RED MOUNTAIN UNDERGROUND GOLD PROJECT
VOLUME 4 | CHAPTER 25
TSETSAUT SKII KM LAX HA

Table of Contents

25 Tsetsaut Skii km Lax Ha 1
25.1 Introduction 1
25.2 Background and Context 2
25.2.1 Regulatory and Policy Setting 2
25.2.2 TSKLH 3
25.2.3 Environmental Setting 16
25.3 Consultation Summary 20
25.3.1 Pre-Application Engagement 20
25.3.2 Future Engagement 21
25.4 Scope of the Assessment 22
25.4.1 Information Sources 22
25.4.2 Input from Consultation 23
25.5 Potential Effects 23
25.5.1 Methods 23
25.5.2 Project Interactions 23
25.5.3 Discussion of Potential Effects 26
25.6 Mitigation Measures 41
25.6.1 Key Mitigation Approaches 41
25.6.2 Effectiveness of Mitigation Measures 41
25.6.3 Management Plans and Monitoring 60
25.7 Residual Effects Characterization 60
25.7.1 Summary of Residual Effects 60
25.7.2 Methods 61

25.7.3 Potential Residual Effects Assessment ... 65
25.7.4 Summary of Residual Effects Assessment ... 80
25.8 Other Matters of Concern ... 82
25.9 Issue Summary Table ... 82
25.10 References ... 84

List of Tables

Table 25.2-1: Summary of TSKLH Aboriginal Interests in the Project Area ... 15

Table 25.2-2: Project-Specific Wildlife Baseline Studies ... 18

Table 25.4-1: Data Sources for TSKLH ... 22

Table 25.5-1: Potential Project Interactions: TSKLH Aboriginal Interests ... 24

Table 25.5-2: Potential Project Interactions and Effects on Fish and Fish Habitat ... 31

Table 25.6-1: Proposed Mitigation Measures and Their Effectiveness ... 43

Table 25.6-2: Wildlife and Wildlife Habitat Mitigation Measures ... 44

Table 25.6-3 Fish and Fish Habitat Mitigation Measures ... 52

Table 25.6-4: Vegetation and Ecosystems Mitigation Measures ... 53

Table 25.7-1: Residual Effect Characterization Definitions for Wildlife and Wildlife Habitat and Vegetation and Ecosystems ... 62

Table 25.7-2: Residual Effect Characterization Definitions for Fish and Fish Habitat ... 63

Table 25.7-3: Attributes of Likelihood ... 64

Table 25.7-4: Confidence Ratings and Definitions ... 65

Table 25.7-5: Characterization of Potential Residual Effects on Habitat Availability ... 66

Table 25.7-6: Characterization of Potential Residual Effects on Habitat Distribution ... 68

Table 25.7-7: Characterization of Potential Residual Effects on Mortality Risk ... 68

Table 25.7-8: Characterization of Residual Effects on Fish Habitat ... 71

Table 25.7-9: Characterization of Residual Effects on Dolly Varden due to Changes in Water Quality ... 74

Table 25.7-10: Characterization of Residual Effects on Dolly Varden due to Changes in Streamflows ... 75

Table 25.7-11: Characterization of Potential Residual Effects to Plant Resources ... 77

Table 25.7-12: TSKLH Harvested Plants by Ecosystem VC ... 79

Table 25.7-13: Summary of the Residual Effects Assessment on TSKLH’s Aboriginal Interests ... 81

Table 25.9-1: TSKLH Issue Summary Table ... 82

List of Figures

Figure 25.2-1: TSKLH Territory (Map 1 of 2) 8
Figure 25.2-2: TSKLH Traditional Territory (Map 2 of 2) 9
Figure 25.2-3: Registered Traplines held by TSKLH Members 12

25 TSETSAUT SKII KM LAX HA

25.1 Introduction

The purpose of this chapter is to summarize the engagement and consultation conducted by IDM with Tsetsaut Skii km Lax Ha (TSKLH) and to conduct an assessment of the potential effects of the Project on TSKLH's Aboriginal Interests in the Bitter Creek valley, as outlined in the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) and the Environmental Impact Statement Guidelines (the EIS Guidelines) issued for the Project by the Canadian Environmental Assessment Agency (the Agency).

This chapter includes:

- Background information and context regarding TSKLH;
- An assessment of the potential effects on TSKLH's Aboriginal Interests;
- Proposed mitigation measures to avoid, mitigate, manage or otherwise address potential effects on TSKLH's Aboriginal Interests;
- An assessment of the potential residual effects on TSKLH's Aboriginal Interests, after mitigation measure have been taken into consideration; and
- A summary of any other matters of concern to TSKLH as expressed to IDM.

The following valued components (VCs) and intermediate components (ICs) have informed this chapter:

- Air Quality Effects Assessment (Chapter 7);
- Noise Effects Assessment (Chapter 8);
- Vegetation and Ecosystems Effects Assessment (Chapter 15);
- Wildlife and Wildlife Habitat Effects Assessment (Chapter 16);
- Fish and Fish Habitat Effects Assessment (Chapter 18);
- Commercial, Recreational, and Aboriginal Fisheries, under the Economic Effects Assessment (Chapter 19);
- Visual Quality, under the Social Effects Assessment (Chapter 20); and
- Heritage Effects Assessment (Chapter 21).

The assessment of potential effects on TSKLH's Aboriginal Interests is based on a comparison between the predicted future conditions with the Project and the predicted future conditions without the Project.

To avoid unnecessary duplication, only relevant biophysical VCs have been selected to inform the assessment of Aboriginal Interests. For example, while changes to Sediment Quality may have effects on plants gathered for traditional purposes, the linkage between Sediment Quality and Vegetation has already been considered in the Vegetation and Ecosystems Effects Assessment (Chapter 15) therefore inclusion of Vegetation and Ecosystems in the Aboriginal Interests effects assessment considers any indirect effects resulting from changes to Sediment Quality. Indirect pathways and other linkages, such as the example described, are listed in the respective chapters.

25.2 Background and Context

25.2.1 Regulatory and Policy Setting

This section provides a summary of relevant legislation, regulations, policies, plans, and guidelines relevant to IDM's consultation with TSKLH.

25.2.1.1 BC Environmental Assessment Act

The Project is reviewable under the *BC Environmental Assessment Act* (BCEAA). Section 11 of the BCEAA states that the executive director, when determining the scope of the assessment and the procedures and methods for conducting the assessment, may also specify "the persons and organizations, including but not limited to the public, first nations, government agencies and, if warranted in the executive director's opinion, neighbouring jurisdictions, to be consulted by the proponent or the Environmental Assessment Office (EAO) during the assessment, and the means by which the persons and organizations are to be provided with notice of the assessment, access to information during the assessment and opportunities to be consulted," (Government of BC, 2002). Pursuant to this, EAO issued a Section 11 Order for the Project in February 2016.

TSKLH is listed on Schedule C (notification) of the Section 11 Order. Paragraph 12.2 of the Section 11 Order outlines that EAO will provide notification to TSKLH at milestones in the environmental assessment process so that they may remain informed and have the opportunity to raise any issues with EAO for discussion. EAO did not delegate consultation activities regarding TSKLH to IDM.

25.2.1.2 Canadian Environmental Assessment Act, 2012

The Project is reviewable under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). The Canadian Environmental Assessment Agency (the Agency) issued the Environmental Impact Statement (EIS) Guidelines for the Project in January 2016 (the EIS Guidelines).

Section 5(1)(c) of CEAA 2012 states that the Environmental Impact Statement (Application/EIS) must assess, with respect to Aboriginal peoples, the potential changes to health and socio-economic conditions; physical and cultural heritage; current use of lands and resources for traditional purposes; and any structure, site or thing that is of historical, archaeological, paleontological, or architectural significance that may be caused by changes to the environment caused by the Project (Government of Canada, 2012). The EIS Guidelines issued for the Project stipulate that TSKLH is included in the list of Aboriginal Groups less potentially affected by the Project and its related effects.

A key objective of CEAA 2012 is to promote communication and cooperation with Aboriginal peoples, which includes First Nations, Inuit, and Métis. The proponent is expected to engage with Aboriginal Groups that may be affected by the Project as early as possible in the Project planning process. The proponent will provide Aboriginal Groups with opportunities to learn about the Project and its potential effects, make their concerns known about the Project's potential effects, and discuss measures to mitigate those effects. The proponent is strongly encouraged to work with Aboriginal Groups in establishing an engagement approach. The proponent will make reasonable efforts to integrate traditional Aboriginal knowledge into the assessment of environmental impacts.

The EIS Guidelines specify that IDM will make key EA summary documents (e.g. draft/final EIS, key findings, plain language summaries) accessible to TSKLH and ensure their views are heard and recorded.

25.2.2 TSKLH

25.2.2.1 Governance

TSKLH is not currently recognized as a band under the *Indian Act, 1876*. Previously, TSKLH was considered by the provincial government to be a house, or *wilp*, of Gitxsan First Nation. TSKLH, under the leadership of hereditary chief Darlene Simpson, has been fighting for recognition as a separate First Nation for about 15 years (Simpson D. , 2016). Regarding consultation on the Kerr Sulphurets Mitchell (KSM) Project, the Gitxsan Hereditary Chiefs Office confirmed to Seabridge Gold that TSKLH should be consulted independently regarding potential effects to land and resource use in TSKLH territory (Rescan, 2013). TSKLH continue to work towards full recognition of their Aboriginal rights and title from the provincial and federal governments (ERM Rescan, 2014; Ming, 2016).

TSKLH is organized by a hereditary administrative culture that employs a tenure system to control resource use, territorial management, and decision-making under the leadership of a hereditary chief (Ming, 2016). TSKLH established the Tsetsaut Consultation Society for the purpose of representing the Aboriginal rights of TSKLH and engaging with proponents of resource development projects in their territory (Ming, 2016). To date, IDM has not been directed to consult with the Tsetsaut Consultation Society by either EAO or the Agency. IDM's engagement to date has been with TSKLH's political leadership.

25.2.2.2 History

"Tsetsaut" refers to an ethnolinguistic group who occupied the territory around the headwaters of the Nass, Stikine, Unuk, and Skeena Rivers, around Meziadin Lake, and on Portland Canal, Observatory Inlet, and Behm Canal (Sterritt, 1998). Tsetsaut means "those of the interior" in Tsimshian, and was used by Nisga'a, Gitxsan, and Tsimshian groups to refer to those who occupied the land north and northeast of their territories (Sterritt, 1998; ERM Rescan, 2014). Tsetsaut describes two culturally related groups: the Western Tsetsaut and the Eastern Tsetsaut (Sterritt, 1998).

TSKLH are the descendants of the Raven Clan of the Eastern Tsetsaut (Rescan, 2013; Ming, 2016). The Eastern Tsetsaut are also known as *Laxwiiyiip,* and themselves refer to their territory as *Laxwiiyiip* (Sterritt, 1998). Eastern Tsetsaut were never encountered by ethnographers; their existence was documented through Franz Boas and George T. Emmons meetings with Western Tsetsaut and through Gitxsan oral histories (Sterritt, 1998; Duff, 1981). Boas documented stories about a group called *Laq'uyî'p* (or *Laxwiiyiip*), distinct from the Western Tsetsaut and from the Tahltan (ERM Rescan, 2014). No further attempts to meet with *Laxwiiyiip* were undertaken at the time, but subsequent research has determined that the stories of *Laxwiiyiip* referred to Eastern Tsetsaut (ERM Rescan, 2014). Boas recorded the meaning of *Laxwiiyiip* to be "on the prairie", referring to the plateau at the headwaters of the Stikine, Nass, and Skeena Rivers (ERM Rescan, 2014).

The Western Tsetsaut were called the Portland Canal Tsetsaut. Western Tsetsaut had experienced population decline throughout the 1800s due to disease and attacks from the Eastern Tsetsaut, Nisga'a, and Tlingit (Sterritt, 1998; Gillespie & Filice, 2015). Following contact with Europeans, they assimilated with Nisga'a and Tlingit (ERM Rescan, 2014; Sterritt, 1998). When Boas met with the Western Tsetsaut in 1894 the group had been reduced to 12 men and their families who had relocated from the upper Portland Canal to the Anglican mission in the Nisga'a Village of Gingolx (formerly Kincolith) in 1885 (Duff, 1981). When ethnographer George T. Emmons returned to meet with the Western Tsetsaut in 1907, he found 7 people who identified as Tsetsaut: four men, two old women, and a girl (Duff, 1981). Subsequent ethnographic reports from the area do not describe any individuals identifying as Tsetsaut (Duff, 1981).

25.2.2.3 Ethnography

There are very few primary ethnographic accounts of the Tsetsaut: by the time ethnographer Franz Boas made contact with the Western Tsetsaut in 1894, the Tsetsaut had dispersed and assimilated with Nisga'a and Tlingit families (ERM Rescan, 2014; Sterritt, 1998).

Tsetsaut society is structured by matrilineal exogamous clans: house groups are based on the female line, and marriage is only permitted with members of outside groups (Rescan, 2013). Emmons reported that the Tsetsaut were socially organized into three clans: Wolf, Eagle, and Raven (Duff, 1981). When Boas encountered the Western Tsetsaut, the Eagle clan had become extinct, and the Wolf clan continued to practice marriage to outside groups (Rescan, 2013). Present day TSKLH claim descent from the Raven Clan (Rescan, 2013; Emmons, 1911).

Each house manages hunting, fishing, and gathering territories, and the use of those territories is directed by the hereditary chief (Rescan, 2013; Ming, 2016). Feasts are an important activity in maintaining the house system as they provide the occasion for the recounting of oral histories that reinforce the house title (Rescan, 2013).

The Laxwiiyip Tsetsaut, from whom the TSKLH are descended, were a group of closely related families. In his field notes from the 1920s, Barbeau lists together in one grouping the names Ksemgunqweek, Biiniks (or "pi'niks"), Skawill (sqa'wil), Skii km Lax Ha ("xske'gamlaxe"), and Nagan ("na'gan"). While Gyetem Galdo is not included in this list, Barbeau does include "noxsto for noxsgidamgaldo", which means "mother of Gyetem Galdo". This list compiled by Barbeau confirms the close family relations between the groups who have held the names Ksemgunqweek, Biiniks, Skawill, Skii km Lax, Nagan, and Gyetem Galdo. As Barbeau confirms in his book *Totem Poles of the Gitksan*, "Gitemraldo [Gyetem Galdo] and his kinsmen Sqawil [Skawill] and Sanaws [Shanoss]" share the same Raven clan origins and "came originally from the Groundhog country, at the headwaters of the Skeena. […] They still retain their hunting grounds in the Groundhog." By the early 1800s, Gyetem Galdo had become a prominent chief in Gitanmaax (Hazelton) "through his ability and success in the *potlatch*." In this way, Gyetem Galdo acquired territory among the Gitxsan, but still today recognizes his Laxwiiyip Tsetsaut ancestry and remains a member of the TSKLH Nation (Chief D. Simpson, 2017).

Skii km Lax Ha is the name of the house group, their hereditary chief, and their traditional territory (Ming, 2016). The traditional name Skii km Lax Ha has passed from Johnson Nagun, to Daniel Skawill, to Johnny Wilson, to current-day TSKLH Chief Darlene Simpson (Rescan, 2009).

25.2.2.4 Language

The traditional language of TSKLH is Tsetsaut, or *Wetalh*, which is part of the northern dialect of the Athapaskan language family (Rescan, 2013; Gillespie & Filice, 2015). Athapaskan, also spelled Athabascan or Athapascan, is an extensive language family consisting of approximately 38 languages (Hargus, 2010). Northern Athapaskan languages are found in Alaska, Yukon, the Northwest Territories, BC, and Alberta (Krauss, 1981). Subgroups of the Athapaskan language are also spoken in the southwest United States and on the Pacific Coast (Hargus, 2010).

Historians and ethnographers had previously confused the Tsetsaut as an offshoot of Tahltan, their Athapaskan speaking neighbours, however the connection between Tahltan and Tsetsaut has since been disproven and the two are clearly distinct First Nations (Chief D. Simpson, 2017)(Duff, 1981). Tsetsaut's other neighbours, Nisga'a, Gitxsan, and Coast Tsimshian, speak Tsimshianic languages (First Peoples' Language Map British Columbia).

Wetalh is no longer spoken by TKSLH and is believed to be extinct (Krauss, 1981). Boas' contact with the Tsetsaut in 1894 represents the only documentation of the Tsetsaut language. Of his three informants, only one was a fluent speaker, but from the data Boas recorded, linguists find it "clear that Tsetsaut was one of the most divergent of Northern Athapaskan languages," (Krauss, 1981). *Wetalh* is believed to have been more similar to the

Han and Kitchin languages spoken in the Yukon than the closest Athapaskan neighbours, Tahltan and Kaska (ERM Rescan, 2014).

In 2013, TSKLH reported that members predominately speak English although some TSKLH members speak the Gitxsan language, *Gitxsanimaax* (ERM Rescan, 2014; Gitxsan, n.d.).

25.2.2.5 Demographics

In 2017, TSKLH estimate there are approximately 35 members (Chief D. Simpson, 2017). TSKLH members primarily live in Hazelton and New Hazelton (ERM Rescan, 2014).

As TSKLH are not a recognized band under the *Indian Act*, there are no TSKLH designated Indian Reserves and data regarding TSKLH members is not disaggregated in provincial and federal statistical information.

25.2.2.6 Traditional Territory

TSKLH refers to its traditional territory as *Laxwiiyiip* (Ming, 2016). According to the 2008 TSKLH Traditional Knowledge and Use Research Report submitted in support of the Application for an Environmental Assessment Certificate / Environmental Impact Statement for the KSM Project, Stewart and the Cambria Icefield are included in TSKLH’s traditional territory (Rescan, 2013). Ethnographer James Teit noted that Eastern and Western Tsetsaut “occupied all the upper Portland Canal around Stewart, and Salmon and Bear Rivers” (ERM Rescan, 2014).

TSKLH currently describe its territorial boundaries as follows, as illustrated on the annotated figures provided by TSKLH in their letter of June 26, 2017 (Chief D. Simpson, 2017). See Figure 25.2-1 and Figure 25.2-2.

The following description of TSKLH’s traditional territory has been provided by TSKLH (Chief D. Simpson, 2017). The eastern boundary of TSKLH Territory runs generally southeast from (i) Klappan Mountain in the North, (ii) following the height of land on the east side of the Skeena River to (iii) its junction with the Kluatantan River, then (iv) following the Skeena River further southeast to (v) its junction with the Duti River, and then (vi) continuing along the height of land dividing the Skeena and Nass watersheds to (vii) Octopus Lake, then (viii) continuing southwest to Aluk Creek, to include Octopus Lake, then (ix) along Aluk Creek to where Aluk Creek runs into the Cranberry (Salmon) River, all to include Slowmaldo Mountain, Blackwater (Damdochax or Sheduwitt) Lake, Sallysout Creek, Mount Skuyhil, Kwinageese River and Lake, and Brown Bear Lake.

The southern boundary runs generally southwest from the confluence of Aluk Creek and the Cranberry (Salmon) River (x) along the Cranberry (Salmon) River to (xi) the confluence of the Cranberry (Salmon) and Nass Rivers.

From the confluence of the Cranberry (Salmon) and Nass Rivers, the southeastern boundary (xii) crosses the Nass River and (xiii) runs northwest along the height of land dividing the Kinskuch and Nass Rivers to (xiv) Scrub Lake, then (xv) along the height of land between the White and Kinskuch Rivers, to include the White River watershed, then (xvi) continuing north along the height of land between Kitsault Lake and Jade Lake, and then (xvii) west along the height of land between Kitsault Lake and the White River, then (xviii) continuing northwest over the height of ice of the Cambria Icefield to (xix) the Alaska-Canada border.

The Laxwiiyip Tsetsaut treated the height of ice on the Cambria Icefield as forming part of its southern border. The height of ice has moved over time, as the Cambria Icefield itself has shifted. Figure 25.2-1 and Figure 25.2-2 illustrate this part of the southern border of TSKLH Territory as the height of ice exists today.

From the junction of the Cambria Icefield and the Alaska-Canada border, the boundary (xx) continues northwest along the Alaska-Canada border to (xxi) the upper Unuk river watershed.

From the upper Unuk River watershed, (xxii) the northwest boundary runs between the Unuk and Iskut/Stikine River watersheds, then (xxiii) northeast along the height of land dividing the Iskut/Stikine and Bell-Irving watersheds to (xxiv) Tumeka Lake, to include all of the Bowser Lake drainage, as well as Awijii (Oweegee) Lake, Awijii (Oweegee) Creek (Little Sowill Creek), Awijii (Oweegee) Mountain Range, Skowill Creek, and Mount Skowill.

From Tumeka Lake, (xxv) the northern boundary runs generally east to meet up with Klappan Mountain, to include Mount Gunanoot and parts of the headwaters of the Nass, Stikine, and Skeena Rivers.

Figure 25.2-1: TSKLH Territory (Map 1 of 2)

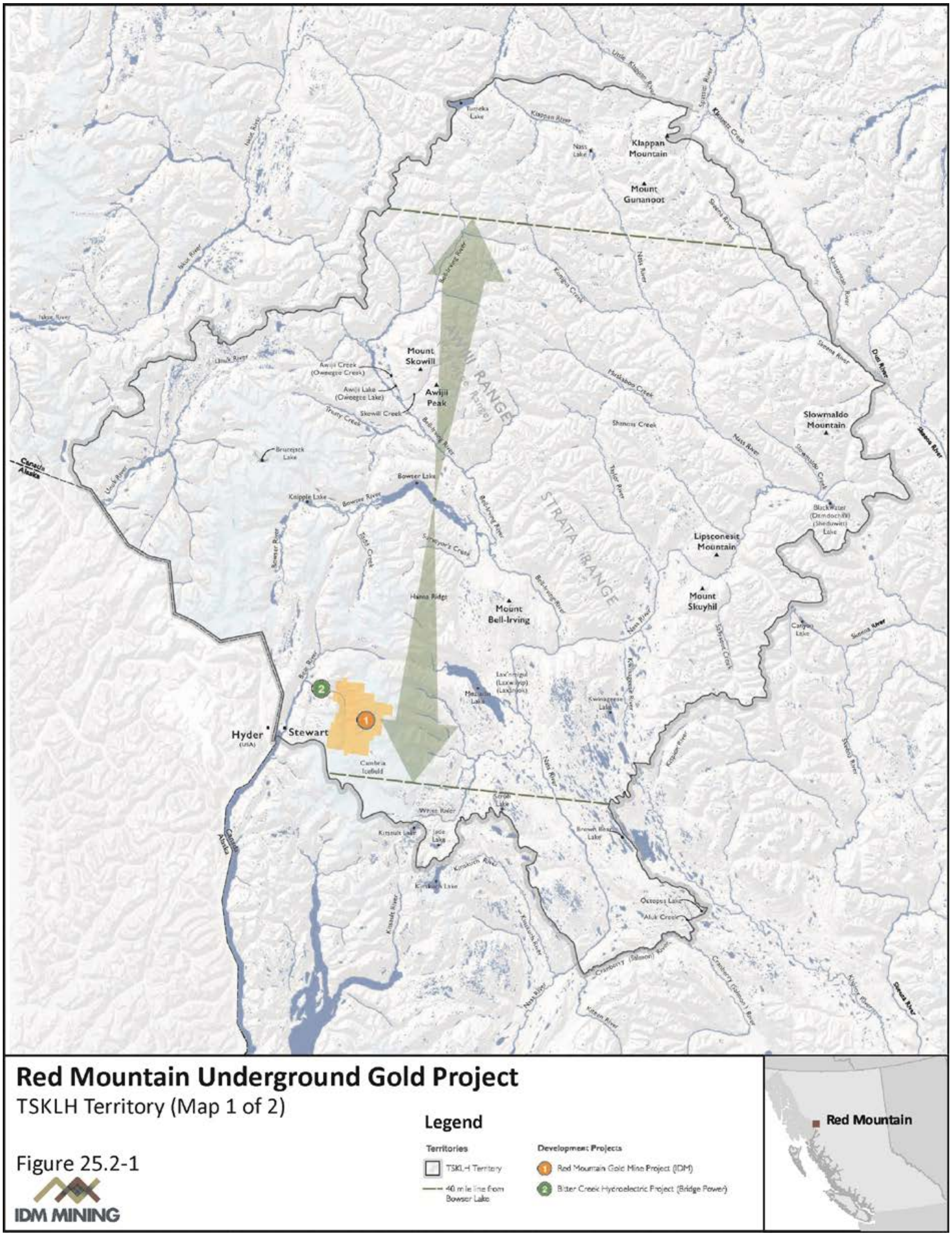
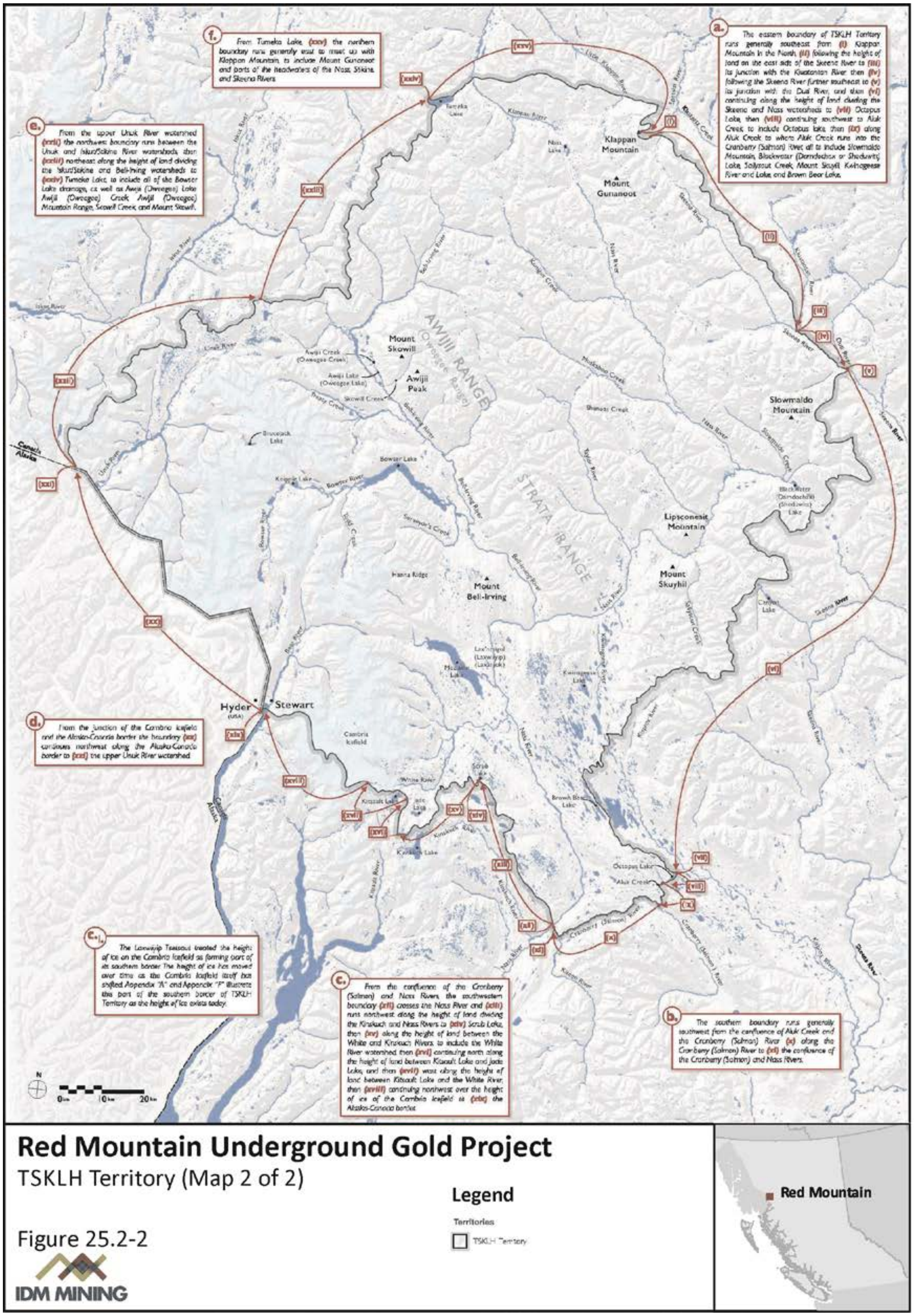


Figure 25.2-2: TSKLH Traditional Territory (Map 2 of 2)



25.2.2.7 Traditional Land and Resource Use

Historical documentation of Eastern Tsetsaut traditional land and resource use is sparse, as the Tsetsaut largely assimilated with other Aboriginal Groups in the early 20th century, as described above (Rescan, 2013). The following description of historical and current traditional land and resource use activities has been obtained from reviewing the EA Applications for the Kerr-Sulphurets-Mitchell (KSM), Brucejack Gold (Brucejack), and Northwest Transmission Line (NTL) Projects.

Fishing

Traditionally, fish are a significant food source for TSKLH. Boas describes the Western Tsetsaut traditional economy as based on inland game hunting, supplemented by salmon fishing in the Portland Canal during the summers (Rescan, 2013). Eastern Tsetsaut have been described as more reliant on fishing in the lakes and rivers of the valleys in their territory than the Western Tsetsaut. Meziadin Lake is a documented site of spring and sockeye salmon fishing (Rescan, 2013). Tsetsaut were also known to fish on the Nass River at a village where a tributary joins the main river (Rescan, 2013). According to TSKLH, their ancestors also fished in the Stewart area, particularly for eulachon (also called oolichan) (ERM Rescan, 2014).

Fishing for species such as Chinook, sockeye, coho, steelhead, oolichan, steelhead, and rainbow trout continue to be an important activity for providing sustenance to TKSLH (Ming, 2016; Rescan, 2009). Current fishing areas include the Bell-Irving River at its confluence with Treaty Creek and Snowbank Creek, Meziadin Lake, Cranberry River, and Oweegee Creek (Rescan, 2013; Rescan, 2009). A 2013 survey of TSKLH found that Chinook and sockeye salmon are consumed by TSKLH members two to three times per week throughout the year (Rescan, 2013). Steelhead salmon and Dolly Varden are eaten less than once a week on average, while eulachon grease is consumed two to three times a week with dried meat (Rescan, 2013).

Hunting and Trapping

Hunting and trapping by TSKLH ancestors, including Simon Gunanoot and Daniel Skowill, are documented in the early 20th century. Simon Gunanoot was a notable figure in TSKLH's recent past; he was of TSKLH descent through his father, hereditary Chief Johnson Nagun, and Gitxsan (wilp Geel) though his mother (RDKS, n.d.; Rescan, 2013; Sterritt et al., 1998). Simon Gunanoot relied on his hunting and trapping abilities to support his family while evading law enforcement for over 13 years for a murder charge of which he was later acquitted in 1920 (RDKS, n.d.). Many accounts document Simon Gunanoot and his father's use of the Meziadin Lake area (ERM Rescan, 2014). Former hereditary chief Daniel Skowill's hunting and trapping activities in TSKLH territory have been documented though interviews and provincial documents (Rescan, 2013). Skowill's trapline between Bowser Lake and Todada Lake produced 34 beaver, 7 marten, 2 muskrats, and one fisher between 1931 and 1932 (Rescan, 2013). Mount Skowhill, Mount Skuyhil, and Skowill Creek are named after Daniel Skowill because of his use of those areas for hunting (Rescan, 2013).

Hunting and trapping activities are an important aspect of traditional and current TSKLH life. Species of importance for TSKLH hunting and trapping include grizzly bear, black bear, moose, caribou, wolverine, marten, muskrat, hoary marmot, beaver, rabbit, and grouse (Rescan, 2013). Boas noted that the Eastern Tsetsaut employed nets for hunting rabbits, while the Western Tsetsaut did not (Rescan, 2013).

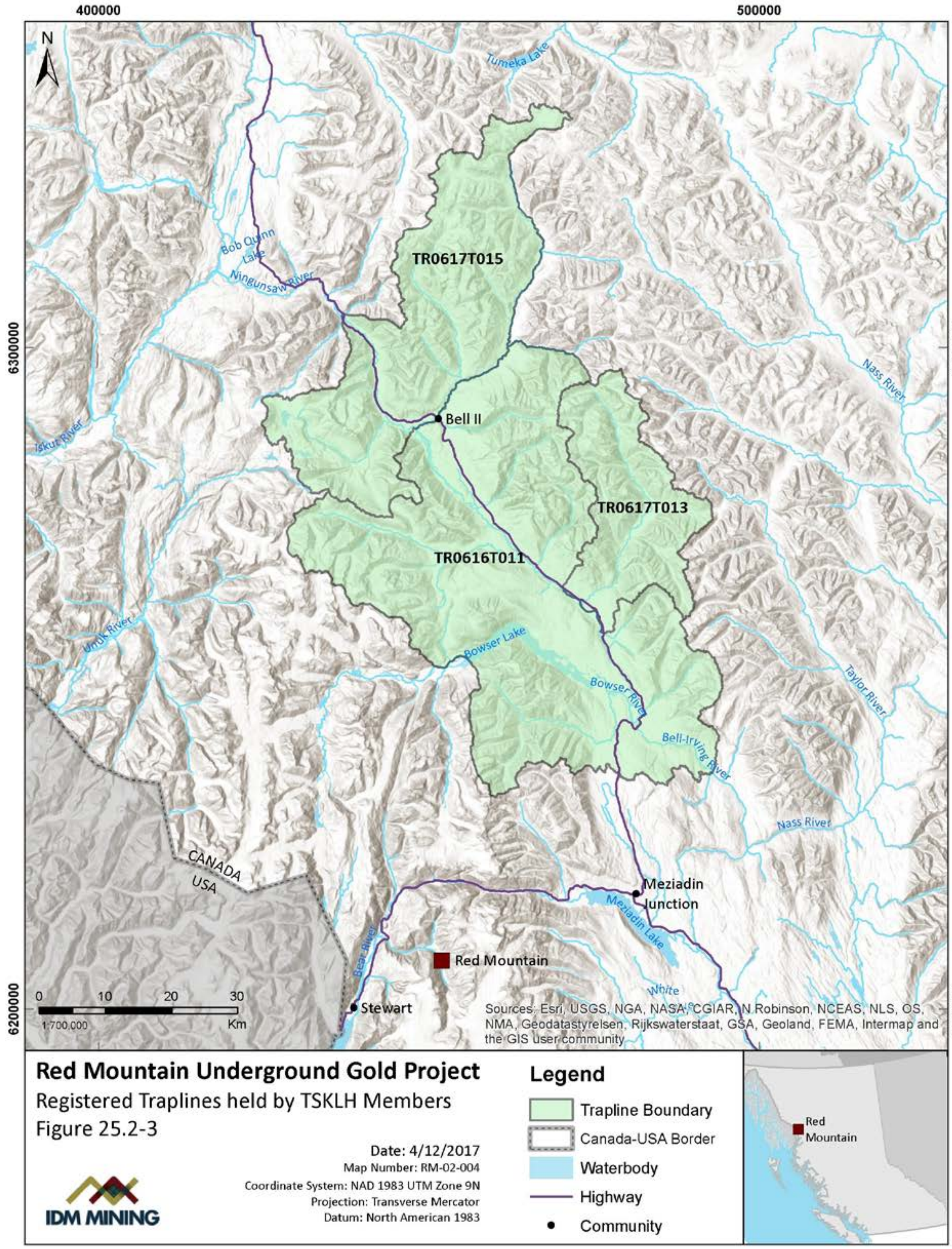
Based on interviews conducted in support of EAs for the KSM and NTL projects, hunting and trapping continue to be an important activity for providing subsistence and cultural utility. Moose are the most actively hunted animal. They are a source of food, and their hooves serve a cultural purpose in TSKLH regalia, aprons, and leggings (Rescan, 2013). Grizzlies, black bears, and groundhogs are also hunted and trapped (Rescan, 2013).

Trapping remains vital for TKSLH members for economic, social, and ceremonial reasons (Ming, 2016). According to interviews conducted in association with the NTL Project, TSKLH hunting and trapping sites are concentrated in the areas surrounding Meziadin Lake, the Bell-Irving River, Bell I, and Bell II (Rescan, 2009). In 2013, TSKLH held three registered trap lines: one in the Bowser Lake, Bowser River, and Treaty Creek areas; one at Teigen Creek; and a third in the Taft Creek area (Rescan, 2013). TSKLH held traplines are shown in the figure below.

Wetlands are a favoured trapping environment for TSKLH members, particularly for beaver, which are trapped as a source of meat and for their pelts (Rescan, 2013). Marten are also trapped for their pelts, and wolves are trapped for their pelts and to control their predation on other desirable species (Rescan, 2013).

TSKLH access their trapping sites by road, snowmobile, and by foot (Rescan, 2013). TSKLH reported that members were active trappers prior to 2009, but that trapping has decreased as members became busy working in the provincial economy through mineral exploration and energy industries operating within their traditional territory (Rescan, 2013).

Figure 25.2-3: Registered Traplines held by TSKLH Members



Berry Picking and Plant Harvesting

Historically, TSKLH collected berries for consumption and for trade with neighbouring groups. TSKLH traded soapberries with Nisga'a Nation and coastal Tsimshian groups in exchange for herring eggs and seaweed (Rescan, 2013). TSKLH encouraged the growth of berries though conducting controlled burns, commonly on south facing slopes (Rescan, 2013). This practice was discontinued as it is prohibited by the provincial government (Rescan, 2013).

The Gunanoots maintained a berry harvesting area on the west side of Meziadin Lake through controlled burning. David Gunanoot, son of Simon Gunanoot, noted that his family's burning activities at Meziadin Lake resulted in blueberry patches and created habitat for moose (McLeod & McNeil, 2004). Since the discontinuation of controlled wildfires, berry harvesting has moved into clear-cuts, which TSKLH note are less reliable locations because the areas quickly regrow (Rescan, 2013). Natural wildfires are infrequent due to the wet forests common throughout their territory (Rescan, 2013).

TKSLH continue to harvest berries, plants, and mushrooms throughout their territory. Berry species harvested include huckleberries, blueberries, soapberries, and cranberries (Rescan, 2009). Important plant species harvested include fiddleheads, dandelions, yarrow, devil's club, and willow (Ming, 2016). TSKLH have described contemporary berry picking and plant harvesting in areas around Bell II, Bowser Lake, Bell I, north of Mount Bell-Irving, Meziadin Lake, Meziadin Junction, and along the Nass River north of Cranberry Junction (Rescan, 2009).

25.2.2.8 Travel Routes

Interviews with TSKLH knowledge holders have documented several trails in the vicinity of the Project (Rescan, 2013; Rescan, 2009; ERM Rescan, 2014). The trails were used to travel long distances, to access resource harvesting areas, and to meet with Nisga'a Nation and coastal Tsimshian groups for trade (ERM Rescan, 2014; Rescan, 2013).

Four historic trails are reported to originate in Stewart:

- From Stewart to Meziadin Lake, along the Bear and Strohn rivers (the route of present-day Highway 37A);
- From Stewart to Bowser Lake, via the Salmon River to Silver Creek and Summit Lake, and over the Salmon Glacier;
- From Stewart to Bowser River, following Bear River to American Creek, which leads to Bowser River;
- From Stewart to the Bell-Irving River and a cabin, from the Strohn River, to Surprise Creek, to Surveyor's Creek, which led to the Bell-Irving River (ERM Rescan, 2014).

In the early 20th century, TSKLH continued to travel in the Stewart area. TSKLH ancestors have described personal experiences travelling through Stewart in interviews (Rescan, 2013). In the 1950s, Gerry Gunanoot, a descendant of Simon Gunanoot, described a travel route between Hanna Ridge and Stewart (Rescan, 2013). The route followed Hanna Ridge to the top of Meziadin Lake, along a glacier bed, and then approximately 22 kilometres (km) to the eastern extent of a winter road from Stewart (ERM Rescan, 2014). Another historical travel route described by Jessie (Lumm) Sterritt in an 1980 interview was from Prince Rupert to Stewart by boat and then by foot overland to Bowser Lake. The route was reported to take two weeks to travel, but was faster during the winter when travelling by snowshoe (ERM Rescan, 2014).

During traditional knowledge and use interviews conducted for the NTL Project, TSKLH identified current use of historic trails for accessing hunting and trapping areas and cabins. Contemporary use of historic trails was described around Meziadin Lake, along the Bell-Irving River, Bowser Lake, Teigen Lake, and Highway 37 (Rescan, 2009).

25.2.2.9 Occupation Sites

TSKLH have long used Meziadin Lake as a base for fishing, berry gathering, hunting, and trapping. Meziadin Lake was also a summer trading location where Tsetsaut, Nisga'a, and Gitxsan groups would meet annually (Rescan, 2013). A village known as Laxandzok (or Laxanjok) was located downstream from the falls on the Meziadin River (ERM Rescan, 2014). The village was also known to be the location of battles between Gitanyow and Tsetsaut (Rescan, 2013). When Johnson Nagun and Simon Gunanoot lived at Meziadin Lake, it is believed their cabin was located at the old village site (ERM Rescan, 2014). Jessie (Lumm) Sterritt stated that she frequently camped at Meziadin Lake, and that there were many cabins built and occupied by TSKLH descendants (Rescan, 2009).

Oral histories describe a Western Tsetsaut village called G.elen at the location of present day Stewart (ERM Rescan, 2014). In the early 20th century, TSKLH members continued to frequent and reside in Stewart. TSKLH claim that Albert Allen, of the Gyetem Galdo house in the Raven Clan, applied for two reserves in or around Stewart one of which was located along American Creek (ERM Rescan, 2014). Simon Gunanoot, Albert Allen, and Daniel Skowill all had houses in what was known as the "Indian District" of Stewart (ERM Rescan, 2014). Longtime Mayor of Stewart and local historian Ian McLeod confirmed the presence of the Gunanoot family in Stewart to sell furs and purchase supplies following Simon Gunanoot's acquittal in 1920 (McLeod & McNeil, 2004). In more recent times, McLeod documented that David Gunanoot, son of Simon Gunanoot, owned a house on Second Avenue in Stewart during the 1940s (McLeod & McNeil, 2004).

While most TSKLH members reside in Hazelton, they maintain occupation sites in the form of hunting and fishing cabins throughout their territory. Currently TSKLH members utilize and maintain a series of cabins along the Highway 37 corridor between the Snowslide Range and the Oweegee Range, at Skowill Creek, at Bowser Lake, Bell II, and Meziadin Lake (Rescan, 2009; Rescan, 2013).

25.2.2.10 Current Business Operations

TSKLH is notable in northwest BC as the owners of a successful contracting company, Tsetsaut Ventures Ltd. (TVL). TVL is owned and operated by Hereditary Chief Darlene Simpson and her husband George Simpson, and employs both Aboriginal and non-Aboriginal workers from the Hazelton area (Hume, 2013). TVL provide a range of services to the resource development industry including building core boxes, construction of mine buildings, managing work camps, and supplying first-aid attendants, cooks, geotechnicians, environmental monitors, and equipment such as excavators, supply trucks, and earthmovers (Hume, 2013). TVL has worked closely with large mining projects in northwest BC including Brucejack, operated by Pretium Resources Inc., and a redevelopment of Granduc Copper by Castle Resources Inc. (Hume, 2013). TVL has worked with the Project during the 2014 and 2016 summer exploration seasons to provide core boxes.

25.2.2.11 Summary

Table 25.2-1 provides a summary of TSKLH's Aboriginal Interests in the Project area.

Table 25.2-1: Summary of TSKLH Aboriginal Interests in the Project Area

Aboriginal Interest	Relevant Species	Location
Fishing	Salmon	• Throughout TSKLH territory, notably: - Meziadin Lake; - Bowser Lake; - Cranberry River; - Oweegee Creek; - Along the Bell-Irving River at the confluences with Treaty Creek; and - Snowbank Creek.
	Steelhead and rainbow trout	• Bell-Irving River between Treaty and Wildfire Creeks; • Meziadin Lake; and • Meziadin Falls.
Hunting and trapping	Moose	• Ningunsaw Pass; • Wetlands surrounding Oweegee Creek; • Wetlands surrounding Teigen Creek; • Bell-Irving River valley; and • Wetlands at the mouth of Bowser Lake.
	Grizzly and black bears	• Ningunsaw Pass; • Wetlands surrounding Oweegee Creek; • Wetlands surrounding Teigen Creek; • Bell-Irving River near Wildfire Ridge; and • Bowser Lake.
	Small fur bearers: beaver, wolf, marten, wolverine, and rabbit	• Bowser Lake; • Bowser River; • Treaty Creek; • Teigen Creek, • Taft Creek; • Along the Highway 37 corridor; and • Three TSKLH-held trap lines.

Aboriginal Interest	Relevant Species	Location
Plant harvesting	Huckleberries, blueberries, soapberries, cranberries, mushrooms, fiddleheads, dandelions, yarrow, devil's club, and willow	• Throughout TSKLH territory, notably: - Bell II; - Oweegee Lake; - Bowser Lake; - Bell I; - North of Mount Bell-Irving; - Meziadin Lake; - Meziadin Junction; and - Nass River north of Cranberry Junction.
Travel routes	n/a	• Meziadin Lake; • Bell-Irving River; • Bowser Lake; • Teigen Lake; and • Highway 37.
Occupation sites	n/a	• Highway 37 corridor between the Snowslide Range and the Oweegee Range; • Bowser Lake; • Bell II; and • Meziadin Lake.

25.2.3 Environmental Setting

The Project is located within the Bitter Creek watershed, which ranges in elevation from approximately 100 to 1850 metres (m) above sea level. Red Mountain, which holds the targeted ore deposits, is between the Cambria Icefield and Bromley Glacier.

25.2.3.1 Vegetation and Ecosystems

The Bitter Creek watershed is within the Southern Boundary Ranges ecoregion of BC. These ranges from an area of rugged coastal mountains with steep topography, glaciers, and icefields. The climate is typically cold and wet with heavy precipitation year round. In higher elevations, heavy snowpacks (up to 3 m) are typical.

Steep, wet slopes that contain frequent avalanche tracks characterize the Bitter Creek valley. The north end of the valley contains Coastal Western Hemlock (CWH) forests along the lower and mid slopes, including large areas of mid-slope mature and old forests. This zone encompasses 1,969 hectares (ha). Dominant tree species are Western Hemlock (*Tsuga heterophylla*) and Sitka Spruce (*Picea sitchensis*).

The mouth of Bitter Creek, as it drains into Bear River, is characterized by flat floodplain forests. Narrow fringes of floodplain forest extend up Bitter Creek, with most of the creek floodplain area being highly scoured rock and gravel, and occasional sparsely vegetated areas. Mountain Hemlock (MH) forests occupy a narrow, steep band above the CWH (around 700 m in elevation) and replace the CWH at the valley bottom as elevation increases to the east of Roosevelt Creek. Forests in the MH zone are dominated by Mountain Hemlock (*Tsuga mertensiana*) and Amabalis Fir (*Abies amabilis*). Yellow Cedar (*Chamaecyperus nootkatensis*) is also infrequently present. Parkland MH forests start around 900 m in elevation, and often contain old to very old forested stands before giving away to stunted Krummholz around 1,200 m as the alpine zone begins.

As Bitter Creek climbs in elevation towards Bromley Glacier, lower slope forests begin to be replaced by early seral shrub communities where the soil development is limited and vegetation communities are in early stages of establishment post-glaciation. At the southern end of the valley, the MH transitions into sparse parkland communities, with the majority of the area dominated by recently de-glaciated moraine, along with colluvial slopes and barren alpine communities. Alpine communities are varied in the Bitter Creek watershed. Transitional areas above the parkland forests are often diverse and contain rich herb meadow slopes, subalpine fir (*Abies lasiocarpa*) krummholz, and expanses of alpine heath intermixed with dwarf shrub tundra-like communities. Exposed higher elevations contain extensive sparsely-vegetated communities and barren rock outcrops before giving away to glaciers and icefields.

Avalanche tracks are abundant in the watershed, due to steep slopes and high snowfall. Avalanche habitat is typically wet and rich and dominated by alder (*Alnus alnobetula*), with lesser components of Devil's club (*Oplopanax horridus*) and various willows (*Salix* spp.). At upper elevations, the avalanche slopes often contain rich herb meadows. The edge of avalanche tracks, as they pass through forested areas, often contain slide-maintained forested communities that are highly irregular and fragmented in extent, and contain a high percent of dead or damaged trees.

25.2.3.2 Wildlife and Migratory Birds

Table 25.2-2 summarizes baseline data collection from 2015 to 2017 for key wildlife species. Field surveys from 2015 to 2016 focused on species presence and, where possible, relative abundance. Surveys conducted in 2017 were conducted to supplement data gaps in mountain goat winter surveys. A combination of ground and aerial surveys were used depending on the focal species.

The LSA for wildlife and migratory birds encompasses the area (14,594.6 ha) from the mouth of Bitter Creek to the headwaters at the base of the Bromley Glacier and the edge of the Cambria Icefields. The RSA is a much larger area surrounding the LSA and is intended to provide a regional context to the wildlife and wildlife habitat found within the LSA. The RSA encompasses 205,350 ha, from Meziadin Lake in the east to the head of the Portland Canal in the west, and from Hastings Arm in the south to the upper end of the American Creek watershed to the north. The RSA was also intended to provide regional context for the LSA and to provide an assessment of wide ranging species such as Grizzly Bear and Wolverine.

Table 25.2-2: Project-Specific Wildlife Baseline Studies

Species	Survey Description	Survey Dates
Mountain Goat	Surveys primarily conducted on an opportunistic basis while accessing the site or during other surveys	August 2015
	Aerial surveys within the LSA	June and July 2016
	Aerial surveys within the RSA	July 2016 (northern half of the RSA) August 2016 (southern half of the RSA)
	Aerial survey within Nisga'a Lisims Government (NLG) Mountain Goat Block 25 (includes LSA)	March 2017
	Ground surveys within the LSA (fixed observation stations)	July 2016 March 2017
	Habitat assessments within the LSA, including WHR field verification (2015 field season only)	August 2015 June and July 2016
	Wildlife cameras	2015 and 2016 field visits March 2017
Grizzly Bear	Opportunistic wildlife surveys throughout the LSA Wildlife cameras	August 2015 June and July 2016
	Aerial den survey	August 2015
Moose	Opportunistic wildlife surveys throughout the LSA	August 2015
	Systematic transect surveys within suitable portions of the LSA	June 2016
Furbearers	Opportunistic wildlife surveys throughout the LSA	2015 and 2016 field visits
Migratory Breeding Birds	Unlimited radius point count surveys within the LSA	June to July 2016

Mountain Goat studies show that the LSA provides abundant habitat. High summer habitat use was observed in the proposed Mine Site area near Goldslide Creek. Trails and fresh tracks traverse from north to south and vice versa along well-established trails that cross Goldslide Creek just downstream of the current exploration camp. This movement pattern continues northward toward Roosevelt Creek, and the east side of the Bitter Creek valley is heavily utilized in summer.

Grizzly bear use within the LSA varies by season. Spring habitat is limited to lower elevations due to long-lasting snowpacks. During the summer, grizzly bears are wide roaming and a large portion of the LSA provides suitable habitat. Wildlife cameras detected individuals within the Goldslide Creek basin. Fall habitat is again located within lower elevations and is related to the limited availability of high protein foods and location of berry crops. Five grizzly bear dens have been identified on north facing slopes on the southern boundary of the LSA.

Moose studies show that the LSA provides little wintering habitat for this species. Most habitat is located along the floodplains of Bitter Creek at lower elevations and within the confluence of the Bear River. No signs of moose or evidence of use were observed during any of the 2015-2016 surveys.

Surveys for furbearers such as marten and wolverine were conducted opportunistically while conducting other studies. Furbearer observations included evidence of signs such as tracks and scat. While suitable habitat is present within the LSA, American Marten and Wolverine were not detected.

Migratory birds were detected through radius point count surveys and as incidental observations during species-specific bird surveys. Of the 28 migratory bird species detected, those that were most frequent included Varied Thrush (18%), Swainson's Thrush (13%) and American Robin (6%). Other species of note included Olive-sided Flycatcher (a *Species at Risk Act*-listed species), MacGuillvary's Warbler, and Black Swift. Most detections occurred within forested habitat in the CWH zone. This zone also had the greatest diversity of migratory bird species.

25.2.3.3 Fish and Fish Habitat

Fish and fish habitat baseline surveys were conducted to create a baseline for aquatic data. Surveys were initiated in 2014 and conducted seasonally through 2016. The scope of these baseline surveys included fish habitat, fish communities, sediment quality, tissue metal burdens of the invertebrate community, periphyton, and benthic macroinvertebrates.

The study area was divided into a LSA and RSA, with the LSA considered to contain watercourses that could be directly affected by mine development and operations, while the RSA represents that zone potentially influenced indirectly. Of the fish and fish habitat surveys, 35 sites were established within the RSA with 21 of those lying within the LSA, which is comprised of Bitter Creek and its tributaries. The Bitter Creek mainstem was delineated into 6 reaches. Reach 5 contains seven barriers in the form of falls, cascades, or chutes, each of which forms a complete fish migration barrier. Thus, waters along Bitter Creek and its tributaries upstream of these barriers are non-fish bearing.

The LSA is characterized by a deeply-incised valley carved through rugged, rocky terrain. Landscape features within the Bitter Creek valley include: landslides, debris torrents, outwash channels, and alluvial fans associated with most tributaries.

Bitter Creek, the primary waterbody within the LSA, is a highly turbid watercourse originating beneath Bromley Glacier, and is charged by glacial melt and precipitation (rain and snowmelt) and, to a lesser extent, groundwater. Bitter Creek is a left bank and largest tributary to Bear River. Habitat is marginal throughout Bitter Creek and constrained by high velocity, heavy suspended sediment loads, and low habitat complexity.

Bear River sample sites (i.e., in the RSA) exhibited superior fish habitat quality and quantity over those in the LSA. Salmonid spawning and rearing areas, although not extensive through the Bear River watershed, were widely distributed with the majority associated with right bank tributaries and side channels. Conversely, fish habitat in the LSA appeared confined to the lower reaches of Bitter Creek tributaries allowing fish access. Habitat is also associated with those areas within or immediately downstream of Bitter Creek tributary confluences, where water is clear or sediment loads are significantly less than the Bitter Creek mainstem channel. In large part, the Bitter Creek mainstem channel provides very little habitat because of its elevated turbidity, high current velocities, and negligible refugia.

Two fish species were observed in the LSA: Dolly Varden and Coastrange Sculpin. Dolly Varden were found throughout the fish bearing portions of the watershed, Reaches 1 to 4, while sculpins were noted only in the lower section of Bitter Creek’s first reach immediately adjacent to the mainstem of the Bear River. The majority of LSA fish were observed in Bitter Creek tributaries or in Bitter Creek channel margins influenced by tributary flow.

Fish species diversity in Bear River was greater than that of Bitter Creek and included Dolly Varden, Coho, Chum, Pink and Chinook salmon, Steelhead, Eulachon, and Coastrange Sculpin (Chum, Pink, Steelhead, and Eulachon documented but not observed). Sampled areas in the Bear River outside the LSA were confined to small tributaries, alluvial fans, and off-channel areas.

Fish habitat quality throughout the RSA is limited by flashiness, high-suspended sediment values, and minimal habitat complexity. Bitter Creek originates beneath the Bromley Glacier and receives additional sediment load directly from its bank margins in its upper three reaches, as well as from frequent events associated with its numerous tributaries over the length of its mainstem channel. A recent and ongoing failure of the Bromley Glacier upstream of its toe contributes large volumes of ice to Bitter Creek that imparts severe scour and elevated suspended sediment loads to downstream reaches. This recent and likely ongoing event will further degrade the already limited and stressed downstream main channel habitat suitability for fish.

25.3 Consultation Summary

25.3.1 Pre-Application Engagement

TSKLH has been included in EAO’s Section 11 Order at the notification level (Schedule C).

IDM has shared Project information with TSKLH outside of the EA process, including discussions on the proposed design of the Project and potential business opportunities. TSKLH’s business, Tsetsaut Ventures Ltd. (TVL), has been involved in business opportunities associated with the Project’s advanced exploration activities.

In advance of the public comment period on the draft Application Information Requirements (dAIR), IDM provided a courtesy notification to TSKLH of the opportunity to review and provide comments on the dAIR, as well as the public open house in Stewart, scheduled for October 12, 2016.

On October 12, 2016, IDM hosted a site visit for TVL. The focus of the site visit was to discuss potential business opportunities for TVL related to the development of the Project as well as for TVL to share their experience working in remote and exposed alpine environments.

On May 25, 2017, IDM provided a draft version of this chapter to TSKLH for their review and comment. IDM will consider all feedback received and will provide a record outlining its response.

On June 26, 2017, TSKLH provided a letter to IDM with some revisions and clarifications to the description of TSKLH's ethnographic background and traditional territory. TSKLH's feedback is appreciated and has been incorporated into Section 25.2.2.

On August 16, 2017, IDM responded to TSKLH's letter to thank them for the feedback and additional information and to provide a table outlining IDM's responses and whether or how the information was incorporated into the Application/EIS.

The draft chapter provided to TSKLH included measures proposed to avoid, minimize, mitigate, or otherwise address potential effects to its Aboriginal Interests. TSKLH did not provide its views on the effectiveness of those mitigation measures nor did it propose additional measures. IDM anticipates that TSKLH will have further opportunity to review the proposed mitigation measures during the public comment period held during the upcoming Application Review phase of the EA.

TSKLH's feedback did not include any views on Aboriginal fisheries; information on the frequency, duration, seasonality, and timing of traditional practices; or information related to the characterization of baseline conditions of health, socio-economics, or physical and cultural heritage.

IDM's engagement with TSKLH has not resulted in any changes to the Project's design and implementation.

25.3.2 Future Engagement

IDM looks forward to continuing dialogue with TSKLH regarding the proposed Project during the upcoming Application Review phase of the EA, as well as the future permitting, Construction, and Operation phases of the Project.

IDM is committed to ongoing and mutually respectful engagement with TSKLH. IDM will continue to share Project information with TSKLH, such as this Application/EIS, any technical memos prepared during the Application Review phase that are made public by either EAO or the Agency, and other engagement materials prepared by IDM, such as newsletters and the Project website. IDM will respond to any comments received from TSKLH under paragraph 12.5 of the Section 11 Order, and IDM is also available to meet with TSKLH to discuss the Project in more detail at TSKLH's request.

25.4 Scope of the Assessment

25.4.1 Information Sources

Data used to compile the baseline information listed above are summarized in Table 25.4-1.

Table 25.4-1: Data Sources for TSKLH

Data Source	Quality, Reliability, and Applicability of Data
Northwest Transmision Line Project: Skii km Lax Ha Traditional Knowledge and Use Study prepared by Rescan for the Northwest Transmission Line Project in 2009.	• High-quality ethnographic report on TSKLH's Aboriginal Interests in the area of the Northwest Transmission Line Project. • Regional applicability, but not specific to Bitter Creek valley.
KSM Project: Skii km Lax Ha Traditional Knowledge and Use Research Report prepared by Rescan for the Kerr-Sulpherets Mitchell (KSM) Project in 2013.	• High-quality ethnographic report on TSKLH's Aboriginal Interests in the KSM Project area. • Lower level of participation by TSKLH leadership than the Brucejack report (below). • Regional applicability, but not specific to Bitter Creek valley.
Brucejack Gold Mine Project: Tsetsaut/Skii km Lax Ha Nation Traditional Knowledge and Traditional Use Report prepared by ERM Rescan for the Brucejack Gold Mine Project in 2014.	• High-quality ethnographic report on TSKLH's Aboriginal Interests in the area of the Brucejack Project. • Very high level of participation with TSKLH leadership. • Regional applicability, but not specific to Bitter Creek valley.
Ethnographic and historical information on TSKLH, including: • Duff W. (1981). Tsetsaut. In J. Helm, *Handbook of North American Indians Volume 6: Subarctic* (pp. 454 -457). Smithsonian Institute. • Krauss, M. E. (1981). Northern Athapaskan Languages. In J. Helm, *Handbook of North American Indians Volume 6* (pp. 67 - 85). Smithsonian Institute. • McLeod, I., & McNeil, H. (2004). *Prospectors, Promoters, and Hard Rock Miners: Tails of Stewart, B.C. and Hyder, Alaska camps.* Kelowna: S.H. Co. Ltd. • Sterritt, N. M. (1998). *Tribal Boundaries in the Nass Watershed.* Vancouver: UBC Press.	• Peer-reviewed and industry-standard ethnographic information on TSKLH. • Regional applicability, but not necessarily to the Bitter Creek valley.

Data sources for the other disciplines that have informed this chapter are listed in their respective chapters.

25.4.2 Input from Consultation

On May 25, 2017, IDM provided a draft version of this chapter to TSKLH for their review and comment. IDM will consider all feedback received and will provide a record outlining its response. On June 26, 2017, TSKLH provided a letter to IDM with some revisions and clarifications to the description of TSKLH's ethnographic background and traditional territory. TSKLH's feedback is appreciated and has been incorporated into Section 25.2.2.

25.5 Potential Effects

The purpose of this section is to identify how TSKLH's Aboriginal Interests may be affected by interactions with Project's components and activities.

25.5.1 Methods

A standardized effects assessment methodology has been applied to all assessment topics. This methodology follows recommended provincial and federal guidelines and legislated requirements, pursuant to BCEAA and CEAA 2012.

25.5.2 Project Interactions

The following describe the potential interactions between proposed Project components or activities and TSKLH's Aboriginal Interests:

- Potential changes to TSKLH's ability to hunt, fish, trap, and harvest plants resulting from environmental effects on fish, fish habitat, wildlife, wildlife habitat, or vegetation and ecosystems;
- Potential changes to TSKLH's ability to hunt, fish, trap, and harvest plants resulting from changes in access to the Bitter Creek valley;
- Potential changes to TSKLH's traditional travel routes as a result of Project activities;
- Potential changes to TSKLH's traditional occupation sites as a result of Project activities; and
- Potential changes to the cultural value of the Bitter Creek valley, including avoidance, resulting from changes in Air Quality, Visual Quality, and Noise.

In addition, IDM will provide an analysis of how changes to the environment caused by the Project will affect:

- TSKLH's socio-economic conditions, including:
  - The use of navigable waters;
  - Forestry and logging operations;
  - Commercial fishing, hunting, trapping, and gathering activities;
  - Commercial outfitters; and
  - Recreational use.
- TSKLH's health, including consideration of Air Quality, Country Foods, Drinking Water Quality, and Noise exposure.

These anticipated interactions are summarized in Table 25.5-1.

Table 25.5-1: Potential Project Interactions: TSKLH Aboriginal Interests

Project Component or Activity	Valued Components / Intermediate Components	Potential Effect Pathway / Interaction with TSKLH's Aboriginal Interests
Access Road Powerline Mine Site Tailing Management Facility (TMF) Process Plant	Wildlife and Wildlife Habitat	Potential environmental changes to wildlife (including birds) and wildlife habitat resulting in changes to TSKLH's ability to harvest wildlife for traditional purposes, including: • Habitat alteration; • Sensory disturbance; • Disruption to movement; • Direct mortality; • Indirect mortality; • Chemical hazards; and • Attractants.
Mine Site TMF Access Road	Fish and Fish Habitat	Potential environmental changes to fish and fish habitat resulting in changes to TSKLH's ability to harvest fish for traditional purposes, including: • Direct mortality; • Reduction in fish health; and • Changes in fish habitat quantity or quality.

Project Component or Activity	Valued Components / Intermediate Components	Potential Effect Pathway / Interaction with TSKLH's Aboriginal Interests
Access Road Powerline Mine Site TMF Process Plant	Vegetation and Ecosystems	Potential environmental changes to vegetation and ecosystems resulting in changes to TSKLH's ability to harvest plants for traditional purposes, including: • Loss and/or alteration of ecosystem function and extent; and • Loss or alteration of known occurrences of rare plants or lichens.
Access Road	Access	Potential changes to TSKLH's ability to access the Bitter Creek valley for traditional purposes.
Access Road	n/a	Potential changes to TSKLH's ability to use traditional travel routes as a result of Project activities.
Access Road Transmission Line Mine Site TMF Processing Plant	n/a	Potential changes to TSKLH's ability to use traditional occupation sites as a result of Project activities.
Access Road Transmission Line Mine Site TMF Processing Plant	Air Quality Visual Quality Noise	Potential changes to the cultural value of the Bitter Creek valley as a result of changes to Visual Quality, Noise, and Air Quality.
Access Road Transmission Line Mine Site TMF Processing Plant	n/a	Potential changes to TSKLH's socio-economic conditions as a result of changes to the use navigable waters.
Access Road Powerline Mine Site TMF Process Plant	Contemporary Land and Resource Use	Potential changes to TSKLH's socio-economic conditions as a result of changes to forestry and logging operations.
Access Road Powerline Mine Site TMF Process Plant	CRA Fisheries Contemporary Land and Resource Use	Potential changes to TSKLH's socio-economic conditions as a result of changes to commercial fishing, hunting, trapping, and gathering activities.

Project Component or Activity	Valued Components / Intermediate Components	Potential Effect Pathway / Interaction with TSKLH's Aboriginal Interests
Access Road Powerline Mine Site TMF Process Plant	Contemporary Land and Resource Use	Potential changes to TSKLH's socio-economic conditions as a result of changes to commercial outfitting operations.
Access Road Powerline Mine Site TMF Process Plant	Recreational Values	Potential changes to TSKLH's socio-economic conditions as a result of changes to recreational use.
Access Road Powerline Mine Site TMF Process Plant	Air Quality	Potential changes to TSKLH's health as a result of changes to Air Quality.
Access Road Powerline Mine Site TMF Process Plant	Country Foods	Potential changes to TSKLH's health as a result of changes in quality of country foods.
Access Road Powerline Mine Site TMF Process Plant	Drinking Water Quality	Potential changes to TSKLH's health as a result of changes to drinking water quality.
Access Road Powerline Mine Site TMF Process Plant	Noise	Potential changes to TSKLH's health as a result of changes to Noise.

25.5.3 Discussion of Potential Effects

This section provides a more detailed description of the potential effects listed in Table 25.5-2. Assumptions regarding the potential effects are documented in each effect subsection below, and margins of error or degrees of uncertainty are provided.

25.5.3.1 Potential Changes due to Environmental Effects

25.5.3.1.1 Potential Changes to Wildlife Resources

Habitat Availability: Habitat Alteration and Sensory Disturbance

Habitat alteration includes the loss or alteration of wildlife habitat due to the Project footprint, which will result in the displacement of wildlife for a period of time. Habitat alteration will occur during the Construction Phase when the Project footprint is cleared of vegetation, but will persist throughout all phases until Project components are removed and reclaimed. All Project components will be temporary. Disturbed areas no longer required for the Project will be progressively reclaimed, and any Project components remaining once production has ceased will be removed and reclaimed.

Sensory disturbance includes the potential effects of Project-related noise, light, dust, or human presence on wildlife, which may result in behavioral changes, different predator-prey interactions, or avoidance of the Project footprint and adjacent areas. Sensory disturbance will occur during all Project phases. Sensory disturbance will be greatest from the Construction Phase through to the Closure and Reclamation Phase, but is anticipated to lessen during the Post-Closure Phase when minimal monitoring and maintenance activity will occur on site. Once production is completed, all Project components will be removed and reclaimed and the potential effects of sensory disturbance should cease.

Measures to avoid, minimize, mitigate, or otherwise address the potential effects of the Project on wildlife habitat availability are listed in Section 25.6.

Habitat availability has been identified as a potential residual effect on mountain goat, moose, grizzly bear, furbearers, and migratory birds. These residual effects are discussed in Section 25.7.3.1.

Disruption to Movement

Disruption to movement includes the potential effects of Project activities and infrastructure on habitat connectivity and wildlife movements. Project activities and infrastructure may create physical or sensory barriers or filters to movement between daily or seasonal habitats, which could have implications for the long-term persistence and viability of wildlife populations. Habitat fragmentation occurs through habitat removal (i.e., through vegetation clearing) in a location and in a manner that reduces habitat connectivity, potentially disrupting wildlife movements. Disruption to movement can also occur when infrastructure blocks wildlife movement through restricted terrain features (e.g., a narrow valley or canyon) or restricts wildlife movement within or between waterbodies. Increased traffic levels along the highway can confound the issue, adding a sensory barrier or filter to an already existing physical barrier or filter. Disruption to movement may occur during all Project phases and is considered a potential effect for all wildlife VCs except bats and birds, as flight allows movements to continue uninterrupted by Project activities or infrastructure. Once operations cease, all Project components will be removed, the site reclaimed, and the potential effects of disruption to movement should cease.

Measures to avoid, minimize, mitigate, or otherwise address the potential effects of the Project on wildlife movement are listed in Section 25.6.

Habitat disruption has been identified as a potential residual effect on mountain goats, moose, grizzly bear, furbearers, and migratory birds. These residual effects are discussed in Section 25.7.3.1.

Mortality: Direct, Indirect, Chemical Hazards, and Attractants

Direct mortality includes the potential direct effects of Project activities and infrastructure on wildlife mortality caused by vegetation clearing and ground disturbance during construction, collisions with Project-related traffic on the Mine Site and Access Road, or collisions and electrocution caused by the Powerline. Mortality may occur during the Construction Phase through to the Closure and Reclamation Phase and is considered a potential effect via different pathways for each wildlife VC. Direct mortality risk due to vegetation clearing and ground disturbance is more closely related to small mammals, roosting bats, nesting birds, and amphibians that may not be able to escape clearing equipment. Direct mortality risk due to wildlife-vehicle collisions is pertinent for all wildlife VCs, while direct mortality risk due to the Powerline is linked to bats and birds only. Direct mortality risk will be greatest during the Construction Phase when the Project footprint is cleared of vegetation and from the Construction Phase through the Operation Phase when vehicle traffic is anticipated to be highest. The risk is anticipated to lessen during the Closure and Reclamation Phase and will be negligible during the Post-Closure Phase when minimal human activity will occur on site for monitoring and maintenance activities. Once operations cease, all Project components will be removed, the site will be reclaimed, and the potential effects of direct mortality should cease.

Indirect mortality includes the potential indirect effects of Project activities and infrastructure on wildlife mortality caused by increased hunting pressure (both legal and illegal) due to improved access, new travel corridors that facilitate predation, or entrapment in Project facilities such as holding ponds, buildings, or along the Access Road corridor during winter due to high snowbanks. This potential effect may occur during the Construction Phase through to the Closure and Reclamation Phase and is considered a potential effect via different pathways for each wildlife VC. Indirect mortality risk due to increased hunting pressure is related to large mammals and furbearers. Indirect mortality risk due to facilitated predation is addressed for Mountain Goat and Moose only, while indirect mortality due to entrapment is addressed for all wildlife VCs. The risk is anticipated to be negligible during the Post-Closure Phase when minimal human activity will occur on site for monitoring and maintenance activities. Once production is completed, all Project components will be removed and reclaimed and the potential effects of indirect mortality should cease.

Chemical hazards include the potential effects of any Project-related chemicals that may cause adverse health effects on wildlife VCs. Exposure to chemical hazards may occur via uptake from the surrounding environment (e.g., water, dust, soil, or sediment) or via the ingestion of contaminated tissue (e.g., vegetation or animal prey). Exposure may also occur via direct contact with chemical hazards at on-site storage areas. This potential effect may occur during all Project phases and is considered an effect pathway for all wildlife VCs.

Chemical hazards related to Project activities may persist within and adjacent to the Project footprint following the Post-Closure Phase (e.g., metal leaching and acid rock drainage).

Attractants include the potential effects of any Project-related features or materials that may interest or provide resources for wildlife VCs, which could lead to behavioral changes and potential human-wildlife conflicts. This may occur during the Construction Phase through to the Closure and Reclamation Phase and is considered a potential effect for all wildlife VCs. Project features or materials that may attract wildlife include infrastructure where odors or food sources associated with petroleum products, food waste and associated domestic garbage, or grey water and sewage may be present. Project infrastructure may also provide refuge or shelter for small mammals or perching, nesting, or roosting sites for bats and birds. Waterbirds and amphibians may be attracted to holding ponds or roadside pools as stop-over, foraging, or breeding sites. Amphibians may also be attracted to road surfaces during the summer that retain heat after sunset. Vegetation growing along Project roads or within the Powerline right of way may attract grazing or browsing wildlife, while roadkill carcasses along Project roads may attract scavenging wildlife. Wildlife may also be attracted to salt on Project roads used for deicing or dust suppression, and Project roads and the Powerline right of way may create favorable travel corridors. Once production is completed, all Project components will be removed and reclaimed and the potential effects of attractants should cease.

Measures to avoid, minimize, mitigate, or otherwise address the potential effects of the Project on wildlife mortality are listed in Section 25.6.

Mortality has been identified as a potential residual effect on mountain goats, moose, grizzly bear, furbearers, and migratory birds. These residual effects are discussed in Section 25.7.3.1.

25.5.3.1.2 Potential Changes to Fish Resources

The Project may have effects on Fish and Fish Habitat, including direct mortality, reduction in fish health, and changes in fish habitat quantity or quality. Three primary Project components will interact with Fish and Fish Habitat:

- Underground mining;
- The TMF; and
- The Access Road, which will involve Bitter Creek infill during construction.

The only direct loss of fish habitat is anticipated though construction of the Access Road parallel to Bitter Creek. Instream works as a part of this activity could affect the availability of instream habitat features (such as pools and substrates) that could affect overwintering, spawning, and rearing habitat availability for fish. Aquatic resources (benthic invertebrates and periphyton) colonization habitat may also be affected. Potential effects to aquatic resources have been considered as a pathway in the summary of potential effects to Fish and Fish Habitat.

The Fish VC in this assessment is represented by Dolly Varden, Bull Trout, Eulachon, and Salmonid species. Note that Salmonid species consist of all salmonids present in the LSA and

RSA, except for Dolly Varden and Bull Trout, since the latter were identified as separate sub-components early in the VC selection process.

Goldslide Creek is a non-fish bearing watercourse that discharges more than 5 km upstream from any fish-bearing waters in Bitter Creek. Goldslide Creek is not fish habitat due to its discharge into Bromley Glaicer. It does not contribute to fish habitat in the form of food due to its distance from fish habitat below downstream fish barriers. It does make a minor contribution to Bitter Creek flow.

The potential interactions between proposed Project components and Fish and Fish Habitat are summarized in Table 25.5-2.

Table 25.5-2: Potential Project Interactions and Effects on Fish and Fish Habitat

Project Component/Activity	Dolly Varden	Bull Trout	Eulachon	Salmonid Species	Fish Habitat	Potential Effect / Pathway of Interaction with Fish and Fish Habitat
Construction Phase						
Workforce (including employment of staff and contractors)	X	X				Potential increased fishing pressure due to increased access and increased presence in the Bitter Creek valley.
Construct Access Road and Haul Road from Hwy 37A to the Upper Portal	X	X	X	X	X	Changes in water and sediment chemistry from erosion, sedimentation and dust deposition; direct mortality from mine footprint and associated infrastructure; habitat loss from mine footprint development and associated infrastructure; habitat loss from changes to streamflow and channel morphology; direct mortality from increased fishing pressure.
Install powerline from substation tie-in to the Lower Portal laydown area	X	X			X	Changes to surface water quality as a result of erosion and sedimentation, dust deposition.
Discharge of water from underground workings at the Mine Site	X	X	X	X	X	Changes to surface water quality as a result of mine water discharge; habitat loss from changes in streamflow.
Water withdrawal for the purposes of dust suppression and construction use (primarily contact water management ponds; secondarily Bitter Creek, Goldslide Creek, and Otter Creek) and to meet freshwater needs (Otter Creek, Goldslide Creek)	X	X			X	Habitat loss from changes to streamflow.
Clear and prepare the TMF basin and Process Plant site pad	X	X			X	Direct mortality and habitat loss due to mine footprint development and associated infrastructure; changes to water and sediment chemistry from erosion, sedimentation, and dust deposition.
Excavate rock and till from the TMF basin and local borrows / quarries for construction activities (e.g. dam construction for the TMF)	X	X			X	Changes in water and sediment chemistry from erosion, sedimentation, and dust deposition.

Project Component/Activity	Dolly Varden	Bull Trout	Eulachon	Salmonid Species	Fish Habitat	Potential Effect / Pathway of Interaction with Fish and Fish Habitat
Establish water management facilities including diversion ditches for the TMF and Process Plant	X	X			X	Changes in water and sediment chemistry from erosion, sedimentation, and dust deposition.
Construct the TMF	X	X			X	Changes in water and sediment chemistry from erosion, sedimentation, and dust deposition.
Construct the Process Plant and Run of Mine Stockpile location	X	X			X	Changes in water and sediment chemistry from erosion, sedimentation, and dust deposition.
Construct water treatment facilities and test facilities at Bromley Humps	X	X			X	Changes in water and sediment chemistry from erosion, sedimentation, and dust deposition.
Construct Bromley Humps ancillary buildings and facilities	X	X			X	Changes in water and sediment chemistry from erosion, sedimentation, and dust deposition.
Commence milling to ramp up to full production	X	X			X	Changes in water and sediment chemistry from erosion, sedimentation, and dust deposition.
Operation Phase						
Workforce (including employment of staff and contractors)	X	X				Potential increased fishing pressure due to increased access and increased presence in the Bitter Creek valley.
Use Access Road for personnel transport, haulage, and delivery of goods	X	X	X	X	X	Changes in surface water and sediment chemistry from erosion, sedimentation and dust deposition.
Maintain Access Road and Haul Road, including grading and plowing as necessary	X	X	X	X	X	Changes in surface water and sediment chemistry from erosion, sedimentation and dust deposition.
Maintain powerline right-of-way from substation tie-in to portal entrance, including brushing activities as necessary	X	X			X	Changes in surface water and sediment chemistry from erosion, sedimentation and dust deposition.
Discharge of water from underground facilities	X	X	X	X	X	Changes in surface water and sediment chemistry from mine discharge; habitat loss from changes to streamflow.
Extract ore from the underground load-haul-dump and transport to Bromley Humps to Run of Mine Stockpile (ore transport and storage)	X	X			X	Changes in surface water and sediment chemistry from erosion, sedimentation and dust deposition.

Project Component/Activity	Dolly Varden	Bull Trout	Eulachon	Salmonid Species	Fish Habitat	Potential Effect / Pathway of Interaction with Fish and Fish Habitat
Freshwater for the Process Plant will be obtained through water withdrawal from Bitter Creek	X	X			X	Habitat loss from changes to streamflow.
Treat and discharge, as necessary, excess water from the TMF	X	X	X	X	X	Changes in hydrology, and water and sediment chemistry from TMF discharges.
Progressively reclaim disturbed areas no longer required for the Project	X	X			X	Changes in surface water and sediment chemistry from erosion and sedimentation.
Closure and Reclamation Phase						
Workforce (including employment of staff and contractors)	X	X				Potential increased fishing pressure due to increased access and increased presence in the Bitter Creek valley.
Use and maintain Access Road for personnel transport, haulage, and removal of decommissioned components until road is decommissioned and reclaimed.	X	X	X	X	X	Changes in surface water and sediment chemistry from erosion, sedimentation and dust deposition.
Decommission underground infrastructure	X	X			X	Changes in surface water and sediment chemistry from erosion, sedimentation and dust deposition.
Flood underground	X	X	X	X	X	Changes in hydrology, and water and sediment chemistry from mine discharges.
Decommission and reclaim Lower Portal Area and Powerline	X	X			X	Changes in surface water and sediment chemistry from erosion, sedimentation, and dust deposition.
Decommission and reclaim Haul Road	X	X			X	Changes in surface water and sediment chemistry from erosion, sedimentation, and dust deposition.
Decommission and reclaim all remaining mine infrastructure (Mine Site and Bromley Humps, except TMF) in accordance with Closure Plan	X	X			X	Changes in surface water and sediment chemistry from erosion, sedimentation, and dust deposition
Construct the closure spillway	X	X			X	Changes in surface water and sediment chemistry from erosion, sedimentation, and dust deposition
Treat and discharge water from the TMF	X	X	X	X	X	Changes to surface water quality as a result of discharge, erosion and sedimentation, and dust deposition

Project Component/Activity	Dolly Varden	Bull Trout	Eulachon	Salmonid Species	Fish Habitat	Potential Effect / Pathway of Interaction with Fish and Fish Habitat
Conduct maintenance of mine drainage, seepage, and discharge	X	X	X	X	X	Changes in hydrology, and water and sediment chemistry from discharges
Remove discharge water line and water treatment plant	X	X			X	Changes in surface water and sediment chemistry (due to filling of the TMF and discharge via the closure spillway)
Decommission and reclaim Access Road	X	X	X	X	X	Changes in surface water and sediment chemistry from erosion, sedimentation, and dust deposition
Post-Closure Phase						
Flood underground	X	X	X	X	X	Changes to surface water quality as a result of ML/ARD and groundwater interaction

No effects of the Project are anticipated on salmonid species, eulachon, or coastrange sculpin as they are not found in the mainstem of Bitter Creek. Sockeye, pink, and chum salmon are absent from the LSA, and the Project is not anticipated to affect these species of salmon.

No effects of the Project are anticipated on steelhead. Steelhead only occur in the Bear River, and the Project is not anticipated to result in residual effects outside of the extent of Bitter Creek.

Measures to avoid, minimize, mitigate, or otherwise address the potential effects of the Project on fish and fish habitat are listed in Section 25.6.

Some residual effects on fish habitat and Dolly Varden are anticipated due to the interactions between the Project and Bitter Creek. These are detailed in Section 25.7.3.2.

25.5.3.1.3 Potential Changes to Vegetation and Ecosystems

As outlined in Chapter 15 (Vegetation and Ecosystems), the Project is anticipated to have minimal adverse residual effects on vegetation and ecosystems in the Bitter Creek valley due to the limited magnitude of the Project footprint. Clearing of vegetation will be targeted to the footprint of surficial Project components; most of the works will be conducted underground.

The Project will interact with Ecologically Valuable Soils, Alpine and Parkland Ecosystems, Old Growth and Mature Forested Ecosystems, Floodplain and Wetland Ecosystems, BC CDC Listed Ecosystems, and Rare Plant, Lichens, and Associated Habitat during the Construction, Operation, and Closure and Reclamation Phases of the Project. The potential effects and pathway(s) of interaction include the following:

1. Loss and alteration of soil quality and quantity through soil stripping, handling, stockpiling, and dust effects;

2. Loss of ecosystem function, abundance, and/or distribution through surface clearing;

3. Alteration of ecosystem function through edge effects and fragmentation, alteration of hydrological connectivity, dust effects, and introduction and/or spread of invasive plant species;

4. Loss of known occurrences of rare plant and/or lichen habitat through surface clearing; and

5. Alteration of rare plant and/or lichen habitat due to edge effects and fragmentation, alteration of hydrological connectivity, dust effects, and introduction and/or spread of invasive plant species.

There are no anticipated interactions between Post-Closure Phase activities (i.e., flooding of the underground workings and post-closure environmental monitoring) and Vegetation and Ecosystems VCs. There will be no road access to the Project; all access will be via helicopter.

Measures to avoid, minimize, mitigate, or otherwise address the potential effects of the Project on plant resources are listed in Section 25.6. However, direct and indirect effects cannot be fully mitigated and thus loss and/or alteration of alpine and parkland ecosystems, old and mature forested ecosystems, BC Conservation Data Centre (BC CDC) listed floodplain and wetland ecosystems, and rare plants and lichens are predicted.

IDM has not found evidence of TSKLH harvesting BC CDC listed plants or lichens for traditional purposes, therefore this potential interaction and effect has not been brought forward into the effects assessment.

The potential residual effects of the Project on plant resources are discussed in Section 25.7.3.3.

25.5.3.2 Potential Changes to Access

Project development may limit user access to resources within Bitter Creek due to safety considerations and disturbance. This effect is anticipated to occur during the Construction, Operation, and Closure and Reclamation Phases of the Project.

Measures to avoid, minimize, mitigate, or otherwise address the potential effects of the Project on access are listed in Section 25.6. IDM anticipates that through effective implementation of these mitigation measures, there will be no residual effects on access.

25.5.3.3 Potential Changes to Travel Routes

The Project is not anticipated to affect the travel routes traditionally used by TSKLH, as summarized in Table 25.2-1. TSKLH did not identify concerns regarding the Project's potential effect on travel routes in their letter to the Agency dated October 19, 2015.

25.5.3.4 Potential Changes to Occupation Sites

The Project is not anticipated to affect TSKLH's traditional occupation sites, as summarized in Table 25.2-1. TSKLH did not identify concerns regarding the Project's potential effect on occupation sites in their letter to the Agency dated October 19, 2015.

25.5.3.5 Potential Changes to Cultural Value

25.5.3.5.1 Air Quality

Proposed Project activities will result in air emissions to the ambient environment. This includes the generation and airborne transport of fugitive dust particles and exhaust emissions from surface and underground equipment. The Air Quality Effects Assessment has characterized ambient air quality by seven indicators: nitrogen oxide, sulphur dioxide, carbon monoxide, total suspended particulate matter, respirable particulate matter, and dust deposition. An air dispersion model was used to predict the potential Air Quality effects of the Project and compared to provincial and federal ambient air quality objectives. The model was prepared in line with guidance stipulated in the BC Model Guidelines and in consultation with the BC MOE. The detailed Air Quality Effects Assessment is located in Chapter 7.

The Air Quality dispersion model considered ambient background concentrations of air contaminants. A regional air-emission inventory was prepared for the major sources associated with the Project.

There are six mining or development activities that are considered air emissions sources:

- Heaters and fans;
- Vented mining equipment tailpipe emissions from underground;
- Mining equipment and vehicle tailpipe emissions from surface;
- Unpaved road dust;
- Material handling, such as material drop onto stockpiles; and
- Other mining activities, such as earthworks, grading, and stockpiling.

As outlined in the Air Quality Effects Assessment, air contaminant concentrations are predicted to be below ambient air quality objectives within 500 m of Project infrastructure and within 50 m of the Access Road. These objectives were developed to be protective of human and environmental health.

Due to the absence of Air Quality effects, it is unlikely that Project-induced changes to Air Quality will affect the cultural value of the Bitter Creek valley. As no effects to TSKLH's Aboriginal Interests have been identified due to changes in Air Quality, no mitigation measures or residual effects have been noted for this component.

25.5.3.5.2 Visual Quality

The Bitter Creek valley is a steep-sided, mountainous valley, heavily forested in the lower and middle reaches, gradually giving way to a treeless, alpine landscape dominated by glaciers in the higher regions. Access to the valley is limited due to rugged terrain and lack of infrastructure. A logging road and bridge at Hartley Gulch were decommissioned in the 1990s. Project interactions with Visual Quality are restricted to the Bitter Creek watershed where Project components or activities might be observed.

Project infrastructure will be visible to individuals entering the Bitter Creek valley. Given the steepness and narrowness of the valley, individuals are likely to access the valley using the Access Road as the other side of the valley has no known trails or access.

It is IDM's understanding that TSKLH seldom uses the Bitter Creek valley for traditional purposes; therefore, the likelihood reduced cultural value due to Visual Quality effects is low.

The Access Road gate and Powerline will be visible to passing motorists driving along Highway 37A. Given highway speeds and the curvature of the highway, it is anticipated that this infrastructure will not be visible for more than a few seconds. The interaction between motorists and Visual Quality has no potential effect on TSKLH's Aboriginal Interests.

As no effects on TSKLH's Aboriginal Interests have been identified due to changes in Visual Quality, no mitigation measures or residual effects have been noted for this component.

25.5.3.5.3 Noise

Project activities may introduce noise to the surrounding environment, potentially creating adverse noise effects to receptors located in the area. Project-related noise levels (including blasting) have therefore been assessed and compared to relevant benchmarks and guidance levels for the protection of human health and wildlife. Noise modeling employed the protocols outlined in the International Organization for Standardization. The full assessment is available in Chapter 8 (Noise Effects Assessment).

Due to the relatively remote location of the Project, it is expected that regional noise levels are low, and ambient noise will be prevalent along with other intermittent or infrequent sources, such as overlying aircraft.

An estimated baseline nighttime noise level of 35 A-weighted decibels (dBA) (L_n) was adopted for the Bitter Creek valley. Daytime ambient sound levels (L_d) are commonly 10 dBA L_{eq} higher than nighttime levels. For the purpose of assessing potential Project effects on TSKLH’s Aboriginal Interests as a result of Noise, only daytime noise levels have been considered, as it is unlikely individuals would use the valley at night.

Predictions for Noise effects in the Bitter Creek valley are well below exceedance limits. During the Construction Phase, noise exceedances of 55 dBA (approximately the noise level of conversational speech or an air conditioning unit) are limited to the immediate area of construction at Bromley Humps. During operations, the immediate area around the Haul Road from the Process Plant to the Mine Site and the locations near the portals will also exceed 55 dBA.

Due to the very limited extent of Noise effects and to the known low level of TSKLH’s use of the Bitter Creek valley (based on IDM’s understanding), it is unlikely that Project noise will affect the cultural value of the Bitter Creek valley. As no effects to TSKLH’s Aboriginal Interests have been identified due to changes in Noise, no mitigation measures or residual effects have been noted for this component.

25.5.3.6 Socio-Economic Conditions

25.5.3.6.1 Navigable Waters

The Project is not anticipated to have any effect on navigable waters; therefore, there is no potential for adverse effect on TSKLH’s use of navigable waters and no potential change to TSKLH’s socio-economic condition.

25.5.3.6.2 Forestry and Logging Operations

The Project is not anticipated to have any effect on forestry and logging operations; therefore, there is no potential for adverse effect on TSKLH’s forestry or logging operations and no potential change to TSKLH’s socio-economic condition. An assessment of the Project’s potential effects on Contemporary Land and Resource Use is available in Chapter 19 (Economic Effects Assessment).

25.5.3.6.3 Commercial Fishing, Hunting, Trapping, and Gathering

Commercial Fishing

Based on IDM's research, there are no commercial fishing operations in the Project area; therefore, the Project is not anticipated to have any effect on TSKLH's socio-economic condition as a result of interactions with commercial fishing.

Commercial Hunting

Based on IDM's research, there are no commercial hunting operations in the Project area; therefore, the Project is not anticipated to have any effect on TSKLH's socio-economic condition as a result of interactions with commercial hunting.

Commercial Trapping

TSKLH holds commercial traplines north of Meziadin Lake (see Figure 25.2-2). These traplines are outside of the area where potential effects to wildlife are anticipated therefore the Project is not anticipated to have any effect on TSKLH's socio-economic condition as a result of interactions with commercial trapping.

Commercial Gathering

Pine mushroom gathering is a lucrative commercial activity in northwestern BC.

The South Nass Sustainable Resource Plan (SRMP) outlines the ecologies where pine mushrooms generally grow:

- Rapidly drained and generally course soils with a high coarse fragment content and a thin forest floor;
- Associated with Western hemlock, lodgepole pine, and sparse herb and shrub layers with a high coverage of mosses; and
- Low-productivity forests typical of rocky ridges and hill tops, as well as on coarse textured soils near rivers (Ministry of Forests, Lands, and Natural Resource Operations, 2012).

Further research conducted for the Northwest Transmission Line Project indicate that pine mushroom habitat is often associated with gentle slopes and open canopy that allows light to penetrate to the forest floor (Rescan Environmental Services Ltd., 2010).

Based on the above descriptions of pine mushroom habitat as well as the current lack of access infrastructure to the Bitter Creek valley, it is unlikely that pine mushroom harvesting occurs in the valley. Increased access to the valley as a result of the construction of the Project's access road may increase pine mushroom harvesting opportunities.

The Project is not anticipated to have adverse effects on commercial gathering, such a mushroom picking, due to lack of interaction; therefore, there is no potential adverse effect on TSKLH's socio-economic condition due to potential effects of the Project on commercial gathering.

25.5.3.6.4 Guide Outfitting

The guide outfitting license in the Project area is owned by Nisga'a Nation; therefore, the Project is not anticipated to have any effect on TSKLH's socio-economic condition as a result of interactions with guide outfitting.

25.5.3.6.5 Recreational Use

It is IDM's understanding that TSKLH's recreational use of the Project area would be similar in nature and scope to that of non-Aboriginal persons', therefore no further discussion of recreational use is provided here. Feedback provided by TSKLH did not identify any specific recreational uses in the Project area. An assessment of the Project's potential effects on Recreational Values is included in Chapter 20 (Social Effects Assessment).

25.5.3.7 Potential Changes to Health

IDM has conducted a Human Health Risk Assessment (HHRA) to evaluate the effects of chemicals of potential concern (COPCs) resulting from all Project activities during construction and operation. The HHRA has been completed for baseline conditions and considers all phases of the Project to yield estimates of incremental risks. The HHRA has been completed in accordance with applicable federal (e.g., Health Canada), provincial (e.g., BC MOE), and regional (e.g., Northern Health) risk assessment guidance.

The conceptual site model for the HHRA describes sources and exposure pathways and identifies potential human receptors and exposure routes including: inhalation, ingestion, and dermal contact for all COPCs in potentially-affected exposure media (e.g., soil, air, food, drinking water). Potential adverse effects were based on toxicity reference values identified by Health Canada and/or other relevant jurisdictions, where applicable. In general, these include non-carcinogenic health effects as identified by hazard quotients and carcinogenic health effects as identified through incremental lifetime cancer risks.

25.5.3.7.1 Air Quality

Due to the lack of Project effects on Air Quality, it is unlikely that changes to Air Quality will affect the health of TSKLH members. As no health effects on TSKLH have been identified due to changes in Air Quality, no mitigation measures for this pathway have been identified.

25.5.3.7.2 Drinking Water

IDM is not aware of any TSKLH members or communities who rely on the Bitter Creek valley as a source of drinking water. Based on baseline water quality research conducted in support of the Project, it is likely that existing water in the Bitter Creek valley is not suitable for drinking water: ground water in the area is naturally high in arsenic and surface water is extremely turbid.

Due to the existing poor quality of drinking water in the area and the lack of current use of the area for drinking water, no adverse effects are anticipated on TSKLH's health as a result of changes to drinking water quality.

25.5.3.7.3 Country Foods

Animals and plants in the Bitter Creek valley that may be consumed will not be exposed to COPCs for high spatial or temporal extents due to the limited particulate deposition of COPCs predicted. Fish, present downstream of the Project site, in the lower reaches of Bitter Creek, and will not experience prolonged exposure to COPCs. This limited exposure is unlikely to result in elevated levels of metals fish in tissues that would be consumed and adversely affect humans.

Based on the available information, the results of the HHRA conducted in support of the Project, and the limited use of the Bitter Creek valley by TSKLH to harvest country foods, no residual adverse effects are anticipated on TSKLH's health resulting from the consumption of country foods.

25.5.3.7.4 Noise

Due to the very limited extent of Noise effects, it is unlikely that Project noise will affect TSKLH's health. As no effects on TSKLH's health have been identified due to changes in Noise, no mitigation measures for this pathway have been identified.

25.6 Mitigation Measures

25.6.1 Key Mitigation Approaches

IDM has identified measures to avoid, minimize, mitigate, or otherwise address potential adverse effects to TSKLH's Aboriginal Interests. These are summarized in Table 25.6-1.

Approaches considered to manage, mitigate, and/or monitor potential effects may include:

- Optimizing Alternatives;
- Design Mitigation;
- Best Available Technology;
- Best Management Practices;
- Restoration; and
- Offsetting.

25.6.2 Effectiveness of Mitigation Measures

The anticipated effectiveness of mitigation measures to minimize the potential for significant adverse effects is evaluated and classified as follows:

- Low effectiveness: After implementation of the mitigation measure, the effect is largely unchanged (i.e., little to no improvement in the condition of the VC or indicator);

- Moderate effectiveness: After implementation of the mitigation measure, the effect is moderately changed (i.e., a moderate improvement in the condition of the VC or indicator);

- High effectiveness: After implementation of the mitigation measure, the effect is significantly improved (i.e., major improvement in the condition of the VC or indicator), or the effect is eliminated;

- Unknown effectiveness: The mitigation measure has not been employed elsewhere in similar circumstances, and its effectiveness is unknown.

The potential effects, proposed mitigation measures, and their effectiveness are summarized using Table 25.6-1. This table also identifies the residual effects that will be carried forward for residual effects characterization and significance determination.

Table 25.6-1: Proposed Mitigation Measures and Their Effectiveness

Potential Effect	Valued Components	Applicable Phase(s)	Mitigation Measure(s)	Residual Effect(s)
Potential Changes to Wildlife Resources	Wildlife and Wildlife Habitat	Construction Operation Closure and Reclamation Post-Closure	See Table 25.6-2	• Habitat availability • Habitat disruption • Mortality
Potential Changes to Fish Resources	Fish and Fish Habitat	Construction Operation Closure and Reclamation	See Table 25.6-3	• Fish habitat • Dolly Varden
Potential Changes to Plant Resources	Vegetation and Ecosystems	Construction Operation Closure and Reclamation	See Table 25.6-4.	• Loss and alteration of ecosystem abundance, distribution, and/or function • Loss or alteration to known occurrences
Potential Changes to Access	n/a	Construction Operation Closure and Reclamation	IDM will develop, in consultation with the appropriate parties, an Access Management Plan to limit access to the Bitter Creek valley. The Access Management Plan will consider individuals' safety with respect to an active mining project; Aboriginal and Treaty rights in the Bitter Creek valley; existing tenured or licensed activities in the Bitter Creek valley; and existing recreational values in the Bitter Creek valley.	None

Table 25.6-2: Wildlife and Wildlife Habitat Mitigation Measures

Potential Effect	Applicable Phase(s)	Mitigation Measures	Effectiveness[1]	Uncertainty[2]	Residual Effect (Y/N)
Mountain Goat					
Habitat Alteration	Construction	Project Design Minimize Habitat Disturbance	High Moderate	Low Low	Y
Sensory Disturbance	All Phases	Project Design Minimize Habitat Disturbance Manage Vehicle Traffic	High Moderate Moderate	Low Low Low	Y
Disruption to Movement	All Phases	Project Design Reduce Barriers or Filters of Movement Manage Vehicle Traffic Prevent Wildlife Entrapment	High Moderate Moderate High	Low Low Low Low	Y
Direct Mortality	All Phases	Wildlife Education Program Wildlife Protection Protocol Manage Vehicle Traffic	High High Moderate	Low Low Low	Y
Indirect Mortality	All Phases	Wildlife Education Program Wildlife Protection Protocol Prevent Wildlife Entrapment Manage Vehicle Traffic Access Restriction on Access Road	High High High Moderate High	Low Low Low Low Low	Y
Chemical Hazards	All Phases	Wildlife Protection Protocol Manage Chemical Hazards	High High	Low Low	N
Attractants	All Phases	Wildlife Protection Protocol Manage Attractants	High High	Low Low	N
Grizzly Bear					
Habitat Alteration	Construction	Project Design Minimize Habitat Disturbance	High Moderate	Low Low	Y

Potential Effect	Applicable Phase(s)	Mitigation Measures	Effectiveness[1]	Uncertainty[2]	Residual Effect (Y/N)
Sensory Disturbance	All Phases	Minimize Habitat Disturbance Manage Vehicle Traffic	Moderate Moderate	Low Low	Y
Disruption to Movement	All Phases	Project Design Reduce Barriers or Filters of Movement Manage Vehicle Traffic Prevent Wildlife Entrapment	High High High High	Low Low Low Low	N
Direct Mortality	All Phases	Wildlife Education Program Wildlife Protection Protocol Manage Vehicle Traffic	High High Moderate	Low Low Low	Y
Indirect Mortality	All Phases	Wildlife Education Program Wildlife Protection Protocol Prevent Wildlife Entrapment	High High High	Low Low Low	N
Chemical Hazards	All Phases	Wildlife Protection Protocol Manage Chemical Hazards	High High	Low Low	N
Attractants	All Phases	Wildlife Protection Protocol Manage Attractants	High High	Low Low	N
Moose					
Habitat Alteration	Construction	Project Design Minimize Habitat Disturbance	High Moderate	Low Low	Y
Sensory Disturbance	All Phases	Manage Vehicle Traffic Minimize Habitat Disturbance	Moderate Moderate	Low Low	Y
Disruption to Movement	All Phases	Prevent Wildlife Entrapment Minimize Habitat Disturbance Reduce Barriers or Filters of Movement Manage Vehicle Traffic	High Moderate Moderate Moderate	Low Low Low Low	N

Potential Effect	Applicable Phase(s)	Mitigation Measures	Effectiveness[1]	Uncertainty[2]	Residual Effect (Y/N)
Direct Mortality	All Phases	Wildlife Protection Protocols Manage Attractants Manage Vehicle Traffic	High High Moderate	Low Low Low	Y
Indirect Mortality	All Phases	Wildlife Education Program Wildlife Protection Protocols	High High	Low Low	N
Chemical Hazards	All Phases	Wildlife Protection Protocols Manage Chemical Hazards	High High	Low Low	N
Attractants	All Phases	Manage Attractants	High	Low	N
Furbearers					
Habitat Alteration	Construction	Project Design Minimize Habitat Disturbance	High Moderate	Low Low	Y
Sensory Disturbance	All Phases	Minimize Habitat Disturbance Manage Vehicle Traffic	Moderate Moderate	Low Low	Y
Disruption to Movement	All Phases	Project Design Reduce Barriers or Filters of Movement Manage Vehicle Traffic Prevent Wildlife Entrapment	High Moderate Moderate High	Low Low Low Low	Y (marten only)
Direct Mortality	All Phases	Wildlife Education Program Wildlife Protection Protocol Manage Vehicle Traffic	High High Moderate	Low Low Low	Y (marten only)
Indirect Mortality	All Phases	Wildlife Education Program Wildlife Protection Protocol Prevent Wildlife Entrapment	High High High	Low Low Low	N
Chemical Hazards	All Phases	Wildlife Protection Protocol Manage Chemical Hazards	High High	Low Low	N

Potential Effect	Applicable Phase(s)	Mitigation Measures	Effectiveness[1]	Uncertainty[2]	Residual Effect (Y/N)
Attractants	All Phases	Wildlife Protection Protocol Manage Attractants	High High	Low Low	N
Hoary Marmot					
Habitat Alteration	Construction	Project Design Minimize Habitat Disturbance	High Moderate	Low Low	Y
Disruption to Movement	All Phases	Project Design Manage Vehicle Traffic Prevent Wildlife Entrapment	High Moderate High	Low Low Low	N
Direct Mortality	All Phases	Minimize Habitat Disturbance Wildlife Protection Protocols Manage Vehicle Traffic	Moderate High Moderate	Low Low Low	Y
Indirect Mortality	All Phases	Wildlife Protection Protocols Prevent Wildlife Entrapment	High High	Low Low	N
Chemical Hazards	All Phases	Wildlife Protection Protocols Manage Chemical Hazards Manage Attractants	High High High	Low Low Low	N
Attractants	All Phases	Wildlife Protection Protocols Manage Attractants	High High	Low Low	N
Bats					
Habitat Alteration	Construction	Project Design Minimize Habitat Disturbance Wildlife Protection Protocols	High Moderate High	Low Low Low	Y
Sensory Disturbance	Construction Operation	Project Design Wildlife Protection Protocols	High High	Low Low	Y
Direct Mortality	Construction	Project Design Minimize Habitat Disturbance Manage Vehicle Traffic	High Moderate Moderate	Low Low Low	N

Potential Effect	Applicable Phase(s)	Mitigation Measures	Effectiveness[1]	Uncertainty[2]	Residual Effect (Y/N)
Chemical Hazards	Operation Closure and Reclamation Post-Closure	Wildlife Protection Protocols	High	Low	N
Attractants	Operation Closure and Reclamation Post-Closure	Project Design Wildlife Protection Protocols Manage Attractants	High High High	Low Low Low	N
Migratory Breeding Birds					
Habitat Alteration	Construction	Project Design Wildlife Education Program Minimize Habitat Disturbance	High High Moderate	Low Low Low	Y
Sensory Disturbance	All Phases	Wildlife Education Program Wildlife Protection Protocols Minimize Habitat Disturbance	High High Moderate	Low Low Low	Y
Direct Mortality	All Phases	Wildlife Education Program Wildlife Protection Protocols Manage Vehicle Traffic Prevent Wildlife Entrapment	High High Moderate High	Low Low Low Low	N
Indirect Mortality	All Phases	Wildlife Education Program Wildlife Protection Protocols Manage Vehicle Traffic Prevent Wildlife Entrapment	High High Moderate High	Low Low Low Low	N
Chemical Hazards	All Phases	Project Design Wildlife Education Program Wildlife Protection Protocols Manage Chemical Hazards	High High High High	Low Low Low Low	N

Potential Effect	Applicable Phase(s)	Mitigation Measures	Effectiveness[1]	Uncertainty[2]	Residual Effect (Y/N)
Attractants	All Phases	Wildlife Education Program Wildlife Protection Protocols Manage Attractants	High High High	Low Low Low	N
Migratory Birds – Species at Risk					
Habitat Alteration	Construction	Project Design Wildlife Education Program Minimize Habitat Disturbance	High High Moderate	Low Low Low	Y
Sensory Disturbance	All Phases	Wildlife Education Program Wildlife Protection Protocols Minimize Habitat Disturbance	High High Moderate	Low Low Low	Y
Direct Mortality	All Phases	Project Design Wildlife Education Program Wildlife Protection Protocols Minimize Habitat Disturbance Manage Vehicle Traffic	High High High Moderate Moderate	Low Low Low Low Low	Y (common nighthawk and marbled murrelet only)
Indirect Mortality	All Phases	Wildlife Education Program Wildlife Protection Protocols Manage Vehicle Traffic Prevent Wildlife Entrapment	High High Moderate High	Low Low Low Low	N
Chemical Hazards	All Phases	Project Design Wildlife Education Program Wildlife Protection Protocols Manage Chemical Hazards	High High High High	Low Low Low Low	N
Attractants	All Phases	Wildlife Education Program Wildlife Protection Protocols Manage Attractants	High High High	Low Low Low	N

Potential Effect	Applicable Phase(s)	Mitigation Measures	Effectiveness[1]	Uncertainty[2]	Residual Effect (Y/N)
Raptors					
Habitat Alteration	Construction	Project Design	High	Low	Y
Sensory Disturbance	All Phases	Minimize Habitat Disturbance	Moderate	Low	Y
Direct Mortality	All Phases	Wildlife Education Program Wildlife Protection Protocols Minimize Habitat Disturbance Manage Vehicle Traffic	High High Moderate Moderate	Low Low Low Low	N
Indirect Mortality	All Phases	Wildlife Education Program Wildlife Protection Protocols	High High	Low Low	N
Chemical Hazards	All Phases	Project Design Wildlife Education Program Wildlife Protection Protocols Manage Chemical Hazards	High High High High	Low Low Low Low	N
Attractants	All Phases	Wildlife Education Program Wildlife Protection Protocols Manage Attractants	High High	Low Low	N
Non-Migratory Game Birds					
Habitat Alteration	Construction	Project Design Minimize Habitat Disturbance	High Moderate	Low Low	Y
Sensory Disturbance	All Phases	Wildlife Protection Protocols Minimize Habitat Disturbance	High Moderate	Low Low	Y
Direct Mortality	All Phases	Project Design Manage Attractants Manage Vehicle Traffic	High High Moderate	Low Low Low	Y
Indirect Mortality	All Phases	Wildlife Protection Protocols Manage Attractants	High High	Low Low	N

Potential Effect	Applicable Phase(s)	Mitigation Measures	Effectiveness[1]	Uncertainty[2]	Residual Effect (Y/N)
Chemical Hazards	All Phases	Wildlife Protection Protocols Manage Attractants	High High	Low Low	N
Attractants	All Phases	Manage Attractants	High	Low	N
Amphibians – Western Toad					
Habitat Alteration	Construction	Project Design Minimize Habitat Disturbance	High Moderate	Low Low	N
Disruption to Movement	All Phases	Project Design Reduce Barriers or Filters to Movement	High Moderate	Low Low	N
Direct Mortality	All Phases	Minimize Habitat Disturbance Reduce Barriers or Filters to Movement Manage Vehicle Traffic	Moderate Moderate Moderate	Low Low Low	N
Indirect Mortality	All Phases	Prevent Wildlife Entrapment	High	Low	N
Chemical Hazards	All Phases	Manage Chemical Hazards	High	Low	N
Attractants	All Phases	Manage Attractants	High	Low	N

[1]Effectiveness: Low = measure unlikely to result in effect reduction; Moderate = measure has a proven track record of partially reducing effects; High = measure has documented success (e.g., industry standard; use in similar projects) in substantial effect reduction

[2]Uncertainty: High = proposed measure is experimental, or has not been applied in similar circumstances; Moderate = proposed measure has been successfully implemented, but perhaps not in a directly comparable situation; Low = proposed measure has been successfully applied in similar situations

Table 25.6-3 Fish and Fish Habitat Mitigation Measures

VC/IC	Potential Effects	Mitigation Measures	Rationale	Applicable Phase(s)	Effectiveness[1]	Uncertainty[2]	Residual Effect
Fish (as represented by dolly vardon, bull trout, eulachon and Oncorynchus salmonids)	Increased fishing pressure	No fishing policy for Project employees and guests	Staff training and awareness plus monitoring and enforcement of company policies are key components of many of IDM's management plans.	Construction, Operation, Closure and Reclamation	High	Low	No
		Existing DFO regulations will be followed.	IDM is committed to lawful operation of the Project.				
		All Project roads will be closed to the public, including private vehicles (snowmobile, all-terrain vehicles, etc.) and all foot traffic, with the possible exception of individuals with existing rights to access the Bitter Creek valley. Project road use will be restricted only to Persons required for Project construction, operation, and maintenance.	Public awareness is a key component of IDM's management plans.		Moderate (Providing round-the-clock monitoring of activity on the roads is not feasible)	Moderate (Difficult to predict how many individuals will ignore signage and rules)	
	Changes in aquatic resources	All implemented mitigation measures for Aquatic Resources will serve as mitigation for Fish and Fish Habitat relative to this effect (Chapter 17, Section 17.6).					No
	Changes in surface water quality	All implemented mitigation measures for Surface Water Quality will serve as mitigation for Fish and Fish Habitat relative to this effect (Chapter 13, Section 13.6).					Yes
	Changes in sediment quality	All implemented mitigation measures for Sediment Quality will serve as mitigation for Fish and Fish Habitat relative to this effect (Chapter 14, Section 14.6).					No
	Changes in stream flow	All implemented mitigation measures for Hydrology will serve as mitigation for Fish and Fish Habitat relative to this effect (Chapter 12, Section 12.6.3).					Yes
		Water withdrawal will follow provincial regulatory requirements and standard best practices to avoid adverse impacts to streamflows, fish and fish habitat.	IDM is committed to lawful operation of the Project.	Operation, Closure and Reclamation	High	Low	
	Effects of blasting	All implemented mitigation measures for Surface Water Quality will serve as mitigation for Fish and Fish Habitat relative to this effect (Chapter 13, Section 13.6).					No
		Blasting activities will be limited to the Mine Site during operations; there is no potential for effects on fish from explosive shockwaves as the blasting zone will not be near any fish-bearing watercourses.	Avoidance of blasting activities within fish-bearing watercourses.	Construction, Operation, Closure and Reclamation	High	Low	
		Capture surface runoff and diverting it to the Portal Collection Pond in the Mine Site or the TMF in Bromley Humps for treatment prior to discharge.	Minimizes the potential for increased nitrogen loading to streams		High		
Fish Habitat	Habitat loss	Infrastructure (including the Access Road) shall be designed in a manner that minimizes or avoids habitat loss to Fish and Fish Habitat, including minimize the number of stream crossings.	Directly avoids and minimizes the amount of habitat loss to fish and fish habitat	Construction	Moderate (Some habitat loss will occur)	Low	Yes
		Road crossings have been designed to avoid unnecessary impact on fish-bearing streams.					

[1]Effectiveness: Low = measure unlikely to result in effect reduction; Moderate = measure has a proven track record of partially reducing effects; High = measure has documented success (e.g., industry standard; use in similar projects in substantial effect reduction

[2]Uncertainty: Low = proposed measure has been successfully applied in similar situations; Moderate = proposed measure has been successfully implemented, but perhaps not in a directly comparable situation; High = proposed measure is experimental, or has not been applied in similar circumstances

Table 25.6-4: Vegetation and Ecosystems Mitigation Measures

VC/IC	Potential Effects	Mitigation Measures	Rationale	Applicable Phase(s)	Effectiveness[1]	Uncertainty[2]	Residual Effect
Ecologically Valuable Soil	Loss and alteration of soil quality and quantity through soil stripping, handling, stockpiling, and dust effects	The design of the Access Road and Haul Road has been optimized to minimize the distance travelled, which will reduce dust associated with Construction and Operation.	Reduces the loss and alteration of soil quantity and quality	Construction, Operation, Closure and Reclamation	Moderate (Proposed measures will minimize effect over the short, medium, and long term; however, losses will still occur)	Moderate (Setting realistic reclamation goals that take into consideration the ecology of the area will improve the likelihood of reinstating ecosystem function over time)	Yes
		The design of the Access Road optimizes the utilization of the existing forestry road to avoid and minimize new disturbance.					
		The clearing of soils will be minimized to the extent possible, and avoided where practicable, for unique features identified by Qualified Environmental Professionals (QEPs), including exposed bedrock and cliffs.					
		Minimize cut-and-fill in areas with ML/ARD potential. Where possible, organic soils will be salvaged and stored separately from mineral soils.					
		Soil handling procedures will be developed specific to sensitive ecosystems. High quality soils will be identified and stockpiled.	Development of ecosystem-specific measures will allow for focused effects reduction. Stockpiling of valuable soil allow for better planning during reclamation				
		Implement ecosystem-based revegetation and progressive reclamation promptly to minimize erosion potential and to facilitate initiation of successional ecological processes.					
		Conduct regular inspections to ensure drainage, erosion, and sediment control measures are effective and functioning properly; all necessary repairs and adjustments will be conducted in a timely manner.	Regular inspections allows for corrective actions which will reduce impacts of sediments to stream course				

VC/IC	Potential Effects	Mitigation Measures	Rationale	Applicable Phase(s)	Effectiveness[1]	Uncertainty[2]	Residual Effect
Alpine and Parkland Ecosystems; Old Growth and Mature Forested Ecosystems; Floodplains and Wetlands Ecosystems; BC CDC Listed Ecosystems	Loss of ecosystem function, abundance and/or distribution through surface clearing	The clearing of vegetation will be minimized to the extent possible, and avoided where practicable, for unique features identified by QEPs, including wetlands, exposed bedrock, cliffs etc., which often provide high-value habitat to wildlife and may support sensitive vegetation communities and growth forms.	Minimizing vegetation clearing will reduce the effects on the VCs	Construction, Operation, Closure and Reclamation	Moderate (Proposed measures will minimize effect over the short, medium, and long term; however, losses will still occur)	Moderate (Setting realistic reclamation goals that take into consideration the ecology of the area will improve the likelihood of reinstating ecosystem function over time)	Yes
		The design of the Access Road optimizes the utilization of the existing forestry road to avoid and minimize new disturbance.					
		The area of landscape disturbance will be minimized and ecosystem-based revegetation and progressive reclamation will occur promptly to minimize erosion potential, introduction of invasive plants, and to facilitate initiation of successional ecological processes.					
		Revegetation will be undertaken with seeds (and/or plants) suitable for the local ecosystem and during the appropriate growing season and conditions to: 1) ensure maximum survival rate; 2) avoid establishment of invasive species; and 3) facilitate the establishment of ecological functions and their associated attributes (e.g. species diversity and productivity).	Development of ecosystem-specific measures will allow for focused effects reduction. This approach helps establishment of an ecological trajectory that is suitable for the area	Construction, Operation, Closure and Reclamation, Post-closure	High (implementation time will vary – implementation is rapid for revegetation to control soil erosion and exclude invasive species; the development of ecological functions occurs over decades		No
		Objectives of closure plans for reclaimed areas will be developed to establish site conditions that allow for realistic and operationally feasible ecological trajectories and that take into consideration ecosystem function and wildlife habitat objectives.					
		Monitoring of reclaimed areas will be conducted periodically to ensure they are revegetated.	This allows for the measurement of vegetation establishment				

VC/IC	Potential Effects	Mitigation Measures	Rationale	Applicable Phase(s)	Effectiveness[1]	Uncertainty[2]	Residual Effect
Alpine and Parkland Ecosystems		Ecosystem-specific soil handling procedures will be developed. High-quality soils will be identified and stockpiled when required.	Separating high quality soils allows for better use of these soils during reclamation	Construction, Closure and Reclamation	Moderate (Tailored handling procedures will minimize some of the key issues, such as a reduction in chemical, physical, and biological properties of soil; however due to the sensitive nature of alpine and parkland soils, some effects will remain).	Low	Yes
Old Growth and Mature Forested Ecosystems		Construction activities will be conducted in accordance with the guidelines outlined in the Wildlife Management Plan to ensure minimal risk to old growth and mature forest wildlife habitat, such adhering to sensitive periods, specific guidelines, and applicable legislation for wildlife species of concern that use old growth and mature forests.	Development of ecosystem-specific measures will allow for focused effects reduction	Construction, Closure and Reclamation	Moderate: the effectiveness of avoiding new disturbance to ecosystem abundance and extent through optimization measures is high; however, there is low confidence that reclamation efforts can restore the structure and function associated with old and mature forest ecosystems to a level similar to that of baseline condition in the long term.	Low	Yes
		Manage forests according to the *Forest and Range Practices Act* (FRPA) silviculture requirements and BMPs.	IDM is committed to lawful operation of the Project. Adhering to FRPA requirements will ensure compliance		High	Low	
Floodplain and Wetland Ecosystems		Reduce effects to terrestrial ecosystems that depend on hydrological connectivity and flow through management by ensuring free passage of water through fill materials (i.e., using free-span bridges or culverts).	Maintaining existing hydrological regimes is important for maintaining baseline ecosystems	Construction, Operation, Construction and Reclamation	High	Low	Yes (only to the BC CDC Listed floodplain ecosystems)
		Soil handling procedures will be developed specific to sensitive ecosystems. High-quality soils will be identified and stockpiled.	Separating high value soil from less valuable or unsuitable soil allows for more effective restoration				
		Retain roots and groundcover where possible to maintain slope stability and prevent surface erosion.	This allows for soil retention				
		Reduce erosion potential by conducting sensitive work during periods of low runoff to the extent possible.	This allows for soil retention				

VC/IC	Potential Effects	Mitigation Measures	Rationale	Applicable Phase(s)	Effectiveness[1]	Uncertainty[2]	Residual Effect
		Riparian areas will be managed per the legislated reserve and/or management zone setbacks and work practices established under FRPA, where feasible.	IDM is committed to lawful operation of the Project. Adhering to FRPA requirements will ensure compliance				
BC CDC Listed Ecosystems		Soil handling procedures will be developed specific to sensitive ecosystems. High-quality soils will be identified and stockpiled.	Development of ecosystem-specific measures will allow for focused effects reduction.	Construction, Operation, Closure and Reclamation	Moderate (The effectiveness of avoiding BC CDC listed ecosystems through the communication and delineation of no-work zones around these ecosystems is high; however, BC CDC listed ecosystems will not be avoided altogether so the overall effectiveness is considered moderate).	Low	Yes
		Communicate the location of BC CDC listed ecosystems to ground crews.	Staff training and awareness are key components of many of IDM's management plans.				
		Conduct pre-construction surveys to delineate relevant boundaries of the BC CDC listed ecosystems.					
		Delineate "no work" zones and/or buffers around BC CDC listed ecosystems, where feasible.					
Alpine and Parkland Ecosystems; Old Growth and Mature Forested Ecosystems; Floodplains and Wetlands Ecosystems; BC CDC Listed Ecosystems	Alteration of ecosystem function, abundance, and/or distribution through dust effects, fragmentation, edge effects, and invasive plant introduction	The Vegetation and Ecosystems Management Plan will be implemented and will include the following measures where practicable: conduct pre-construction invasive plant surveys within the Project footprint to determine the presence/absence of invasive plants; remove existing invasive plant populations to prevent the spread to adjacent areas; and establish an early detection, inventory, control, and monitoring and follow up program in accordance with Provincial guidance (i.e., FLNRO 2017) and expert recommendations.	Development of ecosystem-specific measures will allow for focused effects reduction. Addressing invasive plants through survey and removal limits effects to sensitive ecosystems	Construction, Operation, Closure and Reclamation	Moderate (Preventive measures and early detection systems are effective in terms of avoiding introduction and spread of invasive plants in most cases; however, an efficient early detection plan needs trained personnel with clear accountabilities and a sustained long-term commitment to preventing invasive plant introduction and spread)	Low	No
		Appropriate setback and buffer distances from surface water bodies and riparian features will be implemented and maintained.					
Alpine and Parkland Ecosystems		Minimize deposition of fugitive dust in alpine ecosystems through adherence to the Air Quality and Dust Management Plan.	Reducing the source of the potential effect minimizes the potential effect. Minimizing dust limits potential negative effects to alpine and parkland ecosystems.	Operation	High	Low	No

VC/IC	Potential Effects	Mitigation Measures	Rationale	Applicable Phase(s)	Effectiveness[1]	Uncertainty[2]	Residual Effect
Ecologically Valuable Soil		Implement ecosystem-based revegetation and progressive reclamation promptly to minimize introduction of invasive plants and to facilitate initiation of successional ecological processes.	Development of ecosystem-specific measures will allow for focused effects reduction. Revegetation with suitable vegetation limits the negative effects of invasive plants.	Construction, Operation, Closure and Reclamation	Moderate (Any time soil is moved and disturbed there will be some loss to soil quality. This loss of soil quality is dependent on inherent soil characteristics as well as moisture levels at the time of salvage/disturbance. If salvage occurs under ideal moisture conditions and the soil has a high sand content, degradation is minimal. If fine textured soils are moved when wet, degradation can be substantial). The re-establishment of ecological functions associates with alpine ecosystems in areas that have been disturbed will occur over several decades.	Low	Yes
		Strip and stockpile soil for future reclamation.	Proactive treatment and handling is more effective than post-hoc reclamation.				
		Minimize the number of times soil is moved.					
		Salvage and store organic soils separately from mineral soils, where possible.					
Old Growth and Mature Forested Ecosystems		Construction activities will be conducted in accordance with the guidelines outlined in the Wildlife Management Plan to ensure minimal risk to old growth and mature forest wildlife habitat, such as adhering to sensitive periods, specific guidelines, and applicable legislation for wildlife species of concern that use old growth and mature forest.	Development of ecosystem-specific measures will allow for focused effects reduction. Minimizing disturbance limits negative effects.	Construction, Operation, Closure and Reclamation	Moderate: the effectiveness of avoiding new disturbance to ecosystem abundance and extent through optimization measures is high; however, there is low confidence that reclamation efforts can restore the structure and function associated with old growth and mature forest ecosystems to a level similar to that of baseline condition in the long term.	Low	Yes
		Manage forests according to the *Forest and Range Practices Act* (FRPA) silviculture requirements and BMPs	IDM is committed to lawful operation of the Project.		High	Low	
Floodplain and Wetland Ecosystems		Appropriate setback and buffer distances from surface water bodies and riparian features will be implemented and maintained.	Development of ecosystem-specific measures will allow for focused effects reduction. Appropriate buffers reduces negative effects.	Construction, Closure and Reclamation	Moderate to High (The effectiveness of mitigation is moderate to high as most effects to wetland ecosystems will be avoided and minimized through	Low	Yes (only to the BC CDC Listed floodplain ecosystems)

VC/IC	Potential Effects	Mitigation Measures	Rationale	Applicable Phase(s)	Effectiveness[1]	Uncertainty[2]	Residual Effect
		Riparian areas will be managed per the legislated reserve and/or management zone setbacks and work practices established under FRPA, where feasible.	IDM is committed to lawful operation of the Project.		adherence to the established protection measures outlined in the Project management plans. The effectiveness of avoiding effects to wetland ecosystems that depend on hydrological connectivity and flow is moderate as hydrological connectivity can be difficult to determine depending on the site characteristics.)		
		All vehicles and machinery travel will be restricted to designated road surfaces.	Reducing the source of the potential effect minimizes the potential effect. Traffic confined to designated roadways limits soil degradation.				
BC CDC Listed Ecosystems		Manage riparian areas per the legislated reserve and/or management zone setbacks and work practices established under the FRPA.	IDM is committed to lawful operation of the Project.	Construction, Closure and Reclamation	High	Low	Yes
Rare Plants, Lichens, and Associated Habitats	Loss of known occurrences of rare plants or lichens and/or habitat through surface clearing.	Apply adaptive Project design changes that avoid harm to rare plant and lichen populations, where practicable.	Reducing the source of the potential effect minimizes the potential effect.	Construction, Operation, Closure and Reclamation, Post-closure	High	Moderate (Potential alteration through surface clearing of adjacent areas and dust deposition may have effects on rare plants and lichens beyond our current understanding. Many rare plant and lichens and their specific abiotic and biotic requirements are not well understood)	Yes
		Conduct pre-construction rare plant surveys to delineate the rare plant/lichen habitat.	Improving quality of baseline data allows for better mitigation by excluding rare plant populations from development activity.				
		Avoid surface disturbance in areas with known rare plant and lichen populations.	Reducing the source of the potential effect minimizes the potential effect.				
		Avoid use of all herbicide sprays within 200 m of rare plant and lichen populations and limit such use to direct application rather than broadcast sprays.					
		Create exclusion zones around rare plant and lichen habitats to minimize effects related to surface clearing, fugitive dust, and invasive plant introduction.					

VC/IC	Potential Effects	Mitigation Measures	Rationale	Applicable Phase(s)	Effectiveness[1]	Uncertainty[2]	Residual Effect
		Erect temporary fencing or other barriers around the nearby rare plant and lichen populations to avoid further disturbance to the site where avoidance is not feasible and development is permitted within buffer areas around plant populations.					
		Minimize deposition of fugitive dust on rare plant and lichen populations through adherence to the Air Quality and Dust Management Plan.					
		Ensure that a qualified environmental monitor, capable of identifying rare plants and lichens, is on site (at the clearing location) during vegetation-clearing activities in known rare plant habitat.	Regular monitoring allows for proactive solutions.				
Rare Plants, Lichens, and Associated Habitats	Alteration of known occurrences of rare plants or lichens or habitat through edge effects, dust deposition and introduction and spread of invasive plants	Avoid use of all herbicide sprays within 200 m of rare plant and lichen populations and limit such use to direct application rather than broadcast sprays.	Reducing the source of the potential effect minimizes the potential effect. These collective mitigation measures reduce direct negative effects to rare plants and lichens, and associated habitat	Closure, Operation, Closure and Reclamation	High	Moderate (Effectiveness will vary among species)	Yes
		Apply dust suppression measures (i.e., wetting work areas, roads, and storage piles, installing equipment covers, and using dust hoods and shields).					
		Apply water to roads to minimize dust from ore and waste rock haulage and grading.					
		Install windbreaks or fences around known problem areas or stockpiles to limit the dispersion of dust emissions from equipment and stockpiles.					
		Design and manage stockpiles and storage areas to minimize dust emissions.					

25.6.3 Management Plans and Monitoring

IDM has developed a series of management plans targeting anticipated Project-specific mitigation and monitoring requirements. These are listed in Part E, Chapter 29 of the Application/EIS. These plans will be implemented to address potential effects on TSKLH's Aboriginal Interests:

- Environmental Management System;
- Adaptive Management Plan;
- Access Management Plan;
- Air Quality and Dust Management Plan;
- Aquatic Effects Management and Response Plan;
- Erosion and Sediment Control Plan;
- Groundwater Monitoring Plan;
- Material Handling & Geochemistry Management Plan;
- Noise Abatement Plan;
- Site Water Management Plan;
- Spill Contingency Plan;
- Tailings Management Plan;
- Terrain and Soil Management Plan;
- Vegetation and Ecosystems Management Plan;
- Waste Management Plan; and
- Wildlife Management Plan.

25.7 Residual Effects Characterization

25.7.1 Summary of Residual Effects

Based on Section 25.5 and Table 25.6-1, the following residual effects have been brought forward and are discussed below:

- Potential changes to TSKLH's ability to harvest wildlife (including birds) for traditional purposes due to residual effects to Wildlife and Wildlife Habitat, including:
  - Habitat availability;
  - Habitat distribution;
  - Mortality Risk;

- Potential changes to TSKLH's ability to harvest fish for traditional purposes due to residual effects to Fish and Fish Habitat, including:
  - Fish habitat;
  - Dolly Varden;

- Potential changes to TSKLH's ability to harvest plants for traditional purposes due to residual effects to Vegetation and Ecosystems, including:
  - Loss and alteration of ecosystem abundance, distribution, and/or function; and
  - Loss or alteration to known occurrences.

25.7.2 Methods

This section presents the methods used to determine potential residual effects on TSKLH's Aboriginal Interests.

As this section draws on the result of other chapters of the Application/EIS (notably Wildlife and Wildlife Habitat (Chapter 16), Fish and Fish Habitat (Chapter 18), and Vegetation and Ecosystems (Chapter 15)). The specific methodologies used to determine and characterize residual effects are presented in those respective chapters.

This residual effects assessment employs a spatial- and logic-based approach to determine the effect of the biophysical residual effects on TSKLH's Aboriginal Interests.

Each residual effect has been characterized based on the following aspects:

- **Magnitude**: Magnitude is a measure of the intensity of a residual effect or the degree of change caused by the proposed Project (and other developments, if applicable) relative to baseline conditions, guidelines, or threshold values. Depending on the VC or IC, the characterization of magnitude may be numerical (e.g., absolute or relative effect size) or qualitative (e.g., low, moderate, and high).

- **Geographic Extent**: This is the spatial scale of the effect and is different from the spatial boundary (i.e., study area) for the residual effects characterization. The spatial boundary for the residual effects characterization represents the maximum area used for the assessment and is related to the spatial distribution and movement of VCs and ICs. However, the geographic extent of residual effects can occur on several scales within the spatial boundary of the assessment. Geographic extent refers to the area affected and is characterized according to the scale of the effect and the properties of the component or the measurement indicator.

- **Duration**: Duration is defined as the length of time the residual effect persists (usually in years) and is expressed relative to Project phases. The duration of an effect will typically be described as short-term, long-term, or permanent; definitions of short- and long-term would vary by VC or IC and consider VC- or IC-specific temporal characteristics.

- **Frequency**: Frequency refers to how often a residual effect will occur. Frequency is explained more fully by identifying when the residual effect occurs (e.g., once at the beginning of the Project). If the frequency is sporadic or regular, then the length of time between occurrences and the seasonality of occurrences (if present) is discussed.

- **Reversibility**: After removal of the Project activity or stressor, reversibility is the likelihood that the Project will no longer influence a VC or IC in a future predicted period. The period is provided for reversibility (i.e., duration) if a residual effect is reversible. Permanent residual effects are considered irreversible.

- **Context**: Context refers to the sensitivity and resilience of the VC or IC indicator to further changes in the environment that may be caused by the Project. For example, an ecologically sensitive site is likely to have little resilience to additional imposed stresses. Context draws heavily on an understanding of existing conditions that reflect cumulative effects of other projects, activities that have been carried out, and information about the effect of natural and human-caused trends on the condition of the VC or IC. Project effects may have a higher effect if they occur in areas or regions that have already been adversely affected by human activities or exhibit ecological fragility and have little resilience to imposed stresses.

The definitions for the characterizations of residual effects differ between the Wildlife and Wildlife Habitat, Vegetation and Ecosystems, and Fish and Fish Habitat Effects Assessments.

The definitions for the characterizations of residual effects for Wildlife and Wildlife Habitat and Vegetation and Ecosystems are summarized in Table 25.7-1.

Table 25.7-1: Residual Effect Characterization Definitions for Wildlife and Wildlife Habitat and Vegetation and Ecosystems

Criteria	Residual Effect Characterization Definitions for Wildlife and Wildlife Habitat and Vegetation and Ecosystems
Magnitude	• **Negligible (N)**: no detectable change from baseline conditions. • **Low (L)**: differs from the average value for baseline conditions but remains within the range of natural variation and below a guideline or threshold value. • **Moderate (M)**: differs substantially from the average value for baseline conditions and approaches the limits of natural variation but equal to or slightly above a guideline or threshold value. • **High (H)**: differs substantially from baseline conditions and is significantly beyond a guideline or threshold value, resulting in a detectable change beyond the range of natural variation.
Geographical Extent (Biophysical)	• **Discrete (D):** effect is limited to the Bitter Creek valley. • **Local (L):** effect is limited to the LSA. • **Regional (R):** effect extends beyond the LSA but within the RSA. • **Beyond regional (BR):** effect extends beyond the RSA.
Duration	• **Short-term (ST):** effect lasts less than 18 months (during the Construction Phase of the Project). • **Long-term (LT):** effect extends beyond the life of the Project (encompassing Operation, Reclamation and Closure, and Post-Closure Phases). • **Permanent (P)**: effect will continue in perpetuity.
Frequency	• **One-time (O)**: effect is confined to one discrete event. • **Sporadic (S)**: effect occurs rarely and at sporadic intervals. • **Regular (R)**: effect occurs on a regular basis. • **Continuous (C)**: effect occurs constantly.

Criteria	Residual Effect Characterization Definitions for Wildlife and Wildlife Habitat and Vegetation and Ecosystems
Reversibility	• **Reversible (R)**: effect can be reversed. • **Partially reversible (PR)**: effect can be partially reversed. • **Irreversible (I)**: effect cannot be reversed, is of permanent duration.
Context	• **High (H)**: the receiving environment or population has a high natural resilience to imposed stresses and can respond and adapt to the effect. • **Neutral (N)**: the receiving environment or population has a neutral resilience to imposed stresses and may be able to respond and adapt to the effect. • **Low (L)**: the receiving environment or population has a low resilience to imposed stresses and will not easily adapt to the effect.

Characterizations of residual effects for the Fish and Fish Habitat Effects Assessment are summarized in Table 25.7-2.

Table 25.7-2: Residual Effect Characterization Definitions for Fish and Fish Habitat

Criteria	Residual Effect Characterization Definitions for Fish and Fish Habitat
Magnitude	• **Low (L):** The magnitude of effect is within the range of natural variation and is unlikely to affect the existing productive capacity of fish habitat. • **Moderate (M):** The magnitude of the effect is at the limits of natural variation or habitat changes affect up to 10% of the available habitat in a watercourse, such that the productive capacity of the habitat may be reduced and affect fish populations in the entire watercourse; and/or the value of the measurement indicator is up to 30% greater than guideline or threshold value for the protection of aquatic life. • **High (H):** The magnitude of effects exceeds natural variation, or habitat changes affect more than 10% of the available habitat in a watercourse, such that the productive capacity of the habitat may be reduced and affect an entire fish population, or more than one fish population; and/or the value of a measurement indicator is more than 30% greater than guideline or threshold value for the protection of aquatic life.
Geographical Extent	• **Discrete (D):** Effect is limited to the immediate receiving environment in Goldslide Creek watershed (mine area) or the immediate freshwater environment in Bitter Creek (TMF area, Access Road) • **Local (L):** Effect is limited to the immediate receiving environment in Goldslide Creek watershed (Mine Site) or the immediate freshwater environment in Otter Creek (Bromley Humps) or the immediate receiving environment in Bitter Creek (Access Road). • **Regional (R):** Effect extends across the RSA. • **Beyond Regional (BR):** Effect extends beyond the RSA and beyond the province (transboundary effects).

Criteria	Residual Effect Characterization Definitions for Fish and Fish Habitat
Duration	• **Short term (ST):** Effect lasts less than 18 months (during the Construction Phase of the Project). • **Long term (LT):** Effect lasts greater than 18 months and less than 22 years (encompassing Operation, Reclamation and Closure, and Post-Closure Phases). • **Permanent (P):** Effect lasts more than 22 years.
Frequency	• **One time (O):** Effect is confined to one discrete event (month). • **Sporadic (S):** Effect occurs rarely and at sporadic intervals. • **Regular (R):** Effect occurs on a regular basis. • **Continuous (C):** Effect occurs constantly.
Reversibility	• **Reversible (R):** Effect can be reversed. • **Partially reversible (PR):** Effect can be partially reversed. • **Irreversible (I):** Effect cannot be reversed, is of permanent duration.
Context	• **High (H):** the receiving environment has a high natural resilience to imposed stresses, and can respond and adapt to the effect. • **Neutral (N):** the receiving environment has a neutral resilience to imposed stresses and may be able to respond and adapt to the effect. • **Low (L):** the receiving environment has a low resilience to imposed stresses, and will not easily adapt to the effect.

25.7.2.1.1 Assessment of Likelihood

Likelihood is determined per the attributes listed in Table 25.7-3, where possible.

Table 25.7-3: Attributes of Likelihood

Likelihood Rating	Threshold
High	Effect has > 80% chance of effect occurring.
Moderate	Effect has 40-80% chance of effect occurring.
Low	Effect has < 40% chance of effect occurring.

25.7.2.1.2 Significance Determination

The significance of each biophysical residual effect has been brought forward to this section. The definition of "significant" or "not significant" for each residual effect is defined in its particular chapter.

Due to the unique nature of Aboriginal Interests, IDM has made no determination of the significance of residual adverse effects on Aboriginal Interests. It would be inappropriate for IDM to make such a statement of determination.

25.7.2.1.3 Confidence and Risk

Confidence definitions are provided in Table 25.7-4.

Table 25.7-4: Confidence Ratings and Definitions

Confidence Rating	Threshold
High	There is a good understanding of the cause-effect relationship between the Project and a VC, and all necessary data are available to support the assessment. The effectiveness of the selected mitigation measures is moderate to high. There is a low degree of uncertainty associated with data inputs and/or modeling techniques, and variation from the predicted effect is expected to be low. Given the above, there is high confidence in the conclusions of the assessment.
Moderate	The cause-effect relationships between the Project and a VC are not fully understood (e.g., there are several unknown external variables or data for the Bitter Creek valley are incomplete). The effectiveness of mitigation measures may be moderate or high. Modeling predictions are relatively confident. Based on the above, there is a moderate confidence in the assessment conclusions
Low	Cause-effect relationships between the Project and a VC are poorly understood. There may be several unknown external variables and/or data for the Bitter Creek valley is incomplete. The effectiveness of the mitigation measures may not yet be proven. Modeling results may vary considerably given the data inputs. There is a high degree of uncertainty in the conclusions of the assessment.

25.7.2.1.4 Analytical Assessment Techniques

There are no specific models, calculations, references, or supporting data relevant to this residual effects assessment.

25.7.3 Potential Residual Effects Assessment

25.7.3.1 Potential Residual Effects to Wildlife Resources

IDM has identified three potential residual effects relating to wildlife resources. These are summarized and characterized in Table 25.7-5, Table 25.7-6, and Table 25.7-7.

Table 25.7-5: Characterization of Potential Residual Effects on Habitat Availability

Wildlife VC	Summary of Residual Effects Characterization	Likelihood (High, Moderate, Low)	Significance (Significant or Not)	Confidence (High, Moderate, Low)
Mountain Goat	Magnitude: Low Extent: Local Duration: Long-term Frequency: Continuous Reversibility: Reversible Context: Low to Neutral	High	Not Significant	Moderate
Grizzly Bear	Magnitude: Low Extent: Local Duration: Long-term Frequency: Continuous Reversibility: Reversible Context: High	High	Not Significant	Moderate
Moose	Magnitude: Low Extent: Local Duration: Long-term Frequency: Continuous Reversibility: Reversible Context: High	High	Not Significant	High
Marten	Magnitude: Low Extent: Local Duration: Long-term Frequency: Continuous Reversibility: Reversible Context: High	High	Not Significant	High
Wolverine	Magnitude: Low Extent: Local Duration: Long-term Frequency: Continuous Reversibility: Reversible Context: High	Moderate	Not Significant	Moderate
Habitat Guilds (Migratory Birds)	Magnitude: Low Extent: Local Duration: Long-term Frequency: Continuous Reversibility: Reversible Context: High	High	Not Significant	Moderate

Wildlife VC	Summary of Residual Effects Characterization	Likelihood (High, Moderate, Low)	Significance (Significant or Not)	Confidence (High, Moderate, Low)
Black Swift	Magnitude: Low Extent: Local Duration: Long-term Frequency: Continuous Reversibility: Reversible Context: Low	Moderate	Not Significant	Moderate
Common Nighthawk	Magnitude: Low Extent: Local Duration: Long-term Frequency: Continuous Reversibility: Reversible Context: Low	Moderate	Not Significant	Moderate
MacGillivray's Warbler	Magnitude: Low Extent: Local Duration: Long-term Frequency: Continuous Reversibility: Reversible Context: High	High	Not Significant	High
Marbled Murrelet	Magnitude: Low Extent: Local Duration: Long-term Frequency: Continuous Reversibility: Reversible Context: Neutral	Moderate	Not Significant	Moderate
Olive-sided Flycatcher	Magnitude: Low Extent: Local Duration: Long-term Frequency: Continuous Reversibility: Reversible Context: Low	High	Not Significant	Moderate

Table 25.7-6: Characterization of Potential Residual Effects on Habitat Distribution

Wildlife VC	Summary of Residual Effects Characterization	Likelihood (High, Moderate, Low)	Significance (Significant or Not)	Confidence (High, Moderate, Low)
Mountain Goat	Magnitude: Low Extent: Local Duration: Long-term Frequency: Continuous Reversibility: Reversible Context: Low to Neutral	High	Not Significant	Low
Marten	Magnitude: Low Extent: Local Duration: Long-term Frequency: Continuous Reversibility: Reversible Context: High	Low	Not Significant	High

Table 25.7-7: Characterization of Potential Residual Effects on Mortality Risk

Wildlife VC	Summary of Residual Effects Characterization	Likelihood (High, Moderate, Low)	Significance (Significant or Not)	Confidence (High, Moderate, Low)
Mountain Goat	Magnitude: Negligible to Low Extent: Local Duration: Long-term Frequency: Regular and Continuous Reversibility: Partially Reversible Context: Neutral	Low	Not Significant	Moderate to High
Grizzly Bear	Magnitude: Low Extent: Local Duration: Long-term Frequency: Sporadic Reversibility: Reversible Context: Neutral	Low	Not Significant	High

Wildlife VC	Summary of Residual Effects Characterization	Likelihood (High, Moderate, Low)	Significance (Significant or Not)	Confidence (High, Moderate, Low)
Moose	Magnitude: Moderate Extent: Discrete Duration: Long-term Frequency: Sporadic Reversibility: Reversible Context: Low	Low	Not Significant	Moderate
Marten	Magnitude: Low Extent: Discrete Duration: Long-term Frequency: Sporadic Reversibility: Reversible Context: Neutral	Low	Not Significant	High
Common Nighthawk	Magnitude: Low Extent: Discrete Duration: Long-term Frequency: Sporadic Reversibility: Reversible Context: Low	Low	Not Significant	High
Marbled Murrelet	Magnitude: Low Extent: Local Duration: Long-term Frequency: Sporadic Reversibility: Reversible Context: Neutral	Moderate	Not Significant	Moderate

The Project is not likely to result in significant residual effects on wildlife resources in the Bitter Creek valley. This lack of significant residual effects coupled with TSKLH's low level of use of the Bitter Creek valley in the exercise of their Aboriginal rights (to IDM's knowledge), means that the Project has a low likelihood of resulting in a low magnitude effect to TSKLH's ability to harvest wildlife resources. The extent of the effect would be discrete (i.e., limited to the Bitter Creek valley), long-term (likely to last for the duration of the Project), continuous of the life of the Project, and reversible upon reclamation of the Project.

25.7.3.2 Potential Residual Effects to Fish Resources

25.7.3.2.1 Fish Habitat

There will be no fish habitat loss under the mine infrastructure in Bromley Humps or the Mine Site because there are no fish bearing watercourses within these areas. Loss of non-fish bearing aquatic habitat is described in the assessment for Aquatic Resources (Volume 3, Chapter 17).

No residual effects are anticipated on Bull trout, Eulachon or Salmonid Species as they do not occur in the LSA or mainstem of Bitter Creek where road access is proposed.

There will be no instream fish habitat loss at watercourse crossings along the Access Road, because only two crossings, Roosevelt Creek and Hartley Gulch, are fish bearing and these will be facilitated using clearspan bridges. No instream fish habitat loss is associated with clearspan bridges, as there is no instream infrastructure required for this type of crossing. Riparian habitat loss at clear span bridges is expected where the road right of way intersects with the riparian buffer zone.

There is potential for fish habitat loss where infilling for the Access Road is required within the Bitter Creek channel. The proposed road alignment along the North/North East bank of Bitter Creek follows an abandoned existing road at the toe of steep hillside on the North side of Bitter Creek. To avoid destabilizing sensitive slopes and putting road users and workers in an unsafe position, portions of the access road will encroach on the Bitter Creek channel.

Sections of the existing road were washed away during a flood event in 2011, and therefore upgrading of the road along its original alignment requires construction within the channel formed during the 2011 flood. However, the 2011 flood was 1-in-25 to 1-in-100 year event, and therefore some of the areas where the road construction is proposed are very rarely wetted and well above the annual high water.

One 150 m section of the access road requires re-alignment of Bitter Creek at the toe of a weak fractured bedrock face. The works involve realignment of the Bitter Creek channel towards the South/South East bank, construction of a road prism along North/North East bank, with bank armouring. Approximately 1.14 ha of habitat will be altered, however no net loss of habitat is expected, because the existing channel can accommodate the annual range of flows, and realignment of the creek will not reduce average channel width.

Approximately 2.7 ha of riparian habitat will be disturbed adjacent to fish bearing streams (e.g. earthworks, armouring, slope cut and fill, roadway surface, crossings), the majority of this occurs where the road right of way intersects with the Bitter Creek riparian buffer zone. Some of the disturbed riparian area will be re-vegetated post construction, although maintenance of a maximum canopy height will be necessary to maintain slight lines along the road. The road will be deactivated prior to the end of the Closure and Reclamation Phase, using forestry practices, and therefore riparian vegetation will revert to near baseline conditions.

The characterization of residual effects on fish habitat is summarized in Table 25.7-8.

Table 25.7-8: Characterization of Residual Effects on Fish Habitat

Criteria	Interaction with Fish Habitat
Magnitude	**Low**: The area of habitat loss is limited to the LSA and to less than 150 m stretch along the Access Road/Bitter Creek.
Geographical Extent	**Discrete:** The areas of total habitat loss are limited to a short section of Bitter Creek from the road.
Duration	**Short-term**: Habitat loss occurs once during the Construction Phase; fish populations will recover once conditions return to their pre-disturbance state.
Frequency	**One time:** Habitat loss will be limited to a discrete occurrence during the construction of the Access Road.
Reversibility	**Partially Reversible:** Replacement habitat will become available when the channel is realigned, although it may not be the same quality or type or habitat. Riparian areas will be replanted were possible, and reclaimed in closure.
Context	**High:** Fish populations have high resilience to a relatively small and temporary decrease in available habitat.

The likelihood rating for this residual effect on Fish Habitat is moderate; the residual effect has 40-80% chance of effect occurring.

The residual effect on Fish Habitat is determined to be not significant. Residual effects are limited to the local area (less than 200 m), and existing habitat does not provide critical function that could not be provided elsewhere in the local area. Any loss of habitat will be offset, as required, and determined by the federal Department of Fisheries and Oceans (DFO) in subsequent permitting stages.

The confidence rating for this residual effect on Fish Habitat is high. There is sufficient baseline data to understand the form and function of existing Fish Habitat. The proposed mitigation measures are commonly applied best management practices with a high degree of effectiveness. This leads to high confidence in the conclusions of the assessment.

25.7.3.2.2 Dolly Varden

25.7.3.2.3 Potential Residual Effects to Dolly Varden due to Surface Water Quality

Residual effects on Fish from changes in Surface Water Quality are expected, based on the Water and Load Balance Model (Appendix 14-C) which, for the mitigated scenario, predicts that some water quality parameters will exceed CCME or BC WQGs.

The Water and Load Balance Model (Appendix 14-C) predicted the maximum monthly concentrations of water quality parameters in Goldslide Creek, Bitter Creek, Rio Blanco Creek and Bear River, occur for operations (Years 1 to 6) and closure/post-closure (Years 7 to 21). Water and Load Balance Model predictions are summarized in the Surface Water Quality Effects Assessment (Volume 3: Chapter 13). Contaminants of potential concern (COPCs) for Fish were identified as those parameters predicted to exceed water quality guidelines (CCME or BC MOE), in the expected case (P50), at model assessment nodes located in the fish-bearing areas (BC06 and BC02). The following COPCs were identified in Bitter Creek, which are discussed below in relation to residual effects on Dolly Varden:

- Operations: selenium
- Post Closure: cadmium, selenium, silver, and zinc

There are no potential contaminants of concern for Fish in Bear River.

Cadmium

There are cadmium exceedances during operations in Bitter Creek. During post-closure, cadmium marginally exceeds the BC WQG (1.1 times and 1.2 times higher) at BC06 and BC02, respectively, and exceeds the CCME WQG (1.6 times and 1.7 times higher) at BC06 and BC02, respectively.

Toxicity of cadmium (Cd) is highly variable among taxonomic groups and life-stages, and is also highly dependent on length of exposure. Excess cadmium interferes with the uptake of calcium by fish, which can result in cellular damage, decreases in metabolic activity, increased mortality, decreased growth, and decreased reproductive capacity and success (BC MOE, 2015). The BC WQG is the more relevant guideline for Bitter Creek, whereas the CCME guidelines are more stringent as they apply to all Canadian waters. Cadmium has been found to be toxic to salmonid species, however tolerance is highly dependent on species and life-stage. Rainbow Trout are particularly sensitive to high cadmium concentrations, whereas Bull Trout have been found to be more tolerant (Hansen *et al.,* 2002).

The exceedances of the BC WQG are marginal, and therefore adverse effects on Dolly Varden from water borne exposure to this contaminant is expected to be low. Furthermore, exceedances are seasonal (spring / summer), thereby limiting the potential for chronic effects on Dolly Varden.

Selenium

Selenium exceeds the BC WQG and CCME WQG during both operations and post-closure at both BC06 and BC02. During operations, BC WQGs are exceeded by 1.2 times and 2.1 times and CCME WQGs are exceeded by 2.7 times and 4.1 times at BC06 and BC02, respectively. During post-closure, BC WQGS are exceeded by 2.2 times and 3.8 times at BC06 and BC02, respectively. These exceedances are largely due to background concentrations, which exceeded guidelines in both the water and sediment.

CCME and BC water quality guidelines for selenium are based on a lowest observed effect level (LOEL) of 0.01 mg/L introduced by the International Joint Commission (IJC) to protect species in the Great Lakes (IJC 1981). For the CCME guideline, a safety factor of 10 was applied to the LOEL to end up with the guidance of 0.001 mg/L. The BC WQG of 0.002 mg/L incorporates a safety factor of 5 to recognize that selenium is an essential trace element for animal nutrition and that it is the bioaccumulation of selenium through the food chain (chronic effects) that is the major source, not through the water column.

Selenium has the potential to induce both reproductive and non-reproductive effects in fish. Reproductive impacts originate from the maternal transfer of selenium, whereas non-reproductive effects are related to direct effects on individuals, and both primarily result from dietary uptake (Lemly, 2008; DeForest and Adams, 2011). Chronic effects of selenium toxicity include lack of fertilization, hatchability and higher mortalities of eggs as well as increased cataracts, pathological alterations in liver, kidneys, heart and ovaries and skeletal deformities (Lemly 2002, 1997). The likelihood of adverse effects to fish in Bitter Creek is low, as selenium exceeds BC WQG during the winter months (September to March/April). Additionally, a difference in selenium toxicity and bioaccumulation has been noted between lentic and lotic systems. In a review compiled by Adams *et al.* (2000), a clear distinction was demonstrated between fast and slow moving water systems, with selenium bioaccumulation generally ten times greater in lentic environments in comparison to lotic environments. Bitter Creek is a fast moving, lotic systems, therefore bioaccumulation and associated dietary uptake by fish are expected to be low.

Silver

There are silver exceedances during operations in Bitter Creek. During post-closure, silver is below BC WQG at both BC06, and marginally exceeds the CCME WQG (1.6 times and 1.2 times higher) at BC06 and BC02, respectively.

Silver uptake in freshwater fish mainly occurs in cells related to nutrient uptake and ion regulation on the gills (CCME, 2015). The inhibition of sodium and chloride uptake channels on fish gills due to silver ions can negatively impact ion balances (CCME, 2015).

An effect on Dolly Varden from increased silver concentrations is considered highly unlikely as concentrations will not exceed the BC WQG and exceedances of the CCME guideline are small and occur in six months of the year only.

Zinc

There are zinc exceedances during operations in Bitter Creek. During post-closure zinc is predicted to be below the CCME WQG. Zinc will exceed the BC WQG (1.3 times higher) at BC06 but be essentially equal to or below the guideline at BC02.

Zinc is an important micronutrient and is therefore essential in the structure of numerous proteins (Hogstrand and Wood, 1996). Uptake of zinc primarily occurs on fish gills, and high concentrations of calcium in the water can reduce uptake (Bradley and Sprague, 1985). High concentrations of zinc can cause physical damage to the gills, which then induces hypoxia (Spry and Wood, 1984). Lower concentrations of zinc have been seen to impede calcium uptake, and cause hypocalcemia (Spry and Wood, 1985). Zinc exceedances at BC06 is predicted to occur during April to July when water hardness is lower. However, the overall potential for zinc toxicity to fish is expected to be low given the seasonal frequency and small magnitude of exceedance of the BC WQG.

The characterization of residual effects on Dolly Varden is summarized in Table 25.7-9.

Table 25.7-9: Characterization of Residual Effects on Dolly Varden due to Changes in Water Quality

Criteria	Interaction with Dolly Varden
Magnitude	**Low:** The effect on Dolly Varden is at the limits of natural variation, as only one parameter (selenium) is predicted to exceed the BC WQG for the protection of aquatic life by more than 30%.
Geographical Extent (Biophysical)	**Local:** Effect is limited to the immediate freshwater environment in Bitter Creek (TMF and Access Roads).
Duration	**Permanent:** changes to Surface Water Quality from TMF and Mine Site discharge are predicted to be beyond the Post-Closure Phase.
Frequency	**Sporadic:** Discharges and predicted guideline exceedences occur on an intermittent basis, such that effect on Dolly Varden may not occur during periods where there are no discharges.
Reversibility	**Reversible:** After post-closure, the Surface Water Quality, and therefore potential effects on Fish (Dolly Varden), are expected to revert back to within baseline conditions after a number of years.
Context	**High:** Fish can recover once water quality reverts to baseline conditions.

The likelihood rating for this residual effect on Dolly Varden is low.

Exceedances of water quality guidelines are predicted, but any effects on Fish (Dolly Varden) will be localized and have no far-reaching effects on regional productivity or diversity. Overall, ecological conditions that support Fish populations relative to existing baseline will be maintained. Therefore, the residual effect is considered not significant.

Confidence in the significance determination for this effect is Moderate, because the magnitude of the effect (changes in Surface Water Quality concentrations) cannot be fully quantified but only inferred from the water quality predictions. Monitoring of the aquatic environment, including fish tissue, as part of the MMER and the Project AEMP (Volume 5, Chapter 29) will provide further confidence in managing the risk of selenium on fish populations in the LSA.

25.7.3.2.4 Potential Residual Effects to Dolly Varden due to Changes in Streamflows

A residual effect to Fish and Fish Habitat from changes in streamflow in Bitter Creek is anticipated based on the water quantity predictions in Appendix 14-C.

During operations, increases in flow will occur in Bitter Creek as result of mine discharge into Goldslide Creek.

The maximum predicted increase in flow in January and December is 15% and 10% of baseline conditions at BC06 and BC02 respectively. During freshet and summer (May to September) the change in flow is negligible in Bitter Creek.

The increased flow during operations for the winter is much less than the peak flows during the summer in Bitter Creek, so the increase in flow during the winter is not expected to have any effect on the geomorphology of the stream channel. Under natural conditions, winter is a low flow period. Dolly Varden egg incubation occurs over the winter period, and increases in flow could therefore affect incubating eggs and fry emergence timing. Increased winter flows are also expected to improve the availability of overwintering habitat (deeper areas that do not freeze to bottom) for juveniles.

Table 25.7-10: Characterization of Residual Effects on Dolly Varden due to Changes in Streamflows

Criteria	Interaction with Dolly Varden
Magnitude	**Low**, based on the predictions for increases in flow.
Geographical Extent (Biophysical)	**Local:** Effect is limited to the immediate freshwater environment in Bitter Creek (TMF and Access Roads).
Duration	**Short-term:** Changes to streamflows from discharge inputs is limited to the Operation phase.
Frequency	**Regular:** Flow increases will occur seasonally during the winter months.
Reversibility	**Reversible:** After operations, the flow regime will return to within baseline levels and therefore Fish and Fish Habitat will recover as well.
Context	**High:** Fish and Fish Habitat can recover once flows revert to baseline levels.

The likelihood of effects to Fish from changes in streamflows in Bitter Creek is high.

Although effects on Dolly Varden life stages may occur as a result of winter flow increases in Bitter Creek, the effect will be localized and have no far-reaching effects on regional productivity or diversity. The effect is also seasonal (winter only), short-term (operations), and reversible. Overall, ecological conditions that support Fish populations relative to existing baseline will be maintained. Therefore, the residual effect is considered not significant.

Confidence in the significance determination for this effect is Moderate, because the magnitude of the effect can be indirectly quantified (magnitude of flow changes) and the mechanism through which changes in streamflow impact Fish and Fish Habitat is reasonably well understood.

25.7.3.2.5 Effects to TSKLH's Ability to Harvest Fish

Due to the localized aspects of the residual effects on Fish and Fish Habitat and TSKLH's low level of use of the Bitter Creek valley for traditional purposes (as understood by IDM), the Project has a low likelihood of resulting in a low magnitude effect to TSKLH's ability to harvest fish. The extent of the effect would be discrete (i.e., limited to the Bitter Creek valley), long-term (likely to last for the duration of the Project), continuous of the life of the Project, and reversible upon reclamation of the Project.

25.7.3.3 Potential Residual Effects to Plant Resources

Some residual effects on plant resources are anticipated however these are not likely to be significant due to the relatively small Project footprint. The characterization of potential residual effects on plant resources is summarized in the table below.

Table 25.7-11: Characterization of Potential Residual Effects to Plant Resources

Residual Effect (Measurement Indicators)	Valued Component	Project Phase(s)	Mitigation Measures	Summary of Residual Effects Characterization *(context, magnitude, geographic extent, duration, frequency, reversibility)*	Likelihood *(High, Moderate, Low)*	Significance *(Significant, Not Significant)*	Confidence *(High, Moderate, Low)*
Loss of Ecologically Valuable Soils	Ecologically Valuable Soils	Construction Operation Closure and Reclamation	See Table 15.6-2	Context: Neutral Magnitude: Moderate Geographic Extent: Discrete Duration: Long-Term Frequency: Sporadic Reversibility: Irreversible	High	Not Significant	Moderate
Alteration of Ecologically Valuable Soils	Ecologically Valuable Soils	Construction Operation Closure and Reclamation	See Table 15.6-2	Context: Low Magnitude: Low Geographic Extent: Discrete Duration: Long-Term Frequency: Continuous Reversibility: Partially Reversible	High	Not Significant	High
Loss and alteration of ecosystem abundance, distribution, and/or function	Alpine and Parkland Ecosystems	Construction Operation Closure and Reclamation	See Table 15.6-2	Context: Low Magnitude: Moderate Geographic Extent: Discrete Duration: Long-Term to Permanent Frequency: Continuous Reversibility: Partially Reversible	High	Not Significant	Low to Moderate

Residual Effect (Measurement Indicators)	**Valued Component**	**Project Phase(s)**	**Mitigation Measures**	**Summary of Residual Effects Characterization** *(context, magnitude, geographic extent, duration, frequency, reversibility)*	**Likelihood** *(High, Moderate, Low)*	**Significance** *(Significant, Not Significant)*	**Confidence** *(High, Moderate, Low)*
Loss and alteration of ecosystem abundance, distribution, and/or function	Old Growth and Mature Forested Ecosystems	Construction Operation Closure and Reclamation	See Table 15.6-2	Context: Low Magnitude: Moderate Geographic Extent: Discrete Duration: Permanent Frequency: Continuous Reversibility: Partially Reversible to Irreversible	High	Not Significant	Moderate
Loss and alteration of ecosystem abundance, distribution, and/or function	BC CDC Listed Ecosystems	Construction Operation Closure and Reclamation	See Table 15.6-2	Context: Neutral Magnitude: Negligible to High Extent: Discrete Duration: Long-Term to Permanent Frequency: Continuous Reversibility: Partially Reversible to Irreversible	High	Not Significant	Moderate
Loss or alteration to known occurrences	Rare Plants, Lichens, and Associated Habitat	Construction Operation Closure and Reclamation	See Table 15.6-2	Context: Low Magnitude: Negligible to High Extent: Beyond Regional Duration: Short Term to Permanent Frequency: One time to Continuous Reversibility: Partially Reversible to Irreversible	Moderate to High	Not Significant	Moderate

Plants traditional harvested by TSKLH (as summarized in Table 25.7-12, including huckleberries, blueberries, soapberries, cranberries, fiddleheads (species unknown), dandelions, yarrow, devil's club, and willow are all likely to occur in the Bitter Creek valley. Table 25.7-12 cross-references these plants' likely habitats with the ecosystem VCs assessed by IDM.

Table 25.7-12: TSKLH Harvested Plants by Ecosystem VC

Plants	Ecosystem VC
Huckleberries, blueberries	Alpine and Parkland Ecosystems Old and Mature Forested Ecosystems
Soapberries	Certain Floodplains
Cranberries	Alpine and Parkland Ecosystems Certain Wetlands Old and Mature Forested Ecosystems
Mushrooms	Unknown
Fiddleheads (species unknown)	Unknown (not identified during field surveys but may occur at the lower elevations closer to the ocean)
Dandelions	Variable
Yarrow	Old and Mature Forested Ecosystems (lower elevations)
Devil's Club	Old and Mature Forested Ecosystems Certain Wetlands
Willow	Alpine and Parkland Ecosystems Old and Mature Forested Ecosystems Wetlands and Floodplains BC CDC Listed Ecosystems

The Project is not anticipated to have any significant residual adverse effects on Vegetation and Ecosystems VCs in the areas where TSKLH traditionally gather plants, including floodplains (where TSKLH may potentially harvest soapberries) or wetlands (where TSKLH may potentially harvest cranberries, Devil's Club, and Willow).

The low current use of the Bitter Creek valley by TSKLH members combined with the lack of significant residual effects on plant resources means that the Project has a low likelihood of resulting in a low magnitude effect to TSKLH's ability to harvest plants. The extent of the effect would be discrete (i.e., limited to the Bitter Creek valley), long-term (likely to last for the duration of the Project), continuous of the life of the Project, and reversible upon reclamation of the Project.

Increased access to the valley as a result of the construction of the Project's Access Road may increase the opportunity to gather plants in the valley.

In comparison to the traditional use value of the regional area, the Bitter Creek valley has low traditional use value and the Project will not likely result in alienation of lands from Aboriginal traditional use due to residual effects to plant resources.

The residual effect on plant resources may only be partially reversible or irreversible, however the existing cultural value is low (in IDM's understanding).

25.7.4 Summary of Residual Effects Assessment

Residual effects and the selected mitigation measures, characterization criteria, likelihood, significance determination, and confidence evaluations are summarized in Table 25.7-13.

Table 25.7-13: Summary of the Residual Effects Assessment on TSKLH's Aboriginal Interests

Valued Component	Residual Effect	Project Phase(s)	Mitigation Measures	Summary of Residual Effects Characterization Criteria *(magnitude, geographic extent, duration, frequency, reversibility, context)*	Likelihood *(High, Moderate, Low)*	Significance *(Significant, Not Significant)*	Confidence *(High, Moderate, Low)*
Potential changes to TSKLH's ability to harvest wildlife (including birds) for traditional purposes	Wildlife and Wildlife Habitat	Construction Operation Closure and Reclamation	See Table 25.6-2	Magnitude: Low Extent: Discrete Duration: Long-term Frequency: Continuous Reversibility: Reversible Context: High	Low	Not Significant	Moderate
Potential changes to TSKLH's ability to harvest fish for traditional purposes	Fish and Fish Habitat	Construction Operation Closure and Reclamation	See Table 25.6-3	Magnitude: Low Extent: Discrete Duration: Long-term Frequency: Continuous Reversibility: Reversible Context: High	Low	Not Significant	Moderate
Potential changes to TSKLH's ability to harvest plants for traditional purposes	Vegetation and Ecosystems	Construction Operation Closure and Reclamation	See Table 25.6-4	Magnitude: Low Extent: Discrete Duration: Long-term Frequency: Continuous Reversibility: Reversible Context: High	Low	Not Significant	Moderate

25.8 Other Matters of Concern

In the letter of June 26, 2017, TSKLH states that "Aboriginal title is the overarching interest of the TSKLH Nation that stands to be affected by the Project," provides extensive documentation to support TSKLH's claim to Aboriginal title in the Project area, and raises the concern that Aboriginal title is not included in this chapter (Simpson 2017). TSKLH also states that the intrusions of mining projects "on the interests protected by Aboriginal title cannot be resolved by low-level consultation or by mere notification from the Crown or proponents about Project-related activities on territory held under Aboriginal title or claimed Aboriginal title" (Simpson 2017), which IDM believes is a reference to the levels of consultation determined by EAO and the Agency for the Project's EA.

IDM understands that TSKLH has been in discussions with representatives from the provincial government regarding the Crown's analysis of TSKLH's strength of claim to Aboriginal rights and title in the Project area, and that this is an ongoing issue of concern for TSKLH. IDM defers to the Crown on all matters related to strength of claim, including title, and consultation.

25.9 Issue Summary Table

Table 25.9-1 summarizes the issues, interests, and concerns raised by TSKLH regarding potential effects to their Aboriginal Interests (from IDM's perspective), IDM's proposed mitigation measures, and the status of the issue, interest, or concern.

It is IDM's opinion that all potential effects to TSKLH's Aboriginal Interests can be fully mitigated or accommodated.

Table 25.9-1: TSKLH Issue Summary Table

Topic	Issues, Interest, or Concern Raised	Analysis of Potential Effect	Proposed Measures to Avoid, Mitigate or Otherwise Manage Effects	Status of Resolution (e.g. resolved, ongoing resolution, referred to agency, etc.)
Hunting	TSKLH have Aboriginal rights to hunt in the Project area.	The Project is not likely to result in significant adverse effects to wildlife resources.	See Table 25.6-2	Resolved
Trapping	TSKLH owns traplines in the Project area.	The Project is not likely to result in significant adverse effects to wildlife resources.	See Table 25.6-2	Resolved

Topic	Issues, Interest, or Concern Raised	Analysis of Potential Effect	Proposed Measures to Avoid, Mitigate or Otherwise Manage Effects	Status of Resolution (e.g. resolved, ongoing resolution, referred to agency, etc.)
Fishing	TSKLH have Aboriginal rights to fish in the Project area.	The Project is not likely to result in significant adverse effects to fish resources.	See Table 25.6-3	Resolved
Mushroom, Plant, and Berry Harvesting	TSKLH harvest, consume, and trade plants, such as berries.	The Project is unlikely to result in significant adverse effects to plant resources.	See Table 25.6-4	Resolved
Aboriginal Title	TSKLH claim Aboriginal Title in the Project area. TSKLH are concerned regarding potential effects of the Project on their Aboriginal title and feel that the level of consultation determined by EAO is not appropriate.	IDM defers to the Crown on all matters related to strength of claim, including title, and consultation.	n/a	Referred to Crown agencies

25.10 References

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