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5.4.13 Furbearers

5.4.13.1 Introduction

This section assesses the potential effects of the Project on the furbearers Valued Component (VC). The indicator species are marten (*Martes americana*) and beaver (*Castor Canadensis*). The assessment is described in the subsections below and will be conducted for these species. This introduction describes the information sources of the assessment and the applicable regulatory framework for the assessment of the VC (**Section 5.4.13.1.1**). The spatial, temporal, administrative, technical boundaries and assessment approach is describes in (**Section 5.4.13.3**).

Furbearers are year-round residents in the Project area and are indicative of the winter mammal carrying capacity and habitat connectivity of the landscape. The American marten (*Martes americana*) is a representative species of furbearer that is distributed across the entire Project area.

Marten was selected as a representative furbearer Valued Component (VC) because of the ecological, cultural, as well as the economic importance of traditional trapping. As an indicator for the habitat requirements of other harvested furbearers (e.g., lynx, coyote) in the Project area, if management plans retain polygons with high valued habitat, there is a greater chance of maintaining biodiversity across managed landscapes (Proulx, 2006). The conservation of marten will act to protect other furbearer species in the area, as the high valued marten habitat represents habitats used by all furbearers.

Marten is dependent on mature and old-growth coniferous forests, although deciduous and mixed forests are also used to satisfy their life requisites. Pre-existing habitat loss and fragmentation have altered the amount of potential habitat within the Project area. Marten is an indicator of forest ecosystem health and an important prey species for many predatory carnivores (e.g., wolverine (*Gulo gulo*), coyote (*Canis latrans*), and great-horned owl (*Bubo virginianus*)) (Buskirk and Ruggiero, 1994).

Beaver (*Castor canadensis*) was also selected as an additional indicator species for furbearers due to its economic importance to First Nations and local trappers, and its representative habitat within wetlands and other waterbodies in the Project area. Through the building of dams to create ponds and the harvesting of trees, beavers are responsible for the creation and alteration of wildlife habitat, as well as affecting the hydrology of the local environment (Pollock et al., 2003).

5.4.13.1.1 Regulatory Considerations

To assess potential Project effects, a number of regulatory requirements were considered (**Table 5.4.13-1**) that apply to furbearers and different phases of Project development, mitigation, and reclamation. Furbearers are subject to the BC *Wildlife Act* regulations (Government of BC, 1996a), and some species are provincially listed species at risk (e.g., wolverine *Iuscus* subspecies (*Gulo gulo luscus*) and fisher (*Martes pennanti*) are Blue-listed). Species of conservation concern that occur in the Project area are afforded protection under the *Species at Risk Act* (SARA) (Government of Canada, 2002). When also listed federally (e.g., western population of wolverine),

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provincially listed species are subject to SARA and/or the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The Vanderhoof Land and Resource Management Plan (LRMP) (ILMB, 1997) provides guidance for development of the regional area, as well as recommendations for the protection of furbearer habitat. Management of wildlife habitat and populations is considered under the BC *Forest and Range Practices Act* (Government of BC, 2002) and the BC Conservation Framework.

Table 5.4.13-1: Regulatory Considerations Regarding Furbearers

Regulation/ Guideline	Brief Description or Requirements	Data Required to Meet Regulation/Guideline	Timeframe (Pre/Post-Application Submission)
Canada <i>Species at Risk Act</i>	Species at risk may require federal permits for handling or habitat destruction.	Occurrence and abundance / distribution data from surveys.	Ongoing monitoring of mitigation measures, wildlife management plan for exploration, construction and operation potentially affecting the designated western population of marten.
BC <i>Wildlife Act</i>	Pertains to all furbearer species and their management. Permits are required for handling and surveys of furbearers that may harass animals.	Abundance and distribution data from BC CDC records and surveys, furbearer habitat suitability.	Wildlife management plans pre-Application
BC <i>Forest and Range Practices Act</i>	Riparian areas, wetlands and old-growth management areas require special management.	Impact assessment and proposed mitigation/offsets required to assess habitat loss to old-growth forest edges and wetland areas, both of which can include important habitat for furbearers.	Wildlife management plans and permitting for exploration.
Vanderhoof Land and Resource Management Plan	Provides guidelines for the development of the Vanderhoof area with recommendations for wildlife.	Abundance and distribution data from BC CDC records and surveys, furbearer habitat suitability.	Wildlife management plans pre-Application
BC Conservation Data Centre	Wolverine and fisher are provincially Blue-listed.	Habitat and population data related to the Project.	Ongoing

Note: BC CDC = British Columbia Conservation Data Centre

5.4.13.2 Valued Component Baseline

Baseline surveys for furbearers took place within the mine site, mine site access road, airstrip, freshwater supply system, and transmission line LSAs, and wildlife RSA in areas identified as having potential for higher furbearer usage and suitable for survey transects. Areas along the Kluskus FSR were not surveyed since they did not fit these criteria (Figure 2.1-26 in **Appendix 5.1.3.4A**). Surveys are considered complete because they focused on the presence/non-detection of species within the LSAs and RSA, and most potential species were identified during surveys (**Appendix 5.1.3.4A**, Section 3.5.2.4, Table 3.5-1). Incidental detections through aerial winter tracking surveys and photographs from wildlife cameras provided additional evidence. Six aerial reconnaissance transects were flown within the Project area on 16 March 2011, winter tracking surveys were completed between 12 to 16 March 2012, and wildlife cameras were used along rivers, creeks, games trails, roads, clearcuts, forest edges, and wetlands throughout the Project area in 2012 and 2013. The cameras were used to record species presence in these areas during summer and early fall (June to September). Baseline field studies followed Resources Information Standards Committee (RISC) standards for winter tracking for marten to determine presence/not-detected status (RISC, 1998).

For marten, 14 individuals were detected during the 2012 ground winter track surveys. All locations were within the Regional Study Area (RSA) outside of the mine site Local Study Area (LSA), which both comprise the Project area. Detections were nearly equally split between the Engelmann Spruce – Subalpine Fir Nechako Moist Very Cold (ESSFmv1) and Sub-Boreal Spruce Kluskus Moist Cold (SBSmc3) variants. Most of these detections (50%) occurred in mature pine forests, with smaller numbers in mature spruce and subalpine fir forests, and one detection in a young pine forest. No marten were detected using aerial track surveys, wildlife cameras, or incidentally. Transects along roads had low numbers of marten tracks (as well as other mustelids), which is likely due to the disturbance of road traffic and the added exposure to predation in the open area. There were marten tracks in the same area; however, the tracks were located within the adjacent forest. The marten tracks were located in the lower Davidson Creek area in areas of mature and old-growth pure pine stands adjacent to regenerating clearcuts. In addition, one wolverine was detected during the ground-based winter track surveys in 2012 in the lower Davidson Creek area, and one fisher was observed crossing the Kluskus FSR in 2013 (**Appendix 5.1.3.4A**).

Five beavers or signs of beaver (e.g., lodge, dam) were detected incidentally during other surveys between 2011 and 2013. All detections occurred within the SBS BGC zone and were up to 1300 m in elevation; four detections were located on lakes within the RSA, and one detection located on Davidson Creek within the mine site.

5.4.13.2.1 Past, Present, or Future Project Activities

The project or activities considered in the assessment are in the Project Inclusion List (PIL). The PIL identifies those projects or human activities that may overlap spatially or temporally with the Project summarized in (**Table 4.3-11**). **Appendix 4C** presents the detailed Project Inclusion List and descriptions of various projects and activities used for assessing potential environmental effects.

Pre-existing habitat loss and fragmentation due to logging and road development has altered the low elevation habitat within the Project area. The mountain pine beetle (MPB) infestation has affected large areas of mature pine forest in the region including the LSA and RSA, some of which was harvested, while remaining stands are in various stages of degeneration. Mineral exploration in the area increased the number of access roads. Furbearer baseline information was collected in the LSA and portions of the RSA that were altered by these past and present activities. Future activities in the RSA are expected to include similar activities.

Forest fire and forest insects are the primary natural disturbances in low elevation habitat. Fire directly alters habitat through loss of mature and old-growth coniferous forests, which are important furbearer habitat. Beavers are well adapted to early seral deciduous and mixed forest habitats and are expected to benefit from disturbance related to fire and MPB.

5.4.13.2.2 Traditional Ecological and Community Knowledge

Furbearers are important to local residents and Aboriginal groups. Furbearers and trapping of these animals provide a basis for a traditional lifestyle that has endured for many years. Interviews with First Nations and trapline tenure holders found that trapping was important to the local economy (**Section 3**). In recent years, due to fluctuating fur prices, increasing costs, and other factors such as trapline owners passing away or retiring, the amount of trapping has varied. Furbearers trapped include beaver, mink (*Neovison vison*), lynx (*Lynx canadensis*), marten, muskrat (*Ondatra zibethicus*), rabbit, coyote, wolf, and some wolverine. Many Aboriginal people and some non-Aboriginal people have the skills to trap, clean, and skin animals (Interview with Owner of Trapline TR0712T036, 2013; Interview with Owner of Trapline TR0712T039, 2013; Interview with Owners of Trapline TR0711T007, 2013; Interview with Lhoosk'uz Dene Nation and Saik'uz First Nation Members, 2013) (**Section 3**).

5.4.13.3 Potential Effects of the Proposed Project and Proposed Mitigation

This subsection identifies and analyzes potential adverse effects on the furbearer VC resulting from the proposed Project's construction, operations, closure and post-closure phases.

It first describes the features of the study area, temporal, administrative, and technical boundaries. (**Section 5.4.13.3.1 to Section 5.4.13.3.4**).

Then, **Section 5.4.13.3.6** details the assessment approach used in the assessment followed by **Section 5.4.13.3.8** Mitigation Measures.

The assessment considers the following:

- Terrestrial habitat, including the quality and quantity of any lost habitat for relevant species;
- Feeding, or breeding habitats;
- Any wetland habitat alteration or loss (particularly to address effects on beaver);

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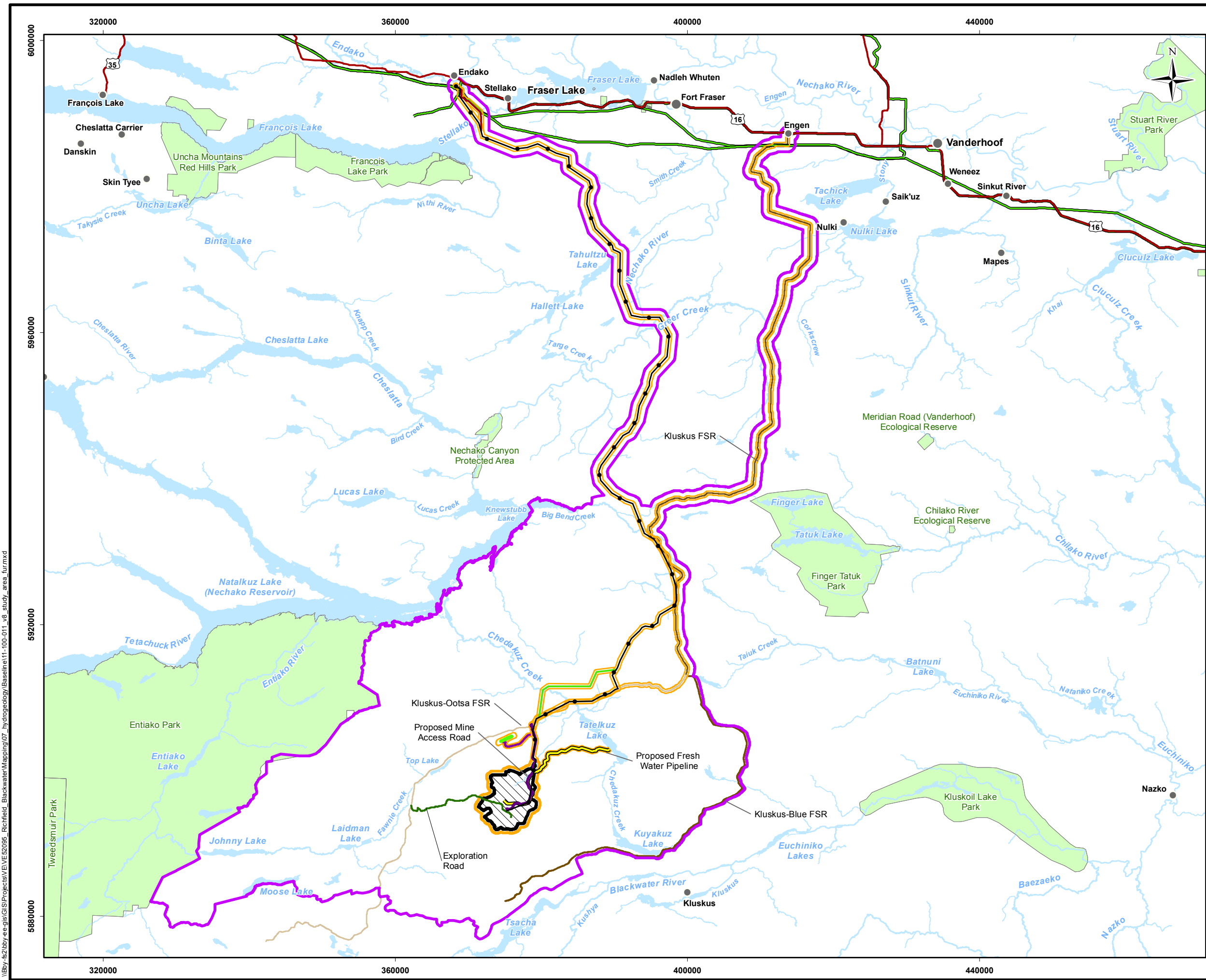
- Barriers to wildlife, including the roads developed as part of the mine and their potential effects on wildlife movements;
- Disturbance of daily or seasonal wildlife movements (e.g., migration and home ranges), which would include potential hazards and conflicts associated with mine access and travel corridors of terrestrial wildlife;
- Any species of furbearer that are Rare, Vulnerable, Endangered, Threatened, or of Special Concern as listed under provincial Blue and Red lists, SARA, COSEWIC, as well as, any species of international significance;
- Direct and indirect wildlife mortality from the mine operations and traffic;
- Wildlife habitat is being rated for suitability as a surrogate for wildlife productivity; and
- Implications of the proposed Project acting as an attractant for particular species.

A range of potential effects on furbearers can be associated with a project involving a mine site, linear features including roads, water supply pipeline and electrical transmission line. Assessment boundaries define the scope or limits of the assessment. The boundaries encompass the areas and time periods during which the Project is expected to interact with furbearers (spatial and temporal boundaries), any constraints placed on the assessment of those interactions due to political, social, and/or economic realities (administrative boundaries), and any limitations in predicting or measuring changes (technical boundaries). Each of these boundaries is defined in the subsections below.

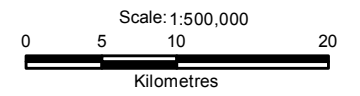
Activities occurring during each phase of the proposed Project could potentially interact with furbearers. Habitat loss, features that act as attractants to some species, potential mortality, changes in habitat availability, noise disturbance (displacement), and disruptions of movement are the predicted key and moderate interactions of the proposed Project related to furbearers. Taking a conservative approach, both key and moderate interactions are combined and considered jointly in assessment of project and cumulative effects.

5.4.13.3.1 Study Area Boundaries

Two geographic scales were defined for considering the Project effects on furbearers and furbearer habitat, as shown on **Figure 5.4.13-1** and described below. These areas were used for collecting baseline information. The Project area encompasses the Local Study Area (LSA) and Regional Study Area (RSA) as described below. Past, present, and future activities that may affect furbearers within these areas were identified and assessed within the RSA.



- Legend**
- Populated Place
 - Highway
 - Kluskus FSR
 - Kluskus-Blue FSR
 - Kluskus-Ootsa FSR
 - Existing Transmission Line
 - Parks & Protected Areas
- Project Components**
- Exploration Road
 - Proposed Mine Access Road
 - Proposed Transmission Line
 - Proposed Transmission Line (Mills Ranch Reroute)
 - Proposed Transmission Line (Stellako Reroute)
 - Proposed Freshwater Pipeline
 - Proposed Airstrip Access
 - Proposed Airstrip
 - Proposed Mine Site
- Regional Study Area Boundaries for Furbearers and Associated Habitat**
- Regional Study Area
 - Local Study Area



Reference
BC Government GeoBC Data Distribution

CLIENT: **newgold**

PROJECT: **Blackwater Gold Project**

Regional Study Area Boundaries for Furbearers and Associated Habitat

DATE: May, 2014	ANALYST: KA	Figure 5.4.13-1
JOB No: VE52277	QA/QC: LR	PDF FILE: 11-100-011_v8_study_area_fur.pdf
GIS FILE: 11-100-011_v8_study_area_fur.mxd		
PROJECTION: UTM Zone 10	DATUM: NAD83	amec

\\bby-is2bby-ee-gis\GIS\Projects\VE\VE52095_Richfield_Blackwater\Mapping\07_hydrogeology\Baseline\11-100-011_v8_study_area_fur.mxd

Local Study Area: The AIR describes the LSA as follows (**Table 4.3-1 of Section 4**):

- Mine Site: Approximate 500 m buffer around the proposed mine site facilities; and
- Transmission line, mine access road, airstrip, freshwater supply pipeline, and Kluskus FSR: approximately 250 m buffer from each side of the linear component boundary.

The rationale for the LSA is as follows (**Table 4.3-1 of Section 4**):

- The LSA includes the entire mine site where habitat will be removed and considers a buffer to take into account sensory disturbance; and
- The LSA includes all linear components and a buffer to take into account sensory disturbance. The buffer along the linear corridors varies because activities along those corridors varies from an access road that may have greater sensory disturbance to a transmission line with limited human activity or traffic after construction.

The LSA for the purpose of the furbearers VC comprises 22,509 ha and includes 7,032 ha for the Project footprints (**Table 5.4.13-2**). The LSA includes the proposed mine site area (the mine site footprint plus a 500 m buffer), and all linear components areas (linear components with 250 m buffer on each side of linear component boundary, except for the airstrip which is 300 m buffer on each side). The linear component boundary, also referred to as the footprint, is comprised of the feature's right-of-way (ROW) and an additional buffer. The linear component boundary widths are as follows: existing Kluskus FSR is 20 m (20 m ROW with no buffer), proposed mine access road is 120 m (20 m ROW with 50 m buffer each side), proposed transmission line is 140 m (40 m ROW with 50 m buffer on each side), proposed freshwater supply pipeline is 110 m (10 m ROW with 50 m buffer on each side), proposed airstrip is 200 m (100 m ROW with 50 m buffer each side), and the proposed airstrip access road is 10 m (10 m ROW, with no buffer). The transmission line includes a mainline route and two potential re-routes, the Mills Ranch and Stellako options.

Table 5.4.13-2: Project Component Footprint Areas

Component	Area (ha)
Mine Site	4,430
Access Road	95
Existing Kluskus Forest Service Road	253
Airstrip	50
Freshwater Pipeline	132
Main Transmission Line	1,806
Mills Ranch Transmission Line	202
Stellako Transmission Line	62
Total Project Footprint	7,032

Note: ha = hectare

Regional Study Area: The AIR describes the RSA as follows (**Table 4.3-1 of Section 4**):

- Mine Site: Includes ungulate winter range established for the Tweedsmuir-Entiako caribou herd (U-7-012). The western and southern edges of the RSA outline these winter ranges. The southwestern boundary follows the Upper Blackwater Management Zone where the RSA then follows the Blue Road till it reaches the Ootsa – Kluskus FSR and follows this north until it reaches the Nechako Reservoir. The northern boundary of the RSA follows the shoreline of the Nechako Reservoir. The northern boundary of the RSA follows the shoreline of the Nechako Reservoir; and
- Transmission Line and Kluskus FSR. Approximate 1 km buffer from the linear component boundary.

The rationale for the RSA is as follows (**Table 4.3-1 of Section 4**):

- Extends beyond the mine site LSA to consider natural barriers for wildlife such as large water bodies or watershed divides.

The RSA for the purpose of the furbearer VC; comprises 291,714 ha and is large enough to assess the seasonal home range movements and important seasonal habitats of most species considered, some of which have long distance movement patterns. The RSA was selected to include a wide variety of habitat types also found in the LSA, allowing the assessment of relative abundance of habitat within the LSA relative to the greater region within which the Project is situated.

5.4.13.3.2 Temporal Boundaries

Preliminary temporal boundaries of the Project, which are contingent on permitting, include four primary phases.

- **Construction phase:** The construction phase of the Project will occur over 2 years and will likely start following receipt of the required permits;
- **Operations phase:** The operations phase of the Project will extend for approximately 17 years;
- **Closure phase:** The closure phase is estimated to last approximately 18 years (ending in Year 35); and
- **Post-closure phase:** The post-closure phase starts in Year 35.

In terms of duration of effects, the following terms are used in this effects assessment:

- Short-term—Effect occurs during the construction phase;
- Long-term—Effect occurs throughout operations and closure; and
- Chronic—Effect extends into post-closure or beyond.

5.4.13.3.3 Administrative Boundaries

Marten is a management species for many of the resource management zones (RMZ) in the Vanderhoof Land and Resource Management Plan (LRMP). Each RMZ has a selection of species of management concerns and objectives to guide land use decisions and management. The mine site and associated infrastructure including the roads and transmission line are located within the following RMZs: Nechako Valley, Nechako West, Upper Nechako River, Vanderhoof South, Crystal Lake, Kluskus, Chedakuz, Davidson Creek, and Laidman Lake. These RMZs have objectives that are considered for each species effects assessment if relevant. The Project is located within five Wildlife Management Units (WMUs): 5-12, 5-13, 6-1, 7-11, and 7-12. Each WMU is the primary designation tool for conservation lands under section 4 of the *Wildlife Act*. Conservation and management of fish, wildlife, and their habitats are priority in a WMU and are used to set hunting and trapping regulations (BC MFLNRO, 2012).

5.4.13.3.4 Technical Boundaries

Technical boundaries for the assessment are established by the accuracy of the wildlife habitat model predictions used in the effects assessment. There is an uncertainty / margin of error associated with the use of habitat suitability models; however, RISC standards for ratings and suitability classes were followed. Therefore, these include acceptable levels of uncertainty for an assessment. Surveys were completed within the LSA and RSA.

5.4.13.3.5 Potential Project Effects

The assessment of potential Project effects on furbearers within the RSA included habitat effects and mortality risk, as well as potential cumulative effects. Many threats to furbearers and associated habitat are related and may interact. Cumulative impacts may not be evident when threats are examined individually.

The named projects from the PIL in **Table 4.3-11** that represent present and future projects will not have interactions with the Project however the listed activities from the list will. Pre-existing habitat loss and fragmentation due to logging and road development has altered the low elevation habitat within the Project area. The mountain pine beetle (MPB) infestation has affected large areas of mature pine forest in the region including the LSA and RSA, some of which was harvested, while remaining stands are in various stages of degeneration. Mineral exploration in the area increased the number of access roads. Furbearer baseline information was collected in the LSA and portions of the RSA that were altered by these past and present activities. Future activities in the RSA are expected to include similar activities.

Forest fire and forest insects are the primary natural disturbances in low elevation habitat. Fire directly alters habitat through loss of mature and old-growth coniferous forests, which are important furbearer habitat. Beaver are well adapted to early seral deciduous and mixed forest habitats and are expected to benefit from disturbance related to fire and MPB.

Project effects consider both the key and moderate interactions defined and identified in **Section 4, Table 4.3-2** (Project Component and Activity Interaction Matrix). In order to conservatively assess

interactions of the project with furbearers and furbearer habitat, both key and moderate interactions were combined and included in the modeling and effects assessment. The interactions are further identified using a ranking table (**Table 5.4.13-3**) to identify potential interactions with different Project phases. Analysis includes determining whether the resulting effect can be managed to acceptable levels through standard operating practices, through the application of best management practices (BMPs) or codified practices, or if the resulting effect may exceed acceptable levels without implementation of specified mitigation. **Table 5.4.13-3** is used to guide specific mitigation and monitoring needed for this VC.

Table 5.4.13-3: Potential Interaction of Project Activities with Furbearers

Project Activities and Physical Works	Potential Key and Moderate Interactions
Construction of Mine, Airstrip, Access Roads, Freshwater Supply Pipeline, and Transmission Line	
Clearing and grubbing	2
Open pit preparation	1
General earthworks (moving surface soil)	1
Equipment operation	1
Road upgrading and construction	2
Borrow pit excavation	2
Road and airstrip use	1
Operations of Mine, Airstrip, Access Roads, Freshwater Supply Pipeline, and Transmission Line	
Open pit mining	1
Process plant	1
Transportation system	2
Temporary waste rock stockpiles	2
Tailings storage facility	1
Camp	2
Road use	2
Water collection pond	2
Decommissioning Closure and Post-Closure Mine, Airstrip, Access Roads, Freshwater Supply Pipeline, and Transmission Line	
Roads	2
Reclamation	2

Note: 0 = No interaction.
 1 = Moderate Interaction occurs; however, based on past experience and professional judgment, the resulting effect can be managed to acceptable levels through standard operating practices and/or through the application of best management or codified practices.
 2 = Key Interaction occurs. The resulting effect may exceed acceptable levels without implementation of mitigation. Further assessment and monitoring is warranted.

Several measurable Categories of Potential Environmental Effects / Issues for Project effects were defined and the rationale for the selection of each Categories of Potential Environmental Effects / Issues is provided in **Table 5.4.13-4**.

Table 5.4.13-4: Categories of Potential Environmental Effects / Issues for Furbearers

Categories of Potential Environmental Effects / Issues	Notes or Rationale for Selection
Habitat Loss and Alteration	Effects on population abundance and distribution are directly affected by habitat availability and displacement from effective habitat. Vegetation clearing for the Project and disturbance from Project activities during construction and operations may affect habitat availability and quality. This analysis included a rating of habitat quality for furbearers so that the relative quantitative loss of moderate to high value habitat was assessed in relation to local and regional availability of suitable habitat measured as percentage lost and hectares lost.
Changes in Furbearer Population Dynamics	For some species, predation may be affected by changes in predator populations resulting in differential mortality of furbearer species. This relies on provincial data and potential monitoring data of furbearer populations and distribution over the life of the Project, including species, features, and occurrences based on field surveys and BC CDC records. Future change can be monitored with intensive surveys. For furbearers, the focus is on relative abundance and distribution in areas of potential impact and measures of known mortality.
Mortality Risk	Assessment of the potential effects of roads, pits, and other structural features on direct mortality. The assessment includes potential effects of direct mortality from vehicles. This relies on provincial data and potential monitoring furbearer mortality related to the Project area. This is a qualitative estimate based on risk of vehicle collisions.
Changes in Furbearer Movement Patterns	Changes in movement patterns may affect species breeding and survival rates, and may increase predation/mortality. This relies on monitoring and surveys. Aspects such as noise, light, odours, and human presence may affect use of habitats close to Project activities.
Changes in Furbearer Health	Contaminant loading may affect furbearer health. This is a qualitative measure that relies on reporting of animal health and provincial data. Health can include assessment of the potential impacts of identified contaminants of potential concern on feeding, movement, reproductive behaviour and success, and direct mortality.

Note: Includes input from consultation with regulators, Aboriginal organizations, affected stakeholders and the public, as well as EA guidelines, other regulatory drivers, policies and/or programs.

Evidence suggests that, below certain thresholds of habitat cover, species may decline more rapidly than would be expected from habitat loss alone (Andr n, 1994). When remaining functional habitat is greater than 10% to 30% in a region, species are still affected by habitat loss (Andr n, 1994; Fahrig, 1997; Swift and Hannon, 2010) but are not necessarily at risk of regional extirpation. Depending on taxa and landscape, residual habitat thresholds ranging from 10% to as high as 60% may be required to avoid rapid population declines (Bennett and Ford, 1997; Villard et al., 1999; Swift and Hannon, 2010) (**Table 5.4.13-5**). However, most threshold evidence supports a minimum 30% residual habitat threshold at a landscape level to avoid rapid declines that may lead to regional extirpation (Swift and Hannon, 2010). For this assessment, precautionary thresholds have been identified for species for which specific thresholds do not exist. A precautionary threshold is defined as the point before a resource would be expected to undergo an unacceptable change, either from an ecological, regulatory, or social perspective. This definition allows the

Proponent and regulators to enact mitigation measures with sufficient time to prevent the particular resource from reaching or exceeding the true ecological threshold. The following precautionary thresholds are used in this assessment: 70% residual habitat (30% loss) for species not identified as a conservation concern (e.g., moose); and 80% residual habitat (20% loss) for species of conservation concern (e.g., caribou, grizzly bear, furbearers).

Table 5.4.13-5: Potential Key and Moderate Interactions with Categories of Potential Environmental Effects / Issues for Furbearers

Project Activities and Physical Works	Categories of Potential Environmental Effects / Issues				
	Habitat Loss or Alteration	Changes in Furbearer Population Dynamics	Mortality Risk	Changes in Furbearer Movement Patterns	Changes in Furbearer Health
Construction of Mine, Airstrip, Access Roads, Freshwater Supply Pipeline, and Transmission Line					
Clearing and grubbing	2	2	1	2	0
Open pit preparation	1	1	1	1	0
General earthworks (moving surface soil)	1	0	0	1	1
Equipment operation	1	1	2	2	1
Road upgrading and construction	2	1	2	2	1
Borrow pit excavation	2	2	1	2	1
Road and airstrip use	1	1	2	2	1
Operations of Mine, Airstrip, Access Roads, Freshwater Supply Pipeline, and Transmission Line					
Open pit mining	1	1	1	1	1
Process plant	1	1	1	1	1
Transportation system	2	1	1	2	1
Temporary waste rock stockpiles	2	1	1	2	2
Tailings storage facility	1	1	1	1	1
Camp	2	1	1	2	1
Road use	2	1	2	2	1
Water collection pond	2	2	2	2	2
Decommissioning Closure and Post-Closure Mine, Airstrip, Access Roads, Freshwater Supply Pipeline, and Transmission Line					
Roads	2	1	2	2	2
Reclamation	2	2	1	2	1

Note: 0 = No interaction.
 1 = Moderate Interaction occurs; however, based on past experience and professional judgment, the resulting effect can be managed to acceptable levels through standard operating practices and/or through the application of best management or codified practices.
 2 = Key Interaction occurs. The resulting effect may exceed acceptable levels without implementation of mitigation. Further assessment and monitoring is warranted.

Potential interactions are linked to the temporal scale of the Project phases and vary for the time needed to return to baseline conditions (**Table 5.4.13-6**). For instance, sensory disturbances tend to be very short-lived and transient, and effects may be related to frequency of disturbance and duration, but recovery may be very quick once disturbances stop. Conversely, habitat loss due to Project construction may require greater amounts of time to recover to baseline conditions.

Table 5.4.13-6: Temporal Boundaries

Categories of Potential Environmental Effects / Issues	Temporal Boundary
Habitat Loss and Alteration	Construction through to post-closure
Changes in Furbearer Population Dynamics	All phases after clearing and during construction
Mortality Risk	Construction and operations
Changes in Furbearer Movement Patterns	Construction and operations
Changes in Furbearer Health	All phases and into closure

Anticipated Project effects include habitat loss (e.g., cleared vegetation, changes to wetland quantity and quality) and some potential degradation (**Table 5.4.13-7** and **Table 5.4.13-8**). The construction of the mine site, access roads, transmission line, freshwater supply pipeline, and airstrip will require vegetation removal. A small amount of vegetation will be lost permanently (greater than 100 years), while the majority of other areas will be reclaimed progressively or during closure.

In addition to direct habitat loss, activities on the mine site, airstrip, and access road may reduce functional use of habitat. Road use may result in direct mortality from vehicle collisions and displacement from suitable habitat from sensory disturbance (e.g., noise, visual disturbance from mine-related activity). Chemical hazards and attractants may affect furbearers that frequent the mine area, airstrip, transmission line, or access roads. Mitigation may help reduce the incidence of mortality; however, it is not expected to eliminate the effect.

Three of the five potential Categories of Potential Environmental Effects/Issues for marten and beaver, habitat loss and alteration, mortality risk, and changes in furbearer health, are applicable to the Project and therefore carried through the effects assessment. These Categories of Potential Environmental Effects/Issues are considered the most important effects on marten and beaver and influence the habitat effectiveness of an area. Evaluating the effectiveness of wildlife habitat accounts for the suitability of the habitat for a particular species, as well as the minimum habitat size, dispersal ability, and sensitivity of a species to disturbance (**Appendix 5.4.13A**).

Changes in population dynamics and movement patterns will not be considered further in the assessment due to the ability of marten and beaver to disperse across the landscape, and the relatively small home ranges and large population sizes in central BC for these species.

The noise and vibration effects assessment determined that no meaningful changes to ambient noise levels will be expected beyond the Project boundary, therefore residual effects are negligible. The only exceptions will be blasting and aircraft noise; however, they will have minimal impact on equivalent sound pressure levels due to their very short duration. Consequently, changes in long-term furbearer movement patterns due to noise disturbance are not considered further, but short-term effects are included in habitat alteration considerations through buffering and downgrading habitat suitability near infrastructure.

Table 5.4.13-7 provides an overview of the Categories of Potential Environmental Effects/Issues carried through the effects assessment.

Table 5.4.13-7: Overview of Potential Project Effects on Beaver and Marten

Categories of Potential Environmental Effects/Issues	Description	Project Phases	Project Components
Habitat Loss or Alteration	Areas that will be cleared of vegetation or wetland area for Project infrastructure (e.g., facility direct footprint, road surface and cut/fill, borrow areas, etc.) result in temporary to long-term habitat loss. Disturbance from noise may temporarily displace furbearers near infrastructure. Disrupted movements, and displacement from areas used for reproduction or feeding.	Construction, operations, closure, and decommissioning post-closure	Mine site, access roads, site, transmission line, freshwater supply pipeline, and airstrip
Mortality Risk	Direct mortality from physical exposure to traffic or attractants and increased access to trappers, Disrupted movements, and displacement from areas used for reproduction or feeding may increase mortality risk.	Construction, operations, closure	Mine site, access roads, site, transmission line, freshwater supply pipeline, and airstrip
Changes in Furbearer Health	Potential impacts of identified contaminants of potential concern on furbearer feeding, movement, reproductive behaviour and success, and direct mortality.	Construction, operations, closure	Mine site, access roads, site, transmission line, freshwater supply pipeline, and airstrip

5.4.13.3.6 Assessment Approach for Measuring Potential Effects

Both quantitative and qualitative approaches were used for the assessment of potential Project effects on furbearers. A quantitative approach was used for determining the potential loss and alteration of habitat within the RSA, and a qualitative approach was used for assessing an increase in mortality risk and change in furbearer health.

5.4.13.3.6.1 Habitat Suitability Model Assumptions

Habitat suitability modeling is based on assumptions related to TEM and PEM habitat interpretations, professional judgment and experience related to furbearer and furbearer habitat, literature and traditional knowledge. Assumptions include the quantitative rating of TEM and PEM units for value to furbearer during different life history stages and seasons and are based on similar models used and tested throughout BC and assessed over time through population estimates and research. Specific assumptions related to habitat quality are described in each sub-model. Habitat suitability value is assumed to reflect the current value of habitat and not the future value.

Assumptions related to mortality, disturbance, displacement, predation and health are described in the effects sections related to these categories of assessment. Habitat ratings were interpreted to represent potential reductions in habitat quality and effectiveness related to mine infrastructure. Models assumed that all suitable habitat could be used and that habitat was included in calculations of habitat impacted by the Project.

5.4.13.3.6.2 Habitat Loss and Alteration

To identify the most critical habitats for marten and beaver, ratings tables were developed to model moderate to high value habitats (ratings values 1–3) in the Project area during the winter period (marten only) and growing period. Potential areas affected by Project component footprints were calculated. TEM or PEM was the basis for habitat polygons rated in the LSA and RSA, and the BC Watershed Atlas (BC Ministry of Environment, 2013) was used to identify streams for use as riparian areas. Although marten and beaver are less common residents in higher elevations, such as the mine site, all potential habitat sites were included to present a conservative measure of potential effects on habitats and populations.

Based on the availability of information about the specific life requisites for marten and beaver, a six-class scheme habitat model was used (**Appendix 5.4.13B**). Growing season habitats were evaluated for food and security-thermal habitat.

5.4.13.3.6.2.1 Marten Growing Season Habitat Model

Marten habitat suitability ratings for the growing season include:

- Structural stages 6 and 7 (mature forest to old forest) provide optimal security and are rated class 1;
- Structural stages 1 and 2 provide no significant food or shelter and are rated class 6;
- Structural stage 5 forest, riparian areas, swamps and bogs are rated class 2-3 as they can provide foraging habitat;
- Structural stages 3 and 4 are rated class 4 and provide minimal foraging and shelter habitat;
- The Boreal Altai Fescue Alpine (BAFA) zone and waterbodies are rated as not suitable as they do not provide foraging or shelter habitat; and
- Areas within 50 m of roads are reduced by one class due to avoidance of roads.

5.4.13.3.6.2.2 Marten Winter Season Habitat Model

Marten habitat suitability ratings for the winter season include:

- Structural stages 6 and 7 (mature forest to old forest) provide optimal security and are rated 1-2;
- Structural stages 1 and 2 provide no significant food or shelter and are rated class 6;
- Structural stage 5 forest, riparian areas, swamps and bogs are rated class 2-3 as they can provide foraging habitat;

- Structural stages 3 and 4 are rated class 4 and provide minimal foraging and shelter habitat;
- The BAFA zone, ESSF Moist Very Cold Parkland (ESSFmvp) subzone, and waterbodies are rated 6 as they do not provide foraging or shelter habitat; and
- Areas within 50 m of roads are considered directly impacted by dust and edge effects to habitats and are reduced by one habitat suitability class.

5.4.13.3.6.2.3 Beaver Growing Season Habitat Model

Beaver habitat suitability ratings for the growing season include:

- Aquatic areas with less than a 7% gradient and less than 50 m from shore, and adjacent upland areas up to 30 m away from the shoreline with deciduous or mixed forest or shrubs with a canopy closure between 40% and 60% are rated high, as these areas provide preferred foraging habitat;
- Aquatic areas with a gradient between 7% and 12% or up to 100 m from shoreline are rated up to moderate;
- Aquatic areas with a gradient between 13% and 14% and up to 200 m from shoreline are rated up to low;
- All other aquatic areas are rated as not suitable;
- Terrestrial environments with deciduous or mixed forest or shrubs and canopy closure of 10% to 40%, or 60% and 100% up to 100 m from shoreline, are rated up to moderate;
- Terrestrial environments with any forest or shrubs up to 200 m from a shoreline or a canopy closure less than 10% are rated up to low; and
- Areas greater than 200 m from shore, areas above 1,300 m, areas in the BAFA zone, or areas in the ESSFmvp subzone are rated as not suitable.

5.4.13.3.6.3 Mortality Risk

There are no measureable parameters for the assessment of changes in mortality due to collisions with vehicles or predator-prey changes, therefore the assessment is qualitative.

5.4.13.3.6.4 Health

There are no measureable parameters for the assessment of changes in wildlife health due to predator-prey changes or disease, therefore the assessment is qualitative.

5.4.13.3.7 Model Results for Quantification of Potential Project Effects on Habitat

The potential overlap of Project component footprints on moderate to high value marten habitat is tabulated in **Table 5.4.13-8** (growing habitat) and **Table 5.4.13-9** (winter habitat) and illustrated on **Figure 5.4.13-2** and **Figure 5.4.13-3**. The potential overlap of Project component footprints on moderate to high value beaver habitat is tabulated in **Table 5.4.13-10** and illustrated on **Figure 5.4.13-4**. The areas shown represent the maximum potential habitat affected and do not account for existing disturbance or mitigation measures.

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Table 5.4.13-8: Potential Marten Growing Habitat Area Affected Within Footprints, LSAs, and RSA

	Project Component	Marten Moderate Habitat Area (ha)	Total Area (ha)	Moderate Habitat % of Total Area	% of RSA Habitat by Footprint Component	Marten High Habitat Area (ha)	Total Area (ha)	High Habitat % of Total Area	% of RSA Habitat by Footprint Component
Footprint or Corridor	Access Road	14	95	15	<1	0	95	0	0
	Airstrip	6	50	11	<1	1	50	2	<1
	Kluskus FSR	103	253	41	<1	0	253	0	0
	Mine Site	1,769	4,430	40	2	0	4,430	0	0
	Freshwater Supply Pipeline	13	132	10	<1	0	132	0	0
	Transmission Line – Main	447	1,806	25	<1	85	1,806	5	2
	Transmission Line – Mills Ranch	121	202	60	<1	5	202	2	<1
	Transmission Line – Stellako	36	62	58	<1	1	62	2	<1
	Total	2,510	7,032	36	2	92	7,032	1	2
LSA	Access Road	91	363	25	<1	0	363	0	0
	Airstrip	65	465	14	<1	26	465	6	1
	Kluskus FSR	2,104	6,574	32	2	117	6,574	2	3
	Mine Site	2,447	6,123	40	2	0	6,123	0	0
	Freshwater Supply Pipeline	166	731	23	<1	0	731	0	0
	Transmission Line – Main	2,253	8,068	28	2	460	8,068	6	12
	Transmission Line – Mills Ranch	539	924	58	1	22	924	2	1
	Transmission Line – Stellako	166	306	54	<1	13	306	4	<1
	Total	7,829	23,554	33	7	638	23,554	3	17
RSA		105,954	291,714	36	-	3,785	291,714	1	-
Area	footprint % RSA	2	-	-	-	2	-	-	-
	footprint % LSA	31	-	-	-	30	-	-	-
Habitat	footprint % RSA Habitat	2	-	-	-	2	-	-	-
	footprint % LSA Habitat	32	-	-	-	14	-	-	-

Note: FSR = forest service road; ha = hectare; LSA = Local Study Area; RSA = Regional Study Area

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Table 5.4.13-9: Potential Marten Winter Habitat Area Affected Within Footprints, LSAs, and RSA

	Project Component	Marten Moderate Habitat Area (ha)	Total Area (ha)	Moderate Habitat % of Total Area	% of RSA Habitat by Footprint Component	Marten High Habitat Area (ha)	Total Area (ha)	High Habitat % of Total Area	% of RSA Habitat by Footprint Component
Footprint or Corridor	Access Road	14	95	15	<1	0	95	0	0
	Airstrip	6	50	11	<1	1	50	2	<1
	Kluskus FSR	103	253	41	<1	0	253	0	0
	Mine Site	1,769	4,430	40	2	0	4,430	0	0
	Freshwater Supply Pipeline	13	132	10	<1	0	132	0	0
	Transmission Line – Main	447	1,806	25	<1	85	1,806	5	2
	Transmission Line – Mills Ranch	124	202	61	<1	5	202	2	<1
	Transmission Line – Stellako	36	62	58	<1	1	62	2	<1
	Total	2,513	7,032	36	2	92	7,032	1	2
LSA	Access Road	91	363	25	<1	0	363	0	0
	Airstrip	65	465	14	<1	26	465	6	1
	Kluskus FSR	2,104	6,574	32	2	117	6,574	2	3
	Mine Site	2,447	6,123	40	2	0	6,123	0	0
	Freshwater Supply Pipeline	166	731	23	<1	0	731	0	0
	Transmission Line – Main	2,259	8,068	28	2	460	8,068	6	12
	Transmission Line – Mills Ranch	553	924	60	1	22	924	2	1
	Transmission Line – Stellako	166	306	54	<1	13	306	4	<1
	Total	7,850	23,554	33	7	638	23,554	3	17
RSA		105,993	291,714	36	-	3,785	291,714	1	-
Area	footprint % RSA	2	-	-	-	2	-	-	-
	footprint % LSA	30	-	-	-	30	-	-	-
Habitat	footprint % RSA Habitat	2	-	-	-	2	-	-	-
	footprint % LSA Habitat	32	-	-	-	14	-	-	-

Note: FSR = forest service road; ha = hectare; LSA = Local Study Area; RSA = Regional Study Area

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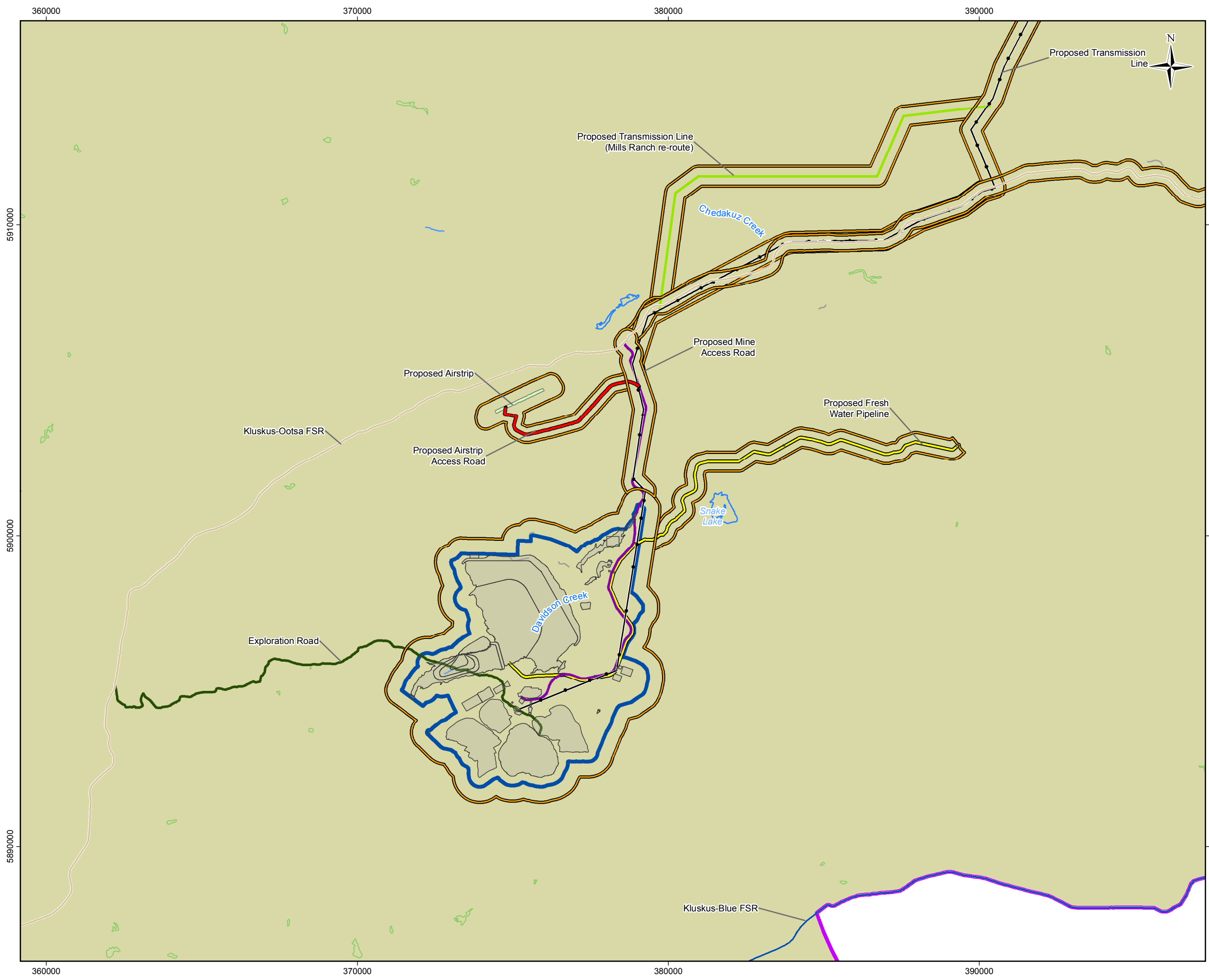


Table 5.4.13-10: Potential Beaver Growing Habitat Area Affected Within Footprints, LSAs, and RSA

	Project Component	Beaver Moderate Habitat Area (ha)	Total Area (ha)	Moderate Habitat % of Total Area	% of RSA Habitat by Footprint Component	Beaver High Habitat Area (ha)	Total Area (ha)	High Habitat % of Total Area	% of RSA Habitat by Footprint Component
Footprint or Corridor	Access Road	0	95	0	0	0	95	0	0
	Airstrip	0	50	0	0	0	50	0	0
	Kluskus FSR	4	253	2	<1	0	253	0	0
	Mine Site	0	4,430	0	0	6	4,430	<1	<1
	Freshwater Supply Pipeline	0	132	0	0	0	132	0	0
	Transmission Line – Main	21	1,806	1	1	4	1,806	<1	<1
	Transmission Line – Mills Ranch	0	202	0	0	1	202	<1	<1
	Transmission Line – Stellako	4	62	6	<1	1	62	2	<1
	Total	28	7,032	0	1	12	7,032	<1	<1
LSA	Access Road	0	363	0	0	1	363	<1	0
	Airstrip	0	465	0	0	0	465	0	0
	Kluskus FSR	122	6,574	2	5	28	6,574	0	1
	Mine Site	1	6,123	<1	0	14	6,123	0	1
	Freshwater Supply Pipeline	0	731	0	0	2	731	0	0
	Transmission Line – Main	98	8,068	1	4	37	8,068	0	2
	Transmission Line – Mills Ranch	0	924	0	0	5	924	1	0
	Transmission Line – Stellako	24	306	8	1	5	306	2	0
	Total	246	23,554	1	9	93	23,554	<1	4
RSA		2,633	291,714	1	-	2,368	291,714	1	-
Area	Footprint % RSA	2	-	-	-	2	-	-	-
	Footprint % LSA	30	-	-	-	30	-	-	-
Habitat	Footprint % RSA habitat	1	-	-	-	1	-	-	-
	Footprint % LSA habitat	12	-	-	-	13	-	-	-

Note: FSR = forest service road; ha = hectare; LSA = Local Study Area; RSA = Regional Study Area

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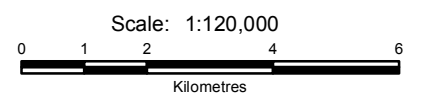
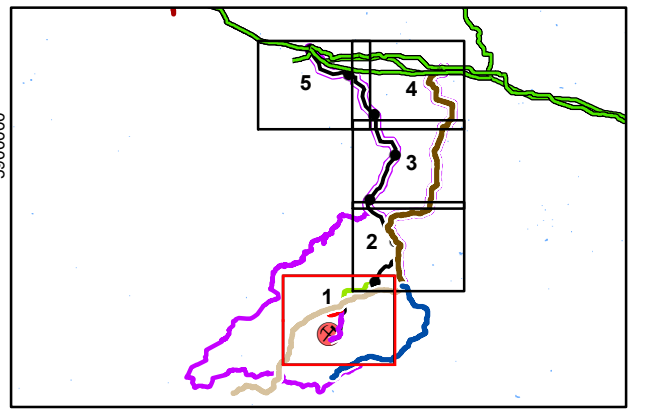
- Existing Road
- Kluskus-Blue FSR
- Kluskus-Ootsa FSR
- Exploration Road
- Proposed Airstrip Access Road
- Proposed Mine Access Road
- Proposed Fresh Water Pipeline
- Proposed Transmission Line
- Proposed Transmission Line (Mills Ranch re-route)
- Proposed Airstrip
- Proposed Site Facilities
- Stream (>=2nd Order)
- Waterbody (>= 4 Ha)
- Wetlands (within RSA)

Wildlife and Wildlife Habitat

- Local Study Area
- Regional Study Area

Wildlife Habitat Rating

- 1 - High
- 2 - Moderately High
- 3 - Moderate
- 4 - Low
- 5 - Very Low
- 6 - Nil



Reference
BC Government GeoBC Data Distribution

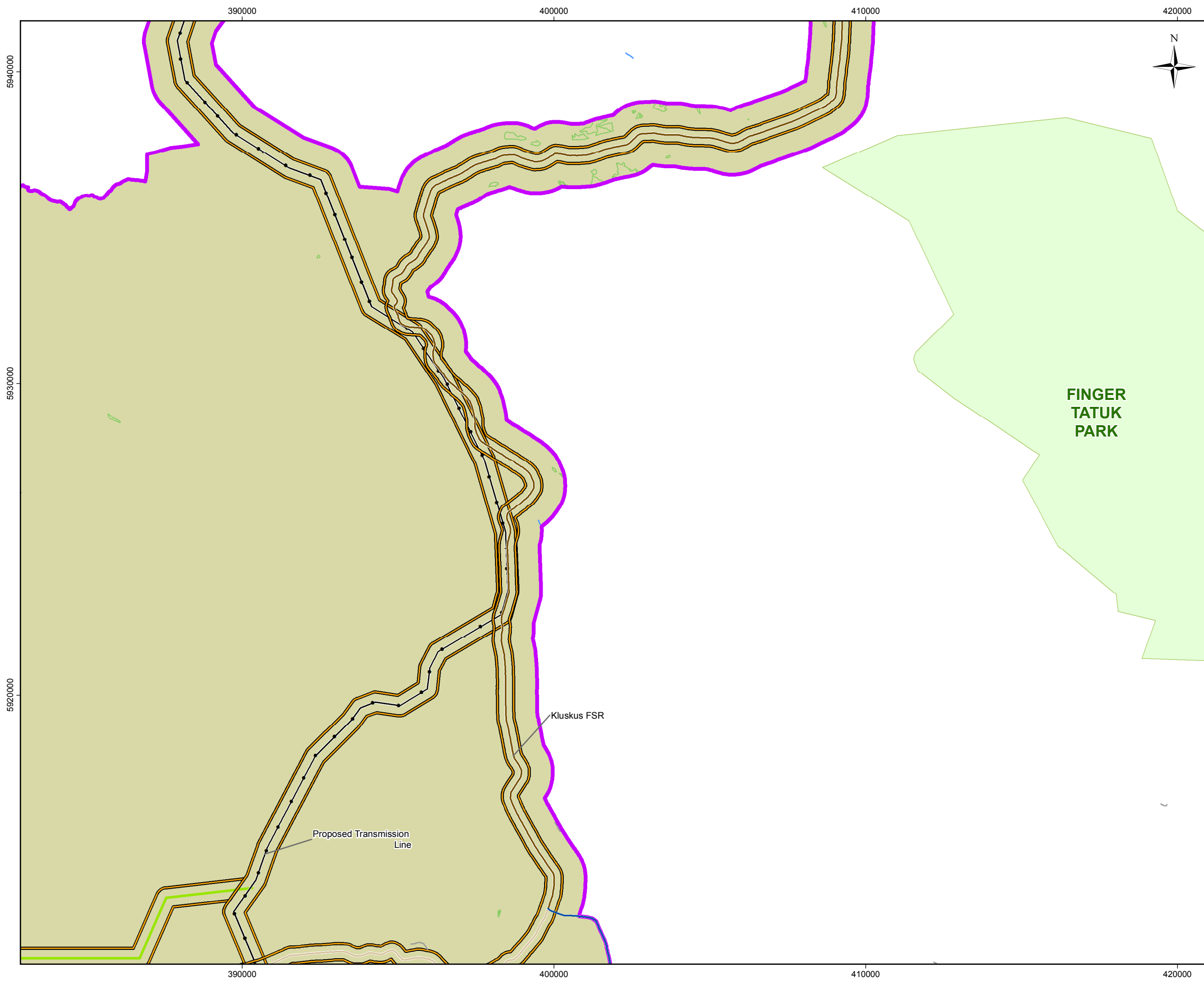
CLIENT:
newgold™

PROJECT:
Blackwater Gold Project

**Wildlife Habitat Rating
Marten - LIG , Map 1 of 5
Life Stage/Season: = Living (LI) / Growing (G)**

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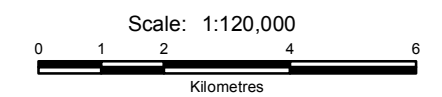
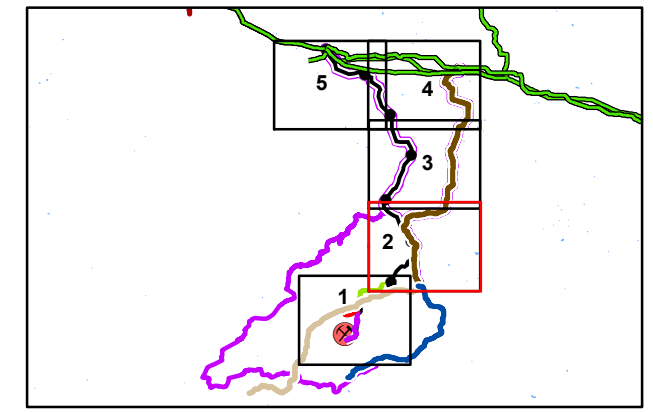
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- Existing Road
- Kluskus FSR
- Kluskus-Blue FSR
- Kluskus-Ootsa FSR
- Proposed Transmission Line
- Proposed Transmission Line (Mills Ranch re-route)
- Stream (>=2nd Order)
- Wetlands (within RSA)
- Parks and Protected Areas
- Wildlife and Wildlife Habitat**
- Local Study Area
- Regional Study Area
- Wildlife Habitat Rating**
- 1 - High
- 2 - Moderately High
- 3 - Moderate
- 4 - Low
- 5 - Very Low
- 6 - Nil

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Reference

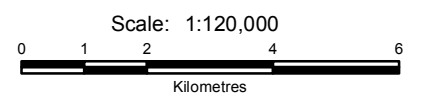
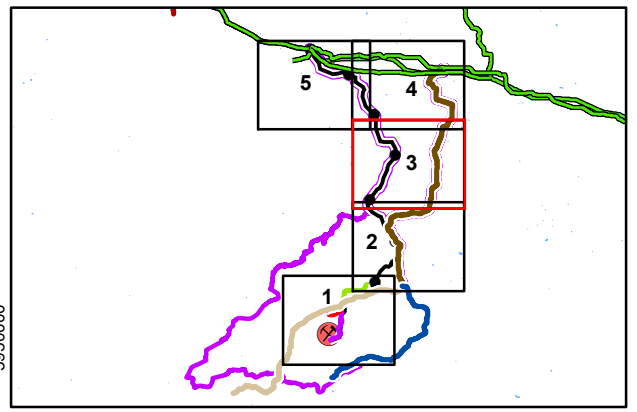
BC Government GeoBC Data Distribution

CLIENT: 		
PROJECT: Blackwater Gold Project		
Wildlife Habitat Rating Marten - LIG , Map 2 of 5 Life Stage/Season: = Living (LI) / Growing (G)		
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PROJECTION: UTM Zone 10	DATUM: NAD83	



Legend

- Existing Road
 - Kluskus FSR
 - Proposed Transmission Line
 - Stream (>=2nd Order)
 - Wetlands (within RSA)
- Wildlife and Wildlife Habitat**
- Local Study Area
 - Regional Study Area
- Wildlife Habitat Rating**
- 1 - High
 - 2 - Moderately High
 - 3 - Moderate
 - 4 - Low
 - 5 - Very Low
 - 6 - Nil

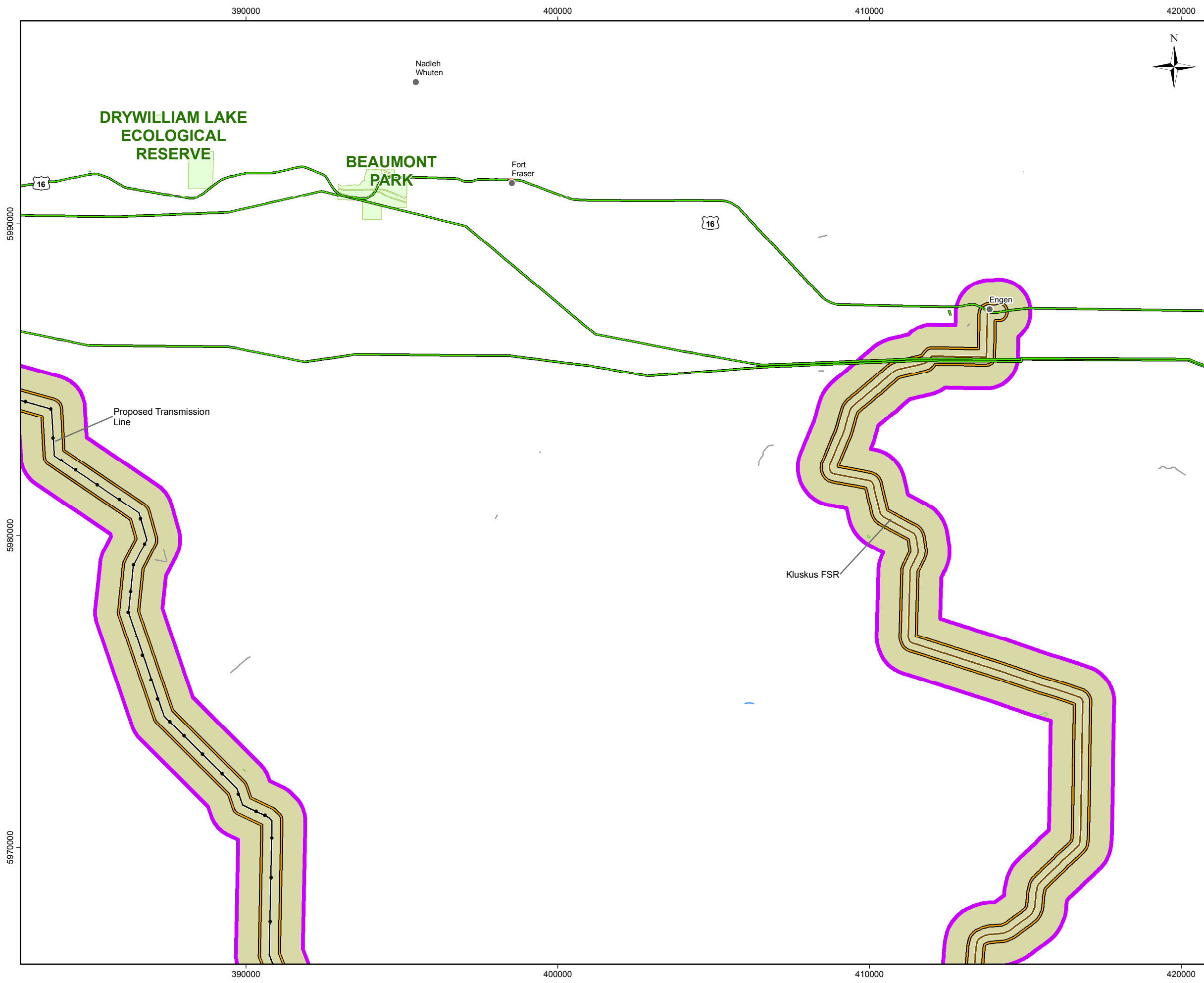


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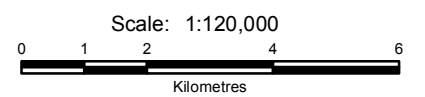
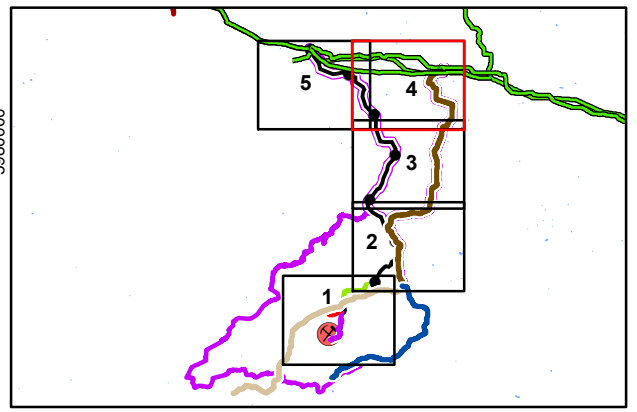
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PROJECT: Blackwater Gold Project		
Wildlife Habitat Rating Marten - LIG , Map 3 of 5 Life Stage/Season: = Living (LI) / Growing (G)		
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- Existing Transmission Line
- Highway
- Existing Road
- Kluskus FSR
- Proposed Transmission Line
- Stream (>=2nd Order)
- Wetlands (within RSA)
- Parks and Protected Areas
- Wildlife and Wildlife Habitat**
- Local Study Area
- Regional Study Area
- Wildlife Habitat Rating**
- 1 - High
- 2 - Moderately High
- 3 - Moderate
- 4 - Low
- 5 - Very Low
- 6 - Nil

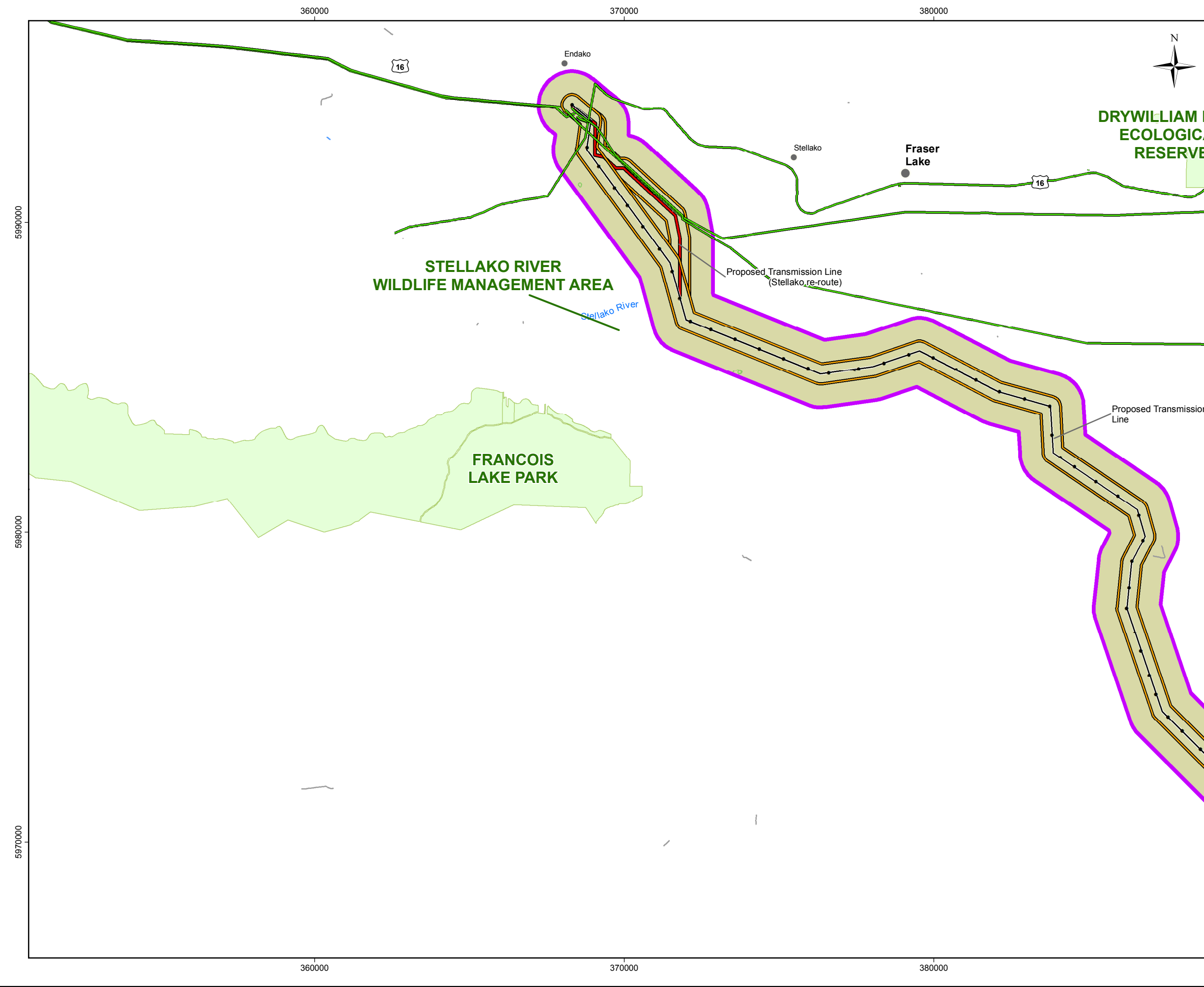


Reference

BC Government GeoBC Data Distribution

CLIENT: 		
PROJECT: Blackwater Gold Project		
Wildlife Habitat Rating Marten - LIG , Map 4 of 5 Life Stage/Season: = Living (LI) / Growing (G)		
DATE: September, 2015	ANALYST: MY	Figure 5.4.13-2d
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PROJECTION: UTM Zone 10	DATUM: NAD83	

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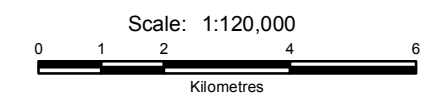
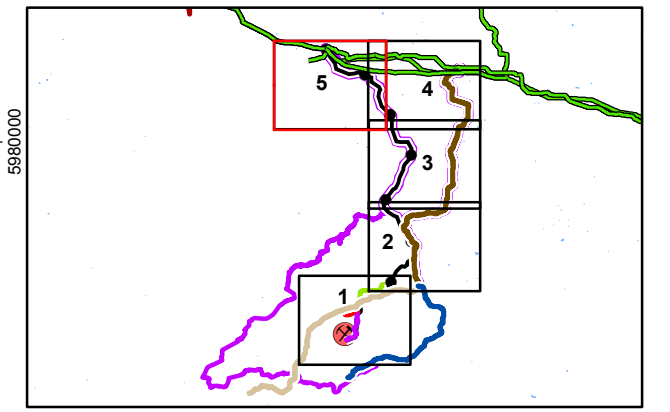
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- Existing Transmission Line
- Existing Road
- Proposed Transmission Line
- Proposed Transmission Line (Stellako re-route)
- Stream (>=2nd Order)
- Wetlands (within RSA)
- Parks and Protected Areas

Wildlife and Wildlife Habitat

- Local Study Area
- Regional Study Area

Wildlife Habitat Rating

- 1 - High
- 2 - Moderately High
- 3 - Moderate
- 4 - Low
- 5 - Very Low
- 6 - Nil



Reference
BC Government GeoBC Data Distribution

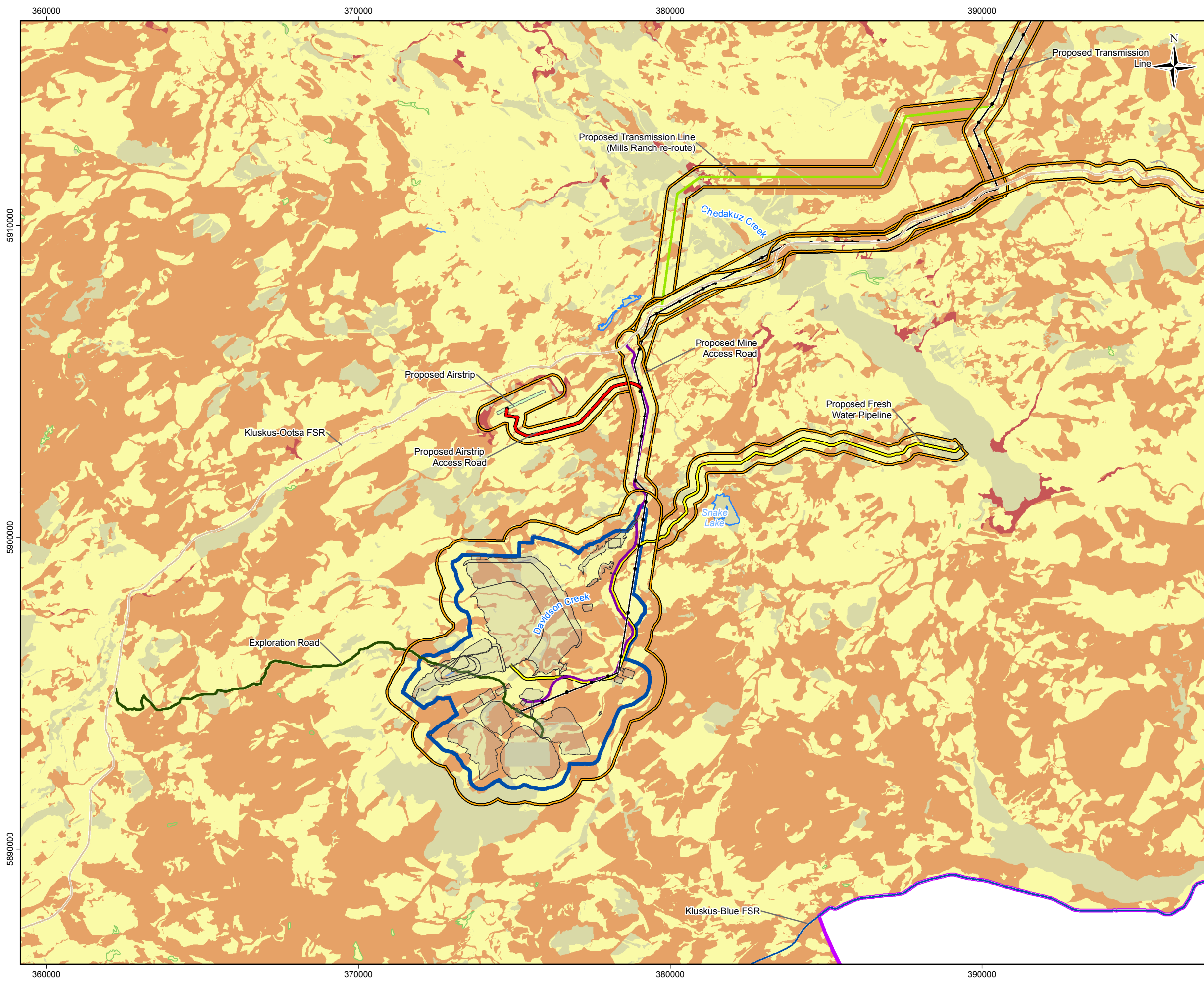
CLIENT:
newgold™

PROJECT:
Blackwater Gold Project

Wildlife Habitat Rating
Marten - LIG , Map 5 of 5
Life Stage/Season: = Living (LI) / Growing (G)

DATE: September, 2015	ANALYST: MY	Figure 5.4.13-2e
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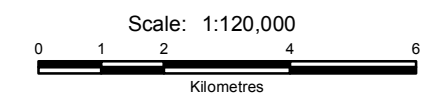
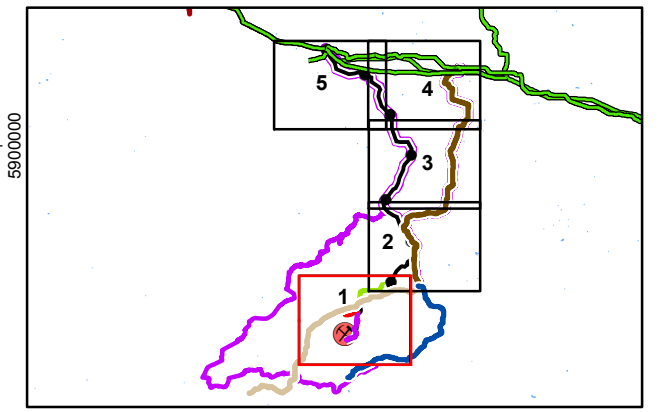
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- Kluskus-Blue FSR
- Kluskus-Ootsa FSR
- Exploration Road
- Proposed Airstrip Access Road
- Proposed Mine Access Road
- Proposed Fresh Water Pipeline
- Proposed Transmission Line
- Proposed Transmission Line (Mills Ranch re-route)
- Proposed Airstrip
- Proposed Site Facilities
- Stream (>=2nd Order)
- Waterbody (>= 4 Ha)
- Wetlands (within RSA)

Wildlife and Wildlife Habitat

- Local Study Area
- Regional Study Area

Wildlife Habitat Rating

- 1 - High
- 2 - Moderately High
- 3 - Moderate
- 4 - Low
- 5 - Very Low
- 6 - Nil



Reference
BC Government GeoBC Data Distribution

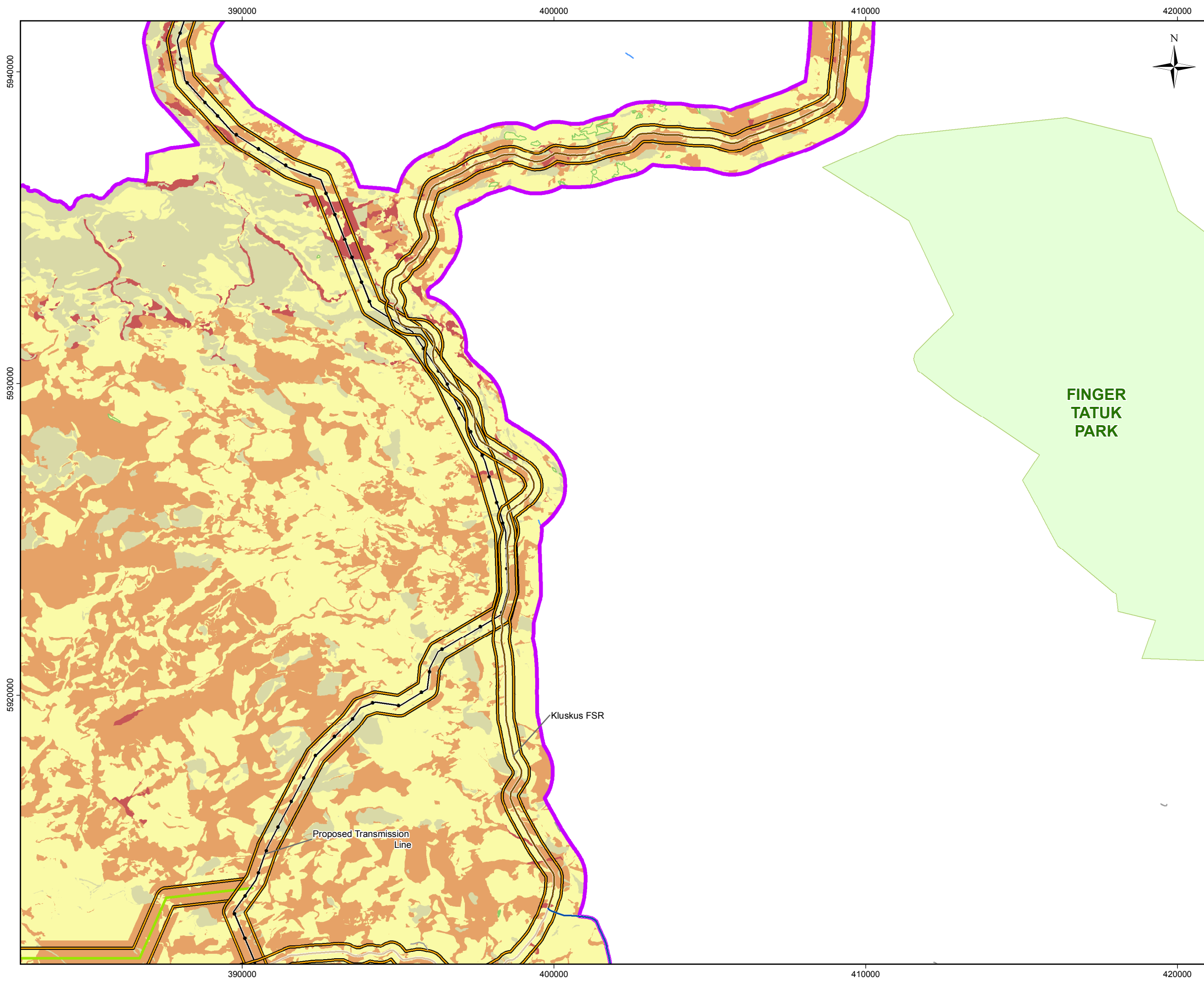
CLIENT:
newgold™

PROJECT:
Blackwater Gold Project

**Wildlife Habitat Rating
Marten - LIW , Map 1 of 5
Life Stage/Season: = Living (LI) / Winter (W)**

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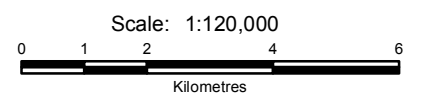
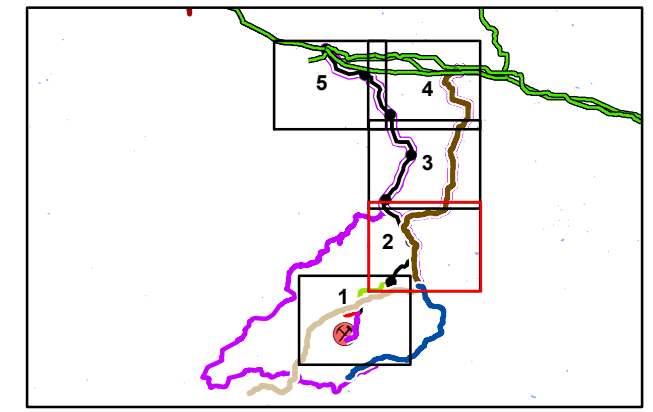
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Legend

- Existing Road
- Kluskus FSR
- Kluskus-Blue FSR
- Kluskus-Ootsa FSR
- Proposed Transmission Line
- Proposed Transmission Line (Mills Ranch re-route)
- Stream (>=2nd Order)
- Wetlands (within RSA)
- Parks and Protected Areas
- Wildlife and Wildlife Habitat**
- Local Study Area
- Regional Study Area
- Wildlife Habitat Rating**
- 1 - High
- 2 - Moderately High
- 3 - Moderate
- 4 - Low
- 5 - Very Low
- 6 - Nil

**FINGER
TATUK
PARK**



Reference

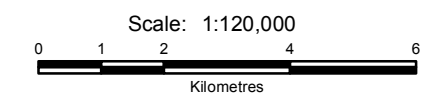
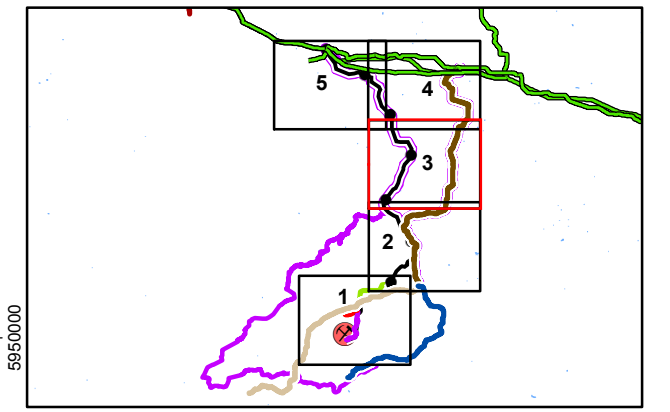
BC Government GeoBC Data Distribution

CLIENT: 		
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Wildlife Habitat Rating Marten - LIW , Map 2 of 5 Life Stage/Season: = Living (LI) / Winter (W)		
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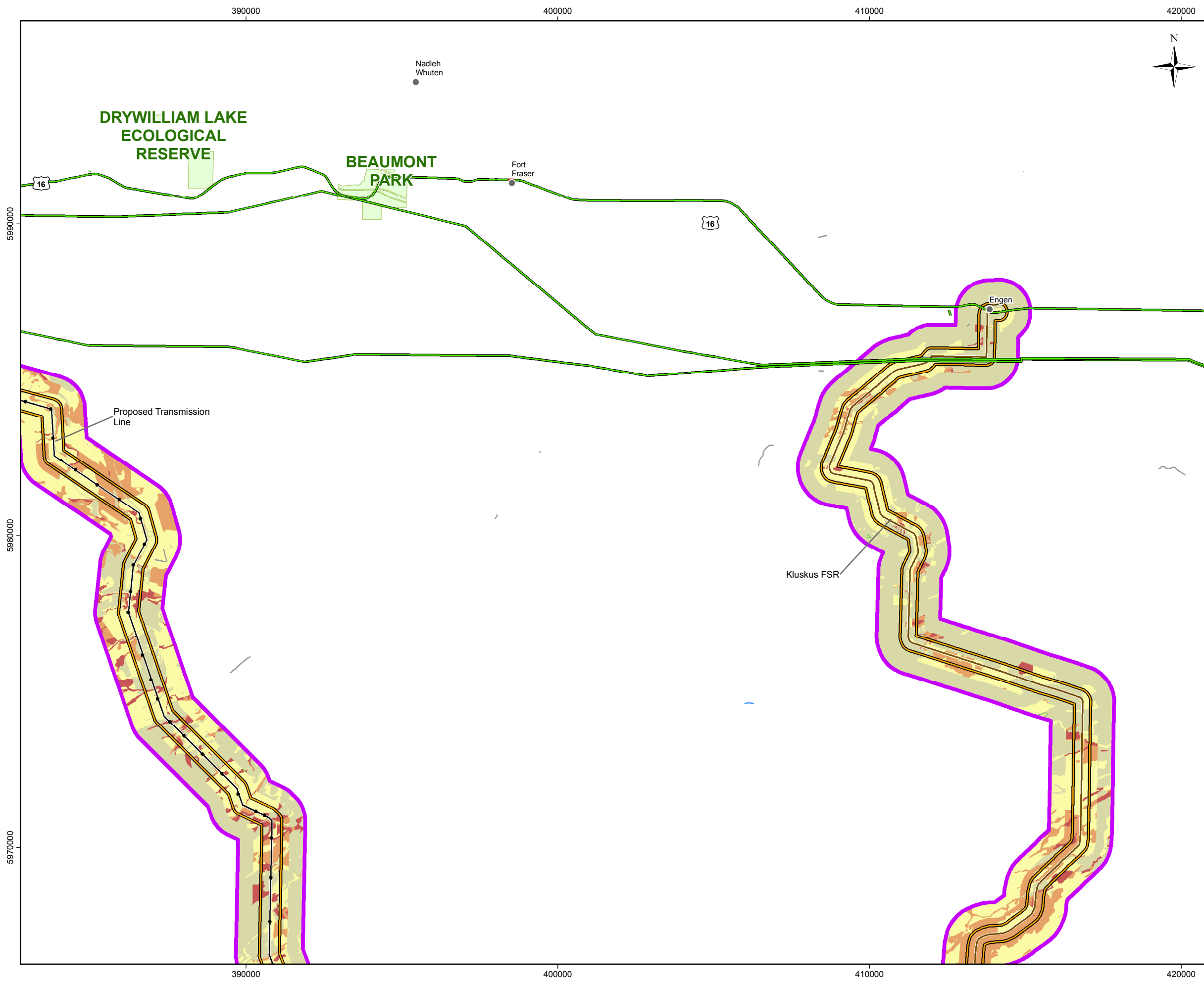
- Legend**
- Existing Road
 - Kluskus FSR
 - Proposed Transmission Line
 - Stream (>=2nd Order)
 - Wetlands (within RSA)
- Wildlife and Wildlife Habitat**
- Local Study Area
 - Regional Study Area
- Wildlife Habitat Rating**
- 1 - High
 - 2 - Moderately High
 - 3 - Moderate
 - 4 - Low
 - 5 - Very Low
 - 6 - Nil



Reference
BC Government GeoBC Data Distribution

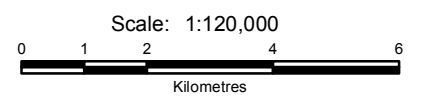
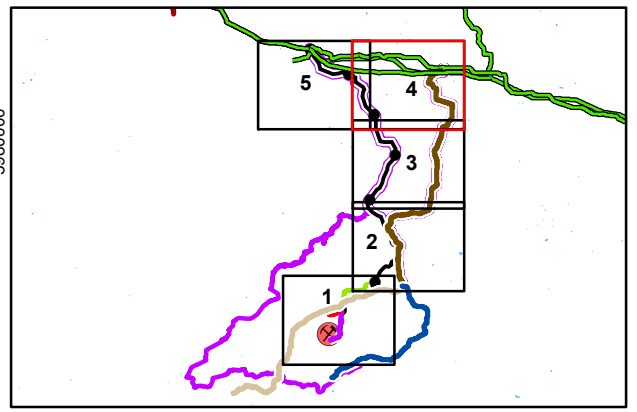
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PROJECT: Blackwater Gold Project		
Wildlife Habitat Rating Marten - LIW , Map 3 of 5 Life Stage/Season: = Living (LI) / Winter (W)		
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Legend

- Existing Transmission Line
- Highway
- Existing Road
- Kluskus FSR
- Proposed Transmission Line
- Stream (>=2nd Order)
- Wetlands (within RSA)
- Parks and Protected Areas
- Wildlife and Wildlife Habitat**
- Local Study Area
- Regional Study Area
- Wildlife Habitat Rating**
- 1 - High
- 2 - Moderately High
- 3 - Moderate
- 4 - Low
- 5 - Very Low
- 6 - Nil

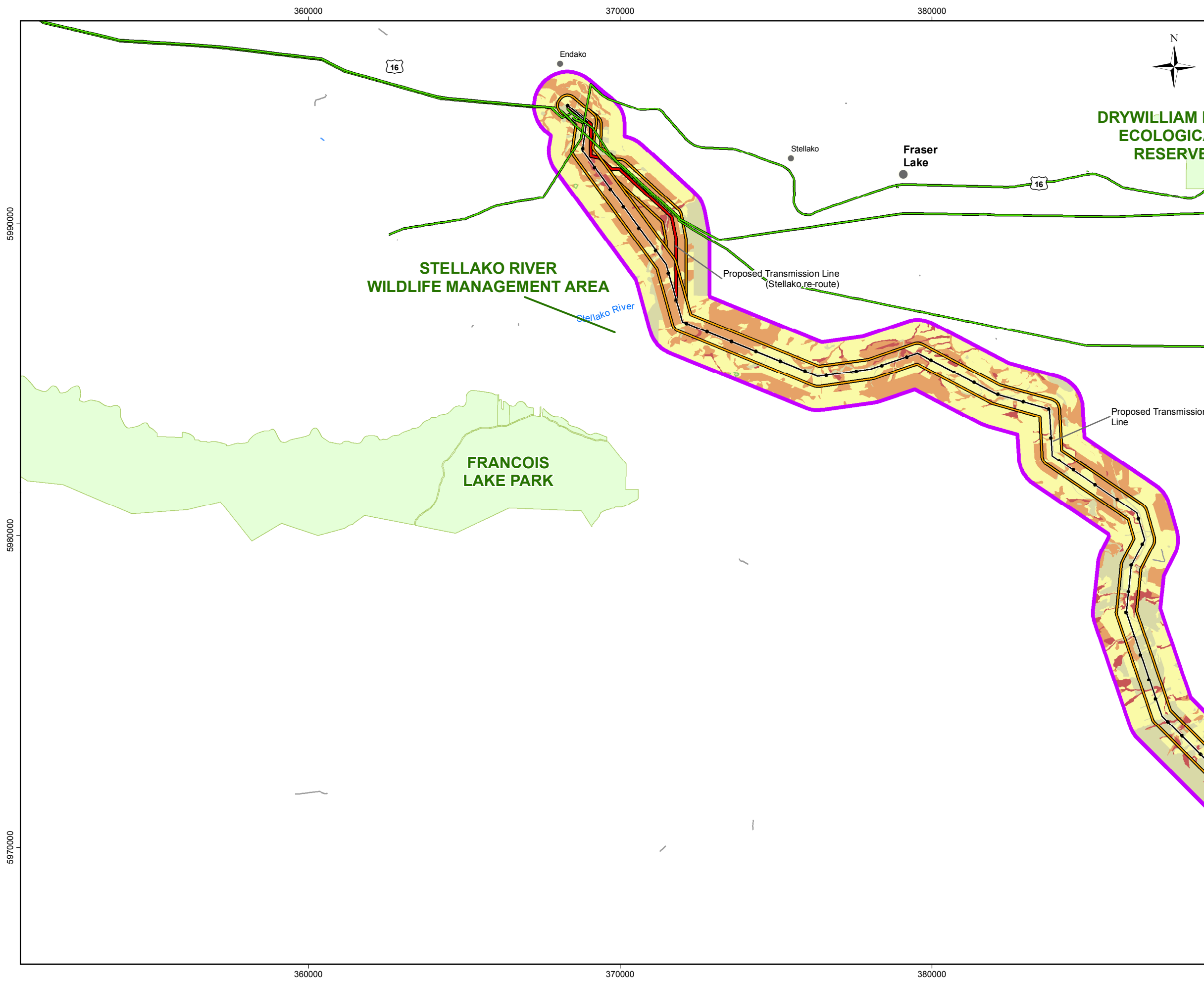


Reference

BC Government GeoBC Data Distribution

CLIENT:		
PROJECT:		
Blackwater Gold Project		
Wildlife Habitat Rating		
Marten - LIW , Map 4 of 5		
Life Stage/Season: = Living (LI) / Winter (W)		
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September, 2015	MY	
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VE52277	MB	04-03-029_WHR_MMAAM_LIW_5.4.13-3.pdf
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UTM Zone 10	NAD83	

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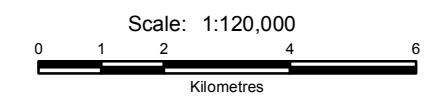
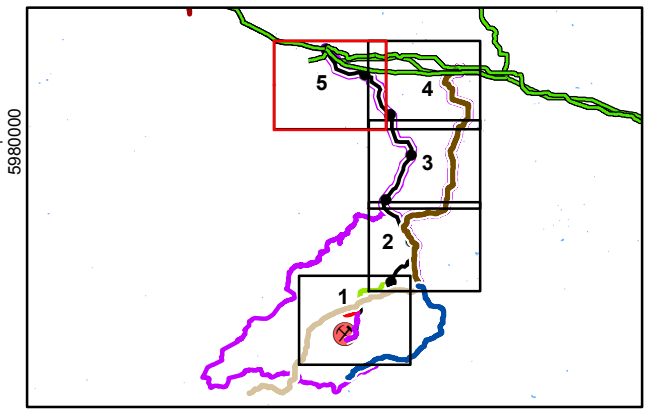
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- Existing Transmission Line
- Existing Road
- Proposed Transmission Line
- Proposed Transmission Line (Stellako re-route)
- Stream (>=2nd Order)
- Wetlands (within RSA)
- Parks and Protected Areas

Wildlife and Wildlife Habitat

- Local Study Area
- Regional Study Area

Wildlife Habitat Rating

- 1 - High
- 2 - Moderately High
- 3 - Moderate
- 4 - Low
- 5 - Very Low
- 6 - Nil



Reference
BC Government GeoBC Data Distribution

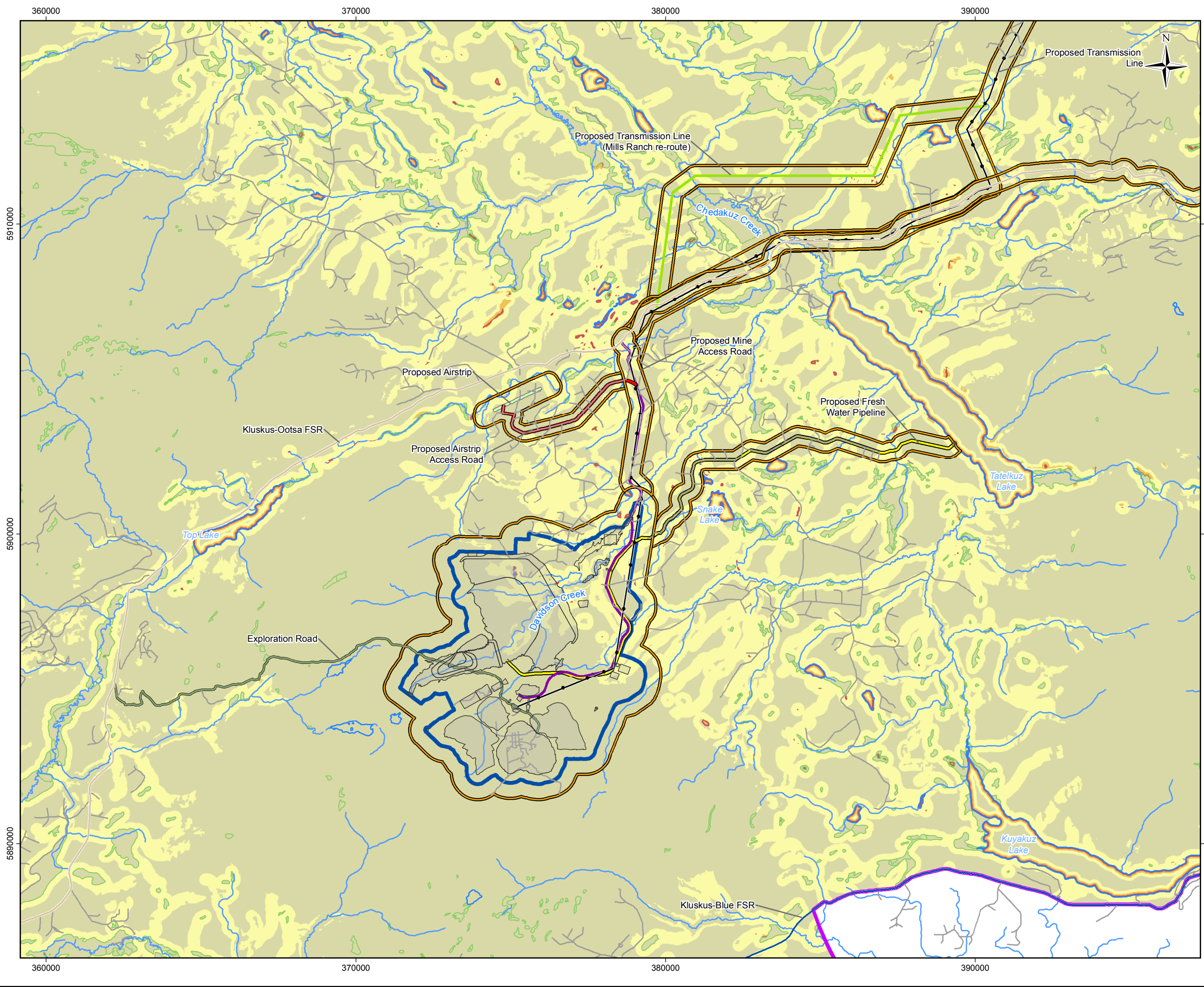
CLIENT:
newgold™

PROJECT:
Blackwater Gold Project

**Wildlife Habitat Rating
Marten - LIW , Map 5 of 5
Life Stage/Season: = Living (LI) / Winter (W)**

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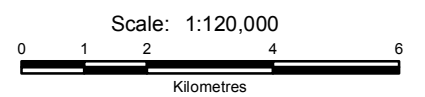
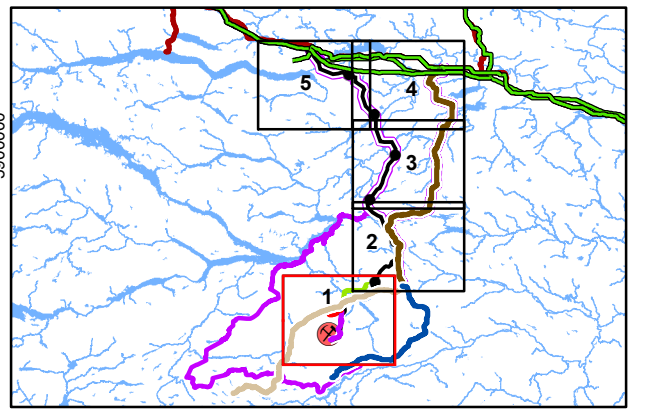
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- Kluskus-Blue FSR
- Kluskus-Ootsa FSR
- Exploration Road
- Proposed Airstrip Access Road
- Proposed Mine Access Road
- Proposed Fresh Water Pipeline
- Proposed Transmission Line
- Proposed Transmission Line (Mills Ranch re-route)
- Proposed Airstrip
- Proposed Site Facilities
- Stream (>=2nd Order)
- Waterbody (>= 4 Ha)
- Wetlands (within RSA)

Wildlife and Wildlife Habitat

- Local Study Area
- Regional Study Area

Wildlife Habitat Rating

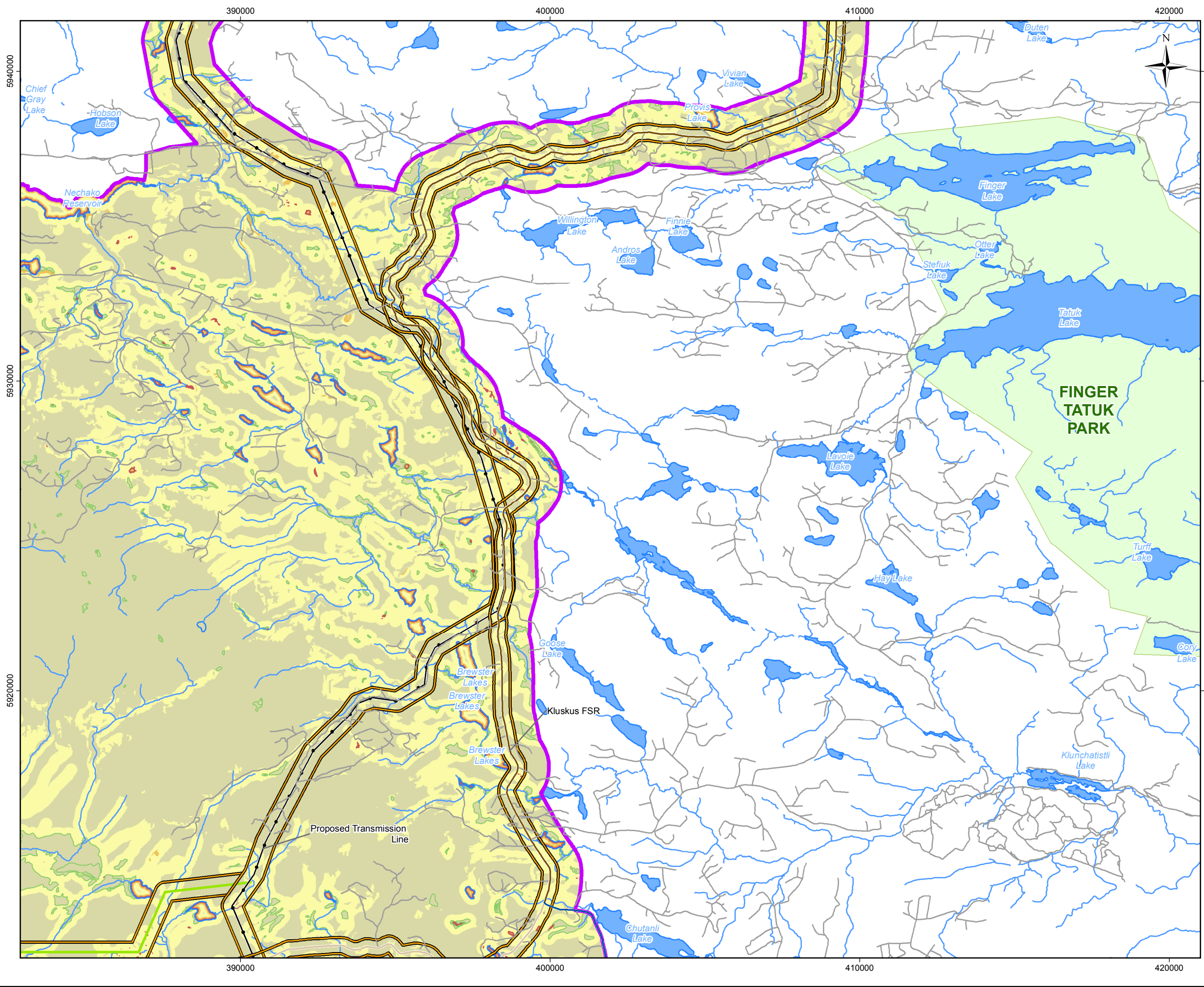
- 1 - High
- 2 - Moderate
- 3 - Low
- 4 - Nil



Reference
BC Government GeoBC Data Distribution

CLIENT: newgold™		
PROJECT: Blackwater Gold Project		
Wildlife Habitat Rating Beaver, Map 1 of 5		
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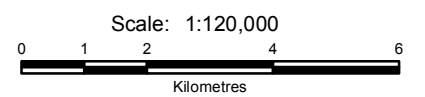
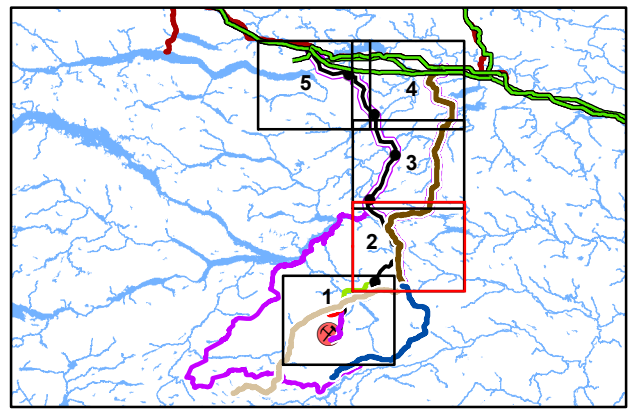
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- Legend**
- Existing Road
 - Kluskus FSR
 - Kluskus-Blue FSR
 - Kluskus-Ootsa FSR
 - Proposed Transmission Line
 - Proposed Transmission Line (Mills Ranch re-route)
 - Stream (>=2nd Order)
 - Waterbody (>= 4 Ha)
 - Wetlands (within RSA)
 - Parks and Protected Areas
- Wildlife and Wildlife Habitat**
- Local Study Area
 - Regional Study Area
- Wildlife Habitat Rating**
- 1 - High
 - 2 - Moderate
 - 3 - Low
 - 4 - Nil



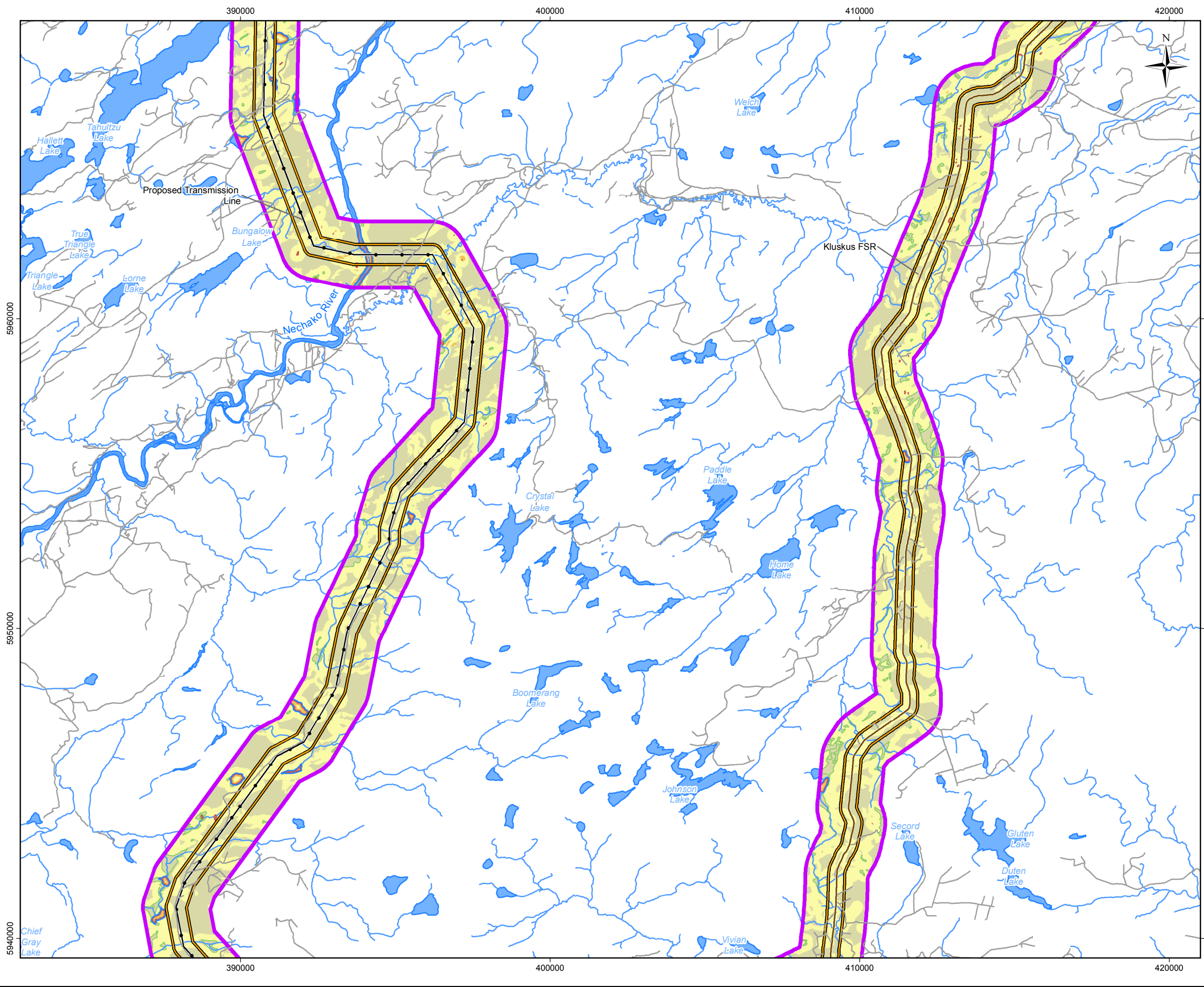
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PARK**



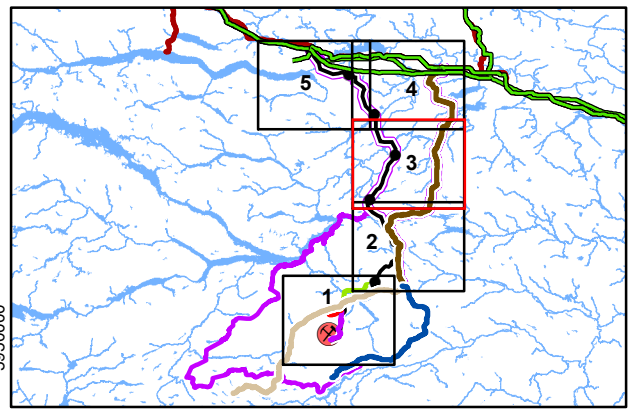
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BC Government GeoBC Data Distribution

CLIENT: 		
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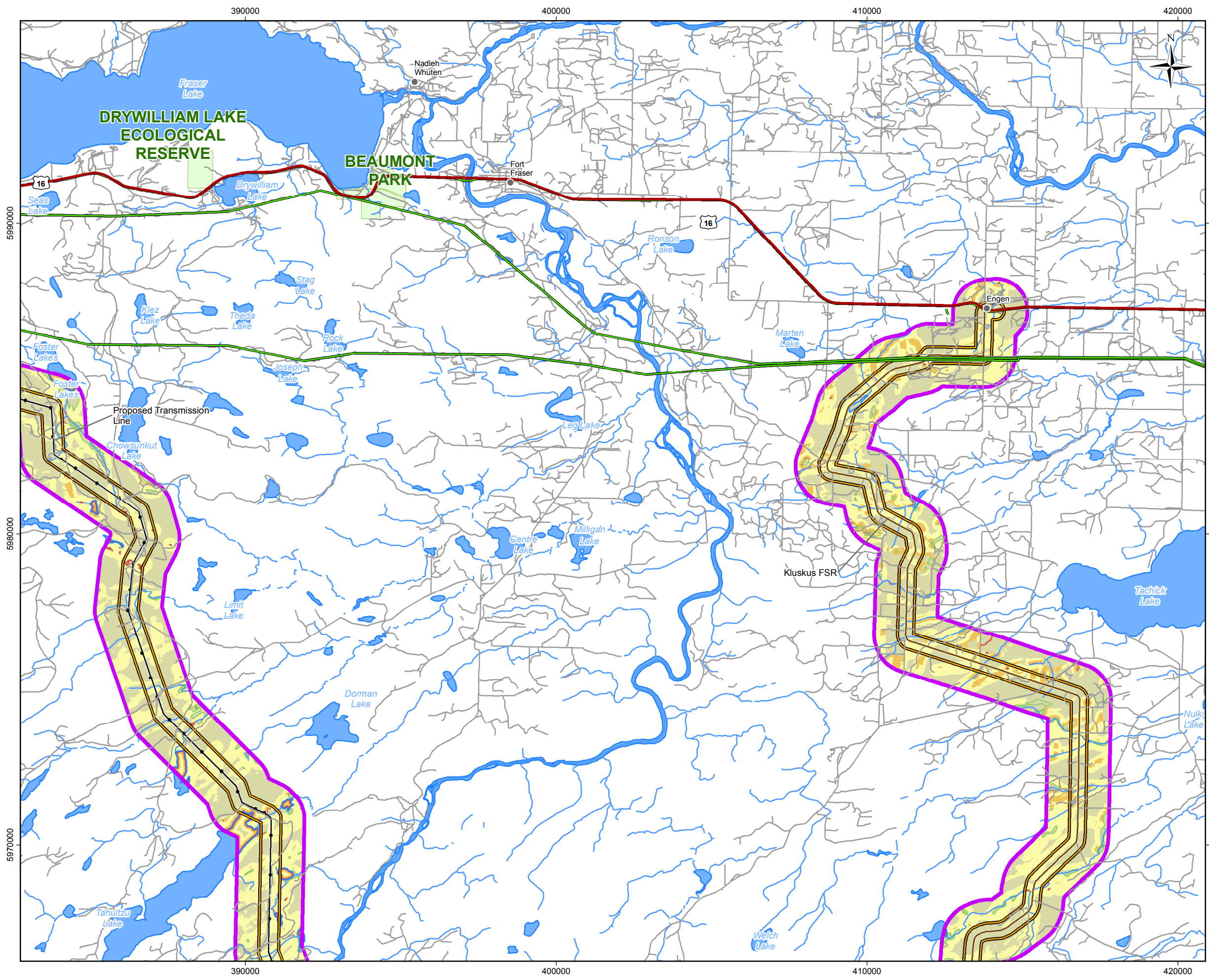
- Legend**
- Existing Road
 - Kluskus FSR
 - Proposed Transmission Line
 - Stream (>=2nd Order)
 - Waterbody (>= 4 Ha)
 - Wetlands (within RSA)
- Wildlife and Wildlife Habitat**
- Local Study Area
 - Regional Study Area
- Wildlife Habitat Rating**
- 1 - High
 - 2 - Moderate
 - 3 - Low
 - 4 - Nil



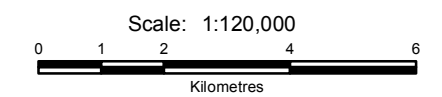
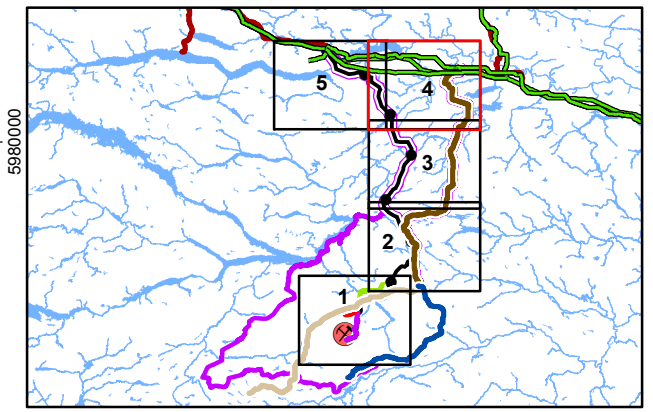
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BC Government GeoBC Data Distribution

CLIENT: 		
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Wildlife Habitat Rating Beaver, Map 3 of 5		
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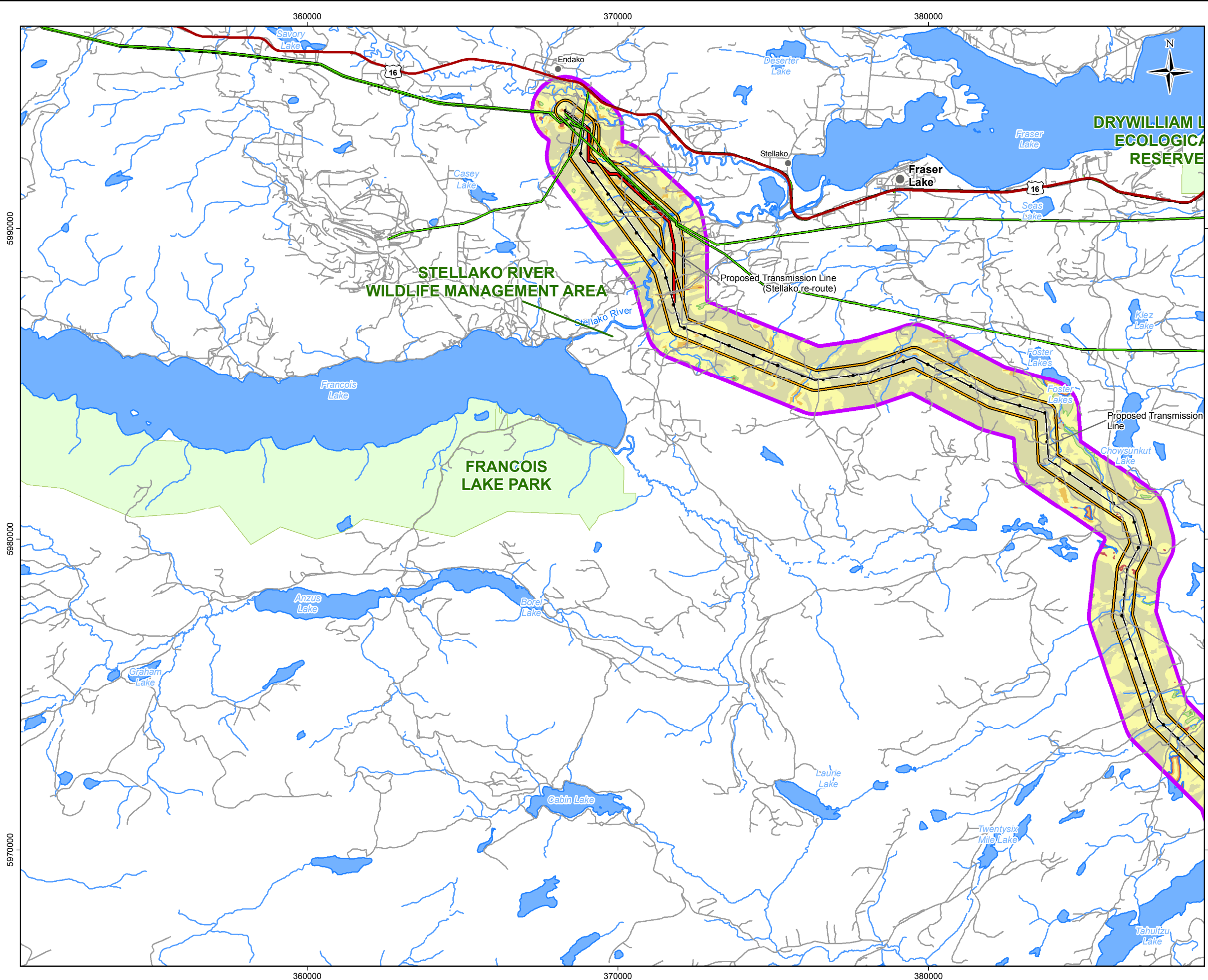
- Legend**
- Existing Transmission Line
 - Highway
 - Existing Road
 - Kluskus FSR
 - Proposed Transmission Line
 - Stream (>=2nd Order)
 - Waterbody (>= 4 Ha)
 - Wetlands (within RSA)
 - Parks and Protected Areas
- Wildlife and Wildlife Habitat**
- Local Study Area
 - Regional Study Area
- Wildlife Habitat Rating**
- 1 - High
 - 2 - Moderate
 - 3 - Low
 - 4 - Nil



Reference
BC Government GeoBC Data Distribution

CLIENT: newgold™		
PROJECT: Blackwater Gold Project		
Wildlife Habitat Rating Beaver, Map 4 of 5		
DATE: September, 2015	ANALYST: MY	Figure 5.4.13-4d
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PROJECTION: UTM Zone 10	DATUM: NAD83	

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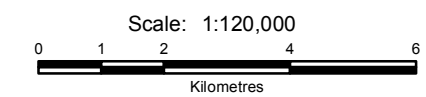
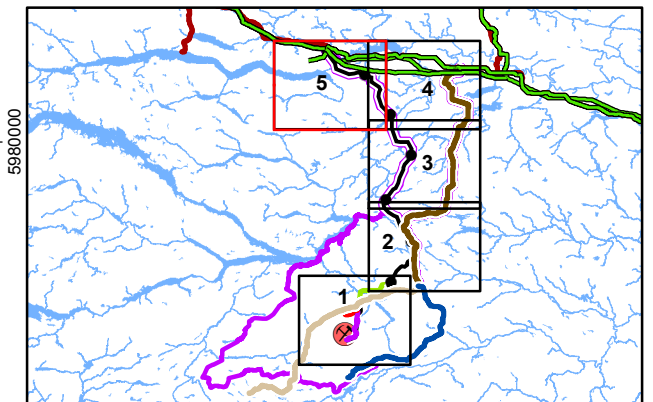
- Populated Place
- Existing Transmission Line
- Highway
- Existing Road
- Proposed Transmission Line
- Proposed Transmission Line (Stellako re-route)
- Stream (>=2nd Order)
- Waterbody (>= 4 Ha)
- Wetlands (within RSA)
- Parks and Protected Areas

Wildlife and Wildlife Habitat

- Local Study Area
- Regional Study Area

Wildlife Habitat Rating

- 1 - High
- 2 - Moderate
- 3 - Low
- 4 - Nil



Reference
BC Government GeoBC Data Distribution

CLIENT: newgold™		
PROJECT: Blackwater Gold Project		
Wildlife Habitat Rating Beaver, Map 5 of 5		
DATE: September, 2015	ANALYST: MY	Figure 5.4.13-4e
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PROJECTION: UTM Zone 10	DATUM: NAD83	

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5.4.13.3.7.1 *Habitat Loss and Alteration*

The habitat loss and alteration category of effects is a method of accounting for areas of vegetation removal and/or ground disturbance due to placement of infrastructure. To simplify the effects assessment, all lost areas are combined regardless of how long they are lost (even though the Project area will be reclaimed, except for some small features) to represent a worst-case scenario.

The majority of marten sign detected in winter was in mature coniferous forest within the ESSFmv1 and SBSmc3 variants. Clearing of mature coniferous forest within the study areas will result in a decrease in available potential habitat, and could result in a shifting of marten territories or a decrease in population size within the Project area (Poole et al., 2004).

High value marten habitats of mature and old-growth forests that provide an optimal mix of denning, foraging, and security/thermal habitats were found in similar amounts within the RSA. Thirty-six percent (105,993 ha) of the RSA was rated as moderate value growing and winter habitat and approximately 1% (3,785 ha) was rated as high value habitat. Footprint components overlap approximately 2% of moderate growing and wintering habitat and 2% of high growing and wintering habitat in the RSA.

Any clearing of vegetation associated with footprints or corridors will reduce the amount of small mammal prey and thermal cover, which can be limiting. The potential direct habitat loss for marten associated with new access roads and the freshwater supply pipeline is predicted to overlap moderate value habitat but not high value habitat. The marten habitat surrounding these areas has undergone timber harvesting, and areas of mature and old-growth forest are limited. Most potential effects on furbearers are associated with clearing of mature and old-growth forest along the transmission line. The footprint of the transmission line (including re-route options) is expected to overlay a maximum 2,070 ha (3% of available moderate habitat and 13% of available high habitat in the RSA). Potential habitat in areas where heavy timber harvesting has occurred are likely less suitable for marten for wintering and growing.

The overall effect of development on marten will likely be a small reduction in suitable habitat in both winter and growing seasons, affecting a low number of marten. The Project development is unlikely to affect the overall habitat availability for marten within the RSA, due to the large amount of available habitat in this area. Effects will potentially occur from the start of Project construction to the end of closure.

Of the beaver habitat in the RSA, approximately 1% (2,633 ha) was rated as moderate value and less than 1% (2,368 ha) was rated as high value. Of the moderate and high value habitat, approximately 1% of each moderate value (28 ha) and high value (12 ha) habitat was overlaid by Project components. Within the Project footprint, the majority of moderate value habitat affected will be within the main transmission line footprint (21 ha), and 4 ha each within the Kluskus FSR and Stellako transmission line footprints. Very little high value habitat is located within the Project footprint, with 6 ha located within the mine site, 4 ha within the main transmission line, and 1 ha each in the Mills Ranch and Stellako transmission line routes.

5.4.13.3.7.2 Mortality Risk

There are low physical risks to marten and beaver through increased mortality caused by vehicle collisions. Increased mortality may occur if marten and beaver are exposed to an increase in trapper access. Effects will potentially occur from the start of Project construction to the end of closure.

5.4.13.3.7.3 Health

There are low physical risks to beaver through increased mortality caused by increased disease transmission and pollution risks. Tularemia is a bacterially transmitted disease spread by biting flies, ticks, and contaminated waters and can cause mortality in beavers if an outbreak occurs. An outbreak could occur naturally during the life of the Project but would not be directly caused by the Project. Based on the disease epidemiology and projected water quality of effluent, the Project would not result in increased animal interactions or increased exposure to toxins.

5.4.13.3.8 Mitigation Measures

A range of habitat mitigation measures and best management practices are applied to the Project as described in the Wildlife Management Plan (WLMP) (**Section 12.2.1.18.4.6**), Landscape, Soils and Vegetation Management and Restoration Plan (LSVMP) (**Section 12.2.1.18.4.4**), Aquatic Resources Management Plan (ARMP) (**Section 12.2.1.18.4.2**), and Wetlands Management Plan (WMP) (**Section 12.2.1.18.4.3**). The following habitat mitigation measures apply to all furbearers and are specific to the potential effects carried through the assessment.

5.4.13.3.8.1 Habitat Loss and Alteration

A range of mitigation measures were applied to the Project. The following mitigation measures will help reduce or eliminate habitat loss and alteration. Avoiding and/or mitigating loss and degradation effects to furbearer and furbearer habitat begins with the Project design. The Kluskus FSR is an existing road for most of its footprint. Some mitigation measures already in place include:

- Road design using existing roads and cleared areas when possible, and, when not avoidable, locating proposed access roads and transmission lines away from wetland and riparian areas or spanning wetlands with transmission lines; and
- Movement of the facilities and topsoil piles within the mine site area away from wetlands, and/or minimizing ground disturbance footprint, and minimizing clearance of mature and old-growth forest.

Manage chemicals such as road salt during construction, operations, decommissioning, and closure to reduce leaching into waterbodies. Implementing the Emergency and Spill Preparedness and Response Plan (ESPRP) (**Section 12.2.1.18.4.13**), and ARMP (**Section 12.2.1.18.3.4.2**).

To meet provincial and federal regulatory requirements for wildlife, vegetation, and aquatic resources relating to the conservation of species and ecosystems at risk, the following plans will be implemented: LSVMP (**Section 12.2.1.18.4.4**), Invasive Species Management Plan (ISMP) (**Section 12.2.1.18.4.5**), WMP (**Section 12.2.1.18.4.3**), Sediment and Erosion Control Plan (SECP) (**Section 12.2.1.18.4.1**), Reclamation and Closure Plan (RCP) (**Section 2.6**), and the

BLACKWATER GOLD PROJECT

APPLICATION FOR AN
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ARMP (**Section 12.2.1.18.4.9**). These plans are designed to control invasive plant species, protect wildlife habitat, and protect in-stream resources. Implementing these management plans, including the wildlife and wetland specific BMPs, will protect and minimize the potential effects of the Project on furbearer habitat not directly affected by the Project.

Mitigation for unavoidable loss of furbearer habitat will be limited to the Project footprint area and will include:

- Mitigating for loss and degradation of adjacent riparian wildlife habitats such as well demarcated no-work zones and management work zones (with restrictions, such as no heavy machinery, etc.) and setbacks in accordance with the *Forest and Range Practices Act* BMPs (BC MFLNRO, 2014) where feasible;
- Minimizing sensory disturbance due to noise and light to areas adjacent to the mine area and airstrip, as stated in the Noise and Vibration Mitigation Measures (**Section 5.2.2**);
- Restoring disturbed habitats at mine closure or development of habitats capable of supporting furbearers as defined in the RCP and WLMP;
- Minimizing ground disturbance and damage to vegetation;
- Applying erosion and sediment control measures;
- Implementing invasive plant management techniques as defined in the ISMP;
- Implementing progressive reclamation using local native vegetation wherever possible, or appropriate commercially grown, weed-free native species LSVMRP , ISMP , RCP; and
- Installing appropriate culverts where required, and maintaining functioning water tables and drainage throughout all phases from construction to decommissioning will maintain wetland function. Mitigation of existing road areas and wetland crossings are predicted to maintain or restore wetland function along the proposed access roads and transmission line.

As part of the closure and reclamation plan, natural cover objects such as rock piles and woody debris piles will be placed in open areas to act as cover, small mammal habitat, and shelter. Coarse woody debris will be placed on the surface of the upland slopes and between rocks and along the slope, parallel and perpendicular with the slopes, to provide habitat features for small mammals and furbearers.

5.4.13.3.8.2 Mortality Risk

Mitigation measures to reduce the potential for direct and indirect mortality risk include:

- Posting speed limits along roads for Project related vehicles, as well as implementation of BMPs of road surface maintenance;
- Water quality monitoring and adaptive management (Decommissioning and Closure Activities, RCP, and Follow-up Program);

- Selecting revegetation species that minimize attraction of wildlife to roadsides will reduce potential vehicle collisions and predation of many species;
- Revegetate linear corridors and discourage predator access by controlling line-of-sight;
- Implementing a no hunting and no firearms policy, as stated in the WLMP;
- Providing breaks in snow banks along the access road to allow wildlife escape as described in the WLMP;
- Removing carrion along the roads to reduce the risk of attracting predator species as described in the WLMP;
- Posting road signs to alert drivers of wildlife sensitive areas such as migration routes and seasonal feeding areas;
- Reporting and documenting wildlife observations and incidents/accidents along access roads as described in the WLMP;
- Restricting and controlling road access to ensure no unauthorized traffic use of the road. All traffic flow on the FSR will be monitored and controlled via radio communications. Reporting observations of wildlife along the road to environmental staff;
- Trapper harvest is managed through FLNRO and increased access is not expected to alter overall harvest levels;
- Implementing adaptive management as described in the WLMP; and
- Including beaver awareness information into regular safety and environmental inductions performed by the mine.

5.4.13.3.8.3 *Effectiveness of Mitigation*

Table 5.4.13-11 provides ratings for effectiveness of mitigation measures to avoid or reduce potential effects on furbearers during mine site development. Mitigation measures will be based on site-specific information and construction engineering and are therefore preliminary at this stage.

Table 5.4.13-11: Mitigation Measures and Effectiveness of Mitigation to Avoid or Reduce Potential Effects on Furbearers during Mine Site Development

Likely Environmental Effect	Project Phase	Mitigation/Enhancement Measure	Effectiveness of Mitigation Rating
Habitat Loss and Alteration	Construction, Operations, Closure, Post-Closure	Road design using existing roads and cleared areas when possible, and, when not avoidable, locating proposed access roads and transmission lines away from wetland and riparian areas or spanning wetlands with transmission lines	High
		Movement of the facilities and topsoil piles within the mine site area away from wetlands, and/or minimizing ground disturbance footprint, and minimizing clearance of mature and old-growth forest	High
		Mitigating for loss and degradation of adjacent riparian wildlife habitats such as well demarcated no-work zones and management work zones (with restrictions, such as no heavy machinery, etc.) and setbacks in accordance with the <i>Forest and Range Practices Act</i> BMPs (BC MFLNRO, 2014) where feasible	High
		Minimizing sensory disturbance due to noise and light to areas adjacent to the mine area and airstrip, as stated in the Noise and Vibration Mitigation Measures (Section 5.2.2)	High
		Restoring disturbed habitats at mine closure or development of habitats capable of supporting furbearers as defined in the RCP and WLMP	Moderate
		Minimizing ground disturbance and damage to vegetation	High
		Applying erosion and sediment control measures	Moderate
		Implementing invasive plant management techniques as defined in the ISMP	Moderate
		Implementing progressive reclamation using local native vegetation wherever possible, or appropriate commercially grown, weed-free native species LSVMRP, ISMP, RCP	High
		Installing appropriate culverts where required, and maintaining functioning water tables and drainage throughout all phases from construction to decommissioning will maintain wetland function	Moderate
Mortality Risk	Construction, Operations, Closure, Post-Closure	Posting speed limits along roads for Project related vehicles, as well as implementation of BMPs of road surface maintenance	Moderate
		Water quality monitoring and adaptive management (Decommissioning and Closure Activities, RCP, and Follow-up Program)	High

Likely Environmental Effect	Project Phase	Mitigation/Enhancement Measure	Effectiveness of Mitigation Rating
		Selecting revegetation species that minimize attraction of wildlife to roadsides will reduce potential vehicle collisions and predation of many species	Moderate
		Revegetate linear corridors and discourage predator access by controlling line-of-sight	Moderate
		Implementing a no hunting and no firearms policy, as stated in the WLMP	High
		Providing breaks in snow banks along the access road to allow wildlife escape as described in the WLMP	Moderate
		Removing carrion along the roads to reduce the risk of attracting predator species as described in the WLMP	High
		Posting road signs to alert drivers of wildlife sensitive areas such as migration routes and seasonal feeding areas	Moderate
		Reporting and documenting wildlife observations and incidents/accidents along access roads as described in the WLMP	Moderate
		Restricting and controlling road access to ensure no unauthorized traffic use of the road	Moderate
		All traffic flow on the FSR will be monitored and controlled via radio communications	Moderate
		Reporting observations of wildlife along the road to environmental staff	Moderate
		Trapper harvest is managed through BC MFLNRO and increased access is not expected to alter overall harvest levels	High
		Implementing adaptive management as described in the WLMP	High
		Including beaver awareness information into regular safety and environmental inductions performed by the mine	High

Note: BC MFLNRO = British Columbia Ministry of Forests, Lands and Natural Resource Operations; BMP = Best Management Practice; FSR = Forest Service Road; ISMP = Invasive Species Management Plan; LSVMRP = Landscape, Soils and Vegetation Management and Restoration Plan; RCP = Reclamation and Closure Plan; WLMP = Wildlife Management Plan

The mitigation / offsetting success ratings shown in **Table 5.4.13-11** are incorporated into the confidence ratings defined in **Section 4.3.5** and summarized in **Table 5.4.13-14**. In summary, low success rating means mitigation has not been proven successful, moderate success rating means mitigation has been proven successful elsewhere, and high success rating means mitigation has been proven effective.

In the case of furbearers on the mine site, mitigation/offsetting success rating is classified as moderate overall because most mitigation measures are consistent with those proposed by BC MFLNRO for protection of furbearer populations, and demonstrated as moderate to high in effectiveness in other locations.

5.4.13.4 Residual Effects and their Significance

Table 5.4.13-12 and **Table 5.4.13-13** present a summary of the potential residual effects for marten and beaver after mitigation, as well as management strategies by Project phase and component.

Table 5.4.13-12: Summary of Categories of Potential Environmental Effects/Issues and Mitigation Measures – Marten

Project Phase	Project Component	Category of Assessment	Mitigation and Management of Effects	Potential for Residual Effect?
Construction, Operations, Closure, and Post-Closure	Mine site, access roads, freshwater supply pipeline, airstrip and transmission line	Habitat Loss and Alteration	LSVMP, progressive reclamation with appropriate species. Avoid large scale clearing of old-growth forest. Primary area of concern is at mature and old-growth forest in the mine site and the transmission line.	Yes
Construction, Operations, Closure and Post-Closure	Mine site, access roads, freshwater supply pipeline, airstrip, and transmission line	Mortality Risk	Follow the WLMP to reduce potential effects on furbearers and their habitat. Restrict access to only individuals working directly for the Proponent; gate site access points and road closure after mine closure (Transportation and Access Management Plan [TAMP] [Section 12.2.1.18.4.14]). No hunting and no firearms policy as described in WLMP. Enforce speed limits on access roads.	No
Construction, Operations, Closure and Post-Closure	Mine site, access roads, freshwater supply pipeline, airstrip, and transmission line	Changes in Furbearer Health	Manage attractants such as road salt during construction, operations, decommissioning, and closure. Implementing the ESPRP, and effluent and dust management.	No
Construction, Operations, and Closure	Mine site, access roads, freshwater supply pipeline, airstrip, and transmission line	Changes in Furbearer Movement Patterns	Minimize Project footprint, as outlined in existing Project Description. Implementing the Noise and Light Mitigation Measures to reduce	No

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Project Phase	Project Component	Category of Assessment	Mitigation and Management of Effects	Potential for Residual Effect?
			attraction of furbearers to facilities and potential resultant mortality.	
Construction, Operations, Closure and Post-Closure	Mine site, access roads, freshwater supply pipeline, airstrip, and transmission line	Changes in Population Dynamics	Implement vegetation management.	No

Table 5.4.13-13: Summary of Categories of Potential Environmental Effects/Issues and Mitigation Measures – Beaver

Project Phase	Project Component	Category of Assessment	Mitigation and Management of Effects	Potential for Residual Effect?
Construction, Operations, Closure, and Post-Closure	Mine site, access roads, freshwater supply pipeline, airstrip and transmission line	Habitat Loss and Alteration	LSVMRP, progressive reclamation with appropriate species. Avoid large scale clearing of mixed wood forest.	Yes
Construction, Operations, Closure, and Post-Closure	Mine site, access roads, freshwater supply pipeline, airstrip and transmission line	Mortality Risk	Follow WLMP to reduce potential effects on furbearers and their habitat. Enforce speed limits on access roads. Restrict access to only individuals working directly for the Proponent; gate site access points and road closure after mine closure (TAMP). No hunting and no firearms policy as described in WLMP.	Yes
Construction, Operations, Closure, and Post-Closure	Mine site, access roads, freshwater supply pipeline, airstrip and transmission line	Changes in Beaver Health	Manage attractants during construction, operation, and decommissioning and closure. ESPRP, effluent and dust fall management.	No
Construction, Operations, and Closure	Mine site, access roads, freshwater supply pipeline, airstrip, and transmission line	Changes in Beaver Movement Patterns	Minimizing Project footprint, as outlined in existing Project Description. Implementing the Noise and Light Mitigation Measures Plan to reduce attraction of furbearers to facilities and potential resultant mortality.	No

Project Phase	Project Component	Category of Assessment	Mitigation and Management of Effects	Potential for Residual Effect?
Construction, Operations, Closure, and Post-Closure	Mine site, access roads, freshwater supply pipeline, airstrip, and transmission line	Changes in Population Dynamics	Implementing vegetation management.	No

Each of the potential residual effects is characterized in terms of the effect's magnitude or severity, geographic extent, duration, reversibility, context or furbearer habitat, probability of the effect's occurrence, and confidence in the conclusions (**Table 5.4.13-14**).

Table 5.4.13-14: Characterization of Residual Environmental Effects for Furbearers

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Magnitude	The amount of change in a measurable parameter or variable relative to baseline case	Negligible—Effects are not measurable Low—A measurable change but within the range of expected natural variation based on species life history Medium—A measurable change but less than high High ⁽¹⁾ — A >20% change of density, abundance or distribution for listed species and >30% change of density, abundance or distribution for all other species
Geographical Extent	The geographic area in which an environmental, economic, social, heritage, or health effect of a defined magnitude occurs	Local: Within the LSA—Effect is prevalent in the LSA – Regional: Within the RSA—Effect extends beyond the LSA into the RSA
Frequency	When the effect occurs and the number of times during the Project or a specific Project phase that an environmental effect may occur	Once—Effect occurs on one occasion Intermittent—Effect occurs several times Continuous—Effect occurs continuously
Duration	The period of time required until furbearers returns to baseline condition, or the effect can no longer be measured or otherwise perceived	Less than two years (i.e., effects happens during the construction phase only) Medium-term—Not applicable for furbearers Long-term— From more than 17 to less than 35 years (i.e., effect happens during construction, operations and closure) Chronic— More than 35 years and beyond (i.e., effect happens from construction through to post closure and beyond)
Reversibility	The likelihood that a measurable parameter will recover from an effect	Yes—Effect is reversible within part of a whole generation after the impact ceases No—Effect is not reversible over the timescales listed

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Context	Resilience to stress due to ecological fragility and degree of disturbance of area in which the Project is located.	<p>Low – Furbearers have high resilience to stress, have not been affected by other projects or activities or natural changes. No listed species or ecosystems identified</p> <p>Medium – Furbearers have moderate resilience to stress, the VC has been affected by other projects or activities, or natural changes but still has capacity to assimilate more changes. Presence of blue-listed species or ecosystems</p> <p>High – Furbearers have weak resilience to stress, the VC has been severely affected by other projects or activities, or natural changes. Presence of red-listed or SARA-listed species or ecosystems</p>
Likelihood of Effect	The likelihood that a residual effect will occur	<p>Low—Low likelihood a residual effect will occur</p> <p>Moderate—Medium likelihood a residual effect will occur</p> <p>High—High likelihood a residual effect will occur</p>
Significance	Expectation of a residual effect on the furbearers that is above the suggested threshold	<p>Not Significant (negligible)—Effects are point-like or local in geographic extent, with a low context rating, and a negligible magnitude, short-term, reversible, and with a low frequency (once or intermittent)</p> <p>Not Significant (minor)—Effects are local in geographic extent, with a low magnitude, and low context rating, short-term to chronic, reversible, and with a low frequency (once or intermittent)</p> <p>Not Significant (moderate)—Effects are local to regional in geographic extent, and medium in magnitude, moderate context rating, medium-term to chronic, reversible, and occur at all frequencies</p> <p>Significant—Effects occur to furbearers with a medium to high context, and high context rating, high magnitude, regional in geographic extent, long-term to chronic, non-reversible, and occur at all frequencies</p>
Confidence Level	Confidence in the residual effects prediction	<p>Low—Effects on furbearers are not well understood, mitigation has not been proven effective</p> <p>Moderate—Effects on furbearers are understood in similar ecosystems and effects documented in the larger regional area or in the literature, mitigation proven effective elsewhere.</p> <p>High—Effects on furbearers are well understood, mitigation has been proven effective.</p>

Note: LSA = Local Study Area; RSA = Regional Study Area; SARA = *Species at Risk Act*
 (1) High: A threshold of 20% change or loss is proposed for high magnitude. This is a general environmental practitioner approach, which has been used and supported in the past for resource development projects, including the Joint Review Panel Report on the Jackpine Mine Expansion Project which decision statement was made under CEAA 2012.

Thresholds are based on the ability to likely detect change in habitat as a result of Project effects. Threshold effect levels to furbearers (**Table 5.4.13-15**) were selected to reflect the ability of surveys to detect quantitative and qualitative habitat changes (Thompson and Harestad, 1994).

Table 5.4.13-15: Threshold(s) for Determining Significance of Residual Furbearer Habitat, Mortality, and Health in the RSA

Categories of Potential Environmental Effects/Issues	Threshold of Environmental Effect
Habitat Loss and Alteration	>20% reduction in relative furbearer habitat abundance or habitat areas with a moderate to high suitability ratings (e.g., >20% change in amount of furbearer moderate to high suitable habitats within the RSA, as estimated in suitability model). Evidence of lack of use or displacement due to sensory disturbance may be included as lost habitat if evident.
Mortality Risk	Qualitative measure of risk within the RSA because of Project effects (e.g., road density).
Changes in Furbearer Health	Qualitative measure of risk within the RSA of beaver disease or condition linked to Project effects.

Note: RSA = Regional Study Area

Table 5.4.13-16 and **Table 5.4.13-17** present the residual effects assessment summaries for furbearers, based on the categorization of effects.

Table 5.4.13-16: Residual Effects Assessment Summary for Furbearers (Except Beaver)

Project Phase	Project Component	Categories of Potential Environmental Effects/Issues	Mitigation and Management	Potential for Residual Effect?	Residual Effect	Context	Magnitude	Geographic Extent	Duration	Reversibility	Frequency	Likelihood Determination	Level of Confidence for Likelihood	Significance Determination	Level of Confidence for Significance
Construction through to Post-Closure	Mine site, airstrip, transmission line, freshwater supply pipeline, and access roads	Habitat Loss and Alteration	Noise and Vibration Mitigation Measures, minimize sensory disturbances. LSVMRP, progressive reclamation with appropriate species, maintain forest function and vegetation cover	Yes	Unavoidable loss of habitat	Low	Negligible	Local	Chronic	Reversible	Once time	High	High	Not Significant (minor)	High

Table 5.4.13-17: Residual Effects Assessment Summary for Beaver

Project Phase	Project Component	Categories of Potential Environmental Effects/Issues	Mitigation and Management	Potential for Residual Effect?	Residual Effect	Context	Magnitude	Geographic Extent	Duration	Reversibility	Frequency	Likelihood Determination	Level of Confidence for Likelihood	Significance Determination	Level of Confidence for Significance
Construction through to Post-Closure	Mine site, airstrip, transmission line, freshwater supply pipeline, and access roads	Habitat Loss and Alteration	LSVMRP, progressive reclamation with appropriate species, maintain forest function and vegetation cover	Yes	Unavoidable loss of habitat	Low	Negligible	Local	Chronic	Reversible	One time	High	High	Not Significant (negligible)	High
Construction through to Post-Closure	Mine site, airstrip, transmission line, freshwater supply pipeline, and access roads	Mortality Risk	LSVMRP, progressive reclamation with appropriate species, maintain forest function and vegetation cover WLMP, restricting trapping access within Project area.	Yes	Unavoidable direct mortality of beaver	Low	Negligible	Local	Long term	Reversible	Intermittent	Low	High	Not Significant (minor)	High
Construction through to Post-Closure	Mine site, airstrip, transmission line, freshwater supply pipeline, and access roads	Furbearer Health	LSVMRP, progressive reclamation with appropriate species, maintain forest function and vegetation cover	Yes	Unavoidable indirect mortality of beaver	Low	Negligible	Local	Long term	Reversible	Intermittent	Low	High	Not Significant (negligible)	High

5.4.13.4.1 Mine Site

The residual effects of habitat loss and degradation of furbearer habitat (except beaver) are rated as Not Significant (minor) with high confidence, due to the magnitude, geographical extent, frequency, and reversibility of the effect occurring. Loss and degradation of moderate to high value furbearer habitat will occur once during the construction phase and these effects will be evident in the closure and post-closure phases. Within the mine site, the effect is rated with negligible magnitude because a small amount of the available habitat will be affected. The context was rated as moderate as the sensitivity to recovery for these ecosystems is high; however, the Blue-listed wolverine and fisher were both detected within the Project area. Regionally, these moderate and high value habitats are widespread and relatively common. A small fraction of available moderate and high value habitat will be affected relative to habitats where furbearers occur at the higher elevations near the mine site. The one exception is wolverine that uses high elevation alpine areas during summer. The clearing of trees from forested habitats will generally make the habitat unsuitable for marten, as mature and old-growth coniferous forests are an essential component of their habitat. The habitat impacts have a local effect to the Project footprint and the sensory disturbance has a local effect, limited to the LSA. The duration of the habitat effect will be chronic (greater than 30 years) until areas are reclaimed post-closure; however, some areas will be revegetated before closure reducing the duration the habitat is lost. Once the habitat effect occurs, it will be approximately 17 years before closure and then at least 80 or more years for the forested ecosystems to reach maturity (i.e., structural stage 6) or near baseline conditions.

For beaver, the residual effects of habitat loss and degradation of habitat are rated as Not Significant (negligible) with high confidence, due to magnitude, geographic extent, frequency, and reversibility of the effect occurring. Loss and degradation of beaver habitat will occur once during the construction phase and will be evident through the closure and post-closure phases. Within the mine site, the effect is rated with low magnitude because a small amount of the available habitat will be affected, and the context was rated as low as the sensitivity to recovery for these ecosystems is high. Regionally, these moderate and high value habitats are widespread and relatively common, and a small percentage of the available moderate and high value habitat will be affected relative to habitats where beaver occur near the mine site. The clearing of trees from riparian areas around wetlands, lakes, rivers, and streams will generally make the habitat unsuitable for beavers, as trees are an essential component of their habitat. The duration of the habitat effect will be chronic, although some areas will be revegetated before closure reducing the duration the habitat is lost, and beaver habitat is quick to respond and recover from disturbances.

The residual effects of beaver mortality are rated as Not Significant (minor) with high confidence, due to the magnitude, geographic extent, frequency, and reversibility of the effect occurring. Mortality of beaver may occur intermittently from the construction phase through to closure. Within the mine site, the effect is rated with low magnitude because of the small increase in mortality. The context was rated as low as the sensitivity for beaver populations to recover from a small amount of mortality is high. The clearing of forest around riparian areas as well as creating linear corridors may increase the accessibility of predators to these areas (e.g., wolves, coyotes). The mortality impacts will have a local effect and will be limited to specific areas that are cleared for

the Project and within beaver habitat. The duration of the mortality effect will be long term, as these effects may occur throughout the life of the Project.

The residual effects of beaver health are rated as Not Significant (negligible) with high confidence, due to the magnitude, geographic extent, frequency, and reversibility of the effect occurring. Beaver health may be affected intermittently from the construction phase through to closure, due to the potential for disease outbreaks within the population (e.g., tularaemia disease), although this would likely occur naturally. Within the mine site, the effect is rated with low magnitude because a change in the health of beavers may increase indirect mortality. The context was rated as low because the sensitivity of beaver populations to recover from health issues or indirect mortality is high. The health impacts will have a local effect and will be limited to specific areas within the LSA that are within beaver habitat. The duration of the health effect will be long term, as beavers could be affected throughout operations but they are able to reproduce quickly and populations are able to recover from disease or indirect mortality events relatively quickly.

5.4.13.4.2 Access Roads and Kluskus Forest Service Road

The residual effects of habitat loss and degradation of furbearer habitat (except beaver) along the access roads and Kluskus FSR are rated as Not Significant (minor) with high confidence, due to the magnitude, geographical extent, frequency, reversibility, of the effect occurring. Loss and degradation of moderate to high value furbearer habitat, adverse sensory disturbance and potential for loss due to predation related to changes in predator-prey dynamics will occur along roads associated with the Project. Habitat effects will be local in geographic extent and will potentially occur from within a 50 m buffer from the edge of the road footprint into the LSA. The effect will occur once during the construction phase and will be evident through the closure and post-closure phases. It will be approximately 17 years before closure and then at least 80 or more years for the forest ecosystems to reach maturity (i.e., structural stage 6) or near baseline conditions. The duration of the habitat effect will be chronic (greater than 30 years) until areas are reclaimed post-closure; however, some areas will be revegetated before closure reducing the duration the habitat is lost. The existing Kluskus FSR may be widened, with additional clearing area for borrow pits and laydown areas (to be progressively reclaimed throughout the life of the mine). The access road will be closed and reclaimed. The existing FSR will remain in place. Regionally, these moderate and high value habitats are widespread and relatively common. A small amount of the available moderate and high value habitat will be affected relative to habitats where furbearers occur, especially at higher elevations where wolverine occurs. The clearing of trees from forested habitats will generally make the habitat unsuitable for furbearers, as mature and old-growth coniferous forests are an essential component of their habitat. The context of the effect will be moderate due to the presence of provincially Blue-listed species (e.g., wolverine, fisher).

For beaver, the residual effects of habitat loss and degradation of habitat are rated as Not Significant (negligible) with high confidence, due to the magnitude, geographic extent, frequency, and reversibility of the effect occurring. Loss and degradation of beaver habitat will occur once during the construction phase and will be evident through the closure and post-closure phases. Within the access road and Kluskus FSR, the effect is rated with low magnitude because a small

amount of the available habitat will be affected, and the context was rated as low as the sensitivity to recovery for these ecosystems is high. Regionally, these moderate and high value ecosystems are widespread and relatively common, and a small percentage of the available moderate and high value habitat will be affected relative to habitats where beaver occur near the access road and FSR. The clearing of trees from riparian areas around wetlands, lakes, rivers, and streams will generally make the habitat unsuitable for beavers, as trees are an essential component of their habitat. The duration of the habitat effect will be chronic, but some areas will be revegetated before closure reducing the duration the habitat is lost, and vegetation associated with beaver habitat is quick to respond and recover from habitat disturbances.

The residual effects of beaver mortality are rated as Not Significant (minor) with high confidence, due to the magnitude, geographic extent, frequency, and reversibility of the effect occurring. Mortality of beaver may occur intermittently from the construction phase through to closure phase. Within the access road and FSR, the effect is rated with low magnitude because of the small increase in mortality expected. The context was rated as low because the sensitivity for beaver populations to recover from a small amount of mortality is high. The clearing of forest around riparian areas as well as creating linear corridors may increase the accessibility of predators to these areas (e.g., wolves, coyotes). The mortality impacts will have a local effect and will be limited to specific areas that are cleared for the Project and within beaver habitat. The duration of the mortality effect will be long term, as these effects may occur throughout the life of the Project.

The residual effects of beaver health are rated as Not Significant (negligible) with high confidence, due to the magnitude, geographic extent, frequency, and reversibility of the effect occurring. Beaver health may be affected intermittently from the construction phase through to closure, due to the potential for natural disease outbreaks within the population. Within the access road and FSR, the effect is rated with low magnitude because of the small amount that indirect beaver mortality may increase. The context was rated as low as the sensitivity of beaver populations to recover from health issues or indirect mortality is high. The health impacts will have a local effect and will be limited to specific areas within the LSA that are within beaver habitat. The duration of the health effect will be long term, but beavers are able to reproduce quickly and populations are able to recover from disease or indirect mortality events relatively quickly.

5.4.13.4.3 Airstrip, Transmission Line, and Freshwater Supply Pipeline

The residual effects of habitat loss and degradation of furbearer habitat (except beaver) at these facilities are rated as Not Significant (minor) with high confidence, due to the magnitude, geographical extent, frequency, reversibility, of the effect occurring. Loss and degradation of furbearer habitat will occur during construction and will be evident through operations and closure phases of the airstrip, transmission line, and freshwater supply pipeline areas. These effects will be reversible but chronic in duration (greater than 30 years). The habitat effects for the airstrip and freshwater supply pipeline have a negligible magnitude rating because much of the area is already disturbed by logging and many of the mitigation practices implemented in the closure and reclamation plan will minimize the majority of effects.

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Habitat effects will potentially occur within a 50 m buffer from the edge of the component footprint. The clearing of mature and old-growth forest habitats will generally make the habitat unsuitable for furbearers, as trees are an essential component of their habitat for feeding and security. Some species of furbearers may use the transmission line during Project operations and most will use the area after it has been reclaimed and reached the mature forest stage (i.e., structural stage 6) or near baseline conditions. There is no reasonable expectation that Project activities would affect the viability of furbearers due to the widespread and common extent of suitable habitat within the RSA.

For beaver, the residual effects of habitat loss and degradation of habitat are rated as Not Significant (negligible) with high confidence, due to the magnitude, geographic extent, frequency, and reversibility of the effect occurring. Loss and degradation of beaver habitat will occur once during the construction phase and will be evident through the closure and post-closure phases. Within the airstrip, transmission line, and freshwater supply pipeline areas, the effect is rated with low magnitude because a small amount of the available habitat will be affected, and the context was rated as low as the sensitivity to recovery for these habitats is high. Regionally, these moderate and high value habitats are widespread and relatively common, and a small percentage of the available moderate and high value habitat will be affected relative to habitats where beaver occur near the airstrip, transmission line, and freshwater supply pipeline. The clearing of trees from riparian areas around wetlands, lakes, rivers, and streams will generally make the habitat unsuitable for beavers, as trees are an essential component of their habitat. The habitat impacts have a local effect mostly confined to the Project footprint and the sensory disturbance has a local effect, limited to the LSA. The duration of the habitat effect will be chronic, but some areas will be revegetated before closure reducing the duration the habitat is lost, and beaver habitat is quick to respond and recover from habitat disturbances.

The residual effects of beaver mortality are rated as Not Significant (minor) with high confidence, due to the magnitude, geographic extent, frequency, and reversibility of the effect occurring. Mortality of beaver may occur intermittently from construction phase through to closure phase. Within the airstrip, transmission line, and freshwater supply pipeline, the effect is rated with low magnitude because of the small increase in mortality expected. The context was rated as low because the sensitivity for beaver populations to recover from a small amount of mortality is high. The clearing of forest around riparian areas, as well as creating linear corridors, may increase predator accessibility to these areas (e.g., wolves, coyotes). The mortality impacts will have a local effect and will be limited to specific areas that are cleared for the Project and within beaver habitat. The duration of the mortality effect will be long term, as these effects may occur throughout the life of the Project.

The residual effects of beaver health are rated as Not Significant (negligible) with high confidence, due to the magnitude, geographic extent, frequency, and reversibility of the effect occurring. Beaver health may be affected intermittently from the construction phase through to closure, due to the potential for disease outbreaks within the population. Within the airstrip, transmission line, and freshwater supply pipeline, the effect is rated with low magnitude because of the small amount that indirect beaver mortality may increase. The context was rated as low because the sensitivity of beaver populations to recover from health issues or indirect mortality is high. The health impacts

will have a local effect and will be limited to specific areas within the LSA that are within beaver habitat. The duration of the health effect will be long term, as beavers are able to reproduce quickly and populations are able to recover from disease or indirect mortality events relatively quickly.

5.4.13.4.4 Project Area

The residual effects of habitat loss and degradation of furbearer habitat (except beaver) are rated as Not Significant (minor) with high confidence, due to the magnitude, geographical extent, frequency, and reversibility of the effect occurring. Loss and degradation of moderate to high value furbearer habitat will occur during the construction phase primarily in the mine site area and these effects will be evident through operations. Regionally, these moderate to high value habitats are widespread and available throughout the RSA. The duration of the habitat effect will be chronic (greater than 30 years) until areas are reclaimed post-closure; however, some areas will be revegetated before closure reducing the duration the habitat is lost. Once the habitat effect occurs, it will be approximately 17 years before closure and then at least 80 or more years for the forested ecosystems to reach maturity (i.e., structural stage 6) or near baseline conditions. The habitat effect will occur once and will be reversible.

For beaver, the residual effects of habitat loss and degradation of habitat are rated as Not Significant (negligible) with high confidence, due to the magnitude, geographical extent, frequency, and reversibility of the effect occurring. Loss and degradation of moderate to high value beaver habitat will occur during the construction phase primarily along the transmission line area and these effects will be evident through construction. Regionally, these moderate to high value habitats are widespread and available throughout the RSA. The duration of the habitat effect will be chronic until areas are reclaimed post-closure; however, some areas will be revegetated before closure reducing the duration the habitat is lost.

The residual effects of beaver mortality are rated as Not Significant (minor) with high confidence, due to the magnitude, geographical extent, frequency, and reversibility of the effect occurring. Changes in beaver mortality may occur during all phases of the Project, and beaver populations are able to recover from mortality events relatively quickly giving it a low magnitude. The duration of the mortality effect will be long-term throughout operations.

The residual effects of beaver health are rated as Not Significant (negligible) with high confidence, due to the magnitude, geographical extent, frequency, and reversibility of the effect occurring. Beaver health may be affected during any phase of the Project and, therefore, the duration of the health effect will be long-term. However, beaver populations are able to recover quickly from disease or indirect mortality.

5.4.13.5 Cumulative Effects

A Cumulative Effects Assessment (CEA) for the furbearer VC is necessary because the Project is expected to have a Not Significant (minor) residual adverse effect on marten habitat loss and degradation, and a Not Significant (minor) residual adverse effect on beaver risk of mortality. Residual effects on marten habitat or beaver mortality that could arise from other projects or

activities in the region are assessed to fully understand the context of the residual adverse effects on furbearers by the Project. The spatial boundary for this assessment is the RSA. The temporal boundaries include historical, present, and certain and reasonably foreseeable projects within the RSA. Rationale for carrying forward into the CEA is shown in **Table 5.4.13-18**.

Table 5.4.13-18: Project Related Residual Effects; Rationale for Carrying forward into the CEA

Project Component	Project Phase	Residual Effect	Rationale	Carried Forward to Cumulative Effects Assessment
Mine site, airstrip, transmission line, freshwater supply pipeline, and access roads	Construction through to Closure	Unavoidable loss or alteration of habitat for furbearers	Changes in the amount of habitat from baseline conditions	Yes
Mine Site, Airstrip, Transmission Line, Freshwater Supply Pipeline, and Access Roads	Construction through to Closure	Unavoidable mortality of beaver	Changes in mortality	Yes

The MPB infestation has affected large areas of mature pine forest in the region, which has resulted in a loss of furbearer habitat. Some MPB-killed pine forest was harvested while remaining forests are in various stages of degeneration due to the MPB. Mineral exploration in the area has increased the number of access roads, which have caused increased habitat fragmentation and road access for people. There is no hunting season in the Project area; however, the area is used by trappers and recreationalists who may impact furbearers by causing mortality, disturbance, and displacement. Agriculture is prevalent in the northern portion of the cumulative effects area and considered a limitation to furbearers. Baseline information was collected in the LSA and portions of the RSA that were altered by these past and present activities. The future activities in the Project area are expected to include similar activities. For assessing cumulative effects for mortality of beaver CEA, the most relevant land uses in the RSA that could potentially interact include forestry, mining, and agriculture activities. **Table 5.4.13-19** presents identified interactions between past, present, and future projects and land uses in the RSA.

Table 5.4.13-19: Key and Moderate Interactions between Furbearers and other Past, Present, and Future Projects/Activities

Potential Residual Effect	Historical Land Use			Representative Current and Future Land Use			Carried Forward into CEA?
	Forestry (cutblocks and woodlots)	Agriculture (range tenures)	Trapping and Hunting	Mining (active, current prospecting, quarries)	Forestry (cutblocks and woodlots)	Agriculture (active range tenures)	
Habitat Loss and Alteration	I	I	I	I	I	I	Yes
Mortality Risk	I	I	I	I	I	I	Yes

Note: I = interaction, KI = key interaction, NI = no interaction

A Wildlife Management Plan has been developed for the Project to provide mitigation for all components and phases of the Project. For the furbearer CEA, the most relevant land uses in the RSA that could potentially interact with furbearer habitat and mortality include forestry, mining, trapping, and agriculture activities. No singular reviewable projects were identified within the RSA. Current mineral prospecting could lead to mine projects in the future, but hypothetical projects are not to be considered during the CEA (BC EAO, 2013). **Table 5.4.13-19** presents the identified interactions between past, present, and future projects and land uses in the RSA for the CEA.

5.4.13.5.1 Potential Residual Cumulative Effects and Mitigation Measures

Forestry-related activities within the RSA will potentially temporarily alter and degrade furbearer habitat through habitat conversion, erosion and sedimentation, and invasive species introduction. Forestry activities typically result in the removal of forested habitats. Wetland and riparian habitats are not usually removed; however, removal of forest surrounding these areas may cause the degradation of these habitats.

Suggested mitigation measures for forestry activities include: 1) follow forest harvest guidelines, retention of snags and wildlife trees, including cutblock and road design to minimize erosion and maximize reforestation; 2) maintain buffers around wetlands, riparian areas; 3) apply sediment control to areas around wetlands and other waterbodies; 4) implement invasive plant control measures and monitoring systems; 5) and replant native vegetation to expedite succession. These mitigation activities are described in the environmental management plans for the Project (**Section 12.2.1**).

Agricultural activities in the RSA will potentially degrade furbearer habitat. Conversion of forest to agricultural crops or cattle pasture either severely degrades or results in the loss of furbearer habitat. Cattle grazing can degrade wetland and riparian vegetation, and potentially introduce invasive vegetation species. Trampling can compact wetland soils and cause erosion in riparian areas resulting in sedimentation of surface waters. Mechanical harvesting of wetland vegetation can cause rutting and soil displacement. Farms and other agricultural operations can result in reduced water quality in wetlands through fertilizer and pesticide use. Similar to forestry activities, agricultural

activities do not typically result in the loss of furbearer habitat but may result in degraded furbearer habitat.

Suggested mitigation measures for agricultural activities include: 1) establishing cattle exclusion zones to limit grazing to uplands, thereby minimizing erosion and sedimentation; 2) minimizing pesticide and fertilizer use around aquatic resources and before precipitation events to limit chemical runoff from entering wetlands; 3) establishing protected riparian areas prior to clearing; and 4) controlling invasive species.

Mining activities (e.g., current prospecting, exploration) are occurring southeast and northwest of the mine site, and are likely to continue into the future. Mineral prospecting can result in degraded furbearer habitat through accidental discharge of drilling fluids and vegetation removal, and may result in an increase in mortality, either through increased access to beaver habitat or mortality from spills. Hunting and trapping may cause disturbance within furbearer habitat, and may degrade these areas.

Suggested mitigation measures for mineral exploration and prospecting, which are typical permit conditions under the *Mines Act* (Government of BC, 1996b), include: 1) pre-planning to avoid wetlands and minimizing stream crossings for access roads; 2) avoiding work during critical breeding and rearing seasons for wildlife; 3) limiting the production of excess drilling fluids; 4) maintaining buffers around wetlands and riparian areas; and 5) avoiding discharges of drilling fluids into aquatic systems.

5.4.13.5.2 Significance of Potential Residual Cumulative Effects

The Project will contribute to additional loss of furbearer habitat and increase in beaver mortality in combination with the past, present, and future activities (e.g., forestry, agricultural, and mineral exploration) identified in the RSA for this CEA. The significance of the Project's contribution to cumulative effects in the RSA was determined at the post-closure phase for this assessment as forests and other habitats will be mitigated through reclamation primarily during closure. Logging activities in the RSA have likely caused some loss of marten habitat; however, application of BMPs (BC MFLNRO, 2014) will protect key forest and wetland habitats needed by furbearers. Although Project effects and the effects of other activities in the RSA may be cumulative, no additional adverse residual effects on furbearers are anticipated due to the Project. Due to the minimal loss of furbearer habitat associated with forestry, agricultural, and mineral exploration, the significance determination for residual cumulative effects is Not Significant (minor) as a result of Project implementation (**Table 5.4.13-20**) because of the mitigation and compensation measures for the Project and forestry management practices to reclaim forest cover. Due to the minimal increase in beaver mortality associated with forestry, agricultural, and mineral exploration, the significance determination for residual cumulative effects is Not Significant (minor) as a result of Project implementation (**Table 5.4.13-21**) because of the mitigation and compensation measures for the Project.

Table 5.4.13-20: Residual Cumulative Effects Assessment for Loss of Furbearer Habitat

Effect Attribute	Current/Future Cumulative Environmental Effect(s) without Project	Cumulative Environmental Effect with Project Contributions
Context	Medium	Medium
Magnitude	Low	Negligible
Geographic Extent	Regional	Local
Duration	Long Term	Chronic
Reversibility	Yes	Yes
Frequency	Intermittent	Once
Likelihood Determination	High	High
Level of Confidence for Likelihood	High	High
Significance Determination	Not Significant (minor)	Not Significant (minor)
Level of Confidence for Significance	High	High

Table 5.4.13-21: Residual Cumulative Effects Assessment for Beaver Mortality

Effect Attribute	Current/Future Cumulative Environmental Effect(s) without Project	Cumulative Environmental Effect with Project Contributions
Context	Low	Low
Magnitude	Low	Negligible
Geographic Extent	Regional	Local
Duration	Long Term	Long term
Reversibility	Yes	Yes
Frequency	Intermittent	Intermittent
Likelihood Determination	Moderate	Low
Level of Confidence for Likelihood	High	High
Significance Determination	Not Significant (minor)	Not Significant (minor)
Level of Confidence for Significance	High	High

5.4.13.6 Limitations

The effects assessment for furbearers is based on the information presented within the current Project Description. The Project footprint, mine site facilities, and areas disturbed were assumed based on the current Project designs. The key limitation of this assessment is the cyclic population numbers of furbearers. Regional abundance and habitat use are not known beyond habitat suitability models and professional judgment.

5.4.13.7 Conclusion

Furbearers will be adversely affected through loss and degradation of habitat and increased mortality risk during the life of the Project but are expected to return to near baseline conditions

upon post-closure. Due to the minimal loss of furbearer habitat associated with forestry, agricultural, and mineral exploration, the significance determination for residual cumulative effects is Not Significant (minor) and the project residual effects are determined to be Not Significant (negligible to minor).

The potential Project residual effects include habitat loss and degradation of a small amount of moderate to high value habitat for furbearers. These effects will be caused primarily by the construction and widening of roads, the development of the airstrip, freshwater pipeline, and mine site, and the clearing for the transmission line. The maximum extent of habitat effects is considered local in context, with the loss pertaining to the clearing limits and degradation within 50 m of those limits.

Mitigation and adaptive management plans will avoid and mitigate the majority of adverse effects. Where it is not possible to mitigate completely, the effects will be minimized to keep the magnitude of effects at negligible to low. Mitigation measures for minimizing habitat and mortality effects on furbearers include no net loss of wetland habitat, reclamation and revegetation, no firearms or hunting on the Project tenure, and access management plans to mitigate human and predator access on linear clearings. Mortality and health effects on furbearers were considered only for beaver, primarily because of the limited extent and magnitude of Project activity that overlaps key furbearer habitats. Additional mitigation measures to minimize residual effects on beavers include:

- Maintain quantity and quality of mature and old-growth forest cover;
- Apply wildlife management plan measures to road use agreements with other commercial users of the access roads;
- Close and decommission access roads and trails after mine closure and reclamation are achieved; and
- Conduct habitat restoration of existing disturbed habitats affected by the current road and transmission line, including closure and decommissioning spur roads/trails.