 2023 [accessed November 2023]: <http://www.bclaws.ca/civix/document/id/complete/statreg/14015>.
- Government of BC. 2014b. Procedures For Mitigating Impacts On Environmental Values (Environmental Mitigation Procedures) Version 1.0. [accessed November 2023]. [https://www2.gov.bc.ca/assets/gov/environment/natural-resource-policy-legislation/environmental-mitigation-policy/em\\_procedures\\_may27\\_2014.pdf](https://www2.gov.bc.ca/assets/gov/environment/natural-resource-policy-legislation/environmental-mitigation-policy/em_procedures_may27_2014.pdf).
- Government of BC. 2023a. Habitat Wizard online mapping database. DataBC. GeoBC. Available: <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/ecosystems/habitatwizard>. Accessed November 2023.

- Government of BC. 2023b. iMapBC online mapping database. DataBC. GeoBC. Available: <https://maps.gov.bc.ca/ess/hm/imap4m/>. Accessed November 2023.
- Government of BC. 2023c. Fisheries Inventory Data Query (FIDQ). Available: <https://a100.gov.bc.ca/pub/fig/welcome.do>. Accessed November 2023
- Government of BC. 2023d. Requirements and Best Management Practices for Making Changes In and About A Stream in British Columbia.  
Available: <https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/working-around-water>. Accessed November 2023.
- Government of BC. 2023e. A User's Guide for Changes In and About a Stream in British Columbia. Available: <https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/working-around-water>. Accessed November 2023.
- Government of BC. 2023f. Regional Terms and Conditions and Timing Windows - Cariboo Region. Available: <https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/working-around-water/regional-terms-conditions-timing-windows>. Accessed November 2023.
- Government of Canada. 1985. *Fisheries Act, 1985*. R.S.C., 1985, c. F-14. Current to 31 Oct 2023. Ottawa ON: Minister of Justice. [accessed November 2023]. <https://laws-lois.justice.gc.ca/eng/acts/f-14/>.
- Government of Canada. 1994. *Migratory Birds Convention Act, 1994*. S.C. 1994, c. 22. Current to 31 Oct 2023. Ottawa ON: Minister of Justice. [accessed November 2023]. <https://laws-lois.justice.gc.ca/eng/acts/m-7.01/page-1.html>.
- Government of Canada. 2002. *Species at Risk Act*. SC 2002, c. 29. Current to 31 Oct 2023 and last amended 3 February 2023. [accessed November 2023] <http://laws-lois.justice.gc.ca/eng/acts/S-15.3/>.
- Government of Canada. 2019. Government of Canada. Species at Risk Act Public Registry. Residence Descriptions. Description of residence for Bank Swallow (*Riparia riparia*) in Canada. May 2019. (Accessed November 2023).
- Government of Canada. 2021. Minor Works Order. SOR/2021-170. Current to 31 October 2023. Available: <https://laws-lois.justice.gc.ca/PDF/SOR-2021-170.pdf>. Accessed 21 November 2023.
- Government of Canada. 2022. Migratory Birds Regulation, 2022 (SOR/2022-105), Current 17 Oct 2023 and last amended June 23 2023. Available: <https://laws-lois.justice.gc.ca/eng/regulations/SOR-2022-105/index.html>. Accessed November 2023.
- Great Blue Heron Management Team (GBHMT). 2018. British Columbia Great Blue Herons Atlas. [accessed July 2023]. <http://cmnmaps.ca/GBHE>.
- Haddow, C., Bings, B. and Wallich, E., Cover. 2013. Requirements and Habitat Needs of Grassland-nesting Birds in the Cariboo-Chilcotin. Ministry of Forests, Lands and Natural Resource Operations, Resource Practices Br., Victoria BC FREP Report 36. <http://www.for.gov.bc.ca/hfp/frep/publications/index.htm>
- Kalcounis MC, Hecker KR. 1995. Intraspecific variation in roost-site selection by little brown bats (*Myotis lucifugus*). Presented at the Bats and Forests Symposium, 19-21 October.

- Klinkenberg, B. (Editor). 2023. E-Fauna BC: Electronic Atlas of the Wildlife of British Columbia. Department of Geography, University of British Columbia. Vancouver, BC. [accessed November 2023].  
<http://www.geog.ubc.ca/biodiversity/efauna/>.
- McPhail, J.D. 2007. The Freshwater Fishes of British Columbia. 696 pp.
- McCrae, C.J., K.Warren, J. Shrimpton. 2012. Spawning Site Selection in interior Fraser River Coho Salmon *Oncorhynchus kisutch*: an imperiled population of anadromous salmon for a snow-dominated watershed. Online Publication, Vol. 16 249-260, 2012 Endangered Species Research. Published online March 2022
- O’Keefe, J.M., S.C. Loeb, J.D. Lanham, and H.S. Hill, Jr. 2009. Macrohabitat factors affect day roost selection by eastern red bats and eastern pipistrelles in the southern Appalachian Mountains, USA. *Forest Ecology and Management* 257:1757–1763.
- Patriquin KJ. 2001. Ecology of a bat community in harvested boreal forest in northwestern Alberta. (M.Sc. Thesis). University of Calgary, Calgary, AB.
- Pederson, C. 1998. Overview Report Quesnel River Study Area Fish Habitat Assessment Procedure. Prepared for Weldwood of Canada Ltd. March 1998
- Resources Information Standards Committee (RISC). 2001. Reconnaissance (1:20 000) Fish and Fish Habitat Inventory: Standards and Procedures. April 2001. Version 2.0. [accessed October 2023].  
<https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/nr-laws-policy/risc/recce2c.pdf>.
- Thomas DW. 1988. The distribution of bats in different ages of Douglas-fir forests. *The Journal of Wildlife Management*, 52:619–626.
- Withler. I.L., 1966. Variability in life history characteristics of steelhead trout (*Salmo gairdneri*) along the Pacific Coast of North America. *J. Fish. Res. Board Can.* 23: 365-393
- WiTS (Wildlife Tree Stewardship Program). 2018. Wildlife Tree Stewardship Atlas. The Community Mapping Network. [accessed November 2023]. <http://www.cmmmaps.ca/wits/>.



- LEGEND**
- INVASIVE ALIEN PLANT PROGRAM (IAPP) POINT
  - FISS POINT
  - ▲ PILEATED WOODPECKER OBSERVATION
  - PROJECT ALIGNMENT L100 A3
  - FIELD VERIFIED STREAM
  - WATERCOURSE (1:20,000)
  - WATERBODY (1:20,000)
  - WETLAND
  - ▨ UNGULATE WINTER RANGE
  - ▨ AGRICULTURAL LAND RESERVE (ALR)
  - ▨ PARK / PROTECTED AREA
  - ▨ OLD GROWTH MANAGEMENT AREA (LEGAL)
  - ▨ WOODLAND CARIBOU (SOUTHERN MOUNTAIN POPULATION) CRITICAL HABITAT
  - ▭ STUDY AREA



IAPP Species Code	IAPP Species Name
BT	Bull thistle
BU	Burdock species
CD	Curled dock
CT	Canada thistle
FS	Field scabious
HA	Hoary alyssum
LS	Leafy spurge
MG	Meadow goats-beard
MH	Meadow hawkweed
OD	Oxeye daisy
OH	Orange hawkweed
SC	Sulphur cinquefoil
SH	Scentless chamomile
SJ	St. John's wort/Saint John's wort/ Goatweed
SK	Spotted knapweed
TC	Common tansy
TH	Tall hawkweed
YH	Yellow hawkweed

FISS Species Code	FISS Species Name
CC	Sculpin (General)
CH	Chinook Salmon
L	Lamprey (General)
LKC	Lake Chub
LSU	Longnose Sucker
MW	Mountain Whitefish
RB	Rainbow Trout
RSC	Redside Shiner

**REFERENCE(S)**

1. BASE DATA CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA AND CANADA.
2. IMAGERY OBTAINED FROM MOTI, DATED JUNE 2023
3. CONTOURS GENERATED FROM LIDAR, OBTAINED FROM MOTI, DATED JUNE 2023

COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT  
MINISTRY OF TRANSPORTATION

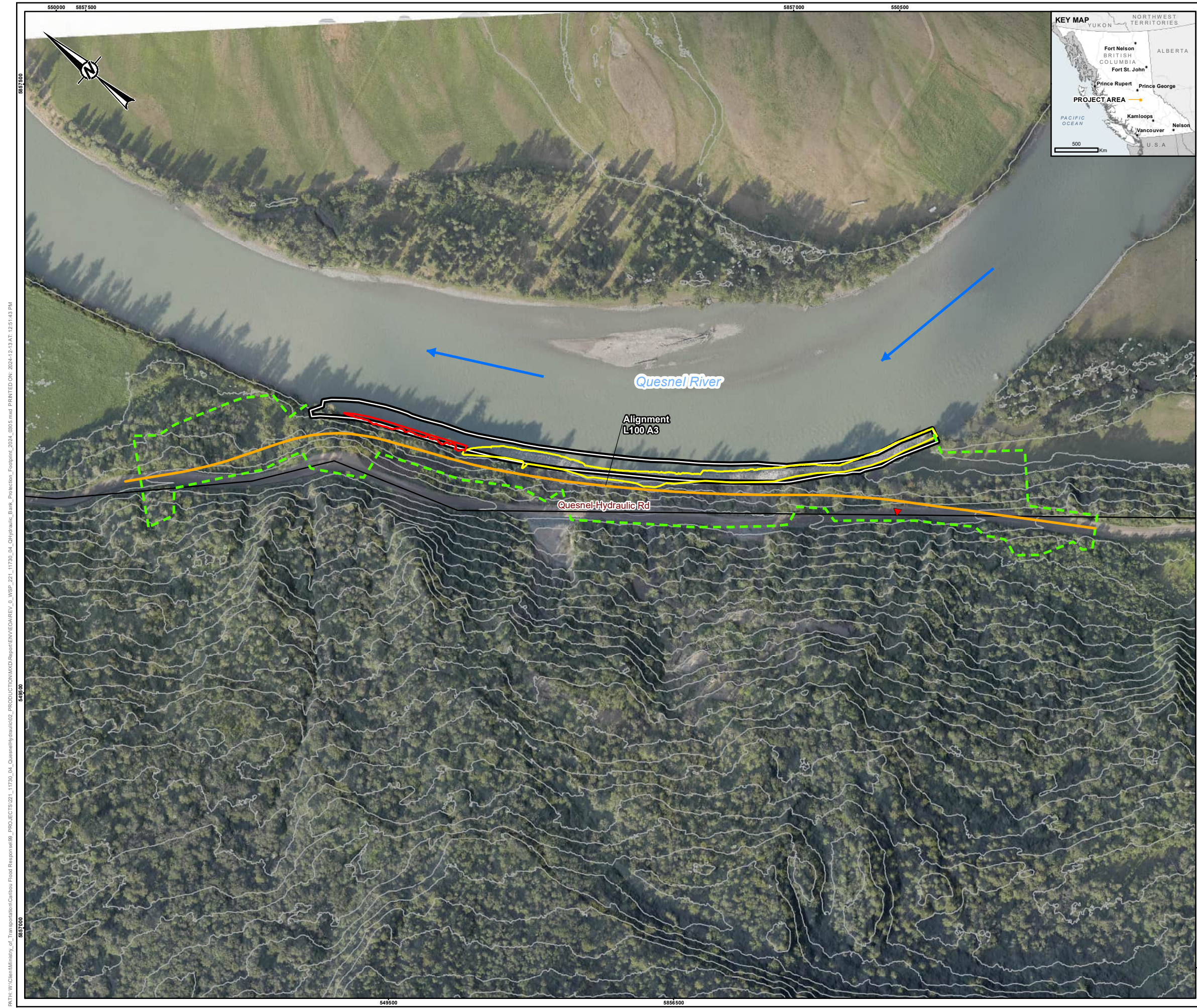
PROJECT  
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QUESNEL-HYDRAULIC ROAD

TITLE  
**ENVIRONMENTAL OVERVIEW ASSESSMENT FOR ONLINE OPTION – PROJECT AREA**

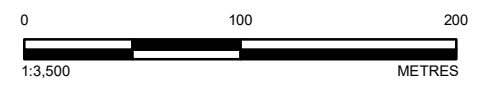
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	REVIEWED RJ
	APPROVED RJ

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



- LEGEND**
- ▲ PILEATED WOODPECKER OBSERVATION
  - PROJECT ALIGNMENT L100 A3
  - ➔ FLOW DIRECTION
  - CONTOUR (5 m)
  - ROAD - LOCAL
  - - - CLEARING AND GRUBBING BOUNDARY
  - ▭ PROPOSED RIP RAP BANK ARMOURING 2024
  - ▭ PREVIOUS RIP RAP BANK ARMOURING 2023
  - ▭ RIP RAP BANK ARMOURING FOOTPRINT



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- COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT  
**MINISTRY OF TRANSPORTATION**

PROJECT  
**CARIBOO ROAD RECOVERY PROJECT  
 QUESNEL-HYDRAULIC ROAD**

TITLE  
**ENVIRONMENTAL OVERVIEW ASSESSMENT FOR ONLINE  
 OPTION – PROJECT FOOTPRINT**

CONSULTANT	YYYY-MM-DD	2024-12-13
	DESIGNED	EJH
	PREPARED	MY
	REVIEWED	RJ
	APPROVED	RJ

PATH: W:\Client\Ministry\_of\_Transportation\Cariboo\_Road\_Recovery\PRODUCTION\MOI\_Report\ENVIRONMENTAL\_REPORT\2024\_0015.mxd PRINTED ON: 2024-12-13 AT: 12:51:43 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

**APPENDIX A**

**Site Photographs**



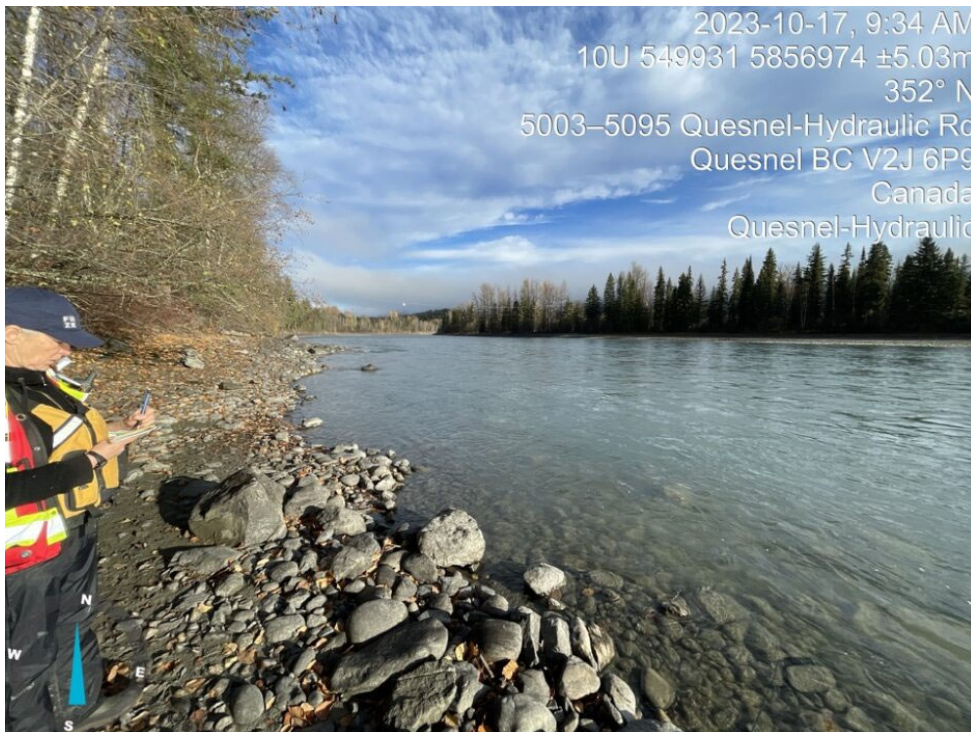
**Photograph 1: View west across Quesnel River of proposed bank protection area, showing downstream end of previous (2023) rock placement and access path, 16 October 2023.**



**Photograph 2: View southeast looking upstream at proposed bank protection area, 17 October 2023.**



Photograph 3: View west, representative vegetation within proposed bank protection area, 17 October 2023.



Photograph 4: View north, downstream from upstream extent of proposed bank protection area, 17 October 2023.



Photograph 5 : Representative substrate within proposed bank protection area, 17 October 2023.



Photograph 6 : Juvenile bear tracks within proposed bank protection area, 17 October 2023.



**Photograph 7: Fish carcass observed within proposed bank protection area, 17 October 2023.**

**APPENDIX B**

**BC CDC Species and Ecosystems  
Explorer Search Results**

Group Name	English Name	Scientific Name	BC List <sup>2</sup>	COSEWIC <sup>3</sup>	SARA <sup>4</sup>	Habitat <sup>5</sup>	Likelihood <sup>7</sup>
Amphibian	Western Toad	<i>Anaxyrus boreas</i>	Yellow	SC	1-SC (2018)	The historical range extends from Alaska and southern Yukon south to Baja California. In BC, it is found from low to high elevations throughout the province and on Haida Gwaii. It is absent from the northern interior. The western toad breeds in shallow littoral zones of lakes, temporary and permanent pools, ditches, slow moving streams, and wetlands. Adults use terrestrial habitat, including forests and woodlands, with ample cover such as shrubs, woody debris, and rocks.	Moderate potential: species with ranges that overlap the query search area and for which suitable habitat is likely to be present but are not known within 5 km of the Project area
Birds (Non-Passerine)	American Bittern	<i>Botaurus lentiginosus</i>	Blue			The range extends from northern Canada south to California, New Mexico, Arkansas, West Virginia and North Carolina. It occurs in the south and central regions of BC. This species mostly occurs in BC during the breeding season but a few will remain year round along the coast. Found in large freshwater wetlands, dominated by tall, dense stands of cattails, sedges, or bulrushes with patches of open water. Readily uses wetlands created by impoundments, beaver dams, sloughs, and lake margins. Overwinters in areas where the temperature remains above freezing. The American bittern eats mainly fish, crayfish, amphibians, mice and shrews, insects, and other animals. This species may nest in grassy uplands surrounding wetlands or on a hummock floating in shallow water.	Not expected: Typical breeding range of species does not overlap the Project.
Birds (Non-Passerine)	American Golden-Plover	<i>Pluvialis dominica</i>	Blue			The breeding range in North America extends from northeastern Manitoba along Hudson's bay, north through Nunavut, the Northwest Territories, the Yukon, and northwestern BC, and as far west as Alaska. In BC breeding is localized to the Chilcotin region. The American golden-plover winters in natural grasslands in South America. Suitable nesting habitat is found in the arctic and subarctic tundra and occasionally the montane tundra. Nests are located in sparsely vegetated areas, with rocky-slopes and well-drained soils. During migration, this species inhabits coastal and inland areas including prairies, fields, mudflats, shorelines, beaches, and estuaries.	Unlikely: Species migration range overlaps the Project, however species is unlikely to breed near Project. Citizen science records exist within 15 km of the Project outside the breeding season (eBird 2023).
Birds (Non-Passerine)	American White Pelican	<i>Pelecanus erythrorhynchos</i>	Red	NAR		The breeding range extends from south-eastern and central BC, east to western Ontario and the northwestern US states. Wintering occurs along the southern Pacific coast from California south to Baja California, coastal areas of Mexico, southeast US, and parts of Central America. Suitable breeding habitat occurs on islands found in freshwater lakes, rivers, or marshes often with sparse vegetation. Breeding islands are often long distances from foraging areas. This species forages in marshlands, wetlands, rivers, and sometimes deep lakes. Migration habitat occurs along river valleys and other aquatic foraging areas.	Unlikely: Project does not overlap known breeding locations of species, however species may use Quesnel River for foraging or during migration. Citizen science records within 15 km of the Project, closer to the Fraser River near Kersley (eBird 2023).
Birds (Non-Passerine)	Band-tailed Pigeon	<i>Patagioenas fasciata</i>	Blue	SC	1-SC (2011)	Breeding occurs from western BC and southern Vancouver Island, south to northern California and in the southern interior of the United States. Breeding along the Pacific coast occurs in low elevation (0 - 300m) coniferous forest with varying mixtures of Sitka spruce, western red cedar, western hemlock, and Douglas-fir. This species prefers habitat with fruit bearing shrubs or cultivated areas for foraging. The band tailed pigeon will also breed in temperate and mountain forests.	Not expected: Typical breeding range of species does not overlap the Project.
Birds (Non-Passerine)	Black Swift	<i>Cypseloides niger</i>	Blue	E	1-E (2019)	Occurs across much of BC including Vancouver Island during the summer, but does not occur on Haida Gwaii. Forages over forests or open habitats and breeds in rock crevice sites behind waterfalls, on sea cliffs, or in caves. Limited to a small number of known breeding sites in BC.	Unlikely: Species range overlaps the Project Area, but low habitat suitability is likely to be present (e.g., no cliff habitat).
Birds (Non-Passerine)	California Gull	<i>Larus californicus</i>	Red			This species occurs in Alberta and isolated locations in Washington, Oregon, and California during the breeding season. Only two breeding colonies have been documented in British Columbia, both in the Okanagan Valley (Siddle 2015). Breeding occurs on islands of inland natural lakes and river. Over-wintering occurs along the coast from extreme southwestern BC to Mexico. Along the Pacific coast of BC, this species inhabits rocky coasts, mudflats, estuaries, river deltas, and marine waters on the continental shelf.	Unlikely: Project does not overlap known breeding locations of this species, however species may occasionally migrate through habitats within 5 km of the Project.
Birds (Non-Passerine)	Caspian Tern	<i>Hydroprogne caspia</i>	Blue	NAR		Breeds on Pacific coast including the Fraser River delta in BC. Breeding habitat consists of coastal estuarine, salt marsh, and barrier island. Nests among driftwood and debris on low, flat, sandy or rocky islands, on shell banks and beaches, and on sparsely vegetated, sandy, muddy or pebbly shores. Also on dredge material islands and salt dikes. Forages along coastlines, shorelines, lakes, rivers, estuaries, and sloughs.	Not expected: Typical breeding range of species does not overlap the Project.
Birds (Non-Passerine)	Common Nighthawk	<i>Chordeiles minor</i>	Blue	SC	1-SC (2023)	Breeding extends from the southern Northwest Territories and the Yukon, south throughout BC, east to southern Labrador, throughout the United States and into Mexico. The common nighthawk inhabits open and semi-open habitat including grasslands, coniferous forests, logged or slash-burned forests, prairies and plains, farm fields, rock outcrops, sand dunes and beaches, and urban/suburban areas. This species nests on the ground in open habitat such as short grasslands and gravel areas.	Moderate Potential: Species range overlaps the Project, and suitable habitat is likely to be present (e.g., open fields). Citizen science records within 15 km of the Project (eBird 2023).
Birds (Non-Passerine)	Double-crested Cormorant	<i>Nannopterum auritum</i>	Blue	NAR		The range extends from Alaska south along the Pacific Coast to Mexico. Also occurs in the interior of Canada and the United States and Florida and the Caribbean. In BC, it breeds primarily in the Strait of Georgia, as well as at two inland colonies at Stum Lake, west of Quesnel, and in the Creston Valley Wildlife Area, near the southern BC border. Nests are located on protected offshore islands and rocks or on bridges, shipwrecks, docks and nesting-towers. Ground nesting occurs on rocky islands and on mats of vegetation in wetlands. Forages mainly in marine habitats but may also visit inland lakes and the estuaries of large rivers. Overwinters in coastal areas.	Not expected: Typical breeding range of species does not overlap the Project.
Birds (Non-Passerine)	Eared Grebe	<i>Podiceps nigricollis</i>	Blue			Breeding range extends from southwestern Canada, as far east as Manitoba, and south to the southwestern United States. Overwintering range occurs from the Strait of Georgia and Juan de Fuca straight in BC, south along the coast of the western U.S., and throughout Mexico and central America. Breeding habitat consists mainly of shallow lakes, ponds, and marshes. Migration and overwintering habitat includes seacoasts, estuaries, and bays. Nesting typically occurs in shallow water located in eutrophic wetlands and within shoreline areas. Nest initiation ranges from late May to the third week in July.	Unlikely: Project does not overlap breeding range of this species, however species may migrate through habitats within 5 km of the Project (e.g., Quesnel River).
Birds (Non-Passerine)	Great Blue Heron, <i>herodias</i> subspecies	<i>Ardea herodias herodias</i>	Blue			The great blue heron <i>herodias</i> subspecies is found throughout southern Canada, the United States, and in coastal Mexico. In BC, it is found year round east of the Coast Mountains. It forages along water margins including marine habitat, slow moving freshwater, and grasslands. Stick nests are located in tall coniferous and deciduous trees.	Moderate Potential: Species breeding range overlaps the Project, and suitable habitat is likely to be present along the Quesnel River. Citizen science records within 5 km of the Project (eBird 2023).
Birds (Non-Passerine)	Green Heron	<i>Butorides virescens</i>	Blue			The range in North America extends from southeastern Canada and south to Florida, where it breeds throughout the eastern United States. In the west it is found from southern BC, south to Baja California and Mexico where it occurs in coastal habitats. In BC, this species occurs along the south coast and is restricted to the Lower Mainland, as far east as Hope and Vancouver Island from Sooke north to Campbell River. The green heron is a resident along the south coast. Green heron occur in swamps, mangroves, marshes and riparian zones along creeks and streams. Nests are in trees, thickets or bushes over water, dry woodlands and orchards.	Not expected: Typical breeding range of species does not overlap the Project.

APPENDIX B  
BC CDC Species and Ecosystems Explorer Search Results

Group Name	English Name	Scientific Name	BC List <sup>2</sup>	COSEWIC <sup>3</sup>	SARA <sup>4</sup>	Habitat <sup>5</sup>	Likelihood <sup>7</sup>
Birds (Non-Passerine)	Gyrfalcon	<i>Falco rusticolus</i>	Blue	NAR		The breeding range extends from Alaska, east throughout the Canadian Arctic and Greenland. Wintering habitat extends as far south as the northern United States. Inhabits open country in the Arctic including tundra, open coniferous forest, mountainous regions and rocky seacoasts. This species nests on cliff ledges, beneath sheltering overhangs, and occasionally in abandoned hawk or raven nests.	Not expected = Typical breeding range of species does not overlap the Project.
Birds (Non-Passerine)	Lewis's Woodpecker	<i>Melanerpes lewis</i>	Blue	T	1-T (2012)	Breeding occurs in western North America from southern BC, south to New Mexico and west to California. This species occurs in areas with an open canopy and moderately dense understorey with ample woody material in which birds can forage for insects. Habitat includes open ponderosa pine forests, riparian woodland with cottonwoods, or logged/ burnt pine forest.	Low potential = Project is on edge of species' typical range, and the Project does not contain suitable ponderosa pine forest. Citizen science records occur within 5 km of the Project outside of the breeding season.
Birds (Non-Passerine)	Long-billed Curlew	<i>Numenius americanus</i>	Yellow	SC	1-SC (2005)	Breeding occurs in western North America from southern BC, Alberta and Saskatchewan south to California, Nevada, Utah, Colorado, and New Mexico. In BC, breeding occurs in the southern interior from the Thompson-Okanagan Plateau and Chilcotin-Cariboo region, north to Quesnel, and the eastern Kootenay region. This species nests in prairie habitat including short-grass and mixed prairie sites. Nesting does not occur in areas of dense vegetation. The long-billed curlew overwinters along the southern Pacific Coast in salt marshes, tidal estuaries, and moist pastures.	High Potential: Species range overlaps the Project, and suitable habitat is likely to be present. Record within 5 km (efauna 2023). Citizen science records within 5 km of the Project (eBird 2023).
Birds (Non-Passerine)	Northern Goshawk, <i>atricapillus</i> subspecies	<i>Accipiter gentilis atricapillus</i>	Blue	NAR		Breeding occurs from Alaska, east to northern Quebec and Newfoundland and south to the Great Lakes in the east and California, Arizona, New Mexico and Mexico in the west. This subspecies is widespread in B.C., except coastal areas where it is replaced by the laingi subspecies. Breeding is most common in mountainous areas and boreal zones. In western areas, nest in mature to old-growth forests with high canopy cover in Douglas fir ( <i>Pseudotsuga menziesii</i> ), pine ( <i>Pinus</i> sp.) and aspen ( <i>Populus tremuloides</i> ).	Low Potential: Project overlaps species breeding range, and forested habitat of Potential exists within 5 km of the Project.
Birds (Non-Passerine)	Peregrine Falcon	<i>Falco peregrinus</i>	No Status	SC	1-SC	The peregrine falcon's breeding range occurs throughout North America in scattered populations. In BC, the peregrine falcon is found along the entire coast (including Haida Gwaii and Vancouver Island), in the southern interior and the extreme northeastern corner of the province. Three subspecies are recognized in BC. Suitable habitat for breeding is found on cliffs that are often along rivers or coasts and urban structures such as buildings or towers. Open habitats such as grassy areas, meadows, grasslands, pastures and urban areas are used for foraging.	Not expected: Typical breeding range of species does not overlap the Project.
Birds (Non-Passerine)	Peregrine Falcon, <i>anatum</i> subspecies	<i>Falco peregrinus anatum</i>	Red	NAR		The breeding range of the anatum subspecies extends from Alaska, south through BC, most of the continental United States and Mexico. Both migratory and non-migratory individuals are apparent within BC. The anatum subspecies occurs in a variety of terrestrial (including tundra) and coastal habitats depending on the season. During nesting season, nests are generally on cliffs over forest or water. Nest sites are frequently associated with water bodies including lakes, marine and river ecosystems. When not breeding, this subspecies is found in areas where their desired prey concentrates, such as farmland. **In April 2007, the Peregrine Falcon in Canada was assessed as two separate units: pealei subspecies and anatum/tundrius. The original Peregrine Falcon tundrius subspecies designation was de-activated in April 2007.	Low Potential: Species range overlaps the Project, and habitat of moderate suitability may be present within 5 km but was not observed on Site (e.g., cliff habitat over Quesnel River).
Birds (Non-Passerine)	Prairie Falcon	<i>Falco mexicanus</i>	Red	NAR		The prairie falcon overwinters in the Great Plains and Great Basin. Breeding occurs in south central BC, southern Alberta and Saskatchewan and throughout the western United States to northwestern Mexico. In BC, it is found in the Thompson-Okanagan Plateau and Chilcotin-Cariboo Basing as far north as Williams Lake. The prairie falcon occurs in dry, open habitat including grasslands, shrub steppe and alpine tundra. Nesting for this species occurs on cliffs and bluffs.	Not expected: Typical breeding range of species does not overlap the Project.
Birds (Non-Passerine)	Red-necked Phalarope	<i>Phalaropus lobatus</i>	Blue	SC	1-SC (2019)	The distribution of the red-necked phalarope is considered circumpolar. In North America the breeding range extends from Alaska, east to northern Quebec, Labrador and Newfoundland, and southern Greenland. This species also breeds in northwestern BC, in the Kitimat and Stikine district. Wintering grounds occur largely at sea in tropical waters. In BC, during migration this species is apparent along the coast (Queen Charlotte Strait and Strait of Juan de Fuca) and inland (Charlie Lake). Suitable breeding habitat occurs in subarctic tundra or tundra forest near freshwater lakes, ponds, bogs, marshes, and small streams. A variety of habitat types are used during migration including pelagic and inshore coastal areas, salt marshes, bays, inlets, lakes, ponds, ditches, marshes, irrigated fields, and estuaries.	Unlikely: Project does not overlap breeding range of this species, however species may migrate through habitats within 15 km of the Project. Citizen science records within 15 km of the Project (eBird 2023).
Birds (Non-Passerine)	Rough-legged Hawk	<i>Buteo lagopus</i>	Blue	NAR		Breeding occurs throughout the Canadian arctic islands, Alaska, the Yukon, the Northwest Territories, Nunavut, northern Ontario, northern Quebec, and Labrador. Winter range extends from southern Canada south to California, Texas, and the Gulf Coast. The rough legged hawk is found in BC during migration and in the winter throughout most of the province east of the Coast Mountain Range, and north of 52°N. In addition, the species appears along the southeast coast of Vancouver Island and in the Fraser Lowland area. This species inhabits open treeless areas including grasslands, alpine meadows, wetlands (marshes, bogs, fens and swamps), sagebrush flats, and open cultivated areas (agricultural fields).	Unlikely: Typical breeding range does not overlap the Project, however species may use, however species may use habitats (e.g., open fields) within 5 km of the Project during non-breeding and migration periods. Several citizen science records within 15 km of the Project outside of the breeding season, primarily along the Fraser River (eBird 2023).
Birds (Non-Passerine)	Sharp-tailed Grouse, <i>columbianus</i> subspecies	<i>Tympanuchus phasianellus columbianus</i>	Blue			The Sharp-tailed Grouse are year-round residents found in a variety of habitats that are dominated by herbaceous cover and shrubs. There are records from the Wycliffe and Canal Flats areas north of Cranbrook. Leaks are formed at mid- to high elevations and breeding sometimes occurs in disturbed, open areas. Additionally, muskogs in lowland areas may be used for breeding. Nesting generally occurs in dense stands of shrub with sufficient foliage for cover.	Unlikely: Project does not overlap breeding range of this species, however species may migrate through habitats within 5 km of the Project (e.g., Quesnel River).
Birds (Non-Passerine)	Short-eared Owl	<i>Asio flammeus</i>	Blue	T	1-SC (2012)	Breeding for the short-eared owl occurs from Alaska, throughout Canada (except the Arctic islands), and northern United States. This species breeds from high arctic to mid-latitudes, including off-shore islands, in open habitats with low vegetation. Nests are built near a reliable source of small mammal prey. They use fresh and saltwater marshes, gravel pits, rock quarries, shrub thickets, and woodlots outside of the breeding period.	Moderate Potential: Species range overlaps the Project, and suitable habitat is likely to be present (e.g., open fields for foraging). Citizen science records within 15 km of the Project (eBird 2023).
Birds (Non-Passerine)	Surf Scoter	<i>Melanitta perspicillata</i>	Blue			Breeding occurs in Quebec, northern Canada and Alaska. This species overwinters in coastal habitat. In BC, the surf scoter occurs throughout the province and is a year round or seasonal resident, depending on its location within the province. Surf scoters are associated with sand-mud and cobble substrate and in rocky fjords.	Unlikely: Typical breeding range does not overlap the Project, however species may use, however species may use habitats in the within 5 km of the Project (e.g., Quesnel River) during migration periods.
Birds (Non-Passerine)	Swainson's Hawk	<i>Buteo swainsoni</i>	Red			Breeding occurs east of the Cascades in western North America, east to Manitoba and south to Nevada, Arizona, New Mexico, Texas, and northern Mexico. In BC, it is found in the Okanagan and Thompson valleys and in the Bulkley Basin from Hazelton to Smithers. It inhabits savannah, open pine-oak woodland and cultivated lands (e.g., alfalfa and other hay crops, and certain grain and row croplands) with scattered trees. Typically nest in solitary trees, bushes, or small groves.	Moderate Potential: Species range overlaps the Project, and suitable habitat is likely to be present (e.g., cultivated lands). Citizen science records outside the breeding season within 15 km of the Project (eBird 2023).

Group Name	English Name	Scientific Name	BC List <sup>2</sup>	COSEWIC <sup>3</sup>	SARA <sup>4</sup>	Habitat <sup>5</sup>	Likelihood <sup>7</sup>
Birds (Non-Passerine)	Upland Sandpiper	<i>Barrtramia longicauda</i>	Red			The breeding range extends from southern Canada from Alberta east to Nova Scotia, and as far south as Missouri and Kansas. Scattered populations occur in eastern and central BC and from the Northwest Territories west to Alaska. Preferred habitat includes large areas of short grass for feeding and courtship with interspersed or adjacent taller grasses for nesting and brood cover. Typically nests on the ground among grasses.	Not expected: Typical breeding range of species does not overlap the Project.
Birds (Non-Passerine)	Western Grebe	<i>Aechmaphorus occidentalis</i>	Red	SC	1-SC (2017)	The range extends from coastal and southern BC, east to southwestern Manitoba, south to Baja California and Mexico. Year-round residents occur along the coast of BC and season residents (breeding) occurs in south central BC. Occurrence of this species within its range is dependent on the availability of suitable breeding lakes and marshes. Colonies are known in only three locations in BC: Salmon Arm Bay on Shuswap Lake, the north arm of Okanagan Lake, and the Creston Valley Wildlife Management Area (Blood 1999). Areas of open water with emergent vegetation along the edges are required on breeding waterbodies. Wintering habitat occurs in brackish waters, estuaries, rivers, and sheltered sea coasts.	Unlikely: Project does not overlap breeding range of this species, however species may migrate through habitats within 5 km of the Project (e.g., Quesnel River).
Birds (Non-Passerine)	White-throated Swift	<i>Aeronautes saxatalis</i>	Blue			The range extends from southern BC to central America. In BC, white-throated swift only breed in south central BC in the Smilkameen Valley, Okanagan Valley, Kootenay mountains, southern Thompson Valley, Clearwater Valley, and Chilcotin-Cariboo Basin. Breeding is associated with rock crevices in cliffs and canyons in mountainous areas, but may use buildings or sea cliffs. Primarily found in mountainous areas and forages over a variety of habitats.	Unlikely: Species range overlaps the Project Area, but low habitat suitability is likely to be present (e.g., no cliff habitat).
Ecological Communities	Douglas-fir - hybrid white spruce / thimbleberry	<i>Pseudotsuga menziesii</i> - <i>Picea engelmannii</i> x <i>glauca</i> / <i>Rubus parviflorus</i>	Blue	N/A	N/A	#N/A	
Ecological Communities	Douglas-fir - lodgepole pine / clad lichens	<i>Pseudotsuga menziesii</i> - <i>Pinus contorta</i> / <i>Cladonia</i> spp.	Blue	N/A	N/A	#N/A	
Ecological Communities	Douglas-fir / Douglas maple / step moss	<i>Pseudotsuga menziesii</i> / <i>Acer glabrum</i> / <i>Hylacomium splendens</i>	Red	N/A	N/A	#N/A	
Ecological Communities	hybrid white spruce - paper birch / devil's club	<i>Picea engelmannii</i> x <i>glauca</i> - <i>Betula papyrifera</i> / <i>Oplopanax horridus</i>	Blue	N/A	N/A	#N/A	
Ecological Communities	hybrid white spruce / ostrich fern	<i>Picea engelmannii</i> x <i>glauca</i> / <i>Matteuccia struthiopteris</i>	Red	N/A	N/A	#N/A	
Fish	Bull Trout	<i>Salvelinus confluentus</i>	Blue	SC		The range extends from the southern Yukon south to the Columbia river drainage in Nevada and McCloud River drainage in California. In BC, bull trout generally occur in the interior of the province. It inhabits streams and coastal habitats where large rivers traverse the Coast Mountains to the Pacific Ocean.	Moderate potential = species with ranges that overlap the query search area and for which suitable habitat is likely to be present but are not known within 5 km of the Project area
Fish	Cutthroat Trout, lewisi subspecies	<i>Oncorhynchus clarkii lewisi</i>	Blue	SC	1-SC (2010)	The range of this subspecies is limited to BC and Alberta. In BC this species occurs in the Kootenay, Flathead and Pend d'Oreille rivers, and inhabits lakes, creeks and major tributaries. Isolated populations also inhabit headwater streams and lakes of the upper Columbia, South Thompson, and Kettle rivers. Populations may be stream-residents, or migratory. Migratory populations may be fluvial, moving between small tributaries where they spawn and rear, and large rivers where they rear as adults, or adfluvial, moving between small tributaries where they spawn and rear and adult rearing lakes. Suitable spawning habitat occurs in relatively small streams characterized by gravel substrates and a low gradient.	Not expected: species with known range that does not overlap the query search area.
Fish	White Sturgeon	<i>Acipenser transmontanus</i>	No Status	E/T	1-E	Most British Columbia sturgeon live in large rivers; however, several populations are either restricted to large lakes or spend a certain amount of time within them.	Moderate potential = species with ranges that overlap the query search area and for which suitable habitat is likely to be present but are not known within 5 km of the Project area
Fish	White Sturgeon (Upper Fraser River Population)	<i>Acipenser transmontanus</i> pop. 5	Red	E	1-E (2003)	This population is found in the Upper Fraser River, upstream of Prince George. Habitat is the same as for Population 4.	Not expected: species with known range that does not overlap the query search area.
Invertebrates - Insects	Familiar Bluet	<i>Enallagma civile</i>	Red			The range extends throughout the United States, primarily east of the Rocky Mountains. In BC, records of occurrence are known from the Cariboo region. This species lives in marshy ponds, lakeshores, slow-moving streams and newly water bodies. Eggs are laid on aquatic vegetation and larvae are aquatic.	Unlikely = species with ranges that overlap the query search area and for which suitable habitat is not likely to be within 5 km of the Project.
Invertebrates - Insects	Forcipate Emerald	<i>Somatochlora forcipata</i>	Blue			The range in BC is restricted from Kootenay National Park in the southern Rocky Mountains to Williston Lake and the BC central plateaus. Suitable habitat occurs around spring-fed streams in the subalpine, fens, small ground water fed pools and open spruce forest. Eggs are laid on moss or algae mats.	Not expected: species with known range that does not overlap the query search area.
Invertebrates - Insects	Hairy-necked Tiger Beetle	<i>Cicindela hirticollis</i>	Blue			The range of this species is incomplete and needs to be reviewed. However, this species is known to occur in the interior of BC, from the southern border to the Bulkley-Nechako Regional District. This species occurs on sandy beaches of streams, rivers, lakes, and oceans.	Unknown: insufficient data and/or information is available for this species to determine likelihood.
Invertebrates - Insects	Jutta Arctic, chermocki subspecies	<i>Oenesis jutta chermocki</i>	Blue			The subspecies chermocki ranges from the Rocky Mountain in BC west to Prince George. This subspecies occurs in lodgepole pine forest clearings, at forest edges, in spruce bogs and along trails. The chermocki subspecies is associated with boreal forests across its range. It feeds on grasses and sedges, and in some parts of its range Labrador tea ( <i>Ledum groenlandicum</i> ).	Unlikely = species with ranges that overlap the query search area and for which suitable habitat is not likely to be within 5 km of the Project.
Invertebrates - Molluscs	Caribou Rams-horn	<i>Planorbella columbiensis</i>	Red			The range in BC for the rams-horn is unknown; the last individual was at Lac La Hache located in the central interior in 1945. If this species is still apparent in BC their habitat would be open lakes.	Not expected: species with known range that does not overlap the query search area.
Invertebrates - Molluscs	Golden Fossaria	<i>Galba obrussa</i>	Blue			This species is found in both perennial lakes and vernal ponds with a mud substrate and macrophyte. There are only 4 records for this species in the province, from Tudy Lake Provincial Park (north of Prince George) south to Skaha Lake.	Not expected: species with known range that does not overlap the query search area.
Invertebrates - Molluscs	Herrington Fingernailclam	<i>Sphaerium occidentale</i>	Blue			This species is endemic to North America, with a scattered distribution from BC in the west, Newfoundland in the east, and Florida, Utah and Colorado in the south. In BC, it is known to occur in Yoho National Park and Flathead River Valley. Suitable habitat occurs in areas with calcareous deposits. It inhabits ditches, swamps and shallow ponds which are dry for a portion of the year and can be found among moist leaves and grass.	Not expected: species with known range that does not overlap the query search area.
Invertebrates - Molluscs	Meadow Rams-horn	<i>Planorbula campestris</i>	Blue			Eight records from this species are known in BC, from the south and east parts of the Province (Wigwam River, Chilliwack Lake and Okanagan Lake) and northern BC. Isolated record exists from Vancouver Island. Occur in seasonally wetted pools and portions of permanent waterbodies, which have mud substrate and dense vegetation (BC CDC 2019).	Not expected: species with known range that does not overlap the query search area.

Group Name	English Name	Scientific Name	BC List <sup>2</sup>	COSEWIC <sup>3</sup>	SARA <sup>4</sup>	Habitat <sup>5</sup>	Likelihood <sup>7</sup>
Invertebrates - Molluscs	Pygmy Fossaria	<i>Galba parva</i>	Blue			The pygmy fossaria is apparent from east central BC to the lower mainland. It is found in a wide range of habitats including lakeshores, riverbanks, streams, marshes, and wet mud flats. Within these habitats it is usually found in submerged vegetation but individuals will also leave the water.	Not expected: species with known range that does not overlap the query search area.
Invertebrates - Molluscs	River Peaclam	<i>Pisidium fallax</i>	Blue			The River Peaclam is distributed throughout Canada from BC to Ontario, and south into northern US. They occur in rivers and lakes and is found on sandy bottoms, sandy gravel, and between large rocks. It prefers large bodies of water with considerable waves action.	Not expected: species with known range that does not overlap the query search area.
Invertebrates - Molluscs	Rocky Mountain Capshell	<i>Acoloxus coloradensis</i>	Blue	NAR		In Canada, it occurs in disjunct populations in BC, Alberta, Ontario and Quebec. In BC, it is restricted to the east-central region of the province. This small, freshwater limpet inhabits high altitude cool, boreal lakes and slow-moving streams characterized by rocky substrate and glacial deposits. It may also occur on submerged wood and decaying leaves.	Not expected: species with known range that does not overlap the query search area.
Invertebrates - Molluscs	Rocky Mountain Physa	<i>Physella propinqua</i>	Blue			Occurs in central and southern BC. May also occur in northern BC and on Vancouver Island. Little habitat information is available from the sources referenced in this document. This species has been found in lakes and rivers.	Unknown: insufficient data and/or information is available for this species to determine likelihood.
Invertebrates - Molluscs	Striated Fingernailclam	<i>Sphaerium striatinum</i>	Blue			There are three records of this species in BC, from north of Prince George, Little Lake in the Cariboo, and Sumas Lake. The last record is from 1997. Occurs in permanent watercourses and waterbodies, in depths up to 12 m. It is expected to occur elsewhere throughout BC.	Unknown: insufficient data and/or information is available for this species to determine likelihood.
Invertebrates - Molluscs	Sunset Physa	<i>Physella virginea</i>	Blue			Limited habitat information available. Historical records indicate this species is associated with lakes, rivers, creeks and sloughs (BC CDC 2017). Very few records in BC.	Unknown: insufficient data and/or information is available for this species to determine likelihood.
Invertebrates - Molluscs	Threeedge Valvata	<i>Valvata tricarinata</i>	Red			Threeedge valvata occurs in soft substrates among macrophytes within lakes, ponds and rivers. It has been recently observed in the lower Columbia River south of Trail, and has been recorded historically in Kootenay Lake and Wasa Lake.	Not expected: species with known range that does not overlap the query search area.
Invertebrates - Molluscs	Widelip Pondsnaill	<i>Stagnicola traski</i>	Blue			This species is known to occur southern BC in three locations: Yoho National Park, near Grand Forks, and near Merritt. Occurs in a wide variety of habitats such as lakes, ponds, marshes, ditches, and slow streams.	Not expected: species with known range that does not overlap the query search area.
Mammal	Caribou (Northern Mountain Population)	<i>Rangifer tarandus</i> pop. 15	Blue	SC	1-SC (2005)	The northern mountain population is found in mountainous terrain in northern and west-central BC. Northern mountain caribou live in mountainous terrain in summer, and migrate to low-elevation forests in winter. Wintering habitat includes lodgepole pine and black spruce forests at low elevation and ridges at high elevation. Areas with low snow fall, where lichens are available, are important for wintering habitat. Found in the Englemann Spruce-Subalpine Fir, Montane Spruce, Sub-Boreal Pine-Spruce, Spruce-Willow-Birch and Boreal White and Black Spruce biogeoclimatic zones.	Not expected: species with known range that does not overlap the query search area.
Mammal	Grizzly Bear	<i>Ursus arctos</i>	Blue	SC	1-SC (2018)	In North America the range extends from Alaska, east to Nunavut, south to BC, western Alberta and the Rocky Mountains in the United States. In BC, it is found throughout the province except on Haida Gwaii and Vancouver Island and it is generally considered extirpated from major urban centres. Habitat is variable and changes with food.	Unlikely: species with ranges that overlap the query search area and for which suitable habitat is not likely to be within 5 km of the Project.
Mammal	Hoary Bat	<i>Lasius cinereus</i>	Blue	E		Occurs in a variety of forest conditions. Forages in open areas including riparian zones. Roosting most often in dense foliage, but sometimes in rock crevices.	Moderate Potential: species with ranges that overlap the query search area and for which suitable habitat is likely to be present but are not known within 5 km of the Project area, could be present in snags and trees within the Project Area
Mammal	Little Brown Myotis	<i>Myotis lucifugus</i>	Blue	E	1-E (2014)	Little brown myotis are common in a wide range of forest types across BC. They appear more abundant in older forest stands, which is likely related to increased snag availability for roosting and ease of foraging under closed canopy. Females establish maternity colonies typically in buildings or cavities in large-diameter trees. Little brown myotis typically forage over still water, rivers, and in forest gaps, edges or along trails. During the winter months, they hibernate in caves.	Moderate Potential: species with ranges that overlap the query search area and for which suitable habitat is likely to be present but are not known within 5 km of the Project area, could be present in snags and trees within the Project Area
Mammal	Mountain Goat	<i>Oreamnos americanus</i>	Blue			Occur in mountainous regions throughout BC. Primarily associated with Steep, rocky areas with cliffs or bluffs in alpine or sub-alpine regions. They prefer areas with sufficient escape terrain (steep rocky areas) for predator avoidance and are usually reluctant to venture more than 400-500 m from escape terrain, often less distance during winter. Coastal mountain goats typically winter at moderate to lower elevations in forested habitats.	Not expected: species with known range that does not overlap the query search area.
Mammal	Northern Myotis	<i>Myotis septentrionalis</i>	Blue	E	1-E (2014)	The geographic range extends from the eastern United States and Canada, west to eastern BC and the southern Northwest Territories. In BC, the species occurs in Hudson's Hope, the Peace River Region, Mount Revelstoke National Park and Revelstoke Dam. The northern myotis is generally associated with forested communities, particularly boreal forests. In BC, habitat information has primarily been collected from Mount Revelstoke National Park where the northern myotis inhabits forests dominated by western hemlock ( <i>Tsuga heterophylla</i> ) and western red-cedar ( <i>Thuja plicata</i> ).	Not expected: species with known range that does not overlap the query search area.
Mammal	Wolverine	<i>Gulo gulo</i>	No Status	SC	1-SC (2018)	Wolverine range in North America extends from Alaska to northern Canada. In BC, it is known to occur in the northern two-thirds of the province and the Columbia Mountains in southeastern BC. Suitable habitat occurs in northern boreal forests, montane forests and subarctic and alpine tundra. Wolverines show preference for high latitudes and high elevations. Snow and a year-round food source are important habitat components.	Unlikely = species with ranges that overlap the query search area and for which suitable habitat is not likely to be within 5 km of the Project.
Mammal	Wolverine, <i>Iuscus</i> subspecies	<i>Gulo gulo luscus</i>	Blue	SC	1-SC (2018)	The luscus subspecies is found across Canada, the northwestern United States and Alaska. Suitable habitat includes boreal forests, subarctic and arctic tundra, montane forests and alpine tundra. It is generally found at high elevations and latitudes. Habitat requirements include a consistent, year-round supply of food (Klinkenbeg 2019). Natal and maternal dens are at high elevations in areas with high snow cover that provide insulation throughout the denning period. Dens are under boulders or deadfall or constructed in snow tunnels (COSEWIC 2014).	Unlikely = species with ranges that overlap the query search area and for which suitable habitat is not likely to be within 5 km of the Project.
Passerine Birds	Barn Swallow	<i>Hirundo rustica</i>	Yellow	SC	1-T (2017)	In North America, this species breeds throughout the interior of Mexico, the continental United States and Canada, and as far north as southern Alaska, the Yukon and the Northwest Territories. Typically inhabits open areas near water with low vegetation. Nesting typically occurs on horizontal surfaces, including natural structures (crevices, cavities, caves) and anthropogenic structures (rafters, ceiling, roofs, bridges), near water with access to mud for nest building.	Moderate Potential: species with ranges that overlap the query search area and for which suitable habitat is likely to be present but are not known within Project Area (rural properties nearby could provide nesting structures, i.e., barns and outbuildings)
Passerine Birds	Bay-breasted Warbler	<i>Setophaga castanea</i>	Red			The northeastern area of British Columbia, northern Rockies and Peace River district is the western limit of the bay breasted warbler's breeding range. There has been one breeding record outside of the northeastern area near Good Hope Lake. This species of warbler inhabits dense, mature boreal coniferous forests with small openings. In addition, some occurrences have been recorded in pine ( <i>Pinus</i> ), hemlock ( <i>Tsuga</i> ), and mixed forests. Typically individuals are found near open water, and occasionally in bogs and swamps.	Not expected: Typical breeding range of species does not overlap the Project.
Passerine Birds	Black-throated Green Warbler	<i>Setophaga virens</i>	Blue			This species breeds from BC to Newfoundland, and south throughout the northeastern United States. Wintering habitat occurs in southern Mexico, the Caribbean and Central America. The black-throated green warbler inhabits mature or mixed-age coniferous or mixed forests (spruce dominated) and mature riparian forest and aspen dominated stands. Nesting typically occurs in conifers but also in hardwoods, shrubs, and vine tangles.	Not expected: Typical breeding range of species does not overlap the Project.

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Passerine Birds	Bobolink	<i>Dolichonyx oryzivorus</i>	Red	SC	1-T (2017)	The bobolink breeds from BC and Alberta east to Newfoundland and in the northern United States. Individuals nest in tall or mixed grass prairie areas. Nesting will occur in cultivated fields with grasses and forbs and abandoned fields.	Moderate potential = species with ranges that overlap the query search area and for which suitable habitat is likely to be present but are not known within 5 km of the Project area
Passerine Birds	Cape May Warbler	<i>Setophaga tigrina</i>	Blue			Breeding habitat occurs from southern Northwest Territories, south to eastern BC, east to Nova Scotia and around the Great Lakes. The Cape May warbler breeds in spruce (Picea sp.) and balsam fir (Abies balsamea) forests that are over 50 years old. This species is associated with areas that have an abundance of spruce budworms; populations reflect spruce budworm populations, expanding during outbreaks.	Not expected: Typical breeding range of species does not overlap the Project.
Passerine Birds	Evening Grosbeak	<i>Coccothraustes vespertinus</i>	Yellow	SC	1-SC (2019)	Breeds mainly throughout the southern and central interior of BC at mid-elevations. Coniferous and mixed forests are preferred for nesting and breeding is frequently associated with outbreaks of forest-defoliating insects such as spruce budworm (Martell 2015).	Moderate potential = species with ranges that overlap the query search area and for which suitable habitat is likely to be present but are not known within 5 km of the Project area
Passerine Birds	Lark Sparrow	<i>Chondestes grammacus</i>	Blue			In BC, breeds in the southern interior in various open habitats with scattered bushes and trees including short-grass, mixed-grass, and tall-grass prairie, parkland, sand hills, barrens, fields, shrub thickets, shrub steppes, woodland edges, orchards, riparian areas, pastures, and savanna. Nests are often in woody vegetation on or near the ground. within BC, this species is documented as breeding in the Okanagan and Similkameen valleys north to Kamloops	Not expected: Typical breeding range of species does not overlap the Project.
Passerine Birds	Olive-sided Flycatcher	<i>Contopus cooperi</i>	Yellow	SC	1-SC (2023)	Breeds in montane and northern coniferous forests from sea-level to timberline, but is usually found in mid- to high-elevation forests. This species is associated with forest openings and edges near natural openings (e.g. streams, lakes, wetlands, meadows), human-made openings (i.e. logged areas), burned forest, and open to semi-open forest.	Moderate potential = species with ranges that overlap the query search area and for which suitable habitat is likely to be present but are not known within 5 km of the Project area
Passerine Birds	Rusty Blackbird	<i>Euphagus carolinus</i>	Blue	SC	1-SC (2009)	The breeding range for the rusty blackbird occurs from Alaska across Canada east to Newfoundland; however, it is absent from the Canadian Arctic and southern British Columbia, Alberta, Saskatchewan and Manitoba. In BC, this species is known in the south central and northern areas during the breeding season. This species inhabits low-elevation wetland habitat in coniferous and mixed forests, including fens, bogs, muskeg, beaver ponds and other wet forest openings. Individuals nest almost exclusively near water, in the branches of deciduous trees or among emergent vegetation. The rusty black bird is an opportunistic feeder and may feed on insects, seeds and some fruits.	Moderate Potential: Species range overlaps the Project, and suitable habitat is likely to be present (e.g., wet depression near Quesnel River). Citizen science records outside the breeding season within 15 km of the Project (eBird 2023).
Passerine Birds	Smith's Longspur	<i>Calcarius pictus</i>	Blue			Breeding range occurs from Alaska east to northern Ontario. In BC, breeding occurs in the Chilkat Pass. Breeding habitat includes wet meadows and wetlands in the forest-tundra transition zone on the north edge of the boreal tree-line. Also occurs in grassy mountain valleys or passes and in shrubby tundra up to 1700m.	Not expected: Typical breeding range of species does not overlap the Project.
Passerine Birds	Winter Wren	<i>Troglodytes hiemalis</i>	Blue			Breeds in northeastern British Columbia. Found in coniferous forest (especially spruce and fir) and mixed forests, primarily with dense understorey; in migration and winter also in deciduous forest and woodland with dense undergrowth and tree-falls, dense hedgerows, and brushy fields	Not expected: Typical breeding range of species does not overlap the Project.
Passerine Birds	Yellow-breasted Chat	<i>Icteria virens</i>	Red	E	1-E (2003)	The range extends from southern Canada, from BC east to Ontario, and south to central Mexico. The BC population is part of the subspecies Icteria virens auricollis which occurs in Canada from BC east to Saskatchewan in spring and summer. Suitable habitat occurs in dense thickets, riparian areas and overgrown clearings dominated by wild rose and willow.	Not expected: Typical breeding range of species does not overlap the Project.
Reptile	Painted Turtle	<i>Chrysemys picta</i>	No Status	T/SC	1-T/SC (2021)	Northern painted turtles occur throughout the warm low elevation valleys of the southeastern interior of BC. Habitat includes ponds, lakes, marshes, and slow-moving backwaters.	Not expected = species with known range that does not overlap the query search area. Quesnel river too large and fast flowing to be suitable habitat.
Vascular Plants - Monocots	American sweet-flag	<i>Acorus americanus</i>	Blue			This species is rare in BC and occurs east of the Coast-Cascade Mountains in wetlands and shallow water. In the Fraser Valley, it is only known from two sites in Pitt Meadows.	Not expected: species with known range that does not overlap the query search area.
Reptile	Painted Turtle - Intermountain - Rocky Mountain Population	<i>Chrysemys picta</i> pop. 2	Blue	SC	1-SC (2007)	Northern painted turtle range extends across North America and is divided into four subspecies based on geographic location. C.p. bellii is the only subspecies in BC and is split into two populations- the pacific coast population and the intermountain-Rocky Mountain population. The Intermountain-Rocky Mountain subpopulation range extends through the southern part of the province in the interior Okanagan and Kootenay regions. It occurs in the shallow waters of ponds, lakes, marshes and slow-moving watercourses. Habitat typically has a muddy bottom with emergent vegetation. Females dig nests in soft soil, and hatchlings remain in nest during winter and emerge in spring.	Not expected: species with known range that does not overlap the query search area.

Search Criteria

BC Conservation Status: Red  
(Extirpated, Endangered, or Threatened) OR Blue (Special Concern)  
OR SARA Schedule 1  
Status: True  
AND Area Of Interest: User Defined Polygon  
AND BGC Zone, Subzone: SBSmh  
Sort Order: Phylogenetic  
Ascending  
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