REPORT

Sandhill Embankment Washout Project

Overview Environmental Assessment

Submitted to:

Ministry of Transportation and Infrastructure

Attention: Krista Englund, Regional Manager Environmental Services for SCR
310 - 1500 Woolridge Street
Coquitlam, BC
V3K 0B8

Submitted by:

Golder Associates Ltd.
1935 Bollinger Road Nanaimo, British Columbia V9S 5W9 Canada

+1 250 754 5651

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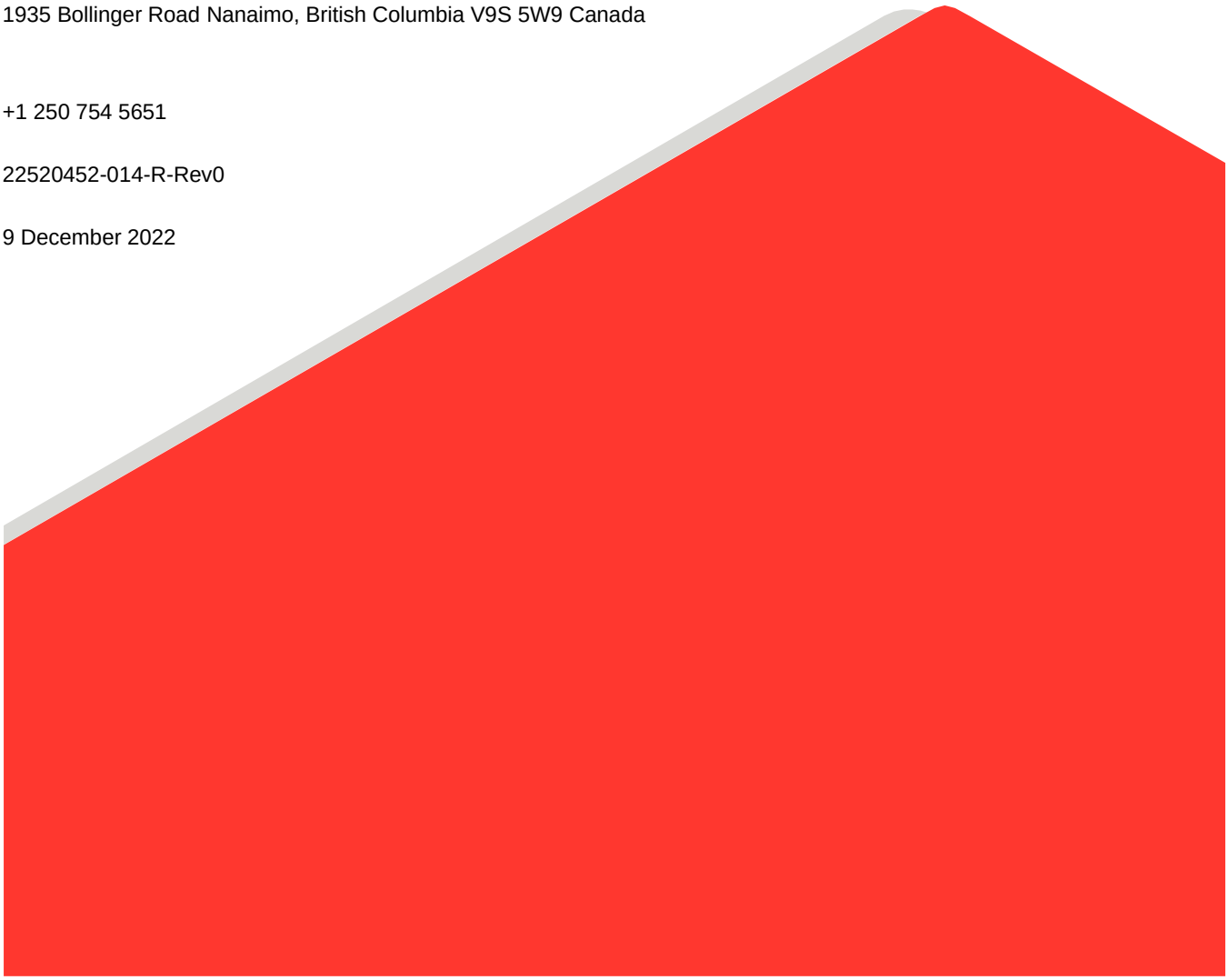

Distribution List

eCopy - Ministry of Transportation and Infrastructure

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1.0 INTRODUCTION

WSP Golder Associates Ltd. (Golder) was retained by the BC Ministry of Transportation and Infrastructure (MOTI) to provide environmental services during design and construction for repairs to Chilliwack Lake Road where it has washed out at the Sandhill Embankment in Chilliwack, BC (Figure 1). This scope of work has been generated following a call-up under the BC MOTI Contract 851CS1161 – As & When Professional Environmental Project Coordination Services executed 30 April 2021.

BC MOTI has requested the preparation of an Overview Environmental Assessment (OEA) in support of the 100% Design for repairs and drainage improvements to the Chilliwack Lake Road (the Project). This OEA includes a description of the Project, a high-level characterization of biophysical resources in and proximal to the Project, potential impacts to the surrounding environment resulting from the Project, and associated mitigation measures to avoid and reduce these adverse Project effects. A brief description of previous work completed involving the stabilization of the Sandhill Embankment and temporary road construction is provided below. Further information on this previous work, including the environmental effects assessment and associated mitigation, is provided in the Environmental Constraints Technical Memorandum (ECTM) prepared previously (Golder 2022).

2.0 BACKGROUND

The Project is located along Chilliwack Lake Road, between Borden Creek Forest Service Road (FSR) and Slesse Creek FSR, and immediately south of the Chilliwack River, and includes approximately 700 m of road and drainage repair and improvements (the Project area). During the 15 November 2021 atmospheric river event, the Sandhill Embankment portion of the Chilliwack Lake Road was washed out, resulting in approximately 9,000 m^3 of displaced soil.

Initial repairs were completed in two phases. The first phase involved the construction of a temporary lane along with temporary drainage measures, while the second phase involved construction work to stabilize the slope. To support this work, an ECTM was produced that provided a high-level characterization of the environmental resources within and adjacent to the embankment washout area to provide context for potential Project-related (i.e., Phase 1 and Phase 2) effects and associated mitigation measures (Golder 2022). The ECTM considered the washout area and adjacent areas where vegetation clearing was anticipated, either for road building or heavy machinery access. This OEA builds upon this initial technical memorandum.

3.0 PROJECT DESCRIPTION

This OEA is provided to support the 100% Design for repairs to the Chilliwack Lake Road. This work will include the following components:

- Clearing and grubbing
- Construction of a new ditch running parallel along the south side of the road to be lined with an impermeable layer and riprap
- Construction and repaving of portions of the Chilliwack Lake Road
- Reinstatement of the Trans Canada Trail

At least one BC Hydro power pole will also be relocated within the clearing and grubbing extent of the Project. This OEA considers this work, but it should be noted that this relocation and the implementation of associated mitigation will be completed by BC Hydro.

4.0 METHODS

4.1 Background Review

Publicly available sources of aquatic and terrestrial data were reviewed to characterize known information on the existing conditions and potential environmental resources within and adjacent to the Project area (i.e., 500 m [the Study area]). Information sources reviewed included the following:

- BC Conservation Data Centre (CDC) Species and Ecosystem Explorer database and associated reports (BC CDC 2022)
- Data BC's iMapBC and Habitat Wizard (Government of BC 2022a,b)
- Invasive Alien Plan Program (IAPP; Government of BC 2022c)
- Wildlife Tree Stewardship Atlas (WiTS; WiTS 2022)
- British Columbia Great Blue Heron Atlas (GBHMT 2022)
- Online satellite imagery (e.g., Google Earth)

4.2 Species and Ecosystems at Risk

Information on rare and endangered species in BC is available from both provincial and federal sources. Provincially, data on known rare and endangered species occurrences (referred to as element occurrences) are available through the BC Conservation Data Centre (BC CDC) (BC CDC 2022). The BC CDC data summarizes both **masked secured publicly available occurrences** and **publicly available occurrences** (non-sensitive element occurrences) for species at risk sightings. The BC CDC assigns a provincial rank or listing of red, blue, or yellow to a species based on its status within BC. Species on the provincial Red list are considered endangered or threatened in BC. Species on the Blue list are considered vulnerable (Special Concern) in BC. Species on the Yellow list are apparently secure and not at risk of extinction.

On a federal level, designations for species at risk occurring in Canada are initially determined by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The committee is established under Section 14 of the federal *Species at Risk Act* (SARA). If approved by the federal Minister of the Environment, species are added to the federal List of Wildlife Species at Risk under Schedule 1 of SARA. Once included on Schedule 1, it is prohibited to kill, harm, harass, capture, possess, collect, buy, sell, or trade individuals, as well as damage or destroy the residence of a species listed as Extirpated, Endangered or Threatened (Government of Canada 2002).

A definition of each federal and provincial conservation status is provided in Table 1.

Table 1: Provincial and Federal Conservation Status Definitions

Agency	Status	Definition
COSEWIC and SARA (Federal)[1]	Extinct (XX)	A species that no longer exists.
	Extirpated (XT)	A species that no longer exists in Canada but exists elsewhere in the wild.
	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 which may become threatened or endangered due to distinct biological characteristics and identified threats.
	Data Deficient (DD)	A species for which there is insufficient scientific information to support status designation.
	Not at Risk	A species that has been evaluated and found to be not at risk.
BC CDC (Provincial)[2]	Red	Indigenous species, subspecies or plant communities that have, or are candidates for, Extirpated, Endangered, or Threatened status in British Columbia. Extirpated taxa no longer exist in the wild in British Columbia but do occur elsewhere. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are likely to become endangered if limiting factors are not reversed. Not all Red-listed taxa necessarily become formally designated. Placing taxa on these lists flags them as being at risk and requiring investigation.
	Blue	Indigenous species, subspecies or plant communities considered to be of Special Concern (formerly Vulnerable) in British Columbia. Taxa of Special Concern have characteristics that make them particularly sensitive to human activities or natural events. Blue-listed taxa area at risk but not Extirpated, Endangered, or Threatened.
	Yellow	Any indigenous species, subspecies, or plant community considered to be secure in BC. Encompasses all those indigenous species not listed as red or blue.

Source: BC CDC (2022)

[1]COSEWIC = Committee on the Status of Endangered Wildlife in Canada; SARA = Federal *Species at Risk Act*.

[2]CDC = Conservation Data Centre

A review of species at risk potentially occurring in the Project Area was undertaken using species lists generated by a search of the BC CDC Species and Ecosystem Explorer (BC CDC 2022). Species potential to occur in the Project area was ranked based on the following criteria:

- **Not Expected** – The Project area and adjacent areas are not expected to provide suitable habitat for the species and/or the proposed Project is well removed from the known range of the species.
- **Unlikely** – The Project area provides limited or low-quality habitat for the species. The species may occur in adjacent habitats and may be observed within the proposed Project area infrequently.
- **Potential** – The Project area provides suitable habitat for one or more life phases of the species.
- **Confirmed** – The species has been observed within or adjacent to the Project area.

Potential use by fish and wildlife species not observed during the field visits is inferred from available habitats, relevant existing information, known species distributions, and professional knowledge of the species (Appendix A). In order to further refine the species likelihood ratings, site specific habitat surveys would be required when fish and wildlife species are expected to be observed and/or species-specific surveys would be required. Potential of occurrence was not assessed for plants as species-specific surveys would be required during the appropriate seasons to confirm the potential for at risk plants.

4.3 Site Visit

A site visit was conducted on 4 March 2022 by one Golder environmental specialist to identify sensitive environmental resources relating to the scope of work completed under Phase 1 and Phase 2. An additional site visit was completed by two Golder environmental specialists on 25 November 2022 to address additional areas included as part of the Project. Between these two visits, the Project area was walked in its entirety, with habitat and chance wildlife encounters recorded. Information gathered included:

- Structure and composition of vegetation communities.
- Wildlife habitat features.
- Chance encounters with wildlife and wildlife sign.
- Aquatic features providing potential habitat or additional habitat for terrestrial species.

5.0 ENVIRONMENTAL REGULATORY CONTEXT

The provincial and federal approval processes and relevant environmental legislation guiding Project construction are described below in Table 2.

Table 2: Federal and Provincial Legislation Potentially Applicable to the Project

Act, Regulation or Bylaw	Description	Applicability to the Project
Federal		
Migratory Birds Convention Act (MBCA)	This Act prohibits the deposit of substances harmful to migratory birds. It also prohibits the killing, capturing, injuring, taking, or disturbing of migratory birds or the damaging, destroying, removing, or disturbing of their nests.	Vegetation clearing should be undertaken outside of the bird breeding season. As per the BC MOTI Breeding Bird Nest Survey Protocol, the bird nesting season occurs between 15 March to 15 August; however, an Appropriately Qualified Professional may use guidance from the General Nesting Periods of Migratory Birds in Canada (i.e., Government of Canada 2018) to refine this window (BC MOTI 2020). If vegetation clearing is to occur in the breeding season, a pre-clearing bird nest survey would be recommended and "no work" buffers would be recommended around active nests based on the species observed.
Migratory Birds Regulations (MBR)	Updates to the Migratory Birds Regulations in 2022 have afforded year-round protection to 18 species, including pileated woodpecker (*Dryocopus pileatus*). Prior to removing a tree that has a pileated woodpecker nest cavity, a 36-month waiting period is required.	Prior to any vegetation clearing, a thorough assessment of trees to be felled should be completed to assess for the presence of pileated woodpecker nests. If a pileated woodpecker nest is recorded, periodic monitoring to assess activity status is required and can only be removed after 36 months of an unoccupied status. Occupancy refers to an active nest of a pileated woodpecker or a different migratory bird that uses cavities for nesting (e.g., black-capped chickadee [*Poecile atricapillus*]).
Species at Risk Act (SARA)	SARA contains prohibitions against the killing, harming, harassing of individuals of endangered, threatened, and extirpated species in Schedule 1 of the Act. The Act also contains a prohibition against the damage or destruction of their residences (e.g., nest or den) and critical habitat. These prohibitions apply to: ■ all endangered, threatened, and extirpated species listed in Schedule 1 of SARA when found on federal lands.	The Project area is not on federal land or within streams with designated critical habitat for aquatic species. On non-federal lands, a SARA Section 73 permit would be required if there is the potential to affect the nest of an MBCA and SARA listed bird species.

Act, Regulation or Bylaw	Description	Applicability to the Project
	■ all endangered, threatened, and extirpated migratory birds listed in Schedule 1 of SARA and protected by MBCA, anywhere they occur including private and provincial lands. ■ all endangered, threatened, and extirpated aquatic species listed in Schedule 1 of SARA, anywhere they occur, including private and provincial lands. When critical habitat, other than that referred to above, is located on private lands, provincial lands or lands within a territory and is not protected through stewardship agreements under SARA or other federal legislation or provincial/territorial laws, the prohibition may be applied.	
Provincial		
Water Sustainability Act	The Act is the principal law for regulating streams, aquifers and associated water resources. Generally, any work that is likely to change the nature of a stream or stream channel must be properly authorized under the Act. Changes in and about a stream include work or activities that: ■ occur within the stream channel, meaning the bed of the stream and the banks, both above and below the natural boundary, ■ regardless of location, are likely to modify the stream or stream channel over time; or ■ occur at, or are planned under, the bed of the stream and are likely to influence the bed of the stream over time.	Works within or about a stream generally require authorization under the *Water Sustainability Act* (WSA). As there is no instream work anticipated, permitting under the WSA is not anticipated. Stormwater ditch lines that may be temporarily disturbed during the Project are considered drainage corridors and not streams as defined under the WSA, meaning no permitting requirements are expected under the WSA.

Act, Regulation or Bylaw	Description	Applicability to the Project
Wildlife Act	The Act protects wildlife and wildlife habitat in BC by identifying wildlife areas, defining human interactions with wildlife, and regulating hunting, trapping, and angling (Government of BC 1996a). Section 34 of the Act prohibits possessing, taking, or destroying: (a) a bird or its egg, (b) the nest of an eagle, peregrine falcon, gyrfalcon, osprey, heron, or burrowing owl, (c) or the nest of a bird not mentioned in (b), when the nest is occupied by a bird or its egg unless authorized under permit	If vegetation clearing is to occur in the bird breeding season (i.e., 15 March to 15 August [BC MOTI 2020]), a pre-clearing bird nest survey should be undertaken. For any active nests recorded, “no work” buffers would be implemented around the nest depending upon the species observed. A permit would be required for an amphibian salvage.
Environmental Management Act	Regulates the discharge or emission of effluent, waste or contaminants and requires spill reporting for certain substances. Prohibits causing pollution (Government of BC 2003a).	Permits would be required for discharge or emission of effluent, waste or contaminants including pesticides and herbicides.
Integrated Pest Management Act	The Act outlines regulations, prohibitions, restrictions, and permits for use of pesticides in BC (Government of BC 2003b).	Permits may be required if pesticides are used to manage specific invasive plant species within the Project area.
Weed Control Act	The Act mandates a duty to control noxious weeds by landowners (Government of BC 1996b).	Requires the control of noxious weeds within the Project area.

6.0 EXISTING CONDITIONS

6.1 Aquatic Resources

The Project area is immediately adjacent to the Chilliwack River (Watershed Code [WSC] 1:50,000: 100-065700-09700), a fifth order watercourse that originates in the mountains of Washington State's North Cascades National Park and flows generally west after draining from Chilliwack Lake (Government of BC 2022b; MOE 2022). This is a fish-bearing watercourse, with at least 25 species recorded (Table 3; MOE 2022). The Chilliwack River is also regularly stocked with steelhead from the nearby Chilliwack River Hatchery (MOE 2022). Slesse Creek (WSC 1:50,000: 100-065700-09700-3800), is located approximately 160 m west of the Project area; however, given the gentle gradient of lands immediately to the west of the Project area, this watercourse is not anticipated to be impacted by the Project.

The site visits did not include habitat assessment of the portions of the Chilliwack River adjacent to the Project area, but it is assumed salmonids and other fish species use this area during some periods of the year, including as part of upstream and downstream migrations.

Table 3: Fish Species Recorded in Chilliwack River[1]

Common Name	Scientific Name	SARA[2]	COSEWIC[2]	BC List[2]	Provincial Status[2]
Bluegill	*Lepomis macrochirus*	-	-	Exotic	SNA
Brown Bullhead	*Ameiurus nebulosus*	-	-	Exotic	SNA
Chinook Salmon	*Oncorhynchus tshawytscha*	-	E/T/SC/DD/NAR	No Status	SNR
Chum Salmon	*Oncorhynchus keta*	-	-	No Status	SNR
Coastal Cutthroat Trout	*Oncorhynchus clarkii*	-	-	Blue	S3S4
Coho Salmon	*Oncorhynchus kisutch*	-	-	No Status	SNR
Cutthroat Trout	*Oncorhynchus clarkii*	-	-	No Status	S4
Dolly Varden	*Salvelinus malma*	-	-	Yellow	S4
Fish are either RB or CT, but suspect they are CT	n/a	-	-	-	-
Kokanee	*Oncorhynchus mykiss*	-	-	Yellow	S5
Lamprey (General)	n/a	-	-	-	-
Largemouth Bass	*Micropterus salmoides*	-	-	Exotic	SNA
Largescale Sucker	*Catostomus macrocheilus*	-	-	Yellow	S5

Common Name	Scientific Name	SARA[2]	COSEWIC[2]	BC List[2]	Provincial Status[2]
Leopard Dace	*Rhinichthys falcatus*	-	NAR	Yellow	S5?
Longnose Dace	*Rhinichthys cataractae*	-	-	Yellow	S5
Mountain Whitefish	*Prosopium williamsoni*	-	-	Yellow	S5
Northern Pikeminnow	*Ptychocheilus oregonensis*	-	-	Yellow	S5
Pink Salmon	*Oncorhynchus gorbuscha*	-	-	No Status	SNR
Prickly Sculpin	*Cottus asper*	-	-	Yellow	S5
Pumpkinseed	*Lepomis gibbosus*	-	-	Exotic	SNA
Rainbow Trout	*Oncorhynchus mykiss*	-	-	Yellow	S5
Redside Shiner	*Richardsonius balteatus*	-	-	Yellow	S5
Salmon (General)	*Oncorhynchus* sp.	-	-	-	-
Sculpin (General)	n/a	-	-	-	-
Signal Crayfish	*Pacifastacus leniusculus*	-	-	Exotic	-
Sockeye Salmon	*Oncorhynchus nerka*	-	-	No Status	SNR
Steelhead	*Oncorhynchus mykiss*	-	-	Yellow	S5
Steelhead (Winter-run)	*Oncorhynchus mykiss*	-	-	Yellow	S5
Sturgeon (General)	*Acipenser* sp.	-	-	-	-
Sucker (General)	*Catostomus* sp.	-	-	-	-
Threespine Stickleback	*Gasterosteus aculeatus*	-	-	Yellow	S5
Unidentifiable Trout - only fry <70mm in length	n/a	-	-	-	-
Whitefish (General)	n/a	-	-	-	-

1 Source: MOE 2022

2 See Table 1 for Term Definitions; SARA – federal Species at Risk Act; COSEWIC – Committee on the Status of Endangered Wildlife in Canada

The Chilliwack River overlaps federally designated critical habitat for coastal giant salamander (*Dicamptodon tenebrosus*; Figure 2; Government of BC 2022a). Critical habitat for this species includes core and connective habitat. These habitat types are based on occurrence records and associated aquatic and terrestrial habitats, connecting streams, and upstream environments (ECCC 2017). More information on this critical habitat is provided in Section 6.3.4.

A ditch line is present on the south side of Chilliwack Lake Road, which drains surface water westward. This ditch is vegetated, and no visible channel was observed during the 4 March 2022 site visit. It runs from Slesse Creek FSR west to approximately 150 m east of the entrance to the Chilliwack River Hatchery, where it shifts southwards into the forest before levelling out with the ground. It is assumed at this point water being drained by the ditch infiltrates into the soil. This ditch meets the definition of a corridor drainage, as per the *Water Sustainability Regulation* Division 4, Section 31(1) (Government of BC 2016). As such, works that divert water in the ditch are exempt from the requirements under Section 6(1) of the *Water Sustainability Act* (Government of BC 2016). This ditch will be reconstructed as part of the Project.

6.2 Terrestrial Resources

6.2.1 Ecological Context

British Columbia has been classified into biogeoclimatic zones based on vegetation, geological and climatic conditions and uses local climate and landform conditions to reflect the distribution and presence of specific plant and animal communities and ecosystems.

The Project area is located within the Coastal Western Hemlock (CWH) biogeoclimatic zone, dry maritime (dm) subzone. The CWHdm is found on the southern mainland of BC and adjacent islands. It extends from the Fraser Valley to the Sunshine Coast, from sea level up to an elevation of approximately 650 m. It experiences a warm climate characterized by wet, mild winters and dry summers. Common tree species in the CWHdm include western hemlock (*Tsuga heterophylla*), coast Douglas-fir (*Pseudotsuga menziesii* var. *menziesii*), and western redcedar (*Thuja plicata*). Dominant understory shrubs include salal (*Gaultheria shallon*) and red huckleberry (*Vaccinium parvifolium*; Green and Klinka 1994).

6.2.2 Vegetation

The Project area is vegetated on either side of Chilliwack Lake Road, with the exception of where the washout occurred and previous clearing during Phase 1 and Phase 2 of the Project (Appendix B; Photos 1-4). The south side of the road is a mixture of young mixed forest that is dominated by coast Douglas-fir (*Pseudotsuga menziesii* var. *menziesii*) and red alder (*Alnus rubra*) along the eastern portion of the Project area, transitioning to older second-growth forest of similar composition along the western portion (Appendix B; Photo 5). The shrub layer is largely composed of salmonberry (*Rubus spectabilis*), rose (*Rosa* sp.), and sword fern (*Polystichum munitum*). Himalayan blackberry (*Rubus armeniacus*) and English ivy (*Hedera helix*), two invasive plant species, were also recorded on the south side of Chilliwack Lake Road.

The north side of the road is composed of mixed forest that is dominated by western redcedar (*Thuja plicata*), with lesser amounts of coast Douglas-fir, red alder, and bigleaf maple (*Acer macrophyllum*). Similar to the south side, younger forest was present in the eastern portion of the Project area with more mature forest present in the western portion. The shrub layer was underdeveloped and mainly consisted of sword fern and small deciduous and conifer saplings Appendix B; Photo 5).

The Invasive Alien Plant Program (IAPP) have no records of invasive plant species occurring within the Project area; however, 12 invasive plant species have been recorded within the Study area (Figure 2; Government of BC 2022c). These species are:

- Bull thistle (*Cirsium vulgare*)
- Burdock species (*Arctium* sp.)
- Canada thistle (*Cirsium arvense*)
- Common tansy (Tanacetum vulgare)
- Creeping buttercup (*Ranunculus repens*)
- Cutleaf blackberry (*Rubus laciniatus*)
- Oxeye daisy (Leucanthemum vulgare)
- Scotch broom (Cytisus scoparius)
- Spotted knapweed (Centaurea stoebe ssp. australis
- St. John's wort species (*Hypericum* sp.)
- Tansy wagwort (Jacobaea vulgaris)
- Yellow archangel (*Lamium galeobdolon*)

Three of these twelve species, Canada thistle, spotted knapweed, and tansy wagwort, are provincially designated as noxious species (Government of BC 2021). Under the BC *Weed Control Act*, land occupiers have a legal responsibility to control noxious species.

6.2.3 Wildlife

6.2.3.1 Herptiles

Amphibians in BC can be grouped into aquatic breeding obligates (frogs, toads, newts, and mole salamanders / Ambystomatidae) and terrestrial breeding obligates (lungless salamanders / Plethodontidae; MOE 2014a). 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.

No records of amphibians were found during the desktop review within or adjacent to the Project area. No amphibians or suitable amphibian breeding habitat was recorded during the site visits. Further, cover objects were limited throughout and adjacent to the Project area, limiting the suitability for terrestrial habitat use.

Federally designated critical habitat for coastal giant salamander occurs adjacent to the northern portion of the Project area. Although this area is designated as core habitat, terrestrial environments are not anticipated to be utilized by this species due to the lack of cover objects, which is an important habitat feature for coastal giant salamander (ECCC 2017). This species is found in small, fast-flowing streams with a wetted width range of 0.7 to 10 m (ECCC 2017). The width of the Chilliwack River at the Project area is approximately 25 to 30 m. As such, coastal giant salamanders are not expected to use the Chilliwack River due to the river's size.

Reptiles with ranges that overlap the Project area include northern alligator lizard (*Elgaria coerulea*), common garter snake (*Thamnophis sirtalis*), northwestern garter snake (*T. ordinoides*), terrestrial garter snake (*T. elegans*), and northern rubber boa (*Charina bottae*). Suitable reptile habitat generally provides access to food sources (i.e., small mammals, amphibians, invertebrates), thermoregulatory habitat such as sunning outcrops and cover objects, shelter from predators, and access to hibernation sites (MOE 2014a). No reptiles or unique reptile habitat features, such as hibernacula, were not observed during the field reconnaissance. Garter snakes may forage in vegetated areas of the Project area; however, foraging habitat is limited due to the general lack of cover objects.

6.2.3.2 Birds

Passerine species use a variety of habitat types depending on life requisites such as nesting and foraging. Suitable nesting sites are available throughout the Project area in trees, shrubs, and on the ground where cover occurs. Passerine species are expected to forage on available fruit, seeds, and insects. Foraging and nesting habitat for passerine species such as black-capped chickadee (*Poecile atricapillus*), American robin (*Turdus migratorius*), and dark-eyed junco (*Junco hyemalis*) is available throughout the Project area where shrub and forest vegetation are present.

Mature trees present in the northern portion of the Project area and the north side of the Chilliwack River provide suitable nesting habitat for raptor species, such as bald eagle (*Haliaeetus leucocephalus*) and red-tailed hawk (*Buteo jamaicensis*). Raptors may perch on trees and tall structures and forage on small mammals and other prey items in open areas in or adjacent to the Project area. The Wildlife Tree Stewardship Atlas contains no recorded nest locations for bald eagle or osprey (*Pandion haliaetus*) within or adjacent to the Project area (WITS 2022). An active bald eagle nest was recorded on the north side of the Chilliwack River, approximately 215 m from Chilliwack Lake Road (Figure 2; Appendix B; Photo 6). This nest was monitored by Golder during construction activities associated with Phase 1 and Phase 2, with no disturbance noted.

In addition to raptors, great blue heron (*Ardea herodias*) may nest in mature trees in the northern portion of the Project area and the north side of the Chilliwack River. The BC Great Blue Herons Atlas contains no recorded nest locations for great blue heron in or adjacent to the Project area (GBHMT 2022). No great blue heron or heron nests were observed during the field reconnaissance.

During the 25 November 2022 site visit, signs foraging by pileated woodpecker (*Dryocpus pileatus*) were noted within and adjacent to the extent of the clearing and grubbing boundary on the south side of Chilliwack Lake Road (Appendix B; Photo 7).

6.2.3.3 Mammals

Small mammals, such as insectivores and rodents, are expected to occur in and around the Project area. Insects, seeds, and berries provide suitable foraging material for small mammals. Medium-sized mammals, such as raccoon (*Procyon lotor*) and coyote (*Canis latrans*), are expected to forage in and around the Project area. Large mammals, such as black bear (*Ursus americanus*) and cougar (*Puma concolor*), have large home ranges and habitat requirements. These species may occasionally forage in the Project area and are anticipated to move through the larger area frequently.

6.2.3.4 Invertebrates

Vegetated areas within and adjacent to the Project area are expected to a host a variety of invertebrates, which likely provide prey items for herptiles, birds, and mammals.

6.3 Species at Risk

A query of the BC CDC for at risk species, using a user defined polygon area, produced 130 wildlife species, 17 plant and lichen species, and 18 ecological communities with either federal designation as Endangered, Threatened or Special Concern, or provincial red- or blue- listed designation (i.e., designated species; Appendix A; BC CDC 2022).

6.3.1 Ecological Communities

The BC CDC query produced 18 provincially listed (red- or blue-listed) ecological communities with potential to occur regionally (BC CDC 2022). A list of provincially listed ecological communities with potential to occur in the regional area from the BC CDC query is provided in Appendix A. Potential of occurrence was not assessed for ecological communities as this would require species-specific plant surveys to be completed in the appropriate season.

The background desktop review found no non-sensitive occurrences of at-risk ecological communities mapped overlapping the Project Area or occurring within 500 m (Government of BC 2022a).

6.3.2 Vegetation

The BC CDC query for at risk plant species produced eight vascular, four non-vascular, and five lichen species with potential to occur regionally with either federal designation as Endangered, Threatened or Special Concern, or provincial red- or blue- listed designation (BC CDC 2022). A full list of plant species returned in the BC CDC query is provided in Appendix A. Potential of occurrence was not assessed for plants as species-specific surveys would be required during the appropriate seasons to confirm the potential for at risk plants.

At the time of the desktop review, no non-sensitive occurrences of at-risk plant species overlapped the Project Area or occurred within 500 m (Government of BC 2022a). No at-risk plant species were observed during either of the site visits.

6.3.3 Fish and Wildlife

The BC CDC query for at risk fish and wildlife produced 130 federally (Endangered, Threatened or Special Concern) and/or provincially (red- or blue-listed) species (BC CDC 2022). This included 10 fish, 5 amphibian, 4 reptile, 58 birds, 15 mammals, and 38 invertebrates. Based on habitat requirements and range, 32 species have the potential to occur in and proximal to the Project area: 2 fish, 1 reptile, 10 birds, 8 mammals, and 11 invertebrates (BC CDC 2022). Species with potential to occur in the Project area are summarized in Table 4. The full list of provincially and federally listed wildlife species returned in the BC CDC query is provided in Appendix A along with their likelihood of occurrence.

At the time of the desktop review, one non-sensitive occurrences for wildlife species at risk overlapped with the Project area (Figure 2). One record for Trowbridge's shrew (*Sorex trowbridgii*), a provincially blue-listed species (BC CDC 2022), overlaps with the eastern portion of the Project area (Government of BC 2022a). No other species at risk overlapped or occurred within 500 m of the Project area (Government of BC 2022a). No species at risk were observed during either of the site visits.

Table 4: Fish and Wildlife Species at Risk with Potential to Occur in or Proximal to the Project Area

Common Name	Scientific Name	SARA[1]	COSEWIC[1]	BC List[1]	Provincial Status[1]	Habitat and Range[2]	Potential of Occurrence in or adjacent to the Project Area
Fish							
Cutthroat Trout, *clarkii* subspecies	*Oncorhynchus clarkii clarkii*	-	-	Blue	S3S4	The range of this species extends from Alaska south to northern California. In BC this species occurs as marine populations, freshwater-resident populations, and headwater stream populations. Suitable habitat occurs in relatively small streams characterized by gravel substrates and a low gradient. Spawning generally occurs in streams.	**Potential -** This species has been recorded in the Chilliwack River and may occur proximal to the Project area.
Bull Trout - South Coast Population	*Salvelinus confluentus* pop. 28	1-SC	SC	Blue	S2S3	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.	**Potential -** This species has been recorded in the Chilliwack River and may occur proximal to the Project area.
Reptiles							
Northern Rubber Boa	*Charina bottae*	1-SC	SC	Yellow	S4	This species is found in warm valleys in the southern regions of BC and south throughout the western United States. It inhabits rocky outcrops, talus slopes, and areas under logs or other structures which provide shelter and thermoregulation, usually not far from water. Generally nocturnal, they are primarily found at low elevation, on warm aspects in forests and grasslands, in or under rotting logs, stumps, rocks, and crevices.	**Potential -** May occur in forested habitat in and adjacent to the Project area where suitable abundance of cover habitat occurs.
Birds							
Band-tailed Pigeon	*Patagioenas fasciata*	1-SC	SC	Blue	S3S4	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.	**Potential -** May nest in forest in and adjacent to the Project area. May forage through Project area, particularly where fruit-producing shrubs are present.

Common Name	Scientific Name	SARA[1]	COSEWIC[1]	BC List[1]	Provincial Status[1]	Habitat and Range[2]	Potential of Occurrence in or adjacent to the Project Area
Common Nighthawk	*Chordeiles minor*	1-T	SC	Blue	S3S5B	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.	**Potential -** May nest in open gravel areas in and proximal to the Project area, as well on gravel beds associated with the Chilliwack River. May forage throughout the Project area.
California Gull	*Larus californicus*	-	-	Red	S1B,SNRN	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. 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.	**Potential -** May occur in the Project area during migration.
Great Blue Heron, *fannini* subspecies	*Ardea herodias fannini*	1-SC	SC	Blue	S3B,S4N	The great blue heron *fannini* subspecies is occurs on the Pacific Coast from Alaska south to Puget Sound, Washington. In BC, it is found year-round in coastal habitats and in the southern interior. It forages along water margins including marine habitat, slow moving freshwater, and grasslands. On the Pacific coast, the species typically nests in colonies in tall Sitka spruce, western red cedar, western hemlock, pine, red alder, Douglas-fir, and black cottonwood.	**Potential -** May nest in forested portions of the Project area. May forage along the Chilliwack River.
Green Heron	*Butorides virescens*	-	-	Blue	S3S4B	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.	**Potential -** May nest and forage in riparian areas associated with the Chilliwack River in and adjacent to the Project area.

Common Name	Scientific Name	SARA[1]	COSEWIC[1]	BC List[1]	Provincial Status[1]	Habitat and Range[2]	Potential of Occurrence in or adjacent to the Project Area
Black-crowned Night-heron	*Nycticorax nycticorax*	-	-	Red	S1	Range extends across North America though status varies by province/state. The breeding range includes Washington State, Idaho, Saskatchewan, Michigan, and Nova Scotia and south into South America. Winter habitat includes states as far north as Oregon, also in Utah, New Mexico, Texas, Gulf Coast, and southern New England. In BC, they are a transient species in Kootenay, Thompson, and on Vancouver Island, a seasonal resident in the Okanagan region, and a year-round resident and confirmed breeder in Lower Mainland. This species is found in wetlands, mangroves, streams, and lakes. Nesting occurs in a variety of habitats such as wetlands, orchards, and on marine islands.	**Potential -** May nest and forage in riparian areas associated with the Chilliwack River in and adjacent to the Project area.
Western Screech-Owl, *kennicottii* subspecies	*Megascops kennicottii kennicottii*	1-T	T	Blue	S2S3	Year-round habitat occurs in western North America from coastal areas of Alaska and BC, south throughout the western United States to Mexico. It typically occurs at low elevations in mature deciduous riparian habitat with available cavities, and wetland and forested habitat. It can also be found in treed urban and suburban environments, and at the edge of forested habitats close to open wetlands or fields.	**Potential -** May nest and forage in riparian areas associated with the Chilliwack River in and adjacent to the Project area.
Olive-sided Flycatcher	*Contopus cooperi*	1-T	SC	Yellow	S4B	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.	**Potential -** May nest in forested portions in and adjacent to the Project area. May forage along both natural and anthropogenic openings/edges.
Barn Swallow	*Hirundo rustica*	1-T	SC	Yellow	S4B	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.	**Potential -** May forage throughout Project area. May nest on DFO hatchery infrastructure adjacent to the Project area.

Common Name	Scientific Name	SARA[1]	COSEWIC[1]	BC List[1]	Provincial Status[1]	Habitat and Range[2]	Potential of Occurrence in or adjacent to the Project Area
Evening Grosbeak	*Coccothraustes vespertinus*	1-SC	SC	Yellow	S5	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.	**Potential -** May nest and forage in forested areas in and adjacent to the Project area.
Mammals							
Southern Red-backed Vole, *occidentalis* subspecies	*Myodes gapperi occidentalis*	-	-	Red	S1	Occurs in most of forested Canada. The subspecies *occidentalis* was historically recorded at Burns Bog in 1999, but the overall range is currently undetermined for this species. This subspecies can be found in moist and wet coniferous forest, in bogs or in riparian forest habitat with abundant ground cover such as shrubs and woody debris.	**Potential -** May occur in forested habitat in and adjacent to the Project area where suitable cover occurs.
Snowshoe Hare, *washingtonii* subspecies	*Lepus americanus washingtonii*	-	-	Red	S1	The *washingtonii* subspecies is found at low elevations in the Fraser River Valley in BC, east to the Chilliwack Valley. A breeding population is known from Burnaby Lake Regional Park in the Lower Mainland. This subspecies occurs in coniferous, deciduous, and mixed forests with dense canopy cover, abundant understory vegetation, which provides shelter, and thicket openings. Areas without canopy cover and mature forests, which have a sparse understory layer, are generally avoided.	**Potential -** May occur in forested habitat in and adjacent to the Project area where suitable cover occurs.
Olympic Shrew	*Sorex rohweri*	-	-	Red	S2?	Range extends from the Olympic Peninsula in Washington to southwestern BC. In BC, this species is found south of the Fraser River in the Fraser River Valley and east to Chilliwack Lake and has been recorded at Burns Bog. The Olympic shrew is associated with mixed deciduous forest habitat of various seral stages.	**Potential -** May occur in forested habitat in and adjacent to the Project area where suitable cover occurs.
Trowbridge's Shrew	*Sorex trowbridgii*	-	-	Blue	S3	The range extends from California north to southwestern BC. In BC, it is restricted to the lower Fraser River valley as far east as Chilliwack Lake and Hope. Suitable habitat occurs in moist to dry mixed wood forests with rich deep soils, abundant woody debris, and lots of leaf litter for shelter.	**Potential -** Occurrence records for this species overlap with the Project area; however, these are dated from 1981. May occur in forested habitat where suitable cover occurs.

Common Name	Scientific Name	SARA[1]	COSEWIC[1]	BC List[1]	Provincial Status[1]	Habitat and Range[2]	Potential of Occurrence in or adjacent to the Project Area
Townsend's Big-eared Bat	*Corynorhinus townsendii*	-	-	Blue	S3	In BC, the range of Townsend's big-eared bat extends from Vancouver Island and the Gulf Islands to the Vancouver area. In the interior of BC, this species is found north to William's Lake and east to Creston. It inhabits coastal forests and dry, interior grasslands. It can be found from sea level to 1070 meters.	**Potential -** May forage along the Chilliwack River and other open spaces in and adjacent to the Project area.
Hoary Bat	*Lasiurus cinereus*	-	-	Blue	S3S4	Occurs from southeast Alaska, east to Newfoundland, and south to South America. Exhibits migratory behaviour, moving northward for summer months. Occurs in deciduous and coniferous forests where it forages in open areas, particularly near and over water and in riparian corridors. Roosts in dense foliage. Feeds on invertebrates, mainly moths.	**Potential -** May forage along the Chilliwack River and other open spaces in and adjacent to the Project area. May roost in trees in and adjacent to the Project area.
Little Brown Myotis	*Myotis lucifugus*	1-E	E	Blue	S3S4	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.	**Potential -** May forage along the Chilliwack River and other open spaces in and adjacent to the Project area. May roost in trees in and adjacent to the Project area or adjacent DFO buildings.
Yuma Myotis	*Myotis yumanensis*	-	-	Blue	S3	Occurs from BC south to Mexico, east to Montana and western Texas. Heavily associated with water. Occurs in a variety of habitats, including riparian areas, woodlands, and forests. Roosts in caves, cliff crevices, bridges, buildings, and other anthropogenic habitats. Hibernacula requirements are generally poorly understood.	**Potential -** May forage along the Chilliwack River and other open spaces in and adjacent to the Project area. May roost in trees in and adjacent to the Project area or adjacent DFO buildings.
Wolverine, *luscus* subspecies	*Gulo gulo luscus*	1-SC	SC	Blue	S3	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. 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.	**Not Expected -** Species requires large, extensive home ranges. As such, may travel through area; however, the Site does not contain any unique features that would provide suitable denning habitat and presence would be limited.

Common Name	Scientific Name	SARA[1]	COSEWIC[1]	BC List[1]	Provincial Status[1]	Habitat and Range[2]	Potential of Occurrence in or adjacent to the Project Area
Invertebrates							
Emma's Dancer	*Argia emma*	-	-	Blue	S3S4	This species occurs in mountainous habitat in BC from the Fraser Valley to the Shuswap and Kettle River. It inhabits banks and riparian habitat along rivers and streams and occasionally lake beaches. Larvae are found among plant stems in pools, under debris, and under rocks in riffles.	**Potential -** May occur in riparian habitat associated with the Chilliwack River.
Sinuous Snaketail	*Ophiogomphus occidentis*	-	-	Blue	S3	Occurs throughout much of BC south of 51°N, including the Lower Mainland, Powell River, Vancouver Island, and the Okanagan on warm streambanks and lakeshores. Females lay eggs directly into water along edges of warm streams and lakes, and larvae burrow into sediments. Flight period is early June to early October.	**Potential -** May occur on banks of the Chilliwack River.
Dun Skipper	*Euphyes vestris*	1-T	T	Blue	S2S3	The range of the western subspecies extends from southwestern BC to California. In BC, it occurs on Vancouver Island, the Lower Mainland and Fraser River canyon to Lillooet. Associated with open, moist habitat including roadside ditches, leave strips, and rights-of-way. Also found in fairly dry areas where spring floods or permanent springs provide moist conditions. Larval food plants include the sedges Cyperus esculentus and *Carex heliophile* and potentially other species in the genus Cyperus. Adults eat nectar from white, pink, or purple flowers including common milkweed and purple vetch.	**Potential -** May occur in disturbed habitat, including openings and ditches, associated with the Project area where larval and adult food plants occur.
Clodius Parnassian, *pseudogallatinus* supspecies	*Parnassius clodius pseudogallatinus*	-	-	Blue	S3S4	The range extends from BC, south to California where it occurs in the Coast, Cascade and Sierra Nevada Mountains. The northern limit of the species range is found in Bella Coola, BC. Suitable habitat occurs at low elevations in riparian habitat. It also inhabits forest openings and moist meadows in the subalpine zone. The larval food plant of this species is *Dicentra formosa*.	**Potential -** May occur in riparian habitat associated with the Chilliwack River where its larval food plant occurs.

Common Name	Scientific Name	SARA[1]	COSEWIC[1]	BC List[1]	Provincial Status[1]	Habitat and Range[2]	Potential of Occurrence in or adjacent to the Project Area
Rocky Mountain Fingernailclam	*Sphaerium patella*	-	-	Red	SH	The Rocky Mountain fingernail clam's range extends across western North America. In BC, this species occurs in the Lower Mainland including Metro Vancouver and the Fraser Valley. Historical occurrences of this species are known from Burnaby Lake, Abbotsford Lake, and Kyuquot on Vancouver Island. The last record is from 1961. Occurs in lakes and watercourses. Habitat includes lakes, sloughs, rivers, and streams.	**Potential -** May occur in the Chilliwack River.
Striated Fingernailclam	*Sphaerium striatinum*	-	-	Blue	S3S4	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.	**Potential -** May occur in the Chilliwack River.
Dusky Fossaria	*Galba dalli*	-	-	Blue	S3S4	There are four records of this species, from the Flathead River Valley and the Lower Fraser Valley, from lakes, ponds, marshes, and small rivers. This species is thought to potentially occur throughout southern BC.	**Potential -** May occur in the Chilliwack River.
Pygmy Fossaria	*Galba parva*	-	-	Blue	S3S5	Occurs 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.	**Potential -** May occur in the Chilliwack River.
Rocky Mountain Physa	*Physella propinqua*	-	-	Blue	S3S4	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.	**Potential -** May occur in the Chilliwack River.
Sunset Physa	*Physella virginea*	-	-	Blue	S3S5	Limited habitat information available. Historical records indicate this species is associated with lakes, rivers, creeks, and sloughs. Very few records in BC.	**Potential -** May occur in the Chilliwack River.

Common Name	Scientific Name	SARA[1]	COSEWIC[1]	BC List[1]	Provincial Status[1]	Habitat and Range[2]	Potential of Occurrence in or adjacent to the Project Area
Oregon Forestsnail	*Allogona townsendiana*	1-E	E	Red	S2	In BC, the Oregon forestsnail's range is restricted to the southwest corner of the province and is typically found at low elevations. They are found SW BC in Tsawwassen, the Lower Mainland, and through the Lower Fraser Valley. Most records occur in the Mission, Abbotsford, and Chilliwack area. Suitable habitat includes mature mixed-wood and deciduous forest dominated by bigleaf maple in the canopy and stinging nettle in the understory. This species is associated with moist habitat, such as seepage areas, with large amounts of leaf litter and woody debris for cover.	**Potential -** May occur in riparian habitats associated with the Chilliwack River.

1 See Table 1 for Term Definitions; SARA – federal *Species at Risk* Act; COSEWIC – Committee on the Status of Endangered Wildlife in Canada

2 Habitat and range information obtained from BC CDC Species Summary Reports (BC CDC 2022).

6.3.4 Critical Habitat

Critical habitat is defined as “the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species’ critical habitat in the recovery strategy, or in an action plan for the species” (Government of Canada 2002). Under SARA, critical habitat is federally protected from activities that result in the destruction or degradation of designated habitat.

The Project area occurs adjacent to designated critical habitat for coastal giant salamander, with mapped polygons overlapping with the Chilliwack River (Figure 2; Government of BC 2022a). Critical habitat for this species includes core and connective habitat. These habitat types are based on occurrence records and associated aquatic and terrestrial habitats, connecting streams, and upstream environments (ECCC 2017). Although no suitable habitat for this species occurs in the Project area, and the Project is not anticipated to directly impact this species, it will be important to implement mitigation measures to minimize sedimentation or contamination of the Chilliwack River, which may impact downstream occurrences of this species.

7.0 EFFECTS ASSESSMENT

The proposed Project, including the BC Hydro pole replacement, may result in adverse effects to the existing aquatic and terrestrial resources if not mitigated effectively. Project activities that may cause disturbance to habitats or result in disturbance and/or mortality to fish and wildlife include vegetation clearing, road building, and debris removal. These activities may have a direct and/or indirect adverse effect on nesting songbirds, nesting raptors, terrestrial habitat quality, and fish and fish habitat.

7.1 Aquatic Effects

Potential adverse effects to the aquatic environments in the Chilliwack River due to Project activities include:

- Temporary elevated suspended sediment levels and water quality changes
- Accidental introduction of deleterious substances

Project activities may increase the potential of erosion within the Project area during construction, resulting in an increased potential for sediment to enter the Chilliwack River. The effects of introduced suspended sediment on fish include altered behaviour and/or physiology. Increased egg mortality, decreased hatching success, and loss of suitable spawning substrate are potential results of elevated suspended sediment levels. Behavioural responses experienced by fish exposed to elevate suspended sediment levels include disruption of territorial behaviour, out-migration, and depressed feeding rate. The severity of the effects of an increase in suspended levels is a function of both sediment concentrations and duration of the sediment episode.

Accidental release or spills may introduce deleterious substances such as fuel, oil, or grease into the Chilliwack River. These substances can affect fish health as they may be acutely or chronically toxic to fish, affecting normal survival, growth, development, or reproduction. Heavy machinery will be used in both Phase 1 and 2 of the Project. Deleterious substances may be introduced into surface water during refuelling of equipment and/or leaking equipment.

These potential effects are expected to be temporary and can be mitigated by the application of measures and best management practices discussed further in Section 8.0.

7.2 Terrestrial Effects

7.2.1 Vegetation

The Project will result in disturbance to vegetation where clearing and grubbing is necessary for the construction and repair of drainage improvements and Chilliwack Lake Road.

The Project has the potential to result in the accidental introduction and/or proliferation of invasive or non-native plant species, particularly those species observed in and adjacent to Project area, such as Himalayan blackberry and English ivy, which may lower the quality of remaining native vegetation. It is anticipated that this effect can be avoided, reduced, or mitigated through BMPs and the measures described in Section 8.0.

7.2.2 Wildlife

Project effects to wildlife are expected to be primarily limited to the immediate Project area, mainly where vegetation and habitat loss occurs. Potential effects to terrestrial wildlife species are anticipated to be a result of:

- Permanent loss of forest and shrub habitat, resulting in loss of wildlife habitat.
- Accidental harm / mortality to wildlife.
- Sensory disturbance to wildlife during Project activities.
- Accidental destruction of sensitive wildlife habitat (e.g., nests).
- Attraction of wildlife to the work area due to garbage and / or food waste.

Noise and other disturbances to wildlife are anticipated during Project activities. Increased noise associated with Project construction may temporarily decrease the quality of habitat for wildlife. This includes the bald eagle nest on the north side of the Chilliwack River that may be active during the construction period. Disturbance to nesting birds can result in nest abandonment by the adults or premature fledging of nestlings (MOE 2013, 2014b).

The Project is also anticipated to result in permanent alteration of terrestrial habitat across the Site. This alteration may result in a loss of breeding and foraging habitat for some wildlife species. Recommended mitigation specific to birds are discussed in Section 8.10.

It is anticipated that the majority of potential effects to terrestrial wildlife can be avoided, reduced, or mitigated through BMPs and the measures described in Section 8.0.

8.0 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 2019).
- Land Development Guidelines for the Protection of Aquatic Habitat (Chilibeck et al. 1993).
- Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (2013).
- Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Developments in British Columbia (BC MOE 2014b).
- Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia: A companion document to Develop with Care (BC MOE 2013).
- Requirements and Best Management Practices for Making Changes In and About A Stream in British Columbia (Government of BC 2022d).

The mitigation measures outlined below are general recommendations. A detailed Construction Environmental Management Plan (CEMP) should be developed by the Contractor's Environmental Monitor (as described in Section 8.1.3 and provided to the MOTI representative for review. The plan will address their Project-specific activities and methods for the Project. The CEMP is required to include the following components, at a minimum: an Erosion and Sediment Control Plan (Section 8.4), a Spill Prevention and Emergency Response Plan (Section 8.5), and an Invasive Plant Management Plan (Section 8.9).

8.1 Key Project Personnel, Roles and Responsibilities during Works

A full list of contacts for the Project, including roles and responsibilities, shall be included in the Contractor's CEMP. This will also provide contact information for MOTI, the Contractor(s), and the Contractor(s)' Environmental Monitor(s) (EM) responsible for implementing, inspecting, and reporting on the effectiveness of environmental protection and mitigation measures.

All Contractors and members of the Project team have a responsibility to protect the environment, socioeconomic, cultural and heritage values for the project during their work. Members of the Project team will have professional responsibilities for environmental management consistent with the sections below.

8.1.1 Project Owner (MOTI)

The role of the Owner is to coordinate the overall Project including the detailed design, material procurement, etc. The responsibilities of the Owner include the following:

- Manage the Project's schedule and budget.
- Maintain effective communication links between the Contractor and Environmental Monitor.

- Document Contractor site-specific work plans for compliance with the CEMP and applicable regulatory permits and approvals.
- Document compliance with terms and conditions of regulatory permits and approvals as mandated under federal and provincial legislation.
- Document that copies of regulatory permit and approvals and required spill response procedures are maintained and available on site.
- Manage and communicate with regulatory agencies, interested, and potentially affected general public stakeholders and Indigenous Peoples, as required.
- Review the Environmental Monitoring reports prepared by the Environmental Monitor.
- Assist in emergency situations or incidents to minimize adverse environmental effects.

8.1.2 Contractor

The Contractor will be responsible for adhering to proposed environmental mitigation measures and regulatory requirements outlined in this OEA. In meeting the environmental requirements of the Project, the Contractor will be required to:

- Confirm the onsite crew have an appropriate level of training and competency to perform the work.
- Maintain effective communication to confirm the onsite crew are aware of the environmental issues and requirements, and their responsibilities are understood prior to the commencement of work.
- Implement appropriate work procedures and controls to prevent and/or reduce the potential for environmental effects.
- Inspect the work practices to evaluate adherence to regulatory and CEMP requirements.
- Verify that emergency spill response materials are available on site for immediate use and appropriately stocked.
- Respond immediately and effectively to environmental incidents including leaks and spills.

8.1.3 Environmental Monitor

The Environmental Monitor will be an Appropriately Qualified Professional that is present to facilitate and document compliance with any environmental regulatory requirements and permit and approval conditions. In general, the responsibilities of the Environmental Monitor include the following:

- Maintain awareness of potential adverse environmental effects associated with the Project.
- Attend pre-job and/or tailboard meetings and communicate environmental sensitivities and environmental requirements of the work to onsite crew including Contractor personnel.
- Be available to be onsite during the construction period and present during high risk or environmentally sensitive activities.

- Provide advice to Contractors to avoid and reduce potential for environmental incidents.
- Confirm the Contractor is implementing mitigation measures and complying with regulatory requirements and any applicable permit and approval conditions, if required.
- Make visual observations during construction works.
- Provide recommendations to the Contractor for installing and/or improving environmental controls and mitigation measures.
- Evaluate effectiveness of the mitigation measures being applied.
- Prepare and submit periodic brief memorandums of implementation and effectiveness of mitigation measures, and corrective actions taken, to the Contractor and MOTI.
- Prepare and submit environmental incidents and non-compliance event memorandums with 24 hours of the event, to the Contractor and MOTI.

The Environmental Monitor has the authority to modify or halt any activity that is causing, or potentially causing, damage to terrestrial and aquatic resources or their habitats.

Regular site visits by the EM will include, but may not be limited to, completion of the following tasks:

- Overview of project construction progress.
- Opportunistic observations and spot inspections of equipment for state of repair, evidence of leaks, and/or excessive grease.
- Inspection of sediment control structures to assess conditions, and possible need for maintenance, repairs or replacement.
- Inspection of material stockpile sites and other possible sources of sedimentation.
- Communications with the Contractor to discuss current observations and noted deficiencies or successes, to follow up on action items, and to anticipate and coordinate construction sequencing and tasks with erosion and sediment control practices.
- Liaison with regulatory agencies.

8.2 Air Quality and Dust Control

The emissions management options and management triggers outlined in Table 5 below will be considered, and the Contractor's CEMP shall include procedures outlining how drivers and equipment operators will be engaged in idle reduction practices. Vehicles and equipment will be operated and maintained according to manufacturer's guidelines and monitored regularly for potential air quality and emission concerns. If required, access routes will be watered to reduce dust generation.

Table 5: Air Quality Emissions Management Options and Triggers

Source Description	Options for Emissions Management	Triggers for Management
Construction Vehicles	Avoid engine idling. In colder weather, where possible, use electrical engine heaters rather than idling to prevent engine freeze. Maintain construction fleet vehicles according to manufacturers' guidelines.	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.
Vehicle Traffic Fugitive Dust	On dry days consider watering unpaved access roads that are in frequent use. Where possible, fit 'upswept' exhausts to construction vehicle fleet. Implementation of a speed limit to slow vehicles and therefore reduce fugitive dust emissions. Cover vehicle loads that are fine grained, especially on windy days.	Visual cues would be the primary trigger for mitigative action to be taken with respect to vehicle traffic fugitive dust emissions. 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.
Heavy Equipment Activities	Move as little material as possible. While placing material, this translates to keeping drop heights as low as possible. Wet material before handling if possible. Water roads as necessary for dust control. Implementing a speed limit to slow vehicles and reduce noise generation.	Visual cues would be the primary trigger for mitigative action to be taken with respect to vehicle traffic fugitive dust emissions. 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.

8.3 Noise Control

Potential effects on terrestrial resources (i.e., wildlife) resulting from noise associated with the Project can be mitigated by implementing the following strategies:

- 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 the WorkSafe BC and other regulatory agencies and jurisdictions having authority for noise levels.

8.4 Erosion and Sediment Control

A detailed Erosion and Sediment Control (ESC) Plan should be prepared as a component of the CEMP and implemented during Project activities. A review of the proposed construction operations by a qualified professional is recommended to adequately address potential sources of sediment, erosion, and drainage interactions. The ESC Plan should provide site-specific mitigation measures to achieve compliance with applicable legislation and regulations[1] and the BMPs and guidelines for erosion and sediment control outlined in the following:

- The Land Development Guidelines for the Protection of Aquatic Habitat (Chilibeck et al. 1993).
- Sediment control provisions implemented should be in accordance with DFO's Measures to Protect Fish and Fish Habitat (DFO 2019).

The plan should include detailed figures that identify specific control measures and other mitigation measures including:

- Soil disturbance should be minimized to only the areas required for site access and remediation.
- Exposed soils should be covered with geotextile materials or tarps to reduce potential for erosion and subsequent sediment mobilization into nearby receptors.
- Preventative measures should be implemented in anticipation of the potential generation and release of sediment-laden water into drainage corridors during works (e.g., silt fences, straw bales, check dams, interception ditches), and should be implemented and maintained by the Contractor as necessary in accordance with permits and approvals, BMPs, and anticipated field conditions.
- Excavated soils and other waste materials removed during Project works, as well as Project-related waste and other substances deleterious to aquatic life should be transported off-site and disposed of in an appropriate disposal facility.
- Foot traffic, vehicles and equipment should be restricted to designated work areas and designated access routes.
- Work site conditions should be monitored and suspended, if necessary, during intense rainfall events.

[1] Such as: Canada *Fisheries Act*, Canada *Species at Risk Act*, BC *Water Sustainability Act* and Regulations, BC *Waste Management Act* and BC *Fish Protection Act*

- Erosion and sediment control measures should be maintained until disturbed ground has been permanently stabilized.
- Areas temporarily disturbed during the Project should be re-vegetated as soon as possible following completion of the work.
- Erosion and sediment control measures should be removed from site once the site has stabilized.

The EM will have authority to immediately suspend all activities that are resulting, or which could imminently result, in the release of sediment or other deleterious substances to waterbodies or environmental receptors in the vicinity of the Project Area.

8.5 Spill Prevention and Emergency Planning

A site-specific Spill Prevention and Emergency Response Plan should be prepared prior to site preparation and construction to reduce potential for spills and provide guidance on spill response. Spill prevention and emergency response planning should provide site-specific mitigation measures to achieve compliance with applicable legislation and regulations and be developed with consideration of applicable BMPs, and the mitigation measures outlined below.

- Vehicles and machinery should arrive on site in a clean and washed condition and should be maintained such that they are free of fluid leaks or excess grease, including at lubrication points.
- Leaks identified should be brought to the machine operators' attention and dealt with immediately.
- Equipment should be inspected by the Contractor(s) prior to start up at the beginning of each day.

Spills or suspected spills of petroleum products or other potentially deleterious substances with potential to enter aquatic habitat should be immediately reported to the Emergency Management BC (EMBC) that is administered by the Environmental Emergency Program. Spills exceeding thresholds specified in the *Spill Reporting Regulation* should be reported immediately to the Environmental Emergency Program (1-800-663-3456). Additionally, ECCC has protocols for notification and reporting of environmental emergencies of substances established under the Environmental Emergency Regulations of the *Canadian Environmental Protections Act* (Government of Canada 2019). Emergency reporting is the same procedure as described above (i.e., reporting to the Environmental Emergency Program). Further, a written report is required to be sent to the Regional Director, Environmental Enforcement Directorate Pacific and Yukon Region (ec.pydalerimd-pyeeddgir.ec@canada.ca). Identified spills should be cleaned up immediately. Hazardous wastes (as defined under the *BC Environmental Management Act*) and hazardous materials such as sorbent material, air and oil filters, hydraulic fluids, contaminated soils, contaminated/noxious vegetation, and petroleum products should be disposed of in an environmentally acceptable location and manner.

The following mitigation measures should be implemented during on-site refuelling and fuel transfers, if required:

- On-site fuelling or maintenance of vehicles and equipment should occur in pre-determined locations away from pathways for receiving waters.
- Used oil, filters, and grease cartridge lubrication containers and other products of equipment maintenance should be collected and kept in a secure receptacle for later disposal.
- Service vehicles used for fuelling should be equipped with automatic shut-off valves. Valves should be in the closed position and locked and secured when not in use.
- During refuelling, an effective communication protocol should be followed to prevent accidental release or overfilling of the equipment.
- Accidental release or overfilling of equipment should be prevented by careful observation and communication.
- No ignition sources should be permitted within the fuelling area.
- A drip tray or pan should be used to collect excess fuel, oil, or other hazardous materials to avoid contamination of soils.
- Spill kits with absorbent pads (capable of handling both hydrocarbon and water-based materials) and containment booms should be available on each piece of heavy equipment and should also be kept on-site at each work area. Materials to be included in spill kits should be included in the Project CEMP.
- Fuels and chemical products stored on site should be kept in a secure container and in a manner that prevents leaks, drips and spills (i.e., containers standing upright with caps on tight).

Used spill clean-up materials should be replaced immediately, and an inventory of materials should be maintained throughout the duration of work activities within the Project area.

The following additional spill prevention measures should be implemented:

- Plastic containers used to carry petroleum products should be designed for that purpose and should not be more than five years of age as per the *Transportation of Dangerous Goods Act* (TDGA) and *Transportation of Dangerous Goods Regulations*.
- Containers should be leak free, sealed with a proper fitting cap or lid and labelled according to the TDGA.
- Containers greater than 23 litres (L; 5 gallons), including 205 L (45 gallon) drums, should be transported upright and secured to prevent shifting and toppling.
- Transportation of hydrocarbons to, and within, the construction areas should be in conformance with the requirements of the TDGA.
- Stationary equipment should be placed within secondary containment capable of holding 150% of the equipment’s fluids.

8.6 Material Storage Handling and Waste Management

Clean-up of the Project area should be an ongoing process. The Project area should be kept free at all times from accumulations of waste materials or rubbish caused by employees or by the work. Garbage and recycling containment should be animal proof. Upon completion of work activities, temporary structures, rubbish, and waste materials resulting from the operations should be removed and properly disposed of.

Applicable mitigation measures should be implemented on-site by the Contractor(s). Detailed and site-specific mitigation measures should be included and developed in the Project CEMP. Below are some general mitigation measures that should be implemented:

- Reasonable efforts should be made to reduce, reuse and/or recycle to reduce the amount of material being disposed of. Wastes should be disposed of in compliance with applicable legislation such as the *Canadian Environmental Management Act*.
- Hazardous waste registration, storage, permit and transportation requirements should be met, if applicable, and waste materials should be removed from the Project area as soon as possible in accordance with applicable standards and regulations. The applicable records relating to the handling, storage, and removal of hazardous wastes should be maintained.
- An appropriate quantity and placement of garbage receptacles and recycling containers should be used to promote work-site cleanliness and sustainable practices.
- The dumping or burning of waste materials should not occur.
- Regular clean up and disposal of waste materials should be conducted to prevent the unnecessary accumulation of waste materials.
- Contractor(s) will be responsible for maintaining Safety Data Sheets (SDS) for all products used on the Project.
- Temporary sanitary facilities in the form of portable toilets will be provided during the Project. Sanitary facilities will be secured so they do not fall over and located in an area greater than 30 m from any watercourse.
- If suspected contaminated materials are found during the works, they will be managed in accordance with the *BC Environmental Management Act* and Regulations.

8.7 Aquatic Life and Habitat Protection

Works within or about a stream generally require either a Notification or Change Approval under the *Water Sustainability Act* (WSA). It is understood the Project does not require any work to be completed within 30 m of the Chilliwack River and therefore does not require permitting under the WSA. Works previously completed for bank stabilization was done so under a blanket WSA Section 91 Order (File 268448), issued 23 November 2021.

Any activity that may result in the death of fish or in the harmful alteration, disruption, or destruction of fish habitat requires an Authorization under the *Fisheries Act*. As vegetation within the Project area was felled during the initial flooding event, Project works will not result in fish habitat destruction or alteration. Further, no instream work is occurring as part of this Project, so additional fish habitat alteration, disruption, or destruction and fish mortality are not anticipated. As such, a *Fisheries Act* Authorization is not expected to be required for this Project.

Strategies to maintain water quality for the protection of aquatic resources during construction of the Project are outlined below:

- Refuel construction equipment more than 30 m from riverine environments. Establish protocols for refuelling and handling of fuel and oil products to reduce potential for spills and entry of fluids into the Chilliwack River.
- Keep machinery and equipment clean and in good operating condition (washed, free of leaks, excess oil, and grease), and check condition of machinery before allowing it to enter the Site.
- Check weather forecasts frequently and communicate them to the Project work crews to reduce the likelihood for construction activities to occur during poor weather conditions that have the potential to impact the effectiveness of mitigation measures, and ultimately impact the aquatic environment.
- Keep spill kits on-site at all times. Spill kits should be equipped with absorbent pads and containment booms capable of handling both hydrocarbon and water-based materials. Site personnel should be trained in the correct use and deployment of the emergency response and spill prevention equipment and supplies.
- Undertake and complete work in such a manner as to avoid or reduce the potential for release of silt, sediment or sediment-laden water, or other deleterious substances into marine environments.
- Fill materials (e.g., rock, crush) should be free of fine sediments, organic material, and deleterious substances.

Although no works are to be completed in or about a stream, the rebuild of the ditch on the south side of Chilliwack Lake Road may drain into nearby watercourses. As such, additional mitigation measures outlined in MOTI's blanket WSA Section 91 Order relevant to aquatic life and habitat protection that have not been addressed above include the following and should be incorporated into the Project:

- Rock used as rip-rap must be certified as non-acid generating and evaluated for potentially acid generating (PAG) and metal leaching (ML) properties as per MOTI Technical Circular T-04/13. Only rock with a low potential for PAG/ML shall be used.

8.8 Vegetation Protection

Vegetation protection strategies outlined below are recommended for application during Project construction. Trees and shrubs should be retained as much as possible.

- Clearing boundaries should be clearly marked, and vegetation outside the work area should not be disturbed.
- Grass seeding should be completed to support erosion and sediment control and site restoration efforts. A similar grass seed mixture as used previously should be used during seeding (Appendix C).
- Where revegetating disturbed areas is planned, it should be completed as quickly as possible after completion of the Project. If possible, plan seeding 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. Use weed-free mulches and other organic stabilizers to reduce potential for erosion until vegetation is established on sensitive soils.
- Conduct work in accordance with Provincial Best Management Practices. These practices, available at: http://www.env.gov.bc.ca/wld/BMP/bmpintro.html, should be reviewed prior to work in the Project area.

8.9 Invasive Plant Management

The Project area contains various invasive plant species (e.g., English ivy, Himalayan blackberry), which can be spread to other areas. An Invasive Plant Management Plan should be developed as part of the Project CEMP to provide guidance on mitigation measures to reduce the proliferation of invasive and non-native plant species. The Invasive Plant Management Plan should outline invasive and non-native species of concern and how to properly remove and dispose of these plant species. It should also outline suggested re-planting post-construction, and, if applicable, monitoring or follow up programs.

Potential effects to the terrestrial and aquatic habitats resulting from the introduction of invasive species can be mitigated by implementing the following strategies consistent with those developed by the Invasive Species Council of BC (ISCBC) (2022):

- Minimize the amount of soil disturbance to only those areas required for the Project. Cover exposed soils with a tarp or geotextile to minimize invasive plant proliferation.
- Check machinery and equipment before it arrives on-site to make sure it is clean (i.e., free of mud and plants) to avoid potential for introduction of invasive plant species.
- Treat and/or properly dispose of invasive plant species to prevent further invasion of naturally vegetated areas and to increase the chance of survival of future plantings. Material containing invasive plants should not be stored or piled at or near the Project area and should be disposed of at an acceptable disposal facility located off-site, using best management practices.
- Avoid potential effects to vegetation due to the potential introduction of contaminants into the environment during construction activities through development and implementation of a site-specific ESC Plan (Section 8.4) and a site-specific approach to spill prevention and response (Section 8.5).
- Inspect clothing and vehicle/equipment undercarriages for plant parts or propagules if working in an area known to contain invasive plants. Remove plant seeds or propagules from clothes and/or equipment and contain washing fluids (i.e., water or mud) on-site at designated cleaning stations.
- Re-vegetate with regionally appropriate, non-invasive, non-persistent seed mixtures or plants and use native species when possible.
- Educate staff and Contractor(s) to identify invasive plants that have the potential to establish at the site.

8.10 Wildlife Protection

Wildlife protection strategies outlined below are recommended for application during Project construction.

- Where possible, avoid and reduce the amount of new disturbance and vegetation clearing, particularly clearing of trees and shrubs.
- Avoid or reduce clearing of important habitat features (e.g., snags) where possible. If applicable, coarse woody debris removed during construction should be replaced upon Project completion.
- Work within the Project area should be conducted in accordance with Provincial Best Management Practices. These practices, available at http://www.env.gov.bc.ca/wld/BMP/bmpintro.html, should be reviewed prior to work in the Project area:

  - Develop with Care: Environmental Guidelines for Urban and Rural Land Developments in British Columbia (MOE 2014b).
  - Guidelines for Amphibians and Reptile Conservation during Urban and Rural Land Development in British Columbia (MOE 2014a).
  - Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia (MOE 2013).
- Garbage, refuse, and construction materials that could attract wildlife should be stored in an appropriate container and removed from the Project area daily (See Section 8.6).
- Sightings of potential problem wildlife should be reported to the Site Supervisor, who will use the information to adapt work activities as appropriate, to reduce interaction with workers and wildlife.
- Vegetation clearing and grubbing activities within the Project area should be conducted within the appropriate "least risk windows" outlined in BC MOTI's nest sweep protocol (i.e., 15 March to 15 August; MOTI 2020); however, the extended least risk window outlined in *Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia* (MOE 2014b) should also be considered to reduce potential contravention of Section 34 of the *BC Wildlife Act*, and concurrently, the *Migratory Birds Convention Act* for the protection of migratory birds and their nests. Where vegetation clearing and grubbing activities cannot be scheduled within the least risk windows, pre-clearing bird nest surveys should be completed by a qualified biologist with experience conducting these surveys. "Least risk windows" as defined by the Develop with Care 2014 document are (MOE 2013; MOE 2014b):
  - Bald eagle (*Haliaeetus leucocephalus*): 1 September – 31 December
  - Osprey (*Pandion haliaetus*): 15 September – 31 March
  - Heron (*Ardea* sp.): 15 September– 15 January
  - Peregrine Falcon (*Falco peregrinus*): 30 July – 28 February
  - Other raptors: 1 October – 28 February
  - Passerines: 1 September – 28 February
  - COMBINED LEAST RISK WINDOW FOR BIRDS: 1 October – 31 December; however, raptor and heron nest surveys should still be completed if vegetation clearing is within this least risk window to verify no raptor or heron nests will be removed.
- Avoid clearing vegetation during the breeding bird period for passerines (15 March – 15 August, MOTI 2020). Should it be necessary to clear vegetation during the breeding bird period, a pre-clearing nest survey should be conducted to search for active nests by a qualified biologist. If an active bird nest is encountered, a species-specific no-clearing buffer zone should be established around the bird nest and clearing and site preparation activities within the buffer zone should be re-scheduled until the nest is no longer active to avoid contravention of the *Migratory Birds Convention Act* and the BC *Wildlife Act*. Appropriate buffer zones vary by species and will be determined by the biologist completing the work but are typically a 30 m radius no-disturbance buffer for songbirds. If stick nests or other raptor nests are identified prior to or during construction, appropriate setbacks should be established in accordance with *Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia* (MOE 2013). Osprey, eagle, heron, and falcon nests are protected year-round under the BC *Wildlife Act*, whether occupied or not.

- Pre-clearing nest surveys should follow guidelines outlined in BC MoTI's *Breeding Bird Nest Survey Protocol* (2020). This includes completing three surveys over a five-day period and having vegetation clearing occur within 48 hours of the last survey, and clearing and grubbing occurring within 10 days (BC MoTI 2020).

8.10.1 Bald Eagle Nest Monitoring

An active bald eagle nest was recorded on the north side of the Chilliwack River during the 4 March 2022 site visit and confirmed during the first round of bald eagle nest monitoring on 10 March 2022. In undeveloped environments, bald eagle nests have a recommended 200 m buffer, with an additional 100 m 'quiet' buffer during the breeding season for a total of 300 m (MOE 2013). This buffer overlaps with the Project area.

This nest should be re-assessed for activity prior to construction if Project activities will occur during the nesting season. If identified as active, a qualified professional should be engaged to provide nest monitoring and additional advice to reduce chances of disturbance to the nest as portions of the Project occur within the 300 m nest buffer.

8.10.2 Pileated Woodpecker Nests

Recent updates to the Migratory Bird Regulations (MBR; Government of Canada 2022) afforded year-round nest protection to 18 species, including pileated woodpecker. In order to remove a pileated woodpecker nest, it has to be designated as inactive for a period of 36 months. An inactive nest is defined as "*[i]f the nest of a Schedule 1 species has not been occupied by a migratory bird for the entirety of the waiting time indicated in the MBR 2022, it is considered to be abandoned, and to no longer have high conservation value for migratory birds" (*Government of Canada 2022).

Pileated woodpecker foraging activity was recorded in mature riparian habitat within the clearing extent of the Project on the south side of the Chilliwack Lake Road (Appendix B; Photo 7). To date, pileated woodpecker nests have not been recorded within the Project area; however, due to their recorded presence, the excavation of new nest cavities prior to clearing activities occurring in the Project area is a possibility. Prior to any vegetation clearing, a thorough survey of all trees to be felled for pileated woodpecker nests is recommended to avoid contravention of the MBR.

8.11 BC Hydro Pole Replacement

Mitigation to be implemented during the BC Hydro pole replacement include those measures identified in the following sections:

- Section 8.2 Air Quality and Dust Control
- Section 8.3 Noise Control
- Section 8.4 Erosion and Sediment Control
- Section 8.5 Spill Prevention and Emergency Planning
- Section 8.6 Material Storage Handling and Waste Management

If vegetation clearing is required, including shrubs and ground cover, and clearing is planned to occur within the breeding bird window (i.e., 15 March to 15 August), a pre-clearing bird nest survey, as described in Section 8.10 should be completed by a qualified professional. It is understood that the pole replacement and re-stringing of powerlines will not involve falling additional trees. If this is not the case, trees to be felled should be surveyed for pileated woodpecker nests, as described in Section 8.10.2, in addition to a pre-clearing nest survey if done so in the breeding bird window. These two surveys can be completed concurrently. Given the distance and visual barrier from trees between the identified bald eagle nest and the pole to be replaced, it is not anticipated that bald eagle nest monitoring is required for this work.

9.0 CLOSURE

Please be aware that Golder Associates Ltd. (Golder) has been acquired by and is now a Member of the WSP family of companies. Golder remains as a legal entity. We are in the process of integrating the resources of our companies.

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

Golder Associates Ltd.

Neil Moss, RPBio
Wildlife Biologist

Shawn Redden, RPBio
Principal, Senior Fisheries Biologist

NM/SR/jts

https://golderassociates.sharepoint.com/sites/160538/project files/6 deliverables/3.0_issued/22520452-014-r-rev0/22520452-014-r-rev0-sandhill oea 09dec_22.docx

10.0 REFERENCES

BC CDC (BC Conservation Data Centre). 2022. Species and Ecosystem Explorer. [accessed November 2022]. http://a100.gov.bc.ca/pub/eswp/.

CCME (Canadian Council of Ministers of the Environment). 2013. Canadian Environmental Quality Guidelines. [accessed November 2022]. http://www.ccme.ca/en/resources/canadian_environmental_quality_guidelines/.

Chilibeck, B, Chislett, G, Norris, G. 1993. Land Development Guidelines for the Protection of Aquatic Habitat. Produced by Fisheries and Oceans Canada (DFO) and Ministry of Environment. [accessed November 2022]. http://www.dfo-mpo.gc.ca/Library/165353.pdf.

DFO (Fisheries and Oceans Canada). 2019. Measure to protect fish and fish habitat. [accessed November 2022]. https://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html

ECCC. 2017. Recovery Strategy for the Coastal Giant Salamander (*Dicamptodon tenebrosus*) in Canada. *Species at Risk Act* Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. 2 parts, 34 pp. + 42 pp.

GBHMT (Great Blue Heron Management Team). 2021. British Columbia Great Blue Herons Atlas. [accessed December 2021]. http://cmnmaps.ca/GBHE/.

Golder (WSP Golder). 2022. Assessment of Environmental Constraints for the Sandhill Washout Project in Chilliwack, BC. Technical Memorandum. Prepared for BC MOTI. Submitted 5 April 2022.

Government of BC. 2016. *Water Sustainability Regulation*. BC Reg. 36/2016. Queen's Printer, Victoria, BC.

Government of BC. 2021. Field Guide to Noxious Weeds and other selected Invasive Plants of British Columbia. Eleventh Edition 2021. Invasive Species Council of BC and Inter-Ministry Invasive Species Working Group. iii + 91 pp.

Government of BC. 2022a. iMapBC online mapping database. DataBC. GeoBC. [accessed November 2022]. https://maps.gov.bc.ca/ess/hm/imap4m/.

Government of BC. 2022b. Habitat Wizard. [accessed November 2022]. https://maps.gov.bc.ca/ess/hm/habwiz/

Government of BC. 2022c. Invasive Alien Plant Program (IAPP). [accessed November 2022]. https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/invasive-species/iapp.

Government of BC. 2022d. Requirements and Best Management Practices for Making Changes In and About a Stream in British Columbia. Version 2022.01. ii + 26 pp.

Government of Canada. 2019. Environmental emergency regulation, 2019: reporting system. [accessed November 2022]. https://publications.gc.ca/collections/collection_2019/eccc/En4-376-3-2019-eng.pdf

Government of Canada. 2022. Fact Sheet: Nest Protection under the Migratory Birds Regulations, 2022. [accessed November 2022]. https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/fact-sheet-nest-protection-under-mbr-2022.html.

Green, R.N. and K. Klinka. 1994. A Field Guide for Site Identification and Interpretation for the Vancouver Forest Region. [accessed November 2022]. https://www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh28.htm.

ISCBC (Invasive Species Council of BC). 2022. Invasive Species. [accessed November 2022]. https://bcinvasives.ca/invasive-species.

ISCMV (Invasive Species Council of Metro Vancouver). 2022. Priority Plants. [accessed November 2022]. https://iscmv.ca/invasive-species/priority-plants/.

MOE (Ministry of Environment). 2013. Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia (2013). [accessed November 2022]. https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/best-management-practices/raptor_conservation_guidelines_2013.pdf.

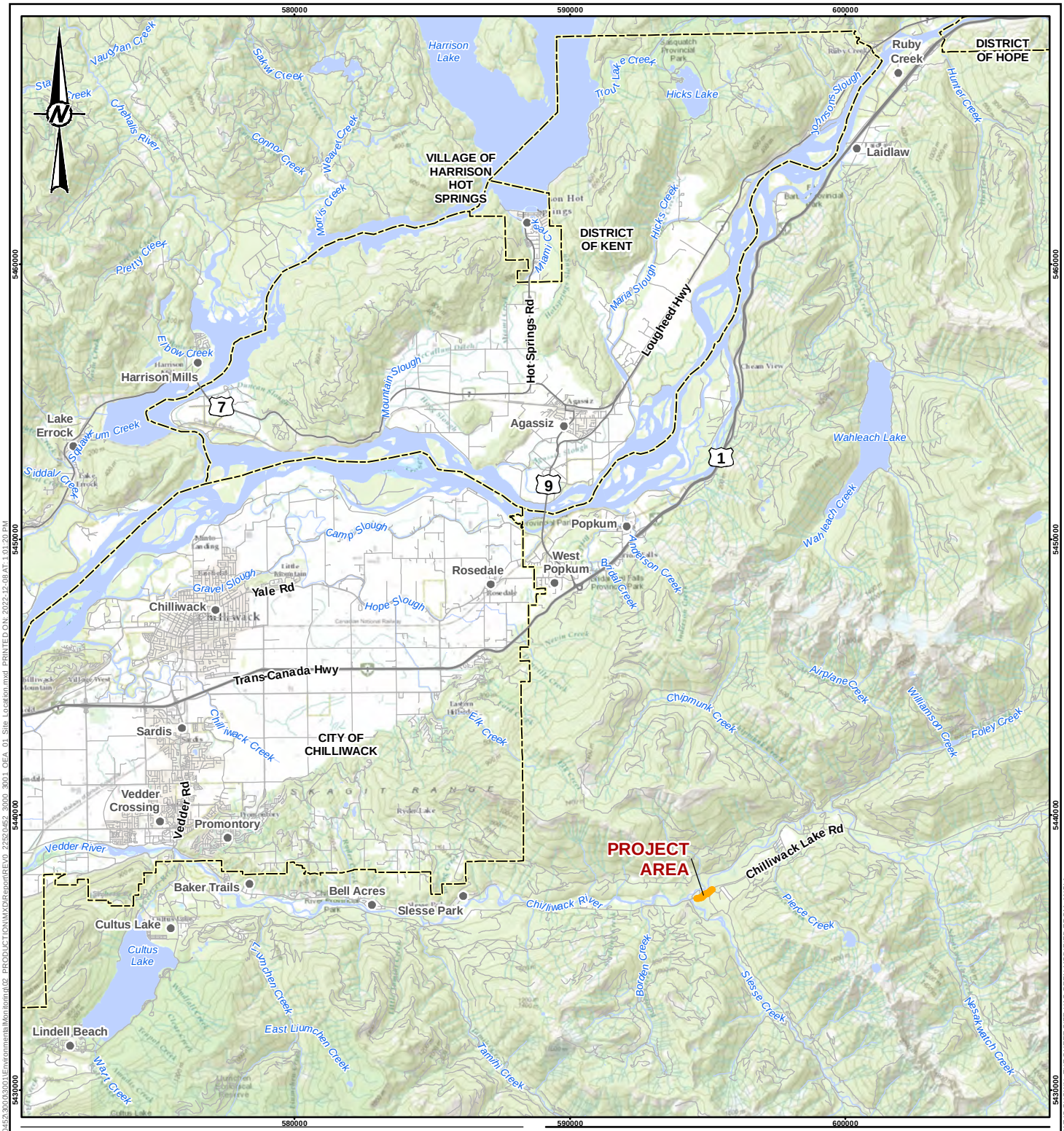
MOE. 2014a. Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia. A companion document to Develop with Care 2014. [accessed September 2022]. https://www.env.gov.bc.ca/wld/documents/bmp/HerptileBMP_complete.pdf.

MOE. 2014b. Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia. [accessed November 2022]. https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/best-management-practices/develop-with-care.

MOE. 2022. Habitat Wizard Streams Report. Chilliwack/Vedder River.

MoTI (Ministry of Transportation and Infrastructure). 2020. Protection of the Environment – Breeding Bird Nest Survey Protocol. September 10, 2020. 2 pp.

WITS (Wildlife Tree Stewardship). 2022. *Wildlife Tree Atlas*. [accessed November 2022]. http://wildlifetree.ca/atlas.html.



LEGEND

- POPULATED PLACE
- PROJECT AREA
- MUNICIPAL BOUNDARY
- WATERBODY
- WATERCOURSE
- HIGHWAY/ROAD

0 4 8

1:200,000 KILOMETRES

REFERENCE(S)

1. MAP BASE SOURCE ESRI, GEOBASE, NRCAN, AND THE GIS USER COMMUNITY.
2. ROADS, WATER FEATURES, MUNICIPAL BOUNDARIES PUBLISHED BY AND OBTAINED FROM THE MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.

COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 10N

CLIENT
MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE

PROJECT
SANDHILL EMBANKMENT WASHOUT PROJECT

TITLE
SITE LOCATION

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-12-08
DESIGNED	NM
PREPARED	MY
REVIEWED	NM
APPROVED	SR

PROJECT NO.	CONTROL	REV.	FIGURE
22520452	3000/3001	0	1

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

25mm

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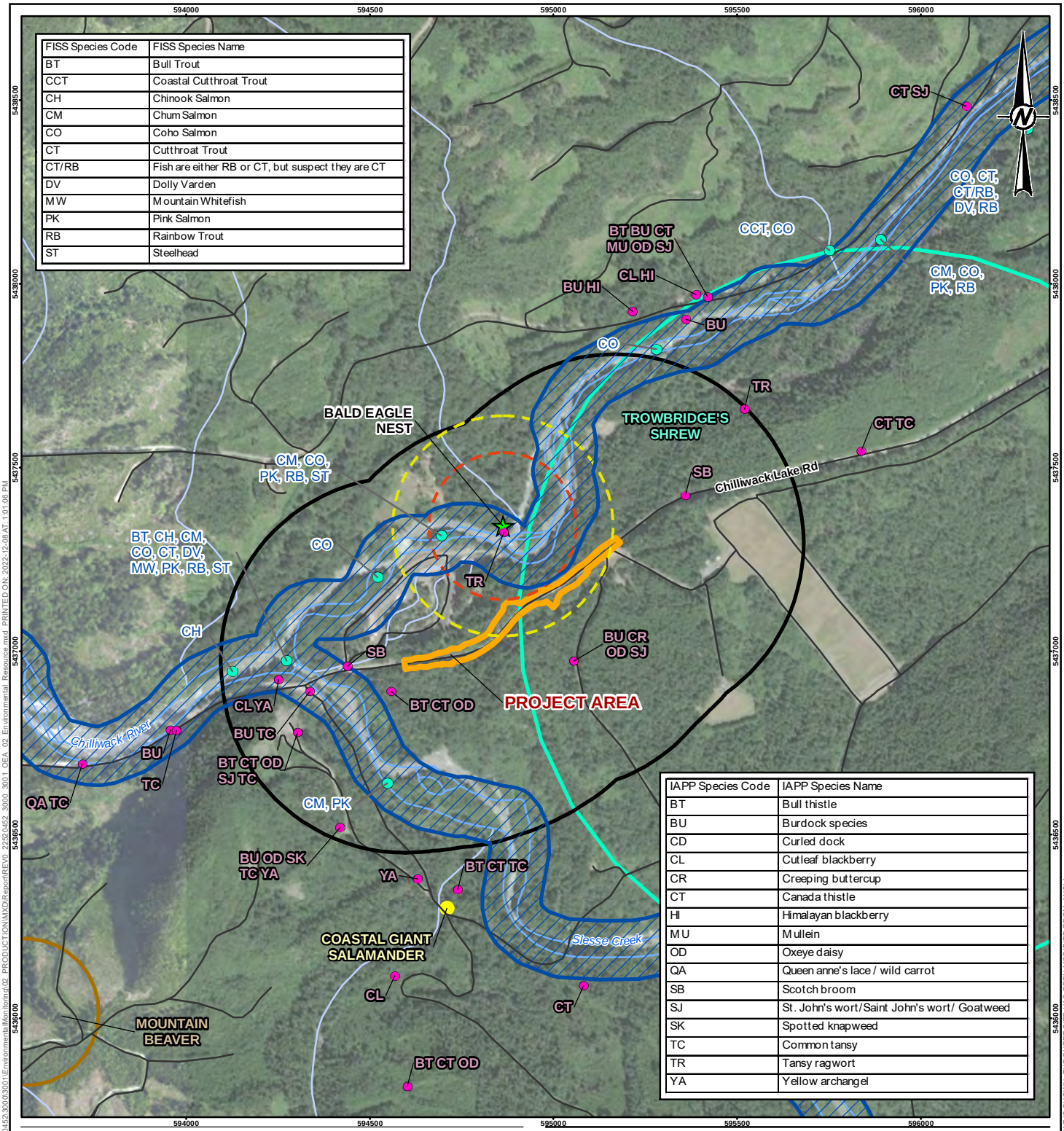

FISS Species Code	FISS Species Name
BT	Bull Trout
CCT	Coastal Cutthroat Trout
CH	Chinook Salmon
CM	Chum Salmon
CO	Coho Salmon
CT	Cutthroat Trout
CT/RB	Fish are either RB or CT, but suspect they are CT
DV	Dolly Varden
MW	Mountain Whitefish
PK	Pink Salmon
RB	Rainbow Trout
ST	Steelhead

IAPP Species Code	IAPP Species Name
BT	Bull thistle
BU	Burdock species
CD	Curled dock
CL	Cutleaf blackberry
CR	Creeping buttercup
CT	Canada thistle
HI	Himalayan blackberry
MU	Mullein
OD	Oxeye daisy
QA	Queen anne's lace / wild carrot
SB	Scotch broom
SJ	St. John's wort/Saint John's wort/ Goatweed
SK	Spotted knapweed
TC	Common tansy
TR	Tansy ragwort
YA	Yellow archangel

LEGEND

- FISS (FISHERIES INFORMATION SUMMARY SYSTEM) POINT
- INVASIVE ALIEN PLANT PROGRAM (IAPP) POINT
- BALD EAGLE NEST
- EAGLE NEST BUFFER
- BREEDING SEASON QUIET BUFFER – BALD EAGLE NEST
- WATERCOURSE
- ROAD
- WATERBODY
- PROJECT AREA
- STUDY AREA
- COASTAL GIANT SALAMANDER CRITICAL HABITAT

CDC ANIMAL SPECIES OF CONSERVATION CONCERN

- COASTAL GIANT SALAMANDER
- MOUNTAIN BEAVER
- TROWBRIDGE'S SHREW

0 100 200 300 400 500

1:15,000 KILOMETRES

REFERENCE(S)

1. MAP BASE SOURCE ESRI, GEOBASE, NRCAN, AND THE GIS USER COMMUNITY.
2. ROADS, WATER FEATURES, MUNICIPAL BOUNDARIES PUBLISHED BY AND OBTAINED FROM THE MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.

COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 10N

CLIENT
MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE

PROJECT
SANDHILL EMBANKMENT WASHOUT PROJECT

TITLE
ENVIRONMENTAL RESOURCES

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-12-08
DESIGNED	NM
PREPARED	MY
REVIEWED	NM
APPROVED	SR

PROJECT NO.	CONTROL	REV.	FIGURE
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APPENDIX A

Species at Risk

Table 1 Error! Unknown document property name.**: Provincially and Federally Designated Wildlife[1] Potentially Occurring within or Adjacent to the Project Area**

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Fish							
Green Sturgeon	*Acipenser medirostris*	1-SC	SC	Blue	S2S3N	The range of this species extends from the Aleutian Islands and Gulf of Alaska south to Mexico. In BC this species occurs in the Fraser and Columbia rivers, using marine and estuary habitat. Suitable habitat occurs in nearshore oceans, bays, and estuaries.	**Not Expected -** This species has not been recorded in the Chilliwack River.
White Sturgeon (Lower Fraser River Population)	*Acipenser transmontanus* pop. 4	-	T	Red	S1S2	The range of this species extends along the Pacific coast of North America in the Fraser River, Columbia, and Sacramento rivers. This population is found in the Lower Fraser River. Spawning occurs in side channels of large rivers characterized by gravel, cobble, or sand substrate. Spawning generally occurs during flooding events at a depth of 3 to 4.5 meters. Juveniles occur in the lower reaches of tributaries, within wetlands and side channels deeper than 5 meters. Suitable habitat for adults occurs in deep near-shore environments characterized by sand or gravel substrate and located close to areas of heavy, turbulent flow.	**Not Expected -** This species has not been recorded in the Chilliwack River.

[1] **Search Criteria:** BC CDC Species and Ecosystem Explorer search completed on 22 November 2022. Search Type: Animal (Restricted to Red, Blue, and Legally designated species) AND User Defined Polygon. Phylogenetic Ascending.

[2] **SARA:** Federal *Species at Risk Act* Schedule number (1-3) for this species. See the SARA website for more information (Government of Canada 2022). E = Endangered, T = Threatened, SC = Special Concern, DD = Data Deficient, NA = Not Assessed.

[3] **COSEWIC**: Committee on the Status of Endangered Wildlife in Canada. Ranks have the following meanings: E = ENDANGERED: A species facing imminent extirpation or extinction, T = THREATENED: A species that is likely to become endangered if limiting factors are not reversed, SC = SPECIAL CONCERN: A species of special concern because of characteristics that make it is particularly sensitive to human activities or natural events, NAR = NOT AT RISK: A species that has been evaluated and found to be not at risk, DD = DATA DEFICIENT: A species for which there is insufficient scientific information to support status designation. NA = Not assessed (Government of Canada 2022).

[4] **BC CDC List**: The provincial list to which the species or ecological community is assigned (BC CDC 2022). Possible values: Extinct, 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), Accidental, Unknown and No Status.

[5] **Provincial Conservation Status** = Provincial Ranks apply to a species' or ecological community's conservation status in BC. The number in parenthesis is the year the rank was last reviewed. The ranks have the following meaning: X = presumed extirpated, H = possibly extirpated, 1 = critically imperilled, 2 = imperilled, 3 = special concern, vulnerable to extirpation or extinction, 4 = apparently secure, 5 = demonstrably widespread, abundant, and secure, NA = not applicable, NR = unranked, U = unrankable. N= non-breeding; B= breeding, ? = inexact or uncertain (BC CDC 2022).

[6] Habitat and range information obtained from BC CDC Species Summary Reports (BC CDC 2022).

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Brassy Minnow - Pacific Group	*Hybognathus hankinsoni* - Pacific group	-	SC	Blue	S2S3	The brassy minnow is found has been found in Delta, Westham Island, Deer and Burnaby Lakes and Brunette River, and to a more limited extent, in the Sumas River and sloughs of Richmond. The brassy minnow is able to survive in small lakes, slow-moving small streams, and drainage ditches, as well as in both clear and stained or turbid water. They were found in large numbers in sloughs, ditches, and lakes of lower mainland region.	**Not Expected -** This species has not been recorded in the Chilliwack River.
Nooksack Dace	*Rhinichthys cataractae* - Chehalis lineage	1-E	E	Red	S1	The range extends from southwestern BC south to northwestern Washington. In BC, this species occurs in the Nooksack River system in the Fraser Valley. Spawning occurs in shallow, fast moving streams characterized by rocky substrate. Adult habitat is found in riffles of fast-flowing rivers, typically with a loose coarse-gravel substrate while young inhabit slow, shallow water characterized by sand or mud substrate.	**Not Expected -** This species has not been recorded in the Chilliwack River.
Salish Sucker	*Catostomus* sp. 4	1-T	T	Red	S2	The species is restricted to Puget Sound in Washington and southwestern BC. Suitable habitat occurs within the Fraser River drainage in coastal streams and small rivers characterized by silt, sand, or gravel substrate. It inhabits streams with a depth of 1 meter and a width of 2 to 7 meters with a slow flow. It also inhabits inland lakes in Washington.	**Not Expected -** This species has not been recorded in the Chilliwack River.
Pygmy Longfin Smelt	*Spirinchus* sp. 1	-	DD	Red	S2	The range extends from Alaska, south to California. In BC the only known spawning run occurs in the lower Fraser River, where they have been documented as far upstream as Chilliwack. Freshwater populations occur in Harrison and Pitt Lake. Suitable habitat occurs in bays and estuaries of coastal streams in brackish and salt water. Some populations occur only in freshwater lakes.	**Not Expected -** This species has not been recorded in the Chilliwack River.
Eulachon	*Thaleichthys pacificus*	-	E/T	Blue	S2S3	The range of this species extends from Alaska south to California. This species is anadromous and spends the majority of its like in marine habitats, returning to freshwater streams to spawn. Spawning occurs in coastal rivers characterized by coarse sand or gravel substrate including the Fraser, Nass, Skeena, and Klinaklini rivers in BC.	**Not Expected -** This species has not been recorded in the Chilliwack River.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Cutthroat Trout, *clarkii* subspecies	*Oncorhynchus clarkii clarkii*	-	-	Blue	S3S4	The range of this species extends from Alaska south to northern California. In BC this species occurs as marine populations, freshwater-resident populations, and headwater stream populations. Suitable habitat occurs in relatively small streams characterized by gravel substrates and a low gradient. Spawning generally occurs in streams.	**Potential -** This species has been recorded in the Chilliwack River and may occur proximal to the Project area.
Bull Trout - South Coast Population	*Salvelinus confluentus* pop. 28	1-SC	SC	Blue	S2S3	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.	**Potential -** This species has been recorded in the Chilliwack River and may occur proximal to the Project area.
Coastrange Sculpin, Cultus Population	*Cottus aleuticus* pop. 1	1-T	E	Red	S1S2	This species is endemic to Cultus Lake in BC. Suitable habitat occurs within the pelagic zone of Cultus Lake. Suitable habitat occurs in Cultus Lake, a coastal lake in the lower Fraser Valley. This lake is monomictic and characterized by steep banks, alkaline water with fairly high clarity. This lake has a high primary production rate.	**Not Expected -** This species has not been recorded in the Chilliwack River.
Amphibians							
Coastal Tailed Frog	*Ascaphus truei*	1-SC	SC	Yellow	S4	The coastal tailed frog is found in the Coast and Cascade Mountain ranges from Alaska south to northern California. In BC, it occurs in the Coast Mountains, from the Lower Mainland north to the Nass River. This species breeds in permanent, clear, cold, swift-moving, mountainous watercourses with step-pool structure and cobble and boulder substrates. It primarily inhabits streams in old-growth or second growth forests that are fish-free. Adults occur in riparian habitat with moist microsites and structural diversity that provides refuge and food.	**Not Expected -** The Project area does not contain any clear, cold, mountainous watercourses.
Western Toad	*Anaxyrus boreas*	1-SC	SC	Yellow	S4	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. 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.	**Unlikely -** No suitable breeding habitat occurs within the Project area. Lack of cover habitat within the Project area limits suitability for terrestrial life phases.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Northern Red-legged Frog	*Rana aurora*	1-SC	SC	Blue	S3	This species' range extends along the Pacific coast of North America from BC south to Baja California. In BC it is found on Vancouver Island, the Gulf Islands, and the Lower Mainland on the west side of the Coast Mountains. The northern red-legged frog breeds in waterbodies with emergent vegetation including shallow ponds, wetlands, ditches, slow moving streams, and lake margins. Adults are found in moist upland habitat and forests with ample cover including woody debris, leaf litter, and shrubs. This species is typically found at low elevation.	**Unlikely -** No suitable breeding habitat occurs within the Project area. Lack of cover habitat within the Project area limits suitability for terrestrial life phases.
Oregon Spotted Frog	*Rana pretiosa*	1-E	E	Red	S1	The range of this species was historically scattered from southwestern BC south to California. In BC, the Oregon spotted frog is found only in a few wetlands in the Fraser River lowlands. Breeding occurs in warm, shallow, seasonal wetlands where eggs are laid. Adults are highly aquatic and occur in wetlands with abundant emergent vegetation and water less than 30 cm deep. Overwintering habitat is variable and includes beaver dams, culverts, woody debris, seeps, and springs that do not completely freeze.	**Not Expected -** The Project area does not overlap the species' known range.
Coastal Giant Salamander	*Dicamptodon tenebrosus*	1-T	T	Blue	S2S3	This species is restricted in BC to the Chilliwack River Valley and tributaries south of the Fraser River around Cultus and Chilliwack Lakes. It inhabits cool, fast flowing mountain streams in mature or second growth forests. Nests are located in rocky areas near streams and seeps.	**Not Expected -** Although mapped critical habitat is proximal to the Project area, no suitable clear, cold, mountainous streams occur in or immediately adjacent to the Project area.
Reptiles							
Northwestern Pond Turtle	*Actinemys marmorata*	1-XT	XT	Red	SX	The range of this species extends west of the Cascade and Sierra Nevada Mountain ranges in Oregon south to Baja California. Isolated populations exist in Washington and Nevada. Historically it was found in southwestern BC but is now considered extirpated from the province. It occurs in quiet ponds, marshes, or streams with muddy bottoms and emergent aquatic vegetation. Occasionally found in brackish water. Often found basking on objects at the surface of the water.	**Not Expected -** This species is considered extirpated from BC.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Painted Turtle - Pacific Coast Population	*Chrysemys picta* pop. 1	1-T	T	Red	S1S2	The Pacific Coast subpopulation range extends through the southern part of the province on southern Vancouver Island and the coastal mainland. It occurs in ponds, lakes, sloughs, and slow-moving streams in shallow water with emergent vegetation, muddy substrates and suitable basking sites. Habitat may also include the riparian zones around these water bodies. Females dig nests in soft soil, and hatchlings remain in nest during winter and emerge in spring.	**Not Expected -** The Project area does not contain any suitable slow-moving watercourses or waterbodies with emergent vegetation.
Northern Rubber Boa	*Charina bottae*	1-SC	SC	Yellow	S4	This species is found in warm valleys in the southern regions of BC and south throughout the western United States. It inhabits rocky outcrops, talus slopes, and areas under logs or other structures which provide shelter and thermoregulation, usually not far from water. Generally nocturnal, they are primarily found at low elevation, on warm aspects in forests and grasslands, in or under rotting logs, stumps, rocks, and crevices.	**Potential -** May occur in forested habitat in and adjacent to the Project area where suitable abundance of cover habitat occurs.
Gophersnake, *catenifer* subspecies	*Pituophis catenifer catenifer*	1-XT	XT	Red	SX	The range extends from California, Arizona, and New Mexico, north to Washington and Idaho. This species is considered extirpated in BC. It is found mainly in dry grasslands, although it is sometimes associated with wetlands in the Bunchgrass and Ponderosa Pine biogeoclimatic zone. The *catenifer* subspecies is most common in semi-arid, brushy areas and adjacent to farms.	**Not Expected -** This species is considered extirpated from BC.
Birds							
Brant	*Branta bernicla*	-	-	Blue	S3M	The range in North America extends throughout the arctic region from Alaska east to Ellesmere Island and the north coast of Greenland. Wintering occurs along the Pacific coast. In BC, the Brant winters in Haida Gwaii, Tsawwassen and Boundary Bay in the Lower Mainland, the Strait of Georgia, the Strait of Juan de Fuca, and Vancouver Island. During migration it can be found in near shore coastal waters or foraging in open grassy areas such as lawns, pastures, golf courses, and marshes. Near shore coastal habitat is often associated with eel-grass and sea lettuce. Migrating birds concentrate around spawning herring.	**Not Expected -** The Project area does not contain coastal waters, grassy areas, marshes, or other suitable foraging habitat used during migratory and overwintering periods.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Tundra Swan	*Cygnus columbianus*	-	-	Blue	S3N	The breeding range of the tundra swan extends from the Aleutian Islands and coastal Alaska, east the northern coast of the Yukon, Northwest Territories, Nunavut, and the southern Arctic Islands. Breeding also occurs in northern Manitoba, Ontario, and Quebec along Hudson's Bay. Winter range is found along the Pacific northwest of the United States to southern BC and along the eastern coast of the United States. Wintering habitat is found along estuaries, lakes, ponds, and rivers. Suitable breeding habitat occurs in arctic wetlands, ponds, and tundra. In addition, this species often breeds in coastal deltas and ponds with pondweed. Migrating habitat occurs in ponds, lakes, wetlands, moist fields, and marshes.	**Not Expected -** The Project area does not contain coastal waters, grassy areas, marshes, or other suitable foraging habitat used during migratory and overwintering periods.
Black Scoter	*Melanitta americana*	-	-	Blue	S3S4N	Breeding occurs along the western and northern coast of Alaska and in northern Quebec and Ontario. Nonbreeding range occurs along the coast of western North America from the Aleutian Islands south to northern Baja California and along the Atlantic coast. In BC, several thousand winter in calm waters between Vancouver Island and the mainland but occur all along the coast. Breeding occurs near lakes and nests are located on till or rock substrate. Wintering habitat is poorly studied. `	**Not Expected -** The Project area is outside of the species' breeding range. This species occurs in marine habitats during the overwintering period.
Surf Scoter	*Melanitta perspicillata*	-	-	Blue	S3B,S4N	Breeding occurs in Quebec, northern Canada, and Alaska. This species overwinters in coastal habitat. In BC, the surf scooter 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.	**Not Expected -** The Project area is outside of the species' breeding range. This species occurs in marine waters during the overwintering period.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Western Grebe	*Aechmophorus occidentalis*	1-SC	SC	Red	S1B,S2N	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. 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 seacoasts.	**Not Expected -** No known breeding colonies in or adjacent to the Project area. Species occurs in marine habitats during the overwintering period
Band-tailed Pigeon	*Patagioenas fasciata*	1-SC	SC	Blue	S3S4	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.	**Potential -** May nest in forest in and adjacent to the Project area. May forage through Project area, particularly where fruit-producing shrubs are present.
Yellow-billed Cuckoo	*Coccyzus americanus*	-	-	Red	SXB	The breeding range of this species extends throughout the eastern United States, west to the Great Plains, and north to southern Ontario and Quebec. Breeding is also known in Arizona, New Mexico, and California, north to Idaho, Wyoming, and Montana. In BC, vagrants occur in the south of the province. Records of breeding for this species are known from the lower Fraser Valley and Vancouver Island. Suitable habitat occurs in dense deciduous riparian habitat composed of cottonwood, willow, and birch. It also inhabits abandoned farmland, orchards, and parks.	**Not Expected -** The Project area does not contain suitable habitat (i.e., dense deciduous riparian habitat).

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Common Nighthawk	*Chordeiles minor*	1-T	SC	Blue	S3S5B	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.	**Potential -** May nest in open gravel areas in and proximal to the Project area, as well on gravel beds associated with the Chilliwack River. May forage throughout the Project area.
White-throated Swift	*Aeronautes saxatalis*	-	-	Blue	S3S4B	The range extends from southern BC to central America. In BC, white-throated swift only breed in south central BC in the Similkameen 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.	**Not Expected -** The Project area is outside of the species' known range.
Black Swift	*Cypseloides niger*	1-E	E	Blue	S2S4B	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 -** May forage throughout, but no suitable breeding habitat occurs in or adjacent to the Project area.
American Golden-Plover	*Pluvialis dominica*	-	-	Blue	S3S4B	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.	**Not Expected -** Both breeding and overwintering ranges do not overlap with the Project area. This species uses coastal habitats along with prairies and fields during migration, habitats that do not occur in or adjacent to the Project area.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
American Avocet	*Recurvirostra americana*	-	-	Blue	S2S3B	Breeding occurs in coastal California and the western interior of the United States, north to Alberta, Saskatchewan, and Manitoba, typically east of the Sierra Nevada and Cascade Mountains. In BC, breeding has been recorded in the Thompson-Okanagan region and west Kootenay region. Breeding occurs in salt ponds, potholes, and shallow alkaline wetlands dominated by bulrushes, sedges, or common cattails. The species may also breed around lakes and mudflats. Nests are built in sparse vegetation, often on islands. Seven nesting locations have been recorded in BC. Foraging occurs along the periphery of water bodies.	**Not Expected -** The Project area is outside of the species' known range.
Upland Sandpiper	*Bartramia longicauda*	-	-	Red	S2B	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 -** The Project area is outside of the species' known range.
Red Knot	*Calidris canutus*	1-T	T	Blue	S3?M	In BC, occurs primarily along seacoasts on tidal flats and beaches, less frequently in marshes and flooded fields	**Not Expected -** The Project area does not contain suitable habitat (i.e., coastal habitats, marshes, flooded fields).
Short-billed Dowitcher	*Limnodromus griseus*	-	-	Blue	S2S3B	The breeding range is restricted to scattered areas in North America from Alaska and BC east to Alberta, Saskatchewan, Ontario, and Quebec. In BC, it occurs in the St. Elias Mountains and Haida Gwaii. This species nests occur in wet boggy muskeg and wet meadows in subalpine zones, plateaus, and valleys with a mix of grasses, sedges, and mosses.	**Not Expected -** The Project area is outside of the species' known range.
Hudsonian Godwit	*Limosa haemastica*	-	T	Red	S1B	The breeding range in North America includes scattered populations from eastern Alaska, east to Hudson's Bay. In BC, breeding is known from Chilkat Pass in the north of the province. Suitable breeding habitat occurs in open sedge meadows bordered by forest. It also inhabits bogs, spruce islands, and shallow pools surrounded by coniferous forests and upland areas dominated by grasses and lichens. The Hudsonian godwit winters in coastal marshes in South America.	**Not Expected -** The Project area is outside of the species' known range.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Long-billed Curlew	*Numenius americanus*	1-SC	SC	Yellow	S4B	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.	**Not Expected -** The Project area is outside of the species' known range.
Red-necked Phalarope	*Phalaropus lobatus*	1-SC	SC	Blue	S3S4B	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.	**Not Expected -** Both breeding and overwintering ranges do not overlap with the Project area. This species uses coastal habitats during migration, which does not occur in or adjacent to the Project area.
Wandering Tattler	*Tringa incana*	-	-	Blue	S3B	The breeding range extends from Alaska, east to the Yukon, western Northwest Territories, and south to northwestern BC. Wintering range extends along the coast from southern BC, south to Peru and on near shore islands. In North America, suitable breeding habitat is found in dwarf shrub and montane tundra. It also is found breeding near scree slopes, creeks, rivers, alpine lakes, and tailings ponds from mining activities. Wintering areas are found in rocky intertidal habitat including reefs, jetties, sea stacks, rocky shorelines, piers, and pilings. Also found in estuaries and freshwater water bodies near the coast.	**Not Expected -** The Project area is outside of the species' known range.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Caspian Tern	*Hydroprogne caspia*	-	NAR	Blue	S3B	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.	**Unlikely -** May forage along the Chilliwack River, but few no public records of this species in the region (eBird 2022).
California Gull	*Larus californicus*	-	-	Red	S1B,SNRN	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 BC, both in the Okanagan Valley. 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.	**Potential -** May occur in the Project area during migration.
Forster's Tern	*Sterna forsteri*	-	DD	Red	S1B	Breeding occurs from southeastern BC at Creston, south to Washington, Oregon, Idaho, Montana, and California. The breeding range also extends from eastern Alberta, east to Manitoba and south to North and South Dakota and Minnesota. Scattered breeding populations occur in other localities throughout North America. Suitable habitat occurs primarily in marshes with fresh, brackish, or salt water. This species also inhabits the edges of lakes, ponds, wetlands, and streams with emergent vegetation.	**Not Expected -** The Project area is outside of the species' known range.
Marbled Murrelet	*Brachyramphus marmoratus*	1-T	T	Blue	S3	Lives out at sea except during the breeding season. In BC, breeds in coastal areas of the Georgia Depression and Coast and Mountains in mature/ old growth coniferous forests. Key habitat attributes for nesting include nest trees that are >30 m tall, small gaps in the canopy for accessing the nest, large limbs covered with deep moss that provide a landing pad and soft substrate for a nest cup, and overhead cover for shelter and protection from predators.	**Not Expected -** The Project area is outside of the species' known range.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Tufted Puffin	*Fratercula cirrhata*	-	-	Blue	S2S3B,S4N	In BC, the tufted puffin winters in pelagic areas along the coast. The tufted puffin overwinters in deep, oceanic water and is mainly pelagic. Occasionally, individuals' winter in bays. This species breeds in colonies on steep rock islands and cliffs. The breeding range extends along the BC coast. Individuals nest on offshore islands or along the coast in ground burrows, sometimes under boulders and piles of rocks, and occasionally under dense vegetation.	**Not Expected -** The Project area is outside of the species' known range.
Cassin's Auklet	*Ptychoramphus aleuticus*	1-SC	SC	Red	S2B,S3N	The breeding range extends from Russia, through Alaska and BC, and extends south to Baja California. Up to 50% of the global population is found in the Scott Island group off Vancouver Island. Cassin's auklet nests on small islands, free of mammalian predators. It nests in shallow borrows, rock crevices, and under trees and logs. Outside of the breeding season, it is largely pelagic.	**Not Expected -** The Project area is outside of the species' known range.
Ancient Murrelet	*Synthliboramphus antiquus*	1-SC	SC	Blue	S2S3B,S4N	Breeding range occurs from the Aleutian Islands and Gulf of Alaska, and Haida Gwaii in BC. Breeding colonies establish on large islands with forests, shrub, or grass cover. Foraging occurs on the Pacific continental shelf and slope waters.	**Not Expected -** The Project area is outside of the species' known range.
Common Murre	*Uria aalge*	-	-	Red	S2B,S3S4N	Breeding occurs in the Aleutian Islands and along the coast of Alaska, south to Haida Gwaii and in the coastal areas of Oregon and northern California. Wintering range extends throughout the Pacific Northwest and the Bering Sea. In the east the range extends from the northeastern United States, north to Newfoundland and coastal are of Quebec and Labrador, to southern Greenland. This species is a year-round resident in most of coastal BC, with seasonal populations in the Kitimat-Stikine and Squamish-Lillooet districts. The common murre overwinters in sheltered bays and other coastal areas, often feeding on herring. Breeding habitat is on cliffs, rocky headlands of islands, or sloping islands near the ocean.	**Not Expected -** The Project area is outside of the species' known range.
Northern Fulmar	*Fulmarus glacialis*	-	-	Red	S1B,S4N	The Northern Fulmar's breeding range occurs in scattered locations along the coast of BC, Alaska, the Canadian Arctic, and eastern Canada. This species breeds on coastal cliffs located on islands and the mainland. Marine habitat ranges from ice-covered high-arctic regions to temperate boreal zones with preference for water temperature between 3 and 7°C.	**Not Expected -** The Project area is outside of the species' known range.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Double-crested Cormorant	*Nannopterum auritum*	-	NAR	Blue	S3S4	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.	**Unlikely -** May forage along the Chilliwack River, but few no public records of this species in the region (eBird 2022).
American White Pelican	*Pelecanus erythrorhynchos*	-	NAR	Red	S1B	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, southeaster 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.	**Not Expected -** The Project area is outside of the species' known range.
Great Blue Heron, *fannini* subspecies	*Ardea herodias fannini*	1-SC	SC	Blue	S3B,S4N	The great blue heron *fannini* subspecies is occurs on the Pacific Coast from Alaska south to Puget Sound, Washington. In BC, it is found year-round in coastal habitats and in the southern interior. It forages along water margins including marine habitat, slow moving freshwater, and grasslands. On the Pacific coast, the species typically nests in colonies in tall Sitka spruce, western red cedar, western hemlock, pine, red alder, Douglas-fir, and black cottonwood.	**Potential -** May nest in forested portions of the Project area. May forage along the Chilliwack River.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
American Bittern	*Botaurus lentiginosus*	-	-	Blue	S3B,SNRN	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 -** No wetland or lake margin habitat available in or adjacent to the Project area.
Green Heron	*Butorides virescens*	-	-	Blue	S3S4B	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.	**Potential -** May nest and forage in riparian areas associated with the Chilliwack River in and adjacent to the Project area.
Black-crowned Night-heron	*Nycticorax nycticorax*	-	-	Red	S1	Range extends across North America though status varies by province/state. The breeding range includes Washington State, Idaho, Saskatchewan, Michigan, and Nova Scotia and south into South America. Winter habitat includes states as far north as Oregon, also in Utah, New Mexico, Texas, Gulf Coast, and southern New England. In BC, they are a transient species in Kootenay, Thompson, and on Vancouver Island, a seasonal resident in the Okanagan region, and a year-round resident and confirmed breeder in Lower Mainland. This species is found in wetlands, mangroves, streams, and lakes. Nesting occurs in a variety of habitats such as wetlands, orchards, and on marine islands.	**Potential -** May nest and forage in riparian areas associated with the Chilliwack River in and adjacent to the Project area.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Northern Goshawk, *laingi* subspecies	*Accipiter gentilis laingi*	1-T	T	Red	S2	The *laingi* subspecies occurs in southeastern Alaska, coastal B.C., the Olympic Peninsula and possibly coastal areas of Washington and Oregon. This subspecies is a year-round resident that only occurs in Canada in coastal areas of BC, mainly on Haida Gwaii and Vancouver Island, and other large coastal islands. It inhabits mature forest with dense canopies, open understory and sufficient tree limbs for nesting and perching platforms. Closed canopy likely provides the optimal microclimate for nesting by reducing predation and providing greater prey productivity.	**Unlikely -** No mature or old-growth forest where suitable nesting platforms are present in or adjacent to the Project area.
Rough-legged Hawk	*Buteo lagopus*	-	NAR	Blue	S3N	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).	**Not Expected -** The Project area is generally forested, where this species overwinters in open habitats such as meadows, prairies, and wetlands.
Barn Owl	*Tyto alba*	1-T	T	Blue	S3	The range extends from southern BC and Vancouver Island, south throughout the continental United States, Mexico, Central America, and the Caribbean. The barn owl can be a year-round or seasonal resident of BC depending on its location within the province. This species occurs in open and partly open grasslands, marshes and field habitats, often around human habitation. Nests in caves, buildings, hollow trees, and crevices on cliffs.	**Not Expected -** The Project area is generally forested, where this species occurs in open habitats such as agricultural fields, grasslands, and marshes.
Short-eared Owl	*Asio flammeus*	1-SC	T	Blue	S3B,S1N	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.	**Not Expected -** The Project area is generally forested, where this species overwinters in open habitats such as fields, marshes, and fields.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Western Screech-Owl, *kennicottii* subspecies	*Megascops kennicottii kennicottii*	1-T	T	Blue	S2S3	Year-round habitat occurs in western North America from coastal areas of Alaska and BC, south throughout the western United States to Mexico. It typically occurs at low elevations in mature deciduous riparian habitat with available cavities, and wetland and forested habitat. It can also be found in treed urban and suburban environments, and at the edge of forested habitats close to open wetlands or fields.	**Potential -** May nest and forage in riparian areas associated with the Chilliwack River in and adjacent to the Project area.
Spotted Owl	*Strix occidentalis*	1-E	E	Red	S1	The spotted owl's range extends from southwestern BC south to Mexico. In BC, this species is a year-round resident that occurs in the Chilliwack, Squamish and Cascades Forest Districts and historically was found in the Sunshine Coast Forest District. This species occurs in a variety of habitat types and forest stands, including western hemlock, mixed evergreen, mixed conifer, Douglas-fir, and redwood. Generally, it is found in late seral stage coniferous forests from sea level elevations up to 1400 meters.	**Not Expected -** The Project area does not contain any mature or old-growth forests, the preferred habitat of this species.
Lewis's Woodpecker	*Melanerpes lewis*	1-T	T	Blue	S2S3B	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 understory 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.	**Not Expected -** The Project area is outside of the species' known range.
Prairie Falcon	*Falco mexicanus*	-	NAR	Red	S1	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 -** The Project area is outside of the species' known range.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Peregrine Falcon, *anatum* subspecies	*Falco peregrinus anatum*	1-SC	NAR	Red	S2?	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.	**Unlikely -** No suitable nesting habitat (i.e., cliffs) in or adjacent to the Project area. The Project area is also not anticipated to contain concentrations of preferred prey (e.g., waterfowl) during overwintering periods.
Gyrfalcon	*Falco rusticolus*	-	NAR	Blue	S3S4B,SNRN	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 -** The Project area is not expected to contain concentrations of preferred prey during overwintering periods.
Olive-sided Flycatcher	*Contopus cooperi*	1-T	SC	Yellow	S4B	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.	**Potential -** May nest in forested portions in and adjacent to the Project area. May forage along both natural and anthropogenic openings/edges.
Horned Lark, *strigata* subspecies	*Eremophila alpestris strigata*	1-E	E	Red	SXB	The breeding range extends from Alaska, east throughout the Canadian Arctic, and south from BC to Newfoundland. Year-round habitat extends from southern BC, Alberta, and Saskatchewan throughout the United States. Habitat occurs at low to high elevations (0 - 4000m) with short grasslands and barren ground. This species breeds in barren ground with short (< a few centimeters) grasses, bare agricultural fields, and abandoned surface mines.	**Not Expected -** This species occurs in open habitats, such as grasslands or fields, which are not present in or adjacent to the Project area.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Barn Swallow	*Hirundo rustica*	1-T	SC	Yellow	S4B	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.	**Potential -** May forage throughout Project area. May nest on DFO hatchery infrastructure adjacent to the Project area.
Purple Martin	*Progne subis*	-	-	Blue	S3S4B	Breeding occurs throughout the eastern United States and southeastern Canada. In western North America breeding populations are scattered in southern BC south to California in coastal environments, and the central western United States. In BC, breeding populations occur along the south and east coast of Vancouver Island and the Gulf Islands as far north as Port Neville. Colonies also occur in the Lower Mainland at Rocky Point, Maplewood Flats, Blackie Spit, and Reifel wildlife refuge. Two inland sites in the Lower Fraser Valley, at Silvermere Lake and Nicomen Slough were occupied in 2006 and 2007. Suitable habitat includes open and partly open areas, often near water or around towns. The purple martin is a cavity nester, often using woodpecker holes in trees and snags or holes in buildings. This species will frequently use nest boxes and artificial holes.	**Not Expected -** No known breeding colonies in or adjacent to the Project area.
Sage Thrasher	*Oreoscoptes montanus*	1-E	E	Red	S1B	The breeding range extends from southern BC, south to northern Arizona and New Mexico and east to southern Saskatchewan. The species wintering range occurs in the southwestern United States and central Mexico. In BC, it is known at the southern Okanagan and Similkameen Valleys. This species is highly associated with sagebrush habitat, which is used during the breeding season. Nesting occurs in shrubs with a minimum height of 1 m and on average nests are found in shrubs 1.5 m wide and 1.3 m high. Migrating sage thrashers have been observed in a variety of habitats including estuaries, beaches, agricultural fields, and dykes.	**Not Expected -** The Project area is outside of the species' known range.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Evening Grosbeak	*Coccothraustes vespertinus*	1-SC	SC	Yellow	S5	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.	**Potential -** May nest and forage in forested areas in and adjacent to the Project area.
Canada Warbler	*Cardellina canadensis*	1-T	SC	Blue	S3B	Breeding occurs from northeastern BC, east to Nova Scotia, and south around the Great Lakes and the northeastern United States. In BC, found around the Peace River lowlands and in the western Taiga plains. This species occurs in mature deciduous and mixed forests, often in low vegetation, in damp microhabitats along streams. The Canada warbler breeds in moist, mixed coniferous and deciduous forests with a well-developed understory near streams, swamps, or bogs.	**Not Expected -** The Project area is outside of the species' known range.
Black-throated Green Warbler	*Setophaga virens*	-	-	Blue	S3B	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 -** The Project area is outside of the species' known range.
Bobolink	*Dolichonyx oryzivorus*	1-T	SC	Red	S2?B	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.	**Not Expected -** The Project area is outside of the species' known range.
Rusty Blackbird	*Euphagus carolinus*	1-SC	SC	Blue	S3S4B	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 BC, 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.	**Not Expected -** The Project area is outside of the species' known range.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Yellow-breasted Chat	*Icteria virens*	1-E	E	Red	S2B	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 -** The Project area is outside of the species' known range.
Nelson's Sparrow	*Ammospiza nelsoni*	-	NAR	Red	S2B	Breeding occurs from the east-central area of BC, east to southwestern Manitoba, and south to North Dakota, South Dakota, and Minnesota. This species prefers freshwater marshes with dense, emergent vegetation or damp areas with dense grasses. Suitable habitat includes wet meadows, lake margins with emergent cattails, and native prairie. Nelson's sparrow nests on the ground in matted beds of rushes or in a dense clump of grasses or sedges.	**Not Expected -** The Project area is outside of the species' known range.
Lark Sparrow	*Chondestes grammacus*	-	-	Blue	S2S4B	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 -** The Project area is outside of the species' known range.
Smith's Longspur	*Calcarius pictus*	-	-	Blue	S3S5B	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 -** The Project area is outside of the species' known range.
Mammals							
Mountain Beaver	*Aplodontia rufa*	1-SC	SC	Yellow	S4	In BC, mountain beavers are found in the Cascades Mountain range and south of the Fraser River in the Fraser Valley. The mountain beaver inhabits areas with deep soil and dense understory vegetation, often near small streams or seepage areas. Burrows are generally found on slopes with moist soils that allow tunneling. This species is restricted to areas with succulent vegetation.	**Unlikely -** No small watercourses occur in or immediately adjacent to the Project area. The Project area does not contain dense understorey vegetation.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Southern Red-backed Vole, *occidentalis* subspecies	*Myodes gapperi occidentalis*	-	-	Red	S1	Occurs in most of forested Canada. The subspecies *occidentalis* was historically recorded at Burns Bog in 1999, but the overall range is currently undetermined for this species. This subspecies can be found in moist and wet coniferous forest, in bogs or in riparian forest habitat with abundant ground cover such as shrubs and woody debris.	**Potential -** May occur in forested habitat in and adjacent to the Project area where suitable cover occurs.
Snowshoe Hare, *washingtonii* subspecies	*Lepus americanus washingtonii*	-	-	Red	S1	The *washingtonii* subspecies is found at low elevations in the Fraser River Valley in BC, east to the Chilliwack Valley. A breeding population is known from Burnaby Lake Regional Park in the Lower Mainland. This subspecies occurs in coniferous, deciduous, and mixed forests with dense canopy cover, abundant understory vegetation, which provides shelter, and thicket openings. Areas without canopy cover and mature forests, which have a sparse understory layer, are generally avoided.	**Potential -** May occur in forested habitat in and adjacent to the Project area where suitable cover occurs.
Pacific Water Shrew	*Sorex bendirii*	1-E	E	Red	S2?	The range for this species is restricted to western North America where it occurs from southwestern BC, south to northern California. In BC, it occurs in the Lower Fraser River valley, as far east as the Chilliwack River and Harrison Lake. This species primarily inhabits riparian areas in wet coniferous or mixed forests, along low gradient streams, and marshes. The Pacific water shrew is associated with skunk cabbage, red alder, and western redcedar. It can also occur in wet ditches and in grassy sloughs.	**Unlikely -** May occur in areas adjacent to the Chilliwack River; however, the portion of the Chilliwack River adjacent to the Project area is fast-flowing with limited ground cover in riparian areas.
Olympic Shrew	*Sorex rohweri*	-	-	Red	S2?	Range extends from the Olympic Peninsula in Washington to southwestern BC. In BC, this species is found south of the Fraser River in the Fraser River Valley and east to Chilliwack Lake and has been recorded at Burns Bog. The Olympic shrew is associated with mixed deciduous forest habitat of various seral stages.	**Potential -** May occur in forested habitat in and adjacent to the Project area where suitable cover occurs.
Trowbridge's Shrew	*Sorex trowbridgii*	-	-	Blue	S3	The range extends from California north to southwestern BC. In BC, it is restricted to the lower Fraser River valley as far east as Chilliwack Lake and Hope. Suitable habitat occurs in moist to dry mixed wood forests with rich deep soils, abundant woody debris, and lots of leaf litter for shelter.	**Potential -** Occurrence records for this species overlap with the Project area; however, these are dated from 1981. May occur in forested habitat where suitable cover occurs.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Townsend's Mole	*Scapanus townsendii*	1-E	E	Red	S1	The range extends from southwestern BC, south along the coast to northwestern California. In BC, it is restricted to a small area in the central Fraser Valley. Habitat includes open areas with heavier soils and high-water content. It is found in pastures, prairies, open forests and shrub habitats in the lowlands and flood plains. This species spends most of the time underground and is most often found in silt loam soil with sufficient humus.	**Not Expected -** The Project area is outside of the species' known range.
Townsend's Big-eared Bat	*Corynorhinus townsendii*	-	-	Blue	S3	In BC, the range of Townsend's big-eared bat extends from Vancouver Island and the Gulf Islands to the Vancouver area. In the interior of BC, this species is found north to William's Lake and east to Creston. It inhabits coastal forests and dry, interior grasslands. It can be found from sea level to 1070 meters.	**Potential -** May forage along the Chilliwack River and other open spaces in and adjacent to the Project area.
Hoary Bat	*Lasiurus cinereus*	-	-	Blue	S3S4	Occurs from southeast Alaska, east to Newfoundland, and south to South America. Exhibits migratory behaviour, moving northward for summer months. Occurs in deciduous and coniferous forests where it forages in open areas, particularly near and over water and in riparian corridors. Roosts in dense foliage. Feeds on invertebrates, mainly moths.	**Potential -** May forage along the Chilliwack River and other open spaces in and adjacent to the Project area. May roost in trees in and adjacent to the Project area.
Little Brown Myotis	*Myotis lucifugus*	1-E	E	Blue	S3S4	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.	**Potential -** May forage along the Chilliwack River and other open spaces in and adjacent to the Project area. May roost in trees in and adjacent to the Project area or adjacent DFO buildings.
Yuma Myotis	*Myotis yumanensis*	-	-	Blue	S3	Occurs from BC south to Mexico, east to Montana and western Texas. Heavily associated with water. Occurs in a variety of habitats, including riparian areas, woodlands, and forests. Roosts in caves, cliff crevices, bridges, buildings, and other anthropogenic habitats. Hibernacula requirements are generally poorly understood.	**Potential -** May forage along the Chilliwack River and other open spaces in and adjacent to the Project area. May roost in trees in and adjacent to the Project area or adjacent DFO buildings.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Wolverine, *luscus* subspecies	*Gulo gulo luscus*	1-SC	SC	Blue	S3	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. 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.	**Not Expected -** Species requires large, extensive home ranges. As such, may travel through area; however, the Site does not contain any unique features that would provide suitable denning habitat and presence would be limited.
Long-tailed weasel, *altifrontalis* subspecies	*Mustela frenata altifrontalis*	-	-	Red	SH	The last confirmed sighting of this species in the Fraser Valley was in 1937; however, it may occur in Fraser Valley or Metro Vancouver regional districts. The *altifrontalis* subspecies occupies a variety of habitat types from marshes, grasslands, and low-elevation forests to alpine tundra. May den in hollow trees, logs, rock or slash piles, and existing nests and burrows. Primarily eats mice and voles, but also other small mammals, birds, eggs, snakes, and insects.	**Unlikely -** May occur in forested portions of the Project area; however, no recent records of this species regionally.
Grizzly Bear	*Ursus arctos*	1-SC	SC	Blue	S3?	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 availability. Home ranges often include riparian areas, ungulate calving grounds, early seral-stage forests and productive berry patches. High quality forage is often found in open, non-forested sites; however, resting sites (security cover) is located in closed forest stands adjacent to high quality feeding areas. Dens are typically dug into dry, stable soil slopes with east or north facing aspects that accumulates snow, providing insulation against the cold, and are adjacent to feeding areas.	**Not Expected -** The Project area overlaps with the North Cascades grizzly bear population unit, which has an extreme conservation ranking and an estimated population size of 6 (Government of BC 2020). Human presence is frequent in the Project area, which also does not contain unique habitat features required by grizzly bear.
Mountain Goat	*Oreamnos americanus*	-	-	Blue	S3	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 -** No suitable cliff/bluff habitat in or adjacent to the Project area.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Invertebrates							
Emma's Dancer	*Argia emma*	-	-	Blue	S3S4	This species occurs in mountainous habitat in BC from the Fraser Valley to the Shuswap and Kettle River. It inhabits banks and riparian habitat along rivers and streams and occasionally lake beaches. Larvae are found among plant stems in pools, under debris, and under rocks in riffles.	**Potential -** May occur in riparian habitat associated with the Chilliwack River.
Vivid Dancer	*Argia vivida*	1-SC	SC	Blue	S2S3	This species occurs in the south of BC from the Coast Mountains to the Rocky Mountains. Suitable habitat occurs in small streams and spring fed ponds (both hot and cold springs). Water bodies are highly vegetated and often occur in dry forests or grasslands.	**Not Expected -** No suitable habitat in or adjacent to the Project area (i.e., small streams, spring fed ponds).
Alkali Bluet	*Enallagma clausum*	-	-	Blue	S3	In BC, this species occurs in BC's southern interior around Osoyoos, Kelowna and Vernon, with several occurrences near Williams Lake. Occurs in saline ponds and lakes in grasslands and dry forested area.	**Not Expected -** The Project area is outside of the species' known range.
Black Petaltail	*Tanypteryx hageni*	-	-	Blue	S3	In BC, black petaltail is only found along the coast of the mainland in mountainous habitat of the Cascades and Coast mountains and at sea level along the central coast of BC. It occurs in water seeps with moss covered rocks, spring fed bogs or seeps in old growth or riparian forests.	**Not Expected -** No suitable habitat in or adjacent to the Project area (i.e., water seeps, spring fed bogs in mature or riparian forests).
Grappletail	*Octogomphus specularis*	-	SC	Red	S2	This species occurs in the Pacific Northwest in coastal habitat. In BC, it is known to occur in the Fraser Valley. Found near small, wooded streams, with many riffles, draining lakes. Adults can be found on rocks near streams, or away from water on branches of bushes and trees. Larvae burrow into the bottom sediments.	**Not Expected -** No suitable habitat in or adjacent to the Project area (i.e., small, wooded streams).
Sinuous Snaketail	*Ophiogomphus occidentis*	-	-	Blue	S3	Occurs throughout much of BC south of 51°N, including the Lower Mainland, Powell River, Vancouver Island, and the Okanagan on warm streambanks and lakeshores. Females lay eggs directly into water along edges of warm streams and lakes, and larvae burrow into sediments. Flight period is early June to early October.	**Potential -** May occur on banks of the Chilliwack River.
Western Pondhawk	*Erythemis collocata*	-	-	Blue	S3S4	In BC, the range extends from the lowlands along the south coast east to Osoyoos Lake in the interior. Members of this family are most common around ponds, marshy lakeshores and slow streams that contain floating vegetation.	**Not Expected -** No suitable habitat in or adjacent to the Project area (i.e., lakes, ponds, slow-moving streams).

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Blue Dasher	*Pachydiplax longipennis*	-	-	Blue	S3S4	In BC, the range extends from low elevation sites along the south coast and Osoyoos Lake in the interior. This species inhabits ponds and lakes with abundant emergent vegetation and a vegetated riparian zone.	**Not Expected -** No suitable habitat in or adjacent to the Project area (i.e., lakes, ponds).
Autumn Meadowhawk	*Sympetrum vicinum*	-	-	Blue	S3S4	In BC, the autumn meadowhawk's range includes the southern interior, from the southern Okanagan Valley and Kootenay River to Creston, and the south coast. It inhabits marshes, ponds, slow streams, and lakes with emergent vegetation. Eggs are deposited in moss and vegetation along the bank, or in, water bodies.	**Not Expected -** No suitable habitat in or adjacent to the Project area (i.e., lakes, ponds, slow-moving streams).
Hairy-necked Tiger Beetle	*Cicindela hirticollis*	-	-	Blue	S2S4	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.	**Not Expected -** The Project area does not overlap the species' known range.
Audouin's Night-stalking Tiger Beetle	*Omus audouini*	1-T	T	Red	S1	The range of the night stalking tiger beetle is confined to a narrow strip of lowland coastal area in southwestern BC around Boundary Bay and the Greater Victoria area of the Georgia Basin. Habitat occurs in coastal areas that are less than 20 m above sea level and are within 3 km of a body of salt water. Adults of this species crawl on the ground and are attracted to sunny areas such as open grasslands, habitats with sparse vegetation, coastal bluffs, meadows, open forests (Garry Oak), and old abandoned agricultural fields. Larvae are located in clay banks above the ocean high tide line or in stream banks. This species is tolerant of areas that are periodically flooded by both freshwater and seawater. The Audouin's night-stalking tiger beetle may be a pest of Douglas-fir cones.	**Not Expected -** The Project area does not overlap the species' known range.
Silver-spotted Skipper, *californicus* subspecies	*Epargyreus clarus californicus*	-	-	Red	S1	The subspecies *californicus* occurs on Vancouver Island and the Lower Mainland. Suitable habitat occurs in disturbed areas and habitats with black locust trees. The larval foodplant for this subspecies is *Lotus crassifolius*.	**Not Expected -** The Project area does not overlap the species' known range.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Propertius Duskywing	*Erynnis propertius*	-	-	Red	S2	The range extends from southern Vancouver Island to Baja California. In BC, their range is limited to the Garry oak ecosystems of southeastern Vancouver Island and adjacent Gulf Islands (as far north as Hornby Island) and an isolated Garry oak site on Sumas Mountain. This species is typically found in Garry oak sites, but stray individuals have been recorded at non-Garry oak sites in the Lower Mainland, north to Mount Currie. The propertius duskywing is dependent on substrate under trees for overwintering purposes. The larval food plant and nectar plant is Garry oak.	**Not Expected -** The Project area does not overlap the species' known range.
Dun Skipper	*Euphyes vestris*	1-T	T	Blue	S2S3	The range of the western subspecies extends from southwestern BC to California. In BC, it occurs on Vancouver Island, the Lower Mainland and Fraser River canyon to Lillooet. Associated with open, moist habitat including roadside ditches, leave strips, and rights-of-way. Also found in fairly dry areas where spring floods or permanent springs provide moist conditions. Larval food plants include the sedges Cyperus esculentus and *Carex heliophile* and potentially other species in the genus Cyperus. Adults eat nectar from white, pink, or purple flowers including common milkweed and purple vetch.	**Potential -** May occur in disturbed habitat, including openings and ditches, associated with the Project area where larval and adult food plants occur.
Indra Swallowtail	*Papilio indra*	-	-	Red	S1	The range extends from the Cascade Mountains of BC to Baja California and east to the Black Hills in South Dakota and Rockies in northern New Mexico. In BC, it is known from Manning Provincial Park where it inhabits dry rocky subalpine areas of Gibson and Allison Pass. The larval food plant in Washington is *Lomatium grayi*.	**Not Expected -** The Project area does not overlap the species' known range.
Clodius Parnassian, *claudianus* subspecies	*Parnassius clodius claudianus*	-	-	Blue	S3S4	In BC, this subspecies occurs on Vancouver Island. The *claudianus* subspecies inhabits moist riparian habitats near streams at low elevations and wet subalpine meadows and subalpine riparian habitat at higher elevations. Larval food plant in BC is bleeding heart, in the family Fumariaceae. Steer's head is the larval food plant for this species in California, and possibly in Oregon, and Washington.	**Not Expected -** The Project area does not overlap the species' known range.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Clodius Parnassian, *pseudogallatinus* supspecies	*Parnassius clodius pseudogallatinus*	-	-	Blue	S3S4	The range extends from BC, south to California where it occurs in the Coast, Cascade and Sierra Nevada Mountains. The northern limit of the species range is found in Bella Coola, BC. Suitable habitat occurs at low elevations in riparian habitat. It also inhabits forest openings and moist meadows in the subalpine zone. The larval food plant of this species is *Dicentra formosa*.	**Potential -** May occur in riparian habitat associated with the Chilliwack River where its larval food plant occurs.
Western Pine Elfin, *sheltonensis* subspecies	*Callophrys eryphon sheltonensis*	-	-	Blue	S3	The subspecies *sheltonensis* occurs on Vancouver Island and in the Lower Fraser Valley regions of BC. This subspecies is associated with pine dominated forests. Adult nectar plants include *Salix prolixa*. The larval food plant is generally lodgepole pine but may also include Ponderosa pine and western white pine.	**Not Expected -** Forests in and adjacent to the Project area are not pine-dominated.
Johnson's Hairstreak	*Callophrys johnsoni*	-	SC	Red	S2?	In BC, this species occurs on southeastern Vancouver Island and the Lower Mainland, west of Hope at four locations. The four extant locations in BC are: Stanley Park, Lynn Canyon Park, Pacific Spirit Park and UBC Haney Research Forest. Johnson's hairstreak occurs in the canopy of mature forests where the food plant, hemlock dwarf mistletoe, is available. Hemlock dwarf mistletoe is known to parasitize western hemlock trees.	**Not Expected -** The Project area does not overlap the species' known range.
Common Wood-nymph, *incana* subspecies	*Cercyonis pegala incana*	-	-	Red	S2?	The *incana* subspecies occurs on Vancouver Island south to the Willamette Valley in Oregon. Suitable habitat includes forest openings dominated by grasses, clear-cuts, roadsides, meadows, and stream banks. In BC, the larval food plant is likely grasses, but may also include sedges.	**Not Expected -** The Project area does not overlap the species' known range.
Hoffman's Checkerspot	*Chlosyne hoffmanni*	-	-	Red	S2	The range extends from the Cascade Mountains south through the Sierra mountains. In BC, it is known from Manning Provincial Park. Suitable habitat includes meadows and openings near dry Douglas-fir forested habitat at 1250 to 1900 m elevation. Also found in valleys and openings in subalpine to alpine areas.	**Not Expected -** The Project area does not overlap the species' known range.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Monarch	*Danaus plexippus*	1-SC	E	Red	S1?B	The monarch occurs mainly in the southern interior regions, Peace River, and Northern Rockies area. Occurrences do also occur along the coast, in the lower Fraser Valley and Vancouver Island. This species migrates to overwinter in coastal California or Mexico. This species occurs in open habitat, including agricultural fields, leave strips and roadside ditches, where milkweed and wildflowers including goldenrod, asters and purple loosestrife are available. Breeds in patches of milkweed host plant.	**Unlikely -** Milkweed, the species host plant, was not observed in or adjacent to the Project area.
Zerene Fritillary, *bremnerii* subspecies	*Speyeria zerene bremnerii*	-	-	Red	S2	The *bremnerii* subspecies occurs on Vancouver Island and the Gulf Islands. Suitable habitat is found in moist to dry meadows, including sagebrush and ponderosa pine () habitat, with springs. In addition, the subspecies may occur in Douglas-fir forest in parts of its range. Larval food plants are species of the genus Viola.	**Not Expected -** The Project area does not overlap the species' known range.
Olympia Oyster	*Ostrea lurida*	1-SC	SC	Blue	S3	The range extends throughout the west coast of North America. In BC, it is found in the Georgia Strait, the west coast of Vancouver Island and in the Queen Charlotte Strait. Suitable habitat occurs in saltwater lagoons and estuaries within the intertidal and sub tidal zones. It also inhabits tidal flats, bays, sounds, pilings, and tidal channels. This species requires hard substrate for establishment.	**Not Expected -** The Project area does not occur in marine habitats.
Herrington Fingernailclam	*Sphaerium occidentale*	-	-	Blue	S2S3	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 -** The Project area does not overlap the species' known range.
Rocky Mountain Fingernailclam	*Sphaerium patella*	-	-	Red	SH	The Rocky Mountain fingernail clam's range extends across western North America. In BC, this species occurs in the Lower Mainland including Metro Vancouver and the Fraser Valley. Historical occurrences of this species are known from Burnaby Lake, Abbotsford Lake, and Kyuquot on Vancouver Island. The last record is from 1961. Occurs in lakes and watercourses. Habitat includes lakes, sloughs, rivers, and streams.	**Potential -** May occur in the Chilliwack River.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Striated Fingernailclam	*Sphaerium striatinum*	-	-	Blue	S3S4	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.	**Potential -** May occur in the Chilliwack River.
Northern Abalone	*Haliotis kamtschatkana*	1-E	E	Red	S2	The range extends from Alaska to California. In BC, it occurs along open coastal habitats. This is a marine species occurring in coastal waters, typically found in the sub tidal zone on rock or other hard surfaces. Suitable habitat also exists in the intertidal zone. It is often associated with kelp, sea urchins, sea stars and coralline algae.	**Not Expected -** The Project area does not occur in marine habitats.
Prairie Fossaria	*Galba bulimoides*	-	-	Blue	S3?	Freshwater perennial or vernal habitats such as lakes, ponds, slow moving streams, and ditches, generally with seasonally flowing water.	**Not Expected -** No suitable habitat in or adjacent to the Project area (i.e., lakes, ponds, slow-moving streams).
Dusky Fossaria	*Galba dalli*	-	-	Blue	S3S4	There are four records of this species, from the Flathead River Valley and the Lower Fraser Valley, from lakes, ponds, marshes, and small rivers. This species is thought to potentially occur throughout southern BC.	**Potential -** May occur in the Chilliwack River.
Pygmy Fossaria	*Galba parva*	-	-	Blue	S3S5	Occurs 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.	**Potential -** May occur in the Chilliwack River.
Widelip Pondsnail	*Stagnicola traski*	-	-	Blue	S3S4	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 -** The Project area does not overlap the species' known range.
Rocky Mountain Physa	*Physella propinqua*	-	-	Blue	S3S4	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.	**Potential -** May occur in the Chilliwack River.
Sunset Physa	*Physella virginea*	-	-	Blue	S3S5	Limited habitat information available. Historical records indicate this species is associated with lakes, rivers, creeks, and sloughs. Very few records in BC.	**Potential -** May occur in the Chilliwack River.

Common Name	Scientific Name	SARA[2]	COSEWIC[3]	BC List[4]	Provincial Status[5]	Habitat and Range[6]	Potential of Occurrence in or adjacent to the Project Area
Meadow Rams-horn	*Planorbula campestris*	-	-	Blue	S3S4	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.	**Not Expected -** No suitable habitat in or adjacent to the Project area (i.e., waterbodies with mud substrate and dense vegetation).
Western Thorn	*Carychium occidentale*	-	-	Blue	S3	In BC, the range extends from Vancouver Island and the Gulf Islands to the Lower Mainland, west of the Coast and Cascade Mountains. Suitable habitat occurs in the moist leaf litter at low elevation (less than 80 meters above sea level) deciduous and mixed wood forests. It is associated with big leaf maple. In addition, the species often inhabits riparian areas or moist areas near seeps.	**Not Expected -** The Project area does not overlap the species' known range.
Oregon Forestsnail	*Allogona townsendiana*	1-E	E	Red	S2	In BC, the Oregon forestsnail's range is restricted to the southwest corner of the province and is typically found at low elevations. They are found SW BC in Tsawwassen, the Lower Mainland, and through the Lower Fraser Valley. Most records occur in the Mission, Abbotsford, and Chilliwack area. Suitable habitat includes mature mixed-wood and deciduous forest dominated by bigleaf maple in the canopy and stinging nettle in the understory. This species is associated with moist habitat, such as seepage areas, with large amounts of leaf litter and woody debris for cover.	**Potential -** May occur in riparian habitats associated with the Chilliwack River.
Puget Oregonian	*Cryptomastix devia*	1-XT	XT	Red	SX	It is considered extirpated from its historical range in BC and Canada. This species has not been recorded since 1905; however, the historical range included Vancouver Island and the SW mainland of BC. Habitat information is available from populations in the United States. Suitable habitat includes moist old-growth and late successional stage forests and riparian areas. A closed canopy, coarse woody debris and dense leaf litter are essential habitat components.	**Not Expected -** Species is considered extirpated from BC.

Table 2: Provincially and Federally Designated Plants[7] Potentially Occurring within or Adjacent to the Project Area

Common Name	Scientific Name	SARA[8]	COSEWIC[9]	BC List[10]	Provincial Status[11]	Habitat and Range[12]
Vascular Plants						
corrupt spleenwort	*Asplenium adulterinum*	-	-	Blue	S3	This species occurs only in BC in North America, with a restricted range extending from Vancouver Island to the lower Fraser Valley. Suitable habitat occurs in the montane and subalpine zones on dry to moist talus slopes and the walls of limestone fissures.
whitebark pine	*Pinus albicaulis*	1-E	E	Blue	S2S3	The range extends east of the Coast and Cascade Mountains from BC, east to southwestern Alberta, and south to California, Nevada, and Wyoming. Suitable habitat is found in the subalpine and alpine zones in moist to dry areas. Whitebark pine inhabits exposed ridges of montane forests near the timberline. It is generally found growing in thin, rocky, and cold soils.
tall bugbane	*Actaea elata* var. *elata*	1-E	E	Red	S1S2	In BC this species appears to favour seepage slopes and benches in mature forest stages. It is found in shady, low to mid elevation moist, mixed, mature (70-150 yr. old) western red cedar-hemlock forest, commonly in T*huja plicata-Polystichum munitum-Achlys triphylla* communities, in mixed Douglas-fir-bigleaf maple sites, and in predominantly deciduous stands.

[7] **Search Criteria:** BC CDC Species and Ecosystem Explorer search completed on 22 November 2022. Search Type: Plants (Restricted to Red, Blue, and Legally designated species) AND User Defined Polygon. Phylogenetic Ascending.

[8] **SARA:** Federal *Species at Risk Act* Schedule number (1-3) for this species. See the SARA website for more information (Government of Canada 2022). E = Endangered, T = Threatened, SC = Special Concern, DD = Data Deficient, NA = Not Assessed.

[9] **COSEWIC**: Committee on the Status of Endangered Wildlife in Canada. Ranks have the following meanings: E = ENDANGERED: A species facing imminent extirpation or extinction, T = THREATENED: A species that is likely to become endangered if limiting factors are not reversed, SC = SPECIAL CONCERN: A species of special concern because of characteristics that make it is particularly sensitive to human activities or natural events, NAR = NOT AT RISK: A species that has been evaluated and found to be not at risk, DD = DATA DEFICIENT: A species for which there is insufficient scientific information to support status designation. NA = Not assessed (Government of Canada 2022).

[10] **BC CDC List**: The provincial list to which the species or ecological community is assigned (BC CDC 2022). Possible values: Extinct, 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), Accidental, Unknown and No Status.

[11] **Provincial Conservation Status** = Provincial Ranks apply to a species' or ecological community's conservation status in BC. The number in parenthesis is the year the rank was last reviewed. The ranks have the following meaning: X = presumed extirpated, H = possibly extirpated, 1 = critically imperilled, 2 = imperilled, 3 = special concern, vulnerable to extirpation or extinction, 4 = apparently secure, 5 = demonstrably widespread, abundant, and secure, NA = not applicable, NR = unranked, U = unrankable. N= non-breeding; B= breeding, ? = inexact or uncertain (BC CDC 2022).

[12] Habitat and range information obtained from BC CDC Species Summary Reports (BC CDC 2022).

Common Name	Scientific Name	SARA[8]	COSEWIC[9]	BC List[10]	Provincial Status[11]	Habitat and Range[12]
alpine anemone	*Anemone drummondii* var. *drummondii*	-	-	Blue	S3	The variety *drummondii* is found in southwestern BC. Suitable habitat is found in moderately moist to dry meadows, and on ledges, rock outcrops and rocky slopes. It also inhabits gravelly slopes and scree slopes. It occurs in the subalpine and alpine zones.
cliff paintbrush	*Castilleja rupicola*	1-T	T	Blue	S3	Occurs in the Fraser Valley in BC in the Cascade Mountains. Associated with dry to mesic cliffs and rocky slopes, with an elevation range extending from the upper montane to alpine zones.
leafy mitrewort	*Mitellastra caulescens*	-	-	Blue	S3	Occurs in the Fraser Valley and Vancouver Island. Associated with wet to moist meadows and woodlands.
leafless wintergreen	*Pyrola aphylla*	-	-	Blue	S3	In BC, records are known from Vancouver Island and the southern interior. The range extends from southern Vancouver Island, south to Oregon and east to Idaho.
phantom orchid	*Cephalanthera austiniae*	1-T	E	Red	S2	The phantom orchid is endemic to the Pacific northwest of North America and is found from BC south to California and Idaho. In BC this species is known from the Saanich Peninsula on Vancouver Island, Saltspring Island, and the lower Fraser Valley. Suitable habitat occurs in moist forests in the lowland zone. It inhabits sites with a thick humus layer in mixed and coniferous forests mature and old-growth forests. It is found in shaded areas with sparse ground cover often on south or west facing slopes.
Non-vascular Plants						
Roell's brotherella	*Brotherella roellii*	1-E	E	Red	S1S2	This species is endemic to western North America where its range extends from southwestern BC south to western Washington. In BC, known from the Lower Mainland in the Vancouver area as far east as Chilliwack and in the Squamish area. Forms mats on rotten logs, stumps, and bases of trees in cool to moist mixed deciduous and conifer forest, usually at low elevations along valley margins. It may also be found along streams and in swampy floodplains.

Common Name	Scientific Name	SARA[8]	COSEWIC[9]	BC List[10]	Provincial Status[11]	Habitat and Range[12]
banded cord-moss	*Entosthodon fascicularis*	1-SC	SC	Blue	S2S3	The range in North America extends from BC, south to Oregon and Idaho. It occurs in coastal areas of BC primarily in the southwest of the province, but it is also known from the Kootenay region. Almost all Canadian populations occur in Garry oak ecosystems where it grows on bare soil or leaf litter. It inhabits open, semi-shaded areas with rock outcrops. Most sites occur in moist, seepage areas or vernal pools in seasonally wet areas. Banded cord-moss usually grows amongst other moss species and small vascular plants. Sites are usually fairly open.
silver hair moss	*Fabronia pusilla*	1-E	E	Red	SH	In BC, known to occur near Lower Arrow Lake in the Kootenay Valley and Sumas Mountain near Abbotsford. Suitable habitat occurs usually in Mediterranean-type climates, but the known sites in BC are known to have hot summers and cool to cold winters. It inhabits rocks and tree bark, generally found on semi-exposed.
poor pocket moss	*Fissidens pauperculus*	1-E	E	Red	S1	Poor pocket moss is endemic to western North America, where the range extends from California to southwestern Oregon with disjunct populations in Washington and southwestern BC. Suitable habitat occurs along streambanks on intermittently moist, silt-rich, steep, exposed soil. Sites are partially or heavily shaded and may be found in forest habitat dominated by Douglas-fir and western hemlock. Known occurrence in North Vancouver.
Lichens						
flaking tarpaper	*Collema flaccidum*	-	-	Red	S1S3	Rare over (mossy) rocks and trees in open coastal localities. In BC, known from SE Vancouver, Island, Abbotsford, Hope, and a disjunct population in Revelstoke.
quilted stippleback	*Dermatocarpon intestiniforme*	-	-	Blue	S2S3	Associated with base-rich rock, in open sites.
cryptic paw	*Nephroma occultum*	1-SC	T	Blue	S3	The range is restricted to BC, south to Oregon. Suitable habitat occurs in maritime and intermontane forests. It grows on the bark and wood of conifer trees. Almost all known locations are from old-growth forests.
midlife vinyl	*Scytinium californicum*	-	-	Blue	S2S3	Occurs on rocks in open, dry maritime and intermontane locations in the Coastal Douglas-fir biogeoclimatc zone.
peacock vinyl	*Scytinium polycarpum*	1-SC	SC	Yellow	S4	Limited information available for this species.

Table 2: Provincially Designated Ecosystems[13] Potentially Occurring within or Adjacent to the Project Area

Common Name	Scientific Name	BC List[14]	Provincial Status[15]
common spike-rush Herbaceous Vegetation	*Eleocharis palustris* Herbaceous Vegetation	Blue	S3
Sitka spruce / salmonberry Dry	*Picea sitchensis / Rubus spectabilis* Dry	Red	S1S2
black cottonwood - red alder / salmonberry	*Populus trichocarpa - Alnus rubra / Rubus spectabilis*	Blue	S3
black cottonwood / Sitka willow	*Populus trichocarpa / Salix sitchensis*	Blue	S2S3
Douglas-fir - western hemlock / salal Dry Maritime	*Pseudotsuga menziesii - Tsuga heterophylla / Gaultheria shallon* Dry Maritime	Red	S2
Douglas-fir / sword fern	*Pseudotsuga menziesii / Polystichum munitum*	Red	S2
Labrador-tea / western bog-laurel / peat-mosses	*Rhododendron groenlandicum / Kalmia microphylla / Sphagnum* spp.	Blue	S3
Sitka willow - Pacific willow / skunk cabbage	*Salix sitchensis - Salix lasiandra* var. *lasiandra / Lysichiton americanus*	Blue	S3
western redcedar - Sitka spruce / skunk cabbage	*Thuja plicata - Picea sitchensis / Lysichiton americanus*	Blue	S3?
western redcedar / slough sedge	*Thuja plicata / Carex obnupta*	Red	S2
western redcedar / black twinberry	*Thuja plicata / Lonicera involucrata*	Red	S1
western redcedar / sword fern - skunk cabbage	*Thuja plicata / Polystichum munitum - Lysichiton americanus*	Blue	S3?
western redcedar / sword fern Dry Maritime	*Thuja plicata / Polystichum munitum* Dry Maritime	Red	S2?
western redcedar / salmonberry	*Thuja plicata / Rubus spectabilis*	Red	S1S2

[13] **Search Criteria:** BC CDC Species and Ecosystem Explorer search completed on 22 November 2022. Search Type: Ecosystems (Restricted to Red, Blue, and Legally designated species) AND User Defined Polygon. Phylogenetic Ascending.

[14] **BC CDC List**: The provincial list to which the species or ecological community is assigned (BC CDC 2022). Possible values: Extinct, 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), Accidental, Unknown and No Status.

[15] **Provincial Conservation Status** = Provincial Ranks apply to a species' or ecological community's conservation status in BC. The number in parenthesis is the year the rank was last reviewed. The ranks have the following meaning: X = presumed extirpated, H = possibly extirpated, 1 = critically imperilled, 2 = imperilled, 3 = special concern, vulnerable to extirpation or extinction, 4 = apparently secure, 5 = demonstrably widespread, abundant, and secure, NA = not applicable, NR = unranked, U = unrankable. N= non-breeding; B= breeding, ? = inexact or uncertain (BC CDC 2022).

Common Name	Scientific Name	BC List[14]	Provincial Status[15]
western redcedar / three-leaved foamflower Dry Maritime	*Thuja plicata* / *Tiarella trifoliata* Dry Maritime	Blue	S2S3
western hemlock - western redcedar / deer fern	*Tsuga heterophylla - Thuja plicata / Struthiopteris spicant*	Red	S2
western hemlock / flat-moss	*Tsuga heterophylla / Buckiella undulata*	Blue	S3
common cattail Marsh	*Typha latifolia* Marsh	Blue	S3

REFERENCES

BC CDC (Conservation Data Centre). 2022. BC Species and Ecosystems Explorer. [accessed November 2022]. https://a100.gov.bc.ca/pub/eswp/

eBird. 2022. Species Maps. [accessed November 2022]. https://ebird.org/map

Government of BC. 2020. Grizzly Bear Conservation Ranking in BC. [accessed November 2022]. https://www.env.gov.bc.ca/soe/indicators/plants-and-animals/grizzly-bears.html

Government of BC. 2022. iMapBC 2.0. [accessed November 2022]. https://maps.gov.bc.ca/ess/hm/imap4m/.

Government of Canada. 2022. Species at risk public registry. [accessed November 2022]. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html

APPENDIX B

Photos

Photo 1: Eastern end of Project, looking west. 25 November 2022.

Photo 2: Western end of Project, looking east. 25 November 2022.

Photo 3: Stabilization of the slope failure area. 25 November 2022.

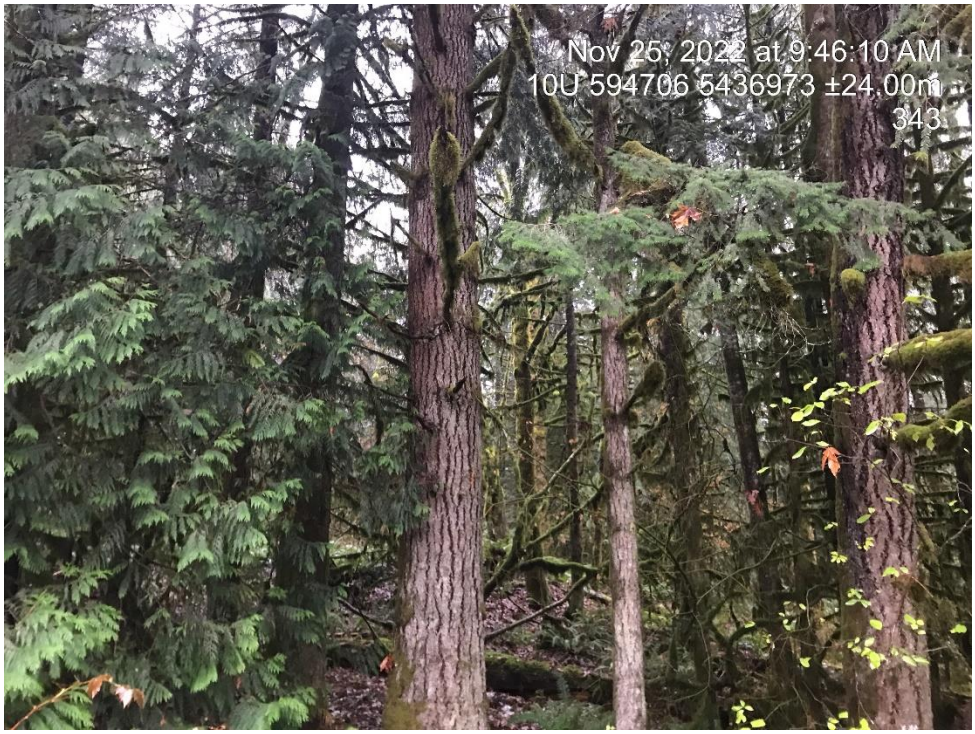

Photo 4: Representative photo of second-growth mixed forest on the south side of Chilliwack Lake Road. 25 November 2022.

Photo 5: Representative photo of second-growth mixed forest on the north side of Chilliwack Lake Road. 25 November 2022.

Photo 6: Bald eagle (*Haliaeetus leucocephalus*) nest located north of the Chilliwack River. 24 March 2022.

Photo 7: Pileated woodpecker (*Dryocopus pileatus*) foraging tree recorded in the Project area on the south side of Chilliwack Lake Road. 25 November 2022.

APPENDIX C

Previously used Seed Mixture

TERRASOL Seed Mixture

TEC2206 - Sandhill Erosion

Common Name

30%	Creeping Red Fescue
25%	Perennial Ryegrass
20%	Tall Fescue
8%	Climax Timothy
5%	Alfalfa
5%	Dwarf White Clover
5%	Birdsfoot Trefoil
2%	Red Top

Canada No. 1 Seed Blend
Seed Percent by weight

golder.com