

Chapter 32 - Assessment of Effects on Matters of Federal Jurisdiction

Crown Mountain Coking Coal Project
Application for an Environmental Assessment Certificate /
Environmental Impact Statement

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32. Assessment of Effects on Matters of Federal Jurisdiction

32.1 Introduction

Pursuant to Section 5 of the Canadian Environmental Assessment Act, 2012 (CEA Act, 2012), the Environmental Impact Statement (EIS) must consider the effects of the Project on components of the environment, including those that are directly linked or necessarily incidental to federal decisions that would allow the Project to proceed. Section 5 categories of environmental effects in the CEA Act, 2012 include (with reference to the specific section number of CEA Act, 2012 in [square brackets]):

- Changes to components of the environment within federal jurisdiction [Section 5(1)(a)];
- Changes to the environment that would occur on federal or transboundary lands [Section 5(1)(b)];
- Effects of changes to the environment on Aboriginal peoples [Section 5(1)(c)]; and
- Changes to the environment that are directly linked or necessarily incidental to federal decisions, and the effects of those changes on the human environment [Section 5(2)].

The intent of Chapter 32 is to summarize the potential effects to components of the environment that are subject to federal jurisdiction, as they relate to the assessment of Project Valued Components (VCs; Chapters 6 to 19, and Chapters 22 to 31) and to present the assessment of effects on changes to the environment that would occur on transboundary lands and changes to the environment that are directly linked or necessarily incidental to federal decisions. Collectively, these are referred to as “matters of federal jurisdiction”, for brevity. A summary of the matters of federal jurisdiction under CEA Act, 2012, and the potential changes to the environment and relevant Application for an Environmental Assessment Certificate/Environmental Impact Statement (Application/EIS) chapters is provided in Table 32.1-1.

Table 32.1-1: Summary of Federal Areas of Jurisdiction under the Canadian Environmental Assessment Act, 2012

Areas of Federal Jurisdiction [Related Section of CEA Act, 2012]	Potential Changes to the Environment	Relevant Application/ EIS Chapter
Changes to Components of the Environment within Federal Jurisdiction		
Fish and Fish Habitat [Section 5(1)(a)(i)]	<ul style="list-style-type: none"> • Changes in fish mortality • Changes in instream habitat loss due to mine design and development • Habitat loss due to changes in water quality • Changes in water quality • Change in fish and fish habitat due to blasting • Changes to streambed structure • Functional riparian disturbance 	Chapter 12
Species at Risk (Aquatic and Terrestrial)* [Section 5(1)(a)(ii)]	<p>Aquatic Species at Risk:</p> <ul style="list-style-type: none"> • Changes in fish mortality • Changes in instream habitat loss due to mine design and development • Habitat loss due to changes in water quality • Changes in water quality • Change in fish and fish habitat due to blasting • Changes to streambed structure • Functional riparian disturbance <p>Terrestrial Species at Risk:</p> <ul style="list-style-type: none"> • Vegetation species (whitebark pine): <ul style="list-style-type: none"> ○ Mortality and/or loss of habitat ○ Change in rates of germination, growth, and reproduction • Wildlife species: <ul style="list-style-type: none"> ○ Habitat loss and degradation ○ Sensory disturbance ○ Disruption to movement ○ Increased mortality risk 	<p>Chapter 12</p> <p>Chapter 14</p> <p>Chapter 15</p>
Migratory Birds [Section 5(1)(a)(iii)]	<ul style="list-style-type: none"> • Habitat loss and degradation • Sensory disturbance • Increased mortality risk • Waterbird health 	Chapter 15
Changes to the Environment on Transboundary Lands		
Transboundary Lands [Section 5(1)(b)(i), Section 5(1)(b)(ii), and Section 5(1)(b)(iii)]	<ul style="list-style-type: none"> • Changes to the environment that would occur on federal lands. • Changes to the environment that would occur in a province other than the one in which the act or thing is done or where the physical activity, the designated project or the project is being carried out (i.e., lands outside of B.C.). • Changes to the environment that would occur outside of Canada. 	Chapter 32

Areas of Federal Jurisdiction [Related Section of CEA Act, 2012]	Potential Changes to the Environment	Relevant Application/ EIS Chapter
Changes to the Environment on Indigenous Peoples (and Impacts on Aboriginal and Treaty Rights and Interests of Identified Indigenous Communities)		
Health and Socio-Economic Conditions [Section 5(1)(c)(i)]	<ul style="list-style-type: none"> • Change in the actual or perceived quality of fish resources for sustenance fishing/country foods. • Change in the actual or perceived quality of wildlife resources for hunting/country foods. • Change in the actual or perceived quality of terrestrial plants and medicine resources for sustenance/country foods. • Change due to the indirect disturbance, or health effects, to Indigenous land users because of changes in air quality or surface water quality. 	Chapters 23 to 31
Physical and Cultural Heritage [Section 5(1)(c)(ii)]	<ul style="list-style-type: none"> • Change in the value of place as a result of the permanent loss or changes to unknown pre-contact archaeological sites. • Potential for change of physical and cultural heritage and the ability to know and teach the cultural and social aspects as a result of the loss or changes to pre-contact archaeological sites. 	Chapters 23 to 31
Current Use of Lands and Resources for Traditional Purposes [Section 5(1)(c)(iii)]	<ul style="list-style-type: none"> • Change to current use of lands and resources for traditional purposes as it relates to fishing, hunting and trapping, harvesting and gathering, ceremonial/sacred areas, access and travel routes, and physical and cultural heritage. • Change in the value of place as a result of the change in accessibility to the use of lands and resources for fishing, hunting and trapping, harvesting and gathering, ceremonial/sacred areas, and physical and cultural heritage, and the loss of waterbodies. 	Chapters 23 to 31
Any Structure, Site, or Thing that is of Historical, Archaeological, Paleontological, or Architectural Significance [Section 5(1)(c)(iv)]	<ul style="list-style-type: none"> • Change in the value of place as a result of the permanent loss or changes to unknown pre-contact archaeological sites. • Potential for change of physical and cultural heritage and the ability to know and teach the cultural and social aspects as a result of the loss or changes to pre-contact archaeological sites. 	Chapters 23 to 31

Areas of Federal Jurisdiction [Related Section of CEA Act, 2012]	Potential Changes to the Environment	Relevant Application/ EIS Chapter
Changes to the Environment that are Directly Linked or Necessarily Incidental to Federal Decisions, and Effects of those Changes [Section 5(2)]		
Fisheries Act	<ul style="list-style-type: none"> • Changes in instream habitat loss due to mine design and development • Habitat loss due to changes in water quality • Functional riparian disturbance 	Chapter 32
Species at Risk Act	<ul style="list-style-type: none"> • Habitat loss and degradation • Sensory disturbance • Disruption to movement • Increased mortality risk 	
Migratory Birds Convention Act	<ul style="list-style-type: none"> • Habitat loss and degradation • Sensory disturbance • Increased mortality risk • Waterbird health 	
Canadian Navigable Waters Act	N/A	
Explosives Act	N/A	
Transportation of Dangerous Goods Act	N/A	
Nuclear Safety and Control Act	N/A	
Radiocommunications Act	N/A	

Note: * Although Section 5(1)(a) of CEA Act, 2012 requires that only aquatic species at risk must be assessed as part of an environmental assessment of a Designated Project, the Guidelines for the Preparation of an Environmental Impact Statement for the Crown Mountain Coking Coal Project (CEAA, 2015b) only refer to species at risk and do not specify aquatic species at risk. As such, Chapter 32 presents information on both aquatic and terrestrial species at risk.

For the purposes of the information presented in Chapter 32 as it relates to changes to components of the environment within federal jurisdiction, relevant definitions include:

- Fish as "... parts of fish, shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals, and the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals" (Fisheries Act, s. 2[1]);
- Fish habitat as "... water frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes, including spawning grounds and nursery, rearing, food supply and migration areas" (Fisheries Act, s. 2[1]);
- Species at risk as "...an extirpated, endangered or threatened species or a species of special concern" (Species at Risk Act, s. 2[1]); and
- Migratory bird as "... a migratory bird referred to in the Convention, and includes the sperm, eggs, embryos, tissue cultures and parts of the bird" (Migratory Birds Convention Act, s. 2[1]).

32.2 Changes to Components of the Environment within Federal Jurisdiction

Section 5(1)(a) of CEA Act, 2012 requires that a federal environmental assessment (EA) must evaluate changes to the environment in areas of federal jurisdiction including fish and fish habitat, aquatic species at risk, and migratory birds. Specifically, Section 5(1)(a) states:

“5 (1) For the purposes of this Act, the environmental effects that are to be taken into account in relation to an act or thing, a physical activity, a designated project or a project are (a) a change that may be caused to the following components of the environment that are within the legislative authority of Parliament: (i) fish and fish habitat as defined in subsection 2(1) of the Fisheries Act,(ii) aquatic species as defined in subsection 2(1) of the Species at Risk Act,(iii) migratory birds as defined in subsection 2(1) of the Migratory Birds Convention Act, 1994, and (iv) any other component of the environment that is set out in Schedule 2;...”

Section 32.2 provides a high-level summary of the effects assessments provided in the individual VC chapters for these environmental components within federal jurisdiction. The reader is referred to the following chapters for the effects assessments for these environmental components:

- Fish and Fish Habitat – Chapter 12;
- Species at Risk - Chapters 12, 14, and 15; and
- Migratory Birds - Chapter 15.

A summary of these chapters as they relate to matters of federal jurisdiction (i.e., fish and fish habitat, species at risk, and migratory birds) is provided in the subsections that follow.

32.2.1 Assessment Boundaries

The assessment boundaries used to evaluate the potential Project-related and cumulative changes to components of the environment within federal jurisdiction are the same as those spatial, temporal, administrative, and technical boundaries used in the assessment of relevant VCs in Chapters 12, 14, and 15 of this Application/EIS.

32.2.2 Thresholds for Determining Significance of Residual Effects

The thresholds for used determining the significance of residual Project-related and cumulative environmental effects arising from changes to components of the environment within federal jurisdiction are the same as those used in the assessment of the related VCs in Chapters 12, 14, and 15 of this Application/EIS.

32.2.3 Fish and Fish Habitat

Fish and fish habitat are key components of the aquatic environment and are protected under the federal Fisheries Act (1985, as amended in 2019). Section 2(1) of the Fisheries Act defines fish as the “parts of fish; shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals; and eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals”. Fish habitat is defined as “water frequented by fish and any other areas upon which fish depend directly or

indirectly to carry out their life processes, including spawning grounds and nursery, rearing, food supply and migration areas” (Fisheries Act s. 2[1]). The Fisheries Act prohibits the “harmful alteration, disruption or destruction of fish habitat” without an authorization, prohibits the release of deleterious substances into waters frequented by fish, and prohibits the death of fish by means other than fishing, among other requirements. In the Guidelines for the Preparation of an Environmental Impact Statement for the Crown Mountain Coking Coal Project (EIS Guidelines; CEAA, 2015b), consideration of impacts to fish and fish habitat refers specifically to Westslope Cutthroat Trout (WCT; *Oncorhynchus clarkii lewisi*), Bull Trout (*Salvelinus confluentus*), Burbot (*Lota lota*), and Mountain Whitefish (*Prosopium williamsoni*), as well as other potentially impacted aquatic species in the Elk River and Lake Koochanusa.

Six representative fish species were identified as receptor VCs for the Project in the provincial Application Information Requirements (AIR; British Columbia [B.C.] Environmental Assessment Office [EAO], 2018): Westslope Cutthroat Trout, Bull Trout, Kokanee (*Oncorhynchus nerka*), Burbot, Mountain Whitefish, and Longnose Sucker (*Catostomus catostomus*). Additionally, benthic invertebrate communities were identified as a receptor VC representative of the aquatic health discipline in the Project area.

Key watercourses in the Project footprint, Fish and Fish Habitat Local Study Area (LSA), and Aquatic Regional Study Area (RSA) include the Elk River, Michel Creek, Alexander Creek, West Alexander Creek, Harmer Creek, and Grave Creek. Waterbodies in the vicinity of the Project include Grave Lake, Harriet Lake, Mite Lake, and Barren Lake. The Elk River Valley is extensively used as a recreational fishery, particularly the section of the Elk River between Sparwood and Elkford. Lakes located within the vicinity of the Project are used for recreational fishing and some are stocked with sportfish, according to the Freshwater Fisheries Society of B.C. (2020). Given the high recreational fishing pressure in the area, the Elk River and its tributaries are designated as Classified Waters (British Columbia Ministry of Forests, Lands, Natural Resource Operations, and Rural Development [FLNRORD], 2019), including Alexander Creek which occurs east of the Project and within the coal licence areas. Classified Waters require a special angling license to fish the waters and were created to preserve the unique fishing opportunities provided by highly productive trout streams in B.C. (FLNRORD, 2019). Fishing is prohibited in Grave Creek and its tributaries (FLNRORD, 2019). Trout or qustit’ (including WCT) from the Elk River and tributaries are also important to the Ktunaxa Nation as they provide an important food source and hold cultural significance (Davidson et al., 2018)

The management of cumulative effects to aquatic ecosystems is an ongoing concern in the Elk Valley due to historic, current, and ongoing mining; timber harvesting; recreation; and municipal development pressures in the area (Davidson et al., 2018; Province of B.C., 2020). WCT and riparian habitat were selected as VCs for the Elk Valley Cumulative Effects Management Framework (EV-CEMF). Although many healthy WCT populations persist in the East Kootenay region, WCT faces severe reductions to distribution and abundance throughout its range due to over-harvest, habitat fragmentation and degradation, water quality impacts, hybridization and competition with non-native salmonids, and climate change impacts to streamflows and thermal regimes (Davidson et al., 2018). In addition, high-quality WCT habitat is primarily controlled by riparian areas, which have been extensively impacted by anthropogenic disturbance in the Elk Valley (Davidson et al., 2018). Although EV-CEMF focuses on WCT, many of these impacts can negatively impact fish species in the Elk Valley. Mitigation efforts and management responses to WCT and riparian habitat impacts in the Elk Valley are ongoing to ensure the long-term sustainability of aquatic ecosystems in the region.

32.2.3.1 Potential Environmental Effects

Project activities during the Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases have the potential to affect fish and fish habitat. In some cases, an effect could have a higher interaction with one VC than another based on distribution patterns. Westslope Cutthroat Trout and Bull Trout are the two species occurring most prevalently in West Alexander Creek and Alexander Creek, and are therefore most likely to interact with different Project activities. Mountain whitefish was recorded in the lower sections of Alexander Creek, upstream of the confluence with Michel Creek, in very low abundance.

In general, the Project has the potential to affect fish and fish habitat through:

- Fish mortality, by means other than fishing;
- Change in fishing pressure;
- Instream habitat loss due to mine design or infrastructure layout;
- Habitat loss due to changes in water quantity (both through surface water and groundwater losses), which could lead to reduced habitat availability and suitability for certain life stages of fish;
- Changes in water quality, which could reduce habitat suitability for fish and benthic invertebrates, as bioaccumulation of toxicological substances influences reproductive and physiological health and survival rates;
- Potential impacts arising from vibration caused by mine pit blasts;
- Changes in streambed structure (i.e., changes in sediment load and concretion due to calcite precipitation);
- Riparian disturbance through logging and clearing of vegetation have the potential to affect fish and fish habitat through removal of riparian vegetation and increased erosion and sediment deposition; and
- Road construction and maintenance could potentially affect fish and fish habitat through construction-related activities, increased dust and sedimentation of receiving waterbodies, and an increase in the recreational pressure on popular angling species such as Bull Trout and Westslope Cutthroat Trout in the Fish and Fish Habitat LSA. As shown in the EV-CEMF, an increase in road development is directly linked to increased recreational pressure on popular angling species.

32.2.3.1.1 Fish Mortality

As outlined in Section 34.4 of the Fisheries Act, proponents are responsible for planning and implementing works, undertakings, or activities in a manner that avoids harmful impacts, specifically the death of fish by means other than fishing. Any activity in or near a stream that could alter or impact the aquatic environment, or comes into contact with fish, could potentially lead to fish mortality.

During the Construction and Pre-Production phase, there is the potential for fish mortality to occur due to machinery operating near or in streams while excavating, transporting, or constructing infrastructure required for Project operations. Apart from machinery, increased total suspended sediments (TSS) concentrations caused by erosion, logging, excavating, increased dust and dispersion, construction runoff, soil movement, transportation, and relocation of materials has the potential to impact fish and fish habitat. Increased suspended particles and increased sediment deposition have the potential to clog fish

gills and affect growth rates (Kemp et al., 2011). During Operations, loading, hauling, and stockpiling of soil in or near a streambed could cause fish mortality by resulting in increased TSS concentrations or altering streambed structure. During Reclamation and Closure, increased TSS and use of machinery associated with reconstructive instream reclamation, if found necessary, may cause fish mortality; however, these works are anticipated to occur in streams where fish populations may be lower due to degraded habitat, which would lower the risk of fish deaths in the immediate area. No potential adverse effects to fish and fish habitat resulting in fish mortality are anticipated during Post-Closure, as all activities with the potential to result in fish mortality will be completed prior to mine closure.

32.2.3.1.2 Change in Fishing Pressure

Increased fishing pressure could arise due to greater accessibility to the Project area resulting from upgrades to the Line Creek Mine Road, Valley Road, Grave Creek Road, and Branch C Road. These roads will require upgrading and expansion from their current configurations during Construction and Pre-Production to handle both coal haulage and vehicles travelling to the site. Access roads entering the Project site will be secured with gates attended by security personnel to restrict unauthorized access. In collaboration with regulators and key stakeholders, NWP will establish No Unauthorized Entry (NUE) areas in order to ensure worker and public safety within and near the Project.

Development of the mine site will result in the removal of approximately 5.5 km of West Alexander Creek, which may be used for recreational angling activities. The extent to which West Alexander Creek is used for angling could not be confirmed; however, the lower reaches of the creek support both Westslope Cutthroat Trout and Bull Trout. While there is potential for angling use of West Alexander Creek, it is anticipated to be relatively minimal and to a lesser extent compared to the mainstems of Alexander Creek, Michel Creek, and the Elk River. During Operations, use of Alexander Creek for fishing will be permitted, except for those sections in close proximity to the pits during blasting activities.

Grave Creek Road and Branch C Road will remain as permanent access roads Post-Closure for future commercial and recreational use. However, given that the majority of West Alexander Creek will be removed due to the Project and that access to angling in Alexander Creek is already provided via the Alexander Creek Road from the south, no changes to fishing pressure due to increased site access are anticipated to occur following Reclamation and Closure. Changes to the use of the Elk River for fishing activities due to Project activities are considered to be negligible for the duration of the Project. Changes to fish populations due to increased fishing activities resulting from increased public access to West Alexander Creek, Alexander Creek, or the Elk River are therefore not anticipated.

While Indigenous fisheries and harvesting have not been identified in West Alexander Creek or Alexander Creek, Indigenous peoples could potentially exercise their Aboriginal and Treaty rights to fish within these systems in the future. Both Westslope Cutthroat Trout and Bull Trout are valued as traditionally important fish species by several Indigenous Communities. While the number of Indigenous peoples who may choose to fish within the Alexander Creek watershed in the future is unknown, it is not expected to pose a significant risk to local fish populations. Subsequently, there is limited evidence to suggest that there will be changes to fishing pressure in the vicinity of the Project due to future Indigenous fisheries.

32.2.3.1.3 Instream Habitat Loss Due to Mine Design and Development

As outlined in Section 35 of the Fisheries Act, proponents are responsible for planning and implementing works, undertakings, or activities in a manner that avoids the harmful alteration, disruption, or destruction (HADD) of fish habitat unless they obtain an authorization to do so from the Minister of Fisheries and Oceans Canada. Some Project activities will lead to unavoidable instream habitat loss due to the mine design and its development. During the Construction and Pre-Production phase, instream habitat loss is expected to be caused by construction of the Interim Sediment Pond in the upper reaches of West Alexander Creek. These reaches are not fish-bearing; however, this activity has the potential to remove resources (such as nutrients) from lower reaches. During the Operations phase, instream habitat loss is expected to be caused by:

- Construction of the Main Sediment Pond in Year 4 in West Alexander Creek;
- Loading, hauling, and stockpiling of soil in West Alexander Creek; and
- Loading, hauling and dumping of mine rock in West Alexander Creek.

No potential adverse effects to fish and fish habitat are anticipated during the Reclamation and Closure and Post-Closure phases, as all activities with the potential to result in direct habitat loss as a result of mine design and development will be completed by that time.

32.2.3.1.4 Habitat Loss Due to Changes in Water Quantity

Instream habitat loss due to changes in water quantity could lead to reduced habitat availability and suitability for certain life stages of fish. In general, a change in the amount of water could alter the wetted width, depth, natural hydrological regime, substrate carrying capacity, natural geomorphological processes and the concentration of substances released into the receiving environment from the Project. It could also lead to reduced accessibility and lower concentrations of dissolved oxygen and higher water temperatures during summer periods, and less suitable habitat previously used for overwintering purposes. A reduction in water quantity could also impact fish habitat connectivity. Following principles from the B.C. Instream Flow Guidelines for Fish (2004), an assessment on the potential effects of the Project to fish and fish habitat availability and suitability was completed, and instream flow thresholds developed to protect fish and fish habitat downstream of the Project.

The Construction and Pre-Production and Operations phases involve activities that will influence the hydrologic characteristics within portions of the Grave Creek and West Alexander Creek/Alexander Creek watersheds. These activities include the removal of trees, clearing and grubbing, site grading, and the construction of mine site facilities and transportation and drainage infrastructure, which will alter local topography and cause localized changes to surface water hydrology. In addition, the Interim Sediment Pond will be constructed for surface water quality purposes and to provide a source of process water, thereby sequestering water for use by the Project that could reduce downgradient streamflow. Outflows from the Interim Sediment Pond will discharge via a controlled outlet structure to West Alexander Creek, partially restoring streamflow that would otherwise result from sequestering water in the pond.

Surface water withdrawals from Grave Creek will occur on an ongoing basis during the Operations phase to provide a source of process water. Drainage and water management infrastructure will continue to be constructed and modified to collect, convey, and divert surface runoff within the mine area, along linear infrastructure, and around mine facilities. The Main Sediment Pond is scheduled to be constructed in Year 4, after which the Interim Sediment Pond will be decommissioned. During the remaining period of

the Operations phase, contact water from the North Pit will serve as the primary source of process water. Outflows from the Main Sediment Pond will discharge via a controlled outlet structure to West Alexander Creek, partially restoring streamflow that would otherwise result from sequestering water in the pond.

Following the end of operational mining activities, the drainage and water management infrastructure will be modified and decommissioned as part of the reclamation works in preparation for site closure during the Reclamation and Closure phase. Drainage pathways will be established to reflect the final layout and grading plan within the Project footprint. The Main Sediment Pond will continue to operate during this phase of the Project and will continue to outlet to West Alexander Creek. The primary change during the Post-Closure phase is the decommissioning of the Main Sediment Pond, during which water that would otherwise be sequestered in the pond will partially restore streamflow in downgradient watercourses.

32.2.3.1.5 Changes in Water Quality

Changes in water quality could pose substantial threats to fish and fish habitat, particularly fish health. Potential effects on surface water quality are assessed in Chapter 11. In general, changes to surface and groundwater quality have the potential to affect fish and fish habitat through the pathways presented through increased TSS and turbidity and increased metal concentrations. These two pathways could alter the chemical water quality and thereby reduce the habitat suitability for fish and benthic invertebrates, as the input of metals, organic, and inorganic substances could alter the health of fish and fish habitat VCs.

Increased TSS and Turbidity

Increased TSS can cause a range of effects from behavioural changes to mortality. Elevated levels of TSS can impact fish by physically damaging tissues and organs or by decreasing light penetration and visual clarity in the water. Invertebrate populations depend upon primary production, which could be adversely affected by elevated levels of sediment. Direct effects of sediment on aquatic invertebrates may include: physical habitat change due to the scouring of streambeds and the dislodgment of individuals, smothering and clogging of the interstices between substrate components which affects their microhabitat, and abrasion of respiratory surfaces and interference of food uptake for filter-feeders (British Columbia Ministry of Environment, Lands and Parks [BCMELP], 1998).

The Interim Sediment Pond will be built during the Construction and Pre-Production phase which, due to sedimentation, could affect the water quality. During Operations, discharge from the Interim and Main Sediment Ponds has the potential to contain elevated levels of TSS. Flows entering West Alexander Creek from the sediment ponds also have the potential to result in erosion of the natural creek bed, causing additional TSS loads downstream. The Main Sediment Pond will continue to operate during the Reclamation and Closure phase, and management of the discharge will continue Post-Closure until all water quality objectives have been met. The Main Sediment Pond will then be decommissioned to re-establish flows in West Alexander Creek. Decommissioning will require the removal of sediment from the dam structure, constructing additional spillways, and breaching the main dam. Decommissioning of the Main Sediment Pond has the potential to affect surface water quality in the receiving environment by increased levels of TSS and turbidity and may result in erosion to the natural creek bed, causing additional TSS loads downstream.

Increased Metal Concentrations

Toxicological substances, such as selenium, are known to bioaccumulate when levels increase above provincial benchmarks and local thresholds established for maintaining aquatic health. The B.C. water quality guideline (WQG) of 2 µg/L (microgram per litre) is considered protective of all aquatic life. Selenium exceedances could lead to reduced reproductive and physiological health and survival rate of fish and benthic invertebrate communities. Selenium concentrations in the tissue of prey organisms of fish and birds provides another compartment of the ecosystem to monitor selenium bioaccumulation. Excessive selenium can cause a wide variety of toxic effects at the biochemical, cellular, organ, and system levels. Bioaccumulation that exceeds the protective thresholds for aquatic life, and particularly fish, could lead to deformities and lesions and lower reproductive success in fish and fish habitat VCs.

No effects associated with the Construction and Pre-Production phase are anticipated to contribute to metal leaching into receiving waters. During Operations, all mine site drainage will be collected in the sediment ponds, either the Interim Sediment Pond during the first four years of Operations or the Main Sediment Pond beyond Year 4. Water in the sediment ponds will be monitored (as described in the Site Water Management Plan, Chapter 33, Section 33.4.1.8) to ensure it meets approved discharge limits and released into the West Alexander Creek drainage where it will flow to the confluence with Alexander Creek. Alexander Creek joins Michel Creek downstream near Highway 3, which subsequently discharges into the Elk River upstream of Sparwood. Water quality impacts downstream of the Project in the Fish and Fish Habitat LSA have the potential to affect Westslope Cutthroat Trout, Bull Trout, Mountain Whitefish, and benthic invertebrates, and water quality impacts in the Aquatic RSA (particularly downstream of Elko) have the potential to affect Burbot and Kokanee.

The Main Sediment Pond will continue to operate during the Reclamation and Closure phase, and management of the Main Sediment Pond discharge will continue Post-Closure until all water quality objectives have been met. The Main Sediment Pond will then be decommissioned to re-establish flows in West Alexander Creek.

32.2.3.2 Change in Fish and Fish Habitat Due to Blasting

The potential for effects to fish and fish habitat as a result of blasting may occur during two Project phases: Construction and Pre-Production, and Operations. The Department of Fisheries and Oceans Canada (DFO) has established guidelines for determining setback distances for blasting effects on fish due to pressure (acoustic) effects as well as peak velocity (Wright and Hopky, 1998). Blasting in or near water produces shock waves that can damage the swim bladders and rupture internal organs of fish, may kill or damage fish eggs or larvae, and can have effects on fish and fish habitat even when detonated from a considerable distance from the aquatic habitat (Wright, 1982; Wright and Hopky, 1998; DFO, 1995). An assessment of mine pit blast vibration was conducted (refer to Chapter 7) in order to predict worst-case scenario vibration levels at certain receptor points along the West Alexander Creek and Alexander Creek.

During Construction and Pre-Production, any explosive charges that may be required will be limited to 75 kilograms (kg), which results in setbacks of 43 metres (m; pressure) and 131 m (peak velocity). For Operations, recommended setback distances to achieve 100 kilopascals (kPa) and peak particle velocity (PPV) of 13 mm/s (millimetres per second) are presented in Chapter 12, Table 12.5-4 and Table 12.5-5 for fish habitat and spawning habitat, respectively.

Vibration impacts due to mine pit blasting are not anticipated to affect fish and fish habitat. At end pit extent and at the shortest distance from fish bearing aquatic habitat, the peak particle velocity was found to remain below the recommended guideline of 13 mm/s. No potential adverse effects to fish and fish habitat resulting from vibration caused by mine pit blasts are anticipated during Reclamation and Closure or Post-Closure, as all blasting activities will be completed prior to mine closure.

32.2.3.2.1 Changes in Streambed Structure

Physical changes in streambed structure have the potential to change the instream characteristics that fish need to spawn and for food resources such as benthic invertebrate communities to survive in. Drivers of these physical changes are often increased sediment deposition, changes in stream geomorphology, and calcite concretion of the substrate due to increased calcite loads. A summary of pathways through which the Project could potentially impact streambed structure is presented in the following subsections.

Increased Sediment and Dust

The direct effects of increased sediment and dust caused by the scouring and abrasive action of suspended particles, can damage gill tissues or reduce respiration by clogging gills, leading to decreased resistance to infection or disease, reduced growth, or mortality (Wood and Armitage, 1997). The indirect effects of increased TSS to fish and fish habitat is through decreased water clarity, which can alter movement or migration patterns, feeding success, and the availability of habitat quantity and quality. Both direct and indirect effects can cause decreased growth rates and changes in community structure and population sizes (Kemp et al., 2011).

The Project has the potential to affect fish and fish habitat during the Construction and Pre-Production phase through increased dust and consequently increased TSS as a result of transportation, land clearing, road construction and upgrading, excavations, and construction of water management infrastructure such as the Grave Creek Reservoir and Interim Sediment Pond. Dust deposition generated by these activities could lead to increased TSS concentrations in the receiving environment, which also has an effect on surface water quality. Dust, as it relates to water quality, is discussed in more depth in Chapter 6 and Chapter 11. Increased dust could also contribute to increased sediment in aquatic environments in the Fish and Fish Habitat LSA.

During Operations, where possible, non-contact water runoff will be directed away from the mine disturbed areas by means of small catchment sumps and drainage ditches, and routed to the natural catchments draining to watercourses; however, due to localized challenges such as geotechnical stability and avalanche risks, channel construction is not feasible in all areas of the site such as the upper western slopes of West Alexander Creek above the Mine Rock Storage Facility (MRSF). As a result, it is expected that water management structures will intercept both surface runoff from undisturbed areas, as well as from mine disturbed areas at these locations. During Operations, dust is expected to be generated by blasting, transportation, loading, hauling, and dumping of mine rock and coal, mine road construction, run of mine coal sizing, conveying clean coal, and progressive reclamation activities. Dust deposition generated by these activities could lead to increased TSS concentrations in the receiving environment.

During Reclamation and Closure, some localized erosion and sedimentation may occur from the decommissioning of mine site infrastructure and reclamation of remaining disturbed areas. During Reclamation and Closure, some dust is expected to be generated through the decommissioning of mine

site infrastructure and reclamation of remaining disturbed areas. During Post-Closure, the Main Sediment Pond will be decommissioned. No increase in dust during this phase is anticipated; however, there is a potential for an increase in TSS during decommissioning of the Main Sediment Pond.

Changes in Stream Geomorphology

The hydrologic regime of a watershed, which is characterized by runoff, influences the transport of sediment and stream channel evolution in-channel processes. A decrease in surface water quantity and changes to flood frequency and intensity will affect fluvial geomorphology and consequently stream condition below the Project footprint. Channel structure and pattern develop as a function of discharge timing and volume, which carries sediment and woody debris. These factors, combined with the physical channel character such as bank materials, confinement, gradient, and substrate, gather in the stream channel.

During Construction and Pre-Production, some erosion and sedimentation is expected from land clearing activities including logging, clearing, and grubbing, excavations, construction of the Interim Sediment Pond and Grave Creek Reservoir, road upgrading, and soil salvage. The use of heavy machinery within or adjacent to creeks and associated drainage channels may lead to localized erosion, resulting in additional sedimentation to watercourses. Two temporary sediment ponds will be constructed to capture construction runoff water during the construction of the run-of-mine (ROM) pad and facilities pad, and construction of smaller, local water management structures (i.e., ditches and sumps will commence prior to mining begins in the North Pit). Discharge from the temporary sediment ponds will join a drainage ditch adjacent to the lower haul road and discharge to the West Alexander Creek catchment. These activities could increase sediment input and affect stream bank stability in WAL1 and Alexander Creek downstream of the confluence.

During Operations, the Project has the potential to impact fish and fish habitat geomorphology during construction and operation of the sediment ponds, which will detain all coarse sediment and potentially increase inputs of fine sediment. The Main Sediment Pond will discharge via a controlled outlet structure (spillway) to West Alexander Creek, which could affect the channel geomorphology, potentially causing aggradation. Additionally, during site Operations, some localized erosion and sedimentation is expected from activities including mine road development, construction of the Main Sediment Pond, loading, hauling, and stockpiling of soil, removal of unconsolidated materials from the pits, and reclamation activities.

The Project has the potential to impact fish and fish habitat geomorphology during Reclamation and Closure with the sediment ponds detaining all coarse sediment and potentially increasing inputs of fine sediment. During Reclamation and Closure, some localized erosion and sedimentation may also occur from the decommissioning of mine site infrastructure and reclamation of remaining disturbed areas. During decommissioning of the Main Sediment Pond, coarse sediment and fine sediment input is likely to increase before eventually returning to pre-development conditions. During decommissioning of the Main Sediment Pond, the embankment will be lowered, which could potentially increase erosion due to increased flows and thereby increasing the sediment load carried downstream into Alexander Creek.

Calcite Precipitation and Concretion

Creeks downstream of conventional coal mining rocks dumps in the Elk Valley have been increasingly shown to have calcite (CaCO₃) concretions. These deposits are the result of contact waters emerging from the mine waste rock (MacGregor et al., 2012). Calcite precipitation poses serious threats to fish and fish habitat by removing habitat for benthic invertebrates, suffocating aquatic plants, and reducing adequate spawning habitat (Hocking et al., 2019). Calcite precipitation does not necessarily affect fish and fish habitat immediately or detrimentally, since calcite is a naturally occurring substance in the Elk River watershed; however, when calcite volumes are increased substantially and under certain contributing conditions, it concretes the interstitial spaces and sediment. Concreted streambeds offer lower spawning potential and lower the ecological functioning of an ecosystem by the removal of benthic invertebrate, and other lower trophic levels, within a stream. Water quality as it relates to calcite precipitation and concretion therefore has the potential to adversely impact fish and fish habitat downstream of the Project.

No effect from calcite precipitation and concretion is anticipated to occur during Construction and Pre-Production. During Operations, calcite is likely to leach from mine rock placed in the West Alexander Creek drainage that comes in contact with water. Calcite will continue to leach from contact water in the West Alexander Creek Mine Rock Storage Facility during Reclamation and Closure and Post-Closure. With the decommissioning of the Main Sediment Pond, calcite could pose a potential long-term threat to streambed structure downstream of the Project footprint.

32.2.3.2.2 Functional Riparian Disturbance

Riparian habitats are often biologically diverse and may provide numerous ecosystem services, including removal of excess nutrients and suspended sediments, input of nutrients to waterbodies, temperature regulation of waterbodies, and providing habitat to terrestrial and aquatic wildlife. In general, the Project has the potential to affect riparian habitat through reduction of ecosystem abundance and alteration of ecosystem composition and structure. Changes in riparian abundance and composition have the potential to affect fish and fish habitat through removal of riparian vegetation and increased erosion and sediment deposition, which could lead to decreased leaf litter, instream cover, and less large woody debris, which play an important role in maintaining channel morphology and lead to increased water temperature due to the removal of cover.

Merchantable timber will be logged from the infrastructure and Pre-Production development footprint, followed by clearing of the remaining vegetation from the infrastructure and pre-development footprint, potentially affecting the abundance of riparian habitats in the Construction and Pre-Production phase. Alteration of water quantity in downstream reaches of affected watersheds has the potential to reduce the area of riparian habitat, particularly where the magnitude of change in surface water quantity is high, such as riparian habitat within the lower reaches of the West Alexander Creek watershed. There is potential for the operation of vehicles and equipment to result in the introduction of new occurrences, or the spread of existing occurrences, of non-native and invasive species. Collectively, these sources of non-native and invasive species, environmental impairment and altered water flows, together with an inherent susceptibility to incursion of non-native and invasive species, have potential to result in alteration of the composition and structure of riparian habitats downstream and/or downwind of the Project footprint.

Potential effects to the abundance of riparian habitats are anticipated during the Operations phase, attributed to the construction and expansion of pits, the Mine Rock Storage Facility, and construction of the Main Sediment Pond. Potential effects to the composition and structure of riparian habitat are anticipated during the Operations phase for the same reasons as described for the Construction and Pre-Production phase.

Ecological restoration will be conducted during the Reclamation and Closure phase, during which abiotic conditions and early successional trajectories of vegetation communities will be established in accordance with the Ecological Restoration Plan (Chapter 33, Section 33.4.1.3). With successful implementation, the restoration of ecological conditions will partially reverse the loss of riparian habitats in the Project footprint. If re-vegetation is not completely successful, then erosion and sedimentation of, or deposition of dust to, riparian habitats located downstream or downwind of the Project footprint may continue to occur.

For the same reasons provided for the Construction and Pre-Production phase, the Reclamation and Closure and Post-Closure phases have the potential to result in change to the composition and structure of riparian habitat caused by erosion and sedimentation or deposition of dust. Potential effects on riparian abundance and distribution are not anticipated during Post-Closure beyond those that occurred in the Construction and Pre-Production and Operations phases.

32.2.3.3 Mitigation Measures

The key measures proposed to mitigate potential effects to fish and fish habitat are summarized in Table 32.2-1. This table also identifies the anticipated residual effects that were carried forward in the characterization of residual effects, significance, and likelihood and confidence. Where no residual effect was identified in this table, the effect was rated not significant with a high level of confidence and was not carried forward for further assessment.

Mitigation measures proposed to reduce adverse effects to fish and fish habitat are generally accepted, understood, and proven to effectively reduce adverse effects on fish and fish habitat. Where mitigation measures do not or may not mitigate all effects, or if there is an unknown or moderate level of confidence in their effectiveness, the effect was carried forward for further analysis of residual effects. Mitigation measures that are expected to completely mitigate potential effects with a high level of confidence based on their proven effectiveness elsewhere were classified as having no expected residual effects and were excluded from further assessment. If monitoring indicates that the effectiveness of mitigation measures and reclamation activities is lower than predicted, further mitigation may be required (refer to the Fish and Fish Habitat Management Plan [Chapter 33, Section 33.4.1.5] for more details).

No other technically and economically feasible mitigation measures were considered for fish and fish habitat, and NWP is not aware of potential future technology innovations that could help further mitigate effects.

Table 32.2-1: Summary of Proposed Mitigation Measures for Fish and Fish Habitat

Potential Effect	Potentially Affected VCs	Key Mitigation Measures	Effectiveness	Residual Effect?	Impacted VCs
Fish Mortality	<ul style="list-style-type: none"> • Westslope Cutthroat Trout • Bull Trout 	<ul style="list-style-type: none"> • Avoiding killing fish by means other than fishing. • Avoiding using explosives in or near water. • Planning in water works, undertakings, or activities to respective timing windows to protect fish. 	High	No	None
Change in Fishing Pressure	<ul style="list-style-type: none"> • Westslope Cutthroat Trout • Bull Trout 	<ul style="list-style-type: none"> • Develop NUE areas to prohibit public access to the Project footprint. • Secure access roads to restrict and enforce unauthorized access. • Implement the Access Management Plan. • Implement a no angling policy for NWP employees and contractors. • Coordination with local conservation enforcement for Alexander and West Alexander Creeks should increases in recreational fishing be observed by NWP employees. 	High	No	None
Instream Habitat Loss Due to Mine Design and Development	<ul style="list-style-type: none"> • Westslope Cutthroat Trout • Bull Trout • Benthic Invertebrates 	<ul style="list-style-type: none"> • Avoid conducting works, undertakings, or activities in water. • Avoid placing fill or other temporary or permanent structures below the high-water mark. • Avoid fording of the watercourse. • Avoid disturbing or removing materials from the banks, shoreline, or waterbody bed, such as; sand, rocks, aquatic vegetation, or natural wood debris. • Avoid building structures in watercourses or in areas that may result in erosion and/or scouring of the streambed or banks that are inherently unstable. • Minimize the impact by obtaining and authorization under the Fisheries Act for harmful alteration, disruption, or destruction (HADD) of fish habitat caused by habitat loss and developing an offsetting plan to compensate and replace for habitat loss caused by the Project. 	Low	Yes	<ul style="list-style-type: none"> • Westslope Cutthroat Trout • Bull Trout • Benthic Invertebrates

Potential Effect	Potentially Affected VCs	Key Mitigation Measures	Effectiveness	Residual Effect?	Impacted VCs
Habitat Loss Due to Changes in Water Quantity	<ul style="list-style-type: none"> • Westslope Cutthroat Trout • Bull Trout • Benthic Invertebrates 	<ul style="list-style-type: none"> • Segregation and diversion of non-contact surface runoff around mine disturbed areas and water control facilities. • Controlling outflows from water management facilities to maintain streamflow conditions in the receiving watercourses to the extent possible, particularly during low flow conditions. • Limiting surface water withdrawals to minimize impacts on streamflow. • Implementation of progressive contouring and reclamation of the Mine Rock Storage Facility to minimize changes in land use and hydrological characteristics. • Decommissioning and reclaiming water management facilities to restore natural streamflow conditions in the receiving watercourses to the extent possible. • Implement the Site Water Management Plan. • Maintain fish passage by avoiding changing flow or water level and obstructing or interfering with the movement and migration of fish. 	Moderate	Yes	<ul style="list-style-type: none"> • Westslope Cutthroat Trout • Bull Trout • Benthic Invertebrates
Changes in Water Quality	<ul style="list-style-type: none"> • Westslope Cutthroat Trout • Bull Trout • Kokanee • Burbot • Mountain Whitefish • Longnose Sucker • Benthic Invertebrates 	<ul style="list-style-type: none"> • Limit erosion and contain sediment through the application of standard industry practices. • Conduct regular inspections to ensure control measures are effective and functioning properly. • Divert clean runoff around mine disturbed areas, where possible. • Capture clean surface water that cannot be diverted in sediment ponds prior to release. • Limit the mine disturbance footprint through Project design and progressive reclamation. • During active mining, dewatering will be carried out using drainage ditches, berms, sumps and pumps. Pit dewatering will be coordinated to meet overall water quality objectives. 	Moderate	Yes	<ul style="list-style-type: none"> • Westslope Cutthroat Trout • Bull Trout • Benthic Invertebrates

Potential Effect	Potentially Affected VCs	Key Mitigation Measures	Effectiveness	Residual Effect?	Impacted VCs
Change in Fish and Fish Habitat Due to Blasting	<ul style="list-style-type: none"> • Westslope Cutthroat Trout • Bull Trout 	<ul style="list-style-type: none"> • Once backfilled and allowed to fill with groundwater inflows, selenium and nitrate are effectively reduced in mildly suboxic saturated rock fill. • Engineered layering of coal rejects and mine rock to limit metal leaching and acid-rock drainage (ML/ARD). • Saturated backfill of mine rock in the East and North Pits. • Progressive reclamation of the Mine Rock Storage Facility. • Installation of impermeable liners in the Interim and Main Sediment Ponds. • Diverting clean, non-contact water away from the sediment ponds; where possible. • Appropriate sizing of sediment ponds to minimize seepage losses and convey runoff during storm events. • Limit the mine disturbance footprint through Project design and progressive reclamation. • Groundwater and surface water monitoring. • Reduction of charge per delay by decking the blast holes. • Increasing the delay time between rows and holes to produce discrete explosions. • Use of bubble/air curtains to disrupt the shock waves. • Design of blasts and delay configurations to minimize vibration. 	High	No	None
Changes in Streambed Structure	<ul style="list-style-type: none"> • Westslope Cutthroat Trout • Bull Trout • Mountain Whitefish • Benthic Invertebrates 	<ul style="list-style-type: none"> • Limit erosion and contain sediment through the application of standard industry practices. • Conduct regular inspections to ensure control measures are effective and functioning properly. • Divert clean runoff around mine disturbed areas, where possible. • Capture clean surface water that cannot be diverted in sediment ponds prior to release. 	Moderate	Yes	<ul style="list-style-type: none"> • Westslope Cutthroat Trout • Bull Trout • Benthic Invertebrates

Potential Effect	Potentially Affected VCs	Key Mitigation Measures	Effectiveness	Residual Effect?	Impacted VCs
Functional Riparian Disturbance	<ul style="list-style-type: none"> • Westslope Cutthroat Trout • Bull Trout • Mountain Whitefish • Benthic Invertebrates 	<ul style="list-style-type: none"> • Limit the mine disturbance footprint through Project design and progressive reclamation. • Limit dust generation and emissions through the application of standard industry practices and emissions control measures. • Conduct regular inspections to ensure control measures are effective and functioning properly. • Limit the mine disturbance footprint through Project design and progressive reclamation. • Maintaining an undisturbed vegetated buffer zone between areas of on-land activity and the high-water mark of any waterbody. • Using existing trails, roads, or cut lines wherever possible. • Avoiding tree removal, where possible. • Using methods to prevent soil compaction, such as swamp mats or pads. • Carry out works, undertakings, and activities on land. • Project design optimization. • Implementation of Ecological Restoration Plan. • Minimizing disturbance and cleared areas. • Monitor reclaimed wetlands and wetland function. • Project design optimization. • Minimum design standards for water management infrastructure. • Energy dissipation devices. 	Moderate	Yes	<ul style="list-style-type: none"> • Westslope Cutthroat Trout • Bull Trout • Benthic Invertebrates

Instream habitat loss due to mine design and development is anticipated to potentially impact Westslope Cutthroat Trout, Bull Trout, and benthic invertebrates only. This is due to the habitat loss being limited to the West Alexander Creek valley, which the baseline fish and fish habitat assessment found to be exclusively used by Westslope Cutthroat Trout. Bull Trout occur throughout Alexander Creek, but not all of West Alexander Creek. Further studies could aim to better understand the Bull Trout movement in Fish and Fish Habitat LSA. Based on data collected during the baseline assessment and population study of 2020-2021, it was found that Westslope Cutthroat Trout and Bull Trout were the only fish species occurring in West Alexander Creek. No other fish and fish habitat VCs were therefore considered further for potential impacts due to instream habitat loss due to mine design, only benthic invertebrates, Bull Trout, and Westslope Cutthroat Trout were carried forward in the assessment.

Habitat loss due to changes in water quantity has the potential to impact Westslope Cutthroat Trout, Bull Trout, and benthic invertebrates. Due to the reductions in flow being limited to West Alexander Creek, fish and fish habitat VCs occurring in West Alexander Creek and those occurring immediately downstream are anticipated to be impacted. The reduction is anticipated to be effectively mitigated below ALE7. These three VCs were therefore carried forward in the assessment, while all VCs occurring outside this spatial area were not found to be impacted by the reduction of flows in West Alexander Creek due to the Project.

Changes in water quality have the potential to impact all fish and fish habitat VCs: Westslope Cutthroat Trout, Bull Trout, Kokanee, Burbot, Mountain Whitefish, Longnose Sucker, and benthic invertebrates. Due to water quality impacts having the potential to interact at a local (Fish and Fish Habitat LSA) level, but also cumulatively at a regional (Aquatic RSA) level, all VCs could be potentially impacted by Project induced changes to water quality. In particular, metals leaching into the receiving environment have the potential to result in the bioaccumulation of metal pollutants in the biological food web. Based on the surface water quality assessment (Chapter 11), water quality is not anticipated to exceed the Elk Valley Water Quality Plan (EVWQP) benchmarks downstream of the Project. EV MC2, which is situated just downstream of the Fish and Fish Habitat LSA, is a compliance point for which the water quality model found no exceedances are anticipated to occur (i.e., <19 µg/L selenium). This means that changes in water quality are anticipated to be adequately mitigated for fish and fish habitat downstream of the Fish and Fish Habitat LSA. Furthermore, the dilution of metals as far down as ALE1 and ALE2 showed metal levels below the EVWQP benchmarks. This means mountain whitefish would not be anticipated to be impacted by changes in water quality due to the Project. Therefore, the only VCs carried forward in the effects assessment were Westslope Cutthroat Trout, Bull Trout, and benthic invertebrates, focused on effects occurring within the Fish and Fish Habitat LSA.

Changes in streambed structure have the potential to impact Westslope Cutthroat Trout, Bull Trout, mountain whitefish, and benthic invertebrates. Geomorphological and TSS impacts are not anticipated to extend beyond the Fish and Fish Habitat LSA. As such, it is not anticipated that mountain whitefish, or other fish and fish habitat VCs occurring lower down in the Elk River watershed, will be affected by changes in streambed structure. The effects assessment therefore focusses on the effects occurring due to changes in streambed within the Fish and Fish Habitat LSA upstream of Highway 3. The VCs anticipated to potentially be impacted by changes in streambed structure are therefore Westslope Cutthroat Trout, Bull Trout, and benthic invertebrates, focused on effects occurring within the Fish and Fish Habitat LSA.

Functional riparian disturbance has the potential to impact Westslope Cutthroat Trout, Bull Trout, mountain whitefish, and benthic invertebrates. While riparian disturbances often occur at and interact

with the aquatic ecosystem at a landscape scale, functional riparian disturbance due to the Project is limited to the Fish and Fish Habitat LSA and therefore to fish and fish habitat VCs that occur in the Fish and Fish Habitat LSA. After avoidance and mitigation has been applied, the fish and fish habitat VCs anticipated to be affected by the Project are Westslope Cutthroat Trout, Bull Trout, and benthic invertebrates, focused on effects occurring within the Fish and Fish Habitat LSA.

32.2.3.4 Residual Effects

The Project has the potential to affect fish and fish habitat in the Fish and Fish Habitat LSA. The Project is anticipated to result in 31,928 square metres (m²) of instream habitat loss due to mine design in West Alexander Creek, 3,237 m² of habitat loss due to changes in water quantity below the Main Sediment Pond in West Alexander Creek, and an estimated 36.13 hectares (ha) of associated functional riparian habitat removal. The total instream habitat loss in West Alexander Creek is therefore estimated at 35,165 m² and accounts for all fish-bearing habitat in West Alexander Creek. Uncertainty exists whether offsetting would be appropriate in compensating for complete removal of a suspected resident population of Westslope Cutthroat Trout home range in West Alexander Creek. Limited offsetting opportunities exist in the Fish and Fish Habitat LSA specifically for WCT, with most of the available offsetting measures currently located in the Aquatic RSA; however, offsetting opportunities for other species are available in the Fish and Fish Habitat LSA. As a result, the residual effects of instream habitat loss due to mine design and development and habitat loss due to changes in water quantity were found to be significant, for Westslope Cutthroat Trout only; effects to other species such as Bull Trout and benthic invertebrates were found to be not significant. Further consultation with DFO and Indigenous stakeholders are required to assess the feasibility of an offsetting strategy.

Changes in water quality were found to be not significant for both pathways of effects to fish and fish habitat, i.e., increased TSS and increased metal concentrations. The water quality model predictions were found to have no significant effect to fish and fish habitat. The possibility for bioaccumulation exists but is found to be not significant as it relates to aquatic wildlife. A bioaccumulation model that focusses on using benchmarks specific to the protection of aquatic life is recommended for a more in-depth assessment of the potential impacts of metal concentrations on fish and fish habitat in the Fish and Fish Habitat LSA. Based on the results from the water quality model and the human health and ecological risk assessment, there is no significant threat to fish and fish habitat presented; however, it is with low confidence that this assessment applies these findings.

The potential of the Project to result in fish mortality was found to be not significant. This is due to the ability of the Project to mitigate all potential mortality pathways around aquatic habitats during all Project phases. The primary mitigation measure will be the salvage of fish from all directly impacted areas. In addition, a permanent fish barrier be designed and installed at the confluence of West Alexander Creek with Alexander Creek.

The effect of blasting on fish and fish habitat VCs was found to be not significant. All potentially effects will be fully mitigated by adjusting blasting timing and volume of explosives used. This ensures that all blasts throughout the Project will remain below the 13 mm/s threshold for the protection of fish and fish habitat.

Potential effects to changes in streambed structure were found to be not significant. Three pathways of effect were identified: calcite, increased sediment, and changes in geomorphology. Calcite is anticipated

to be fully mitigated through the addition of anti-scalants when and as needed throughout all Project phases. Sediment releases will be mitigated through the Main Sediment Pond at the downstream end of West Alexander Creek and is therefore not anticipated to substantially impact fish and fish habitat. The geomorphology assessment found that one reach of Alexander Creek (ALE7) has high sensitivity to changes in geomorphology due to the braided characteristic of this reach and the lack of confinement. The section of Alexander Creek below the confluence with West Alexander Creek is less resilient to changes in flow and sediment load and could become aggraded. While the effects of potential changes in geomorphology do not pose substantial risk to fish and fish habitat, continued monitoring will be required to ensure sediment and erosion plans are effective in mitigating the potential risk posed by the Project activities to geomorphology below the confluence.

Residual effects and the selected mitigation measures, characterization criteria, significance determination, and confidence are summarized in Table 32.2-2.

32.2.3.5 Cumulative Effects

A cumulative effects assessment was undertaken for the fish and fish habitat VCs because there is a possibility that potential Project residual effects may remain after the implementation of proposed mitigation measures. The potential residual effects identified include: instream habitat loss due to mine design and development; habitat loss due to changes in water quantity; changes in water quality; changes in streambed structure; and functional riparian disturbance. The cumulative effects assessment involved the identification of past, present, and reasonably foreseeable future projects or activities followed by an evaluation to characterize cumulative residual effects on fish and fish habitat in the Aquatic RSA under various temporal cases (Base Case, Project Case, and Future Case). The assessment of cumulative effects under the Project Case included all past and present projects/activities that have the potential to contribute to adverse cumulative effects on fish and fish habitat, while the Future Case considers the potential for substantial overlapping of Project effects with those of reasonably foreseeable future projects or activities.

No past, present, or reasonably foreseeable future projects or activities that may have an adverse effect on fish and fish habitat are expected to spatially or temporally overlap with the residual effects resulting from instream habitat loss due to mine design and development and changes in streambed structure, as these residual effects are limited to within the extent of the Project footprint. The habitat loss is anticipated to be compensated following DFO's strategy for offsetting instream habitat losses that result from HADD. The assumption is therefore that, under these regulatory habitat loss restrictions, no other project or activity in the Aquatic RSA would result in habitat loss due to HADD. Given that there is no anticipated spatial and temporal overlap between these residual effects and those of other past, present, and reasonably foreseeable future projects or activities, it follows that cumulative effects are not likely to occur. The cumulative effects assessment therefore focused only on the following residual effects of the Project: habitat loss due to changes in water quantity, changes in water quality, and functional riparian disturbance in the Aquatic RSA. In addition, the following effects of other projects and activities occurring or which may occur in the Aquatic RSA were evaluated as overlapping with the effects of the Project: riparian disturbance, as driven by landscape-scale disturbances associated with forestry harvesting; road development associated with the construction and operation of the Project and after the Project has been decommissioned; increased urban and recreational development in the Aquatic RSA; and increased natural disturbance due to fire and insect outbreaks.

Table 32.2-2: Summary of Residual Effects on Fish and Fish Habitat

Residual Effect	Impacted Fish and Fish Habitat VC	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Instream Habitat Loss Due to Mine Design and Development	<ul style="list-style-type: none"> Westslope Cutthroat Trout 	<ul style="list-style-type: none"> Construction and Pre-Production Operations 	<ul style="list-style-type: none"> Cannot be fully minimized or mitigated. Requires an offsetting/compensation plan to ensure no net loss occurs. Feasibility of offsetting remains uncertain and requires consultation with Indigenous stakeholders and DFO. 	Duration: Permanent Magnitude: High Geographic Extent: Discrete Frequency: Once Reversibility: Irreversible Context: Low to neutral	Significant, and Likely to Occur	High
	<ul style="list-style-type: none"> Bull Trout 	<ul style="list-style-type: none"> Construction and Pre-Production Operations 	<ul style="list-style-type: none"> Cannot be fully minimized or mitigated. Requires an offsetting/compensation plan to ensure no net loss occurs. The amount of habitat used by Bull Trout and the low density of Bull Trout present in these sections of West Alexander Creek would suggest that offsetting is feasible and would be able to fully offset the residual losses caused by the Project. 	Duration: Permanent Magnitude: Low Geographic Extent: Discrete Frequency: Once Reversibility: Irreversible Context: Low to neutral	Not Significant	High

Residual Effect	Impacted Fish and Fish Habitat VC	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
	<ul style="list-style-type: none"> Benthic Invertebrates 	<ul style="list-style-type: none"> Construction and Pre-Production Operations 	<ul style="list-style-type: none"> Cannot be fully minimized or mitigated. Requires an offsetting/compensation plan to ensure no net loss occurs. The amount of habitat lost in West Alexander Creek is potentially very high (fish bearing and non-fish bearing), and the functional contributions made by benthic invertebrates to the food web downstream of West Alexander would require further consideration during offsetting measure development and finalization.. Uncertainty remains on the amount of habitat required for offsetting and it relates to non-fish bearing reaches in the West Alexander Creek watershed, but the losses are anticipated to be fully offset through the development and finalization of an offsetting plan with Indigenous stakeholder and DFO consultation 	Duration: Permanent Magnitude: High Geographic Extent: Discrete Frequency: Once Reversibility: Irreversible Context: Low to neutral	Not Significant	High

Residual Effect	Impacted Fish and Fish Habitat VC	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Habitat Loss Due to Changes in Water Quantity	<ul style="list-style-type: none"> Westslope Cutthroat Trout 	<ul style="list-style-type: none"> Construction and Pre-Production Operations Reclamation and Closure Post-Closure 	<ul style="list-style-type: none"> Segregation and diversion of non-contact surface runoff around mine disturbed areas and water control facilities. Controlling outflows from water management facilities to maintain streamflow conditions in the receiving watercourses to the extent possible, particularly during low flow conditions. Limiting surface water withdrawals to minimize impacts on streamflow Implementation of progressive contouring and reclamation of dump site areas to minimize changes in land use and hydrological characteristics. Decommissioning and reclaiming water management facilities to restore natural streamflow conditions in the receiving watercourses to the extent possible. Implement the Site Water Management Plan. Maintain fish passage by avoiding changing flow or water level and obstructing or interfering with the movement and migration of fish. Cannot be fully minimized or mitigated. 	Duration: Permanent Magnitude: Moderate to High Geographic Extent: Local Frequency: Continuous Reversibility: Irreversible Context: Neutral	Significant, and Likely to Occur	Moderate

Residual Effect	Impacted Fish and Fish Habitat VC	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
			<ul style="list-style-type: none"> Requires an offsetting/compensation plan to ensure no net loss occurs. Feasibility of offsetting remains uncertain and requires consultation with Indigenous stakeholders and DFO. 			
	<ul style="list-style-type: none"> Bull Trout 	<ul style="list-style-type: none"> Construction and Pre-Production Operations Reclamation and Closure Post-Closure 	<ul style="list-style-type: none"> Segregation and diversion of non-contact surface runoff around mine disturbed areas and water control facilities. Controlling outflows from water management facilities to maintain streamflow conditions in the receiving watercourses to the extent possible, particularly during low flow conditions. Limiting surface water withdrawals to minimize impacts on streamflow. Implementation of progressive contouring and reclamation of dump site areas to minimize changes in land use and hydrological characteristics. Decommissioning and reclaiming water management facilities to restore natural streamflow conditions in the receiving watercourses to the extent possible. 	Duration: Permanent Magnitude: Moderate Geographic Extent: Local Frequency: Continuous Reversibility: Irreversible Context: Neutral	Not Significant	Moderate

Residual Effect	Impacted Fish and Fish Habitat VC	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
			<ul style="list-style-type: none"> Implement the Site Water Management Plan. Maintain fish passage by avoiding changing flow or water level and obstructing or interfering with the movement and migration of fish. Cannot be fully minimized or mitigated. Requires an offsetting/compensation plan to ensure no net loss occurs. The amount of habitat used by Bull Trout and the low density of Bull Trout present in these sections of West Alexander Creek suggests that offsetting is feasible and would be able to fully offset the residual losses caused by the Project. 			
	<ul style="list-style-type: none"> Benthic Invertebrates 	<ul style="list-style-type: none"> Construction and Pre-Production Operations Reclamation and Closure Post-Closure 	<ul style="list-style-type: none"> Segregation and diversion of non-contact surface runoff around mine disturbed areas and water control facilities. Controlling outflows from water management facilities to maintain streamflow conditions in the receiving watercourses to the extent possible, particularly during low flow conditions. 	Duration: Permanent Magnitude: Moderate to High Geographic Extent: Local Frequency: Continuous Reversibility: Irreversible Context: Neutral	Not Significant	Moderate

Residual Effect	Impacted Fish and Fish Habitat VC	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
			<ul style="list-style-type: none"> • Limiting surface water withdrawals to minimize impacts on streamflow. • Implementation of progressive contouring and reclamation of dump site areas to minimize changes in land use and hydrological characteristics. • Decommissioning and reclaiming water management facilities to restore natural streamflow conditions in the receiving watercourses to the extent possible. • Implement the Site Water Management Plan. • Maintain fish passage by avoiding changing flow or water level and obstructing or interfering with the movement and migration of fish. • Cannot be fully minimized or mitigated. • Requires an offsetting/compensation plan to ensure no net loss occurs. • The losses are anticipated to be fully offset through the development and finalization of an offsetting plan with Indigenous stakeholder and DFO consultation 			

Residual Effect	Impacted Fish and Fish Habitat VC	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Changes in Water Quality	<ul style="list-style-type: none"> • Westslope Cutthroat Trout • Bull Trout • Benthic Invertebrates 	<ul style="list-style-type: none"> • Construction and Pre-Production • Operations • Reclamation and Closure • Post-Closure 	<ul style="list-style-type: none"> • Diverting clean, non-contact water away from the sediment ponds; where possible. • Appropriate sizing of sediment ponds to minimize seepage losses and convey runoff during storm events. • Limiting the mine disturbance footprint through Project design and progressive reclamation. • Continued monitoring. • Working with other proponents, the provincial government, and the Ktunaxa Nation Council (KNC) to establish a regional monitoring program and long-term water quality targets for Michel Creek. • Collaborating with other proponents to ensure these targets are met through a combination of Project-specific and regional mitigation measures. 	<p>Duration: Long-term Magnitude: Low to High Geographic Extent: Local Frequency: Continuous Reversibility: Reversible to Irreversible Context: Neutral</p>	Not Significant	Low to Moderate
Changes in Streambed Structure	<ul style="list-style-type: none"> • Westslope Cutthroat Trout • Bull Trout • Benthic Invertebrates 	<ul style="list-style-type: none"> • Construction and Pre-Production • Operations • Reclamation and Closure • Post-Closure 	<ul style="list-style-type: none"> • Treating water prior to discharge as required to minimize calcite formation. • Working with other proponents, the provincial government, and the KNC to establish a regional monitoring program and long-term water quality targets for Michel Creek. 	<p>Duration: Long-term Magnitude: Moderate Geographic Extent: Local Frequency: Continuous Reversibility: Reversible to Irreversible Context: Neutral</p>	Not Significant	Moderate

Residual Effect	Impacted Fish and Fish Habitat VC	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
			<ul style="list-style-type: none"> Appropriate sizing of sediment ponds to minimize seepage losses and convey runoff during storm events. Continued monitoring. 			
Functional Riparian Disturbance	<ul style="list-style-type: none"> Westslope Cutthroat Trout 	<ul style="list-style-type: none"> Construction and Pre-Production Operations Reclamation and Closure Post-Closure 	<ul style="list-style-type: none"> Delay construction areas of mine components until ready to mine. Project design optimization. Minimum design standards for water management infrastructure. Energy dissipation devices. Requires an offsetting/compensation plan to ensure no net loss occurs. The amount of habitat loss in sections of West Alexander Creek is high; however, this loss could be fully offset for. 	Duration: Long-term to permanent Magnitude: Low to High Geographic Extent: Discrete to Regional Frequency: Once to Continuous Reversibility: Reversible Long-term to Irreversible Context: Low to neutral	Not Significant	Moderate
	<ul style="list-style-type: none"> Bull Trout Benthic Invertebrates 	<ul style="list-style-type: none"> Construction and Pre-Production Operations Reclamation and Closure Post-Closure 	<ul style="list-style-type: none"> Delay construction areas of mine components until ready to mine. Project design optimization. Minimum design standards for water management infrastructure. Energy dissipation devices. 	Duration: Long-term to permanent Magnitude: Low to High Geographic Extent: Discrete to Regional Frequency: Once to Continuous Reversibility: Reversible Long-term to Irreversible Context: Low to neutral	Not Significant	Moderate

Future disturbance was simulated under the following scenarios: 1) the direct effects of the proposed Project development at maximum build-out and Post-Closure, 2) Project maximum build-out with cumulative effects, and 3) Project maximum build-out with cumulative effects and natural disturbance. The Aquatic Hazard for Scenario 1 increases upon peak mining at 2038 and decreases with mine reclamation at 2055. Compared to an aging forest alone, Aquatic Hazard score would have been 0.58 without mining. Mining acts to increase the Hazard in the Aquatic Watersheds (AW) by 0.04 points. In Scenario 2, most AWs demonstrate increased Aquatic Hazard upon peak mining at 2038 and decreased hazard at 2055 after mine reclamation. Scenario 3 builds off Scenario 2 by adding fire and insect outbreak natural disturbances. Most AWs demonstrate increases in Aquatic Hazard at peak mining and either decreases or have unchanged hazard at 2055. While the Aquatic Hazard increases with the cumulative assessments developed in Scenario 2 and 3, these increases are moderate (upper moderate in Scenario 3 2038) and decrease in the Future Case models of these scenarios. The cumulative effects on fish and fish habitat, arising from the Project in conjunction with other projects and activities and natural disturbances are therefore found to be not significant.

The cumulative effects assessment focuses only on a change in surface water quality from the sediment pond discharge, which has the potential to spatially or temporally overlap with currently operating or proposed projects or activities in the Aquatic RSA. The water quality model that was prepared for the Aquatic RSA includes the cumulative interactions with effects from ongoing mining operations in the Elk Valley. The results of the model indicate that the predicted change in surface water quality for the Project Case is negligible to non-detectable when considering monthly median predicted concentrations during all Project phases at multiple nodes in the Aquatic RSA. Estimated mass contributions of the Project to Michel Creek are minimal and water quality in Michel Creek is expected to continue to meet Teck's permit limits in Michel Creek in lieu of a regional water quality target for this watercourse. Water quality is the main potential pathway for effects to species in the larger Elk River and Lake Koochanusa watershed. Since this assessment looked at sensitive species across the entire watershed that may be most likely impacted by the Project, it is not anticipated that the Project will have a negative impact on any other aquatic species present in the Elk River watershed.

Using the thresholds for ranking the level of hazard associated with the extent of loss of riparian habitat provided for by the EV-CEMF (Davidson et al., 2018), the reduction of riparian habitat associated with construction of the Project footprint would be classified as a low risk. The cumulative loss of riparian habitat within the Landscapes and Ecosystems LSA is permanent and potentially irreversible; however, following implementation of the recommended mitigation measures, including applicable ecological restoration measures, the magnitude of the residual effect is considered to be low. Consequently, the residual cumulative effect associated with the adverse change in abundance (or area) of riparian habitat is considered to be not significant.

The water balance and loading model that was prepared for the Aquatic RSA includes the cumulative interactions with effects from ongoing mining operations, forestry activities, and hydroelectric dams in the Elk Valley. The results of model indicate that the predicted change in surface water quantity for the Project case is negligible to non-detectable (i.e., less than 1% compared to baseline) when considering mean annual and mean monthly flows during all Project phases at multiple nodes in the Aquatic RSA. No measurable residual cumulative effects to fish and fish habitat from changes in surface water quantity are predicted beyond the Aquatic LSA boundary, within the remainder of the Aquatic RSA. The residual

cumulative effects of habitat loss due to changes in surface water quantity during all phases of the Project on fish and fish habitat were therefore rated not significant.

Residual cumulative effects and the selected mitigation measures, characterization criteria, significance determination, and confidence are summarized in Table 32.2-3. As indicated, there are no significant residual cumulative effects to fish and fish habitat anticipated as a result of the Project.

32.2.3.6 Summary for Fish and Fish Habitat

The potential effects of the Project on fish and fish habitat were considered to be:

- Fish mortality;
- Instream habitat loss due to mine design and development;
- Habitat loss due to changes in water quantity;
- Changes in water quality;
- Change in fish and fish habitat due to blasting;
- Changes in streambed structure; and
- Functional riparian disturbance.

Various mitigation measures will avoid or minimize potential effects to fish and fish habitat, though potential residual effects may remain. These residual effects were determined to be not significant, with the exception of the residual effects of instream habitat loss due to mine design and development and habitat loss due to changes in water quantity, which were both found to be significant for Westslope Cutthroat Trout only with a high likelihood to occur. The residual cumulative effects of habitat loss due to changes in water quantity, changes in water quality, functional riparian disturbance, and additional effects assessed under the EV-CEMF related to riparian disturbance at the landscape scale, road development, increased urban and recreational development, and increased natural disturbance due to fire and insect outbreaks arising from the Project in combination with other past, present, and reasonably foreseeable future projects and activities were considered not significant.

As required by CEA Act, 2012, a follow-up program must be defined to verify the effects predictions or the effectiveness of mitigation. This follow-up strategy focuses on the implementation of an Aquatic Effects Monitoring Program (AEMP), which will include surface water quality, sediment, benthic invertebrate, and fish tissue monitoring (in fish bearing watercourses). In addition to the AEMP, a monitoring program will be developed to assess fish communities and fish habitat. The aim of this program will be to assess if mitigation measures are effective and to provide an adaptive management framework to support early detection of effects and adequate response procedures for protecting fish and fish habitat.

32.2.4 Species at Risk

As noted in Section 32.1, the federal Species at Risk Act (SARA; 2002) defines species at risk as "...an extirpated, endangered or threatened species or a species of special concern" (SARA, s. 2[1]). The Project has the potential to impact aquatic and terrestrial species at risk and as such, Section 32.2.4 summarizes the potential project, residual, and cumulative effects that are predicted to occur. Although Section 5(1)(a) of CEA Act, 2012 requires that only aquatic species at risk must be assessed as part of an environmental assessment of a Designated Project, the Project EIS Guidelines (CEAA, 2015b) only refer to species at risk generally and do not specify aquatic species at risk; as such, information on both aquatic and terrestrial species at risk is presented.

Table 32.2-3: Summary of Cumulative Effects on Fish and Fish Habitat

Residual Cumulative Effect	Fish And Fish Habitat VCs	Project Phases	Mitigation Measures	Summary of Cumulative Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Increased Road Development	<ul style="list-style-type: none"> • Westslope Cutthroat Trout • Bull Trout • Kokanee • Burbot • Mountain Whitefish • Longnose Sucker 	<ul style="list-style-type: none"> • Construction and Pre-Production • Operations • Reclamation and Closure • Post-Closure 	<ul style="list-style-type: none"> • Constructing suitable watercourse crossings. • Maintenance of riparian habitat at crossings and adjacent to roadways to minimize sedimentation. • Lower road density and stream crossings where possible and as soon as possible once road becomes inactive. • The reduction in road density and stream crossings functionally reduces hazard by reducing angler access, sediment delivery, and stream fragmentation. • Remove existing hanging culverts, with thought given to possible negative effects. • Install effective stream crossing structures, such as bridges, where needed. • Improve engineering of roads/crossing structures in the future (i.e. for reduced sediment input, reduced fragmentation, etc.). • Maintain or rehabilitate roads to minimize sediment input. 	<p>Duration: Long-term Magnitude: Low to Moderate Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible long-term Context: Neutral</p>	Not Significant	Moderate

Residual Cumulative Effect	Fish And Fish Habitat VCs	Project Phases	Mitigation Measures	Summary of Cumulative Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
			<ul style="list-style-type: none"> Deactivate roads near streams where possible - this could include varied levels of deactivation from cross ditching to minimize hydrologic effects to complete road roll back in highly sensitive areas. 			
Increased Urban and Recreational Development in the RSA	<ul style="list-style-type: none"> Westslope Cutthroat Trout Bull Trout Kokanee Burbot Mountain Whitefish Longnose Sucker 	<ul style="list-style-type: none"> Construction and Pre-Production Operations Reclamation and Closure Post-Closure 	<ul style="list-style-type: none"> Development of green areas/no development zones. Establish buffer zones. Improve engineering of roads/crossing structures in the future (i.e. for reduced sediment input, reduced fragmentation, etc.). Appropriate management of angling recreational licensing and zoning to mitigate the increased pressure on popular angling species. Educational and awareness raising initiatives to protect and promote effective management and utilization of freshwater resources and fish habitat. 	Duration: Long-term Magnitude: Low to Moderate Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible long-term Context: Neutral	Not Significant	Moderate

Residual Cumulative Effect	Fish And Fish Habitat VCs	Project Phases	Mitigation Measures	Summary of Cumulative Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Increased Natural Disturbance Due to Fire and Insect Outbreaks	<ul style="list-style-type: none"> • Westslope Cutthroat Trout • Bull Trout • Kokanee • Burbot • Mountain Whitefish • Longnose Sucker 	<ul style="list-style-type: none"> • Construction and Pre-Production • Operations • Reclamation and Closure • Post-Closure 	<ul style="list-style-type: none"> • Planting post-fire. • Post-fire salvage harvest, where the goal is to not further disturb riparian areas or significantly affect runoff regimes. • Forests subjected to fire and pest disturbance are left to regenerate naturally. • Permitting for proposed development should acknowledge nearby pest outbreaks and the potential direction of infestation movement (particularly for spruce budworm). These areas could be targeted for harvest, if appropriate. • Carefully designed salvage harvest to help mitigate the spread of pests. 	Duration: Long-term Magnitude: Low to Moderate Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible long-term to Irreversible Context: Neutral	Not Significant	Moderate
Habitat Loss Due to Changes in Water Quantity	<ul style="list-style-type: none"> • Westslope Cutthroat Trout • Bull Trout • Kokanee • Burbot • Mountain Whitefish • Longnose Sucker 	<ul style="list-style-type: none"> • Construction and Pre-Production • Operations • Reclamation and Closure • Post-Closure 	<ul style="list-style-type: none"> • Site Water Management Plan. • Ongoing monitoring to maintain release volumes downstream supporting fish and fish habitat functionality. • Site reclamation. • Reclamation monitoring. 	Duration: Long-term Magnitude: Low Geographic Extent: Local Frequency: Continuous Reversibility: Irreversible Context: High	Not Significant	Moderate

Residual Cumulative Effect	Fish And Fish Habitat VCs	Project Phases	Mitigation Measures	Summary of Cumulative Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
	<ul style="list-style-type: none"> Benthic Invertebrates 					
Changes in Water Quality	<ul style="list-style-type: none"> Westslope Cutthroat Trout Bull Trout Kokanee Burbot Mountain Whitefish Longnose Sucker Benthic Invertebrates 	<ul style="list-style-type: none"> Construction and Pre-Production Operations Reclamation and Closure Post-Closure 	<ul style="list-style-type: none"> Diverting clean, non-contact water away from the sediment ponds; where possible. Appropriate sizing of sediment ponds to minimize seepage losses and convey runoff during storm events. Treating water prior to discharge as required to minimize calcite formation. Limiting the mine disturbance footprint through Project design and progressive reclamation. Continued monitoring. Working with other proponents, the provincial government, and the KNC to establish a regional monitoring program and long-term water quality targets for Michel Creek. Collaborating with other proponents to ensure these targets are met through a combination of Project-specific and regional mitigation measures. Teck is currently implementing the Elk Valley Water Quality Plan, which was developed to mitigate 	Duration: Long-term Magnitude: Low –to Moderate Geographic Extent: Regional Frequency: Continuous Reversibility: Irreversible Context: Neutral	Not Significant	Moderate

Residual Cumulative Effect	Fish And Fish Habitat VCs	Project Phases	Mitigation Measures	Summary of Cumulative Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Functional Riparian Disturbance	<ul style="list-style-type: none"> • Westslope Cutthroat Trout • Bull Trout • Kokanee • Burbot • Mountain Whitefish • Longnose Sucker 	<ul style="list-style-type: none"> • Construction and Pre-Production • Operations • Reclamation and Closure • Post-Closure 	<p>the effects of mining operations on chemical water quality in the Elk Valley.</p> <ul style="list-style-type: none"> • Delay construction areas of mine components until ready to mine. • Project design optimization. • Minimum design standards for water management infrastructure. • Energy dissipation devices. • A riparian planting program is available to help mitigate agricultural riparian disturbance, but it is unknown at this time to what extent the program is being implemented. 	<p>Duration: Long-term to Permanent Magnitude: Low Geographic Extent: Discrete to Regional Frequency: Once to Continuous Reversibility: Reversible long-term to Irreversible Context: Neutral</p>	Not Significant	Moderate

32.2.4.1 Aquatic Species at Risk

The proposed Project has the potential to result in adverse effects on Westslope Cutthroat Trout (WCT), which is an aquatic federally listed species at risk. Two designatable units (DUs) of WCT occur in Canada: the Saskatchewan-Nelson Rivers population in Alberta; and the Pacific population in B.C., both of which are federally listed under Schedule 1 of the SARA (2002). The Alberta population is listed as Threatened under Schedule 1 of SARA, whereas the Pacific population is listed as Special Concern. Because the Project is located on the west side of the Continental Divide, the Project is located in the native range of the Pacific population, which is federally listed as Special Concern.

Summary information on WCT is provided in Section 32.2.3. Details on the baseline conditions and in-depth Project effects assessment is provided in Chapter 12.

There are no listed aquatic invertebrate species known to be present in the vicinity of the Project.

32.2.4.1.1 Potential Environmental Effects

Potential effects on WCT are described in Chapter 12 and summarized in Section 32.2.3.1. The potential effects of the Project on WCT were considered to be:

- Fish mortality;
- Instream habitat loss due to mine design and development;
- Habitat loss due to changes in water quantity;
- Changes in water quality;
- Change in fish and fish habitat due to blasting;
- Changes in streambed structure; and
- Functional riparian disturbance.

Further discussion of these potential effects is provided in Section 32.2.1.1. The effects are not repeated here for brevity and to avoid duplication.

32.2.4.1.2 Mitigation Measures

Mitigation measures for WCT are described in Chapter 12 and summarized in Section 32.2.3.3 above; they are not repeated here for brevity and to avoid duplication. Proposed mitigation measures for fish mortality and change in fish and fish habitat due to blasting are anticipated to have a high degree of effectiveness; as such, these effects were not carried forward in the characterization of residual effects. Instream habitat loss due to mine design and development, habitat loss due to changes in water quantity, changes in water quality, changes in streambed structure, and functional riparian disturbance are not anticipated to be fully mitigated and were therefore carried forward into the characterization of residual effects within the Fish and Fish Habitat LSA.

32.2.4.1.3 Residual Effects

Residual effects on WCT are described in Chapter 12 and summarized in Section 32.2.3.4 above; they are not repeated here for brevity and to avoid duplication. The residual effects identified for WCT in the Fish and Fish Habitat LSA were all determined to be not significant, with the exception of the residual effects of instream habitat loss due to mine design and development and habitat loss due to

changes in water quantity, which were both found to be significant with respect to WCT only, with a high likelihood to occur, because there are limited to no opportunities to offset the loss of habitat for the resident population of WCT in West Alexander Creek in the Fish and Fish Habitat LSA. Should suitable offsetting measures be put in place to offset the residual effects to WCT, this effect could be considered not significant.

32.2.4.1.4 Cumulative Effects

Cumulative effects on WCT are described in Chapter 12 and summarized in Section 32.2.3.5 above; they are not repeated here for brevity and to avoid duplication. No past, present, or reasonably foreseeable future projects or activities that may have an adverse effect on WCT are expected to spatially or temporally overlap with the residual effects resulting from instream habitat loss due to mine design and development and changes in streambed structure, as these residual effects are limited to within the extent of the Project footprint. The habitat loss is anticipated to be compensated following DFO's strategy for offsetting instream habitat losses that result from HADD. The assumption is therefore that, under these regulatory habitat loss restrictions, no other project or activity in the Aquatic RSA would result in habitat loss due to HADD. Given that there is no anticipated spatial and temporal overlap between these residual effects and those of other past, present, and reasonably foreseeable future projects or activities, it follows that cumulative effects are not likely to occur.

The residual cumulative effects of habitat loss due to changes in water quantity, changes in water quality, functional riparian disturbance, and additional effects assessed under the EV-CEMF related to riparian disturbance at the landscape scale, road development, increased urban and recreational development, and increased natural disturbance due to fire and insect outbreaks arising from the Project in combination with other past, present, and reasonably foreseeable future projects and activities were considered not significant.

32.2.4.2 Terrestrial Species at Risk

The SARA protects terrestrial species listed as extirpated, endangered, or threatened from being killed, harmed, harassed, or captured; and the residences of these at-risk wildlife species on federal land and within federally designated critical habitat. The proposed Project has the potential to result in adverse effects on terrestrial federally listed species and their habitat including whitebark pine and listed carnivore, bat, bird, and amphibian species (Table 32.2-4). Only those species with confirmed presence or a high potential to be impacted by the proposed Project are included in the discussion of effects on terrestrial species at risk in Table 32.2-4; species at risk with the potential to occur in the Project footprint or the Local Study Areas used in the assessment but whose presence was not confirmed in these study areas are not included in Table 32.2-4 and are not discussed further.

Summary information on potentially impacted terrestrial species at risk is provided in Sections 32.2.4.2.1 to 32.2.4.2.5. Details on the baseline conditions, habitat suitability modelling, and in-depth Project effects assessments are provided in Chapters 14 (whitebark pine) and 15 (wildlife and wildlife habitat).

Table 32.2-4: Species at Risk Potentially Impacted as a Result of the Proposed Project

Common Name	Scientific Name	Species at Risk Act Status
Vegetation		
Whitebark Pine	<i>Pinus albicaulis</i>	Schedule 1, Endangered
Carnivores		
American Badger	<i>Taxidea taxus</i>	Schedule 1, Endangered
Grizzly Bear	<i>Ursus arctos</i>	Schedule 1, Special Concern
Wolverine	<i>Gulo gulo</i>	Schedule 1, Special Concern
Bats		
Little Brown Myotis	<i>Myotis lucifugus</i>	Schedule 1, Endangered
Fringed Myotis	<i>Myotis thysanodes</i>	Schedule 3, Special Concern
Northern Myotis	<i>Myotis septentrionalis</i>	Schedule 1, Endangered
Birds		
Barn Swallow	<i>Hirundo rustica</i>	Schedule 1, Threatened
Bobolink	<i>Dolichonyx oryzivorus</i>	Schedule 1, Threatened
Common Nighthawk	<i>Buteo swainsoni</i>	Schedule 1, Threatened
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	Schedule 1, Special Concern
Flammulated Owl	<i>Otus flammeolus</i>	Schedule 1, Special Concern
Lewis's Woodpecker	<i>Melanerpes lewis</i>	Schedule 1, Threatened
Long-billed Curlew	<i>Numenius americanus</i>	Schedule 1, Special Concern
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Schedule 1, Threatened
Peregrine Falcon	<i>Falco peregrinus</i>	Schedule 1, Special Concern
Peregrine Falcon subsp. anatum	<i>Falco peregrinus anatum</i>	Schedule 1, Special Concern
Short-eared Owl	<i>Asio otus</i>	Schedule 1, Special Concern
Western Grebe	<i>Aechmophorus occidentalis</i>	Schedule 1, Special Concern
Western Screech Owl subsp. macfarlanei	<i>Otus kennicottii macfarlanei</i>	Schedule 1, Threatened
Williamson's Sapsucker subsp. nataliae	<i>Sphyrapicus throideus nataliae</i>	Schedule 1, Endangered
Amphibians		
Western Toad	<i>Anaxyrus boreas</i>	Schedule 1, Special Concern

32.2.4.2.1 Vegetation Species at Risk (Whitebark Pine)

Whitebark pine occurrence within the Project footprint and the Landscapes and Ecosystems LSA was confirmed via observations Terrestrial Ecosystem Mapping (TEM) polygons, with additional TEM polygons predicted to have whitebark pine based on the available VRI data. As it relates to whitebark pine critical habitat, a total of 763 individuals were assessed, of which 73 met the size requirements for reproductively mature trees. Of the non-reproductively mature trees and seedlings, 476 (out of 690, or 69%) were considered to be healthy or non-terminally infected with white pine blister rust. There is potential for as

much as 332 ha of seed dispersal critical habitat, and 1,004 ha of recovery/regeneration critical habitat in the Landscapes and Ecosystems LSA. Additional information on existing conditions and the assessment of effects on whitebark pine is provided in Chapter 14.

Potential Environmental Effects

Mortality and/or Loss of Habitat

In the absence of mitigation, Project activities can affect whitebark pine through a direct overlap of the Project footprint with whitebark pine stands and habitat, or due to indirect effects from adjacent or nearby Project activities. Potential effects on the abundance of whitebark pine and its habitat are anticipated over the course of the Project through direct losses due to logging, clearing and grubbing of vegetation, as well as removal of soil and overburden, mostly located in areas associated with initial development of the pits, mine rock and coal reject disposal areas. Where there is overlap between the Project footprint and documented areas of whitebark pine, such site preparation activities, the Project has the potential to remove mature cone-bearing (i.e., reproductive) trees, saplings, seedlings, as well as seeds cached by Clark's Nutcracker, a species of bird that thrives on whitebark pine seeds, thereby threatening their survival. The progressive expansion of the pits, mine rock, and coal reject disposal areas during the Operations phase has potential to result in mortality of whitebark pine and a loss of habitat. Ecological restoration will be conducted during the Reclamation and Closure phase, during which abiotic conditions (e.g., surface contours, drainage pathways) and early successional trajectories of vegetation communities will be established in accordance with the Ecological Restoration Plan (Chapter 33, Section 33.4.1.3).

Change in Rates of Germination, Growth, and Reproduction

Deposited sediments or deleterious substances have potential to disrupt plant physiological processes (e.g., evapotranspiration, nutrient uptake), causing reduced reproductive and growth rates of existing vegetation that may result in a loss of whitebark pine individuals. Consequently, erosion and suspension of exposed soils, construction material (e.g., road fill), stockpiled coal and mine waste (e.g., mine rock), or release of deleterious substances due to leaks, spills or the transport, handling and/or use of hazardous materials (e.g., ammonium nitrate) have the potential to affect the reproduction and growth of existing occurrences of whitebark pine. Where vehicles and/or equipment arrive to the Project with soil and/or vegetation debris, or such vehicles and/or equipment must contact or be operated in the vicinity of existing occurrences, the Project may cause the introduction and/or spread of non-native and invasive species that may outcompete existing occurrences of whitebark pine.

Mitigation Measures

The key mitigation measures proposed to mitigate potential effects on whitebark pine summarized in Table 32.2-5. Where mitigation measures do not or may not mitigate all effects or if there is a low level of confidence in their effectiveness, the effect was carried forward for further analysis of residual effects. Mitigation measures that are expected to completely mitigate potential effects with a high level of confidence based on their proven effectiveness elsewhere were classified as having no expected residual effects.

No other technically and economically feasible mitigation measures were considered for whitebark pine, and NWP is not aware of potential future technology innovations that could help further mitigate effects.

Table 32.2-5: Summary of Proposed Mitigation Measures Related to Whitebark Pine

Potential Effect	Mitigation Measure(s)	Effectiveness	Residual Effect
Mortality and/or Loss of Habitat	<ul style="list-style-type: none"> • Project design optimization • Salvage top soils to retain seedbank • Implementation of Ecological Restoration Plan, including: <ul style="list-style-type: none"> ○ Complete inventory and mapping of whitebark pine distribution and critical habitat; ○ Replacement of critical habitat; ○ Collection of seeds and scion; and • Determination of compensation ratio; and • Operational monitoring of retained critical habitat 	Unknown	Yes
Change in Rates of Germination, Growth, and Reproduction	<u>Erosion, Deposition of Dust and Airborne Deleterious Substances</u> <ul style="list-style-type: none"> • Implement the Air Quality and Greenhouse Gas Management Plan, the Soil Management Plan, the Erosion and Sediment Control Plan, the Vegetation and Ecosystems Management and Monitoring Plan, and the Spill Prevention, Control and Countermeasures Plan • Minimize the extent of disturbance within and adjacent to whitebark pine and habitat • Inspect erosion and sediment control measures • Education and training • Low speed limits • Regular road maintenance • Minimize earthworks during windy periods • Progressive reclamation and revegetation • Dust suppression methods • Proper covers/shielding where required • Monitor and inspect dust control measures 	High	No
	<u>Non-native and Invasive Species</u> <ul style="list-style-type: none"> • Implementation of the Vegetation and Ecosystems Management and Monitoring Plan • Control, manage, and remove invasive plants on site • Establish buffers and “no-work” zones where current infestations exist • Restore with appropriate native vegetation • Education and training • Restrict traffic in known infested areas • Decontaminate vehicles and machinery 	High	No

Residual Effects

Whitebark pine was confirmed to be present within the Landscapes and Ecosystems LSA, occupying an estimated potential area of 1,375 ha (out of 12,886 ha in the Landscapes and Ecosystems LSA, or 11% of the total area of the LSA), of which the Project footprint overlaps with potentially as much as 591 ha, or 43% of the extent of such habitat in the Landscapes and Ecosystems LSA. Although the extent of the Project footprint is conservative in nature, buffered to account for uncertainty in the full extent of Project activities, it is not feasible to completely avoid overlap with occurrences of whitebark pine, particularly

for the mine pits, mine rock, and coal reject disposal areas (Figure 14.6-2). That stated, the total area of habitat does not reflect the variation in density of whitebark pine or the suitability of habitat because habitat areas are mapped as occupied/suitable, or not.

As was outlined in Section 14.6.5.3.2, the presented proportional effect of the Project on whitebark pine (measured by the proportional area of habitat/critical habitat affected) over-estimates the Project's potential effect, as it does not consider the existing rate of mortality due to white pine blister rust. Existing rates of mortality would see the population of whitebark pine decrease to approximately 20% from current/baseline conditions over the subsequent 34 years, regardless of whether the Project were to proceed or not. Consequently, although 43% of potential whitebark pine habitat in the Landscapes and Ecosystems LSA may be affected by the Project, the population would be subjected to a predicted net loss of only 20% due to Project activities, with the remainder due to naturally occurring disease or mortality.

The representation of loss of critical habitat due to overlap with the Project footprint may not completely reflect the potential effect of the Project. Seed dispersal and recovery/regeneration critical habitat types respectively accounted for 332 ha and 1,004 ha of the Landscapes and Ecosystems LSA, of which the Project footprint overlaps with 100% and 47% of the respective critical habitat areas. The assessment underestimates the total extent of recovery/regeneration critical habitat with potential to be affected by the Project due to the loss of the associated seed dispersal habitat; however, the extent may be overestimated because retained recovery/regeneration critical habitat areas would still be accessible to seed caching from other seed dispersal critical habitat areas within 2 kilometres (km). The same limitation may have a counteracting influence on the predicted loss of whitebark pine critical habitat, in which it both underestimates and overestimates the potential extent of loss of recovery/regeneration critical habitat. Existing rates of mortality would see the population of whitebark pine decrease to approximately 20% from current/baseline conditions over the subsequent 34 years, regardless of whether the Project were to proceed or not. Consequently, although 43% of potential whitebark pine habitat in the Landscapes and Ecosystems LSA may be affected by the Project, the population would be subjected to a predicted net loss of only 20% due to Project activities, with the remainder due to naturally occurring disease or mortality.

Residual effects on whitebark pine are summarized in Table 32.2-6. The residual effect of the Project on mortality and/or loss of habitat for whitebark pine is considered not significant. The Project's potential effect mortality and/or habitat loss for of up to 20% of the whitebark pine population (after white pine blister rust losses) is measurable and detectable, but not likely to reduce the basal area for whitebark pine in seed dispersal critical habitat below the threshold of 2 m²/ha. Although the duration of the residual effect will continue well beyond the Post-Closure phase of the Project (i.e., permanent), early research in restoration of whitebark pine has suggested there is potential for favourable restoration outcomes. The use of white pine blister rust resistant plants in restoration is anticipated to further improve the resilience of whitebark pine well beyond the closure of the Project. Regardless of the time required, the residual effect is not considered irreversible (i.e., it is rather reversible, long-term) and, therefore, is considered to be not significant. The level of confidence of the significance prediction on mortality of whitebark pine and/or loss of habitat is considered to be low, given uncertainty in the confirmed extent of whitebark pine in the Landscapes and Ecosystems LSA and Project footprint, the background loss of whitebark pine due to white pine blister rust (among other sources of mortality), and the success of whitebark pine restoration programs. Mitigation and follow up measures will improve the level of confidence in this prediction.

Table 32.2-6: Summary of Residual Effects on Whitebark Pine

Residual Effect	Project Phase(s)	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Mortality and/or Loss of Whitebark Pine Habitat	<ul style="list-style-type: none"> Construction and Pre-Production Operations Reclamation and Closure 	<ul style="list-style-type: none"> Project design optimization. Salvage topsoil to retain seedbank. Implementation of Ecological Restoration Plan, including: <ul style="list-style-type: none"> Complete inventory and mapping of whitebark pine distribution and critical habitat; Replacement of critical habitat; Collection of seeds and scion; and Determination of compensation ratio. Operational monitoring of retained critical habitat. 	Duration: Permanent Magnitude: Moderate Geographic Extent: Regional Frequency: Intermittent Reversibility: Reversible Long-Term Context: Low	Not Significant	Low

Cumulative Effects

Residual cumulative effects on whitebark pine are summarized in Table 32.2-7. It is unlikely that other reasonably foreseeable future projects or activities can completely avoid the direct loss of whitebark pine (and its critical habitat). The maximum potential extent of cumulative loss or change in composition and structure of whitebark pine critical habitat in the Landscapes and Ecosystems RSA due to the Project in combination with other reasonably foreseeable future projects or activities is estimated to be 32,984 ha or 14% of the area of potential critical habitat available in the Landscapes and Ecosystems RSA, not including the effects of climate change or white pine blister rust. Environment and Climate Change Canada (ECCC; 2017) identified that both climate change and white pine blister rust had potential to affect up to 100% of the national population, which may be assumed to apply to the Landscapes and Ecosystems RSA.

Although mitigation strategies will support building resilience in whitebark pine populations, it is unlikely that complete restoration will occur such that the extent of whitebark pine will be sustained from existing conditions. Consequently, the net effect of the Project and other reasonably foreseeable future projects or activities interacting cumulatively with natural disturbance and climate change will likely result in a loss or degradation of habitat and a reduction in density to below sustainable population densities. Given the slow generation cycle of whitebark pine (i.e., 60 years to reproductive maturity) and anticipated duration of the effects of climate change, the residual cumulative effect will be permanent and irreversible in the context of the assessment period. The Project contribution to these residual cumulative environmental

effects on whitebark pine is estimated at 802 ha, or less than 1% (i.e., 802 ha of 236,671 ha) of the total extent of potential whitebark pine critical habitat in the Landscapes and Ecosystems RSA. In this light, the Project contribution to the residual cumulative environmental effects of the Project in combination with those of past, present, and reasonably foreseeable future projects or activities on whitebark pine, during all phases of the Project, is considered not significant.

Table 32.2-7: Summary of Cumulative Effects on Whitebark Pine

Residual Cumulative Effect	Mitigation Measures	Summary of Cumulative Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Change in whitebark pine mortality and/or loss of whitebark pine habitat	<ul style="list-style-type: none"> • Project design optimization. • Salvage topsoil to retain seedbank. • Implementation of Ecological Restoration Plan, including: <ul style="list-style-type: none"> ○ Complete inventory and mapping of whitebark pine distribution and critical habitat; ○ Replacement of critical habitat; and ○ Collection of seeds and scion. • Determination of compensation ratio. • Operational monitoring of retained critical habitat. 	Duration: Permanent Magnitude: Moderate to High Geographic Extent: Beyond Regional Frequency: Continuous Reversibility: Reversible long-term to Irreversible Context: Low	Not Significant	Low

32.2.4.2.2 Carnivore Species at Risk

Grizzly Bear

Grizzly bears were broadly distributed in the Terrestrial LSA, occurring along Alexander, Grave, and Harmer Creek drainages and transboundary mountain passes. Grizzly bear were incidentally observed on the avalanche chutes below Gaff peak, and directly west of Crown Mountain, where there was also documentation of a den. Baseline surveys showed evidence of breeding females throughout the Terrestrial LSA. Grizzly bears preferred higher-elevation, steeper, and more rugged terrain during pre-berry and berry seasons, and the opposite during post-berry seasons. Denning sites were associated with broader landscapes that are relatively high and rugged, of moderately steep slope, slightly above treeline but not within barren rock. The habitat model indicates that the best winter (i.e., denning) habitats are located along the east side of Erickson Ridge.

In the South Rockies Grizzly Bear Population Unit, there are an estimated 239 grizzly bears, corresponding to a population density of approximately 2.9 individuals/100 square kilometre (km²) (Lamb et al., 2020).

Current population density estimates in southeast B.C. are considerably lower than during the 1980s, when grizzly bear population density was approximately 6.4 individuals/100 km² (McLellan, 1989). The grizzly bear population north of Highway 3 within the Elk, Bull, and White River valleys declined by 40% between 2006 and 2013, indicating a doubling of mortality rate between those years (Mowat and Lamb, 2016). A preliminary analysis of very recent data suggests there has been a very recent population increase in the Elk Valley since 2012 (Mowat et al., 2018).

Wolverine

Remote camera survey efforts resulted in a total of 19 unique detections/locations of wolverine in the Terrestrial LSA. No wolverine tracks were detected west of Erickson Ridge or lower Grave Lake area but were detected on transects (and incidentally observed) across the eastern portion of the Terrestrial LSA including the upper Grave Creek, Crown Mountain, Alexander Creek, Racehorse Pass, and Deadman Pass areas. One wolverine bed was encountered and based on unique pelage markings visible in remote cameras and genetic analysis, a minimum of one male and one female are present in the Terrestrial LSA. Wolverine showed strong selection for rugged terrain, mid to high elevations, closed-canopied, dense coniferous forest, and landscapes with relatively higher winter snowpack. The greatest determining factors of wolverine occurrence was a negative association with human influence areas. The wolverine habitat model indicates that the best wolverine habitats are located on Crown Mountain, in the Alexander Creek drainage, and within transboundary mountain passes (Deadman, Racehorse, and North Fork Passes) in the northeastern portion of the Terrestrial LSA.

American Badger

Detection/non-detection transect survey efforts resulted in a total of 73 unique detections/locations of American badger burrows in the Terrestrial LSA. Active or recently used American badger burrows were only documented in the northwest portion of the Terrestrial LSA, to the south and southeast of Grave Lake. No active or recently used burrows, or burrows indicative of maternal denning were found within the Project footprint. Based on known American badger social structure and home ranges it is reasonable to assume that the Terrestrial LSA provides habitat for a minimum of one female and one male American badger. Habitat modelling results indicate that the best American badger habitats are patchily distributed in low elevational grassland, brushland, and open forest habitats with deep friable soils. Habitat use by American badgers in the Terrestrial LSA was most strongly determined by Columbian ground squirrel occurrence, suitable parent material, grassland and brushland habitat and open canopy forest.

Additional information on existing conditions and the assessment of effects to the carnivore community is provided in Chapter 15, Section 15.5.

Potential Environmental Effects

Habitat Loss and Degradation

Habitat loss and degradation includes the complete loss or reduction in value of a particular set of resources that the specific habitat provides, such as forage, security, thermal, reproduction, or movement. Physical disturbances including ground disturbance and vegetation clearing can cause direct loss of ecosystems and the corresponding resources they provide. A loss of key resources required to fulfill life requisites can result in reduced body condition, survivorship, and reproductive success. Carnivores may respond to habitat alteration by reducing their use of areas, avoiding habitats for a period of time (i.e.,

displacement), or abandoning portions of their current range. The potential effects of habitat alteration may be particularly high when Project activities and components are within or adjacent to seasonally limiting habitats such as breeding areas.

Habitat degradation can occur from potential introduction and spread of invasive species, changes in vegetation vigour from dust deposition, and surface water runoff from the Project footprint that can contain suspended solids and affect vegetation. Each of these may affect the availability of food (plants and via habitat loss for prey species).

Sensory Disturbance

Sensory disturbance includes behavioural responses to Project-related noise, light, dust, and human presence. Sensory disturbances can lead to disruptions in animal behaviour, causing individuals to lose time and energy normally allocated to foraging, hunting, breeding, and avoiding predators. A loss of time towards fulfilling key life requisites can result in reduced body condition and reduced reproductive success. Carnivores may also respond to sensory disturbances by reducing their use of habitats near the source of disturbance, avoiding habitats for a period (i.e., displacement), or abandoning portions of their current range. Such behavioural responses result in a functional loss of habitat.

Disruption to Movement

Project components and activities have the potential to create physical and/or sensory barriers that prevent or impede movements between daily or seasonal habitats. Physical and sensory barriers lead to disruptions in animal behaviour, causing individuals to lose time and energy normally allocated towards accessing forage and prey, breeding, and avoiding predators. Grizzly bear and wolverine exhibit seasonal movement patterns that are largely driven by food availability. Disruption to carnivore movement patterns can result in reduced body condition, enhanced predation rates, and reduced gene flow between populations, which has implications for species population viability and long-term persistence. Disruption to movement may be particularly high when Project activities and components are within restricted terrain features including narrow valleys or canyons (e.g., Grave Creek Canyon).

Increased Mortality Risk

Mortality risk includes the potential effects of: 1) collisions with Project-related traffic during terrain disturbance and clearing of vegetation, 2) collisions with Project-related traffic on access or mine site roads and powerline, 3) entrapment during avalanche control, 4) collisions with rail, 5) operational mining activities including blasting, 6) ingestion of toxic products from materials stored on-site, and 7) entrapment during construction and operation of Project facilities such as Coal Preparation Plant (CHPP), holding and sediment ponds, or along access roads during winter due to high snowbanks.

Attractants includes the effect of any human activity or material (e.g., food odours, food waste, domestic garbage, grey water, and sewage) that may attract wildlife and could lead to behavioural changes or human-wildlife conflict. Chemical hazards (e.g., ingestion of toxic products) from materials stored on-site may reduce wildlife survival and reproduction.

Mitigation Measures

A summary of the key mitigation approaches and their effectiveness to mitigate potential effects is provided in Table 32.2-8. Where mitigation measures do not or may not mitigate all effects or if there is a low level of confidence in their effectiveness, the effect was carried forward for further analysis of residual effects. Mitigation measures that are expected to completely mitigate potential effects with a high level of confidence based on their proven effectiveness elsewhere were classified as having no expected residual effects.

No other technically and economically feasible mitigation measures were considered for at-risk carnivore species, and NWP is not aware of potential future technology innovations that could help further mitigate effects.

Table 32.2-8: Summary of Proposed Mitigation Measures Related to At-Risk Carnivore Species

VC	Potential Effect	Mitigation Measures	Effectiveness	Residual Effect
At-risk Carnivore Species	Habitat Loss and Degradation	<ul style="list-style-type: none"> Minimization through Project design. Delay clearing until needed. Erosion and sediment control. Air quality and dust management. Progressive reclamation. 	Moderate	Yes
At-risk Carnivore Species	Sensory Disturbance	<ul style="list-style-type: none"> Implement the Noise and Vibration Management Plan. Lighting management. Management of vehicle traffic and site access. 	High	Yes
At-risk Carnivore Species	Disruption to Movement	<ul style="list-style-type: none"> Sensory disturbance measures. Wildlife education. Limited new roads. Conveyor elevated to created underpasses. Progressive reclamation. Management of vehicle traffic and site access. Gaps in snowbanks. 	Moderate	Yes
Wolverine	Increased Mortality Risk	<ul style="list-style-type: none"> Wildlife education. Pre-disturbance den surveys. Management of vehicle traffic and site access. Prevent wildlife entrapment. Clear area before blasting and avalanche control. Minimize attractants. Manage chemical hazards. 	High	No

VC	Potential Effect	Mitigation Measures	Effectiveness	Residual Effect
Grizzly Bear and American Badger	Increased Mortality Risk	<ul style="list-style-type: none"> • Wildlife education. • Pre-disturbance den surveys. • Management of vehicle traffic and site access. • Prevent wildlife entrapment. • Clear area before blasting and avalanche control. • Minimize attractants. • Manage chemical hazards. 	High	Yes

Residual Effects

Residual effects on at-risk carnivore species are summarized in Table 32.2-9.

Grizzly Bear

Direct habitat loss as a result of the Project is of low magnitude and is partly reversible, though the quality of reclaimed areas to grizzly bear will be variable. The indirect habitat loss and degradation from potential impact to the avalanche chutes on the east side of Crown Mountain (if it occurs) may be much more important to grizzly bear, as avalanche chutes rank among the most important habitats for grizzly bear. Sensory disturbance will further degrade habitat in the West Alexander Creek valley. The West Alexander Creek valley will be partially blocked to grizzly bear movements (by the pits and Mine Rock Storage Facility before they are reclaimed); other portions of the Project footprint will represent a semi-permeable barrier.

Based on the characterization of the residual effects and recent trends in local grizzly bear population levels, the Project is unlikely to contribute to limiting the ability of grizzly bear to recover from past declines and maintain a stable population in the Terrestrial LSA. The combined residual effects of habitat loss and degradation, sensory disturbance, disruption to movement, and increased mortality risk on grizzly bear are therefore considered not significant. There is a good understanding of grizzly bear ecology, their habitat availability and distribution, known occurrences, and abundance in the Terrestrial LSA. There is, however, uncertainty in the grizzly bear population trend in the Elk Valley and the factors that may most contribute to grizzly bear population stability. Furthermore, the loss of additional avalanche chutes on the east site of Crown Mountain is uncertain. The confidence in the significance determination of residual effects to grizzly bear is therefore moderate.

Wolverine

In the southeast Kootenay region, wolverine density averages 0.2 wolverines/100 km² (Mowat et al., 2020a). Due to their low reproductive potential and large spatial requirements, wolverines are considered to have low resilience in the Elk Valley region (Apps et al., 2007). Population trends are not well understood. Direct habitat loss as a result of the Project is of moderate magnitude and is partly reversible, though the quality of reclaimed areas to wolverine may be low. Additional wolverine habitat in the West Alexander Creek valley will be degraded by noise and may be avoided by wolverine. Local wolverine movements will be affected by the presence of the Project footprint. There will be only a small amount of new road created as a result of the Project.

Table 32.2-9: Summary of Residual Effects on Carnivore VCs

Valued Component	Residual Effect	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Grizzly Bear	Habitat Loss and Degradation	<ul style="list-style-type: none"> Construction and Pre-Production Operations 	<ul style="list-style-type: none"> Minimizing disturbance and encroachment into natural vegetation. Clearing vegetation only in the year in which the area will be required for construction or operation. Sequencing the development of pits and Mine Rock Storage Facility areas to limit total disturbance during any one period and maximize progressive reclamation opportunities. Progressively reclaiming areas, as described in the Ecological Restoration Plan. Implementation of the Erosion and Sediment Control Plan. Implementation of the Air Quality and Greenhouse Gas Management Plan. Conduct den surveys in high potential habitat. If dens present avoid active dens during vegetation removal and clearing. 	<p>Duration: Long-term Magnitude: Low Geographic Extent: Discrete Frequency: Continuous Reversibility: Reversible long-term Context: Low</p>	Not Significant	Moderate
Grizzly Bear	Sensory Disturbance	<ul style="list-style-type: none"> Construction and Pre-Production Operations Reclamation and Closure 	<ul style="list-style-type: none"> Implement wildlife education program (as described in the Wildlife Management and Monitoring Plan). Implementation of the Noise and Vibration Management Plan. Directed/focused lighting will be used where possible. 	<p>Duration: Long-term Magnitude: Moderate Geographic Extent: Local Frequency: Continuous Reversibility: Reversible long-term Context: Low</p>		

Valued Component	Residual Effect	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
			<ul style="list-style-type: none"> Implementation of the Air Quality and Greenhouse Gas Management Plan. Deactivate roads wherever possible. 			
Grizzly Bear	Disruption to Movement	<ul style="list-style-type: none"> Construction and Pre-Production Operations Reclamation and Closure 	<ul style="list-style-type: none"> The overland conveyor will be elevated to 3 m at 500 m intervals (to be confirmed) to allow wildlife crossing. Management of vehicle traffic and access as described in Traffic Control Plan contributes to reducing barrier effect of roads. Progressively reclaiming areas, as described in the Ecological Restoration Plan. Minimize sensory disturbance (measure describe above). Create gaps in snowbanks to remove physical barriers. Wildlife education. Pre-disturbance den surveys. 	<p>Duration: Long-term Magnitude: Moderate Geographic Extent: Local Frequency: Continuous Reversibility: Reversible long-term Context: Low</p>		
Grizzly Bear	Increased Mortality Risk	<ul style="list-style-type: none"> Construction and Pre-Production Operations Reclamation and Closure 	<ul style="list-style-type: none"> Management of vehicle traffic and site access. Prevent wildlife entrapment. Clear area before blasting and avalanche control. Minimize attractants. Manage chemical hazards. 	<p>Duration: Long-term Magnitude: Low Geographic Extent: Discrete Frequency: Intermittent Reversibility: Reversible long-term Context: Low</p>		

Valued Component	Residual Effect	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Wolverine	Habitat Loss and Degradation	<ul style="list-style-type: none"> Construction and Pre-Production Operations 	<ul style="list-style-type: none"> Minimizing disturbance and encroachment into natural vegetation. Clearing vegetation only in the year in which the area will be required for construction or operation. Sequencing the development of pits and Mine Rock Storage Facility areas to limit total disturbance during any one period and maximize progressive reclamation opportunities. Progressively reclaiming areas, as described in the Ecological Restoration Plan. Implementation of the Erosion and Sediment Control Plan. Implementation of the Air Quality and Greenhouse Gas Management Plan. Conduct dens surveys in high potential habitat. If dens present avoid active dens during vegetation removal and clearing. Implement wildlife education program (as described in the Wildlife Management and Monitoring Plan). 	<p>Duration: Long-term Magnitude: Moderate Geographic Extent: Discrete Frequency: Continuous Reversibility: Reversible long-term Context: Low</p>	Not Significant	High
Wolverine	Sensory Disturbance	<ul style="list-style-type: none"> Construction and Pre-Production Operations Reclamation and Closure 	<ul style="list-style-type: none"> Implementation of the Noise and Vibration Management Plan. Directed/focused lighting will be used where possible. Implementation of the Air Quality and Greenhouse Gas Management Plan. Deactivate roads wherever possible. 	<p>Duration: Long-term Magnitude: Moderate Geographic Extent: Local Frequency: Continuous Reversibility: Reversible long-term Context: Low</p>		

Valued Component	Residual Effect	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Wolverine	Disruption to Movement	<ul style="list-style-type: none"> Construction and Pre-Production Operations Reclamation and Closure 	<ul style="list-style-type: none"> The overland conveyor will be elevated to 3 m at 500 m intervals to allow wildlife crossing. Management of vehicle traffic and access as described in Traffic Control Plan contributes to reducing barrier effect of roads. Progressively reclaiming areas, as described in the Ecological Restoration Plan. Minimize sensory disturbance (measure describe above). Create gaps in snowbanks to remove physical barriers. 	Duration: Long-term Magnitude: Low Geographic Extent: Local Frequency: Continuous Reversibility: Reversible long-term Context: Low		
American Badger	Habitat Loss and Degradation	<ul style="list-style-type: none"> Construction and Pre-Production Operations 	<ul style="list-style-type: none"> Minimizing disturbance and encroachment into natural vegetation. Clearing vegetation only in the year in which the area will be required for construction or operation. Sequencing the development of pits and Mine Rock Storage Facility areas to limit total disturbance during any one period and maximize progressive reclamation opportunities. Progressively reclaiming areas, as described in the Ecological Restoration Plan. Implementation of the Erosion and Sediment Control Plan. Implementation of the Air Quality and Greenhouse Gas Management Plan. 	Duration: Long-term Magnitude: Low Geographic Extent: Discrete Frequency: Continuous Reversibility: Reversible long-term Context: Moderate	Not Significant	High

Valued Component	Residual Effect	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
			<ul style="list-style-type: none"> Conduct dens surveys in high potential habitat. If dens present avoid active dens during vegetation removal and clearing. 			
American Badger	Sensory Disturbance	<ul style="list-style-type: none"> Construction and Pre-Production Operations Reclamation and Closure 	<ul style="list-style-type: none"> Implement wildlife education program (as described in the Wildlife Management and Monitoring Plan). Implementation of the Noise and Vibration Management Plan. Directed/focused lighting will be used where possible. Implementation of the Air Quality and Greenhouse Gas Management Plan. Deactivate roads wherever possible. 	Duration: Long-term Magnitude: Low Geographic Extent: Local Frequency: Continuous Reversibility: Reversible long-term Context: High		
American Badger	Disruption to Movement	<ul style="list-style-type: none"> Construction and Pre-Production Operations Reclamation and Closure 	<ul style="list-style-type: none"> The overland conveyor will be elevated to 3 m at 500 m intervals (to be confirmed) to allow wildlife crossing. Management of vehicle traffic and access as described in Traffic Control Plan contributes to reducing barrier effect of roads. Progressively reclaiming areas, as described in the Ecological Restoration Plan. Minimize sensory disturbance (measure describe above). Create gaps in snowbanks to remove physical barriers. 	Duration: Long-term Magnitude: Low Geographic Extent: Local Frequency: Continuous Reversibility: Reversible long-term Context: Moderate		

Valued Component	Residual Effect	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
American Badger	Increased Mortality Risk	<ul style="list-style-type: none"> Construction and Pre-Production Operations Reclamation and Closure 	<ul style="list-style-type: none"> Wildlife education. Pre-disturbance den surveys. Management of vehicle traffic and site access. Prevent wildlife entrapment. Clear area before blasting and avalanche control. Minimize attractants. Manage chemical hazards. 	Duration: Long-term Magnitude: Low Geographic Extent: Discrete Frequency: Intermittent Reversibility: Reversible long-term Context: Low	Not significant	High

Based on the characterization of the residual effects, despite their low population densities, the Project would not limit the ability of wolverine to persist and maintain self-sustaining populations in the Terrestrial LSA. The residual effects of habitat loss and degradation, sensory disturbance, and disruption to movement on wolverine are therefore considered not significant. There is a moderate understanding of wolverine ecology, their habitat availability and distribution, and known occurrences and abundance in the Terrestrial LSA. Little is known about wolverine population trends in the Elk Valley and the factors that may most contribute to wolverine population stability; however, the confidence in the significance determination of residual effects to wolverine is high.

American Badger

There are an estimated 250 to 405 mature American badgers of the sub-species *Taxidea taxus jeffersonii*, which occur in south-central (Jeffersonii West) and southeastern B.C. (Jeffersonii East; B.C. Badger Recovery Team, 2016; Committee on the Status of Endangered Wildlife in Canada [COSEWIC], 2012b). Although there is limited historical population data in B.C. for American badgers, historical trapping records between 1919 and 1977 infer a likely long-term decline (Jeffersonii Badger Recovery Team 2008). In addition, there have been lower reported female and juvenile captures in certain regions, as well as less anecdotal American badger sightings in B.C. over the last two decades (Jeffersonii Badger Recovery Team, 2008). The East Kootenay American badger population (jeffersonii East) is comprised of an estimated 100 to 160 mature individuals (B.C. Badger Recovery Team, 2016; COSEWIC, 2012b). The Jeffersonii East population are likely overall stable with declines in certain areas (COSEWIC, 2012b).

There were no active or recently used burrows, or burrows indicative of maternal denning found within the Project footprint. American badgers are tolerant of human disturbance and noise and movements are not expected to be disrupted beyond existing levels. The residual effects of habitat loss and degradation, sensory disturbance, disruption to movement, and increased mortality risk on American badger are therefore considered not significant. There is a good understanding of American badger ecology, their habitat availability and distribution, known occurrences, and abundance in the Terrestrial LSA. The confidence in the significance determination of residual effects to American badger is high.

Cumulative Effects

Residual cumulative effects on at-risk carnivore species are summarized in Table 32.2-10.

Grizzly Bear

In the South Rockies Grizzly Bear Population Unit, there are an estimated 239 grizzly bears (Lamb et al., 2020). A preliminary analysis of recent data suggests there has been a very recent population increase in the Elk Valley since 2012 (Mowat et al., 2018). Based on the characterization of the residual cumulative effects and regional grizzly bear population levels, the Project in combination with reasonably foreseeable future projects and activities would not limit the ability of grizzly bear to persist and maintain self-sustaining populations in the Grizzly Bear RSA. The residual cumulative effects of habitat loss and degradation, sensory disturbance, disruption to movement, and increased mortality risk on grizzly bear arising from the Project in combination with other past, present, and reasonably foreseeable future projects and activities during all phases are therefore considered not significant. There is a good understanding of grizzly bear ecology, their habitat availability and distribution, known occurrences, and abundance in the Grizzly Bear RSA. There is, however, uncertainty in the grizzly bear population trend in the Elk Valley and the factors that may most contribute to grizzly bear population.

Table 32.2-10: Summary of Cumulative Effects on Carnivore VCs

Valued Component	Residual Cumulative Effect	Mitigation Measures	Summary of Cumulative Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Grizzly Bear	Habitat Loss and Degradation	<ul style="list-style-type: none"> Minimizing local Project-related effects. Participate in regional initiatives, where relevant and appropriate, and adoption of new management practices and measures to meet regional planning objectives, where possible. 	Duration: Long-term and permanent Magnitude: Low Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible long-term Context: Low	Not Significant	Moderate
Grizzly Bear	Sensory Disturbance	<ul style="list-style-type: none"> Minimizing local Project-related effects. Participate in regional initiatives, where relevant and appropriate, and adoption of new management practices and measures to meet regional planning objectives, where possible. 	Duration: Long-term Magnitude: Low Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible long-term Context: Low		
Grizzly Bear	Disruption to Movement	<ul style="list-style-type: none"> Minimizing local Project-related effects. Participate in regional initiatives, where relevant and appropriate, and adoption of new management practices and measures to meet regional planning objectives, where possible. 	Duration: Long-term Magnitude: Low Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible long-term Context: Low		
Grizzly Bear	Increased Mortality Risk	<ul style="list-style-type: none"> Minimizing local Project-related effects. Participate in regional initiatives, where relevant and appropriate, and adoption of new management practices and measures to meet regional planning objectives, where possible. 	Duration: Long-term Magnitude: Negligible Geographic Extent: Regional Frequency: Intermittent Reversibility: Reversible long-term Context: Low		

Valued Component	Residual Cumulative Effect	Mitigation Measures	Summary of Cumulative Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Wolverine	Habitat Loss and Degradation	<ul style="list-style-type: none"> Minimizing local Project-related effects. Participate in regional initiatives, where relevant and appropriate, and adoption of new management practices and measures to meet regional planning objectives, where possible. 	Duration: Long-term and permanent Magnitude: Low Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible long-term Context: Low	Not Significant	Moderate
Wolverine	Sensory Disturbance	<ul style="list-style-type: none"> Minimizing local Project-related effects. Participate in regional initiatives, where relevant and appropriate, and adoption of new management practices and measures to meet regional planning objectives, where possible. 	Duration: Long-term Magnitude: Low Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible long-term Context: Low		
Wolverine	Disruption to Movement	<ul style="list-style-type: none"> Minimizing local Project-related effects. Participate in regional initiatives, where relevant and appropriate, and adoption of new management practices and measures to meet regional planning objectives, where possible. 	Duration: Long-term Magnitude: Low Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible long-term Context: Low		
American Badger	Habitat Loss and Degradation	<ul style="list-style-type: none"> Minimizing local Project-related effects. Participate in regional initiatives, where relevant and appropriate, and adoption of new management practices and measures to meet regional planning objectives, where possible. 	Duration: Long-term Magnitude: Moderate Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible long-term Context: Moderate	Not Significant	High

Valued Component	Residual Cumulative Effect	Mitigation Measures	Summary of Cumulative Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
American Badger	Sensory Disturbance	<ul style="list-style-type: none"> Minimizing local Project-related effects. Participate in regional initiatives, where relevant and appropriate, and adoption of new management practices and measures to meet regional planning objectives, where possible. 	Duration: Long-term Magnitude: Moderate Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible long-term Context: High		
American Badger	Disruption to Movement	<ul style="list-style-type: none"> Minimizing local Project-related effects. Participate in regional initiatives, where relevant and appropriate, and adoption of new management practices and measures to meet regional planning objectives, where possible. 	Duration: Long-term Magnitude: Low Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible long-term Context: Moderate		
American Badger	Increased Mortality Risk	<ul style="list-style-type: none"> Minimizing local Project-related effects. Participate in regional initiatives, where relevant and appropriate, and adoption of new management practices and measures to meet regional planning objectives, where possible. 	Duration: Long-term Magnitude: Negligible Geographic Extent: Regional Frequency: Intermittent Reversibility: Reversible long-term Context: Low		

Wolverine

In the southeast Kootenay region, wolverine density averages 0.2 wolverines/100 km² (Mowat et al., 2020a). Due to their low reproductive potential and large spatial requirements, wolverines are considered to have low resilience in the Elk Valley (Apps et al., 2007). Population trends are not well understood; however, based on the characterization of the residual cumulative effects and regional wolverine density estimates, the Project in combination with reasonably foreseeable future projects and activities would not limit the ability of wolverine to persist and maintain self-sustaining populations in the Terrestrial RSA. The residual cumulative effects of habitat loss and degradation, sensory disturbance, and disruption to movement on wolverine arising from the Project in combination with other past, present, and reasonably foreseeable future projects and activities during all phases are therefore considered not significant. There is a moderate understanding of wolverine ecology, their habitat availability and distribution, known occurrences, and abundance in the Terrestrial RSA; however, little is known about wolverine population trends in the Elk Valley and the factors that may most contribute to wolverine population stability. The confidence in the determination of the significance of residual cumulative effects to wolverine is therefore moderate.

American Badger

There are an estimated 250 to 405 mature American badgers of the sub-species *Taxidea taxus jeffersonii*, which occur in south-central (Jeffersonii West) and southeastern B.C. (COSEWIC, 2012b; Jeffersonii East; B.C. Badger Recovery Team, 2016). The East Kootenay American badger population (jeffersonii East) is comprised of an estimated 100 to 160 mature individuals (COSEWIC, 2012b; B.C. Badger Recovery Team, 2016). The East population are likely overall stable with declines in certain areas (COSEWIC, 2012b). Based on the characterization of the residual cumulative effects and regional American badger population estimates, the Project in combination with reasonably foreseeable future projects and activities would not limit the ability of American badger to persist and maintain self-sustaining populations in the Terrestrial RSA. The residual cumulative effects of habitat loss and degradation, sensory disturbance, disruption to movement, and increased mortality risk on American badger arising from the Project in combination with other past, present, and reasonably foreseeable future projects and activities during all phases are therefore considered not significant. There is a good understanding of American badger ecology, their habitat availability and distribution, known occurrences, and abundance in the Terrestrial RSA. The confidence in the determination of the significance of residual cumulative effects to American badger is therefore high.

32.2.4.2.3 Bat Species at Risk

The three at-risk bat species selected as VCs were acoustically identified in the Terrestrial LSA. The little brown myotis was acoustically identified at nine sites, suggesting this species occurs throughout the Terrestrial LSA. The northern myotis was acoustically identified at eight sites suggesting this species also occurs throughout the Terrestrial LSA, although in relatively lower abundance. The eastern red bat was acoustically detected at four sites in low abundance, suggesting it only occurs in select portions of the Terrestrial LSA. The assessment of habitat use by bats indicates that areas assumed to contribute most to suitable at-risk bat habitat were rugged terrain/potential hibernacula mapped in proximity to waterbodies, which are known to be important for hydration during events of spontaneous arousal from the hibernation cycle. The at-risk bat habitat model indicates that useable habitat for at-risk bats in fall-winter within the Terrestrial LSA are located along Erickson Ridge, Sheep Mountain, and the Continental

Divide. The model indicates that useable habitats for at-risk bats in spring/summer within the Terrestrial LSA are located along the lower portions of Erickson Ridge, Grave Creek, and along the Alexander Creek drainage.

Additional information on existing conditions and the assessment of effects to the bat community is provided in Chapter 15, Section 15.6.

Potential Environmental Effects

Potential effects on at-risk bat habitat availability and distribution and known occurrences and abundance may occur as a result of Project activities associated with mine development.

Habitat Loss and Degradation

Project components and activities may cause habitat loss and degradation for at-risk bats. Habitat loss and degradation includes the loss or reduction in value of foraging, roosting, maternal roosting, and hibernation habitat. Loss and/or degradation of native vegetation can also affect insect population abundance and thereby prey availability for bats. Physical disturbances including ground disturbance and vegetation clearing can cause direct loss of ecosystems and the corresponding resources they provide. A loss of key resources required to fulfill life requisites can result in reduced body condition, survivorship, and reproductive success. Bats may respond to habitat alteration by reducing their use of areas, avoiding habitats for a period of time (i.e., displacement), or abandoning portions of their current range.

Habitat selection by bats is influenced by the spatial arrangement of required habitat elements, including day-roosts, night-roosts, hibernacula, foraging areas, and access to water. Habitat loss from clearing contributes to habitat fragmentation that may result in required habitat elements being farther apart on the landscape, causing the reduced occurrence of some bat species (reviewed in B.C. MOE, 2016). Some bat species avoid crossing large open areas; however, the creation of edge habitat can also be beneficial to some bat species by providing increased feeding habitat along forest edges.

Sensory Disturbance

Project components and activities may cause sensory disturbance for at-risk bats. Sensory disturbance includes behavioural responses to Project-related noise, vibration, light, and human presence. Noise may interfere with echolocation, causing a reduction in feeding, depending on the noise frequencies and the bat echolocation frequency level.

Noise and vibration from blasting can affect adjacent bat roosts in summer or winter. Sensory disturbances can lead to disruptions in bat behaviour, causing individuals to lose time and energy normally allocated to feeding. A loss of time towards fulfilling key life requisites can result in reduced body condition and reduced reproductive success. At-risk bats may also respond to sensory disturbances by reducing their use of habitats near the source of disturbance, avoiding habitats for a period (i.e., displacement), or abandoning portions of their current range. Such behavioural responses result in a functional loss of habitat.

Increased Mortality Risk

Project components and activities have the potential to cause the direct mortality of at-risk bats. The potential for direct mortality is greatest with destruction of occupied roosts, including both tree and rock-roosts. Roosting can also occur in buildings and inactive structures that then become destroyed during decommissioning or other alteration. Direct mortality may also occur from collisions with vehicles. At-risk bats that fly at low levels above ground can be most vulnerable to collisions with vehicles. Indirect mortality could occur through spread of white-nose syndrome, a lethal fungal disease that is spreading rapidly through populations of North America’s hibernating bat species. The primary mode of disease transfer seems to be due to bat-to-bat contact but transfer of fungal conidia (spores) via human clothing or equipment is a possible mechanism of spread (British Columbia Ministry of Environment and Climate Change [B.C. MOE], 2016). To date, white-nose syndrome is not known to occur in B.C. but has been reported in neighbouring Washington State.

Attractants includes the effect of any human activity or material that may attract wildlife and could lead to behavioural changes. Primary bat attractants are lighting and waterbodies, both of which attract bats for feeding. Waterbodies are also used by bats for drinking. Building structures may attract bats for roosting and may lead to direct mortality if incompatible with operation or decommissioning.

Mitigation Measures

The key mitigation measures proposed to mitigate potential effects on at-risk bat species are summarized in Table 32.2-11. Where mitigation measures do not or may not mitigate all effects or if there is a low level of confidence in their effectiveness, the effect was carried forward for further analysis of residual effects. Mitigation measures that are expected to completely mitigate potential effects with a high level of confidence based on their proven effectiveness elsewhere were classified as having no expected residual effects.

No other technically and economically feasible mitigation measures were considered for at-risk bat species, and NWP is not aware of potential future technology innovations that could help further mitigate effects.

Table 32.2-11: Summary of Proposed Mitigation Measures Related to At-Risk Bats

Potential Effect	Mitigation Measures	Effectiveness	Residual Effect
Habitat Loss and Degradation	<ul style="list-style-type: none"> Avoidance of known and high potential hibernacula. Project design. Progressive reclamation. 	Moderate	Yes
Sensory Disturbance	<ul style="list-style-type: none"> Minimize habitat and sensory disturbance. Manage vehicle traffic and site access. 	High	Yes
Increased Mortality Risk	<ul style="list-style-type: none"> Clearing outside of the maternal roosting period. Pre-disturbance bat surveys. Protection of roosts. 	High	No

Potential Effect	Mitigation Measures	Effectiveness	Residual Effect
	<ul style="list-style-type: none"> Measures to minimize potential spread of white-nose syndrome. 		

Residual Effects

Residual effects on at-risk bat species are summarized in Table 32.2-12. The stability of a bat population depends on the continued presence of required roost types (e.g., summer, winter, day, night, maternity, and swarming), adequate and diverse foraging habitats, and connectivity between these habitats. The Project is expected to result in permanent loss of roosting habitat. Some foraging habitat will be restored after Reclamation and Closure. The amount of high-quality habitat is small relative to availability outside the Project footprint and in the Terrestrial LSA. Connectivity may be lost in the mine footprint due to loss of blocks of forest cover, though most of the high-quality habitat loss will be along access roads, the utility corridor, and the overland conveyor where the Project footprint is narrow and impacts to connectivity will be less. Surveys found several high bat detection areas located within or directly adjacent to the Project footprint. The risk of sensory disturbance is low, as the overlap in frequency between noise generated by the Project and the echolocation frequency of the at-risk bat species may be small.

Based on the characterization of the residual effects, the Project would not limit the ability of at-risk bats to persist and maintain self-sustaining populations in the Terrestrial LSA. The residual effects of habitat loss and degradation and sensory disturbance on at-risk bats are considered not significant.

There is a moderate understanding of at-risk bat ecology, their habitat availability and distribution, their response to noise, known occurrences, and abundance in the Terrestrial LSA. The confidence in the determination of residual effects to at-risk bats is moderate.

Table 32.2-12: Summary of Residual Effects on At-Risk Bat VCs

Residual Effect	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Habitat Loss and Degradation	<ul style="list-style-type: none"> Construction and Pre-Production Operations 	<ul style="list-style-type: none"> Avoidance of known and high potential hibernacula. Project design. Progressive reclamation. 	Duration: Long-term to permanent Magnitude: Moderate Geographic Extent: Discrete Frequency: Continuous Reversibility: Irreversible Context: Low	Not Significant	Moderate

Residual Effect	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Sensory Disturbance	<ul style="list-style-type: none"> Construction and Pre-Production Operations Reclamation and Closure 	<ul style="list-style-type: none"> Minimize habitat and sensory disturbance. Manage vehicle traffic and site access. 	Duration: Long-term Magnitude: Low Geographic Extent: Local Frequency: Continuous Reversibility: Reversible long-term Context: Low	Not Significant	Moderate

Cumulative Effects

Residual cumulative effects on at-risk bat species are summarized in Table 32.2-13. Historical at-risk bat abundance data for the Birds, Bats, and Amphibians RSA are not available, and little is known about the populations of the three at-risk bat VCs. There will be incremental loss of at-risk bat habitat arising from the effects of the Project in combination with those of all other past, present, and reasonably foreseeable future projects and activities; however, the primary serious threat to the two SARA-listed at-risk bat species (i.e., little brown myotis and northern myotis) is white-nose syndrome (COSEWIC, 2013). In the Project-level effects assessment, the risk of increased mortality from white-nose syndrome was predicted to be fully mitigated with no residual effects. While the effect of incremental habitat loss cannot be discounted, its influence on at-risk bat abundance and distribution is expected to be low. Based on the characterization of the residual cumulative effects, the Project in combination with reasonably foreseeable future projects and activities would not limit the ability of at-risk bats to persist and maintain self-sustaining populations in the Birds, Bats, and Amphibians RSA. The residual cumulative effects of habitat loss and degradation and sensory disturbance on at-risk bats arising from the Project in combination with other past, present, and reasonably foreseeable future projects and activities during all phases are therefore considered not significant. The confidence in the determination of the significance of residual cumulative effects to at-risk bats arising from the Project in combination with other past, present, and reasonably foreseeable future projects and activities is high.

Table 32.2-13: Summary of Cumulative Effects on At-Risk Bats

Residual Cumulative Effect	Mitigation Measures	Summary of Cumulative Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Habitat Loss and Degradation	<ul style="list-style-type: none"> Minimizing local Project-related effects. Participate in regional initiatives, where relevant and appropriate, and adoption of new management practices and 	Duration: Long-term to permanent Magnitude: Low to moderate Geographic Extent: Regional Frequency: Continuous	Not Significant	High

Residual Cumulative Effect	Mitigation Measures	Summary of Cumulative Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
	measures to meet regional planning objectives, where possible.	Reversibility: Irreversible Context: Low		
Sensory Disturbance	<ul style="list-style-type: none"> Minimizing local Project-related effects. Participate in regional initiatives, where relevant and appropriate, and adoption of new management practices and measures to meet regional planning objectives, where possible. 	Duration: Long-term Magnitude: Nil Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible long-term Context: Low	Not Significant	High

32.2.4.2.4 Bird Species at Risk

There are 16 Federally listed bird species that are known or have the potential to occur within the Terrestrial LSA. Of these 16 species, four are known to occur in the Terrestrial LSA: Common Nighthawk, Barn Swallow, Olive-sided Flycatcher, and Evening Grosbeak. All four of these species are included in the assessment of project effects on bird species at risk. Barn Swallow and Olive-sided Flycatcher are also representative species under the migratory birds VC.

Additional information on existing conditions and the assessment of effects at-risk bird species is provided in Chapter 15, Section 15.7.3.5.4.

Potential Environmental Effects

Habitat Loss and Degradation

Project components and activities may cause habitat loss and degradation for bird VCs. Habitat loss and degradation includes the loss or reduction in value of a particular set of resources that the specific habitat provides, such as feeding or nesting habitat. Habitat loss and degradation includes the potential effects of ground disturbance, logging, and vegetation clearing. Bird habitat may also be lost or degraded from reduction in surface water flows. Reduced or altered flows may affect riparian habitat for birds through changes to vegetation that provides feeding or nesting habitat. Reduced water flows may affect aquatic invertebrates and reduce food availability for American Dipper, Harlequin Duck, Spotted Sandpiper, and other waterbirds. Discharge from the sediment ponds has the potential to contain elevated concentrations of total suspended solids and may result in increased calcite formation and erosion downstream of the Project. This could affect invertebrate food sources for American Dipper, Harlequin Duck, and Spotted Sandpiper.

Habitat degradation can occur from potential introduction and spread of invasive species, changes in vegetation vigour from dust deposition, and surface water runoff from the Project footprint that can contain suspended solids and affect vegetation. Each of these may affect the availability of food (i.e., plants and via habitat loss for prey species).

Sensory Disturbance

Project components and activities may cause sensory disturbance for bird VCs. Sensory disturbance includes behavioural responses to Project-related noise, light, dust, and human presence. Sensory disturbances can lead to disruptions in bird behaviour, causing individuals to lose time and energy normally allocated to foraging, hunting, breeding, and avoiding predators, and to nest abandonment. Bird VCs respond to sensory disturbances by reducing their use of habitats near the source of disturbance, avoiding habitats for a period (i.e., displacement), or abandoning portions of their current range. Such behavioural responses result in a functional loss of habitat.

Increased Mortality Risk

Project components and activities have the potential to cause the direct mortality of bird VCs. Effects include destruction of bird nests when occupied by birds or eggs, collisions with Project-related equipment and vehicle traffic on access or mine site roads, collisions with electrical wires, and through the physical impact of blasting. Chemical hazards (e.g., ingestion of toxic products) from materials stored on-site during Operations may reduce wildlife survival and reproduction.

Mitigation Measures

The key mitigation measures proposed to mitigate potential effects on bird VCs are summarized in Table 32.2-14. Where mitigation measures do not or may not mitigate all effects or if there is a low level of confidence in their effectiveness, the effect was carried forward for further analysis of residual effects. Mitigation measures that are expected to completely mitigate potential effects with a high level of confidence based on their proven effectiveness elsewhere were classified as having no expected residual effects. This includes increased mortality risk.

Table 32.2-14: Summary of Proposed Mitigation Measures related to At-Risk Bird Species

Potential Effect	Mitigation Measures	Effectiveness	Residual Effect
Habitat Loss and Degradation	<ul style="list-style-type: none"> Minimizing disturbance and encroachment into natural vegetation. Clearing vegetation only in the year in which the area will be required for construction or operation. Sequencing the development of pits and Mine Rock Storage Facility areas to limit total disturbance during any one period and maximize progressive reclamation opportunities. Progressively reclaiming areas, as described in the Ecological Restoration Plan. Implementation of the Erosion and Sediment Control Plan. Implementation of the Air Quality and Greenhouse Gas Management Plan. Implementation of the Site Water Management Plan (riverine birds). 	Moderate	Yes
Sensory Disturbance	<ul style="list-style-type: none"> Implement wildlife education program (as described in the Wildlife Management and Monitoring Plan). Implementation of the Noise and Vibration Management Plan. Directed/focused lighting will be used where possible. 	High	Yes

Potential Effect	Mitigation Measures	Effectiveness	Residual Effect
	<ul style="list-style-type: none"> Implementation of the Air Quality and Greenhouse Gas Management Plan. 		
Increased Mortality Risk	<ul style="list-style-type: none"> All vegetation clearing will be conducted outside the general bird nesting period (Mid-April to Mid-August in each year). A wildlife education program (as described in the Wildlife Management and Monitoring Plan). Management of vehicle traffic and access as described in Traffic Control Plan will contribute to minimization of direct mortality during all Project phases. Signage along Project roads in high-value wildlife areas or known wildlife travel corridors to warn vehicle operators of the potential to encounter wildlife. Powerline design will minimize risk of collision. 	High	No
Waterbird Health	<ul style="list-style-type: none"> Intrinsic to the Site Water Management Plan. 	Moderate	Yes

No other technically and economically feasible mitigation measures were considered for at-risk bird species, and NWP is not aware of potential future technology innovations that could help further mitigate effects.

Residual Effects

Residual effects on at-risk bird species are summarized in Table 32.2-15. Both Olive-sided Flycatcher and Barn Swallow are Blue-listed in B.C. and listed as Threatened under SARA. Both species have undergone large population decreases since the early 1970s and are considered to be below an acceptable level in Canada relative to their national population goal (ECCC, 2019). Both Common Nighthawk and Evening Grosbeak are Yellow-listed in B.C. and listed as Special Concern under SARA. Both species have also undergone large population decreases since the 1970s and are considered to be below an acceptable level in Canada relative to their national population goal (ECCC, 2019).

Based on the characterization of the residual effects, the Project would not limit the ability of species at risk to persist and maintain self-sustaining populations in the Terrestrial LSA. The residual effects of habitat loss and degradation and sensory disturbance on species at risk are therefore considered to be not significant. There is a good understanding of migratory bird ecology, their habitat availability and distribution, their response to noise, known occurrences, and abundance in the Terrestrial LSA. The confidence in the determination of residual effects to species at risk is high.

Table 32.2-15: Summary of Residual Effects on At-Risk Bird Species

Residual Effect	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Habitat Loss and Degradation	<ul style="list-style-type: none"> Construction and Pre-Production Operations 	<ul style="list-style-type: none"> Minimizing disturbance and encroachment into natural vegetation. Clearing vegetation only in the year in which the area will be required for construction or operation. Sequencing the development of pits and Mine Rock Storage Facility areas to limit total disturbance during any one period and maximize progressive reclamation opportunities. Progressively reclaiming areas, as described in Landform Design and Reclamation Plan. Implementation of the Erosion and Sediment Control Plan. Implementation of the Air Quality and Greenhouse Gas Management Plan. 	<p>Duration: Long-term to Permanent Magnitude: Moderate Geographic Extent: Discrete Frequency: Continuous Reversibility: Irreversible to Reversible long-term Context: Neutral</p>	Not Significant	High
Sensory Disturbance	<ul style="list-style-type: none"> Construction and Pre-Production Operations 	<ul style="list-style-type: none"> Implement wildlife education program (as described in the Wildlife Management and Monitoring Plan. Implementation of the Noise and Vibration Management Plan. Directed/focused lighting will be used where possible. Implementation of the Air Quality and Greenhouse Gas Management Plan. 	<p>Duration: Long-term Magnitude: Moderate Geographic Extent: Local Frequency: Continuous Reversibility: Reversible long-term Context: Neutral</p>	Not Significant	High

Cumulative Effects

Residual cumulative effects on at-risk bird species are summarized in Table 32.2-16. Historical Olive-sided Flycatcher, Evening Grosbeak, Barn Swallow, and Common Nighthawk abundance data for the Birds, Bats, and Amphibians RSA are not available, though there is some evidence that disturbance activities in the Elk Valley have resulted in a net negative effect on Olive-sided Flycatcher habitat since the 1890s (Golder Associates, 2014). There is expected to be net incremental losses of up to 9.7% of high-quality migratory bird habitat (depending on the species) in the Bird, Bats, and Amphibians RSA due to habitat alteration through clearing and related activities as well as sensory disturbance for the Future Case; however, the Project contribution to these losses is expected to be small. Based on the characterization of the residual cumulative effects, the Project in combination with other reasonably foreseeable future projects and activities would not limit the ability of bird species at risk to persist and maintain self-sustaining populations in the Birds, Bats, and Amphibians RSA. The residual cumulative effects of habitat loss and degradation and sensory disturbance on bird species at risk arising from the Project in combination with other past, present, and reasonably foreseeable future projects and activities during all phases are therefore considered not significant.

There is a moderate understanding of bird species at risk ecology and their habitat availability and distribution, and moderate understanding of known occurrences and abundance in the Birds, Bats, and Amphibians RSA. The confidence in the determination of the significance of residual cumulative effects to bird species at risk is therefore moderate.

Table 32.2-16: Summary of Cumulative Effects on At-Risk Bird Species

Residual Cumulative Effect	Mitigation Measures	Summary of Cumulative Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Habitat Loss and Degradation	<ul style="list-style-type: none"> Minimizing local Project-related effects. Participate in regional initiatives, where relevant and appropriate, and adoption of new management practices and measures to meet regional planning objectives, where possible. 	Duration: Permanent Magnitude: Low Geographic Extent: Regional Frequency: Continuous Reversibility: Irreversible Context: Neutral	Not Significant	Moderate
Sensory Disturbance	<ul style="list-style-type: none"> Minimizing local Project-related effects. Participate in regional initiatives, where relevant and appropriate, and adoption of new management practices and measures to meet regional planning objectives, where possible. 	Duration: Long-term Magnitude: Low Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible long-term Context: Neutral		

32.2.4.2.5 Amphibian Species at Risk (Western Toad)

Adult western toads were documented across the Terrestrial LSA, while toadlets were documented in only four locations in the Terrestrial LSA. No western toad egg masses or tadpoles were observed over the survey years. Western toads were documented at wetlands and ephemeral areas in the Terrestrial LSA from May to July across the sampling years, primarily during wetland perimeter searches. Through the baseline amphibian surveys, it was not determined if the western toad population present within the Terrestrial LSA is calling or non-calling.

Higher elevation/upland observations of western toad occurred in shallow water alpine wetlands, forested slopes, and a steep, re-planted cutblock. Through habitat use modelling, it is estimated that western toad may potentially use approximately 46% of the Terrestrial LSA. Western toads showed strong selection for aquatic and riparian habitats and were associated with woodland habitats. There was a weak avoidance of coal mining areas. Habitat suitability modelling indicates approximately 165 ha of the Project footprint (13%) was predicted as very high or high habitat quality for western toad. Quality habitats for western toad within the Project footprint are located in the southern quarter of the Project footprint in the area surrounding the Alexander Creek drainage and in the Grave Creek area at lower elevations. Approximately 5,562 ha of the Terrestrial LSA (23%) was predicted as very high or high habitat quality for western toad. Areas of quality habitat for western toad within the Terrestrial LSA are primarily located in the Alexander Creek drainage, Grave Creek Canyon, Grave Prairie, and southwest of the base of Sheep Mountain.

Additional information on existing conditions and the assessment of effects to western toad is provided in Chapter 15, Section 15.8.

Potential Environmental Effects

Potential effects on western toad habitat, mortality, and health. Sensory disturbance was not included as a potential effect on western toad. The western toads present in the Terrestrial LSA are suspected to be part of a non-calling population west of the Rocky Mountains, although this was not confirmed during the baseline studies. Interference of Project noise with western toad breeding are therefore not expected. For these reasons, the effect of sensory disturbance was not considered further for western toad.

Habitat Loss and Degradation

Project components and activities may cause habitat loss and degradation for western toad. Habitat loss and degradation includes the loss or reduction in value of western toad summer breeding areas (e.g., wetlands, ephemeral seeps, and temporary pools), post-breeding dispersal corridors, foraging habitats, and winter hibernacula.

Habitat loss and degradation may occur from clearing of forest cover, clearing and grubbing of wetlands and riparian areas, loss or alteration of surface and groundwater flow that may alter surface water area or vegetation species composition, introduction and spread of invasive species, changes in vegetation vigour from dust deposition, and surface water runoff from the Project footprint that can contain suspended solids and affect vegetation.

Increased Mortality Risk

Project components and activities have the potential to cause increased mortality risk to individual western toads during vegetation clearing, mine rock placement, and collisions with vehicles. Increased mortality risk may also occur during decommissioning of the sediment ponds and the Grave Creek Reservoir if water is drained if and when occupied by western toad. Changes to surface water quality associated with leaching of constituents from mine rock and mining areas (e.g., road surfaces, coal stockpiles) could affect western toad survival and reproduction.

Amphibian Health

The Project has the potential to release chemical contaminants to the environment through controlled or uncontrolled emission such as permitted effluent discharge, surface water runoff, fugitive dust, and emissions from vehicle traffic or other direct facility emissions. These emissions in turn have the potential to alter environmental quality of local and regional landscapes which could potentially expose amphibians to chemical emissions from the Project.

Mitigation Measures

The key mitigation measures proposed to mitigate potential effects on western toad are summarized in Table 32.2-17. Where mitigation measures do not or may not mitigate all effects or if there is a low level of confidence in their effectiveness, the effect was carried forward for further analysis of residual effects. Mitigation measures that are expected to completely mitigate potential effects with a high level of confidence based on their proven effectiveness elsewhere were classified as having no expected residual effects. No other technically and economically feasible mitigation measures were considered for at-risk amphibian species, and NWP is not aware of potential future technology innovations that could help further mitigate effects.

Table 32.2-17: Summary of Proposed Mitigation Measures Related to Western Toad

Potential Effect	Mitigation Measures	Effectiveness	Residual Effect
Habitat Loss and Degradation	<ul style="list-style-type: none"> Minimizing disturbance and encroachment into natural vegetation. Clearing vegetation only in the year (or prior year) in which the area will be required for construction or operation. Sequencing the development of pits and Mine Rock Storage Facility areas to limit total disturbance during any one period and maximize progressive reclamation opportunities. Progressively reclaiming areas, as described in the Ecological Restoration Plan. Implementation of the Erosion and Sediment Control Plan. Implementation of the Air Quality and Greenhouse Gas Management Plan. Implementation of the Site Water Management Plan. 	High	Yes
Contaminant Exposure	<ul style="list-style-type: none"> Intrinsic to the Site Water Management Plan. 	Moderate	Yes

Residual Effects

Residual effects on western toad are summarized in Table 32.2-18. Historical western toad abundance data for the Terrestrial LSA are not available, though there is some evidence of decline based on preliminary evidence gathered during amphibian inventory surveys in the East Kootenay region (Ohanjanian et al., 2006). The removal of occupied breeding sites through mining or other anthropogenic disturbances could have large effects on local population abundance, though no breeding sites have been identified to date within the Terrestrial LSA. The Project is expected to result in loss of high-quality habitat, though the amount is small relative to availability in the Terrestrial LSA. Some lost habitat will be offset by restoration of wetlands and shrublands during reclamation. The potential for increased mortality risk can be minimized, but direct mortality of individual western toads is difficult to eliminate due to the difficulty of detection during most times of the year. Based on the characterization of the residual effects, the Project would not limit the ability of western toad to persist and maintain self-sustaining populations in the Terrestrial LSA. Critical habitat under SARA has not been defined for western toad; loss of critical habitat is therefore not relevant for the determination of significance. The residual effects of habitat loss and degradation and increased mortality risk on western toad are therefore considered not significant. There is a good understanding of western toad ecology and their habitat availability and distribution, though moderate understanding of known occurrences and abundance in the Terrestrial LSA. The confidence in the determination of residual effects to western toad is high.

Amphibian health is assessed under aquatic health in the Human and Ecological Health Assessment. Surface water quality mitigation measures will contribute to avoidance and minimization of contaminant exposure risk, but residual effects may remain. Amphibian health is therefore carried forward and a residual effects assessment is presented below. The assessment of potential residual effects to amphibian health provided in this section is based entirely on the Human and Ecological Health Assessment and no new information is provided. The residual effects to amphibian health is considered to be not significant.

Cumulative Effects

Residual cumulative effects on western toad are summarized in Table 32.2-19. Historical western toad abundance data for the Birds, Bats, and Amphibians RSA are not available, though there is some evidence of decline based on preliminary evidence gathered during amphibian inventory surveys in the East Kootenay (Ohanjanian et al., 2006). Based on the characterization of the residual cumulative effects and regional western toad population levels, the Project in combination with other reasonably foreseeable future projects and activities would not limit the ability of western toad to persist and maintain self-sustaining populations in the Birds, Bats, and Amphibians RSA. The residual cumulative effects of habitat loss and degradation and increased mortality risk on western toad arising from the Project in combination with the effects of other past, present, and other reasonably foreseeable future projects and activities during all phases are therefore considered not significant. There is a good understanding of western toad ecology and their habitat availability and distribution, though moderate understanding of known occurrences and abundance in the Birds, Bats, and Amphibians RSA. The confidence in the determination of the significance of residual cumulative effects to western toad is therefore high.

The residual cumulative effects to amphibian health are considered to be not significant.

Table 32.2-18: Summary of Residual Effects on Western Toad

Valued Component	Residual Effect	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Western Toad	Habitat Loss and Degradation	<ul style="list-style-type: none"> Construction and Pre-Production Operations 	<ul style="list-style-type: none"> Minimizing disturbance and encroachment into natural vegetation. Clearing vegetation only in the year in which the area will be required for construction or operation. Sequencing the development of pits and the Mine Rock Storage Facility to limit total disturbance during any one period and maximize progressive reclamation opportunities. Progressively reclaiming areas, as described in the Ecological Restoration Plan. Implementation of the Erosion and Sediment Control Plan. Implementation of the Air Quality and Greenhouse Gas Management Plan. Implementation of the Site Water Management Plan. 	<p>Duration: Permanent Magnitude: Low Geographic Extent: Discrete to local Frequency: Continuous Reversibility: Reversible long-term to Irreversible Context: Low</p>	Not Significant	High
	Increased Mortality Risk	<ul style="list-style-type: none"> Construction and Pre-Production Operations Reclamation and Closure 	<ul style="list-style-type: none"> Conduct surveys of suitable amphibian breeding habitat prior to clearing, grubbing, and deposition of mine rock and, if amphibians are found, conduct a salvage program to avoid mortality. A wildlife education program (as described in the Wildlife Management and Monitoring Plan). Management of vehicle traffic and access as described in Traffic Control Plan, 	<p>Duration: Long-term Magnitude: Low Geographic Extent: Discrete Frequency: Intermittent Reversibility: Reversible long-term Context: Low</p>		

Valued Component	Residual Effect	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
			<p>contributes to minimization of direct mortality during all Project phases.</p> <ul style="list-style-type: none"> • Signage along Project roads in high-value wildlife areas or known wildlife travel corridors to warn vehicle operators of the potential to encounter wildlife. 			
Amphibian Health	Contaminant Exposure	<ul style="list-style-type: none"> • All phases 	<ul style="list-style-type: none"> • Intrinsic to the Site Water Management Plan. 	Duration: Long-term Magnitude: Negligible Geographic Extent: Local Frequency: Continuous Reversibility: Reversible long-term Context: Low	Not Significant	Moderate

Table 32.2-19: Summary of Cumulative Effects on Western Toad

VC	Residual Cumulative Effect	Mitigation Measures	Summary of Cumulative Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Western Toad	<ul style="list-style-type: none"> Habitat Loss and Degradation 	<ul style="list-style-type: none"> Minimizing local Project-related effects. Participate in regional initiatives, where relevant and appropriate, and adoption of new management practices and measures to meet regional planning objectives, where possible. 	Duration: Long-term and permanent Magnitude: Moderate Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible long-term Context: Low	Not Significant	High
	<ul style="list-style-type: none"> Increased Mortality Risk 	<ul style="list-style-type: none"> Minimizing local Project-related effects. Participate in regional initiatives, where relevant and appropriate, and adoption of new management practices and measures to meet regional planning objectives, where possible. 	Duration: Long-term Magnitude: Negligible Geographic Extent: Regional Frequency: Intermittent Reversibility: Reversible long-term Context: Low		
Amphibian Health	<ul style="list-style-type: none"> Contaminant Exposure 	<ul style="list-style-type: none"> Minimizing local Project-related effects. Participate in regional initiatives, where relevant and appropriate, and adoption of new management practices and measures to meet regional planning objectives, where possible. 	Duration: Long-term Magnitude: Low Geographic Extent: Local Frequency: Continuous Reversibility: Reversible long-term Context: Low	Not Significant	Moderate

32.2.4.3 Summary for Species at Risk

Aquatic and terrestrial federally listed species at risk have the potential to be impacted by the proposed Project. Westslope Cutthroat Trout may be impacted by the Project through instream habitat loss due to mine design and development, habitat loss due to changes in water quantity, changes in water quality, changes in streambed structure, and functional riparian disturbance. The federally listed whitebark pine may be impacted by the Project through mortality and/or loss of habitat and changes in rates of germination, growth and reproduction. Wildlife at-risk species, including listed carnivores, birds, bats, and an amphibian have the potential to be impacted through habitat loss, sensory disturbance, disruption to movement, and increased mortality risk.

Residual effects of instream habitat loss due to mine design and development and habitat loss due to changes in water quantity were both found to be significant for Westslope Cutthroat Trout only, with a high likelihood to occur. No significant adverse residual cumulative effects are predicted for Westslope Cutthroat Trout. No significant adverse residual or cumulative effects are predicted on vegetation and wildlife species at risk as a result of the Project. Follow-up programs will be used to verify environmental effects predictions on species at risk or to verify the effectiveness of mitigation measures where there is uncertainty (i.e., low to moderate confidence). Where environmental effects exceed that predicted under the effects assessment, or mitigation measures prove to be ineffective, alternative strategies are developed to adaptively manage the Project's effects on species at risk.

32.2.5 Migratory Birds

Migratory birds are those bird species defined under the Migratory Birds Convention Act (MBCA, 1994) and, as per the AIR, as represented by Olive-sided Flycatcher, Barn Swallow, and woodpeckers. The Project EIS Guidelines (CEAA, 2015b) require consideration of migratory birds (as defined under MBCA, 1994) and species at risk (species listed under the SARA (2002)). In the EIS Guidelines (CEAA, 2015b), consideration of impacts to migratory birds refers to all species of migratory birds, and not a subset of representative species, as used in the AIR (EAO, 2018). Chapter 15, Section 15.7 assesses the potential impacts of the Project on the bird community, with the assessment of residual Project effects being presented in Section 15.7.3.5.2.

Most bird species in Canada are migratory, moving variable distances between overwintering grounds in the south to nutrient rich breeding grounds in the north in the spring, and back to the south in the fall. Migratory birds are ecologically and economically valuable as they: help regulate pest insect and rodent populations affecting agriculture and forestry; act as pollinators in both seed dispersion and flower pollination; contribute to socio-economic activities (i.e., hunting and birdwatching); and contribute to the overall health and biodiversity of aquatic and terrestrial ecosystems (United Nations Environment Programme, 2012).

Migratory birds detected during breeding seasons as part of Project baseline surveys (reported under Section 15.7.2.2) were grouped into broad habitat guilds (Table 32.2-20) to characterize potential Project effects across multiple species. The habitat guilds include forest, grassland/shrubland, wetland, riparian, non-vegetated, and anthropogenic. Many birds utilize more than a single habitat type or require a matrix or mosaic of habitats; up to two habitats are listed for each species. Species that utilize many habitats

were classified as generalist. The majority are associated with forest (46 of 80 species), followed by wetland (13 of 80) and grassland/shrubland (13 of 80).

Table 32.2-20: Migratory Birds Detected During Baseline Surveys in the Breeding Season with Their Habitat Guild

Common Name	Scientific Name	Primary Habitat	Other Habitat
Mallard	<i>Anas platyrhynchos</i>	Wetland	Water
Canada Goose	<i>Branta canadensis</i>	Wetland	
Bufflehead	<i>Bucephala albeola</i>	Wetland	Water
Barrow's Goldeneye	<i>Bucephala islandica</i>	Wetland	Water
Harlequin Duck	<i>Histrionicus histrionicus</i>	Water	
		Riparian	
Hooded Merganser	<i>Lophodytes cucullatus</i>	Wetland	Forest
American Wigeon	<i>Mareca americana</i>	Wetland	Water
Common Merganser	<i>Mergus merganser</i>	Water	Forest
Common Nighthawk	<i>Chordeiles minor</i>	Grass/shrub	Non-vegetated
Calliope Hummingbird	<i>Selasphorus calliope</i>	Forest	Riparian
Rufous Hummingbird	<i>Selasphorus rufus</i>	Forest	Grass/shrub
American Coot	<i>Fulica americana</i>	Wetland	
Sora	<i>Porzana carolina</i>	Wetland	
Spotted Sandpiper	<i>Actitis macularius</i>	Wetland	
Wilson's Snipe	<i>Gallinago delicata</i>	Grass/shrub	Wetland
Solitary Sandpiper	<i>Tringa solitaria</i>	Wetland	Forest
Common Loon	<i>Gavia immer</i>	Water	Wetland
Great Blue Heron	<i>Ardea herodias</i>	Wetland	Water
Northern Goshawk	<i>Accipiter gentilis atricapillus</i>	Forest	
Northern Flicker	<i>Colaptes auratus</i>	Forest	
Downy Woodpecker	<i>Picoides pubescens</i>	Forest	
Hairy Woodpecker	<i>Picoides villosus</i>	Forest	
Pileated Woodpecker	<i>Dryocopus pileatus</i>	Forest	
American Three-toed Woodpecker	<i>Picoides dorsalis</i>	Forest	
Red-naped Sapsucker	<i>Sphyrapicus nuchalis</i>	Forest	
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Forest	
Western Wood-pewee	<i>Contopus sordidulus</i>	Forest	Grass/shrub
Pacific-slope Flycatcher	<i>Empidonax difficilis</i>	Forest	Riparian
Hammond's Flycatcher	<i>Empidonax hammondii</i>	Forest	

Common Name	Scientific Name	Primary Habitat	Other Habitat
Least Flycatcher	<i>Empidonax minimus</i>	Forest	Forest
Willow Flycatcher	<i>Empidonax traillii</i>	Grass/shrub	Riparian
Cassin's Vireo	<i>Vireo cassinii</i>	Forest	
Warbling Vireo	<i>Vireo gilvus</i>	Forest	
Cedar Waxwing	<i>Bombycilla cedrorum</i>	Forest	
Black-capped Chickadee	<i>Poecile atricapillus</i>	Forest	
Mountain Chickadee	<i>Poecile gambeli</i>	Forest	
Boreal Chickadee	<i>Poecile hudsonica</i>	Forest	
Barn Swallow	<i>Hirundo rustica</i>	Grass/shrub	Anthropogenic
Tree Swallow	<i>Tachycineta bicolor</i>	Grass/shrub	Generalist
Violet-green Swallow	<i>Tachycineta thalassina</i>	Forest	
Ruby-crowned Kinglet	<i>Regulus calendula</i>	Forest	
Golden-crowned Kinglet	<i>Regulus satrapa</i>	Forest	
Marsh Wren	<i>Cistothorus palustris</i>	Wetland	
Red-breasted Nuthatch	<i>Sitta canadensis</i>	Forest	
House Wren	<i>Troglodytes aedon</i>	Generalist	
Pacific Wren	<i>Troglodytes pacificus</i>	Forest	
Brown Creeper	<i>Certhia americana</i>	Forest	
Hermit Thrush	<i>Catharus guttatus</i>	Forest	
Swainson's Thrush	<i>Catharus ustulatus</i>	Forest	
Varied Thrush	<i>Ixoreus naevius</i>	Forest	
Townsend's Solitaire	<i>Myadestes townsendi</i>	Forest	
Mountain Bluebird	<i>Sialia currucoides</i>	Forest	Grass/shrub
American Robin	<i>Turdus migratorius</i>	Generalist	
American Dipper	<i>Cinclus mexicanus</i>	Water	Riparian
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	Forest	
Cassin's Finch	<i>Carpodacus cassinii</i>	Forest	
Purple Finch	<i>Carpodacus purpureus</i>	Forest	
Red Crossbill	<i>Loxia curvirostra</i>	Forest	
White-winged Crossbill	<i>Loxia leucoptera</i>	Forest	
Pine Grosbeak	<i>Pinicola enucleator</i>	Forest	
Pine Siskin	<i>Carduelis pinus</i>	Forest	
Wilson's Warbler	<i>Cardellina pusilla</i>	Grass/shrub	Riparian
MacGillivray's Warbler	<i>Geothlypis tolmiei</i>	Riparian	Forest

Common Name	Scientific Name	Primary Habitat	Other Habitat
Common Yellowthroat	<i>Geothlypis trichas</i>	Generalist	
Orange-crowned Warbler	<i>Oreothlypis celata</i>	Forest	Riparian
Tennessee Warbler	<i>Oreothlypis peregrina</i>	Forest	
Northern Waterthrush	<i>Parkesia noveboracensis</i>	Riparian	Water
Yellow-rumped Warbler	<i>Setophaga coronata</i>	Generalist	
Yellow Warbler	<i>Setophaga petechia</i>	Riparian	Grass/shrub
Townsend's Warbler	<i>Setophaga townsendi</i>	Forest	
Dark-eyed Junco	<i>Junco hyemalis</i>	Forest	Grass/shrub
Lincoln's Sparrow	<i>Melospiza lincolni</i>	Wetland	Riparian
Song Sparrow	<i>Melospiza melodia</i>	Generalist	
Fox Sparrow	<i>Passerella iliaca</i>	Forest	Grass/shrub
Vesper Sparrow	<i>Poocetes gramineus</i>	Grass/shrub	
Chipping Sparrow	<i>Spizella passerina</i>	Forest	Grass/shrub
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	Forest	Grass/shrub
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	Generalist	
Western Tanager	<i>Piranga ludoviciana</i>	Forest	

Notes:

Only bird species listed under the Migratory Birds Convention Act are included in this table.

32.2.5.1 Potential Environmental Effects

Project activities during the Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases have the potential to affect migratory bird VCs. The key interactions resulting in potential significant adverse effect or significant concern are primarily those involving habitat loss or alteration and potential for increased mortality. Many of the potential adverse effects that are not key but require mitigation are related to noise and other sensory disturbance related to construction and operation and operation of vehicles.

As described in Section 15.7.1, two assessments components for migratory birds were evaluated as part of the effects assessment on migratory birds:

- Three representative species were identified in the AIR (EAO, 2018): Olive-sided Flycatcher, Barn Swallow, and woodpeckers; and
- The Guidelines for the Preparation of an Environmental Impact Statement for the Crown Mountain Coking Coal Project (CEAA, 2015b) require consideration of all migratory birds (as defined under MBCA, 1994) and not a subset of representative species, as used in the AIR (EAO, 2018).

A guild approach was used to address the requirements of the EIS Guidelines. Migratory birds detected during the breeding seasons (reported under Section 15.7.2.2) and listed in the MBCA (1994) were grouped into broad habitat guilds to characterize potential Project effects across multiple species.

Migratory birds were assessed for potential Project-related effects on habitat loss and degradation, sensory disturbance, and increased mortality risk.

32.2.5.1.1 Habitat Loss and Degradation

The Project footprint overlaps with suitable habitat for bird VCs and bird habitat in general. The total Project footprint area is 1,283 ha, though this area includes a buffer area intended to account for uncertainty in precise boundaries of disturbance, and not all of the buffer areas will be cleared. Most of the habitat loss within the Landscapes and Ecosystems LSA will be in forested habitats (83.4% of Project footprint).

During Construction and Pre-Production, habitat loss will result from clearing and grubbing the infrastructure and pre-production development footprint, which includes the quarry, Interim Sediment Pond, Grave Creek Reservoir, the CHPP and workshop, initial portions of North Pit and Mine Rock Storage Facility, upgrading of the mine site road and Grave Creek Road, construction of the new road to the explosives factory, the overland conveyor, and the rail loadout. During Operations, habitat degradation may occur in areas not yet cleared, in contingency areas, and in areas directly adjacent to the Project footprint through dust deposition, spread of invasive species, and sedimentation from surface water runoff. In Reclamation and Closure and Post-Closure, no additional loss of habitat for migratory birds is expected and some habitats may be restored through reclamation activities, over time.

32.2.5.1.2 Sensory Disturbance

Sensory disturbance from Project-related noise, light, dust, and human presence is a potential effect for migratory birds during all Project phases. Sensory disturbance may decrease or eliminate use of suitable habitat by migratory birds in areas beyond the Project footprint. The effects of noise and vibration on wildlife receptors is assessed in Chapter 7.

Sensory disturbance to migratory birds is expected in the Construction and Pre-Production phase due to various construction activities of Project components that generate noise, dust, vibration, and light; however, the most pronounced effects with respect to sensory disturbance are during the Operations phase which will involve more intensive mining and processing activities on a continuous basis for up to 15 years of Operations. Therefore, the effects assessment with respect to sensory disturbance was focused on the Operations phase, with Project noise as a surrogate for other sensory disturbances. In the Operations phase, sensory disturbance is expected from the transportation of personnel and materials, land clearing activities, soil salvage, road construction and upgrading, construction of the rail loadout, excavation of the quarry, construction of the coal handling process plant, and construction of water management infrastructure such as the Grave Creek Reservoir and Interim Sediment Pond. During Operations, noise will be generated from progressive clearing and grubbing, further mine road development, detonating explosives (two to three times per week), loading, hauling, and dumping of mine rock, coal processing, operation of the conveyor, hauling to the rail loadout, operation of the rail loadout, and construction of the Main Sediment Pond. Progressive reclamation will also generate noise. In Reclamation and Closure, some sensory disturbance is expected to be generated from the dismantling of infrastructure and buildings and removal of linear infrastructure. Low-level sensory disturbance is also expected to be generated from human activity associated with monitoring and maintenance. Sensory disturbance is expected to be minimal during the Post-Closure phase of the Project.

32.2.5.1.3 Increased Mortality Risk

There is potential for direct mortality of bird VCs in all phases of the Project. Direct mortality of migratory birds over the course of the Project may occur from removal of trees and vegetation acting as bird habitat, destruction of nests when occupied by a bird or eggs, collisions with Project-related equipment during terrain disturbance and clearing of vegetation, collisions with Project-related traffic on access or mine site roads, and from blasting. When buildings are constructed, birds may construct nests on ledges, beams, and other features and may become a nuisance (e.g., aggressive behaviour and droppings), causing increased human-wildlife conflict. Once the overhead powerlines are constructed during Construction and Pre-Production, there is a potential for increased risk of bird collisions with powerlines and risk of electrocution.

32.2.5.2 Mitigation Measures

The key mitigation measures proposed to mitigate potential effects on migratory birds are summarized in Table 32.2-21. Where mitigation measures do not or may not mitigate all effects or if there is a low level of confidence in their effectiveness, the effect was carried forward for further analysis of residual effects. Mitigation measures that are expected to completely mitigate potential effects with a high level of confidence based on their proven effectiveness elsewhere were classified as having no expected residual effects.

No other technically and economically feasible mitigation measures were considered for migratory birds, and NWP is not aware of potential future technology innovations that could help further mitigate effects.

Table 32.2-21: Summary of Proposed Mitigation Measures related to Migratory Birds

Potential Effect	Mitigation Measures	Effectiveness	Residual Effect
Habitat Loss and Degradation	<ul style="list-style-type: none"> Minimizing disturbance and encroachment into natural vegetation. Clearing vegetation only in the year in which the area will be required for construction or operation. Sequencing the development of pits and Mine Rock Storage Facility areas to limit total disturbance during any one period and maximize progressive reclamation opportunities. Progressively reclaiming areas, as described in the Ecological Restoration Plan. Implementation of the Erosion and Sediment Control Plan. Implementation of the Air Quality and Greenhouse Gas Management Plan. Implementation of the Site Water Management Plan (riverine birds). 	Moderate	Yes
Sensory Disturbance	<ul style="list-style-type: none"> Implement wildlife education program (as described in the Wildlife Management and Monitoring Plan). Implementation of the Noise and Vibration Management Plan. Directed/focused lighting will be used where possible. 	High	Yes

Potential Effect	Mitigation Measures	Effectiveness	Residual Effect
	<ul style="list-style-type: none"> Implementation of the Air Quality and Greenhouse Gas Management Plan. 		
Increased Mortality Risk	<ul style="list-style-type: none"> All vegetation clearing will be conducted outside the general bird nesting period (Mid-April to Mid-August in each year). A wildlife education program (as described in the Wildlife Management and Monitoring Plan). Management of vehicle traffic and access as described in Traffic Control Plan will contribute to minimization of direct mortality during all Project phases. Signage along Project roads in high-value wildlife areas or known wildlife travel corridors to warn vehicle operators of the potential to encounter wildlife. Powerline design will minimize risk of collision. 	High	No

32.2.5.3 Residual Effects

Migratory birds were assessed for potential Project-related effects on habitat loss and degradation, sensory disturbance, and increased mortality risk. Proposed mitigation measures will contribute to avoidance, mitigation, and restoration of Project-related effects on migratory birds; however, it is anticipated that residual effects for habitat loss and degradation and sensory disturbance will remain. As such, the effects of habitat loss and sensory disturbance were therefore carried forward into the residual effects assessment. The determination of significance of adverse residual effects was completed for the combined effects of habitat loss and degradation and sensory disturbance. Residual effects on migratory birds are summarized in Table 32.2-22. There are no significant residual effects to migratory birds anticipated as a result of the Project.

Both Olive-sided Flycatcher and Barn Swallow are Blue-listed in B.C. and listed as Threatened under SARA. Both species have undergone a large population decrease since the early 1970s and are considered to be below an acceptable level in Canada relative to their national population goal (ECCC, 2019). For the woodpecker species detected within the Terrestrial LSA, all are Yellow-listed in B.C. and not listed federally. All woodpecker species have had little change to large increase in their population since 1970 and are at an acceptable level in Canada relative to their national population goal (ECCC, 2019).

Of the three representative migratory bird species, the loss of high-quality habitat and habitat affected by sensory disturbance is largest for Olive-sided Flycatcher. Suitable Olive-sided Flycatcher habitat may be created with the creation of new edge habitat, and reclamation activities will restore some Olive-sided Flycatcher habitat by the end of Reclamation and Closure. There is expected to be a net incremental loss of high-quality Olive-sided Flycatcher in the Terrestrial LSA; however, a permanent reduction in the population as a result of the Project is likely minimal or nil. A relatively small amount of high-quality woodpecker habitat will be lost or affected by sensory disturbance in the Terrestrial LSA, and a permanent reduction in the population as a result of the Project is likely minimal or nil. No change to Barn Swallow abundance is expected, considering that little or no breeding habitat is present in the Project footprint and that feeding habitat is widely available in the Terrestrial LSA.

Table 32.2-22: Summary of Residual Effects on Migratory Birds

Valued Component	Residual Effect	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Likelihood (High, Moderate, Low)	Confidence (High, Moderate, Low)
Migratory Birds	Habitat Loss and Degradation	<ul style="list-style-type: none"> Construction and Pre-Production Operations 	<ul style="list-style-type: none"> Minimizing disturbance and encroachment into natural vegetation. Clearing vegetation only in the year in which the area will be required for construction or operation. Sequencing the development of pits and Mine Rock Storage Facility areas to limit total disturbance during any one period and maximize progressive reclamation opportunities. Progressively reclaiming areas, as described in Reclamation and Closure Plan. Implementation of the Erosion and Sediment Control Plan. Implementation of the Air Quality and Greenhouse Gas Management Plan. 	Duration: Long-term to Permanent Magnitude: Moderate Geographic Extent: Discrete Frequency: Continuous Reversibility: Irreversible to Reversible long-term Context: Neutral (Olive-sided Flycatcher, Barn Swallow); Low (woodpeckers)	Not Significant	Not Applicable	High
	Sensory Disturbance	<ul style="list-style-type: none"> Construction and Pre-Production Operations 	<ul style="list-style-type: none"> Implement wildlife education program (as described in the Wildlife Management and Monitoring Plan). Implementation of the Noise and Vibration Management Plan. Directed/focused lighting will be used where possible. Implementation of the Air Quality and Greenhouse Gas Management Plan. 	Duration: Long-term Magnitude: Moderate Geographic Extent: Local Frequency: Continuous Reversibility: Reversible long-term Context: Neutral			

The majority of habitat lost within the Project footprint will be for birds using forested habitats (83.4% of the Project footprint). As a proportion of lost habitat for birds in the footprint relative to the Landscapes and Ecosystems LSA, the largest proportional changes are in Alpine, Forest, and Non-vegetated habitats.

Based on the characterization of the residual effects, the Project would not limit the ability of migratory birds to persist and maintain self-sustaining populations in the Terrestrial LSA. The residual effects of habitat loss and degradation and sensory disturbance on migratory birds are therefore considered to be not significant.

There is a good understanding of migratory bird ecology, their habitat availability and distribution, their response to noise, known occurrences, and abundance in the Terrestrial LSA. The confidence in the determination of residual effects to migratory birds is high.

32.2.5.4 Cumulative Effects

Many present and future projects and activities occur within the distributional range of key migratory bird species including Olive-sided Flycatcher, woodpeckers, and Barn Swallow that are the focus of the migratory bird assessment, as well as in suitable habitat. The residual effects of habitat loss and degradation and sensory disturbance could potentially have a cumulative effect on migratory birds. Residual cumulative effects and the selected mitigation measures, characterization criteria, significance determination, likelihood, and confidence for migratory birds are summarized in Table 32.2-23.

Historical migratory bird abundance data for the Birds, Bats, and Amphibians RSA are not available. There is some evidence that disturbance activities in the Elk Valley have resulted in a net negative effect on Olive-sided Flycatcher habitat since the 1890s (Golder Associates, 2014). There is expected to be net incremental losses of up to 9.7% of high-quality migratory bird habitat (depending on the species) in the Bird, Bats, and Amphibians RSA due to habitat alteration through clearing and related activities as well as sensory disturbance for the Future Case; however, the Project contribution to these losses is expected to be small. Based on the characterization of the residual cumulative effects and regional migratory population levels, the Project in combination with other reasonably foreseeable future projects and activities would not limit the ability of migratory birds to persist and maintain self-sustaining populations in the Birds, Bats, and Amphibians RSA. The residual cumulative effects of habitat loss and degradation and sensory disturbance on migratory birds arising from the Project in combination with other past, present, and reasonably foreseeable future projects and activities during all phases are therefore considered not significant.

There is a good understanding of migratory bird ecology and their habitat availability and distribution, though moderate understanding of known occurrences and abundance in the Birds, Bats, and Amphibians RSA. The confidence in the determination of the significance of residual cumulative effects to migratory birds is therefore high.

Table 32.2-23: Summary of Cumulative Effects on Migratory Birds

VC	Residual Cumulative Effect	Mitigation Measures	Summary of Cumulative Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Migratory Birds	Habitat Loss and Degradation	<ul style="list-style-type: none"> Minimizing local Project-related effects. Participate in regional initiatives, where relevant and appropriate, and adoption of new management practices and measures to meet regional planning objectives, where possible. 	Duration: Long-term to permanent Magnitude: Moderate Geographic Extent: Regional Frequency: Continuous Reversibility: Irreversible to reversible long-term Context: Neutral (Olive-sided Flycatcher, Common Nighthawk, and Evening Grosbeak); Low (woodpeckers)	Not Significant	High
Migratory Birds	Sensory Disturbance	<ul style="list-style-type: none"> Minimizing local Project-related effects. Participate in regional initiatives, where relevant and appropriate, and adoption of new management practices and measures to meet regional planning objectives, where possible. 	Duration: Long-term Magnitude: Low Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible long-term Context: Neutral		

32.2.5.5 Summary for Migratory Birds

Potential effects to migratory birds arising from the Project were assessed in Chapter 15, and in particular its Section 15.7.3.5.2, and were summarized above. The assessment concluded that proposed mitigation measures for the Project will not result in increased mortality risk to migratory birds, with no residual effects expected; however, it was anticipated that residual effects for habitat loss and degradation and sensory disturbance will remain. As such, the effects of habitat loss and degradation as well as sensory disturbance were therefore carried forward into the residual effects assessment.

The determination of significance of adverse residual effects was therefore completed for the combined effects of habitat loss and degradation and sensory disturbance. Residual effects on migratory birds were summarized in Table 32.2-22. Although residual effects to migratory birds were predicted as a result of habitat loss and degradation and sensory disturbance, there were no significant residual effects to migratory birds anticipated as a result of the Project. The majority of habitat lost within the Project footprint will be for birds using forested habitats (83.4% of the Project footprint). With respect to sensory

disturbance, of the three representative migratory bird species (i.e., Olive-sided Flycatcher, Barn Swallow, and woodpeckers), the loss of high-quality habitat and habitat affected by sensory disturbance was largest for Olive-sided Flycatcher. Despite this, sensory disturbance was not expected to result in significant adverse effects to migratory birds because suitable Olive-sided Flycatcher habitat may be created with the creation of new edge habitat, and reclamation activities will restore some Olive-sided Flycatcher habitat by the end of Reclamation and Closure and a permanent reduction in the population as a result of the Project is likely minimal or nil. A relatively small amount of high-quality woodpecker habitat will be lost or affected by sensory disturbance in the Terrestrial LSA, but a permanent reduction in the population as a result of the Project is likely minimal or nil. No change to Barn Swallow abundance is expected, considering that little or no breeding habitat is present in the Project footprint and that feeding habitat is widely available in the Terrestrial LSA.

Despite these effects on habitat loss and degradation and sensory disturbance, based on the characterization of the residual effects, the Project would not limit the ability of migratory birds to persist and maintain self-sustaining populations in the Terrestrial LSA. The residual effects of habitat loss and degradation and sensory disturbance on migratory birds were therefore considered to be not significant, with a high level of confidence.

32.3 Changes to the Environment on Transboundary Lands

Pursuant to Section 5(1)(b) of the Canadian Environmental Assessment Act, 2012 (CEA Act, 2012), changes to the environment on transboundary lands require assessment in the Project's Application/EIS. Specifically, Section 5(1)(b) states:

"5 (1) For the purposes of this Act, the environmental effects that are to be taken into account in relation to an act or thing, a physical activity, a designated project or a project are ... b) a change that may be caused to the environment that would occur (i) on federal lands, (ii) in a province other than the one in which the act or thing is done or where the physical activity, the designated project or the project is being carried out, or (iii) outside Canada;...".

Section 32.3 presents the assessment of potential changes to the environment that may occur on transboundary lands, including assessment of federal lands, lands in a province other than B.C., and lands outside of Canada. As noted in Chapter 1, Section 1.3.3, federal lands nearest the Project include the ?aq'am First Nation Bummer's Flat 1 Reserve (approximately 69 km southwest), Stoney Nakoda Edan Valley 216 Reserve (approximately 70 km northeast), Tobacco Plains 2 (approximately 80 south), Piikani Nation Peigan Timber Limit 147B (approximately 52 km east in Alberta), and Parcels 73 and 82 of the Dominion Coal Blocks (approximately 20 and 40 km southwest, respectively). Lands outside of B.C. and Canada include lands within the Province of Alberta (approximately 5 km east) and the State of Montana (approximately 85 km south). Federal land is not required to facilitate the Project and the Project does not overlap with any federal land.

32.3.1 Assessment Boundaries

The assessment boundaries used to evaluate the potential Project-related and cumulative changes to the environment that would occur on transboundary lands are the same as those spatial, temporal,

administrative, and technical boundaries used in the assessment of relevant VCs. In particular, the spatial assessment boundaries were based on the Project footprint and defined VC-specific LSAs and RSAs presented in the VC assessment chapters. The VC-specific spatial boundaries used to assess potential effects on transboundary lands are summarized in Table 32.3-1. Rationale and justification for the study area boundaries selected for each VC are outlined in the VC assessment chapters and are not repeated here for brevity.

Table 32.3-1: Valued Component Spatial Boundaries

Valued Components or Valued Component Groups	Effects Assessment Spatial Boundaries
Atmospheric Environment (Air Quality and Greenhouse Gases)	<ul style="list-style-type: none"> • Atmospheric LSA • Atmospheric RSA (description of the study areas is provided in Chapter 6, Section 6.2.3.1)
Acoustic Environment	<ul style="list-style-type: none"> • Acoustic LSA • Acoustic RSA (description of the study areas is provided in Chapter 7, Section 7.2.3.1)
Soils and Terrain	<ul style="list-style-type: none"> • Soil Quality and Quantity LSA • Terrain LSA • Soil Quality and Quantity RSA • Terrain RSA (description of the study areas is provided in Chapter 8, Section 8.2.3.1)
Groundwater Quality and Quantity	<ul style="list-style-type: none"> • Groundwater LSA • Groundwater RSA (description of the study areas is provided in Chapter 9, Section 9.2.3.1)
Surface Water Quantity	<ul style="list-style-type: none"> • Aquatic LSA • Aquatic RSA (description of the study areas is provided in Chapter 10, Section 10.2.3.1 and Chapter 11, Section 11.2.3.1)
Surface Water Quality	
Fish and Fish Habitat	<ul style="list-style-type: none"> • Fish and Fish Habitat LSA • Aquatic RSA (description of the study areas is provided in Chapter 12, Section 12.2.3.1)
Landscapes and Ecosystems	<ul style="list-style-type: none"> • Landscape and Ecosystems LSA • Landscape and Ecosystems RSA (descriptions of the study areas are provided in Chapter 13, Section 13.3.3.1 and Chapter 14, Section 14.3.3.1)
Vegetation	
Wildlife and Wildlife Habitat	<ul style="list-style-type: none"> • Terrestrial LSA • Terrestrial RSA • Grizzly Bear RSA • Birds, Bats, and Amphibian RSA (descriptions of the study areas are provided in Chapter 15, Section 15.2.3.1)
Archaeology / Physical and Cultural Heritage	<ul style="list-style-type: none"> • Archaeological LSA • Archaeological RSA (description of the study areas is provided in Chapter 16, Section 16.2.3.1)
Economic Conditions	<ul style="list-style-type: none"> • Economic Conditions LSA • Economic Conditions RSA (description of the study areas is provided in Chapter 17, Section 17.2.3.1)

Valued Components or Valued Component Groups	Effects Assessment Spatial Boundaries
Socio-Community	<ul style="list-style-type: none"> • Socio-Community LSA • Socio-Community RSA (description of the study areas is provided in Chapter 18, Section 18.2.3.1)
Land Use	<ul style="list-style-type: none"> • Land Use and Access LSA • Land Use and Access RSA • Visual Aesthetics LSA • Visual Aesthetics RSA (descriptions of the study areas is provided in Chapter 19, Sections 19.2.3.1)
Human and Wildlife Health	<ul style="list-style-type: none"> • Human Health and Ecological Risk Assessment LSA • Human Health and Ecological Risk Assessment LSA (description of the study areas is provided in Chapter 22, Section 22.2.3.1)

The temporal boundaries the cumulative effects assessment are the same as those for Project effects, as noted in Table 32.3-2. Additional information on the Project phases is provided in Chapter 3.

Table 32.3-2: Temporal Boundaries for the Valued Component Effects Assessments

Phase	Project Year	Length of Phase (Years)
Construction and Pre-Production	1 – 2	2
Operations	3 - 17	15
Reclamation and Closure	18 – 19	2
Post-Closure	20 – 34	15

32.3.2 Transboundary Considerations

The VC assessment chapters (i.e., Chapters 6 to 19, and Chapters 22 to 31) describe the transboundary considerations (i.e., baseline and regional information) for each VC as it relates to transboundary lands, including both federal lands and lands outside of B.C. and Canada. As well, the VC assessment chapters outline the potential impact to transboundary lands within the respective Local Study Area (LSA) and Regional Study Area (RSA) for each VC. Based on the information provided in each VC assessment chapter, Section 32.3.2 summarizes relevant VC baseline information for federal lands and lands outside of B.C. and Canada.

32.3.2.1 Atmospheric Environment

The Project is located approximately 5 km west from the Alberta border along the western side of the Continental Divide and 85 km north from the Montana border in the United States of America (U.S.A). As discussed in Section 6.4.1.2.2, the most frequent wind direction recorded at the baseline climate station was from the southeast. The Project overlaps with a portion of the South Saskatchewan Air Zone along the B.C.-Alberta border. From 2015 to 2017, PM_{2.5} in the South Saskatchewan Air Zone achieved acceptable levels as per the Canadian Ambient Air Quality Standards (CAAQS), with the exception of exceedances resulting from wildlife smoke contributions (Brown, 2019). The South Saskatchewan Air Zone was assigned a “yellow” management level for PM_{2.5} that focuses on preventing air quality deterioration (Brown, 2019).

Benga Mining Limited's proposed Grassy Mountain Coal Project is located 7 km north of Blairmore, Alberta and within the Atmospheric RSA. Dustfall measurements collected from May to June of 2016 at the Devon Coleman station closest to the B.C.-Alberta border ranged from 3 to 113 milligrams per square decimeter per 30 days (mg/dm²/30 days) during that Project's air quality baseline program (Millennium EMS Solutions Ltd., 2016a). Three measurements exceeded the residential Alberta Ambient Air Quality Guidelines (AAAQG) of 53 mg/dm²/30 days, but not the industrial AAAQG of 158 mg/dm²/30 days. Thirty-day averages for sulfur dioxide (SO₂) and nitrogen dioxide (NO₂) were also collected in the same time period; thirty-day SO₂ averages were 0.29 micrograms per cubic metre (µg/m³) or less (compared to the AAAQC of 450 µg/m³), and thirty-day NO₂ averages ranged from 0.41 to 0.62 µg/m³ (compared to the AAAQG of 300 µg/m³). Additional information on the local and regional atmospheric environment is provided in Chapter 6, Section 6.4.1.1 and Section 6.4.2.1.

32.3.2.2 Acoustic Environment

The acoustic environment in the area near the Project and surrounding the Acoustic LSA comprises natural noise sources (e.g., wind, birds, insects), and anthropogenic sources (e.g., residential; recreational; mining; forestry; transportation). Natural sources of ground vibration include volcanic occurrences and seismic events caused by movements along the edges of tectonic plates. The Project location occurs in a medium relative hazard zone for seismic activity (Natural Resources Canada, 2015), but earthquakes do occur in the area (Natural Resources Canada, 2020). Anthropogenic sources of background vibration may include seismic exploration for mining and oil and gas developments; quarrying and resource extraction; large trucks and earth-moving equipment; and timber harvesting and hauling. Mining in the East Kootenay region has been ongoing for well over a century, with coal being the dominant resource extracted in the area. There are several existing metallurgical coal mines in the Elk Valley and Crowsnest coal fields. Additionally, the Canadian Pacific (CP) mainline and the Sparwood/Elk Valley Airport are within the Acoustic LSA, which affect the acoustic environment near the Project. None of the above activities currently occur within the Project footprint or Acoustic LSA; however, these activities are present within the greater region in which the Project is located. Overlapping Project-related effects on the acoustic environment are not expected to physically overlap with federal lands or lands outside of B.C. or Canada. Additional information on the local and regional acoustic environment is provided in Chapter 7, Section 7.4.1.

32.3.2.3 Soils and Terrain

The Project is located in the Elk Valley within the front ranges of the southern Rocky Mountains in southeastern B.C. The Elk Valley stretches more than 180 km from the mouth of the Elk River at Lake Koochanusa in the south, and north to its headwaters in Elk Lakes Provincial Park near the Continental Divide along the B.C.-Alberta border (Elk Valley Cumulative Effects Management Framework Working Group, 2018; George et al., 1987). The Elk Valley forms part of the Continental Ranges of the Rocky Mountains. Soils and terrain of the Project area do not physically overlap with federal lands or lands outside of B.C. or Canada. Additional information on local and regional soils and terrain is provided in Chapter 8, Section 8.4.1.

32.3.2.4 Groundwater Quality and Quantity

There are two mapped aquifers identified within the catchments of Grave Creek and Erickson Creek in the GWELLS database (B.C. MOE, n.d.). Both are located to the southwest of the Project, close to the Town of Sparwood and do not physically overlap with federal lands or lands outside B.C. or Canada. A groundwater

divide generally coincides with the topographic saddle between the West Alexander and Grave Creek drainages and is assumed to follow ridgelines away from that. Hydraulic conductivity data indicates higher values in fluvial and weathered bedrock units as compared to till and competent bedrock. At a large scale, groundwater flow will move from high elevation recharge areas to low elevation discharge areas via the most permeable pathways. As such, groundwater quality and quantity that may be influenced by the Project is not anticipated to interact with federal lands or lands outside of B.C. or Canada, given existing topography. Additional information on local and regional groundwater is provided in Chapter 9, Section 9.3 and Section 9.4.1.

32.3.2.5 Surface Water Quantity

The Aquatic RSA for the Project is situated over the dividing line of Upper Kootenay Basin and the Central Kootenay Basin hydrologic zones (Zone Numbers 19 and 20, respectively). This area is characterized by low precipitation and dry summers, cold and dry winters, and low-to-moderate snowpack (Columbia Basin Trust, 2017). As noted in Chapter 10, Section 10.2, the Aquatic RSA is comprised of the full extents of the Elk River and extends downstream to include the portion of Lake Kooconusa located north of the Canada-U.S.A. border. The Elk River watershed covers an area of approximately 4,381 km² and is generally oriented in a north to south direction. The current land cover of the Elk River watershed is coniferous, shrub, and barren (68.4%, 14.8%, and 8.9%, respectively; Ministry of Forests, Lands, Natural Resource Operations and Rural Development [FLNRORD], 2019). The Elk River has many significant tributaries, including the Fording River, Line Creek, Wigwam River, and Michel Creek.

Of the federal lands nearest the Project, Parcel 73 and a small portion of Parcel 82 of the Dominion Coal Blocks are located with the Aquatic RSA; the other federal lands are located outside the Elk River watershed and do not overlap with the Project. Additional information on local and regional water quantity is provided in Chapter 10, Section 10.3.

32.3.2.6 Surface Water Quality

Extensive water monitoring has been conducted in Lake Kooconusa to assess the impacts from the Elk River (Mebane et al., 2019). Mebane et al. (2019) estimated daily average selenium loads were similar at four mainstem sampling locations in the Kootenay River from Libby Dam (Lake Kooconusa) to the Idaho/B.C. border. The selenium loads in the Kootenay River ranged from approximately 12.1 to 14.5 kilograms per day (kg/d) in September 2018 (Mebane et al., 2019). In May 2019 during high flow sampling, estimated selenium loads were similar throughout the four mainstem Kootenay River sites, ranging from about 48.1 to 53.4 kg/d (Mebane et al., 2019). The results of the 2019 Kooconusa Reservoir Monitoring Program showed that monthly average concentrations of the EVWQP Order constituents (i.e., dissolved cadmium, nitrate, and sulphate) were below respective B.C. WQG at permitted stations in the Canadian portion of the reservoir (Minnow Environmental Inc., 2020). Monthly average selenium concentrations were below the B.C. WQG in all months at all permitted stations, with the exception of the station at the mouth of the Elk River (RG_ELKMOUTH; Minnow Environmental Inc., 2020). Additional information on local and regional water quality is provided in Chapter 11, Section 11.4.1.

32.3.2.7 Fish and Fish Habitat

The Elk River outlet into the Canadian portion of Lake Kooconusa is located approximately 80 km southwest of the Project. Lake Kooconusa extends 65 km from the U.S.A. border to the Kootenay River Inlet, providing a wide range of aquatic habitat. Water levels in the lake are controlled by Libby Dam,

which results in significant seasonal variations in aquatic habitat availability. Lake Koochanusa currently supports 11 native fish species and 6 introduced species, including an abundant bull trout population (Leschied, 2017). Westslope Cutthroat Trout are present in low densities in Lake Koochanusa, likely due a low competitive advantage for food resources. Kokanee were introduced to the lake in the 1980s and now are the most abundant sportfish, and also provide a significant food source for other species such as bull trout (Leschied, 2017). Burbot are present in low densities, and mountain whitefish are distributed throughout the lake. Cyprinid species such as northern pikeminnow, peamouth chub, and redbreast shiner are the most abundant and widely distributed species in the lake, closely followed by longnose sucker and largescale sucker. Yellow perch (*Perca flavescens*) and eastern brook trout (*Salvelinus fontinalis*) are non-native species, both of which pose a conservation threat for native species (Leschied, 2017).

Minnow Environmental conducted environmental monitoring activities in the Canadian portion of Lake Koochanusa in 2018 in accordance with the EVWQP. Water quality data indicated that concentrations of the four EVWQP Order constituents (i.e., dissolved cadmium, nitrate, total selenium, and sulphate) were generally below the respective guidelines at all monitoring stations (Minnow Environmental, 2018). Benthic invertebrate community data showed significantly lower richness and density downstream of the Elk River compared to upstream, and average tissue selenium concentrations were above the B.C. guideline of 4 milligram per kilogram (mg/kg) dry weight (dw) (B.C. MoE 2014) both upstream and downstream of the Elk River. Average selenium concentrations in Westslope Cutthroat Trout muscle tissue were above the B.C. tissue guidelines in samples collected from just north of the mouth and at the mouth of the Elk River, but all were lower than the United States Environmental Protection Agency (U.S. EPA) criterion and EVWQP Level 1 benchmark of 13 mg/kg dw (Minnow Environmental, 2018).

Transboundary effects into Alberta will not occur as a result of the Project as all watersheds within and surrounding the Project footprint are located on the western side of the Continental Divide. Additional local and regional information on fish and fish habitat is provided in Chapter 12, Section 12.4.1.1.

32.3.2.8 Landscapes and Ecosystems

32.3.2.8.1 Avalanche Chutes

Suitable terrain for the development of avalanche conditions may occur throughout the Rocky Mountains, extending into Alberta to the east, and into the United States of America (U.S.A.) to the south. Although specific mapping of avalanche chute ecosystems in these jurisdictions is not available, it is reasonable that such ecosystems are likely to occur in these areas. Additional local and regional information on avalanche chutes is provided in Chapter 13, Section 13.5.1.1.

32.3.2.8.2 Grasslands

In Alberta, mid-elevation grasslands occur in the Montane subregion at an elevation range of 825 to 1,850 m asl, and high elevation grasslands occur in the Subalpine subregion at an elevation range of 1,300 to 2,300 m asl (Downing and Pettapiece, 2006). Grasslands in Alberta have a similar composition to the Elk Valley, commonly dominated by bunch grasses, pine grasses, diverse forbs, and low shrubs. High elevation grasslands extend into Montana, generally occurring as two plant community types: a rough fescue-Idaho fescue association and the Idaho fescue-bluebunch wheatgrass (*Pseudoroegneria spicata*) association, which have analogues in B.C. (Vance et al., 2017). Additional local and regional information on grasslands is provided in Chapter 13, Section 13.5.1.2.

32.3.2.8.3 Riparian Habitat

Several passes between Alberta and B.C. contain riparian habitats that cross the Continental Divide. In Alberta, riparian areas occur throughout all subregions and are concentrated in valley bottoms and floodplains, with large aspen more prevalent in abundance and distribution (Downing and Pettapiece, 2006). South of the Elk Valley in Montana, the Continental Divide continues with riparian areas present throughout all sub-regions. The Elk River outlet into the Canadian portion of Lake Koochanusa is located approximately 80 km southwest of the Project. Lake Koochanusa extends 65 km from the U.S.A. border to the Kootenay River Inlet, providing large riparian areas upstream and non-natural riparian areas surrounding the reservoir. Water levels in the lake are controlled by Libby Dam, which results in significant seasonal variations in riparian habitat (Wetland Stewardship Partnership [WSP], 2010). Given the presence of riparian habitats in areas downstream and/or downwind from the Project, there is potential for the Project to result in transboundary effects to riparian habitats in the U.S.A. and/or the Province of Alberta. Additional local and regional information on riparian habitat is provided in Chapter 13, Section 13.5.1.3.

32.3.2.8.4 Old Growth and Mature Forests

Timoney (2001) identified eleven different generalized types of old growth forest with potential to occur in the Rocky Mountain Natural Subregion, including: plains cottonwood (*Populus deltoides*), aspen (*Populus tremuloides*) grove, aspen forest, balsam poplar (*Populus balsamifera*), Douglas fir (*Pseudotsuga menziesii*), limber pine (*Pinus flexilis*), montane parkland, lodgepole pine, and Engelmann spruce – subalpine fir (*Abies lasiocarpa*). In Alberta, old growth forests are affected by wetland drainage or alteration of flooding regimes, alteration of fire frequency and severity, resource development and disease (e.g., white pine blister rust [*Cronartium rubicola*]) (Timoney, 2001). There are no known publicly accessible inventories or other form of documentation of old growth and mature forest in the vicinity of the Project in Alberta. Additional local and regional information on old growth and mature forests is provided in Chapter 13, Section 13.5.1.4.

32.3.2.8.5 Wetland Ecosystems

The Elk River outlet into the Canadian portion of Lake Koochanusa is located approximately 80 km southwest of the Project. Lake Koochanusa extends 65 km from the U.S.A. border to the Kootenay River Inlet, providing a wide range of aquatic habitat. Wetlands are not present along the foreshore of Lake Koochanusa (Leschied, 2017). Transboundary effects into Alberta will not occur as a result of the Project as all watersheds within and surrounding the Project footprint are located on the western side of the Continental Divide. Additional local and regional information on wetlands is provided in Chapter 13, Section 13.5.1.5.

32.3.2.9 Vegetation

32.3.2.9.1 Listed and Sensitive Plant Communities and Species

The Southern Rocky Mountain Trench and the Columbia Basin are considered a “hotspot” and a centre of rarity in the province for plants (Douglas et al., 1994). Plant communities of similar composition and structure to those found in the Landscapes and Ecosystems LSA can occur in neighbouring areas in Alberta and Montana (Baker et al., 2020; Montana Natural Heritage Program [MNHP], 2017) as well as the Dominion Coal Blocks south of the Project. The Rocky Mountain Natural Region of Alberta adjacent to the

Elk Valley contains several environmentally significant areas of international, national, provincial, and regional significance (Downing and Pettapiece, 2006). Red-listed plants with the potential to occur in the Landscapes and Ecosystems LSA are either secure, or vulnerable (NatureServe S3 ranking) in Alberta due to restricted range, often occurring more abundantly such as Parry's townsendia. Cusick's paintbrush (*Castilleja cusickii*) is considered vulnerable and a watch list species in Alberta (Alberta Conservation Information Management System [ACIMS], 2018) and is listed as Unknown in B.C. (B.C. CDC, n.d.a). Additional local and regional information on sensitive plant communities and species is provided in Chapter 14, Section 14.5.1.1.

32.3.2.9.2 Limber Pine

Limber pine naturally occurs in western North America (Langor, 2007). To the south of the Landscapes and Ecosystems RSA, limber pine has been observed in the Flathead Valley on the MacDonald Range and in abundant populations to the east of the Landscapes and Ecosystems RSA in the Crowsnest Pass, Alberta (Alberta Whitebark and Limber Pine Recovery Team [AWLPRT], 2014, B.C. CDC, 2021). Undocumented populations likely occur in the Flathead valley between B.C. and Montana (Piggot and Moody, 2013). Dispersal of limber pine seed by Clark's Nutcracker can extend up to 33 km which may extend seed dispersal between populations in Alberta, B.C., and Montana (Lorenz et al., 2011) and across provincial and federal boundaries. High rates of blister rust infections occur in southwest Alberta, which has resulted in increased mortality and reduced seed availability (COSEWIC, 2014a; Peters and Visscher, 2019). Additional local and regional information on limber pine is provided in Chapter 14, Section 14.5.1.2.

32.3.2.9.3 Whitebark Pine

Whitebark pine occurs in both neighbouring Alberta and Montana in habitats that are similar to that encountered in the Landscapes and Ecosystems LSA and Landscapes and Ecosystems RSA. Some of the highest levels of blister rust infestations have been documented directly adjacent to B.C. in the Waterton region, approximately 85 km southeast of the Project on the east slope of the Rocky Mountains (Smith et al., 2013). White pine blister rust has the potential to spread to and from transboundary areas, as spores can disperse as far as 1,000 km in large wind events (Frank et al., 2008). The high incidence of disease and mortality in these stands also has implications for natural regeneration, as these stands no longer provide a healthy seed source to the surrounding area. Additional local and regional information on whitebark pine is provided in Chapter 14, Section 14.5.1.3.

32.3.2.10 Wildlife and Wildlife Habitat

32.3.2.10.1 Ungulates

Moose

Moose are highly mobile animals with known populations occupying both sides of the B.C.-Alberta border. It is therefore highly likely that individuals exhibit seasonal or regular transboundary movements. Known or anticipated movement corridors along the Continental Divide include the Crowsnest, Deadman, and Racehorse passes. The Canada/United States border to the south and all other federal lands described in Chapter 1, Section 1.3.3 are beyond the home range of any of the ungulate VCs. Additional local and regional information on moose is provided in Chapter 15, Section 15.4.2.1.1.

Elk

Elk are highly mobile animals that exhibit migratory behaviour. Elk occupy both sides of the B.C.-Alberta border and were recorded using transboundary mountain passes within the Terrestrial LSA. It is therefore highly likely that some individuals or herds exhibit regular transboundary movements. Known or anticipated movement corridors along the Continental Divide include the Crowsnest, Deadman, and Racehorse passes. Additional local and regional information on elk is provided in Chapter 15, Section 15.4.2.1.2.

Bighorn Sheep and Mountain Goat

Bighorn sheep and mountain goat are highly mobile animals with relatively large home ranges and known populations existing along the Continental Divide. Regular transboundary movements by bighorn sheep and mountain goat herds are documented in the Terrestrial RSA (Poole et al., 2009; Poole et al., 2018). It is therefore highly likely that herds existing along the Continental Divide in the Terrestrial LSA exhibit regular transboundary movements. Additional local and regional information on bighorn sheep and mountain goat is provided in Chapter 15, Section 15.4.2.1.3.

32.3.2.10.2 Carnivores

Grizzly Bear

Grizzly bears are highly mobile animals with markedly large home ranges and a distribution that includes contiguous portions of Alberta and Montana (COSEWIC, 2012a). It is therefore highly likely that individuals exhibit seasonal or regular transboundary movements within the Grizzly Bear RSA. Known or anticipated movement corridors along the Continental Divide within the Terrestrial LSA include riparian and alpine habitats within the Crowsnest, Deadman, and Racehorse passes (Apps et al., 2007).

Loss of connectivity for grizzly bear is extensive across the Canada-U.S.A. border largely due to habitat fragmentation from development (i.e., roads and settlements), human-caused mortalities, and low recruitment (Proctor et al., 2012; Lamb et al., 2016). Transboundary immigration is necessary for population viability and long-term persistence (Proctor et al., 2012). Grizzly bear populations in the southern Rocky Mountains of B.C. and Alberta connect populations further south, into Montana (Mowat et al., 2020b). Transboundary movements by grizzly bear from the southern Canadian Rocky Mountain population to Montana are particularly important due to the unoccupied areas to the east and west of the distribution (Proctor et al., 2012; Mowat et al., 2020b). Additional local and regional information on grizzly bear is provided in Chapter 15, Section 15.5.2.1.1.

Wolverine

Wolverines are highly mobile and wide-ranging animals with exceptionally large home ranges and a distribution that includes contiguous portions of Alberta and Montana (COSEWIC, 2014b). It is therefore highly likely that individuals exhibit seasonal or regular transboundary movements within the Terrestrial RSA. Known or anticipated movement corridors to Alberta along the Continental Divide including the Crowsnest, Deadman, and Racehorse passes (Apps et al., 2007). B.C. contains extensive areas of spring snow cover that connect to snow-covered areas in northwestern Montana (McKelvey et al., 2011). The Kootenay region has been identified as a potential corridor for wolverine movements into the U.S.A. (Singleton, 2002; Schwartz et al., 2009; McKelvey et al., 2011). Such transboundary movements are

important for the population viability and long-term persistence of wolverine populations in southeastern B.C. and contiguous U.S.A. (Krebs et al., 2004; Kortello and Hausleitner, 2014). Additional local and regional information on wolverine is provided in Chapter 15, Section 15.5.2.1.2.

American Badger

American badgers are wide ranging animals with known populations existing in Alberta and Montana. Populations of the subspecies *taxus* in southern Alberta and north-central Montana showed high levels of genetic variation, indicating high gene flow (Kyle et al., 2004). In addition, there is evidence of gene flow in the *jeffersonii* East subpopulation between the East Kootenay population and northwestern Montana populations, showing the importance of transboundary considerations in conservation management (Kyle et al., 2004). Although *taxidea* and *jeffersonii* subpopulations are connected further south by populations in the U.S.A., movement between the two through this area is very unlikely due to unsuitable habitat as well as geographic barriers like the Bitterroot Mountain range and the Okanagan Highlands (Washington Wildlife Habitat Connectivity Working Group, 2010; COSEWIC, 2012b). Translocations have occurred across the Canada-U.S.A. border, and American badgers in the East Kootenay region and in northwest Montana are believed to exist as one population (Kyle et al., 2004). Additional local and regional information on American badger is provided in Chapter 15, Section 15.5.2.1.3.

American Marten

American marten are mobile animals with high dispersal capacity (Broquet et al., 2006). It is therefore highly likely that individuals regularly disperse across the Alberta border. Likely dispersal corridors along the Continental Divide include contiguous old and mature mid-elevational forest patches within the Crowsnest, Deadman, and Racehorse passes. Additional local and regional information on American marten is provided in Chapter 15, Section 15.5.2.1.4.

Canada Lynx

Canada lynx are highly mobile animals with relatively large home ranges and known populations existing in Alberta and Montana. It is therefore highly likely that individuals exhibit seasonal or regular transboundary movements. Known or anticipated movement corridors include riparian and forested habitats in the Rocky Mountain Ranges including the Crowsnest, Deadman, and Racehorse passes. The contiguous northwestern Montana and Idaho population unit is thought to support 200 to 300 resident Canada lynx, as habitats are naturally patchy and fragmented due to topography, elevation, and aspect constraints (U.S. Fish and Wildlife Service, 2017). Maintaining transboundary connectivity is important for the persistence of Canada lynx, as populations that exist adjacent to Canadian provinces may function as peripheral subpopulations of the larger metapopulation distributed across Canada and Alaska (McKelvey et al., 2000; U.S. Fish and Wildlife Service, 2017). The Elk Valley Canada lynx population likely acts as a source population to the contiguous US (Apps et al., 1999; McKelvey, et al., 2000; Apps et al., 2007). Additional local and regional information on Canada lynx is provided in Chapter 15, Section 15.5.2.1.5.

32.3.2.10.3 Bats

Bats are highly mobile and for those species that are migratory, spend a substantial amount of the year outside Canada. Bat populations within the Terrestrial LSA and Birds, Bats, and Amphibians RSA are likely part of larger populations that span across both the B.C. and across transboundary lands. Additional local and regional information on bats is provided in Chapter 15, Section 15.6.2.

32.3.2.10.4 Birds

Birds are highly mobile and, for those species that are migratory, spend a substantial amount of the year outside Canada. Bird populations within the Terrestrial LSA and Birds, Bats, and Amphibians RSA are likely part of larger populations that spans across both transboundary lands, including federal land and lands outside of B.C. and Canada. Additional local and regional bird community information is provided in Chapter 15, Section 15.7.2.

32.3.2.10.5 Amphibians (Western Toad and Columbia Spotted Frog)

Western toad can migrate up to 7 km from breeding ponds (Davis, 2000) at high elevations, which may result in potential transboundary movements between B.C. and Alberta via the Continental Divide, approximately 5 km from the Project. Juvenile and adult western toad were observed during baseline studies for the Grassy Mountain Coal Project (Millennium EMS Solutions Ltd., 2016b), located approximately 21 km east of the Terrestrial LSA near Blairmore, Alberta. Observations of the non-calling population of western toad were also recorded in Alberta within approximately 5 km of the Terrestrial LSA, as were Columbia spotted frog (Alberta Environment and Parks, 2020). Although most Columbia spotted frog migrate less than 2 km between breeding and foraging sites, individuals have been recorded to migrate up to 7.5 km (Pilliod et al., 2002). Transboundary movements of amphibians from the Birds, Bats, and Amphibians RSA to the United States are not expected, given the distance to that border. Additional local and regional information on amphibian species is provided in Chapter 15, Section 15.8.2.

32.3.2.10.6 Gillette's Checkerspot

Hobbs (2008) indicated that there have been four geographically distinct populations observed at ten sites within Gillette's checkerspot's range in the southeastern portion of the province. The home range of Gillette's checkerspot is thought to be relatively small (<1 km). Transboundary movements of Gillette's checkerspot beyond the Terrestrial LSA transboundary lands is unlikely. Additional local and regional information on Gillette's checkerspot is provided in Chapter 15, Section 15.9.2.

32.3.2.11 Archaeological Resources / Physical and Cultural Heritage

The Elk Valley forms part of the Continental Ranges of the Rocky Mountains. According to the Archaeological Overview Assessments (AOA) completed for the Project (Choquette, 2012; 2014) the physiography of a region influences the movements of both animals and humans. Choquette (2014) states: "the north-south troughs represented by the valleys of Alexander Creek and the Elk Valley naturally made these travel corridors, the two of them connected by Grave Creek. In addition, the Continental Divide, which bounds much of the LSA on the east, is breached by Racehorse, Deadman, Phillips, and Crowsnest passes connecting to the foothills and plains further east" (Choquette, 2014, p.11). Natural habitats were important aspects of the land that influenced the movements of game animals and pre-contact Indigenous peoples. Some of the grasslands, such as those at high elevations, are relics of more extensive earlier Holocene communities while others, in particular those which occupy Neoglacial floodplain terraces, are more recent by definition of the age of the landforms upon which they are situated (Choquette, 2012, Choquette, 2014). No transboundary effects on physical and cultural heritage are anticipated because impacts to archaeological and palaeontological resources will be limited to the area of physical disturbance within the Project footprint (direct effects) or in close proximity to the Project footprint (indirect effects due to loss of geographical context). Additional information on local and regional characteristics of physical and cultural heritage are provided in Chapter 16, Section 16.3.

32.3.2.12 Economic Considerations

As presented in Chapter 17, the Project is expected to result in the following positive residual effects:

- Increase in employment opportunities and income in the Economic Conditions LSA and RSA;
- Contribution to the regional and local economies; and
- Increased payment to government through taxes and royalty payments.

Of the above positive effects, there is potential that employees could be drawn to the Project from outside the Economic Conditions LSA and RSA and as a result, the employment income benefits of the Project could extend beyond these study boundaries. Based on information collected for the assessment, it is understood that some employees in the Elk Valley coal mines come from out of province, including Alberta. The shift schedules at the mines (e.g., 4 day on/off shifts) allow for employees to come from out of the region to work at the mines. As such, it is possible that some of the employment income benefit could cross provincial boundaries, most notably to parts of Alberta. As well as employees, it is possible that some required goods (e.g., mine equipment) and services (e.g., construction contractors) could be procured from out of Province. Additional information on local and regional economic conditions is provided in Chapter 17, Section 17.3.

32.3.2.13 Socio-Community and Land Use

The population of the local area includes a variety of small communities in B.C. and Alberta, including Sparwood, Elkford, Fernie, and Crowsnest Pass. Individuals also live in the RDEK, including Electoral Area A. The community of Cranbrook is also considered as a regional service centre for the Project. Local communities such as these are likely to provide workers and house new workers, and potentially their families, either permanently or temporarily. Local communities in the Socio-Community LSA in B.C. can be characterized as having a relatively larger working age population when compared to the RDEK, Cranbrook, and Crowsnest Pass. These communities also have a lower median age. The RDEK also has a large temporary or seasonal population. Temporary and seasonal populations enter the Socio-Community LSA for a variety of reasons, including recreation, tourism, and working in the mining sector. Housing characteristics in the Socio-Community LSA and RSA are defined by movements in the mining sectors, with values corresponding to the sector's performance. Availability of rental housing was identified as a concern through primary data collection. Additional information on local and regional socio-community condition is provided in Chapter 18, Section 18.3.

The East Kootenay region is characterized by resource extraction industries such as mining and forestry, as well as nature-based tourism and recreation features and opportunities. The Elk Valley offers an abundance of opportunities for outdoor recreation, which is highly valued by local residents and visitors to the area. Hunting and fishing are prevalent activities throughout the region while there is also an extensive and interconnected network of local and regional trails used for hiking, running, crossing country skiing, and mountain biking. Additional information on local and regional land use is provided in Chapter 19, Section 19.3.

32.3.2.14 Human and Ecological Health

The proposed Project is located in the East Kootenay Coal Fields, an area with a long history of mining exploration and extraction activities. Since 1898, more than 830,000 million tonnes of coal (most of it being coking coal) has been produced from the Crowsnest and Elk River coalfields. Presently, coal mining

operations are ongoing at Fording River, Greenhills, Line Creek, and Elkview Operations. As described in Chapter 10, the hydrologic conditions of the Aquatic LSA and Aquatic RSA are controlled by natural factors (e.g., climate; relief; geology; vegetation) and anthropogenic factors (e.g., mining; forestry; agriculture; hydroelectric dams; climate change). The Aquatic RSA for the Project is situated over the dividing line of Upper Kootenay Basin and the Central Kootenay Basin hydrologic zones (Zone Numbers 19 and 20, respectively). This area is characterized by low precipitation and dry summers, cold and dry winters, and low-to-moderate snowpack (Columbia Basin Trust, 2017). Additional information on local and regional human and ecological health considerations is provided in Chapter 22, Section 22.4.1.

32.3.2.15 Indigenous Communities

Section 32.4 presents information on Indigenous Communities and related discussion of transboundary lands, as applicable. The assessment of changes to the environment on Indigenous peoples, including changes to transboundary lands as it relates to Indigenous Communities, is presented in Section 32.4.

32.3.3 Project Effects Assessment

Chapters 6 to 19, and Chapters 22 to 31 of the Application/EIS assessed the potential for transboundary effects for all VCs and detailed the potential changes that may occur on transboundary lands within the respective LSAs and RSAs for each VC. Information from the VC assessment chapters of the Application/EIS was used to assess the potential for effects on transboundary lands as a result of the Project, which has been summarized in Section 32.3.3. Where changes to or on transboundary lands are anticipated as a result of the Project, the Project residual effects assessments for each VC formed the basis by which Project and residual effects are evaluated for transboundary lands. The assessment of changes to the environment on Indigenous peoples, including changes to transboundary lands as it relates to Indigenous Communities, is presented in Section 32.4. Effects related to unplanned events (e.g., spills, equipment malfunctions, accidents) are presented in Chapter 21.

32.3.3.1 Thresholds for Determining Significance of Residual Effects

The significance thresholds for determining if an adverse residual transboundary environmental effect on a VC is significant or not significant are identical to the thresholds used for the VC-specific Project and cumulative effects assessments (summarized in Table 32.3-3). The reader is referred to each individual VC assessment for the full text of the significance thresholds.

Table 32.3-3: Thresholds for Determining the Significance of Potential Transboundary Effects by Valued Component

Valued Component	Significance Threshold
Atmospheric Environment	<p>An effect that results in or causes:</p> <ul style="list-style-type: none"> A change in ambient criteria air contaminant concentrations (as a measure of a change in air quality) that causes a widespread degradation of the quality of the ambient air in the Atmospheric LSA and Atmospheric RSA such that the maximum outside modelled property boundary Project-related ground-level concentration plus the conservative background level of the air contaminant being assessed frequently exceeds the respective, most stringent ambient air quality objective for a particular contaminant. See Chapter 6, Section 6.5.1 for more information.

Valued Component	Significance Threshold
	<ul style="list-style-type: none"> It is not possible to assess significance related to a measured environmental effect on climate change on a Project-specific basis. Project emissions will be measurable and potentially important in the context of local and provincial GHG emissions, but will be very small in a global context. See Chapter 6, Section 6.5.1 for more information.
Acoustic Environment	<p>An effect that results in or causes:</p> <ul style="list-style-type: none"> An exceedance in the human receptor thresholds listed in Chapter 7, Table 7.5-1 and/or the wildlife receptor thresholds in Table 7.5-2.
Soils and Terrain	<p>An effect that results in or causes:</p> <ul style="list-style-type: none"> Changes to soil quantity or quality so that successful reclamation to self-sustaining ecosystems with an average capability comparable to that of the present baseline is prevented. Changes to terrain that result in increased slope (in general, increase of slope of >15%) creating unstable terrain features, and increased potential for geohazards of greater frequency and magnitude. See Chapter 8, Section 8.5.1 for more information.
Groundwater Quality and Quantity	<p>An effect that results in or causes:</p> <ul style="list-style-type: none"> Greater than 10% change in flows relative to baseline conditions (Locke and Paul 2011; Beecher et al 2016), reduction in the quantity of groundwater recoverable from an aquifer on a sustainable basis such that it no longer meets present or future needs of current users or land owners, or reduction in groundwater discharge and consequent adverse effects to baseflow to a stream, preventing current users from meeting present and future needs on a sustainable basis. Exceedance of a guideline value (except an exceedance related to baseline concentrations), an increase of greater than 10% from the mean of baseline conditions over a given season (KNC, 2020), or for constituents that have been demonstrated to exceed these criteria during the baseline assessment (e.g., lithium and cobalt), an increase of greater than 10% from the 95th percentile of baseline concentrations over a given season. See Chapter 9, Section 9.5.1 for more information.
Surface Water Quantity	<p>An effect that results in or causes:</p> <ul style="list-style-type: none"> An increase in streamflows within the receiving watercourses which would cause a higher potential for flooding or erosion and related impacts to downstream lands or infrastructure; or A reduction in streamflows within the receiving watercourses which would cause changes to the fluvial regime and geomorphic conditions. See Chapter 10, Section 10.5.1 for more information.
Surface Water Quality	<ul style="list-style-type: none"> Approved or working B.C. water quality guidelines for the protection of freshwater aquatic life, the CCME guidelines for the protection of freshwater aquatic life (where B.C. guidelines do not exist), and the EVWQP long-term water quality targets (considered for downstream effects in the Elk River and Lake Koocanusa only; Teck, 2014). Where both short-term (acute) and long-term (chronic) guidelines exist, the long-term guidelines were used as the threshold values as a conservative measure. See Chapter 11, Section 11.5.1 for more information.
Fish and Fish Habitat	<p>An effect that results in or causes:</p> <ul style="list-style-type: none"> An unauthorized fish death by any means other than fishing, the unauthorized release of a deleterious substance, or one that results in an unauthorized HADD (as defined

Valued Component	Significance Threshold
	by subsection 35(1) of the Fisheries Act). See Chapter 12, Section 12.5.1 for more information.
Landscapes and Ecosystems	<p>An effect that results in or causes:</p> <ul style="list-style-type: none"> • Impacts to more than 25% of avalanche chute ecosystems within the Landscapes and Ecosystems LSA (i.e., high magnitude) that is not reversible (i.e., permanent duration) within the timeframe of the Post-Closure phase following implementation of the Ecological Restoration Plan. See Chapter 13, Section 13.6.1.1 for more information. • Results in the loss of grassland ecosystems of an extent that poses a risk to the long-term viability and persistence of grassland ecosystems in the Landscapes and Ecosystems RSA, against which avoidance, mitigation, or restoration measures cannot be feasibly applied or results in the direct mortality of an individual listed plant species or ecological community such that the likelihood for long-term survival of the listed plant population or ecological community in the East Kootenay is reduced as a result. See Chapter 13, Section 13.6.1.2 for more information. • The removal of more than 20% of riparian habitat within the Landscapes and Ecosystems LSA (i.e., high magnitude) that is not reversible (i.e., permanent duration) within the timeframe of the Post-Closure phase following implementation of the Ecological Restoration Plan. See Chapter 13, Section 13.6.1.3 for more information. • A high magnitude, irreversible change in old growth and mature forest from baseline condition across any frequency of occurrence. See Chapter 13, Section 13.6.1.4 for more information. • A Project-caused effect that results in a net loss of wetland function that cannot be avoided, mitigated, or compensated in accordance with objectives of the Federal Policy on Wetland Conservation. See Chapter 13, Section 13.6.1.5 for more information.
Vegetation	<p>An effect that results in or causes:</p> <ul style="list-style-type: none"> • Direct mortality of a listed plant community or species or limber pine such that the likelihood for long-term survival of the listed plant or ecological community in the East Kootenay region is substantially reduced as a result. See Chapter 14, Section 14.6.1.1 for more information. • Alteration of the terrestrial habitat in which a listed plant community or species or limber pine occurs in such a way as to cause a substantial decline in the listed plant population or community abundance or distribution that in turn creates a reduction of the listed plant community or species long-term survival in B.C. • Removal of individuals or degradation of habitat conditions to result in a permanent and irreversible net loss of critical habitat (all types combined). See Chapter 14, Section 14.6.1.3 for more information. • Permanent and irreversible reduction of whitebark pine density to below the range of natural variation or minimum basal area of 2 m²/ha, whichever is greater.
Wildlife and Wildlife Habitat	<p>An effect that results in or causes:</p> <ul style="list-style-type: none"> • The non-permitted contravention of any of the prohibitions stated in Sections 32-36 of the Species at Risk Act including injury, harassment, or mortality of an species at risk; • The non-permitted loss of critical habitat for species at risk; or • A decline in abundance or change in distribution of wildlife populations such that the populations will not be sustainable in the VC-specific study areas. See Chapter 15,

Valued Component	Significance Threshold
	<p>Sections 15.4.3.1, 15.5.3.1, 15.5.6.1, 15.4.3.1, 15.8.3.1, and 15.9.3.1 for more information.</p> <ul style="list-style-type: none"> • A decline in abundance or change in distribution of Gillette’s checkerspot populations such that the populations will not be sustainable in the Terrestrial LSA. See Chapter 15, Section 15.9.3.1 for more information.
Archaeological Resources / Physical and Cultural Resources	<p>An effect that results in or causes:</p> <ul style="list-style-type: none"> • A permanent Project-related disturbance to, or destruction of, all or part of an archaeological or palaeontological resource that is considered to be of increased importance due to factors such as: rarity, cultural significance, or research opportunities, and that cannot be adequately or feasibly mitigated or compensated. See Chapter 16, Section 16.5.1 for more information.
Economic Conditions	<p>An effect that results in or causes:</p> <ul style="list-style-type: none"> • An unacceptable change in baseline conditions that is beyond the historical range of variability, or one which alters the current economic system to an extent that is beyond the capacity of the economic system to respond. Both potential positive and adverse economic effects were considered in this assessment. See Chapter 17, Section 17.5.1 for more information.
Socio-Community	<p>An effect that results in or causes:</p> <ul style="list-style-type: none"> • An unacceptable change in baseline conditions that is beyond the historical range of variability, or one which alters the current socio-community structures to an extent that the level and quality of service are routinely and persistently reduced below current levels for an extended period such that a socio-community system is not able to respond. See Chapter 18, Section 18.5.1 for more information.
Land Use and Visual Aesthetics	<p>An effect that results in or causes:</p> <ul style="list-style-type: none"> • An unacceptable change in baseline conditions that is beyond the historical range of variability, or one which alters the current land use structures to an extent that is beyond the capacity of the land use system to respond. See Chapter 19, Section 19.5.1 for more information.
Human and Ecological Health	<p>An effect that results in or causes:</p> <ul style="list-style-type: none"> • An exceedance in the risk levels for ecological receptors. See Chapter 22, Section 22.4.2.1.1. • An exceedance in the risk levels for human health. See Chapter 22, Section 22.4.2.1.2.

32.3.3.2 Project Effects on Transboundary Lands

32.3.3.2.1 Air Quality and Greenhouse Gases

The Project is located approximately 5 km west from the Alberta border along the western side of the continental divide and 85 km north from the Montana border in the U.S.A. As discussed in Chapter 6, Section 6.4.1.2.2, the most frequent wind direction recorded at the baseline climate station was from the southeast. Consequently, it is anticipated that the majority of air emissions (particularly fugitive dust) will be blown towards the west/northwest of the site; however, the potential for transboundary air quality effects into both Alberta and the U.S.A. have the potential to occur as a result of the Project. Federal land is not required to facilitate the Project and the Project does not physically overlap with any federal land,

though there is potential for transboundary air quality effects to occur on federal lands as a result of the Project.

Project greenhouse gas emissions will be measurable and potentially important in the context of local and provincial GHG emissions but will be very small in a global context. Despite the relative low quantity of emissions, the Project will contribute to national and international greenhouse gas emissions, thereby contributing to global climate change at the transboundary level.

Spatial Distribution of Sensitive Receptors with >1% Exceedance Frequencies of Criteria Air Contaminants Objectives

Sensitive receptors with greater than 1% of exceedance frequencies of air quality objectives are located close to the Project footprint boundary. Of these, Receptor S 202 is the furthest away from the Project footprint boundary (approximately 2 km; Figure 6.5-4). All other receptors with greater than 1% of exceedance frequency of air quality objectives are located within 2 km of the Project footprint boundary.

Consequently, no measurable transboundary effects on air quality in Alberta, the U.S.A., or on federal lands are anticipated as a result of the Project. Potential effects to air quality on federal lands or transboundary lands outside of B.C. or Canada are therefore not considered further. However, potential effects to greenhouse gas emissions at the transboundary level are carried forward for further assessment.

32.3.3.2.2 Acoustic Environment

Due to their distance from the Project and associated Project activities and components affecting noise and vibration, and since noise and vibration levels attenuate with increasing distance from their source such that they are not normally distinguishable from background within 2 to 3 km from the source, noise and vibration levels arising from the Project are not expected to be distinguishable from background levels in either the bordering province of Alberta, the bordering State of Montana, or on federal lands. As such, transboundary effects on the acoustic environment arising from noise and vibration from the Project are not expected to occur in either province or state or on federal lands. Potential effects to the acoustic environment on federal lands or transboundary lands outside of B.C. or Canada are therefore not considered further.

32.3.3.2.3 Soils and Terrain

Due to their distance from the Project and associated Project activities and components, potential effects on soil quantity and quality and terrain arising from the Project are not expected to occur in either the bordering province of Alberta, the bordering State of Montana, or on federal lands. As such, transboundary effects on soil and terrain arising from the Project are not expected to occur in either province or state or on federal lands. Potential effects to soils and terrain on federal lands or transboundary lands outside of B.C. or Canada are therefore not considered further.

32.3.3.2.4 Groundwater Quality and Quantity

Due to their distance from the Project and associated Project activities and components that may affect groundwater quantity and quality and based on the groundwater catchment divides indicated by regional topography and watercourses, potential groundwater effects arising from the Project are not expected to

occur in either the bordering province of Alberta, the bordering State of Montana, or on federal lands. As such, transboundary effects on groundwater quantity or quality arising from the Project are not expected to occur in either province or state or on federal lands. Potential effects to groundwater quality or quantity on federal lands or transboundary lands outside of B.C. or Canada are therefore not considered further.

32.3.3.2.5 Surface Water Quantity

Although Parcel 73 and a small portion of Parcel 82 are located within the Aquatic RSA, changes to surface water quantity within these federal lands are not expected as the watercourses that have the potential to be affected by the Project (i.e., West Alexander Creek, Alexander Creek, the lower reaches of Michel Creek, and the Elk River) do not overlap with the Dominion Coal Blocks. Transboundary effects to surface water quantity in Lake Koochanusa south of the B.C./Montana border during the Operations, Reclamation and Closure, and Post-Closure phases are not anticipated, as the Project footprint accounts for a very small portion of the contributing watershed area of the Kootenay River at the Canada-U.S. border (i.e., less than 0.06%). Transboundary effects into Alberta will not occur as a result of the Project as all watersheds within and surrounding the Project footprint are located on the western side of the Continental Divide. Potential effects to surface water quantity on federal lands or transboundary lands outside of B.C. or Canada are therefore not considered further.

32.3.3.2.6 Surface Water Quality

There is the potential for transboundary effects to surface water quality in Lake Koochanusa to occur during the Operations, Reclamation and Closure, and Post-Closure phases of the Project as a result of the Interim and Main Sediment Pond discharges to the receiving environment into West Alexander Creek. Flow from the sediment ponds will move downstream from Alexander Creek to Michel Creek and subsequently the Elk River to its outlet with Lake Koochanusa, approximately 80 km downstream of the Project; however, contributions from the Project to changes in surface water quality are predicted to be minimal, including transboundary effects into the U.S.A. Transboundary effects into Alberta will not occur as a result of the Project as all watersheds within and surrounding the Project footprint are located on the western side of the Continental Divide. Potential effects to surface water quality on federal lands or transboundary lands outside of B.C. or Canada are therefore not considered further.

32.3.3.2.7 Fish and Fish Habitat

Flow from the sediment ponds will move downstream from Alexander Creek to Michel Creek and subsequently the Elk River to its outlet with Lake Koochanusa, approximately 80 km downstream of the Project. Transboundary effects to fish and fish habitat, as a result of changes in surface water quantity, in Lake Koochanusa during the Operations, Reclamation and Closure, and Post-Closure phase are not anticipated, as the Project footprint accounts for a very small portion of the contributing watershed area of the Kootenay River at the Canada-U.S.A. border (i.e., less than 0.06%).

Potential impacts to fish and fish habitat caused by changes in water quality have the potential to impact waterbodies downstream of the Project in the Fish and Fish Habitat LSA and Aquatic RSA; however, minimal contribution lower down in the Aquatic RSA (Elk River and Lake Koochanusa) is anticipated to occur due to the sediment ponds and adequate management of releases downstream, including transboundary effects into the U.S.A. A detailed description on how selenium will be managed is presented in Chapter 11.

Transboundary effects into Alberta will not occur as a result of the Project, as all watersheds within and surrounding the Project footprint are located on the western side of the Continental Divide. Potential effects to fish and fish habitat on federal lands or transboundary lands outside of B.C. or Canada are therefore not considered further.

32.3.3.2.8 Landscapes and Ecosystems

The Project is located approximately 5 km west from the provincial border with Alberta and approximately 85 km north from the international border with the State of Montana. The most frequent wind direction recorded at the Project baseline climate station was from the southeast while the wind data recorded at the Sparwood CS station is predominant northerly and southerly. The atmospheric environment assessment (Chapter 6, Section 6.5.4.2.1) concluded that no measureable transboundary effects on air quality in Alberta, the United States, or on federal lands are anticipated to occur as a result of the Project. As such, no transboundary effects to avalanche chutes, grasslands, riparian habitat, old growth and mature forests, and wetlands as they relate to fugitive dust or changes in air quality are anticipated to occur. Potential effects to avalanche chutes, grasslands, riparian habitat, old growth and mature forests, and wetlands on federal lands or transboundary lands outside of B.C. or Canada are therefore not considered further.

While the loss of grasslands is important regionally, loss of grasslands as a result of the Project is limited to the Project footprint and as such, the Project is not expected to result in transboundary effects to grasslands in Alberta or the U.S.A. Given the proximity of the Project to international borders and that all watersheds within and surrounding the Project footprint are located on the western side of the Continental Divide, it is unlikely riparian habitat located on transboundary lands will be impacted by sediments, deleterious substances, and/or non-native and invasive species dispersed from the Project. As described in Chapter 11, Section 11.5.2.3, changes to surface water quality within the Dominion Coal Blocks located approximately 20 and 40 km southwest of the Project are not anticipated to occur; therefore, effects to riparian habitat on federal lands are not anticipated.

32.3.3.2.9 Vegetation

Listed and Sensitive Plant Communities and Species

No transboundary effects to listed plants communities or species in Alberta, the U.S.A., or on federal lands are anticipated to occur as a result of the Project, as potential effects on listed plant communities and species as a result of the Project are unlikely to occur outside the Landscapes and Ecosystems LSA. None of the Red-listed species with the potential to occur in the Landscapes and Ecosystems LSA or Landscapes and Ecosystems RSA appear as a species of concern in Montana (MNHP, 2020). Given the Project's distance from transboundary lands, including the Dominion Coal Blocks (20 and 40 km southwest), Alberta (5 km), and Montana (85 km), no transboundary effects to listed and sensitive plant species and communities are anticipated as a result of the Project. Potential effects to listed and sensitive plant communities and species on federal lands or transboundary lands outside of B.C. or Canada are therefore not considered further.

Limber and Whitebark Pine

The Project is located approximately 5 km west of the Alberta provincial border, which is downwind and downslope from the Project. The Project is located approximately 85 km north of the international border

with the State of Montana which is downslope from the Project. Although the Project does not involve the removal of limber pine or whitebark pine and its habitat in other neighbouring jurisdictions, there is potential for dust and airborne deleterious substances to be dispersed from the Project footprint to whitebark pine occurrences and habitat in the Province of Alberta and the U.S.A., and on federal lands. Given the distance between the Project and the respective transboundary lands located within and outside the Elk Valley, potential dust and airborne deleterious substances from the Project are likely to be substantially diluted and dispersed within the greater airshed that overlap with the Project, and are unlikely to be of sufficient magnitude to generate a detectable change in transboundary occurrences of whitebark pine (and its habitat) from existing conditions in these adjacent jurisdictions. Although Clark's Nutcracker can disperse whitebark pine seeds up to a maximum of 36 km, there is an abundance of suitable habitat and existing populations of whitebark pine outside the Landscapes and Ecosystems LSA. Consequently, given the abundance of whitebark pine populations outside of the Landscapes and Ecosystems LSA, the influence of the Project in Alberta, the State of Montana, and on federal lands is considered to be negligible. Potential effects to limber and whitebark pine on federal lands or transboundary lands outside of B.C. or Canada are therefore not considered further.

32.3.3.2.10 Wildlife and Wildlife Habitat

Ungulates

Moose, elk, bighorn sheep, and mountain goat are highly mobile animals that cover large ranges, with known populations occupying both sides of the B.C./Alberta border. Movements across the Continental Divide by bighorn sheep and mountain goats have been documented in the Terrestrial RSA (Poole et al., 2009; Poole et al., 2018). It is highly likely that populations in the Terrestrial LSA exhibit transboundary movements to Alberta and may exhibit movements to the closest federal lands to the Project, Dominion Coal Block Parcels 73 and 82 located outside the Terrestrial LSA and approximately 20 and 40 km southwest of the Project, respectively. Known or anticipated movement corridors along the Continental Divide include the Crowsnest, Deadman, and Racehorse passes. Residual effects to ungulate VCs (if present) have the potential to be considered transboundary effects within Alberta. The Canada/United States of America (U.S.A.) border to the south and all other federal lands described in Chapter 1, Section 1.3.3 are beyond the home range of any of the ungulate VCs. Residual effects to ungulate VCs (if present) are therefore not expected to be transboundary effects within the U.S.A or on federal lands located outside of the Elk Valley.

Carnivores

Grizzly bear, wolverine, and Canada lynx are highly mobile and wide-ranging animals. It is likely that individuals present in the Terrestrial LSA make seasonal or occasional movements into Alberta and possibly the U.S.A. American badger and American marten have high dispersal capability and those present in the Terrestrial LSA may disperse into Alberta. American badgers are believed to be part of the same population as those in Montana. Given that residual effects to carnivore VCs are predicted to occur related to habitat loss and degradation and disruption to movement, there is a potential for these effects to influence transboundary jurisdictions.

Bats

Bats are highly mobile and for those species that are migratory, spending a substantial amount of the year outside Canada. Bat populations within the Terrestrial LSA and Birds, Bats, and Amphibians RSA are likely

part of larger populations that span across both the B.C./Alberta and the Canada/U.S.A. borders. While Project-related disturbances to at-risk bat habitat are anticipated to be limited to the Project footprint, the residual effects of habitat loss and degradation on at-risk bats may have the potential to influence transboundary jurisdictions.

Birds

Birds are highly mobile and, for those species that are migratory, spend a substantial amount of the year outside Canada. Bird populations within the Terrestrial LSA and Birds, Bats, and Amphibians RSA are likely part of larger populations that span across both the B.C./Alberta and the Canada/U.S.A. borders. While Project-related disturbances to bird habitat are limited to the Project footprint and do not extend beyond provincial borders, the residual effect of habitat loss and degradation on bird VCs may have the potential to influence transboundary jurisdictions.

Amphibians (Western Toad and Columbia Spotted Frog)

Western toads can migrate up to 7 km from breeding ponds (Davis, 2000). Although most Columbia spotted frog migrate less than 2 km between breeding and foraging sites, individuals have been recorded to migrate up to 7.5 km (Pilliod et al., 2002). Transboundary movements of both western toads and Columbia spotted frog within the Terrestrial LSA between B.C. and Alberta via the Continental Divide, approximately 5 km from the Project, are therefore possible. Project effects on western toad and Columbia spotted frog will be confined to the Project footprint and potentially minimally outside the footprint in the Terrestrial LSA. Effects on western toad and Columbia spotted frog populations outside of B.C. are unlikely to occur. Transboundary movements of amphibians from the Birds, Bats, and Amphibians RSA to the U.S.A. are not expected, given the distance to that border. Potential effects to amphibians (western toad and Columbia spotted frog) on federal lands or transboundary lands outside of B.C. or Canada are therefore not considered further.

Gillette's Checkerspot

The home range of Gillette's checkerspot is thought to be relatively small (<1 km). Transboundary movements of Gillette's checkerspot between the Terrestrial LSA and Alberta or the U.S.A. are unlikely. Project effects on Gillette's checkerspot will be confined to the Project footprint and effects to populations outside of B.C. are unlikely to occur. Potential effects to Gillette's checkerspot on federal lands or transboundary lands outside of B.C. or Canada are therefore not considered further.

32.3.3.2.11 Archaeological Resources / Physical and Cultural Heritage

No transboundary effects on federal lands or lands outside of B.C. or Canada as it relates to physical and cultural heritage are anticipated because impacts to archaeological and palaeontological resources will be limited to the area of physical disturbance within the Project footprint (direct effects) or in close proximity to the Project footprint (indirect effects due to loss of geographical context). Potential effects archaeological resources and physical and cultural heritage on federal lands or transboundary lands outside of B.C. or Canada are therefore not considered further.

32.3.3.2.12 Economic Conditions

Other than some positive economic benefits resulting in other parts of Canada (namely Alberta) from employment income and the purchase of goods to support the Project, no other economic transboundary

effects are anticipated. Potential effects to economic conditions on federal lands or transboundary lands outside of B.C. or Canada are therefore not considered further.

32.3.3.2.13 Socio-Community and Land Use

Transboundary effects on the socio-community environment arising from the Project are not expected to occur in either the Province of Alberta or the U.S.A. Crowsnest Pass, Alberta is included as part of the Socio-Community LSA, and therefore, considered in the socio-community effects assessment. Potential effects to social and health conditions of Indigenous Communities, including federally owned reserve lands, are discussed in Section 32.3. No socio-community effects to other federal lands in the vicinity of the Project (e.g., Dominion Coal Blocks) are anticipated as these lands are largely unutilized beyond limited forestry operations and recreational activities.

The Project is not expected to result in effects on land use and access that would extend into transboundary lands, including lands that are outside of B.C. and Canada or federal lands. As well, no potential visual effects of the Project will extend into transboundary lands, such as Alberta or the Dominion Coal Blocks. As such, no visual effects to transboundary lands are anticipated.

Potential effects to socio-community and land use on federal lands or transboundary lands outside of B.C. or Canada are therefore not considered further.

32.3.3.2.14 Human and Ecological Health

Predictive air quality modelling (Chapter 6) determined that the HHERA RSA did not warrant transboundary effects modelling in Alberta, or the U.S.A. Predictive water quality modelling (Chapter 11) determined that Lake Kocanusa, which straddles the Canada-U.S.A. border, would experience no significant effects in surface water quality. Accordingly, the human health and ecological risk assessment does not consider transboundary exposure scenarios. As described in Chapter 6, Section 6.5.4.2.1 and Chapter 11, Section 11.5.2.3, air and water quality impacts are not anticipated on federal lands; therefore, the human health and ecological risk assessment does not consider exposure scenarios on federal lands. Potential effects to human and wildlife health on federal lands or transboundary lands outside of B.C. or Canada are therefore not considered further.

32.3.3.3 Mitigation Measures

Mitigation measures presented in each VC assessment chapter to avoid, minimize, restore, and compensate and offset Project-related effects to VCs will be used to reduce the potential for effects to transboundary lands. Detailed mitigation measures are presented in the VC assessment chapters, Chapters 6 to 19, and Chapters 22 to 31. For brevity, all the mitigation measures listed in those chapters are not repeated here. Rather, for those VCs that have been identified as having a potential effect on federal lands and transboundary lands outside of B.C. or Canada, “key” mitigation measures that may avoid or reduce those effects on transboundary lands specifically are outlined. Refer to the mitigation section of each VC assessment chapter for the specific details of Project mitigation measures that will be employed to avoid or reduce potential Project and cumulative effects.

Key mitigation measures for Project-related effects specific to avoiding or reducing potential effects on federal lands or transboundary lands, based on the effects described in Section 32.3.3, include but are not limited to:

- Use of hyperbaric drying rather than thermal drying;
- Enforce low speed limits for vehicular traffic throughout the site, limit long-term idling, and inspect and maintain all vehicles and combustion equipment per manufacturer recommendations and operate within regulatory requirements;
- Engineered layering of coal rejects and mine rock to limit metal leaching and acid rock drainage (ML/ARD) to reduce oxygen, nitrate, and selenium within the Mine Rock Storage Facility and remove selenium from contact water;
- Management of appropriately sized sediment ponds to settle particles and control discharge of contact water into the receiving environment;
- Minimizing disturbance and encroachment into natural vegetation;
- Clearing vegetation only in the year in which the area will be required for construction or operation to minimize the extent of cleared vegetation, to the extent possible;
- All vegetation clearing and tree harvesting will be conducted outside the general bird nesting period (April 13 to August 19 in each year) to avoid impacts to nests when occupied by a bird or eggs and will be avoided during the most sensitive period for bats (May 30 to September 1 in the Kootenay Region);
- Avoidance of mature and old growth with large-diameter trees, and suitable cave hibernacula, where practical alternatives are available;
- Directed/focused lighting will be used where possible, rather than broad area lighting, to minimize sensory disturbance. Light in non-essential areas will only be used when necessary, without compromising worker safety;
- Measures will be implemented to minimize potential Project effects on movement corridors (e.g., through Grave Creek Canyon), including signage along Project roads to warn vehicle operators of the potential to encounter wildlife;
- Underpasses will be created by elevating the conveyor to at least 2.4 m above ground (or higher where terrain can be used to create more clearance) at intervals of two per 1,000 m;
- Prior to winter avalanche control along the access road, avalanche control areas will be visually searched for wildlife prior to avalanche control activities; avalanche control activities will not be conducted when carnivores are present in potential slide areas; and
- Limit the mine disturbance footprint through Project design and progressive reclamation.

Management and monitoring plans applicable to VCs considered in the assessment of changes to the environment that could occur on transboundary lands include but are not limited to the following key management and monitoring plans:

- Air Quality and Greenhouse Gas Management Plan (Chapter 33, Section 33.4.1.1);
- Noise and Vibration Management Plan (Chapter 33, Section 33.4.1.7);
- Site Water Management Plan (Chapter 33, Section 33.4.1.8);
- Erosion and Sediment Control Plan (Chapter 33, Section 33.4.1.4);
- Fish and Fish Habitat Management Plan (Chapter 33, Section 33.4.1.5);
- Spill Prevention, Control, and Countermeasures Plan (Chapter 33, Section 33.4.1.10);
- Vegetation and Ecosystems Management and Monitoring Plan (Chapter 33, Section 33.4.1.11);
- Wildlife Management and Monitoring Plan (Chapter 33, Section 33.4.1.13); and
- Traffic Control Plan (Chapter 33, Section 33.4.2.4).

Additional mitigation measures beyond the mitigation measures to avoid, minimize, restore, and compensate and offset Project-residual effects (as outlined in each applicable VC chapter) are not anticipated to be required to address potential effects to transboundary lands. No other technically and economically feasible mitigation measures were considered for transboundary effects, and NWP is not aware of potential future technology innovations that could help further mitigate effects.

32.3.3.4 Characterization of Residual Transboundary Effects, Significance, Likelihood, and Confidence

After the implementation of mitigation measures, the following Project-residual effects that could result in transboundary effects are predicted. The characterization of residual effects follows methods outlined in Chapter 5, Sections 5.3.4.5. The characterization and significance determination of the transboundary effects is presented in Table 32.3-4. As noted in Table 32.3-4, no significant adverse effects related to changes to the environment that occurs on transboundary lands are expected as a result of the proposed Project. Effects that are determined to be not significant do not require a characterization of likelihood and as such, likelihood is included in Table 32.3-4.

Table 32.3-4: Residual Transboundary Effects Characterization and Significance Determination

Valued Component	Residual Transboundary Effect	Characterization of Residual Transboundary Effects	Significance of Transboundary Effects (Confidence)
Atmospheric Environment – Air Quality	No measurable transboundary effects	N/A	N/A
Atmospheric Environment – Greenhouse Gases	Change in GHG emissions	Duration: Long-term Magnitude: Moderate Geographic Extent: Beyond regional Frequency: Continuous Reversibility: Reversible long-term to irreversible Context: Neutral	Not Significant (High)
Acoustic Environment	No measurable transboundary effects	N/A	N/A
Soils and Terrain	No measurable transboundary effects	N/A	N/A
Groundwater Quality and Quantity	No measurable transboundary effects	N/A	N/A
Surface Water Quality	Effects on surface water quality in Lake Koochanusa in the U.S.A. as a result of Sediment Pond discharges to the receiving	Duration: Long-term Magnitude: Moderate Geographic Extent: Local/Discrete Frequency: Regular	Not Significant (Moderate)

Valued Component	Residual Transboundary Effect	Characterization of Residual Transboundary Effects	Significance of Transboundary Effects (Confidence)
	environment in West Alexander Creek	Reversibility: Reversible long-term Context: Neutral	
Fish and Fish Habitat	Effects on fish and fish habitat caused by changes in water quality as a result of Sediment Pond discharges to the receiving environment in West Alexander Creek, and ultimately Lake Koocanusa in the U.S.A.	Duration: Long-term Magnitude: Low Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible Context: Neutral	Not Significant (Low to Moderate)
Landscapes and Ecosystems	No measurable transboundary effects	N/A	N/A
Vegetation	No measurable transboundary effects	N/A	N/A
Wildlife and Wildlife Habitat - Ungulates	Effects on wildlife habitat and movement of ungulate populations that span B.C., Alberta, and the U.S.A.	Duration: Long-term to Permanent Magnitude: Low to Moderate Geographic Extent: Discrete to Local Frequency: Continuous Reversibility: Reversible long-term Context: Neutral to High	Not Significant (High)
Wildlife and Wildlife Habitat – Carnivores	Effects on wildlife habitat and movement of carnivore populations that span B.C., Alberta, and the U.S.A.	Duration: Long-term to Permanent Magnitude: Low to Moderate Geographic Extent: Discrete to Local Frequency: Continuous Reversibility: Reversible long-term Context: Low to High	Not Significant (Moderate)
Wildlife and Wildlife Habitat – At Risk Bats	Effects on wildlife habitat of bat populations that span B.C., Alberta, and the U.S.A.	Duration: Long-term to Permanent Magnitude: Low to Moderate Geographic Extent: Discrete to Local Frequency: Continuous Reversibility: Irreversible to Reversible Long-term Context: Low	Not Significant (Low)

Valued Component	Residual Transboundary Effect	Characterization of Residual Transboundary Effects	Significance of Transboundary Effects (Confidence)
Wildlife and Wildlife Habitat – Birds	Effects on wildlife habitat and health of bird populations that span B.C., Alberta, and the U.S.A.	Duration: Long-term to Permanent Magnitude: Negligible to Moderate Geographic Extent: Discrete to Local Frequency: Continuous Reversibility: Irreversible to Reversible long-term Context: Low to Neutral	Not Significant (High)
Wildlife and Wildlife Habitat – Amphibians	No measurable transboundary effects	N/A	N/A
Wildlife and Wildlife Habitat – Gillette's Checkerspot	No measurable transboundary effects	N/A	N/A
Archaeology / Physical and Cultural Heritage	No measurable transboundary effects	N/A	N/A
Economic Conditions	No adverse Project economic residual effects predicted. The Project will result in positive economic impacts, including additional employment and income, contribute to regional and local economies, and contribute to government finance through taxes and royalty payments	N/A	N/A
Socio-Community	No measurable transboundary effects	N/A	N/A
Land Use	No measurable transboundary effects	N/A	N/A
Human and Wildlife Health	No measurable transboundary effects	N/A	N/A

32.3.4 Cumulative Effects Assessment

Cumulative environmental effects are the result of Project residual environmental effects interacting with the effects of other past, present, and reasonably foreseeable future projects or activities to produce a combined/overlapping effect. The objective of the cumulative effects assessment is to consider overlapping effects for all residual adverse effects, not only those predicted to be significant (EAO, 2013). Further information regarding the cumulative effects assessment methodology is provided in Chapter 5, Section 5.3.5.

32.3.4.1 Assessment Boundaries

The assessment boundaries used to evaluate the potential Project-related and cumulative changes to the environment that would occur on transboundary lands are the same as those spatial, temporal, administrative, and technical boundaries used in the assessment of relevant VCs. In particular, the spatial assessment boundaries were based on defined VC-specific RSAs presented in the VC assessment chapters (i.e., Chapters 6, 11, 12, and 15) and used in the relevant VC cumulative effects assessments. As described in Chapter 11, Section 11.6.1, while there are no transboundary nodes in the Elk Valley Regional Water Quality Model upon which to make a quantitative prediction of transboundary effects beyond the Aquatic RSA, the model predictions within the Aquatic RSA including the Canadian portion of Lake Koocanusa show that downstream surface water quality effects to Lake Koocanusa as a result of the Project are negligible and within the realm of natural variation. With the remainder of the portions of the Koocanusa watershed that are located outside of Canada being more distal to the Project, it is likely that surface water quality within the remainder of the Koocanusa watershed is the same as, or better than, that within the Canadian portion of Lake Koocanusa and also negligible and within the realm of natural variation. As such, the entirety of the Koocanusa watershed is not included within the Aquatic RSA as no measurable transboundary effects to surface water quality are anticipated to occur. The spatial boundaries for those VCs in which a potential cumulative effect may occur are summarized in Table 32.3-6. Rationale and justification for the RSA boundaries selected for each VC are outlined in the VC assessment chapters and are not repeated here for brevity.

Table 32.3-5: Cumulative Transboundary Effects Spatial Boundaries

Valued Component	Cumulative Transboundary Effects Assessment Spatial Boundary
Greenhouse Gases	Atmospheric RSA
Surface Water Quality	Aquatic RSA
Fish and Fish Habitat	Aquatic RSA
Wildlife and Wildlife Habitat – Ungulates	Terrestrial RSA
Wildlife and Wildlife Habitat – Carnivores	<ul style="list-style-type: none"> • Terrestrial RSA • Grizzly Bear RSA
Wildlife and Wildlife Habitat – Bats	Birds, Bats, and Amphibian RSA
Wildlife and Wildlife Habitat – Birds	Birds, Bats, and Amphibian RSA

As noted in Section 32.3.1, temporal boundaries for the cumulative changes to the environment that would occur on transboundary lands are the same as those used in the assessment of relevant VCs. The temporal boundaries used in the cumulative effects assessment are the same as those for Project effects, as noted in Table 32.3-6. Additional information on the Project phases is provided in Chapter 3.

Table 32.3-6: Temporal Boundaries for the Cumulative Transboundary Effects Assessment

Phase	Project Year	Length of Phase (Years)
Construction and Pre-Production	1 – 2	2
Operations	3 - 17	15
Reclamation and Closure	18 – 19	2
Post-Closure	20 – 34	15

32.3.4.1.1 Identifying Past, Present, and Reasonably Foreseeable Projects and/or Activities

Descriptions of the past, present, and reasonably foreseeable projects and/or activities for consideration in the cumulative effects assessment are provided in Chapter 5, Section 5.3.4.6. A summary of the past, present, and reasonably foreseeable projects or activities that are expected to interact with VCs that have the potential to result in cumulative effects to transboundary lands are detailed in each relevant VC chapter. They are not repeated here, for brevity.

32.3.4.1.2 Identification of Cumulative Transboundary Effects

As per the Guidelines for the Preparation of an Environmental Impact Statement for the Crown Mountain Coking Coal Project (CEAA, 2015b), a cumulative effects assessment of potential effects occurring in transboundary jurisdictions outside of B.C. was conducted and was based on VCs for which residual effects were predicted to occur.

VCs considered in the assessment of transboundary cumulative effects and the potential cumulative effects that may result in changes to the environment that occur on transboundary lands are summarized in Table 32.3-7 and described in more detail below. The assessment of potential cumulative effects to the transboundary environment is based on the potential cumulative effects identified for relevant VCs and the potential of cumulative effects to span across multiple jurisdictions. Transboundary VCs that were not predicted to result in residual effects at a transboundary scale are not included in the assessment of cumulative transboundary effects.

Table 32.3-7: Potential Cumulative Transboundary Effects by Valued Component

Valued Component	Potential Cumulative Transboundary Effect
Greenhouse Gases	<ul style="list-style-type: none"> Change in GHG emissions
Surface Water Quality	<ul style="list-style-type: none"> Change in surface water quality from Sediment Pond discharge
Fish and Fish Habitat	<ul style="list-style-type: none"> Changes in water quality that could result in adverse effects on fish and fish habitat
Wildlife and Wildlife Habitat – Ungulates	<ul style="list-style-type: none"> Effects on wildlife habitat and movement of ungulate populations that span B.C., Alberta, and the U.S.A.
Wildlife and Wildlife Habitat – Carnivores	<ul style="list-style-type: none"> Effects on wildlife habitat and movement of carnivore populations that span B.C., Alberta, and the U.S.A.
Wildlife and Wildlife Habitat – Bats	<ul style="list-style-type: none"> Effects on wildlife habitat of bat populations that span B.C., Alberta, and the U.S.A.
Wildlife and Wildlife Habitat – Birds	<ul style="list-style-type: none"> Effects on wildlife habitat and health of bird populations that span B.C., Alberta, and the U.S.A.

Greenhouse Gases

The assessment of cumulative effects for a change in greenhouse gas emissions under the Future Case considers the potential for overlapping of the Project effects with those of reasonably foreseeable future projects or activities that occur in the Atmospheric RSA. As discussed above, there are currently seven coal mining projects proposed in the Atmospheric RSA, including the Crown Mountain Coking Coal Project. Sufficient data are not available to facilitate a quantitative assessment of cumulative effects on greenhouse gas emissions in the Atmospheric RSA in the Future Case; however, it is expected that each

proposed mine operation will implement appropriate mitigation strategies, including best available current technologies to minimize or eliminate sources of greenhouse gases.

It is understood that mitigation measures and appropriate operational practices are in place for all of the current coal mines in the Elk Valley, and similarly it is expected that an appropriate mitigation strategy would be developed and implemented for the proposed future coal mining operations in the Atmospheric RSA in order to reduce or eliminate sources of transboundary GHG emissions. Chapter 6, Section 6.6 provides additional details of the atmospheric environment cumulative effects assessment.

Surface Water Quality

Current projects operating in the Elk Valley (e.g., Elkview Operations, Line Creek Operations) as well as future projects and activities (e.g., Michel Coal Project, Fording River Extension Project, climate change) have the potential to contribute to adverse cumulative effects on surface water quality in transboundary jurisdictions outside of B.C. A quantitative assessment of cumulative effects on surface water quality for the Project Case was undertaken through the preparation of the conceptual site-wide water quality (SWWQ) model for the cumulative effects assessment Project case. A qualitative assessment was not possible for the Future Case due to the unavailability of adequate information related to the reasonably foreseeable future projects in the Aquatic RSA (i.e., proposed mine site development details, water quality predictions, etc.).

The water quality model that was prepared for the Aquatic RSA includes the cumulative interactions with effects from ongoing mining operations in the Elk Valley. The results of the model indicate that the predicted change in surface water quality for the Project Case is negligible to non-detectable when considering monthly median predicted concentrations during all Project phases at multiple nodes in the Aquatic RSA. Estimated mass contributions of the Project to Michel Creek are minimal and water quality in Michel Creek is expected to continue to meet Teck's permit limits in Michel Creek in lieu of a regional water quality target for this watercourse, where baseline conditions already exceed the B.C. selenium WQG of 2 µg/L. As noted in Section 11.5.4.3, significant residual effects to surface water quality in Grave Creek, West Alexander Creek, Alexander Creek, and the Elk River and Lake Koochanusa are not predicted to occur as a result of the Project. The cumulative change in surface water quality in Michel Creek downstream of Erickson Creek as a result of the Project is below applicable B.C. WQGs and Teck's existing permit limits for nitrate and selenium at EV MC2, and are not detectable in the Elk River at Sparwood or further downstream in the Elk River or Lake Koochanusa. As such, cumulative residual effects to transboundary Lake Koochanusa are not anticipated as a result of the Project. Additional details of the cumulative effects assessment on surface water quality is provided in Chapter 11, Section 11.6.

It is understood that mitigation measures and appropriate operational practices are in place for all of the current coal mines in the Elk Valley, and similarly it is expected that an appropriate mitigation strategy would be developed and implemented for the proposed future coal mining operations in order to meet the regional long-term water quality targets outlined in the EVWQP. Additional monitoring and data sharing with other proponents will be necessary to confirm acceptability of water quality in Michel Creek and waterbodies downstream, such as Lake Koochanusa.

Fish and Fish Habitat

Water quality effects on fish and fish habitat are likely to be isolated to the Fish and Fish Habitat LSA, with little to no effect presented outside the Fish and Fish Habitat LSA. Fish and Fish Habitat VCs that occur outside the Fish and Fish Habitat LSA are therefore not anticipated to be impacted by the Project through changes in water quality from the Main Sediment Pond discharge, and the effect is therefore found to be not significant at the Aquatic RSA scale. As noted above, the SWWQ model prepared for the Aquatic RSA indicates that the predicted change in surface water quality for the Project Case is negligible to non-detectable when considering monthly median predicted concentrations during all Project phases at multiple nodes in the Aquatic RSA. Water quality is the main potential pathway for effects to fish species in the larger Elk River and Lake Kootenusa watershed (i.e., at a regional scale). Since this assessment looked at sensitive species across the entire watershed that may be most likely impacted by the Project, it is not anticipated that the Project will have a negative impact on any other aquatic species present in the Elk River watershed and transboundary waterways. Chapter 12, Section 12.6 provides additional details on the cumulative effects assessment on fish and fish habitat.

Wildlife and Wildlife Habitat

Ungulates

There are approximately 4,000 to 7,000 moose and 15,000 to 24,000 elk in the East Kootenay region with a stable regional population trend (Government of B.C., 2017). In the East Kootenay region, there are approximately 2,200 to 2,600 bighorn sheep (Demarchi et al., 2000; Poole et al., 2016) and an estimated 515 to 770 individuals in the Elk Valley East Population Management Unit with a stable population trend (Poole et al., 2018; Poole and Ayotte, 2019). Mountain goat population trends indicate a stable to decreasing trend in southern B.C. (MGMT, 2010), and surveys completed in the Elk Valley in 2005 estimated 1,005 individuals (Poole and Klafki, 2005).

Many present and reasonably foreseeable future projects and activities create impermeable barriers (e.g., pits and dumps at mines) or semi-permeable barriers (e.g., roads and other linear features) for wildlife. While each of the existing and reasonably foreseeable future projects and activities may block movements of ungulate species to varying degrees, they are geographically separated from the Crown Mountain Coking Coal Project such that additive barriers with the Project are limited. As such, based on regional trends and the interaction of the Project with the potential transboundary movement of ungulate VCs in combination with reasonably foreseeable future projects and activities, it is not anticipated that the Project will result in an impact to the transboundary movement of ungulate species within the Terrestrial RSA, including Alberta. Chapter 15, Section 15.4.4 provides additional details on the cumulative effects assessment on the ungulate community that was used to inform the assessment of potential effects on to transboundary lands.

Carnivores

Similar to ungulates, many present and future projects and activities occur within the distributional range of carnivore VCs and in areas of suitable habitat. These present and reasonably foreseeable future projects and activities have the potential to create impermeable barriers (e.g., pits and dumps at mines) or semi-permeable barriers (e.g., roads, and other linear features) for carnivores in the VC-specific RSAs. While the existing and reasonably foreseeable future projects and activities may block movements of carnivore VCs to varying degrees, the projects and activities are geographically separated from the Crown Mountain

Coking Coal Project such that additive barriers with the Project are limited. The Project, in combination with reasonably foreseeable future projects and activities, is not anticipated to limit the ability of carnivore species from persisting across transboundary jurisdictions and maintain self-sustaining populations in respective carnivore RSAs. Chapter 15, Section 15.5.4 provides additional details on the cumulative effects assessment on the carnivore community that was used to inform the assessment of potential effects on to transboundary lands.

Bats

Although it is anticipated that the Project, in combination with the effects of other past, present, and reasonably foreseeable future projects and activities, will result in an incremental loss of at-risk bat habitat, the serious threat to at-risk bat species (i.e., little brown myotis and northern myotis) is white-nose syndrome (COSEWIC, 2013). In the Project-related effects assessment, the risk of increased mortality from white-nose syndrome was predicted to be fully mitigated with no residual effects to at-risk bat species. While the effect of incremental habitat loss cannot be discounted, its influence on at-risk bat abundance and distribution is expected to be low. It is anticipated that the Project, in combination with reasonably foreseeable future projects and activities, would not limit the ability of at-risk bats to persist across transboundary jurisdictions outside of B.C. or limit the ability for bats to maintain self-sustaining populations in the Birds, Bats, and Amphibians RSA. Chapter 15, Section 15.6.4 provides additional details on the cumulative effects assessment on bats that was used to inform the assessment of potential effects on to transboundary lands.

Birds

Historical data on migratory birds, Northern Goshawk, and bird species at-risk abundance in the Elk Valley is not available for the Birds, Bats, and Amphibians RSA; however, there is some evidence that disturbance activities in the Elk Valley have resulted in a net negative effect on Olive-sided Flycatcher habitat since the 1890s (Golder Associates, 2014). As well, there is some evidence that the Canadian population of Northern Goshawk has had little change since 1970 with this change being considered below the lowest acceptable level relative to its national population goal (ECCC, 2019). There is expected to be net incremental losses of up to 9.7% of high-quality migratory bird habitat (depending on the species) in the Bird, Bats, and Amphibians RSA due to habitat alteration through clearing and related activities as well as sensory disturbance for the Future Case; however, the Project contribution to these losses is expected to be small. The Project, in combination with other reasonably foreseeable future projects and activities, is not expected to limit the ability of bird species to persist and maintain self-sustaining populations in the Birds, Bats, and Amphibians RSA, including transboundary lands (e.g., habitats that span across the Continental Divide). Chapter 15, Section 15.7.4 provides additional details on the cumulative effects assessment on the bird community that was used to inform the assessment of potential effects on to transboundary lands.

32.3.4.1.3 Mitigation for Cumulative Transboundary Effects

The mitigation strategies developed for each Project-related VC effect are applicable to the potential cumulative effects for changes to the environment that could occur on transboundary lands. Mitigation strategies include:

- Project-specific design features and practices and procedures aimed at reducing or eliminating potential Project effects to those VCs considered in the assessment of effects on transboundary lands;

- Regional stakeholder involvement and government-led initiatives to implement effective management plans and monitoring programs;
- Proponent participation, including NWP, in regional initiatives, where relevant and appropriate; and
- Adoption of new management practices and measures to meet regional planning objectives, where possible.

Regional collaboration across provincial and federal jurisdictions is important in addressing potential transboundary cumulative effects resulting from past, present, and future projects and activities in the Elk Valley. At this time, no additional mitigation measures beyond those detailed for the potentially affected VCs have been considered or identified to address potential transboundary cumulative effects. Although transboundary considerations and potential effects have been discussed at VC Working Group meetings and with IAAC (e.g., Section 4.6.8), no specific discussions regarding mitigation measures for transboundary cumulative effects have occurred.

32.3.4.1.4 Characterization of Residual Cumulative Transboundary Effects

After the implementation of mitigation measures, the following Project-residual cumulative effects that could result in transboundary cumulative effects are predicted. The characterization and significance determination of potential residual cumulative transboundary effects is presented in Table 32.3-8. No significant adverse cumulative effects related to changes to the environment that would occur on transboundary lands are expected to occur as a result of the Project acting in combination with the effects of other past, present, and reasonably foreseeable future projects or activities. Effects that are determined to be not significant do not require a characterization of likelihood and as such, likelihood is not included in Table 32.3-8.

Table 32.3-8: Cumulative Transboundary Effects Characterization and Significance Determination

Valued Component	Residual Cumulative Transboundary Effect	Characterization of Residual Cumulative Transboundary Effects	Significance of Cumulative Transboundary Effects (Confidence)
Greenhouse Gases	Change in GHG emissions	Duration: Long-term Magnitude: Moderate Geographic Extent: Beyond regional Frequency: Continuous Reversibility: Reversible long-term to irreversible Context: Neutral	Not Significant (Low)
Surface Water Quality	Change in surface water quality from Sediment Pond discharge	Duration: Long-term Magnitude: Low Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible long-term Context: Neutral	Not Significant (Moderate)

Valued Component	Residual Cumulative Transboundary Effect	Characterization of Residual Cumulative Transboundary Effects	Significance of Cumulative Transboundary Effects (Confidence)
Fish and Fish Habitat	Changes in water quality	Duration: Long-term Magnitude: Low to Moderate Geographic Extent: Regional Frequency: Continuous Reversibility: Irreversible Context: Neutral	Not Significant (Moderate)
Wildlife and Wildlife Habitat - Ungulates	Effects on wildlife habitat and movement of ungulate populations that span B.C., Alberta, and the U.S.A.	Duration: Long-term Magnitude: Low Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible long-term Context: Neutral (moose), high (elk and bighorn sheep), and low (mountain goat)	Not Significant (High)
Wildlife and Wildlife Habitat – Carnivores	Effects on wildlife habitat and movement of carnivore populations that span B.C., Alberta, and the U.S.A.	Duration: Long-term Magnitude: Low Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible long-term Context: Low (grizzly bear, wolverine, American marten), moderate (American badger), and high (Canada lynx)	Not Significant (Moderate)
Wildlife and Wildlife Habitat – At Risk Bats	Effects on wildlife habitat of bat populations that span B.C., Alberta, and the U.S.A.	Duration: Long-term to permanent Magnitude: Low to moderate Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible long-term to irreversible Context: Low	Not Significant (High)
Wildlife and Wildlife Habitat - Birds	Effects on wildlife habitat and health of bird populations that span B.C., Alberta, and the U.S.A.	Duration: Long-term to permanent Magnitude: Low to moderate Geographic Extent: Regional Frequency: Continuous Reversibility: Reversible long-term Context: Neutral (migratory birds and), low to neutral (Northern Goshawk)	Not Significant (Moderate)

32.3.5 Follow-up Strategy

Follow-up programs will be used to verify environmental effects predictions or to verify the effectiveness of mitigation measures where there is uncertainty (i.e., low to moderate confidence). As noted in each of the VC assessment chapters relevant to transboundary considerations (i.e., Chapters 6, 11, 12, and 15), follow-up programs will be implemented as part of the follow-up strategy and will include use of VC-specific management and monitoring plans to support the verification of mitigation measures and effects

predictions. Management and monitoring plans applicable to VCs considered in the assessment of changes to the environment that could occur on transboundary lands include but are not limited to the following key management and monitoring plans:

- Air Quality and Greenhouse Gas Management Plan (Chapter 33, Section 33.4.1.1);
- Noise and Vibration Management Plan (Chapter 33, Section 33.4.1.7);
- Site Water Management Plan (Chapter 33, Section 33.4.1.8);
- Erosion and Sediment Control Plan (Chapter 33, Section 33.4.1.4);
- Fish and Fish Habitat Management Plan (Chapter 33, Section 33.4.1.5);
- Spill Prevention, Control, and Countermeasures Plan (Chapter 33, Section 33.4.1.10);
- Vegetation and Ecosystems Management and Monitoring Plan (Chapter 33, Section 33.4.1.11);
- Wildlife Management and Monitoring Plan (Chapter 33, Section 33.4.1.13); and
- Traffic Control Plan (Chapter 33, Section 33.4.2.4).

Over the course of the Project, NWP will use an Environmental Management System (EMS) based on key components of International Organization for Standardization (ISO) 14001 (see Chapter 33, Section 33.2 for more information). The EMS will provide the structure and procedures for implementing environmental management plans, ensuring compliance with regulations and permit requirements, and continuously improving environmental protection measures and environmental performance. The EMS, the accompanying Environmental Policy (Appendix 1-F), and the NWP Employee Code of Conduct (Appendix 1-B) form the basis through which NWP will require contractors and sub-contractors to comply with environmental management programs, adhere to regulatory permitting requirements, and achieve auditing programs. Through the EMS, NWP will monitor the Project's performance against established objectives and standards and will correct environmental management strategies where necessary by implementing contingency measures and corrective actions.

32.3.6 Summary of Effects to Transboundary Lands

Although Project-residual effects have been predicted for some VCs that may cross international or provincial borders and therefore potentially result in effects in transboundary jurisdictions outside of B.C., with the implementation of mitigation measures, these effects (including residual Project and cumulative effects) have been determined to be either beneficial (economic), or adverse but not significant.

32.4 Changes to the Environment on Indigenous Peoples

Section 5(1)(c) of CEA Act, 2012 requires that a federal EA must evaluate changes to the environment that may affect Indigenous Peoples. Specifically, Section 5(1)(c) states:

"5 (1) For the purposes of this Act, the environmental effects that are to be taken into account in relation to an act or thing, a physical activity, a designated project or a project are ... (c) with respect to aboriginal peoples, an effect occurring in Canada of any change that may be caused to the environment on (i) health and socio-economic conditions, (ii) physical and cultural heritage, (iii) the current use of lands and resources for traditional purposes, or (iv) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance".

The substantive effects assessment to meet the requirements of Section 5(1)(c) of CEA Act, 2012 is detailed in Chapters 23 to 31. Section 32.4 (i.e., this section) is intended to be a high-level summary of key findings of the assessment of the effects of the Project on Indigenous health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, and any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance to address those requirements. In the subsections that follow, we provide a high-level summary of the effects assessments that were detailed in the Indigenous Communities' chapters (Chapters 23 to 31) for these components within federal jurisdiction. The reader is referred to the above-mentioned chapters for the substantive details of the effects assessments for these components.

It is noted that where necessary, the key findings for the assessment of the health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, and any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance in Chapter 23 are differentiated into those considered for Ktunaxa Nation which is collectively identified for ʔakink'umʔasnuqʔiʔit (Tobacco Plains Band), ʔakisq'nuk First Nation (Columbia Lake Band), ʔaq'am (St. Mary's Band), and Yaqaṇ Nuʔkiy (Lower Kootenay Band), and the Indigenous Communities identified as:

- Shuswap Indian Band (Chapter 24);
- Stoney Nakoda (Iyarhe Nakoda) (Bears paw First Nation, Chiniki First Nation, and Wesley First Nation) (Chapter 25);
- Métis Nation of British Columbia (including Elk Valley Métis Nation) (Chapter 26);
- Kainai (Blood Tribe) (Chapter 27);
- Piikani Nation (Aapátohsipikáni) (Chapter 28);
- Siksika Nation (Chapter 29);
- Tsuut'ina Nation (Chapter 30); and
- Métis Nation Alberta – Region 3 (Chapter 31).

32.4.1 Assessment Boundaries

The assessment boundaries used to evaluate the potential Project-related and cumulative changes to the environment on Indigenous Peoples are the same as those spatial, temporal, administrative, and technical boundaries used in the assessment of effects on Indigenous Communities as outlined in Chapters 23 to 31 of the Application/EIS. These are identified as the Aboriginal Treaty Rights and Interests Local Study Area (ATRI LSA) and the Aboriginal Treaty Rights and Interests Regional Study Area (ATRI RSA). These study areas were developed in consideration of VCs or VC groups and technical and scientific information that may be potentially relevant to the assessment of Aboriginal and Treaty rights and interests. The ATRI LSA encompasses the LSAs of receptor and intermediate VCs and VC groups in which Indigenous Peoples (noted as Indigenous Communities throughout the Application/EIS) may have constitutionally protected rights to practice traditional activities, such as for fishing and hunting and gathering.

For the Ktunaxa Nation specifically, the local and regional study areas are identified as the Ktunaxa Nation Rights and Interests Local Study Area (KNRI LSA) and the Ktunaxa Nation Rights and Interests Regional Study Area (KNRI RSA).

32.4.2 Thresholds for Determining Significance of Residual Effects

The thresholds for used determining the significance of residual Project-related and cumulative environmental effects arising from changes to the environment on Indigenous Peoples are the same as those used in the assessment of effects on Indigenous Communities as outlined in Chapters 23 to 31 of the Application/EIS. With respect to the assessment of the potential impact on the Aboriginal and/or Treaty rights and interests of the identified Indigenous Communities, the assessment of severity of adverse impacts on Aboriginal and/or Treaty rights and interests are outlined in Chapters 23 to 31 as separate from the characterization of residual effects.

32.4.3 Health and Socio-Economic Conditions

For the purposes of this assessment, health and socio-economic conditions are referenced in the Application/EIS as social, health, and economic conditions. Based on the background information research and the consultation activities with the Indigenous Communities to date, there are no anticipated interactions between the Project and Indigenous Communities' housing, transportation, or social services and education, and therefore, no unmitigated Project effects on these aspects of social and health conditions are anticipated. While positive effects are possible, there are also no anticipated unmitigated negative Project effects related to Indigenous Communities' economic ventures such as commercial operations, forestry, or logging, and commercial fishing. Some impacts to hunting (and trapping, where applicable) may occur, and are discussed in Section 32.4.5.

The residual effects assessments resulting from the Project on air quality (Chapter 6), fish and fish habitat (Chapter 12), landscapes and ecosystems (Chapter 13), wildlife (Chapter 15), the physical and cultural heritage assessment (Chapter 16), and information from the human health and ecological risk assessment (Chapter 22) were used to support an understanding of Project-related effects that have the potential to change Indigenous Communities' social and health conditions.

The Project can be generally expected to result in positive economic outcomes for employment, income, the regional and local economies, and government finances within the Economic RSA (Chapter 17). These positive outcomes will be enhanced through training programs to maximize the hiring of local workers and from Indigenous Communities. Positive economic effects to nearby communities including Indigenous Communities are expected to occur during all Project phases, with the primary economic benefits occurring during the Construction and Pre-Production and Operations phases, which together are expected to occur over an 18-year period. In this light, specific Project-related effects to economic conditions are not carried forward in this assessment.

The residual effects of a change to social and health conditions due to the Project are characterized as being long-term in duration but low in magnitude as the predicted residual effects to wildlife and human health are considered to present a low risk, and the potential change in country foods is only associated with the Project footprint or close to the haul road, which are areas that will be reclaimed. The low risk to wildlife and human health and associated country foods and consumption of country foods is diminished (mitigated) as the Project disturbance footprint is reclaimed in Reclamation and Closure phases as per the Ecological Restoration Plan (Chapter 33, Section 33.4.1.3). The low exposure risk is unlikely to adversely affect individuals or local populations and therefore there is an unlikely disruption to country food quality. With respect to country food quantity, due to the lack of specific information regarding the use of the

Project footprint by the identified Indigenous Communities (other than the information provided by the Ktunaxa and Tsuut'ina Nations) disruption to country food quantity is unlikely.

The residual effects of the Project on aquatic and terrestrial wildlife health and human health during all Project phases are considered not significant (Chapter 22, Section 22.5.4.3). As such, residual effects to social and health conditions due to the Project, in particular changes to the actual or perceived quality of country foods and indirect disturbance to Indigenous land users, are also considered not significant. Given the conservative nature of the exposure/risks and proposed mitigation in Reclamation and Closure and based on the publicly available information and input received from engagement activities related to the current and historical use of the Project footprint by the identified Indigenous Communities, the Project is not anticipated to result in significant adverse residual effects to aquatic and terrestrial wildlife or Indigenous persons. In the present case, an overall moderate level of confidence that the estimated health risk to aquatic and terrestrial wildlife and human health as a result of the Project is low and not significant is predicted.

Transboundary effects to health and socio-economic conditions during the Project lifecycle are not anticipated, as the Project footprint accounts for negligible changes for the identified Indigenous Communities and mitigation strategies proposed to avoid or offset the potential for any effects to the health and socio-economic conditions in relation to the Project are those included in the Indigenous Impact Management Plan (Chapter 33, Section 33.4.3.4). The impact management measures included in Indigenous Impact Management Plan are expected to be refined as needed with continued consultation with the Indigenous Communities.

32.4.4 Physical and Cultural Heritage, and any Structure, Site, or Thing that is of Historical, Archaeological, Palaeontological, or Architectural Significance

For the purposes of this assessment, physical and cultural heritage is assessed together with any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance. This is due to their potential for cultural importance to the Indigenous Communities and based on their (currently undefined but) potential link to Indigenous ancestry, where the Project may potentially impact the physical and cultural heritage of Indigenous Communities. Pre-contact archaeological artifacts are an immensely important connection between Indigenous Peoples, their ancestors, culture, history, and traditional knowledge (i.e., physical and cultural heritage).

As part of the Project planning process, and following preliminary findings of the Archaeological Baseline Program, the Project footprint was re-designed to minimize direct impacts to as many archaeological sites as possible. NWP has already mitigated this through the redesign of the Rail Loadout to avoid impacts to suspected ancestral burials that were identified during the Baseline Archaeological Program. Through consultation with the Project Archaeologist and KNC, an area within continuous, rolling slope situated upslope to the east-southeast of Grave Prairie was identified as a suitable revised location for the Rail Loadout. Though several relatively small-sized archaeological sites were discovered within the revised location, none of the sites contained evidence of ancestral burials. Following the most recent conclusions of the Archaeological Baseline Program and the current Project footprint configuration, there are 15 pre-contact archaeological sites identified within the Project footprint that are anticipated to be directly

impacted as a result of the Project. None of the sites contain suspected ancestral burial grounds (refer to Chapter 16). Eight of the 15 pre-contact archaeological sites were identified as having the potential for indirect impacts as a result of the Project. The potential residual effects to archaeological resources that might be of interest to Indigenous Communities are summarized in Chapter 16.

The 15 pre-contact archaeological sites noted above are anticipated to be directly impacted by the Project (Chapter 16), though none of these sites include ancestral burials. These resources are located in areas where adjustments to the Project footprint cannot be made. Therefore, additional mitigation in the form of salvaging these resources through a controlled, permitted, professional archaeological excavation will be required in consultation with appropriate Indigenous Community representatives. Currently, there are no identified linkages to pre-contact archaeological sites within the Project footprint with the Indigenous Communities. Other than for the archaeological sites mentioned, there is no interaction between the Project and palaeontological or built heritage resources. Continued consultation to mitigate these impacts where they have the potential to interact with Project-related activities will be undertaken through the Indigenous Impact Management Plan (Chapter 33, Section 33.4.3.4).

Grave Prairie is a landscape containing extremely important Ktunaxa Nation and Shuswap Band cultural values and is located within the Project footprint. The area of Grave Prairie has significant cultural significance to Ktunaxa and that as noted by Ktunaxa Nation (in Chapter 23), any additional infrastructure including the proposed Rail Loadout, is not compatible with this cultural landscape. Ktunaxa Nation notes that the area currently known as the “Grave Prairie Cultural Landscape” contains two “zones”: a “Culturally Significant Area” where no new activities or infrastructure will be accepted, and a “Culturally Sensitive Area” which requires rigorous in-depth assessments prior to additional development. The impacts to this site of any proposed development cannot be mitigated as stated by Ktunaxa Nation (Chapter 23), and simply avoiding the physical remains of Ktunaxa ancestors is not enough to justify the proposed rail loadout facility. For the Grave Prairie Cultural Landscape, the connection between it and Ktunaxa Nation (Chapter 23) and Shuswap Band’s (Chapter 24) physical and cultural heritage has been noted. Mitigation strategies proposed to avoid or offset impacts to the Grave Prairie Cultural Landscape are those identified in the Indigenous Impact Management Plan and are expected to be refined with continued consultation with Ktunaxa Nation and Shuswap Band. Follow-up on Project-related activities that have the potential to impact the Grave Prairie Cultural Landscape will also be undertaken through the Indigenous Impact Management Plan.

As the Project moves forward, both under provincial regulation and authorization and through consultation with the identified Indigenous Communities, the residual environmental effects of the Project on physical and cultural heritage and on a structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance for all phases of the Project are rated not significant due to the mitigation that has been implemented to date, and the mitigation that will be implemented. With the exception of Phase IV (Alexander Creek valley - Secondary Transportation Corridor), the Utility Corridor (west of Elk River); Phase I and II clearance limits (recently defined), which are identified as requiring assessment, baseline conditions of pre-contact heritage resources within the Project footprint are relatively well established, providing sufficient data to assess the potential for direct impacts to heritage resources. The baseline information on the connection between these pre-contact heritage resources and the identified Indigenous Communities’ physical and cultural heritage has not been identified. Mitigation strategies proposed to avoid or offset impacts to pre-contact heritage resources are expected to be moderate to high in effectiveness.

Consultation activities with the identified Indigenous Communities could reduce confidence of mitigation success and effectiveness once a potential connection to Indigenous Communities' ancestry is established or ruled out. Adaptive management measures will be developed and implemented to address corrective actions, as necessary, based on the results of consultation, and mitigation through archaeological monitoring. Continued consultation to mitigate these impacts where they have the potential to interact with Project-related activities will be undertaken through the Indigenous Impact Management Plan.

No residual effects on a change in physical and cultural heritage or any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance due to other Project activities were predicted in consideration of planned mitigation. Monitoring during the Construction and Pre-Production and Operations phases, and adaptive management, as necessary, will confirm these effects predictions and the effectiveness of mitigation, or provide information to implement adaptive corrective actions and strategies.

Transboundary effects to physical and cultural heritage during the Project lifecycle are currently not anticipated, as impacts to archaeological and palaeontological resources will be limited to the area of physical disturbance within the Project footprint (direct effects) or in close proximity to the Project footprint (indirect effects due to loss of geographical context) and linkages between these pre-contact heritage resources and the identified Indigenous Communities' physical and cultural heritage are currently not identified.

32.4.5 Current Use of Lands and Resources for Traditional Purposes

At the time of the submission of this Application/EIS, with the exception of Ktunaxa Nation's HHRA and sensory receptor locations related to current and rights-based use and Tsuut'ina Nation's site visit report; the identified Indigenous Communities have yet to provide a Traditional Knowledge/Traditional Land and Resource Use study for the Project. Therefore, the information utilized reflects NWP's current determination of significance utilizing shared perspectives, secondary sources that are publicly available, and based on input received from consultation and engagement activities, the understanding of which may be further refined through continued consultation with the identified Indigenous Communities. Additionally, the confidence of the residual effects to the current use of lands and resources by the identified Indigenous Communities is considered to be low to moderate where applicable, reflecting the current limited information that is available through ongoing consultation with the identified Indigenous Communities.

Based on the interactions identified, a summary of potential unmitigated effects to Indigenous Communities is outlined below, and where applicable, using information on anticipated effects to receptor and intermediate VCs. Where no appropriate representative VC was identified to serve as a surrogate for effects, additional biophysical information from Project-specific baseline studies and publicly available information was used, where available, to allow for an understanding of potential residual effects to Indigenous resource, use, or species of interest and incorporate share perspectives. Indigenous Communities' rights and interests are grouped by the categories outlined within Section 5(1)(c) of the relevant provisions of CEA Act, 2012.

While water is given special consideration by Ktunaxa Nation, for all identified Indigenous Communities, surface water and groundwater quality and quantity are addressed within the current use of lands and resources for traditional purposes under Fishing, through access to healthy aquatic systems.

32.4.5.1 Water (Ktunaxa Nation)

For Ktunaxa Nation, water has an intrinsic value and is a primary pathway independent of the other pathways that have been assessed in the Application/EIS. The Ktunaxa Nation have identified some HHRA and sensory receptor locations within the Project footprint and the KNRI LSA that relate to current and rights-based use. Some of these receptor locations are understood to be related to water use. Project-impacted watercourses within the Project area of influence have not been specifically identified as being used by the KNC but there is potential for the Ktunaxa Nation to utilize these watercourses for traditional purposes as well as other watercourses in the KNRI LSA.

The Project is anticipated to result in short-term to long-term changes in opportunities for access to and use of watercourses and waterbodies as access to upstream West Alexander Creek is restricted over the course of the Project. As noted in Chapter 10, in Grave Creek, the projected reduction in surface water quantity will be minimal during the Construction and Pre-Production phase and generally limited to the upper reaches of the watercourse. Though the change in water quantity is projected to be moderate in West Alexander Creek, the resulting influence on the downstream reaches of Alexander Creek is considerably lower during this Project phase. The residual effects on surface water quantity and quality due to site construction, operation, and mine closure and reclamation activities and from the disposal of mine rock and coal rejects from the Project, the surface water – groundwater interactions, and the sediment pond discharge are considered not significant and as such, no permanent losses to the ability to access to and use of watercourses and waterbodies is anticipated. It is notable that the results of the effect assessment indicate that the potential impacts of future climate change will have a substantially greater influence on surface water quantity (i.e., magnitude and timing of streamflow) along the downstream watercourses in the Aquatic RSA.

As noted in Chapter 11, seepage and surface runoff will be captured by the water management infrastructure and contained within the Interim or Main Sediment Pond prior to discharge to the receiving environment during Operations, Reclamation and Closure, and Post-Closure. The potentially impacted groundwater is not expected to result in the degradation of surface water quality in the receiving environment to the extent that interaction with local surface water results in chemistry changes that may adversely affect aquatic life. Therefore, no direct effect to the receiving environment is expected that may result in water quality concentrations above the thresholds for significance described in Chapter 11. Effects to surface water quality as a result of the Project are not detectable from background conditions in the Elk River and Lake Koochanusa. Water quality will be monitored and managed to ensure it meets all permitting conditions and contingencies will be implemented on an as needed basis that are detailed in the Project description (Chapter 3) and the Site Water Management Plan (Chapter 33, Section 33.4.1.8). The monitoring approach and adaptive management program are further described in the Follow-up Strategy in Chapter 11. In consideration of the above and the Project's design to reduce impacts to the aquatic system, the residual effect of the Project on the use of water for traditional purposes is rated as not significant.

Though modelling and baseline data were sufficient to evaluate effects for surface water quality, areas currently or potentially used by Ktunaxa Nation to access and use watercourses and waterbodies was limited to the HHRA and sensory receptor locations and shared perspectives; and the confidence of the residual effects to the use of water by Ktunaxa Nation for traditional purposes is considered to be moderate. The residual effects to opportunities for access to and use of aquatic systems will be further discussed through continued consultation with Ktunaxa Nation. Mitigation strategies proposed to avoid or offset the potential for any effects to the use of water for traditional purposes in relation to the change in the environment on the Ktunaxa Nation are those included in the Indigenous Impact Management Plan (Chapter 33, Section 33.4.3.4) and are expected to be refined with continued consultation with the Ktunaxa Nation.

Transboundary effects to health and socio-economic conditions during the Project lifecycle are not anticipated, as the Project footprint accounts for negligible changes for the identified Indigenous Communities and mitigation strategies proposed to avoid or offset the potential for any effects to the health and socio-economic conditions in relation to the Project are those included in the Indigenous Impact Management Plan (Chapter 33, Section 33.4.3.4). The impact management measures included in Indigenous Impact Management Plan are expected to be refined as needed with continued consultation with the Indigenous Communities.

Transboundary effects to surface water quantity in Lake Koocanusa during the Project lifecycle are not anticipated, as the Project footprint accounts for a very small portion of the contributing watershed area of the Kootenay River at the Canada-U.S.A. border and Ktunaxa Nation have not currently identified their use of the Project-impacted watercourses for traditional purposes related to water use. There is the potential for transboundary effects to surface water quality in Lake Koocanusa to occur during the Project lifecycle as a result of the Interim and Main Sediment Pond discharges to the receiving environment in West Alexander Creek. Transboundary effects into Alberta will not occur as a result of the Project as all watersheds within and surrounding the Project footprint are located on the western side of the Continental Divide.

32.4.5.2 Fishing

The fish and fish habitat VCs and related residual effects assessment (Chapter 12) were used to support an understanding of Project-related residual effects that have the potential to change the opportunity to use and access specific fish VCs identified by Indigenous Communities (and all fish in general) as well as access to healthy aquatic systems for fishing as current uses and interests. Residual effects to fish and fish habitat VCs, and all fish in general, include:

- Instream habitat loss as a result of mine design;
- Habitat loss due to changes in water quantity;
- Riparian disturbance; and
- Changes in water quality.

Changes to abundance, disturbance, spawning areas, seasonal movements, movement courses, and habitat requirements for fish species identified by Indigenous Communities and considered in the EIS are included in Chapter 12, Section 12.4.2.2. Chapter 12 also notes that Alexander Creek, West Alexander Creek, Grave Creek, and 12 of 27 wetlands (surveyed for fish presence) which were connected to watercourses were considered fish bearing. Thirteen of the 27 wetlands surveyed had low probability for

fish presence based on the lack of suitable habitat observed and/or disconnectedness with fish-bearing watercourses.

The residual effects of the Project on the current use of lands and resources by the Indigenous Communities with respect to the opportunity to fish and the use of fish species for traditional purposes are characterized as short-term to long-term, as the potential for adverse effects to opportunities for fishing will generally be anticipated to occur until Project activities are completed. Changes in the opportunity to fish and access aquatic systems is restricted to the Fish and Fish Habitat LSA and the opportunities to fish and access to healthy aquatic systems in watercourses currently used or potential used in the future may be altered as a result of Project's residual effects on fish and fish habitat VCs. Changes in opportunities to fish are anticipated to be reversible in the long-term as the Project footprint is reclaimed and off-site fish habitat offsetting measures are implemented, and also because opportunities to fish are present within several watercourses within the Fish and Fish Habitat LSA.

Ktunaxa Nation's HHRA and sensory receptor locations related to current and rights-based use for traditional fishing purposes and their shared perspectives from previous applications supported the determinations of Project related effects to changes of the environment on Ktunaxa Nation. Tsuut'ina Nation did not include any fish or fishing related information in their site visit report. While none of the identified Indigenous Communities have currently made available information (except for Ktunaxa Nation) regarding their use of the watercourses in the Project footprint for fishing purposes, it is understood that Indigenous Communities utilize the ATRI/KNRI LSA for traditional purposes. It is acknowledged that the Indigenous Communities have the potential to use watercourses within the Project footprint given their current use and interest in the region. The Project is anticipated to result in short-term to long-term changes in opportunities for fishing as access to upstream Grave Creek and West Alexander Creek is restricted over the duration of the Project. Impacts to fish habitat, such as the loss of instream habitat, will be offset through the fish habitat offsetting plan and as such, no permanent losses to the ability to fish are anticipated. The Fish and Fish Habitat Management Plan (Chapter 33, Section 33.4.1.5) will compensate for the loss of available habitat to fish and benthic invertebrate communities in the Fish and Fish Habitat LSA and Aquatic RSA or for different uses as required for their life histories, thus resulting in no net loss of instream habitat (i.e., no residual effect) as a result of the Project.

In consideration of the above and the Project's design to reduce impacts to fish and fish habitat VCs, the residual effect of the Project on the current use of lands and resources for the traditional purpose of fishing is rated as not significant. Though baseline data were sufficient to evaluate effects for the fish and fish habitat VCs, areas currently or potentially used by Ktunaxa Nation for fishing in the Project-impacted watercourse (i.e., Alexander Creek) were limited to the HHRA and sensory receptor locations and publicly shared Ktunaxa Nation's perspectives; none of the HHRA and sensory receptor locations related to fishing use overlapped with the Project footprint. Known areas currently or potentially used by Indigenous Communities (other than Ktunaxa Nation) to fish were not available at the time of the assessment. The residual effects to opportunities for fishing and access to aquatic systems will be further discussed through continued consultation with Indigenous Communities. Mitigation strategies proposed to avoid or offset the potential for any effects to fishing for traditional purposes in relation to the change in the environment on the identified Indigenous Communities are those included in the Indigenous Impact Management Plan (Chapter 33, Section 33.4.3.4) and are expected to be refined with continued consultation. Thus, the continued consultation as well as the development of potential follow-up measures to implement

corrective actions as necessary based on that follow-up are expected to improve the low to moderate level of confidence.

Transboundary effects to fish and fish habitat, in Lake Koochanusa during the Project lifecycle are not anticipated, as the Project footprint accounts for a very small portion of the contributing watershed area of the Kootenay River at the Canada-U.S.A. border. Transboundary effects into Alberta will not occur as a result of the Project since other than Ktunaxa Nation, none of the identified Indigenous Communities have identified their use of the Project footprint and the ATRI/KNRI LSA for traditional fishing purposes.

32.4.5.3 Hunting and Trapping

The wildlife and wildlife habitat residual effects assessment (Chapter 15) was used to support an understanding of Project-related effects that have the potential to change hunting and trapping by the Indigenous Communities. Residual effects to wildlife VCs include:

- Habitat loss and degradation;
- Sensory disturbance;
- Disruption to movement; and
- Increased mortality risk.

The assessment of residual effects to land use and access (Chapter 19) was used to understand potential effects on the availability of lands used for hunting and trapping. In addition, changes to air quality (Chapter 6) and noise (Chapter 7) may result in direct sensory disturbance to wildlife as well as indirect sensory disturbance to Indigenous land users and alter or deter their use of the lands for hunting and trapping. Changes to abundance, disturbance, occupancy, seasonal movements, movement corridors, and habitat requirements for wildlife species identified by Indigenous Communities and considered in the EIS are included in Chapter 15.

Pathways of increased risk of mortality for wildlife VCs (described in Chapter 15) that are unlikely to be fully mitigated are collisions with Project-related traffic on access or mine roads and increased hunter access during Post-Closure. Potential direct mortality during the Project phases that may arise from collisions with Project-related traffic are expected to be negligible to low, and further mitigation measures will be implemented to further minimize the risk of collision, if required. Permanent roads created in earlier Project phases may lead to indirect mortality risk due to increased hunter access. Various mitigation measures are expected to contribute to the avoidance and minimization of the risk of mortality on wildlife VCs with high effectiveness. Mortalities from vehicle collisions and hunter access are expected to decline due to a decline in road density in the Terrestrial RSA.

Potential residual effects to the current use of lands and resources by the Indigenous Communities for the traditional purpose of hunting and trapping is characterized as being long-term, due to the potential for adverse effects to opportunities for hunting and trapping species of interest. The effects related to habitat loss and degradation, sensory disturbance, disruption to movement, and mortality risk are expected to continue to the end of the Reclamation and Closure phase of the Project. The potential for negative effects to opportunities for hunting is low to moderate based on the limited amount of expected loss of high-quality habitat, or the semi-permanent nature of infrastructure such as that of linear infrastructure that might impact species movements, and the limited percentage of high-quality habitat that will be impacted by potential sensory disturbance. The potential effects to opportunities for hunting

and trapping are restricted to the Project footprint and the Terrestrial LSA, and the potential for adverse effects to species of interest are expected to occur continuously as the Project activities are completed, from Construction and Pre-Production to Reclamation and Closure. The Project-related changes in current use of lands and resources for the traditional purpose of hunting and trapping are anticipated to be reversible as the site is reclaimed and ecosystems are re-established.

Ktunaxa Nation's HHRA and sensory receptor locations related to current and rights-based use for traditional hunting and trapping purposes and their shared perspectives from previous applications supported the determinations of Project related effects to changes of the environment on Ktunaxa Nation. Tsuut'ina Nation also provided information related to species of interest within the Project footprint in their site visit report. While none of the identified Indigenous Communities have currently made available information (except for Ktunaxa Nation and Tsuut'ina Nation) related to their use of the Project footprint for hunting and trapping for traditional purposes, it is anticipated that Indigenous Communities (including Tsuut'ina Nation) utilize the ATRI LSA based on their species of importance at a low level due to previously noted disturbances. The anticipated low level of use by Indigenous Communities, coupled with the lack of significant adverse effects to wildlife VCs that are potentially used for hunting and trapping purposes, indicates no residual effect on the change in current use of lands and resources for traditional hunting and trapping. It is anticipated that while Ktunaxa Nation have identified some HHRA and sensory receptor locations within the Project footprint and the KNRI LSA, due to previously noted disturbances in the area, Ktunaxa Nation have a moderate level of use in the KNRI LSA. The anticipated moderate level of use by Ktunaxa Nation, coupled with the lack of significant adverse effects to wildlife VCs that are potentially used for hunting and trapping purposes, indicates no residual effect on the change in current use of lands and resources for traditional hunting and trapping. The Project is not anticipated to result in the permanent loss of access or the ability to conduct traditional land and resource use related to hunting and trapping within the Project footprint or VC study areas. As part of Reclamation and Closure, wildlife habitat will be reclaimed within the Project disturbance footprint, and result in a variety of wildlife habitat types for use by ungulate, carnivore, and bird species. Mitigation strategies proposed to avoid or offset the potential for any effects to hunting and trapping for traditional purposes in relation to the change in the environment on the identified Indigenous Communities are those included in the Indigenous Impact Management Plan (Chapter 33, Section 33.4.3.4) and are expected to be refined with continued consultation. Therefore, in consideration of the above and the Project's design to reduce impacts to wildlife VCs, ecosystems, land use, air and noise, the residual effect of the Project on the current use of lands and resources for traditional hunting and trapping is rated not significant.

Baseline conditions of relevant VCs within the Project footprint and VC study areas are well established, providing sufficient data to assess effects to changes in the opportunity for Indigenous Communities to hunt and trap. Though baseline data were sufficient to evaluate effects for Project VCs, not all species of interest to Indigenous Communities identified through publicly available information were evaluated to the depth of the VC baseline studies and effects assessment. The residual effects to opportunities for hunting and trapping will be further discussed through continued consultation with Indigenous Communities. Thus, the continued consultation as well as the development of potential follow-up measures to implement corrective actions as necessary based on that follow-up are expected to improve the low to moderate level of confidence.

Transboundary effects into Alberta will occur as a result of the Project due to the species of interest identified by the Indigenous Communities including ungulate VCs (moose, elk, and bighorn sheep),

carnivore VCs (grizzly bear, wolverine, American badge, American marten, and Canada lynx) and birds having vast home ranges. Transboundary effects into the U.S.A. will also occur for carnivore VCs and birds as a result of the Project due to the species of interest having vast home ranges. While other than Ktunaxa and Tsuut'ina Nations, none of the identified Indigenous Communities have identified their use of the Project footprint and the ATRI/KNRI LSA for traditional hunting and trapping, it is expected that transboundary effects will occur as a result of the interest in the wildlife VCs assessed for Project-related effects.

32.4.5.4 Harvesting and Gathering

The Project has the potential to affect culturally significant plants and ecosystems through reduction of ecosystem/community abundance and distribution, as well as alteration of ecosystem composition and structure (i.e., species abundance and distribution). The total area of potential culturally significant ecosystems to be removed as a direct overlap with components of the Project footprint is 1,193 ha, comprising, 11% of potential culturally significant ecosystems that may contain cultural plants within the Landscapes and Ecosystems LSA. The alteration of the composition and structure of specific culturally significant ecosystems have the potential to also occur as a result of:

- Reduction of surface water quantity in riparian habitats downstream from the Project footprint, resulting in a shift in community composition to resemble adjacent upland ecosystems; and
- Alteration of the severity and frequency of avalanche activity in avalanche chute ecosystems adjacent to the Project footprint, resulting in a shift of community composition depending on the nature of the change in avalanche activity.

The above effects are addressed in greater detail in Chapter 13. Clearing, grubbing, logging and the related vegetation removal during the Construction and Pre-Production and Operations phases of the Project will reduce the abundance and distribution of potential culturally significant ecosystems in the ATRI/KNRI LSA. Given the relatively frequent and common distribution of potential culturally significant plants, the proportional loss of such ecosystems providing habitat for these species within the Project footprint is relatively high (i.e., 93%). This extent of loss within the Project footprint comprises a small proportion (i.e., approximately 1%) of the overall extent of the estimated area of culturally significant ecosystems in the ATRI/KNRI LSA.

Mitigation measures recommended to reduce the extent and severity of potential effects to landscapes and ecosystems (i.e., avalanche chutes, grasslands, riparian habitat, old growth and mature forests, and wetland ecosystems) will act to reduce and mitigate the extent and severity of potential effects to culturally significant plants and ecosystems (see Table 13.7-3 and Chapter 13 for specific mitigation measures). Implementation of the Ecological Restoration Plan (Chapter 33, Section 33.4.1.3) will restore approximately 684 ha of potential habitat for culturally significant plants. Alteration of the landscape within the Project footprint will result in the permanent loss of some ecosystems. Though site-specific input from the Indigenous Communities is only available for Ktunaxa Nation (through their HHRA and sensory receptor locations and shared perspectives that are publicly available) and Tsuut'ina Nation (through plant species information provided in their site visit report), it is generally understood that traditional use of the land depends not only on the resources that may be present, but may also depend on the history and tradition experienced in the context of a specific landscape (i.e., "sense of place"). Consequently, traditional use of lands for harvesting and gathering may be permanently affected as the

sense of place inherent to the lands within the Project footprint and the Landscapes and Ecosystems LSA may not be reclaimed once they are permanently and physically altered.

In consideration of these factors, potential residual effects to the current use of lands and resources by the Indigenous Communities for the traditional purpose of harvesting and gathering is characterized as being long-term to permanent. This is because the loss of vegetation communities and plant species of interest within those communities, as well as access to vegetation communities, will be impacted over the long-term and potentially permanently as ecosystem recovery and restoration may take longer than 34 years to recreate areas used for harvesting and gathering. The proportional area of habitat for potential culturally significant plants and ecosystems is exceptionally low relative to extent of lands within which harvesting and gathering may be conducted by Indigenous Communities. Impacts to plants and vegetation communities potentially used by Indigenous Communities for harvesting and gathering are restricted to the Project footprint. Though ecological restoration activities will restore impacted vegetation communities over time, the reclaimed areas (such as forested sites) will take many years to support mature forests that may support plant species of interest used for harvesting and gathering. The ATRI/KNRI LSA overlaps with several Indigenous Communities' traditional territories, and as such, changes in the accessibility to harvest and gather may impact the ability to undertake cultural and traditional practices for community members and the importance of available lands for traditional practices.

The Project is anticipated to result in a reduction in the abundance and distribution of culturally significant plants and ecosystems, including potential alteration of the respective composition and structure through a reduction in vigour and alteration of nutritional value. Potential effects to culturally significant plants and ecosystems affecting harvesting and gathering will be reduced through implementation of recommended mitigation measures and the Ecological Restoration Plan (Chapter 33, Section 33.4.1.3). Though impacts to access for the purposes of harvesting and gathering will not be permanent, the alteration of the landscape may potentially coincide with an alteration or loss of the sense of place for the Indigenous Communities only within the Project footprint. If traditional harvesting and gathering of culturally significant plants is tied to the sense of place, there is potential that the residual effect may result in long-term to permanent changes and be considered a potentially significant effect, based on a precautionary assumption that some sense of place tied to the landscape within and surrounding the Project footprint cannot be entirely restored. A significant effect on current use of lands and resources for the traditional use of harvesting and gathering culturally significant plants cannot be adequately predicted at this time, as an inherent sense of place tied to lands within the Project footprint and the Landscapes and Ecosystems LSA can only be identified by the Indigenous Communities. In the absence of such information from most Indigenous Communities (other than Ktunaxa Nation and Tsuut'ina Nation), and because ecological restoration activities will restore impacted vegetation communities, this assessment preliminarily concludes that the residual effect of the Project on the current use of lands and resources for harvesting and gathering is rated as not significant with a low level of confidence that will be improved by information from and consultation with affected Indigenous Communities.

Though baseline conditions for culturally significant plants and ecosystems were established using historical documentation available on the Indigenous Communities and the specific information provided by the Ktunaxa and Tsuut'ina Nations on plant species of interest in the Project footprint, or of other developments within the ATRI/KNRI LSA; actual harvesting and gathering practices within the Project footprint and the Landscapes and Ecosystems LSA for all of the Indigenous Communities are not known at this time. Further, it is not well understood if specific ecosystems are identified as having cultural

significance, regardless of whether or not they contain traditionally harvested or gathered plants, or even if other culturally significant plant species not previously identified have potential to be affected.

Mitigation strategies proposed to avoid or offset the potential for any effects to harvesting and gathering for traditional purposes in relation to the change in the environment on the identified Indigenous Communities are those included in the Indigenous Impact Management Plan (Chapter 33, Section 33.4.3.4) and are expected to be refined with continued consultation. Residual effects on the opportunities for harvesting and gathering will be further discussed through continued consultation with the identified Indigenous Communities, as well as through the development of potential follow-up and monitoring and adaptive management measures to implement corrective actions as necessary based on that follow-up. Continued consultation and a follow-up program collaboratively developed with the Indigenous Communities to be implemented is expected to improve the low to moderate level of confidence.

Transboundary effects into Alberta and the U.S.A. will not occur as a result of the Project as other than the Ktunaxa and Tsuut'ina Nations, none of the identified Indigenous Communities have identified their use of the Project footprint and the ATRI/KNRI LSA for traditional harvesting and gathering and the loss of plant species as a result of the Project is limited to the Project footprint and the influence of the Project on transboundary lands is considered to be negligible.

32.4.5.5 Ceremonial/Sacred Areas

The potential general Project effects to ceremonial and sacred places that might exist within the Project footprint include:

- Potential loss of ceremonial and sacred places that might exist within the Project footprint;
- Potential change in accessibility to ceremonial and sacred places that might exist through changes in access to the Project footprint;
- Potential change in the value of place as a result of the loss or changes to ceremonial or sacred areas that might exist within the Project footprint; and
- Potential change in the ability to know and teach the cultural and social aspects of culture and history as a result of the loss or changes to ceremonial or sacred areas that might exist within the Project footprint.

For the purposes of this assessment, the potential residual effects to ceremonial/sacred areas for traditional purposes are presented in the physical and cultural heritage section above (Section 32.4.4), due to their potential for cultural importance to the identified Indigenous Communities and based on their (currently undefined but) potential link to Indigenous ancestry. The current use of lands and resources for traditional purposes also addresses ceremonial/sacred areas through the sections on fishing, hunting and trapping, and harvesting and gathering, where the Project may potentially impact the physical and cultural heritage of the identified Indigenous Communities through ceremonial bundles and the accessibility to areas of such traditional activities (Section 32.4.5). As noted above, the residual environmental effects of the Project on physical and cultural heritage and on a structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance (including ceremonial/sacred areas) for all phases of the Project were rated not significant due to the mitigation measures that have been implemented to date, and the mitigation that will be implemented. Continued consultation with the Indigenous Communities to mitigate these impacts where they have the potential

to interact with Project-related activities will be undertaken through the Indigenous Impact Management Plan (Chapter 33, Section 33.4.3.4).

As noted in Section 32.4.4, transboundary effects to ceremonial/sacred areas during the Project lifecycle are currently not anticipated, and the baseline information on the connection between heritage resources and the identified Indigenous Communities' physical and cultural heritage has not been identified.

32.4.5.6 Access and Travel Routes

Ancient travel routes and landforms of cultural significance are summarized in Chapter 16. In general, travel routes have been historically known to be linked to the movement corridors of wildlife species of interest. Known or anticipated transboundary movement corridors for ungulate species of interest along the Continental Divide include the Crowsnest, Deadman, and Racehorse Passes in the eastern portion of the ATRI/KNRI LSA. Movement corridors for grizzly bear include Alexander Creek, West Alexander Creek, and Grave Creek Canyon. Some fishing access corridors may be impacted as a result of direct losses to watercourses that may be potentially used by Indigenous Communities (e.g., West Alexander Creek). Other connectivity habitats potentially used include the Michel-Alexander linkage at the southern portion of the Fish and Fish Habitat LSA, though access to this area will not be impacted as a result of the Project.

There are no identified Project-related effects to the current use of access and travel routes by Indigenous Communities, and therefore specific Project-related effects to access or travel routes are not carried forward in this assessment.

32.4.5.7 Mitigation Measures

Mitigation measures have been identified to avoid, minimize, or otherwise address potential adverse effects to Indigenous Communities' rights and interests. Through the assessment of effects and continued consultation with Indigenous Communities, mitigation for current use of lands and resources for traditional purposes may continue to be identified and implemented. A range of mitigation measures have been incorporated into the Project and management plans and programs to reduce or eliminate adverse effects on VCs or VC groups that may be of interest to Indigenous Communities. Detailed mitigation measures are provided in the VC assessment chapters of relevant VCs (e.g., Chapter 12) as well as the Project-specific management plans (Chapter 33). Mitigation measures related to the impact on Indigenous Communities' rights and interests are outlined in Chapters 23 to 31 under the Indigenous Impact Management Plan (Chapter 33, Section 33.4.3.4).

The key mitigation measures to reduce impacts to the identified Indigenous Communities' rights and interests include the following.

- Best management practices and procedures related to each VC of interest including the design of mitigation measures as outlined in the Application/EIS.
- Follow-up, monitoring and offsetting and compensation programs related to anticipated residual effects of select VCs (e.g., Ecological Restoration Plan and related on-site restoration).
- Implementation of the engagement agreements between NWP and the identified Indigenous Communities.
- Confirmation and implementation of the Indigenous Impact Management Plan that outlines mitigation measures to avoid, minimize, reduce, and/or offset potential direct and indirect

impacts of the Project and utilizes adaptive management approaches for follow-up strategies and monitoring programs.

- Consideration of collaborative strategies for addressing the cumulative effects where applicable, with the identified Indigenous Communities, other proponents, and regulatory agencies.
- Following the spirit and intent of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and its guiding principles and supporting the recognition of Indigenous stewardship and governance in the Elk Valley.
- Recognizing and respecting the deep personal, community, and cultural attachment of the identified Indigenous Communities to the land and resources where NWP does business and incorporating NWP's understanding of Indigenous interests, values, knowledge, and ways of knowing into NWP decision-making where possible.

In addition to the mitigation measures outlined in the specific VC chapters, the following mitigation measures are proposed to reduce the potential impact on the identified Indigenous Communities' rights and interests:

- Engaging with the identified Indigenous Communities to refine the Indigenous Impact Management Plan specific to the rights-based activities and other interests (e.g., cultural activities, hunting, trapping, fishing, gathering, and cultural heritage) exercised by the identified Indigenous Communities within the Project footprint.
- The Indigenous Impact Management Plan will further describe cross-cultural awareness training, which will be developed in collaboration where possible, with the identified Indigenous Communities. This training is expected to build awareness and reduce potential adverse interactions with the identified Indigenous Communities and will include cultural awareness education and training for staff and on-the-ground personnel during the applicable phases of the Project.
- Supporting possible opportunities to augment VC-specific monitoring programs to include responses to concerns raised by the identified Indigenous Communities utilizing adaptive management approaches for follow-up strategies.
- Participation in the Elk Valley Cumulative Effects Management Framework as co-led by the KNC and other relevant regional cumulative effects initiatives, where appropriate.
- Encouraging the participation of the identified Indigenous Communities to the applicable Project Advisory, Environmental Stewardship, and in the Environmental Monitoring Committee to review, shape, and steer monitoring activities and to guide future priorities.
- Encouraging the participation of the identified Indigenous Communities in the Reclamation Planning Committee to review how traditional knowledge has been incorporated, including Indigenous traditional use and cultural expression as part of the Project closure goals.
- Supporting access to the Project site and provide applicable available resources for the Indigenous-Guardians Program to develop and lead monitoring programs related to the Project.
- Incorporating feedback from the identified Indigenous Communities in the development of an Access Management and Monitoring Program which would address any concerns raised regarding access to areas that might be temporarily restricted due to safety concerns (e.g., in the Project footprint during construction and operations) by creating alternatives to guarantee access to key land use areas. Establishment of No Unauthorized Entry (NUE) areas in order to ensure worker and public safety within and near the Project.

- Supporting the establishment of conservation lands that may be privately held by NWP, an Indigenous Community, or a recognized conservation organization.
- Supporting Indigenous work related to land and resource use planning objectives in proximity to the Project and following the Environmental Assessment Certificate (EAC), supporting Indigenous work related to land and resource use planning objectives for consideration during the relevant Project phases.
- Providing access to requested reports and identifying feedback opportunities where applicable including the various mitigation and monitoring plans as well as those related to the Indigenous Impact Management Plan.

Specific to the use of lands and resources for traditional purposes by Indigenous Communities, some of the mitigation measures include the following.

- Water (for Ktunaxa Nation):
 - Implementation of the Sediment and Erosion Control Management Plan, the Site Water Management Plan, Fish and Fish Habitat Management Plan, Ecological Restoration Plan, and the Air Quality and Greenhouse Gas Management Plan.
 - Earth moving activities throughout the life of mine scheduled to ensure limited durations of exposed soils.
 - Sediment loading in runoff reduced by the application of standard industry practices to intercept sediment before it reaches the receiving environment.
 - Regular inspections to ensure drainage, erosion, sediment control, air quality, and dust control measures are effective and functioning properly, and allow for timely repairs and adjustments as required.
 - Limiting the mine disturbance footprint and avoiding affecting additional drainages beyond West Alexander and Grave Creeks and further to the north of the Grave Creek-West Alexander Creek drainage divide. Runoff will be directed to small catchment sumps prior to release or managed with localized erosion mitigations for small isolated areas of disturbance.
 - For surface water that cannot be diverted, capturing it in sediment ponds prior to release into the West Alexander Creek drainage.
 - Progressive reclamation and re-vegetation throughout the mine life to minimize erosion potential and reduce the Project footprint, minimizing the potential for runoff effects to surface water.
 - NWP will support Ktunaxa Nation's stewardship initiatives where identified and applicable to review existing Project specific programs and plans related to water stewardship and, if required, jointly develop a program to encourage a culture of water stewardship by employees within the Project work environment.
 - Where not addressed through other processes, NWP and Ktunaxa Nation will jointly determine a funding and prioritization mechanism for supporting continued aquatic research studies specific to the Project where applicable and required; and consider requests through existing committees for monitoring studies related to water quality.
- Fishing:
 - Implementation of the Sediment and Erosion Control Management Plan, the Site Water Management Plan, Fish and Fish Habitat Management Plan, Ecological Restoration Plan, and the Air Quality and Greenhouse Gas Management Plan.

- Progressive reclamation and re-vegetation throughout the mine life to minimize erosion potential and reduce the Project footprint, minimizing the potential for runoff effects to surface water, including limiting the mine disturbance footprint with collaboration where possible with Indigenous Communities.
- Prohibiting or limiting non-Indigenous access to fishing areas to assure compliance with fishing restrictions.
- Respecting traditional fisheries timing windows and seasonal rounds where possible.
- As there is potential for access within the Project footprint, NWP is committed to, where possible, creating permanent access during the Post-Closure phase for future traditional activities, including fishing.
- Educating the Project workforce about fish and fish habitats and implementing an angling policy for NWP non-Indigenous employees and contractors.
- Coordinating with local conservation enforcement for Alexander and West Alexander Creeks should increases in non-Indigenous recreational fishing be observed by NWP employees.
- Hunting and Trapping:
 - Implementation of the Wildlife Management and Monitoring Plan, Ecological Restoration Plan, and the Access Management Plan.
 - Progressive reclamation during Operations, where possible, minimizing habitat and sensory disturbances, reducing barriers or filters to movement, and preventing wildlife entrapment with collaboration where possible with Indigenous Communities.
 - Wildlife protection protocols, wildlife education for contractors and employees, and managing vehicle traffic and site access.
 - Implementation of mitigation measures for applicable receptor wildlife VCs.
 - As there is potential for access within the Project footprint, NWP is committed to, where possible, creating permanent access during the Post-Closure phase for future traditional activities, including hunting and trapping.
 - Respecting traditional hunting and trapping timing windows and seasonal rounds, where possible.
- Harvesting and Gathering:
 - Implementation of the Vegetation and Ecosystems Management and Monitoring Plan, Ecological Restoration Plan, and the Air Quality and Greenhouse Gas Management Plan.
 - Minimizing Project footprint, to the feasible extent, by clearing only what is required for Operations and delaying clearing of areas until required for construction or operation to maintain ecosystem functioning.
 - Implementation of an Invasive Plant Management Plan to limit the effects that invasive plants may have on natural vegetation.
 - As there is potential for access within the Project footprint, NWP is committed to where possible creating permanent access during the Post-Closure phase for future traditional activities, including harvesting and gathering.
 - Respecting traditional harvesting and gathering timing windows and seasonal rounds, where possible.
 - Identifying opportunities for harvesting and gathering prior to construction for Indigenous Community members within the Project footprint, and the reestablishment of plant harvesting activities in the reclamation phase.

- Consideration of support for possible mapping of all high priority cultural use areas in the proximity to the Project by Indigenous Communities, including support for research and development of approaches for restoring Landscape and Ecosystem VCs.

NWP will participate in regional cumulative effects initiatives, where relevant and appropriate, and will adopt management practices and measures to meet regional planning objectives, where possible, over the course of the Project. In addition to the above-listed mitigation measures, NWP is committed to ongoing dialogue with the identified Indigenous Communities, as well as the following activities:

- Continued consultation and engagement to identify and understand current use of lands and resources for traditional purposes within the Project footprint, the ATRI/KNRI LSA, and the ATRI/KNRI RSA through the EA/IA processes as well as during the Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases of the Project.
- Implementing the Indigenous Impact Management Plan.
- Identifying opportunities for harvesting and gathering prior to construction for Indigenous Communities and their members within the Project footprint and providing the opportunity for ceremonies on the land prior to construction of Project infrastructure; and
- Regional collaboration between the identified Indigenous Communities, proponents, and governments and implementation of initiatives to minimize collective impacts of past, present, and future projects and activities.

No other technically and economically feasible mitigation measures were considered to address potential impacts to Indigenous Communities' rights and interests. The key mitigation measures identified may change as a result of specific input provided by Indigenous Communities where applicable. At this time, NWP is not aware of potential future technology innovations that may help to further mitigate effects.

32.4.5.8 Cumulative Effects Assessment to the Environment on Indigenous Communities

The assessment of residual cumulative effects of the Project to the environment on Indigenous Communities in combination with those of past, present, and reasonably foreseeable future projects and activities on wildlife and human health concluded no significant adverse cumulative effects on terrestrial, aquatic, and human health. Additionally, no adverse residual effects on socio-economic conditions related to Indigenous Communities were predicted, therefore no cumulative effects to socio-economic conditions are expected to occur. As such, the residual cumulative effects of a change to social, health, and economic conditions arising from the Project on Indigenous Communities in combination with other past, present, and reasonably foreseeable future projects and activities during all phases are considered not significant. The wildlife and human health risk estimates inherently consider operational activities, emissions, and other contaminant releases intrinsic to the predictive modelling of water quality, air quality, and secondarily food via transport, fate, and food chain modelling. Based on the current information available to NWP, it is anticipated that the contribution of the Project's residual effects is unlikely to cause a change in the cumulative effects that could affect the viability or sustainability of traditional use of lands and resources within the ATRI/KNRI RSA by the identified Indigenous Communities.

All information compiled and presented on cumulative effects assessment has been authored by NWP and the information presented in relation to potential Project effects is not intended to supersede traditional knowledge or specific information of the community members and elders. As IAAC has on a preliminary basis determined that the depth of the duty to consult in relation to the Project is at the high

end of the consultation spectrum for the Ktunaxa Nation, the potential cumulative effects on the Ktunaxa Nation's rights and interests are addressed in that context. Cumulative effects of the Project on Ktunaxa Nation's Title, Rights, and related interests may occur where the Project has a residual cumulative effect on traditional activities such as water use, fishing, hunting and trapping, harvesting and gathering, or on physical activities associated with traditional use such as travel and navigation, ceremonial and sacred sites, and physical and cultural heritage areas and any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance. Acknowledging the Ktunaxa Nation's perspective, considering the overall disturbance of lands and waters that has occurred within the Elk Valley over time, and considering both quantitative disturbance and more qualitative factors, we understand that it is the opinion of the Ktunaxa Nation that a threshold on adverse, long-term effect on the exercise of Ktunaxa Nation's rights in the KNRI RSA has already been surpassed. The additional cumulative effects of the Project, while determined to be minor in nature, may potentially exacerbate current and ongoing effects in the Elk Valley from other past and current projects, and on Ktunaxa Nation's exercise of their rights and interests, for the foreseeable future.

The potential impact of the residual cumulative effects on the exercise of Ktunaxa Nation's Title, Rights and related interests will be further discussed through continued consultation with Ktunaxa Nation, as well as through implementation of the Indigenous Impact Management Plan (Chapter 33, Section 33.4.3.4), the development of potential follow-up, and monitoring and adaptive management measures to implement corrective actions as necessary based on that follow-up. On-going programs of environmental and socio-economic monitoring undertaken in collaboration with the Ktunaxa Nation and the co-development of offsets and mitigation measures are addressed in the Application/EIS. As identified throughout the Application/EIS, engagement is ongoing, and the Ktunaxa Nation may provide additional information about the potential effects of the Project on Ktunaxa Nation's rights and interests.

32.4.6 Impact on Aboriginal and/or Treaty Rights and Interests

At the time of the submission of this Application/EIS, with the exception of Tsuut'ina Nation's site visit report and consideration of the HHRA and sensitive receptor locations shared by the Ktunaxa Nation including their perspectives, the identified Indigenous Communities have yet to submit a Traditional Knowledge/Traditional Land and Resource Use study for the Project. Therefore, the information utilized in the assessment of impact on Aboriginal and/or Treaty rights and interests of the identified Indigenous Communities reflects NWP's determination of the confidence of the level of severity of impacts utilizing secondary sources that are publicly available and based on input received from engagement activities. The confidence is considered to be low to moderate where applicable, reflecting the current information that is available through ongoing consultation with the Indigenous Communities. Based on the interactions identified, a summary of the potential impact on the Aboriginal and/or Treaty rights and interests of the identified Indigenous Communities is outlined below. Indigenous Communities' rights and interests are grouped by the categories outlined within Section 5(1)(c) of the relevant provisions of CEA Act, 2012. . It is to be noted that the assessment on impact to the identified Indigenous Communities' rights and interests is not meant to supersede the Crown's formal consultation process to determine adverse impacts to rights of Indigenous Peoples and related accommodation.

The potential for impacts on Aboriginal and/or Treaty rights and interests may occur when there is potential for residual (after mitigation) Project effects (i.e., direct, indirect and/or cumulative) on traditional activities such as fishing, hunting and trapping, harvesting and gathering, or on activities

associated with traditional use such as travel and navigation, ceremonial and sacred sites, and physical and cultural heritage areas. The assessment of the impact on the Aboriginal and/or Treaty rights and interests of the identified Indigenous Communities is through the determination of potential Project effects on traditional land and resource use, including potential change to current use of lands and resources for traditional purposes, potential change to physical and cultural heritage, potential change to any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance, and potential change to health and socio-economic conditions as identified through the potential future use of the Project footprint with and without the Project.

The objective of assessing the level of the severity of the impact on the Aboriginal and/or Treaty rights and interests of the identified Indigenous Communities is to assess the level of severity of the impacts that the Project may have on the exercise of these rights and related interests. An iterative approach has been taken to evaluating the severity of impacts; it may be deemed necessary to update the evaluation as new information becomes available and/or as new mitigation measures are proposed. The assessment of the potential impacts on the identified Indigenous Communities' rights and interests are in consideration of the existing and potential future use of the Project footprint, the ATRI/KNRI LSA, and the ATR/KNRI RSA by these Indigenous Communities to exercise their rights and interests with and without the Project. This includes a comparison of the impact on anticipated future exercise of Indigenous Communities' rights and interests in the Project footprint, the ATRI/KNRI LSA, and the ATRI/KNRI RSA.

Based on the evaluation of the environmental effects of the Project, as determined through Project-related residual effects and residual cumulative effects anticipated for the associated VCs and anticipated effects to non-VC groups, and after implementation of proposed mitigation measures as well as additional information (certain intermediate and receptor VCs) included in the assessment, the potential severity of adverse impacts on the Aboriginal and/or Treaty rights and interests of the identified Indigenous Communities that may remain include:

- Change to current use of water for traditional purposes (Ktunaxa Nation);
- Change to current use of lands and resources for traditional purposes: Fishing;
- Change to current use of lands and resources for traditional purposes: Hunting and trapping;
- Change to current use of lands and resources for traditional purposes: Harvesting and gathering;
- Change to physical and cultural heritage and change to a structure, site, or item that is of historical, archaeological, paleontological, or architectural significance; and
- Change to health and socio-economic conditions (listed as social, health, and economic conditions in Chapters 23 to 31).

Specific to the impacts on Ktunaxa Nation's Title, Rights and related interests, these may occur where the Project has a residual cumulative effect on traditional activities such as use of water for traditional purposes and is included as below. Chapter 23 assesses the Project effects on Ktunaxa Nation's sectors that, based on the publicly shared Ktunaxa perspective, correspond with traditional land and resource use, including the potential change to current use of water for traditional purposes. Chapters 24 to 31 assess the Project effects on the potential changes to the environment as they relate to the identified Indigenous Communities above.

32.4.6.1 Impact on Current Use of Water for Traditional Purposes (Ktunaxa Nation)

The degree in severity of impact on Ktunaxa Nation's rights for the use of water for traditional purposes is rated as moderate. The potential impacts to water quality and access to healthy aquatic systems are predicted to be small in spatial extent. The residual Project effects on surface water quality and quantity are limited to the upper reaches of Alexander Creek and no measurable residual effect on surface water quality and quantity is predicted beyond the Aquatic LSA boundary. Further, cumulative effects are not detectable in the Elk River at Sparwood or further downstream in the Elk River or Lake Koochanusa. It should be noted that there is existing potential for water use access available in the KNRI LSA and KNRI RSA with respect to watercourses outside of the Project footprint. In consideration of the relatively small impact area of the Project, the anticipated effectiveness of the proposed mitigation, and the availability of watercourses in the KNRI RSA, the Project is not anticipated to substantially reduce the ability and opportunity of Ktunaxa Nation to practice their rights and interests related to water use within the KNRI RSA.

Though baseline data were sufficient to evaluate effects for surface water quantity and quality, a few HHRA and sensory receptor locations related to the current or rights-based use by Ktunaxa Nation within the Project footprint and the KNRI LSA were utilized along with the publicly available Ktunaxa perspectives on the Elk Valley, to determine the degree of severity of impact to Ktunaxa Nation's rights and interests. Ktunaxa information on water use within the assessment boundaries supported the increased level of this rating.

Specific to the assessment of the impacts on rights, Ktunaxa Nation information that was included from other applications to define the degree of severity on impacts to water use included Ktunaxa Nation's concerns regarding the ongoing cumulative effects on water quantity and quality in the Elk Valley as a result of industrial open pit coal mining which has been occurring in the region for more than 80 years. Ktunaxa Nation had indicated that these past activities and resulting impacts have discouraged some community members from practicing rights in the Elk Valley. This information was also used to assess the future potential use of lands and resources for traditional purposes without the Project. Ktunaxa Nation's perspectives on mitigation measures for the impact on their rights and interests were included in the Indigenous Impact Management Plan (Chapter 33, Section 33.4.3.4) where applicable from publicly-available information and those shared through engagement on the Project. Continued consultation with Ktunaxa Nation, as well as through the development of potential follow-up and monitoring and adaptive management measures to implement corrective actions as necessary based on that follow-up, are expected to improve the moderate confidence rating in the severity assessment of impact on Ktunaxa Nation's rights and interests.

Transboundary effects to the Ktunaxa Nation's rights and interests related to the use of water for traditional purposes are not anticipated, as the Project footprint accounts for a very small portion of the contributing watershed and its potential impact on Ktunaxa Nation is not expected to occur beyond it.

32.4.6.1.1 Potential Future Use of Water for Traditional Purposes without the Project (Ktunaxa Nation)

Past and ongoing projects and activities located in the KNRI LSA and RSA may potentially be impacting the real or perceived quality and quantity of water use available for Ktunaxa Nation in preferred locations to exercise Ktunaxa Nation's rights and interests. With respect to the reasonably foreseeable future projects

and activities in the KNRI RSA and based on the historical baseline of cumulative effects, past and current development activity in the KNRI LSA and RSA includes, for example, other mines, forestry activity (including logging in the Elk Valley), housing development, transportation facilities (roads), and recreational activities. It is anticipated that these activities will continue in the future without the Project and will continue to have influence on watercourses (water quality and quantity) and possibly fishing activity.

While past, present, and the reasonably foreseeable future projects and activities in the KNRI RSA have the potential for impact on Ktunaxa Nation's rights for the potential future use of water for traditional purposes, the total footprint of the potential future use without the Project in the Elk Valley represents a relatively small proportion of the overall Elk River watershed area. It is anticipated that the potential impact on Ktunaxa Nation's rights for the potential future use of water for traditional purposes that could result from the reasonably foreseeable future projects and activities in the KNRI RSA will be minor in comparison to the impacts of climate change on the timing and magnitude of streamflows within the receiving watercourses in the KNRI RSA. The impacts of each of the Project components and physical activities, in all phases, on Ktunaxa Nation's rights and interests is based on a comparison of the exercise of the use of water for traditional purposes between the potential future use with the Project and without the Project and are summarized in Chapter 23.

32.4.6.2 Impact on Current Use of Lands and Resources for Traditional Purposes: Fishing

The degree in severity of impact on Aboriginal and/or Treaty rights and interests of the identified Indigenous Communities' rights for the use of lands and resources for fishing and fish opportunities is rated as low to moderate. The potential impacts to fish and fish habitat are predicted to be small in spatial extent. Mitigation and the Project's design to reduce impacts to fish and fish habitat VCs and the provision of fish habitat compensation, should allow for fishing opportunities to continue in the Elk Valley (other than the upper sections of West Alexander Creek, which will be lost to Project development) including those for traditional purposes. There is potential for the Project to result in the permanent alienation of the identified Indigenous Communities from fishing locations within the Project footprint related to the experience of being on the land, for which there is no current mitigation identified. It should be noted that through this assessment it has been determined that the impact on the identified Indigenous Communities' rights and interests related to the potential for the Project to result in the permanent alienation of the Indigenous Communities from locations within the Project footprint is rated as a low-level impact due to the current information available on their limited use of the Project footprint for traditional purposes.

Though baseline data were sufficient to evaluate effects for the fish and fish habitat VCs, a few HHRA and sensory receptor locations related to the current or rights-based use by Ktunaxa Nation within the Project footprint and information from Tsuut'ina Nation's site visit were identified. Based on the information available, the identified Indigenous Communities have not expressed to date an interest in possibly using the Project-impacted watercourse (Alexander Creek) in the future. While the identification of HHRA and sensory receptor locations related to the current or rights-based use by Ktunaxa Nation within the KNRI LSA and those expected to occur in the KNRI LSA based on publicly-available information, were made available, areas currently or potentially used by the identified Indigenous Communities for fishing opportunity have not been identified within the ATRI LSA through publicly-available information prior to the assessment. It should be noted that there is existing potential for the harvesting of keystone species

such as Westslope Cutthroat Trout, Kokanee, Burbot, Mountain Whitefish, and Bull Trout, which have been identified as a species of importance to Indigenous Communities based on preliminary feedback where applicable and as identified by IAAC within the ATRI/KNRI LSA.

Specific to Ktunaxa Nation, in consideration of the relatively small impact area of the Project, the anticipated effectiveness of the proposed mitigation, the availability of other watercourses in the KNRI RSA, and existing potential for the harvesting of species of importance to the Ktunaxa Nation based on preliminary feedback, publicly available information, and as identified by IAAC, the Project is not anticipated to substantially reduce the ability and opportunity of Ktunaxa Nation to practice their traditional fishing rights and interests within the KNRI RSA. Though baseline data was sufficient to evaluate effects for fish and fish habitat VCs, a few HHRA and sensory receptor locations related to the current or rights-based use by Ktunaxa Nation within the Project footprint and the KNRI LSA were utilized along with the publicly-available Ktunaxa Nation's perspectives on the Elk Valley, to determine that the degree of severity of impact to Ktunaxa Nation's rights and interests are rated as moderate. Ktunaxa information on fishing for traditional purposes within the KNRI LSA and KNRI RSA supported the increased level of this rating.

Ktunaxa Nation information that was included from other applications to determine the degree of severity on impacts to fishing included the Ktunaxa Nation's concern regarding ongoing cumulative effects on fish species and fishing in the Elk Valley as a result of the ecological effects of early mining practices (coal mining began circa 1897), forest harvesting (including clearing related to rail development and operation), fencing of pre-empted or privatized lands, and declining air and water quality. This information was also used to assess the potential future use of lands and resources for traditional purposes without the Project.

Ktunaxa perspectives on mitigation measures for the impact on their rights and interests were included in the Indigenous Impact Management Plan (Chapter 33, Section 33.4.3.4) where applicable from publicly available information and those shared through engagement on the Project. Continued consultation with Ktunaxa Nation and the identified Indigenous Communities, as well as through the development of potential follow-up and monitoring and adaptive management measures to implement corrective actions as necessary based on that follow-up are expected to improve the confidence rating in the severity assessment of impact on the Aboriginal and/or Treaty rights and interests of the Indigenous Communities.

Transboundary effects to the identified Indigenous Communities' rights and interests related to fishing for traditional purposes are not anticipated, as the Project footprint accounts for a very small portion of the contributing watershed and its potential impact on the Indigenous Communities is not expected to occur beyond it.

32.4.6.2.1 Potential Future Use without the Project of Lands and Resources for Traditional Purposes: Fishing

Past and ongoing projects and activities located in the ATRI/KNRI LSA and ATRI/KNRI RSA may potentially be impacting the real or perceived quality and quantity of fish and fishing opportunities available for traditional purposes in preferred locations to exercise Indigenous Communities' rights and interests. With respect to the reasonably foreseeable future projects and activities in the ATRI/KNRI RSA and based on the historical baseline of cumulative effects, past and current development activity in the ATRI/KNRI LSA

and ATRI/KNRI RSA includes for example other mines, forestry activity (including logging in the Elk Valley), housing development, transportation facilities (roads), and recreational activities. It is anticipated that these activities will continue in the future without the Project and will continue to have influence on lands and resources for traditional fishing in the ATRI/KNRI LSA.

While past, present, and the reasonably foreseeable future projects and activities in the ATRI/KNRI RSA have the potential for impact on the Indigenous Communities' rights for fishing for traditional purposes, the total footprint of the related to fishing without the Project in the Elk Valley represents a relatively small proportion of the overall Elk River watershed area. Potential effects on fish or fish habitat due to past and ongoing projects and activities in the ATRI/KNRI RSA will interact with foreseeable development, and with changes in the environment, and are expected to continue to have an adverse effect on the Indigenous Communities' rights and interests without the Project. The impacts of each of the Project components and physical activities, in all phases, on the Indigenous Communities' rights and interests is based on a comparison of the exercise of the Indigenous Communities' opportunity to fish and access healthy aquatic systems for future fishing opportunities between the potential future use with the Project and without the Project and are summarized in Chapters 23 to 31.

32.4.6.3 Impact on Current Use of Lands and Resources for Traditional Purposes: Hunting and Trapping

The degree in severity of impact on the identified Indigenous Communities' rights and interests for the current use of lands and resources for hunting and trapping is rated as low to moderate. The potential impacts are likely to be small in spatial extent, reversible in the long term, and with few effects to health and/or country foods. Mitigation and the Project's design to reduce impacts to wildlife VCs and the implementation of management, monitoring, and restoration plans, should allow for hunting and trapping activities to continue within the ATRI/KNRI LSA including those for traditional purposes. The currently identified low level of use by the Indigenous Communities coupled with the lack of significant adverse effects to wildlife VCs that are potentially used for hunting and trapping purposes supports the low to moderate level of impact on the change in lands and resources for traditional hunting and trapping. There is potential for the Project to result in the permanent alienation of the identified Indigenous Communities from hunting and trapping locations within the Project footprint related to the experience of being on the land, for which there is no current mitigation identified. It should be noted that, through this assessment, it has been determined that the impact on the identified Indigenous Communities' rights and interests related to the potential for the Project to result in the permanent alienation of the Indigenous Communities from locations within the Project footprint is rated as a low-level impact due to the current information available on their limited use of the Project footprint for traditional purposes.

Though baseline data were sufficient to evaluate effects for identified wildlife VCs and information from Tsuut'ina Nation's site visit were identified, areas currently or potentially used by the Indigenous Communities for hunting and trapping have not been identified within the ATRI LSA through publicly available information. As information related to the identified Indigenous Communities' use of the ATRI LSA (other than information from Tsuut'ina Nation's site visit) to hunt and trap was not made available prior to the assessment, in combination with other factors listed above, the impact on opportunities for hunting and trapping is rated as low to moderate. It is noted that the Indigenous Communities have previously identified the ungulate VCs (e.g., moose, elk, and bighorn sheep), carnivore VCs (e.g., grizzly bear, wolverine, American badger, American marten, and Canada lynx), and birds (e.g., ducks and geese,

migratory birds, and raptors) specifically as species of importance based on preliminary feedback from the identified Indigenous Communities where applicable and as identified by IAAC.

Due to the mitigation measures proposed for the identified wildlife VCs as well as the characterization of the residual effects and the limited current use of the Project footprint for hunting and trapping, the Project is unlikely to contribute to further limiting the current use of lands and resources for traditional hunting and trapping. Therefore, through this assessment it has been determined that the impact on the identified Indigenous Communities' opportunities for hunting and trapping is rated as low to moderate.

Specific to Ktunaxa Nation, though baseline data were sufficient to evaluate effects on wildlife VCs, a few HHRA and sensory receptor locations related to the current or rights-based use by Ktunaxa Nation within the Project footprint and the KNRI LSA were utilized, along with the publicly-available Ktunaxa perspectives on the Elk Valley, to determine that the degree of severity of impact to Ktunaxa Nation's rights and interests are rated as moderate. Ktunaxa information on traditional hunting and trapping within the KNRI LSA and KNRI RSA supported the increased level of this rating. No measurable residual effect on wildlife and wildlife habitat VCs are predicted beyond the KNRI LSA. The Project is not anticipated to result in the permanent loss of access or the ability to conduct traditional hunting and trapping within the Project footprint or the KNRI LSA.

The Project, in combination with other reasonably foreseeable future projects and activities, is not anticipated to limit the ability of ungulates, carnivores, and birds to persist and maintain self-sustaining populations in the VC-specific regional study areas (i.e., Terrestrial RSA, Grizzly Bear RSA). These, in combination with other factors listed above, determined the impact on Ktunaxa Nation's opportunities for hunting and trapping to be rated as moderate. It is noted that Ktunaxa Nation have previously identified the above listed wildlife VCs as species of importance based on preliminary feedback from the Ktunaxa Nation where applicable and as identified by IAAC. Ktunaxa Nation information that was included from other applications to define the degree of severity on impacts to traditional hunting and trapping included Ktunaxa Nation's concern regarding ongoing cumulative effects on wildlife in the Elk Valley as a result of the ecological effects of early mining practices, forest harvesting (including clearing related to rail development and operation), fencing of pre-empted or privatized lands, and declining air and water quality. This information was also used to assess the potential future use of lands and resources for traditional purposes without the Project.

Ktunaxa perspectives on mitigation measures for the impact on their rights and interests were included in the Indigenous Impact Management Plan (Chapter 33, Section 33.4.3.4) where applicable from publicly available information and those shared through engagement on the Project. The mitigation measures proposed for the identified species as well as the characterization of the residual effects and the limited current use of the Project footprint for hunting and trapping, the Project is unlikely to contribute to limiting the current use of lands and resources for traditional hunting and trapping. Continued consultation with Ktunaxa Nation and the identified Indigenous Communities, as well as through the development of potential follow-up and monitoring and adaptive management measures to implement corrective actions as necessary based on that follow-up, are expected to improve the confidence rating in the severity assessment of impact on the Aboriginal and/or Treaty rights and interests of the Indigenous Communities.

Transboundary effects to the identified Indigenous Communities' rights and interests related to hunting and trapping for traditional purposes will occur into Alberta as a result of the Project due to the species of interest identified by the Indigenous Communities including ungulate VCs, carnivore VCs, and birds having vast home ranges. Transboundary effects to the identified Indigenous Communities' rights and interests related to hunting and trapping for traditional purposes will also occur into the U.S.A. for carnivore VCs and birds as a result of the Project due to the species of interest having vast home ranges. While other than the Ktunaxa and Tsuut'ina Nations, none of the identified Indigenous Communities have identified their use of the Project footprint and the ATRI/KNRI LSA for traditional hunting and trapping, it is expected that transboundary effects to the impact on rights for the Indigenous Communities will occur as a result of the interest in the wildlife VCs assessed for Project-related effects.

32.4.6.3.1 Potential Future Use without the Project of Lands and Resources for Traditional Purposes: Hunting and Trapping

Past and ongoing projects and activities located in the ATRI/KNRI LSA and RSA may potentially be impacting the real or perceived quality and quantity of country foods available in relation to hunting and trapping for traditional purposes in preferred locations to exercise Indigenous Communities' rights and interests. With respect to the reasonably foreseeable future projects and activities in the ATRI/KNRI RSA and based on the historical baseline of cumulative effects, past and current development activity in the ATRI/KNRI LSA and ATRI/KNRI RSA includes for example other mines, forestry activity (including logging in the Elk Valley), housing development, transportation facilities (roads), and recreational activities. It is anticipated that these activities will continue in the future without the Project and will continue to have influence on lands and resources for traditional hunting and trapping in the ATRI/KNRI LSA.

There is a potential for cumulative impacts due to the spatial distribution of historical disturbance as a result of mining in the Elk Valley which has followed economic coal resources to form a long north-south band of potential mining-related disturbance. In the ATRI/KNRI LSA, this north-south running band is interrupted by a few relatively undisturbed east-west corridors that provide "gaps" in the mining region for the movement of animals and Indigenous land users. This general trend of north-south oriented mining and potentially related disturbance along valley bottoms and some ridges potentially limits the east-west connectivity between alpine ranges. Without the Project footprint, other impairments to wildlife movement from highway and transportation corridors, as well as other disturbance is likely to create and maintain important barriers to animal movement, and potentially influence Indigenous use of ancestral east-west trails. Past disturbance has also potentially affected the quantity and quality of certain ecosystems available for the practice of Indigenous Communities' rights and interests in the Elk Valley. Within the ATRI/KNRI RSA, these ecosystems are also important for maintaining biodiversity across the landscape, a critically important Indigenous cultural value. This also emphasizes the cumulative effect of past developments on Indigenous Communities' practice of rights and interests. The impacts of each of the Project components and physical activities, in all phases, on Indigenous Communities' rights and interests is based on a comparison of the exercise of the Indigenous Communities' use of lands and resources for hunting and trapping between the potential future use with the Project and without the Project and are summarized in Chapters 23 to 31.

32.4.6.4 Impact on Current Use of Lands and Resources for Traditional Purposes: Harvesting and Gathering

The degree in severity of impact on the identified Indigenous Communities' rights and interests for the current use of lands and resources for harvesting and gathering is rated as moderate as potential impacts are likely to be small in spatial extent, reversible long-term, with few effects to health and/or country foods. The currently identified low level of use by the Indigenous Communities within the Project footprint and the Landscape and Ecosystems LSA indicates the moderate impact on the change in lands and resources for traditional harvesting and gathering. There is potential for the Project to result in the permanent alienation of the Indigenous Communities from harvesting and gathering locations within the Project footprint. It should be noted that through this assessment it has been determined that the impact on the identified Indigenous Communities' rights and interests related to the potential for the Project to result in the permanent alienation of the Indigenous Communities from locations within the Project footprint is rated as a low-level impact due to the current information available on their limited use of the Project footprint for traditional purposes. Through this assessment it has been determined that the impact on the Indigenous Communities' opportunities for harvesting and gathering is rated as moderate as there is potential for the Project to result in the permanent alienation of the Indigenous Communities from locations within the Project footprint.

Though baseline data were sufficient to evaluate effects for the Project VCs, a few HHRA and sensory receptor locations related to current or rights-based use by Ktunaxa Nation within the Project footprint and information from Tsuut'ina Nation's site visit were identified. While the identification of HHRA and sensory receptor locations related to current or rights-based use by Ktunaxa Nation within the KNRI LSA and those expected to occur in the KNRI LSA based on publicly available information was made available, areas currently or potentially used by the identified Indigenous Communities for harvesting and gathering have not been identified within the ATRI LSA through publicly available information prior to the assessment. As such, there is no information indicating that the identified Indigenous Communities currently use the Project footprint and the ATRI LSA for harvesting and gathering. Though site-specific input from most of the identified Indigenous Communities (other than Ktunaxa Nation and Tsuut'ina) is not presently available, it is generally understood that traditional use of the land is dependent not only on the resources that may be present but may also depend on the history and tradition experienced in the context of a specific landscape (i.e., "sense of place"). Consequently, traditional use of lands for harvesting and gathering may be permanently affected as the sense of place inherent to the lands within the Project footprint and the ATRI/KNR LSA may not be restored once permanently and physically altered. Continued consultation with the Indigenous Communities, as well as through the development of potential follow-up and monitoring and adaptive management measures as necessary is expected to improve the confidence rating and the severity of impact on the Aboriginal and/or Treaty rights and interests of the identified Indigenous Communities.

Specific to the assessment of the impacts on rights, Ktunaxa Nation information that was included from other applications to define the degree of severity on impacts to traditional harvesting and gathering included Ktunaxa Nation's concern regarding ongoing cumulative effects in the Elk Valley as a result of the ecological effects of early mining practices (coal mining began circa 1897), forest harvesting (including clearing related to rail development and operation), fencing of pre-empted or privatized lands, and declining air and water quality. This information was also used to assess the potential future use of lands and resources for traditional purposes without the Project.

Ktunaxa perspective on mitigation measures for the impact on their rights and interests were included in the Indigenous Impact Management Plan (Chapter 33, Section 33.4.3.4) where applicable from publicly available information and those shared through engagement on the Project. The mitigation measures proposed for the vegetation VCs and identified plant species as well as the characterization of the residual effects and the limited current use of the Project footprint for harvesting and gathering, the Project is unlikely to contribute to limiting the current use of lands and resources for traditional harvesting and gathering.

Continued consultation with Ktunaxa Nation and the identified Indigenous Communities, as well as through the development of potential follow-up and monitoring and adaptive management measures to implement corrective actions as necessary based on that follow-up, are expected to improve the confidence rating in the severity assessment of impact on the Aboriginal and/or Treaty rights and interests of the Indigenous Communities.

Transboundary effects to the identified Indigenous Communities' rights and interests related to harvesting and gathering for traditional purposes are not anticipated as a result of the Project, since other than Ktunaxa and Tsuut'ina Nations, none of the identified Indigenous Communities have identified their use of the Project footprint and the ATRI/KNRI LSA for traditional harvesting and gathering purposes. The loss of plant species as a result of the Project is limited to the Project footprint and its potential impact on the Indigenous Communities is not expected to occur beyond it.

32.4.6.4.1 Potential Future Use without the Project of Lands and Resources for Traditional Purposes: Harvesting and Gathering

Past and ongoing projects and activities located in the ATRI/KNRI LSA and ATRI/KNRI RSA may potentially be impacting the real or perceived quality and quantity of country foods available for traditional harvesting and gathering in preferred locations to exercise Indigenous Communities' rights and interests. With respect to the reasonably foreseeable future projects and activities in the ATRI/KNRI RSA and based on the historical baseline of cumulative effects, past and current development activity in the ATRI/KNRI LSA and ATRI/KNRI RSA includes for example other mines, forestry activity (including logging in the Elk Valley), housing development, transportation facilities (roads), and recreational activities. It is anticipated that these activities will continue in the future without the Project and will continue to have influence on lands and resources for traditional harvesting and gathering in the ATRI/KNRI LSA.

There is a potential for cumulative impacts due to the spatial distribution of historical disturbance as a result of mining in the Elk Valley which has followed economic coal resources to form a long north-south band of potential mining-related disturbance. In places, including the ATRI/KNRI LSA, this north-south running band is interrupted by a few relatively undisturbed east-west corridors that provide "gaps" in the mining region for the movement of Indigenous land users. This general trend of north-south oriented mining and potentially related disturbance along valley bottoms and some ridges potentially limits the east-west connectivity between alpine ranges. Without the Project footprint, past disturbance has affected the quantity and quality of certain ecosystems available for the practice of Indigenous Communities' rights and interests in the Elk Valley. Within the ATRI/KNRI RSA, these ecosystems are also important for maintaining biodiversity across the landscape, a critically important Indigenous cultural value. Mature and old growth forests potentially being impacted within the Elk Valley have the potential to affect Indigenous Communities' rights and interests. This also emphasizes the cumulative effect of past

developments on Indigenous practice of rights and interests. The impacts of each of the Project components and physical activities, in all phases, on Indigenous Communities' rights and interests is based on a comparison of the exercise of the Indigenous Communities' use of sites for harvesting and gathering for traditional purposes between the potential future use with the Project and without the Project and are summarized in Chapters 23 to 31.

32.4.6.5 Impact on Physical and Cultural Heritage and Change to a Structure, Site, or Item that is of Historical, Archaeological, Paleontological, or Architectural Significance

The degree in severity of impact on the identified Indigenous Communities' rights and interests related to physical and cultural heritage resources and structures, sites, or things of historical, archaeological, paleontological, or architectural significance is rated as moderate to high as potential impacts are likely to be small in spatial extent, and with no effects to health. These heritage resources may be of interest to the identified Indigenous Communities based on their potential linkage to their ancestry though none other than on the Grave Prairie Cultural Landscape in the KNRI LSA by Ktunaxa Nation have been identified based on preliminary consultation with the Indigenous Communities, where applicable and as noted by IAAC. Though baseline data was sufficient to evaluate effects for known heritage resources, the lack of regional information on Indigenous Communities' physical and cultural heritage and structures, sites, or things that are of historical, archaeological, paleontological, or architectural significance leads to a low degree of confidence and subsequently increases the degree of severity of adverse impacts.

Continued consultation with the identified Indigenous Communities, as well as through the development of potential follow-up and monitoring and adaptive management measures as necessary is expected to improve the confidence rating and the severity of impact on the Aboriginal and/or Treaty rights and interests of the Indigenous Communities.

Specific to the assessment of the impacts on rights, impacts on physical and cultural heritage related to the Grave Prairie Cultural Landscape may be potentially mitigated through continued collaboration with the Ktunaxa Nation to consult on alternative means of access to the Rail Loadout including utilization of the proposed road access that may be situated in the previously disturbed footprint of a current road which may require further assessment. Ktunaxa perspectives on mitigation measures for the impact on their rights and interests were included in the Indigenous Impact Management Plan (Chapter 33, Section 33.4.3.4) where applicable from publicly available information and those shared through engagement on the Project. As the Grave Prairie Cultural Landscape includes a "Culturally Sensitive Area" which requires rigorous in-depth assessments prior to contemplating additional development, NWP will continue to work with the Ktunaxa Nation to address related concerns.

32.4.6.5.1 Potential Future Use without the Project of Physical and Cultural Heritage and Impact to a Structure, Site, or Item that is of Historical, Archaeological, Paleontological, or Architectural Significance

With respect to the reasonably foreseeable future projects and activities in the ATRI/KNRI RSA and based on the historical baseline of cumulative effects, past and current development activity in the ATRI/KNRI LSA and RSA includes for example other mines, forestry activity (including logging in the Elk Valley), housing development, transportation facilities (roads), and recreational activities. It is anticipated that these activities will continue in the future without the Project and will continue to potentially impact

physical and cultural heritage and structures, sites, or things that are of historical, archaeological, paleontological, or architectural significance in the ATRI/KNRI LSA.

There is a potential for cumulative impacts due to the spatial distribution of historical disturbance as a result of mining in the Elk Valley which has followed economic coal resources to form a long north-south band of potential mining-related disturbance. In the ATRI/KNRI LSA, this north-south running band is interrupted by a few relatively undisturbed east-west corridors that provide “gaps” in the mining region for the movement of Indigenous land users. This general trend of north-south oriented mining and potentially related disturbance along valley bottoms and some ridges potentially limits the east-west connectivity between alpine ranges. Without the Project footprint, the cumulative effect of past developments on Indigenous practice of rights and interests has influenced Indigenous Communities’ use of ancestral east-west trails. The Elk River valley has seen substantial residential development which may potentially impact physical and cultural heritage and structures, sites, or things that are of historical, archaeological, paleontological, or architectural significance that are anticipated to continue without the Project. Past disturbance has also potentially affected the real or perceived change in accessibility to physical and cultural heritage and structures, sites, or things that are of historical, archaeological, paleontological, or architectural significance for Indigenous Communities and will likely continue to impact Indigenous Communities’ rights and interests without the Project in place. The impacts of each of the Project components and physical activities, in all phases, on Indigenous Communities’ rights and interests is based on a comparison of the exercise of the Indigenous Communities’ physical and cultural heritage resources and structures, sites, or things of historical, archaeological, paleontological, or architectural significance between the potential future use with the Project and without the Project and are summarized in Chapters 23 to 31.

32.4.6.6 Impact on Health and Socio-Economic Conditions (Social, Health, and Economic Conditions)

The degree in severity of impact on the identified Indigenous Communities’ health and socio-economic conditions is rated as low as potential impacts are likely to be small in spatial extent, reversible long-term, and with few effects to health and/or country foods. The currently identified low level of use by the identified Indigenous Communities within the Project footprint and the ATRI/KNRI LSA indicates the low level of impact on the change in lands and resources for traditional purposes and related health and socio-economic conditions. There is potential for the Project to result in the permanent alienation of the identified Indigenous Communities from locations used for traditional purposes within the Project footprint, for which there is no current mitigation identified. It should be noted that through this assessment it has been determined that the impact on Indigenous Communities’ rights and interests related to the potential for the Project to result in the permanent alienation of the Indigenous Communities from locations within the Project footprint is also rated as a low-level impact due to the current information available on their use of the Project footprint for traditional purposes. Due to the potential for change to opportunity for access to country foods within the ATRI/KNRI LSA, a potential for the development of reasonably foreseeable future projects and activities to overlap with these resources and sites have the potential to impact socio-community and economic conditions (i.e., diet, financial impact).

The Project is anticipated to result in positive economic outcomes for employment, income, and local and regional economies. There is also potential for positive change in the potential availability of community

services, the potential for the identified Indigenous Communities to take part in monitoring activities as outlined in the Indigenous Impact Management Plan, and the potential economic benefit for Indigenous Community members related to employment and economic investment during the Project phases.

Though baseline data were sufficient to evaluate effects for socio-community, economic, and human health VCs, a few HHRA and sensory receptor locations related to current or rights-based use by Ktunaxa Nation and information from Tsuut'ina Nation's site visit within the Project footprint were identified. While the identification of HHRA and sensory receptor locations related to current or rights-based use by Ktunaxa Nation within the KNRI LSA and those expected to occur in the KNRI LSA based on publicly available information was made available, areas currently or potentially used by Indigenous Communities for traditional purposes have not been identified within the ATRI LSA through publicly available information prior to the assessment. As such, there is no information indicating that the Indigenous Communities currently uses the Project footprint and the ATRI/KNRI LSA for traditional purposes other than the Grave Prairie Cultural Landscape as identified for Ktunaxa Nation. Continued consultation with the identified Indigenous Communities, as well as through the development of potential follow-up and monitoring and adaptive management measures as necessary is expected to improve the confidence rating and the severity of impact on the Aboriginal and/or Treaty rights and interests of the Indigenous Communities.

Specific to the assessment of the impacts on social, health, and economic conditions, Ktunaxa Nation information that was included from other applications to define the degree of severity included Ktunaxa Nation's concern regarding ongoing cumulative effects on country foods in the Elk Valley as a result of the ecological effects of early mining practices (coal mining began circa 1897), forest harvesting (including clearing related to rail development and operation), fencing of pre-empted or privatized lands, and declining air and water quality which began to be felt in the Elk Valley. Ktunaxa Nation information that was included from other applications to define the degree of severity on impacts to health conditions, referred to the overall health of Ktunaxa citizens having improved as a result of increased access to health services, but lagged well behind non-Ktunaxa in the region. This information was also used to assess the future potential use of lands and resources for traditional purposes as they relate to social, health, and economic conditions without the Project.

Ktunaxa perspective on mitigation measures for the impact on their rights and interests were included in the Indigenous Impact Management Plan (Chapter 33, Section 33.4.3.4) where applicable from publicly available information and those shared through engagement on the Project. Continued consultation with Ktunaxa Nation and the identified Indigenous Communities, as well as through the development of potential follow-up and monitoring and adaptive management measures to implement corrective actions as necessary based on that follow-up, are expected to improve the confidence rating in the severity assessment of impact on the Aboriginal and/or Treaty rights and interests of the Indigenous Communities.

Transboundary effects to health and socio-economic conditions during the Project lifecycle are not anticipated, as the Project footprint accounts for negligible changes for the identified Indigenous Communities and mitigation strategies proposed to avoid or offset the potential for any effects to the health and socio-economic conditions in relation to the Project are those included in the Indigenous Impact Management Plan. The impact management measures included in Indigenous Impact Management Plan are expected to be refined as needed with continued consultation with the Indigenous Communities.

32.4.6.6.1 Potential Future Use without the Project of Health and Socio-Economic Conditions

Food insecurity has been increasing in recent years and in the coming years, the reasonably foreseeable future projects and activities in the Elk Valley and climate change, as well as other factors will likely influence food security in terms of potentially affecting traditional food systems, risking further serious consequences for livelihoods and health. The impact of food insecurity on health extends beyond diet and nutrition. In addition to income growth, housing tenure is an economic risk factor for food insecurity and is linked with other factors such as population growth, urbanization, industrialization, land use shifts, water scarcity, and trends in global energy supply and food trade. With respect to the reasonably foreseeable future projects and activities in the ATRI/KNRI RSA and based on the historical baseline of cumulative effects, past and current development activity in the ATRI/KNRI LSA and RSA includes for example other mines, forestry activity (including logging in the Elk Valley), housing development, transportation facilities (roads), and recreation activities. It is anticipated that these activities will continue in the future without the Project and will continue to potentially impact health and socio-economic conditions in the ATRI/KNRI LSA.

There is a potential for cumulative impacts due to the spatial distribution of historical disturbance as a result of mining in the Elk Valley which has followed economic coal resources to form a long north-south band of mining-related disturbance. In the ATRI/KNRI LSA, this north-south running band is interrupted by a few relatively undisturbed east-west corridors that provide “gaps” in the mining region for the movement of Indigenous land users. This general trend of north-south oriented mining and potential related disturbance along valley bottoms and some ridges potentially limits the east-west connectivity between alpine ranges.

The Project can be generally expected to result in positive economic outcomes for employment, income, the regional and local economies, and government finances within the ATRI/KNRI RSA (Chapter 17). The economic conditions without the Project are expected to be impacted as anticipated positive economic outcomes will diminish due to the lack of availability of economic opportunities related to the Project. Without the Project, future anticipated use may potentially be negatively impacted due to the lack of the residual positive economic effects of the Project.

Without the Project, impacts on Indigenous Communities’ rights and interests related to social and health conditions will continue as a result of activities within the Elk Valley and those outside of the Elk Valley that have the potential to impact food systems. These past and ongoing activities may be impacting the ability of the Indigenous Communities to exercise their rights related to the social, health, and economic conditions of their traditional territory and will likely continue to impact Indigenous Communities’ rights and interests without the Project. This also emphasizes the potential cumulative effect of past developments on Indigenous Communities’ practice of rights and interests related to health and socio-economic conditions. The impacts of each of the Project components and physical activities, in all phases, on Indigenous Communities’ rights and interests is based on a comparison of the exercise of the Indigenous Communities’ rights and interests as they relate to the health and socio-economic conditions due to the Project between the potential future use with the Project and without the Project and are summarized in Chapters 23 to 31.

32.4.7 Follow-up Strategy

Mitigation measures to avoid, minimize, or otherwise address potential effects of the Project on Indigenous Communities' rights and interests linked to other VCs are anticipated to be more for some activities than for others, and as a result the comprehensiveness of the Indigenous Impact Management Plan (Chapter 33, Section 33.4.3.4) and the monitoring programs for the specific elements of the environment (e.g., plants, wetlands, groundwater) reflect the nature of the potential interaction with the environment, the anticipated magnitude or extent of the environmental effects, the expected effectiveness of mitigation, the level of certainty in the environmental effects predictions, and the resulting potential for impact on Indigenous Communities' rights and interests. As the potential for, and consequences of, adverse environmental effects increases; so does the comprehensiveness of the Indigenous Impact Management Plan in order to meet the requirements and objectives of each mitigation measure and/or monitoring program. Based on the assessment of potential impacts on the rights and interests of the identified Indigenous Communities, the change in use of lands and resources for traditional activities such as fishing, hunting and trapping, harvesting and gathering, or on activities associated with traditional use such as travel and navigation, ceremonial and sacred sites, and on physical and cultural heritage areas will require follow-up monitoring.

Communication of the results of the follow-up strategies and/or monitoring programs to the Indigenous Communities is an essential component that will be undertaken through the Indigenous Engagement and Reporting Plan (Chapter 33, Section 33.4.3) to be implemented by NWP. Not only does this maintain communication with all parties and keep them informed of the Project activities and their associated environmental effects, but it also offers the opportunity to incorporate input from Indigenous Communities into the design of the Indigenous Impact Management Plan and related monitoring programs and any consequential adaptive management, where applicable.

Using an adaptive management plan, the follow-up strategies and the monitoring programs will be periodically evaluated for effectiveness and the appropriateness of their elements, and the parameters being measured and reported. This evaluation will be done in consultation with the appropriate regulatory agencies and the results of these strategies and programs will be analyzed. If any elements of the follow-up strategies and the monitoring programs warrant adjustment to meet the aim and intent, then in consultation with regulatory agencies, the strategies and the programs may be adjusted. It is anticipated that as a condition of the approval of the Project, the results of the follow-up strategies, and the monitoring programs or measures being conducted will be reported to the appropriate regulatory agencies, both federal and provincial.

32.4.8 Summary of the Effects of the Changes to the Environment on Indigenous Communities and the Impact on their Rights and Interests

Based on the current information available to NWP utilizing shared perspectives, secondary sources that are publicly available, and the Indigenous Communities' related consultation activities summarized in Chapters 23 to 31, it is predicted at this time that there will not be any significant residual effects from the Project to affect Aboriginal and/or Treaty rights or interests. This assumption will be subject to an ongoing program of environmental and socio-economic monitoring undertaken in collaboration with

potentially impacted Indigenous Communities and the co-development of offsets and/or mitigation measures addressed through the Indigenous Impact Management Plan as necessary.

As outlined in Chapters 23 to 31, the degree of severity of the adverse impact on Indigenous Communities' rights and related interests are expected to vary from low to moderate to moderate to high. For each potential impact, the specific mitigation measures identified that relate to Indigenous Communities' rights and interests are listed in their respective chapters. Mitigation measures discussed in the assessment and related VC assessment chapters will reduce or eliminate effects on resources which are relied upon in order to exercise Aboriginal and/or Treaty rights and related interests for current (and future) use and reduce or eliminate effects on conditions that may prohibit or deter the exercise of Aboriginal and/or Treaty rights and interests. Residual cumulative effects are not anticipated to alter the long-term persistence and viability of fish, wildlife, and vegetation species of interest within the ATRI/KNRI RSA which are relied upon to exercise Aboriginal and/or Treaty rights and related interests. The potential for residual cumulative effects of the Project in combination with reasonably foreseeable future projects and activities on physical and cultural heritage and to any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance are restricted to those located within the footprint of the Project and of other potential projects developed within the ATRI RSA.

It is anticipated that traditional land and resource use activities should be able to continue, except where prohibited for safety purposes (e.g., on the mine site during construction and operations) and surrounding areas including access and egress points. It is also anticipated that activities related to the exercise of Aboriginal and/or Treaty rights and related interests should be able to continue by the members of the identified Indigenous Communities based on the information available regarding their use of the Project footprint and the ATRI/KNRI LSA. Based on the current information available to NWP, it is anticipated that the contribution of the Project's residual effects is unlikely to cause a change in the cumulative effects that could affect the viability or sustainability of traditional use of lands and resources within the ATRI/KNRI RSA by the identified Indigenous Communities. Chapters 23 to 31 outline specific commitments addressed in the Indigenous Impact Management Plan that will be implemented as a result of the outcomes of the assessment processes. It should be noted that dialogue is ongoing with the identified Indigenous Communities with respect to validating and following up on assessment outcomes and addressing any potential new measures that may be identified as the assessment proceeds in order to address potential impacts on the Aboriginal and/or Treaty rights and interests of the Indigenous Communities.

The Application/EIS assesses the Project effects on Ktunaxa Nation's sectors that, based on the Proponent's perspective in the absence of confirmatory information from the Ktunaxa Nation, and correspond with traditional land and resource use including potential change to current use of water for traditional purposes, potential change to current use of lands and resources for traditional purposes, potential change to physical and cultural heritage, potential change to any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance, and potential change to health and socio-economic conditions. Mitigation measures discussed in the assessment and related VC assessment chapters will reduce or eliminate effects on the Ktunaxa Nation sectors which are relied upon in order to exercise Ktunaxa Nation's rights and interests and reduce or eliminate effects on conditions that may prohibit or deter the exercise of Ktunaxa Nation's rights and interests in the Project footprint, the KNRI LSA, and the KNRI RSA. Further to the potential direct effects of the Project, an assessment of potential cumulative effects was undertaken, and as a result of the assessment it was determined that

the potential cumulative effects for each Ktunaxa Nation sector would be minor in nature and are not considered to be significant. These potential cumulative effects are not anticipated to alter the long-term persistence and viability of fish, wildlife, and plant species of interest within the KNRI RSA which may be relied upon by Ktunaxa Nation to exercise their rights and interests. Additionally, the potential for residual cumulative effects of the Project in combination with reasonably foreseeable future projects and activities on physical and cultural heritage and to any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance are restricted to those located within the footprint of the Project and of other potential projects developed within the KNRI RSA.

While the Ktunaxa Nation have provided information regarding their HHRA and sensory receptor locations related to current and rights-based use and publicly-shared perspectives of development in the Elk Valley, it is anticipated that traditional land and resource use activities and the exercise of related rights will be able to continue generally undeterred in the KNRI LSA and KNRI RSA, except within the Project footprint with the previously identified displacement of existing features and where restricted for safety purposes (e.g., the temporary blast restriction area in the vicinity of the mine site). As identified throughout the Application/EIS, it is again noted that engagement is ongoing, and the Ktunaxa Nation may provide additional information about the potential effects of the Project on Ktunaxa Nation's rights and interests which could update the assessment on potential Project effects.

Project-residual effects to the identified Indigenous Communities as a result of the extent of the ATRI RSA have been predicted that may cross provincial borders and therefore potentially result in effects in transboundary jurisdictions outside of B.C. With the implementation of mitigation measures, these effects (including residual Project and cumulative effects) have been determined to be either beneficial (economic), or adverse but not significant. Specific to the impact on rights of Indigenous Communities, the degree of severity of adverse impacts as currently noted are not predicted to occur outside of the ATRI RSA which are in combination with anticipated the future use with or without the Project. Therefore, any potential results in effects in transboundary jurisdictions outside of B.C. are expected to be mitigated with the implementation of the Indigenous Impact Management Plan and through continued consultation with the identified Indigenous Communities, as well as through the development of potential follow-up, and monitoring and adaptive management measures to implement corrective actions as necessary based on that follow-up.

32.5 Changes to the Environment that are Directly Linked or Necessarily Incidental to Federal Decisions

Section 5(2)(a) of CEA Act, 2012 requires that a federal EA must evaluate changes to the environment that are directly linked or necessarily incidental to federal decisions as a result of the Project. Specifically, Section 5(2)(a) states:

"5(2) However, if the carrying out of the physical activity, the designated project or the project requires a federal authority to exercise a power or perform a duty or function conferred on it under any Act of Parliament other than this Act, the following environmental effects are also to be taken into account: (a) a change, other than those referred to in paragraphs (1)(a) and

(b), that may be caused to the environment and that is directly linked or necessarily incidental to a federal authority's exercise of a power or performance of a duty or function that would permit the carrying out, in whole or in part, of the physical activity, the designated project or the project...".

This section is intended to address those requirements. The list of applicable federal permitting and approval requirements for the Project was provided in Table 1.4-1 of this Application/EIS. In addition to federal EA requirements that this Application/EIS is intended to fulfill, key federal permits and approvals potentially required for the Project, relevant Project components, the associated consultation requirements, and potentially impacted VCs and the relevant pathway of effects are listed in Table 32.5-1. No additional effects beyond the effects already described in the Application/EIS and discussed below in Section 32.5 are anticipated to occur and as such, no additional baseline information is required or presented. An assessment of other VCs, not already presented in the Application/EIS, is not provided as no other VCs (aside from those already discussed) have the potential to be affected by changes to the environment caused by Project components.

Further information on these powers, duties, or functions to be exercised by federal authorities in respect of the Project is provided in the subsections that follow.

32.5.1 Fisheries Act

Between 2012 and 2019, the fish habitat alteration provisions outlined in Section 35 of the Fisheries Act were focused on prohibiting "serious harm to fish" without an authorization under Section 35(2) of the Act. The Fisheries Act was amended in 2019 to return the Section 35 provisions to prohibiting "harmful alteration, disruption, or destruction of fish habitat" without an authorization under Section 35(2) of the Act, reverting to the previous language that was in place prior to the 2012 amendments. While HADD is not explicitly defined in the Act, the DFO publication titled "Fish and Fish Habitat Protection Policy Statement" (DFO, 2019a) defines it as "any temporary or permanent change to fish habitat that directly or indirectly impairs the habitat's capacity to support one or more life processes of fish".

The procedures and principles for applying for an authorization under Section 35(2) of the Fisheries Act are detailed in the DFO publication titled "Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat under the Fisheries Act" (DFO, 2019b). When developing projects or carrying out activities that might affect fish or fish habitat, whether on a temporary or permanent basis, proponents are responsible for avoiding and mitigating HADD to the extent possible. When proponents are unable to completely avoid or mitigate HADD, their projects require an authorization under Section 35(2) in order for the Project to proceed without contravening the Act.

Table 32.5-1: Key Federal Environmental Permits and Approvals (i.e., Powers, Duties, or Functions) and Project Components

Permits / Approvals Under Federal Jurisdiction (i.e., Powers, Duties, or Functions of Federal Authorities)	Relevant Project Components and Related Activities	Potentially Affected Valued Components	Pathway of Effects	Anticipated Consultation Requirements
<p>Authorization for Works Affecting Fish Habitat</p> <ul style="list-style-type: none"> • Legislation: Fisheries Act, S. 35(2) • Responsible Agency: DFO, with some provisions administered by ECCC 	<ul style="list-style-type: none"> • Construction of the Interim Sediment Pond in upper West Alexander Creek. • Loading, hauling, and stockpiling of soil in West Alexander Creek. • Loading, hauling and dumping of mine rock in West Alexander Creek. • Construction of the Main Sediment Pond in Year 4 in West Alexander Creek. 	<ul style="list-style-type: none"> • Fish and Fish Habitat (all VCs; Chapter 12) • Surface Water Quantity (Chapter 10) • Surface Water Quality (Chapter 11) • Riparian Habitat (Chapter 13) 	<p>Project works, undertakings, and activities in the West Alexander Creek drainage will result in the unavoidable HADD of fish habitat. The Project will therefore require an authorization under Section 35(2) of the Fisheries Act in order for the Project to proceed without contravening the Act.</p>	<ul style="list-style-type: none"> • Applicants are encouraged to engage with DFO early in the planning process. • Consultation with Aboriginal communities by the Proponent is required when the activity has the potential to adversely affect Aboriginal or treaty rights. • Crown duty to consult prior to exercising a power, duty, or function.
<p>Species at Risk Permit</p> <ul style="list-style-type: none"> • Legislation: Species at Risk Act, S. 73(1) • Responsible Agency: ECCC 	<ul style="list-style-type: none"> • Logging, clearing and grubbing, construction, and operations activities within the infrastructure and production development footprint for the following Project components: <ul style="list-style-type: none"> ○ Quarry ○ Interim Sediment Pond ○ Grave Creek Reservoir ○ CHPP and workshop ○ North, South, and East Pits ○ Mine Rock Storage Facility 	<ul style="list-style-type: none"> • VCs listed on Schedule 1 of SARA as Threatened or Endangered, including: <ul style="list-style-type: none"> ○ American Badger ○ Little Brown Myotis ○ Northern Myotis ○ Barn Swallow ○ Bobolink ○ Common Nighthawk ○ Lewis's Woodpecker 	<p>Although direct mortality or injury of any of these listed species is not anticipated as part of the Project as planned, it is possible that incidental take of such individuals may occur through accidents, malfunctions, or unplanned events that would require a permit under Section 73(1) to be issued. In addition, a permit will likely be required for potential effects to critical habitat for whitebark pine in</p>	<p>Crown duty to consult prior to exercising a power, duty, or function.</p>

Permits / Approvals Under Federal Jurisdiction (i.e., Powers, Duties, or Functions of Federal Authorities)	Relevant Project Components and Related Activities	Potentially Affected Valued Components	Pathway of Effects	Anticipated Consultation Requirements
	<ul style="list-style-type: none"> ○ Mine site road and Grave Creek Road ○ Roads to the explosive facility and mine roads ○ Overland conveyor ○ Rail loadout ○ Main Sediment Pond 	<ul style="list-style-type: none"> ○ Olive-Sided Flycatcher ○ Western Screen Owl subsp. macfarlanei ○ Williamson's Sapsucker subsp. nataliae (wildlife VCs, Chapter 15) ○ Whitebark Pine (Chapter 14) 	the Terrestrial LSA due to logging, clearing and grubbing of vegetation, as well as removal of soil and overburden.	
Migratory Bird Permit <ul style="list-style-type: none"> • Legislation: Migratory Birds Convention Act • Responsible Agency: ECCC 	<ul style="list-style-type: none"> • Logging, clearing and grubbing, construction, and operations activities within the infrastructure and production development footprint for the following Project components: <ul style="list-style-type: none"> ○ Quarry ○ Interim Sediment Pond ○ Grave Creek Reservoir ○ CHPP and workshop ○ North, South, and East Pits ○ Mine Rock Storage Facility ○ Mine site road and Grave Creek Road ○ Roads to the explosive facility and mine roads 	<ul style="list-style-type: none"> • Migratory Birds (Chapter 15) • Vegetation (all VCs; Chapter 14) • Landscapes and Ecosystems (all VCs; Chapter 13) 	If vegetation clearing is necessary during the migratory bird nesting season to facilitate the development of Project components and activities, nest sweeps will be required to avoid detrimental effects to nesting migratory birds.	Crown duty to consult prior to exercising a power, duty, or function.

Permits / Approvals Under Federal Jurisdiction (i.e., Powers, Duties, or Functions of Federal Authorities)	Relevant Project Components and Related Activities	Potentially Affected Valued Components	Pathway of Effects	Anticipated Consultation Requirements
<p>Approval of Works in Navigable Waters</p> <ul style="list-style-type: none"> • Legislation: Canadian Navigable Waters Act • Responsible Agency: Transport Canada 	<ul style="list-style-type: none"> ○ Overland conveyor ○ Rail loadout ○ Main Sediment Pond • Interim Sediment Pond • Main Sediment Pond • Mine Rock Storage Facility 	<ul style="list-style-type: none"> • Socio-Community (Chapter 18) • Land Use and Access (Chapter 19) • Indigenous Communities (Chapters 23 to 31) 	<p>West Alexander Creek is not expected to be navigable. No effects to VCs anticipated.</p>	<ul style="list-style-type: none"> • Requirement for environmental review and consultation is determined by the Navigation Protection Program officer. Normally a 30-day public comment period is required. • Crown duty to consult prior to exercising a power, duty, or function.
<p>Factory License and Magazine License</p> <ul style="list-style-type: none"> • Legislation: Explosives Act and Explosives Regulations • Responsible Agency: Natural Resources Canada (NRCan) 	<ul style="list-style-type: none"> • Explosives factory, including loading facility, wash facility, and storage of detonators and boosters. • Detonation of explosives. 	<ul style="list-style-type: none"> • Acoustic Environment (Chapter 7) • Westslope Cutthroat Trout and Bull Trout (Chapter 12) • Wildlife and Wildlife Habitat (all VCs; Chapter 15) • Socio-Community (Chapter 18) • Land Use and Access (Chapter 19) 	<p>Manufacturing and storage of explosives is not anticipated to have any effect on VCs. Detonation of explosives has the potential to affect fish, wildlife, human health, and land use in the vicinity of the Project through the generation of air overpressure and ground vibration from blasting, though significant effects are not anticipated due to the implementation of mitigation measures.</p>	<p>Crown duty to consult prior to exercising a power, duty, or function.</p>

Permits / Approvals Under Federal Jurisdiction (i.e., Powers, Duties, or Functions of Federal Authorities)	Relevant Project Components and Related Activities	Potentially Affected Valued Components	Pathway of Effects	Anticipated Consultation Requirements
Transportation of Dangerous Goods <ul style="list-style-type: none"> • Legislation: Transportation of Dangerous Goods Act • Responsible Agency: Transport Canada 	Transportation of dangerous goods on Highway 43, Line Creek Mine Road, Valley Road, Grave Creek Road, and mine roads.	N/A	Permitted transportation of goods is not anticipated to result in an effect on VCs.	Permits for the transportation of dangerous goods are typically carried by specialist contractors, who would confirm consultation requirements are met.
Radio-isotope License <ul style="list-style-type: none"> • Legislation: Nuclear Safety and Control Act • Responsible Agency: NRCAN 	Coal handling process plant.	N/A	Authorization for nuclear devices such as slurry density flow meters. No effects to VCs anticipated.	Crown duty to consult prior to exercising a power, duty, or function.
Radio Licenses <ul style="list-style-type: none"> • Legislation: Radiocommunications Act • Responsible Agency: Industry Canada 	Radio communications for all construction, operations, and reclamation and closure activities .	N/A	License for the on-site radio communication system. No effects to VCs anticipated.	Crown duty to consult prior to exercising a power, duty, or function.
International River Improvements Act Notification <ul style="list-style-type: none"> • Legislation: International River Improvement Act • Responsible Agency: ECCC 	<ul style="list-style-type: none"> • Mine Rock Storage Facility • Interim Sediment Pond • Main Sediment Pond 	Surface Water Quantity (Chapter 11)	Construction and operation of the Mine Rock Storage Facility and Interim and Main Sediment Ponds have the potential to affect surface water flows within the Lake Koochanusa watershed.	NWP shall notify and provide the Minister of Environment in writing with the information referred to in paragraphs 6(a) to (e) of the International River Improvements Act if applicable.

In applying for an authorization under Section 35(2) of the Act, proponents are also required to “offset” any residual adverse effects that remain following the implementation of the avoidance and mitigation hierarchy by efforts to counterbalance this residual loss of fish and fish habitat through positive contributions to the aquatic ecosystems, a process known as offsetting (formerly known as fish habitat compensation). Combined with avoidance and mitigation, implementation of suitable offsetting measures effectively has the net effect of resulting in no residual adverse effects to fish and fish habitat (i.e., the effect is considered to be fully mitigated, and, by definition, is not significant). Offsetting measures for residual adverse effects may include but are not limited to:

- Restoring degraded fish habitat to improve conditions for the production of fish;
- Enhancing fish habitat to improve conditions for the production of fish; or
- Creating productive and sustainable fish habitat where none existed before.

In considering the issuance of an authorization under Section 35(2) of the Fisheries Act, the Minister of Fisheries and Oceans Canada must consider a number of factors that are outlined in Section 34.1 of the Act, including the following:

- “34.1 (1)...(a) the contribution to the productivity of relevant fisheries by the fish or fish habitat that is likely to be affected;
- (b) fisheries management objectives;
- (c) whether there are measures and standards
- (i) to avoid the death of fish or to mitigate the extent of their death or offset their death, or
 - (ii) to avoid, mitigate or offset the harmful alteration, disruption or destruction of fish habitat;
- (d) the cumulative effects of the carrying on of the work, undertaking or activity referred to in a recommendation or an exercise of power, in combination with other works, undertakings or activities that have been or are being carried on, on fish and fish habitat;
- (e) any fish habitat banks, as defined in section 42.01, that may be affected;
- (f) whether any measures and standards to offset the harmful alteration, disruption or destruction of fish habitat give priority to the restoration of degraded fish habitat;
- (g) Indigenous knowledge of the Indigenous peoples of Canada that has been provided to the Minister; and
- (h) any other factor that the Minister considers relevant.”

Potential effects to fish and fish habitat arising from the Project were assessed in Chapter 12. A summary of that assessment was provided in Section 32.2.3 above. The specific details of those assessments are not repeated here, for brevity. Project-related activities will result in the removal of waterways, the most notable being the mine site and supporting infrastructure overlapping with a 5.5 km section of West Alexander Creek, a tributary of Alexander Creek. As well, the Project’s powerline will need to cross the Elk River, though this is not expected to affect fish or fish habitat.

With respect to HADD, the assessment concluded that the Project would not result in significant effects to fish and fish habitat as a result of fish habitat alteration, disruption, or destruction caused by the Project, for all fish species except for WCT, for which the effects of the Project were determined to be significant. This is because, while residual effects to fish and fish habitat can likely readily be authorized and offset under Section 35(2) if DFO is willing to do so, offsetting measures are unlikely to completely

offset for the loss of important WCT habitat within the Project footprint (arising from the loss of a portion of West Alexander Creek, which appears to contain a resident WCT population) because this type of habitat is rare in the Fish and Fish Habitat LSA and Aquatic RSA. While this significant effect is predicted, NWP is confident that suitable offsetting measures for all fish including WCT can be defined over time in collaboration with DFO, B.C. EAO, other government departments and agencies, Indigenous knowledge holders, other proponents, key stakeholders, and other possible participants, although such offsetting measures may not necessarily be possible in the Fish and Fish Habitat LSA and offsetting in a different ecological unit may be necessary. NWP committed to actively engage these participants in a collaborative, science-based, solution-minded approach to completing suitable offsetting measures.

Regardless of the above, the Project will result in some HADD that will require a Section 35(2) authorization from the Minister of Fisheries and Oceans Canada in order for the Project to proceed. In considering the issuance of a Section 35(2) authorization, the Minister will necessarily consider the mandatory factors outlined in Section 34.1(1) of the Fisheries Act prior to making a decision, in addition to conducting its duty to consult with Indigenous Peoples as well as considering other factors including public comment, Indigenous rights and interests, and traditional and local knowledge, among others. In considering these and other factors in making a decision under Section 35(2), if the Minister deems it not possible to issue such an authorization, the Project may not lawfully proceed without modification to avoid or further mitigate this loss of fish habitat. Conversely, if the Minister does eventually issue a Section 35(2) to allow the Project to proceed, in so doing it will have made a regulatory decision that the agreed-upon approach to offsetting was deemed to be acceptable in the context of the Fisheries Act requirements and consistent with the mandatory factors in Section 34.1(1) of the Act, such that the resulting change in the environment associated with exercising this power, duty, or function is deemed to not constitute a significant adverse residual environmental effect to fish and fish habitat.

With the application of avoidance, mitigation, and offsetting measures, including adherence to appropriate DFO guidance and land development guidelines, the issuance of an authorization under Section 35(2) of the Fisheries Act will have taken account the changes to the environment that are directly linked or necessarily incidental to a federal authority's exercise of a power or performance of a duty or function that would permit the carrying out of the Project, in compliance with Section 5(2)(b) of CEA Act, 2012.

32.5.2 Species at Risk Act

The federal Species at Risk Act (SARA, 2002), administered by ECCC, defines species at risk as "...an extirpated, endangered or threatened species or a species of special concern" (Species at Risk Act, s. 2[1]). The Project has the potential to affect aquatic and terrestrial species at risk; as such, Section 32.2.4 summarizes the potential project, residual, and cumulative effects that are predicted to occur on such species. Although Section 5(1)(a) of CEA Act, 2012 requires that only aquatic species at risk must be assessed as part of an environmental assessment of a Designated Project, the Project's EIS Guidelines (CEAA, 2015b) only refer to species at risk generally and do not specify aquatic species at risk; as such, information on both aquatic and terrestrial species at risk is presented.

The general prohibitions under SARA are outlined in Section 32(1) of the Act, which prohibit the killing, harming, harassing, capturing, taking, possessing, collecting, buying, selling or trading of individuals of Extirpated, Endangered, and Threatened species that are listed in Schedule 1 without obtaining a permit

under Section 73(1) of the Act. Section 33 of SARA also prohibits the damage or destruction of the residences (e.g., nests or dens) of Extirpated, Endangered, or Threatened species. While Schedule 1 of SARA also lists a number of species as Special Concern, those species are not afforded legal protection through the general prohibitions of Section 32(1) of SARA. In addition, Section 58(1) of SARA prohibits the destruction of any part of critical habitat without obtaining a permit under Section 73(1) of SARA.

Section 73(2) of SARA allows for permits to be issued or agreements to be entered into under certain conditions, to authorize certain activities that would otherwise contravene the Act. The Minister issuing the permit must be of the opinion that the proposed activity qualifies as one of the following:

- the activity is scientific research relating to the conservation of the species and conducted by qualified persons [Section 73(2)(a)];
- the activity benefits the species or is required to enhance its chance of survival in the wild [Section 73(2)(b)]; or
- the effect(s) on the species is incidental to the carrying out of the activity [Section 73(2)(c)].

Under Section 73(3) of SARA, the Minister issuing the permit must also be of the opinion that:

- all reasonable alternatives to the activity that would reduce the impact on the species have been considered, and the best solution has been adopted [Section 73(3)(a)];
- all feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residences of its individuals [Section 73(3)(b)]; and
- the activity will not jeopardize the survival or recovery of the species [Section 73(3)(c)].

Since adverse residual effects to species listed as Special Concern do not require a permit under SARA (i.e., no power, duty, or function is required under SARA for these species), this section focuses on those species at risk that are listed as Extirpated, Endangered, or Threatened, to which the general prohibition in Section 32(1) applies. As a result, while Table 32.2-4 above lists a number of terrestrial species at risk that may be affected by the Project, this section shall focus on the following species at risk listed as Extirpated, Endangered, or Threatened, their residences, or their critical habitat:

- Whitebark pine (Endangered);
- American badger (Endangered);
- Little brown myotis (Endangered);
- Northern myotis (Endangered);
- Barn Swallow (Threatened);
- Bobolink (Threatened);
- Common Nighthawk (Threatened);
- Lewis's Woodpecker (Threatened);
- Olive-sided Flycatcher (Threatened);
- Western Screech Owl subsp. *macfarlanei* (Threatened); and
- Williamson's Sapsucker subsp. *nataliae* (Endangered).

Other fish, carnivore, bat, bird, and amphibian species assessed in Chapter 12 and Chapter 15 that are listed as Special Concern on Schedule 1 of SARA (including Westslope Cutthroat Trout, grizzly bear, wolverine, fringed myotis, Flammulated Owl, Long-billed Curlew, Peregrine Falcon, Peregrine Falcon subsp. *anatum*, Short-eared Owl, Western Grebe, and western toad) are not carried forward in the discussion of effects within federal jurisdiction below because there is no power, duty, or function to be

exercised by the federal authority (ECCC) for these species beyond this Application/EIS (i.e., no permits under Section 73(1) of SARA are required for them). The reader is referred to the summaries provided in Sections 32.2.3 to 32.2.4 above, and the detailed effects assessments in Chapter 12 (for Westslope Cutthroat Trout) and Chapter 15 (for other wildlife species at risk listed in the previous sentence), for the substantive details of the potential Project effects and cumulative effects on these species.

The effects assessments in Chapters 14 and 15, as summarized in Sections 32.2.4 to 32.2.5, concluded that there would be no significant adverse residual effects or significant residual cumulative effects to all the species at risk to which this section applies (i.e., whitebark pine, American badger, little brown myotis, northern myotis, Barn Swallow, Bobolink, Common Nighthawk, Lewis's Woodpecker, Olive-sided Flycatcher, Western Screech Owl subsp. *macfarlanei*, and Williamson's Sapsucker subsp. *nataliae*), with a moderate to high level of confidence.

Although the residual effects on the above noted species were determined to be not significant, it is possible that ECCC may need to issue permits issued under Section 73(1) of SARA if the Project results in:

- The killing, harming, harassing, capturing, taking, possessing, collecting, buying, selling or trading of individuals of any of the species listed above;
- Damage or destruction of their residences (e.g., nests or dens); or
- The destruction of any part of critical habitat.

Although direct mortality or injury of any of these listed species is not anticipated as part of the Project as planned, it is possible that incidental take of such individuals may occur through accidents, malfunctions, or unplanned events that would require a permit under Section 73(1) to be issued. In addition, a permit will likely be required for adverse residual effects on up to 20% of critical habitat for whitebark pine in the Terrestrial LSA. In considering the exercise of this power, duty, or function, the federal authority must consider the factors listed in Sections 73(2) and 73(3) of SARA prior to issuing a permit in this regard. While it is clear that the Project-related activities are not related to scientific research [Section 73(2)(a)] and that adverse effects are not intended to benefit the species or are not required to enhance its chance of survival in the wild [Section 73(2)(b)], any adverse effects occurring on such species would not be the result of a planned event; rather that those effects would be incidental to the carrying out of the Project-related activity (i.e., an accident, malfunction, or unplanned event), in accordance with Section 73(2)(c) of SARA. In addition, in considering the issuance of a SARA permit, the federal authority would necessarily consider the factors listed in Section 73(3) of SARA (i.e., all reasonable alternatives have been considered and the best solution has been adopted; all feasible measures to minimize the impacts on the species have been taken; and the activity would not jeopardize the survival or recovery of the species) prior to issuing a permit. In considering those factors, in addition to conducting its duty to consult with Indigenous Peoples as well as considering other factors including public comment, Indigenous rights and interests, cumulative effects to sensitive or threatened wildlife populations, and traditional and local knowledge, among others, the Minister of ECCC will necessarily have determined that the changes to the environment arising from exercising this power, duty, or function are justifiable under the circumstances and are deemed to not constitute a significant adverse residual environmental effect to species at risk.

With the application of avoidance, mitigation, and restoration measures, the issuance of a SARA permit will have necessarily taken account the changes to the environment that are directly linked or necessarily

incidental to a federal authority's exercise of a power or performance of a duty or function that would permit the carrying out of the Project, in compliance with Section 5(2)(b) of CEA Act, 2012.

32.5.3 Migratory Birds Convention Act

The MBCA defines the provisions by which an estimated 450 native species of migratory birds (including their nests and eggs) are protected in Canada. The MBCA ensures the conservation of migratory bird populations by regulating potentially harmful human activities. Under the MBCA, the killing, harming, harassing, or injuring of migratory birds and their nests is prohibited.

There are no specific provisions of the MBCA that limit habitat loss and degradation or sensory disturbance specifically; however, to comply with the provisions of the MBCA, activities that require the removal of trees and ground vegetation are normally conducted outside of migratory breeding/nesting bird season (typically approximately April 1 to August 30 of each year). In addition, activities should not harm, harass, injure, or kill a migratory bird and their eggs, or destroy their nests. Generally speaking, the provisions of the MBCA do not apply when migratory birds, their eggs, or their nests are not present, such as between the outward migration and return inward migration of migratory birds. Otherwise, a permit must be issued for activities affecting migratory birds, with some exceptions detailed in the regulations. In particular, if vegetation removal activities cannot be avoided during the migratory bird breeding/nesting season, consultation with the Canadian Wildlife Service of ECCC on proposed activities, implementation of feasible avoidance and mitigation measures, and a migratory bird permit may be required.

Potential effects to migratory birds arising from the Project were assessed in Chapter 15, and in particular its Section 15.7.3.5.2. A summary of that assessment was provided in Section 32.2.5 above. The specific details of those assessments are not repeated here, for brevity. The assessment concluded that proposed mitigation measures for the Project will not result in increased mortality risk to migratory birds, with no residual effects expected; however, it was anticipated that residual effects for habitat loss and degradation and sensory disturbance will remain. As such, the effects of habitat loss and degradation as well as sensory disturbance were therefore carried forward into the residual effects assessment.

The determination of significance of adverse residual effects was therefore completed for the combined effects of habitat loss and degradation and sensory disturbance. Residual effects on migratory birds were summarized in Table 32.2-22. Although residual effects to migratory birds were predicted as a result of habitat loss and degradation and sensory disturbance, there were no significant residual effects to migratory birds anticipated as a result of the Project. The majority of habitat lost within the Project footprint will be for birds using forested habitats (83.4% of the Project footprint). With respect to sensory disturbance, of the three representative migratory bird species (i.e., Olive-sided Flycatcher, Barn Swallow, and woodpeckers), the loss of high-quality habitat and habitat affected by sensory disturbance was largest for Olive-sided Flycatcher. Despite this, sensory disturbance was not expected to result in significant adverse effects to migratory birds because suitable Olive-sided Flycatcher habitat may be created with the creation of new edge habitat, and reclamation activities will restore some Olive-sided Flycatcher habitat by the end of Reclamation and Closure and a permanent reduction in the population as a result of the Project is likely minimal or nil. A relatively small amount of high-quality woodpecker habitat will be lost or affected by sensory disturbance in the Terrestrial LSA, but a permanent reduction in the population as a result of the Project is likely minimal or nil. No change to Barn Swallow abundance is expected,

considering that little or no breeding habitat is present in the Project footprint and that feeding habitat is widely available in the Terrestrial LSA.

Despite these effects on habitat loss and degradation and sensory disturbance, based on the characterization of the residual effects, the Project would not limit the ability of migratory birds to persist and maintain self-sustaining populations in the Terrestrial LSA. The residual effects of habitat loss and degradation and sensory disturbance on migratory birds were therefore considered to be not significant, with a high level of confidence.

In light of the above and the conclusion that no significant residual effects to migratory birds are expected, the only power, duty, or function that may be required to be exercised by a federal authority in respect of migratory birds relates to the potential issuance of a migratory bird permit in the event that vegetation removal activities cannot be completed outside of the migratory bird breeding/nesting season. Vegetation clearing activities may not lawfully proceed during the migratory bird breeding/nesting season unless permitted by ECCC, although they may lawfully be carried out without a permit once the outward migration has been completed in the fall and before migratory birds return in the spring. In cases where such vegetation removal activities cannot be avoided during the migratory bird breeding/nesting season, if the Minister of ECCC does issue migratory bird permit to allow those activities to proceed during this period, it will necessarily have determined that the changes to the environment arising from exercising this power, duty, or function are justifiable under the circumstances and are deemed to not constitute a significant adverse residual environmental effect to migratory birds. Alternatively, should the Minister of ECCC determine that it is not able to issue a migratory bird permit for vegetation removal activities during the migratory bird breeding/nesting period, then NWP would simply need to delay Project activities to outside this period in order to complete vegetation removal without residual effects to migratory birds.

With the application of avoidance, mitigation, and restoration measures, the issuance of a migratory bird permit (should one be issued) will have necessarily taken account the changes to the environment that are directly linked or necessarily incidental to a federal authority's exercise of a power or performance of a duty or function that would permit the carrying out of the Project, in compliance with Section 5(2)(b) of CEA Act, 2012.

32.5.4 Canadian Navigable Waters Act

The Canadian Navigable Waters Act (CNWA) was promulgated in 2019, replacing the former Navigation Protection Act (NPA). The CNWA provides conditions for the approval or permitting by Transport Canada for "works" on the Schedule to the Act (often referred to as "scheduled waterways"), as well as for navigable waters that are not considered to be "minor works" as defined in the Minor Works Order under the Act.

Project-related activities will result in the removal of waterways, the most notable being the mine site and supporting infrastructure overlapping with a 5.5 km section of West Alexander Creek, a tributary of Alexander Creek. As well, the Project's powerline will need to cross the Elk River, though this is not expected to impede navigation as the transmission towers will be constructed on land so as to span watercourses, and the transmission lines will be located several metres overhead. It is important to note that the Project will not affect navigation, since West Alexander Creek is not navigable due to steep topography, and the powerline construction and operation is not expected to change navigation in the

Elk River. Other navigable watercourses and waterbodies present in the Aquatic LSA, downstream of the Project, may experience some limited riparian disturbance and reductions in surface water quantity due to the Project, but those changes are not expected to adversely affect navigation in a substantive way. Navigation in other navigable watercourses and waterbodies present in other parts of the Aquatic LSA and Aquatic RSA is not expected to be affected by the Project.

In light of the above, a federal decision (i.e., power, duty, or function) under CNWA is not required for the Project due to the following:

- No components of the Project will be carried out on a scheduled waterway;
- Although a 5.5 km section of West Alexander Creek will be lost to the development of the Project, West Alexander Creek is not navigable due to steep topography;
- Although the powerline will cross the Elk River, powerline construction and operation is not expected to change navigation in the Elk River because the transmission towers span watercourses and conductors are located far overhead; and
- There is no tailings storage facility/impoundment required for the Project.

Since there is no requirement for a federal authority to exercise a power or perform a duty or function in respect of the CNWA, the Project is not expected to result in a change in the environment in regard to navigation. As such, navigation and the CNWA are not discussed further.

32.5.5 Explosives Act

Operation of the North, South, and East Pits including the extraction of coal and mine rock will require the use of explosives manufactured on-site in order to break up the material for extraction and processing.

The federal Explosives Act and its Explosives Regulations define the requirements for explosives manufacture, storage, and use in Canada. A Magazine License will be required for the storage of explosive products and their precursors. In addition, a Factory License will be required for the on-site manufacturing of explosives. Personnel qualifications, technical specifications, setbacks, and other requirements related to these licenses are codified in the Explosives Regulations under the Explosives Act and are well established and understood by mining proponents since explosives use and management are an essential component of most mining operations.

All blasting activities carried out as part of the Project will be conducted by qualified persons in a manner consistent with the Health, Safety and Reclamation Code for Mines in British Columbia; no significant residual adverse environmental effects are anticipated for the storage and use of explosives as long as the mitigation outlined in this Application/EIS and the related regulations and setback requirements established under the Explosives Regulations are applied.

Although licenses will be required under the Explosives Act for these activities, the power, duty, or function exercised in issuing these licenses and permits is not expected to result in a change to the environment. They are thus not discussed further.

32.5.6 Other Approvals, Licenses, and Permits

In addition to the above, other approvals, licenses, or permits may be required for the following:

- Permits for the transportation of dangerous goods by rail, road, or air, under the Transportation of Dangerous Goods Act;
- A radio-isotope license under the Nuclear Control and Safety Act for nuclear devices such as the slurry density flow meters;
- A license under the Radiocommunications Act for the on-site radio communication system; and
- A notification under the International River Improvement's Act for changes to water and flow levels in the Lake Koochanusa watershed due to the Project.

The issuance of these licenses and permits is not expected to result in a change to the environment. They are thus not discussed further.

32.5.7 Summary of Changes to the Environment that are Directly Linked or Necessarily Incidental to Federal Decisions

Provided that federal authorities consider the effects of the Project in view of the various other factors outlined in legislation that require consideration prior to exercising a power, duty, or function under the legislation under their respective jurisdiction, changes to the environment from the Project that are directly linked or necessarily incidental to a federal decision are not predicted.

32.6 Effects of a Change to the Environment

Section 5(2)(b) of CEA Act, 2012 requires that a federal EA must evaluate changes to the environment that are directly linked or necessarily incidental to federal decisions as a result of the Project if they result in an effect to health or socio-economic conditions, physical and cultural heritage, or any site or thing that is of historical, archaeological, palaeontological, or architectural significance. Specifically, Section 5(2)(b) states:

"5(2) However, if the carrying out of the physical activity, the designated project or the project requires a federal authority to exercise a power or perform a duty or function conferred on it under any Act of Parliament other than this Act, the following environmental effects are also to be taken into account: ...

- b) an effect, other than those referred to in paragraph (1)(c), of any change referred to in paragraph (a) on
 - (i) health and socio-economic conditions,
 - (ii) physical and cultural heritage, or
 - (iii) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance."

Potential federal permits related to the Project were listed in Table 32.5-1 and include:

- Authorization for harmful alteration, disruption or destruction of fish habitat under Section 35(2) of the Fisheries Act;
- A permit for harm, injury, or mortality of an Extirpated, Endangered, or Threatened species or affecting their residences or critical habitat under Section 73 of the Species at Risk Act;
- A permit for vegetation clearing during the migratory bird nesting season under the Migratory Birds Convention Act;

- Authorization under the Canadian Navigable Waters Act for effects on navigation;
- Explosives licenses under the Explosives Act;
- Compliance with the Transportation of Dangerous Goods Act;
- A radio-isotope license under the Nuclear Safety and Control Act for nuclear devices such as slurry density flow meters; and
- Radio licenses under the Radiocommunications Act for the on-site radio communication system.

Should any of these authorizations and permits be required, changes to the environment from the Project that are directly linked or necessarily incidental to a federal decision are not predicted to result in an effect to health or socio-economic conditions, physical and cultural heritage, or any site or thing that is of historical, archaeological, palaeontological, or architectural significance. They are thus not discussed further.

32.7 Summary and Conclusions

The Application/EIS provides detailed assessments of potential effects on VCs that may occur as a result of the Project as well as the mitigation measures to avoid, minimize, restore, and compensate and offset Project-related effects. Project effects that were predicted to remain despite the implementation of mitigation measures were considered to be residual effects, which following analysis were rated as not significant or significant. Potential cumulative effects were assessed for VCs that had an identified residual effects resulting from the Project and in those instances, and the significance of residual cumulative effects was determined.

The Application/EIS identifies the potential for significant residual Project-related effects on Westslope Cutthroat Trout which is subject to a federal authority exercising a power, duty, or function related to its mandate under Section 5(1)(a) of the CEA Act, 2012. No significant adverse residual effects from the Project were predicted for other VCs that are subject to a federal authority exercising a power, duty, or function related to its mandate under Section 5(1)(a) of the CEA Act, 2012. In addition, no significant adverse residual cumulative effects resulting from the Project were identified.

The federal authorities exercising a power, duty, or function under Section 5(1)(a) of the CEA Act, 2012 will need to consider a number of factors outlined in the legislation under their respective jurisdiction, as well as the benefits of the Project and other factors, prior to making a decision in respect of those powers, duties, or functions conferred to them under their respective Acts and Regulations. Other factors that will be inherently considered in such decision-making would include the duty to consult with Indigenous Peoples, public comments, Indigenous rights and interests, traditional and local knowledge, cumulative effects to sensitive/threatened wildlife populations, existing environmental management frameworks (e.g., EV-CEMF), and other factors. NWP acknowledges that provincial and federal authorities have the difficult task of balancing the societal needs for goods and commodities such as metallurgical coal, the effects of the Project including cumulative effects, and potential rights and interests of Indigenous Peoples, particularly in light of cumulative effects in the Elk Valley as well as other regulatory and policy frameworks such Government of Canada's climate goals. At the same time, while the Project has the potential to result in significant adverse residual effects on Westslope Cutthroat Trout, the Project is intended to fill a societal need to soften surging global demand for metallurgical coal while creating employment, income, investment, taxes, royalties, and value-added spin-offs for the benefit of residents

of the Elk Valley, where employment and incomes tend to lag behind those of other economic regions of rural B.C. Where significant adverse residual effects were predicted, NWP has committed to carefully monitor the Project performance through follow-up measures, management actions, and collaborations with other parties throughout the Project life, and to adapt to changing conditions as negative changes occur to minimize the extent of those adverse effects. In this light, although significant adverse residual effects are anticipated for Westslope Cutthroat Trout, NWP believes that the significant adverse residual effects of the Project, carefully monitored and managed through design, careful execution, mitigation, response, and adaptive management are outweighed by the benefits of the Project to the residents of the Elk Valley and the Province of B.C., such that those significant adverse residual effects should be deemed by the respective Ministers to be justifiable under the circumstances.

Although Project-residual effects have been predicted for some VCs that may cross international or provincial borders and therefore potentially result in effects in transboundary jurisdictions outside of B.C., with the implementation of mitigation measures, these effects (including residual Project and cumulative effects) have been determined to be either beneficial (economic), or adverse but not significant.

Though impacts on rights and interests of the identified Indigenous Communities have been predicted for certain rights and interests that may cross international or provincial borders (i.e., hunting and trapping) and therefore could potentially result in effects in transboundary jurisdictions outside of B.C., with the implementation of mitigation measures, these effects (including residual Project and cumulative effects) have been determined to be either beneficial (economic), or adverse but not significant.

NWP is committed to creating and sustaining relationships and ongoing dialogue with regulators, communities, and stakeholders to support the environmental, social, and economic sustainability of the Project. Through the implementation of an Environmental Management System and Project-specific mitigation measures and policies and procedures, NWP anticipates the Project will create economic, social, and environmental benefits for local communities, the Elk Valley, the Province of B.C., and Canada.

32.8 References

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