

PARKS CANADA AGENCY

ENVIRONMENTAL IMPACT ANALYSIS FOR ROCK SCALING AND REMEDIATION WORK IN MOUNT REVELSTOKE NATIONAL PARK, TRANSCANADA HIGHWAY, MEADOWS IN THE SKY PARKWAY, NELS NELSEN ROAD



REPORT

MAY 2013
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EXECUTIVE SUMMARY

Parks Canada Agency (PCA) retained EBA Engineering Consultants Ltd. operating as EBA, A Tetra Tech Company (EBA), to complete an Environmental Impact Analysis (EIA) related to remediation works proposed for rock and soil slopes in Mount Revelstoke National Park (MRNP) along the TransCanada Highway (TCH), Meadows in the Sky Parkway or Mount Revelstoke Road (MISP), and Nels Nelsen Road or Ski Jump Road (NNR) (Project Area, Figure 1). The remediation works will occur at five locations along the TCH, eight locations along the MISP and one location along the NNR.

The proposed work is based on findings from an inspection of high priority rock and soil slopes in Mount Revelstoke National Park, conducted by EBA in September 2011. Suggested remediation strategies involve improving catchment ditches, routine removal of loose material on the slopes (scaling), installation of concrete guardrail, removal of deteriorating features (trim blasting), or installation of rock anchors or shotcrete (EBA 2012).

The scope of the EIA included a review of background, online data. No environmental site visit was undertaken for this assessment; however, species specific information obtained from the Mount Revelstoke and Glacier National Parks (MRG) Field Unit has been incorporated. Watercourses and sensitive ecosystems and culturally or historically important sites have been identified within the Project Area and have the potential to be impacted by the project. Mitigation measures have been established for those sites with potential risks. MRG staff may exercise the right to conduct site specific visits to identify, assess and delineate sensitive areas. This report is an assessment of the potential effects to local vegetation, wildlife, cultural and aesthetic and visual values as a result of the proposed remediation works for rock and soil slopes along the TCH, MISP and NNR.

Review of background environmental information and proposed Project activities resulted in the identification of potential impacts to Valued Ecosystem Components (VECs) associated with the rock and soil slope remediation along the TCH, MISP and NNR in MRNP. EBA has concluded that predicted impacts potentially resulting from the proposed project activities can mostly be mitigated within the timeframe of the project.

Potential impacts from the proposed remediation activities include potential habitat alteration/loss as well as the loss of SARA listed Coeur d'Alene salamander (*Plethodon idahoensis*) individuals, wildlife avoidance of the area due to noise from the proposed works; loss or disturbance of local vegetation, including the SARA-listed Whitebark Pine (*Pinus albicaulis*) as a result of blasting and excavation activities; and impacts to air quality and aesthetic and visual components of site and surrounding area due to dust from blasting.

The loss of SARA listed individuals or alterations and loss to their habitat is considered significant. Other residual impacts, if the mitigation measures outlined in this report and outlined by regulatory authorities are adhered to, are expected to be of negligible to low magnitude and not significant.

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1.0 INTRODUCTION

Parks Canada Agency (PCA) retained EBA Engineering Consultants Ltd. operating as EBA, A Tetra Tech Company (EBA), to complete an Environmental Impact Analysis (EIA) related to remediation works proposed for rock and soil slopes in Mount Revelstoke National Park (MRNP) along the TransCanada Highway (TCH), Meadows in the Sky Parkway or Mount Revelstoke Road (MISP), and Nels Nelsen Road or Ski Jump Road (NNR) (Project Area, Figure 1). The remediation works will occur at five locations along the TCH, eight locations along the MISP and one location along the NNR. The proposed work is based on findings from an inspection of high priority rock and soil slopes in Mount Revelstoke National Park, conducted by EBA in September 2011. Suggested remediation strategies involve improving a catchment ditch, routine removal of loose material on the slopes (scaling), installation of concrete guardrail, removal of deteriorating features (trim blasting), or installation of rock anchors or shotcrete (EBA 2012).

The scope of the EIA included a review of background, online data. No environmental site visit was undertaken for this assessment; however, species specific information obtained from the Mount Revelstoke and Glacier national parks (MRG) Field Unit has been incorporated. Watercourses and sensitive ecosystems have been identified in the general area and may be impacted by the project. Mitigation measures have been established for those sites with potential risks. MRG staff may exercise the right to conduct site specific visits to identify, assess and delineate sensitive areas where required. This report is an assessment of the potential effects to local vegetation, wildlife, cultural and aesthetic and visual values as a result of the proposed remediation works for rock and soil slopes along the TCH, MISP and NNR.

This EIA includes:

- The identification of project valued ecosystem components (VECs) in relation to possible effects from the project;
- An assessment of the potential effects of the remediation works;
- An assessment of the significance and geographic extent of the potential effects; and
- An outline of suggested mitigation.

2.0 PROJECT DESCRIPTION

2.1 Project Location and Components

The proposed remediation works are located in MRNP along the TCH, MISP and NNR. The areas identified for rock scaling have all been scaled in the past and are part of an ongoing scaling program to maintain the highway infrastructure and ensure public safety.

For rock cuts in the MRNP, the TCH and MISP used the intersection of the MISP with TCH as km 0.000; NNR used the intersection of MISP and NNR as km 0.000. Along the TCH work is proposed between km 20.186 and 25.109. Along the MISP work is proposed between km 5.35 and 23.607. Along the NNR work is proposed between km 0.000 and 0.167 (Figure 2). Table 1 presents UTM coordinates for all chainage markings within the proposed Project Area and identify specific locations for proposed rock and soil

remediation works. Roadside catchment clearing is a regular and required component of the slope remediation works and will take place only at specific work locations identified along the TCH, MISP, and NNR (Table 1).

Table 1: Project Site UTM Coordinate

Location	Chainage km start/end	UTM Coordinates Zone 11 U	
		Easting	Northing
TransCanada Highway			
Project location start	0.00	415827.19 m E	5651297.73 m N
1	20.186	432399.11 m E	5655089.71 m N
	20.271	432470.77 m E	5655135.58 m N
2	22.40	434326.24 m E	5656121.25 m N
	22.827	434424.90 m E	5656458.40 m N
3	24.619	434913.67 m E	5658118.84 m N
	24.824	435051.88 m E	5658263.47 m N
4	24.824	435051.88 m E	5658263.47 m N
	24.949	435086.09 m E	5658375.50 m N
5	24.949	435086.09 m E	5658375.50 m N
	25.109	435068.23 m E	5658528.18 m N
Meadows in the Sky Parkway			
Project location start	0.00	415827.19 m E	5651297.73 m N
1	5.35	416717.10 m E	5651398.89 m N
2	5.91	416766.44 m E	5651374.43 m N
3	6.20	416994.28 m E	5651319.57 m N
4	13.60	417155.68 m E	5653058.35 m N
5	14.35	417649.60 m E	5652543.55 m N
6	15.70	418817.30 m E	5652252.20 m N
	15.883	418840.39 m E	5652362.96 m N
7	16.20	419443.93 m E	5652411.54 m N
	16.269	419489.24 m E	5652464.77 m N
8	23.50	420093.79 m E	5654449.20 m N
	23.607	420143.09 m E	5654546.12 m N
Nels Nelsen Road			
1	0.00	415697.91 m E	5651828.37 m N
	0.167	415750.11 m E	5651675.29 m N

The rock and soil slopes remediation will include:

- Excavation and common improvement of catchment ditches – includes the removal of accumulations of winter salts/gravels where necessary along the TCH. No pre-work catchment ditch clearing is proposed for the MISP. This is an ongoing activity following the winter season as significant amounts of gravels and debris are deposited into roadside catchment ditches which must be cleared to ensure

the catchment has adequate volume available for fallen rock and debris. Catchment ditches which are suitably large enough will only require removal of post-remediation materials fallen from rock slopes. Following slope remediation, removal of accumulated construction debris (rock fall) from catchment areas identified in Table 1 will be required for all locations. Rock and other debris which falls into the catchment area is loaded into a truck with an excavator. Clearing along the TCH may also include the removal of roadside vegetation within the catchment;

- Scaling – manual removal of loose material on rock slopes using pry bars, hydraulic press, brooms, shovels and suitable power equipment by personnel using roped access to a rock face;
- Trim blasting – controlled blasts in which explosive charges are placed within a predetermined pattern of holes drilled into the unstable rock followed by detonation;
- Installation of rock anchors or shotcrete;
- Removal temporary signage;
- General clearing of vegetation for all tasks;
- Installation of concrete guardrails at specific sites, and
- Repair of damaged road surface, if required.

2.2 Consumptive Use of Natural Resources During Construction

Although hydrocarbons will be consumed to fuel construction machinery, significant quantities of natural resources are not anticipated to be consumed given the scope of the proposed remediation works.

2.3 Project Timing

Precise start and end dates are currently unknown, however it is expected that the rock slope remediation will occur during the spring, summer or fall periods in 2013, 2014, or 2015. Project planning considerations should include potential disturbance during sensitive wildlife windows. Construction during the spring overlaps breeding seasons of several wildlife species, including mountain goats, and amphibians. Section 7 describes mitigation measures to reduce likelihood of effects to breeding wildlife.

3.0 METHODS

3.1 Data Collection

An information review of all areas of proposed slope remediation was conducted. Multiple sources were reviewed to establish baseline information for species and ecosystems historically recorded on site, these sources included:

- British Columbia Conservation Data Centre (CDC) Internet Mapping Service;
- British Columbia Species and Ecosystems Explorer;
- Biogeoclimatic Ecosystem Classification;

- Environment Canada Species at Risk (SAR) Public Registry;
- Parks Canada Biotics Web Explorer, and;
- MRG Field Unit staff.

4.0 BIOPHYSICAL INVENTORY

4.1 Regional Context

The proposed remediation works are located entirely within the Selkirk Mountain Range which, along with the Purcell, Cariboo and Monashee ranges, is part of the larger Columbia Mountain Range. The Columbia's vary both geologically and climatically from the Canadian Rocky Mountains which are located east of Glacier National Park. Weather within MRNP is influenced by the west and originates over the Pacific Ocean. The Columbia Mountains intercept westerly air masses leading to high levels of precipitation all year round. The mean annual precipitation in the subalpine of MRNP is 1,995 mm (Parks Canada, 2013).

As shown in Figure 1, the majority of the Project Area falls within the Interior Cedar Hemlock biogeoclimatic zone (ICH), specifically ICHmw3 (Thompson moist-warm variant) and ICHwk1 (Wells Gray wet-cool variant). In southeastern BC this zone occupies the lower elevations (400 – 1500 m) of the Columbia Mountains. At higher elevations, sites along the MISP fall within the Engelmann Spruce Subalpine Fir biogeoclimatic zone (ESSF); specifically within the ESSFvc (very wet cold variant) (Braumandl and Curran 2002).

4.2 Local Context

4.2.1 Topography

The sites are located within the Columbia Mountain Range and more specifically the Selkirk Mountain Range. These ranges are characterized by rugged mountains with steep, deep, narrow valleys. Ice fields and glaciers can be found in these regions in addition to waterfalls and numerous avalanche paths (Parks Canada, 2009).

4.2.2 Vegetation

Vegetation within the ICH landscape is typically dominated by upland coniferous forests. Comparatively, the ICH has the largest diversity of tree species than any other biogeoclimatic zone in BC. Dominant climax species within the ICHmw3 and ICHwk1 include western red cedar (*Thuja plicata*) and western hemlock (*Tsuga heterophylla*) while Douglas-fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), western white pine (*Pinus monticola*), hybrid white spruce (*Picea engelmannii x glauca*), subalpine fir (*Abies lasiocarpa*), trembling aspen (*Populus tremuloides*), and common paper birch (*Betula papyrifera*) are also common seral species except lodgepole pine and trembling aspen which are rare in the wk1 variant of ICH. Typical understory species include black huckleberry (*Vaccinium membranaceum*), oval-leaved blueberry (*Vaccinium ovalifolium*), devils club (*Oplopanax horridus*) and falsebox (*Paxistima myrsinites*) (Braumandl and Curran 2002):

Climax tree species within the ESSFvc include: Engelmann spruce (*Picea engelmannii*), subalpine fir and mountain hemlock (*Tsuga mertensiana*) while western hemlock and western red cedar can be found at lower elevations of the variant (Braumandl and Curran 2002). White flowered rhododendron (*Rhododendron albiflorum*) is a characteristic shrub of the ESSF and along with black huckleberry (*Vaccinium membranaceum*), oval-leaved blueberry and false azalea (*Menziesia ferruginea*) are common understory shrubs (Braumandl and Curran 2002). White bark pine (*Pinus albicaulis*) are uncommon, but can be found at the treeline on west-south rocky out crops. White bark pine is a blue-listed S3 species in BC and is ranked as Endangered under the *Species at Risk Act* (SARA).

In the upper subalpine along the MISP, meadows are observed hosting a variety of wildflowers including: paintbrush (*Castilleja* sp.), glacier lily (*Erythronium grandiflorum*), fireweed (*Epilobium angustifolium*), lupine (*Lupinus* sp.) and monkeyflower (*Mimulus* sp.) (Parks Canada, 2013).

Whitebark Pine is an endangered, SARA Schedule 1 tree species known within MRNP (Environment Canada, 2012 and Parks Canada 2011a. This tree grows on thin rocky soils and is most abundant on warm dry exposures such as the rocky bluffs within the Project Area (BC CDC 2012).

The CDC Internet Mapping Tool was used to determine potential occurrences of vegetation species of concern at or near the Project Area and to ensure that provincial biodiversity objectives are considered during Project planning. Due to the scale of the proposed restoration works, the CDC vegetation search was limited to a 1 km radius from a central location for each identified stretch of highway. A description of the Provincial Conservation Status the BC List Status and inclusion within Schedule 1 of SARA of the identified species are included in Table 2. Table 3 is a description of the Provincial and BC List Rankings (BC Conservation Data Centre: Conservation Data Centre Mapping Service, 2012). Figure 2 identifies locations of rare plants along the MISP and NNR found according to database searches. It is noted that a rare plant survey may be conducted at the discretion of the MRG Field Unit.

Table 2: Rare Plants Recorded in Proximity to the Rock Slope Restoration Sites

Common Name	Scientific Name	Habitat	Provincial Status	BC List Status	SARA Schedule
TCH km 24.619 – 25.109					
least moonwort	<i>Botrychium simplex</i> var. <i>compositum</i>	Meadows, moist to wet vernal pools and ephemeral seepages	S2S3	Blue	Not Listed
Sutherland's larkspur	<i>Delphinium sutherlandii</i>	Mesic to dry shrublands, open forests. Found over shallow soils within avalanche chutes and bedrock outcrops	S2S3	Blue	Not Listed
MISP km 5.35					
western moonwort	<i>Botrychium hesperium</i>	Mesic grassy slopes	S2S3	Blue	Not Listed
MISP km 5.91 – 6.20					
western moonwort	<i>Botrychium hesperium</i>	Mesic grassy slopes	S2S3	Blue	Not Listed
least moonwort	<i>Botrychium simplex</i> var. <i>compositum</i>	Meadows, moist to wet vernal pools and ephemeral seepages	S2S3	Blue	Not Listed
MISP km 15.70 – 16.269					
Slender spike-rush	<i>Eleocharis elliptica</i>	Lakeshores, streamsides and wet meadows	S2S3	Blue	Not Listed
NNR km 0.00 – 0.167					
western moonwort	<i>Botrychium hesperium</i>	Mesic grassy slopes	S2S3	Blue	Not Listed

Note: (E-Flora BC, 2013; CDC, 2012; Environment Canada, 2012)

Table 3: Description of Provincial and BC List Rankings

Provincial Rank	Definition
SX	Presumed extirpated
SH	Historical (species) / possible extirpated (communities)
S1	Critically imperiled
S2	Imperiled
S3	Special concern, vulnerable to extirpation or extinction
S4	Apparently secure
S5	Demonstrably widespread, abundant, and secure
NA	Not applicable
NR	Unranked
U	Unrankable
BC List	Definition
Red	SX, SH, S1, S1S2, S1S3, S2
Blue	S2S3, S2S4, S3
Yellow	S3S4, S3S5, S4, S4S5, S5

Note: (British Columbia Ministry of Environment, 2011)

4.2.3 Wildlife Resources

The CDC Internet Mapping Tool was used to determine potential occurrences of wildlife species of management concern within a 9 km radius from a central location within each of the identified Project

areas. See Appendix B for the map generated by CDC. See Table 3 for descriptions of rankings (B.C. Conservation Data Centre: Conservation Data Centre Mapping Service, 2012).

All of the sites along the TCH, MISP and NNR are located within Caribou (*Rangifer tarandus* pop. 1, Southern Mountain population, SMP) range. The Caribou is a red-listed species, ranked provincially as S1 and as Threatened under the *Species at Risk Act* (SARA). The Columbia South herd of the SMP ranges through both Mount Revelstoke and Glacier National Parks. This herd is composed of approximately 7 Caribou, down from approximately 100 in 1994.

The Southern Mountain population (SMP) of Caribou differ from other Caribou as their range varies by elevation in response to seasonal change as opposed to laterally. Specifically the Columbia South herd have adapted to the deep snow characteristic of the region, and use the deep snow pack to reach lichen growing on trees (Parks Canada, 2012). According to Thomas and Gray 2002, the SMP Caribou use low slopes and valley bottoms in early winter, moving to higher elevations when then snow pack deepens in mid to late winter where their diet is predominantly arboreal lichens. In spring, the Caribou descend to lower elevations to access other vegetation. Pregnant Caribou will migrate upwards in elevation to older forests in May through June to birth their calves where they tend to stay within the elevations of the ESSF zone for most of the summer. They tend to prefer isolated areas with few predators, for example: islands in lakes, lakeshores, forests and tundra (Thomas and Gray 2002). Rutting typically takes place during the fall season (Parks Canada, 2012).

In the areas surrounding the MISP sites and the NNR site, and TCH km 20.186 to 22.827, the Northern Myotis (*Myotis septentrionalis*) is also a species of management concern reported. The Northern Myotis is ranked provincially as S2S3 and is blue-listed under the BC List. The Northern Myotis hunt nocturnally and typically emerge after sunset. Habitat used to hunt includes small ponds, forest clearings and forest edges at a height of 1 to 3 meters. Winter hibernacula are generally solitary or can occur in small groups. Narrow crevices are preferred where temperatures can be as low as 1.6 °C. Other species of bats are generally present. Hibernation usually begins after one or two killing frosts in September when there are no longer sufficient insects available for forage. During the summer months the Northern Myotis typically roost in crevices behind peeling bark or cavities of decaying trees. Such trees tend to be located in over-mature forest stands (Gill, 2007). Another bat species of management concern within the Park is the Little Brown Myotis (*Myotis lucifungus*); ranked provincially as S5 and is yellow-listed within BC. This bat species is not listed on any schedules of SARA; however, has been assessed as Endangered by COSEWIC 2012 due to recent high mortalities as a result of extensive spread of the White-nose Syndrome (WNS) (Forbes, 2012). The Little Brown Myotis uses caves and hollow trees but has also adapted to human-made structure for resting and maternity sites and generally forage in forested areas near water (BC CDC 2012).

In the areas surrounding the TCH km 24.619 to 25.109, in addition to both Caribou and Northern Myotis, the vivid dancer (*Argia vivida*), a red-listed provincially ranked S2 insect, also has potential to occur. The vivid dancer is a part of the family of narrow-winged damselflies. They are found only in very localised pools near hot springs and spring-fed streams. These insects lay their eggs in aquatic vegetation and when hatched, larvae generally move to flowing water where they attach to the bottoms of stones and roots (Royal BC Museum, 2002). It should be noted that when the search was reduced to a 5 km radius for this specific location, none of the listed occurrences above were recorded.

Mountain goats (*Oreamnos americanus*) are also frequently observed along the TCH within MRNP, and are known to occur at Laings and Laretta corners¹ where the bluffs are used as escape terrain. Grizzly bear (*Ursus arctos*) is known to occur within the Park and is listed as a species of Special Concern by COSEWIC. Another species of Special Concern known to inhabit that area is the Wolverine (*Gulo gulo*) and may occur at or near the Project areas.

The Coeur d'Alene salamander (*Plethodon idahoensis*) has been documented at sites km 0.0 – 0.167 along the NNR and km 5.35 – 6.20 along the MISP (Figure 2). The Coeur d'Alene Salamander is a blue-listed S3S5 species in BC and ranked as a species of Special Concern under SARA. This species lacks lungs and breathes through its skin, and therefore requires moist, shady habitat which could include rockwalls with flowing seepages or streams, waterfall splash zones, caves, streams with exposed bedrock, avalanche paths and moist talus. They are very unlikely to occur if rocky areas are devoid of moisture (Environment Canada, 2012).

The Western Toad (*Anaxyrus boreas*) is known to occur at lower elevations along the MISP and along the TCH where breeding habitat exists, but can also be found at higher elevations (Figure 2). The Western Toad is a blue-listed S3S4 species in BC and ranked as a species of Special Concern under the SARA. This species spend a large majority of their time in terrestrial habitats including forested areas, moist shrublands, meadows and avalanche slopes. A wide variety of habitats are used by this species for breeding ranging from natural lakes to roadside ditches (Environment of Canada, 2012).

The Northern Alligator Lizard (*Elgaria coerulea*) is also a species known within MRNP that inhabits rock outcrops and talus within open coniferous forests and areas along streams (BC CDC 2012).

The Olive-sided Flycatcher (*Contopus cooperi*) has been documented at site km 16.20 – 16.269 along the MISP (Figure 2). The Olive-sided Flycatcher is a blue-listed S3S4B species in BC and is ranked as Threatened under SARA. Habitat for this species generally constitutes open areas with tall trees or snags for perching including forest clearings, openings near water bodies or cut-blocks. Foraging occurs from high vantage points targeting flying insects (Environment of Canada, 2012). There are approximately 183 species of birds found within Glacier and Mount Revelstoke National Parks. The diversity of bird species increases from April to August during the breeding season (Parks Canada, 2012a).

Two invertebrate species at risk, the Pale Jumping Slug (*Hemphillia camelus*), a blue listed S3 species in BC and the magnum mantleslug (*Magnipelta mycophaga*) a blue-listed S2S3 species in BC and designated as Special Concern also have potential to occur within MRNP. These species prefer moist coniferous forest habitat, including downed logs, depressions and within talus (BC CDC 2012).

Following a review of habitat present within the Project Area and potential Project related interactions with wildlife populations, it was determined that a wildlife field survey was not required and therefore was not conducted during the preparation of this EIA. Wildlife mitigation measures, including pre-work surveys for species of management concern, are included in Section 7.0.

¹ Laings and Laretta corners are approximately 20 km east of Revelstoke, near proposed work location 1.

4.2.4 Fisheries Resources

The Ministry of Environment’s Habitat Wizard database was used to identify watercourses within 300 m of each of the locations. To ensure the entire area of each site was investigated a 300 m search was conducted at both beginning and end kilometer markings for each site. No fish or fish habitat surveys were conducted.

TransCanada Highway (TCH)

Project locations from km 22.40 to 25.109 are all located with 300 m of the Illecillewaet River (watershed code: 360). Fish species present in the Illecillewaet River are listed in Table 4. Water bodies were not noted within 300 m of the Project locations from km 20.186 to 22.827.

Table 4: Fish Species Present in the Illecillewaet River

Bridgelip Sucker (<i>Catostomus columbianus</i>)	Brook Trout (<i>Salvelinus fontinalis</i>)
Bull Trout (<i>Salvelinus confluentus</i>)	Kokanee (<i>Oncorhynchus nerka</i>)
Lake Chub (<i>Couesius plumbeus</i>)	Mountain Whitefish (<i>Prosopium williamsoni</i>)
Rainbow Trout (<i>Oncorhynchus mykiss</i>)	Sculpin (General) (<i>Cottus</i>)
Torrent Sculpin (<i>Cottus rhotheus</i>)	Westslope (Yellowstone) Cutthroat Trout (<i>Oncorhynchus clarkii lewisi</i>)

An unnamed stream (watershed code: 360-332600) was noted within 300 m of the restoration site at km 24.619; however, no fish species were documented for this stream.

Meadows in the Sky Parkway (MISP)

The restoration site located at km 14.35 is located near Bridge Creek. Restoration sites between km 15.70 and 15.883 fall within 300 m of Bridge Creek (watershed code: 360-012400) in which both kokanee salmon and rainbow trout have been documented in reaches below the TCH. Water bodies were not noted within 300 m of any of the other MISP sites.

Nels Nelsen Road (NNR)

A small creek occurs above and falls adjacent to the NNR which is not fish bearing but provides significant potential for salamanders (Figure 2). No other water bodies were observed within 300 m of the NNR restoration site.

4.2.5 Cultural or Heritage Resources

Three cultural or historical sites have been identified along the MISP and NNR (Figure 2).

- Site 569T has historical significance as the remains of the Mount Revelstoke Ski Hill, used between 1915 and 1969 (Francis and Perry, 2000). This site is located approximately 500 m east of the junction with the MISP and consists of ski jump platforms and a judge’s tower.
- Site 1511T is a historic wood cistern located along the MISP (Francis and Perry, 2000). The reason and purpose for the cistern is unknown but subject to archival research.
- Site 1895T is a World War I internment camp located on the MISP (Francis, 2011). The camp existed for less than a year, being dismantled in late 1915 or early 1916. Remaining structures include

building footprints, depressions stone-built beehive ovens and a compound security fence among others.

4.2.6 Visual and Aesthetic Resources

The sites of the proposed remediation work are located within the Selkirk Mountain ranges known for rugged mountain tops and dramatic landscapes. The MRNP is host to a variety of diverse ecosystems ranging from rainforests to alpine tundra. All of which contribute the tourism industry in the park and surrounding areas.

5.0 IDENTIFICATION OF VALUED ECOSYSTEM COMPONENTS

5.1 Introduction

Environmental impact analysis is used as a planning tool during the conceptual design phase of a project to identify potential environmental effects of a project and ensure they receive careful consideration before they are undertaken (Canadian Environmental Assessment Agency [CEAA] 2012). Environmental impact analysis for a project is a transparent process involving multiple steps which include:

- Determination of VECs;
- Identification of project activities that may interact with VECs;
- Identification of potential impacts that could interact with VECs as a result of the project;
- Identification of mitigation measures that can be used to reduce impacts;
- Determination and characterization of residual environment effects;
- Determination of the significance of any residual environmental effects; and
- Determination of cumulative effects of the project.

5.1.1 Determination of Valued Ecosystem Components

Following the background review of environmental information, potential VECs were identified for this project, including biological resources (vegetation and wildlife) and visual and aesthetic values. The potential VECs were assessed to determine if they are present in the development area and if they are subject to stakeholder or regulatory concern. Based on these criteria and the professional judgement of the study team, EBA professionals used this information to determine the final VEC selection for the purposes of the environmental impact assessment for this project.

5.1.2 Identification of Project Activities that May Interact with Valued Ecosystem Components

Project activities that may interact with VECs are identified by investigating the various components of the project that have potential effect pathways to the receiving environment. The potential effects pathway for this project involves the rock and soil slopes restoration work at various locations including NNR, MISP and the TCH within MNRP. The project pathway was compared to the list of identified VECs and the interactions were documented for further consideration in the EIA process.

5.1.3 Identification of Potential Impacts on Valued Ecosystem Components

The documented interactions between the project pathway and the VECs are used to identify potential impacts. Knowledge of both the project and VECs are used to identify potential adverse effects of the project on the environment.

5.2 Determination of the Significance of Impacts

5.2.1 Determination and Characterization of Residual Environmental Effects

Residual effects are those that remain following the application of mitigation measures. They can be characterized by their direction, magnitude, geographic extent, frequency, duration, and reversibility (Table 5).

Table 5: Residual Impacts Rating Criteria

Criteria	Rating Term	Definition
Direction	Positive	Beneficial change.
	Neutral	No change.
	Negative	Adverse change.
Geographic Extent	Local	Effect is limited to the footprint of the project site.
	Area Surrounding Project Areas	Effect extends to an area immediately surrounding the project footprint.
	Park-wide	Effect has implications to Mount Revelstoke National Park.
	Regional	Effect extends beyond Mount Revelstoke National Park.
Duration	Short Term	Effect present during construction or less.
	Medium Term	Effect remains for remediation phase.
	Long Term	Effect last beyond decommissioning of property.
Frequency	Once	Effect occurs once during remediation.
	Intermittent	Effect occurs periodically.
	Continuous	Effect occurs continuously during remediation.
Reversibility	Reversible	Effect is reversed after the activity ceases.
	Partially-reversible	Effect is partially reversed after the activity ceases.
	Non-reversible	Effect will not be reversed when activity ceases.
Magnitude	Negligible	No measurable impacts.
	Low	Potential impact may result in slight decline in resource in/on the property during the life of the project. Research, monitoring, and/or recovery initiatives would not normally be required.
	Moderate	Potential impact could result in decline in resource to lower-than-baseline, but stable levels on the property after project closure. Regional management actions such as research, monitoring, and/or recovery initiatives may be required.
	High	Potential impact could threaten sustainability of the resource and should be considered a management concern. Research, monitoring, and/or recovery initiatives should be considered.

5.2.2 Determination of the Significance of Any Residual Environmental Effects

Assigning residual impact significance is required to determine if a project is “likely to cause significant adverse environmental effects, taking into account the implementation of mitigation” (CEAA, Section 20-1). When considering significance relative to a project or a project’s components, the concepts of “adverse” and “likely” have been incorporated (Federal Environmental Assessment Review Office 1994).

EBA has chosen a transparent method of significance determination, as presented in Table 6.

Table 6: Significance Rating Criteria

Impact Magnitude	Geographic Extent	Duration	Significance
Negligible	Any	Any Duration	Not Significant
Low	Any	Any Duration	Not Significant
Moderate	Local	Any Duration	Not Significant
	Area Surrounding Project Areas	Short-term	Not Significant
		Medium-term	Not Significant
		Long-term	Significant
	Park-wide	Short-term	Not Significant
		Medium-term	Significant
		Long-term	Significant
	Regional	Short-term	Not Significant
		Medium-term	Significant
		Long-term	Significant
High	Local	Short-term	Not Significant
		Medium-term	Not Significant
		Long-term	Significant
	Area Surrounding Project Areas	Short-term	Not Significant
		Medium-term	Significant
		Long-term	Significant
	Park-wide	Any Duration	Significant
	Regional	Any Duration	Significant

6.0 IMPACT ANALYSIS

6.1 Project Land Use Description, Construction and Engineering

The rock and soil slopes remediation will include works described in Section 2.1.

6.2 Selection of Valued Ecosystem Components

VECs were selected if they are present at or near the Project site and are of stakeholder or regulatory concern. Based on these criteria it was determined that vegetation, wildlife and visual and aesthetic values are VECs for this project.

6.3 Potential Project Impacts

6.3.1 Project Activities that May Interact with Valued Ecosystem Components

The interactions between the VECs and Project activities were identified by investigating the various components of the Project that have the potential to affect the receiving environment. The identified interactions were documented for further consideration in the EIA process. Table 7 shows the potential Project-VEC interactions based on the anticipated pathways from the planned remediation work (EBA 2012).

Table 7: Project Pathways

Project Activity	Vegetation	Wildlife	Fisheries	Cultural Heritage	Aesthetic and Visual	Applicable Mitigation
Proposed Remediation Works						
Common excavation and catchment ditch improvement	X	X	X	X	X	7.2.1; 7.2.2; 7.2.3; 7.2.4; 7.2.5; 7.2.6
Vegetation clearing	X	X	X		X	7.2.1; 7.2.2; 7.2.3; 7.2.5
Rock scaling	X	X	X	X	X	7.2.1; 7.2.2; 7.2.3; 7.2.4; 7.2.5; 7.2.6
Trim blasting	X	X	X	X	X	7.2.1; 7.2.2; 7.2.3; 7.2.4; 7.2.5; 7.2.6
Installing of rock anchors or shotcrete		X	X		X	7.2.2; 7.2.3; 7.2.5
Installing concrete guardrails			X		X	7.2.4; 7.2.5; 7.2.6
Equipment and material ² transport	X	X	X			7.2.1; 7.2.2; 7.2.3; 7.2.6
Human induced wastes generated by on-site activities (garbage etc.)		X	X		X	7.2.2; 7.2.3; 7.2.5
On-site handling of deleterious substances	X	X	X		X	7.2.1; 7.2.2; 7.2.4; 7.2.5; 7.2.6

² Includes removal of construction waste rock and debris generated by remediation works.

6.3.2 Potential Impacts on Valued Ecosystem Components

After the Project-VEC interactions have been established, the potential impacts can be identified. Knowledge of both the project and VECs are used to identify potential adverse effects of the project on the environment. The following three sections outline the potential negative impacts to all identified VECs as a result of the proposed Project activities.

6.3.3 Biological Impacts

6.3.3.1 Vegetation

Vegetation is established along the cliff edges of most sites and those plants closest to the edge will likely be removed for safety considerations. Permanent loss of vegetation is a potential negative impact due to Project activities particularly if Whitebark Pine exists at these locations. Other potential impacts to vegetation include dust settling on surrounding areas and a spill of deleterious substances or the introduction of non-native species on disturbed sites, brought to the area by construction equipment.

The CDC review indicated that four species of concern were observed within a 1 km radius at five of the fourteen proposed project areas. Of these four species, three require moist habitat ranging from mesic grassy slopes to wet meadows, to riparian habitat to ephemeral seepages. Due to the dry nature of the rock slopes these species are not likely to occur within most of the proposed project areas. However, water courses noted at km 14.35, 15.7 and 15.883 of the MISP could provide potential habitat for the species requiring moist environments (Figure 2). Sutherland's larkspur; however, prefers shallow soils found over avalanche chutes and bedrock within mesic to dry shrub lands and open forests and occurs near one of the five proposed work areas along the TCH. This occurrence was documented in 2004 when 15 plants were observed growing in soil over shallow bedrock with some seepage. This occurrence is approximately 330 m away from km 24.619 of the TCH and therefore impacts are not expected. This population of Sutherland's larkspur will likely not be disturbed by proposed Project activities. Furthermore, it is not likely that the Sutherland's larkspur will occur within the proposed project areas due to their disturbed nature and lack of soil resulting from routine rockface maintenance.

6.3.3.2 Wildlife

There is potential for impact/mortality to Coeur d'Alene salamanders as a result of the proposed works on rock faces (scaling) which may change climatic (moisture, temperature) and hydrological habitat conditions due to vegetation and rock removal and potential shifts to water source patterns. The clearing of catchment ditches composed of fine gravels and organics will not likely result in salamander mortality, however, clearing of ditches composed of talus and broken rock may. The particular population identified in the small creek along the NNR will not likely be affected by scaling activities but could be affected by removal of fallen rock from catchment (Figure 2).

Western Toads are known to occur in the Project Area and have been known to breed within roadside ditches. Therefore, pre-work catchment ditch clearing along the TCH and post-remediation debris clearing in general have potential to impact breeding amphibians, including the Western Toad. In addition, side-casting of overburden and equipment staging activities have potential to impact Western Toad habitat along the TCH. In general, where there is adequate volume within a catchment ditch adjacent to a roadway

such that there is potential for water storage and ponding, clearing will generally not have to occur, limiting the potential impact to pond-breeding amphibians.

Noise from blasting and construction as well as human presence/proximity could potentially cause avoidance behaviour in local wildlife, particularly the Caribou, Mountain Goat and Northern Myotis; this is a potential short-term negative effect. Given the nature and timing of the blasting and the seasonal distribution of Caribou, Mountain Goats and Northern Myotis, it is expected that potential impacts will be observed as avoidance behaviour. It is unlikely that project activities will have a negative impact on the Vivid Dancer damselfly as they are found only in very localised pools near hot springs and spring-fed streams as discussed in Section 4.2.3. Alternatively, species such as the mountain goat and grizzly bear may be active at or near the TCH as a result of project activities increasing potential for human or traffic-wildlife interactions.

Dust generated from on-site activities could potentially affect air quality and have a short-term negative effect on local wildlife. Further short-term negative effects could occur from dust should large volumes settle in surrounding water ways. Improper management of food and on-site waste could result in potential for wildlife attraction and human interaction. Vegetation removal can also directly impact breeding birds during the nesting season. Finally a spill involving deleterious substance and/or the removal of vegetation could result in potentially negative impacts to habitat.

6.3.4 Cultural/Historical Resource Impacts

Project works are not going to occur at or immediately adjacent to these three sites; therefore, no impacts to cultural and historical resources are expected to occur as a result of the proposed remediation activities within Mount Revelstoke National Park.

6.3.5 Aesthetic and Visual Impacts

The following are potentially negative impacts to aesthetic and visual values as a result of the proposed remediation works: dust, noise, presence of construction equipment, extra signage and parked vehicles along the highway. Blasting, heavy equipment and power tools will produce noise and emissions. This section of the TCH is used by tourists, recreationalist and commercial transportation. The experience of TCH users could be negatively impacted should the proposed remediation activities not be properly controlled.

7.0 MITIGATION RECOMMENDATIONS

7.1 Identification of Mitigation

Mitigation measures can be applied by adhering to operational protocol or through project design alterations adopted by the Project to lessen impacts to the identified VECs. It is recommended that an Environmental Management Plan (EMP) is prepared in accordance with PCA Environmental Procedures and incorporating mitigation measures described below. An on-site environmental professional (Environmental Monitor) shall be utilized for construction/effects monitoring intermittently over the construction period or according to regulatory approval criteria. In addition, it is expected that all staff and contactors will understand and comply with all National Park regulations within the Park. Pre-work briefings/meetings are recommended to address environmental sensitivities within the Project Area and

where required by PCA, pre-work wildlife surveys. The Contractor shall also be aware of sensitive wildlife windows described above. Where works are scheduled to occur around important windows (breeding, nesting etc.) consultation with PCA is recommended.

7.2 Mitigation Methods

7.2.1 Mitigation of Vegetation Impacts

The following mitigation measures are suggested to reduce the potentially negative impacts to vegetation:

- The MRG Field Unit may, at their discretion, request a rare plant inspection (to identify rare plants such as Western Moonwort and Whitebark Pine) on rock faces or within catchment ditches prior to works beginning. EBA employs appropriately qualified biologists and can undertake pre-work inspections.
- No vegetation clearing is to occur without prior notification of the Environmental Assessment coordinator and/or responsible biologist. Further, no clearing is to take place within the MRG Bird Nesting window of April 1 through August 31. Any variance for vegetation removal must be obtained from the FU Superintendent in advance of works (Parks Canada 2012d).
- No clearing of Whitebark Pine or other rare or endangered vegetation is to occur without acquisition of appropriate permits (e.g. SARA).
- In areas where vegetation loss is unavoidable, MRG re-vegetation Guidelines are to be incorporated into a restoration plan (Parks Canada 2011).
- Efforts shall be made to ensure the minimum amount of vegetation is cleared or disturbed at each site.
- Limit traffic (foot or vehicle) on exposed soils to reduce soil compaction.
- Prior to accessing the site, construction equipment, particularly tire treads, will be pressure washed to prevent the introduction of non-native species.
- If non-native species are identified on-site and are suspected to have colonized due to construction activities, Parks Canada staff should be notified immediately to determine appropriate measures of treatment.
- Should side-casting, staging or stockpiling need to occur, it will only be at locations specified by PCA.
- Spills on-site are to be managed in accordance with the Environmental Management Plan (EMP) prepared as per section 7.3 of this document.
- Should impacts to surrounding vegetation be detected, appropriate measures to re-vegetate and rehabilitate should be implemented using MRG approved methods and seed mix. If soil is imported due to loss of vegetation it should be treated for invasive plants.

7.2.2 Mitigation of Wildlife Impacts

The following mitigation measures are suggested to reduce the potentially negative impacts to wildlife:

- Works shall be scheduled to occur outside sensitive wildlife periods (nesting, rutting, breeding etc.) as much as possible. Where works are required to occur within sensitive wildlife periods, care will be taken to prevent the disturbance or harm during the construction activities.

- All wildlife sightings will be immediately reported to PCA personnel on a regular basis. PCA shall be notified immediately in the event of human-wildlife interactions, or activity or encounters with bears, goats, cougars, caribou, wolverine or any species at risk.
- Feeding, harassment or destruction of any wildlife is strictly prohibited. Wildlife encountered at or near project locations will be allowed to passively disperse without undue harassment.
- All food and garbage should be stored in vehicles and removed from site daily.
- Inspections shall be undertaken for breeding amphibians where there is to be pre-work clearing along the TCH or waste rock and debris removal from catchment ditches below or adjacent to Project locations identified in Table 1 which contain water. EBA employs appropriately qualified biologists and can undertake pre-work inspections. Timing of ditch clearing activities shall be scheduled to avoid sedimentation during periods when larvae or eggs may be destroyed, if possible. Any locations deemed to be permanent amphibian habitat by PCA shall be identified and avoided. If these areas are required for ditch clearing works, PCA shall be consulted to determine appropriate actions to avoid amphibian mortality.
- Should any large trees meeting habitat requirements for Northern Myotis or Little Brown Bat be marked for clearing, the on-site Environmental Monitor or MRG Field Unit should inspect the tree for presence.
- Should vegetation removal be required, the Environmental Assessment Coordinator and/or responsible biologist must be contacted prior to disturbance as per the MRG Bird Nesting Guidelines. The general bird nesting window for MRG is April 1 to August 31. Variance from this window must be obtained from the FU Superintendent.
- Prior to blasting and periodically during scaling, the Contractor shall “sweep” the work area and maintain a continuous watch for wildlife that may be present. If wildlife is present, work shall be halted until the wildlife have passed through the area and/or have been hazed out of the area by an appropriately qualified biologist.
- Should blasting or construction works take place within the calving window of late May early June, any caribou presence or signs should be reported immediately to PCA and work shall be halted until approval is issued.
- Species at risk could potentially be observed on or near the Project locations. Should this occur, operations in the immediate vicinity of the species should be halted and should re-commence only when the species has left the immediate area. PCA Resource Conservation staff shall be notified immediately via Jasper Dispatch.
- Construction traffic should yield right-of-way to wildlife. A Traffic Safety Plan will incorporate protocol for wildlife occurrences along roads within the project area, due to presence of mountain goats and bears which can both be aggressive towards humans.
- Work should be restricted to 30 minutes after sunrise and 30 minutes prior to sunset; however some activities may need occur at night. Driving at night along the MISP will be avoided as best possible as nocturnal SARA listed salamanders and toads are known to use roads as corridors at night. PCA

approved mortality surveys shall be conducted incorporating established BMPs for road travel for the protection of migrating amphibians.

- Firearms and pets are prohibited on site.
- Spills on-site should be managed in accordance with methods outlined in this document.

7.2.2.1 Coeur d’Alene Salamander Impact Mitigation

Mitigation goals related to Coeur d’Alene Salamanders include:

- Microhabitat conditions are maintained such that streamside moisture levels and natural flow regimes of watercourses are unaltered;
- Structural habitat (rock fissures, talus) integrity remains intact and is protected from blasting or siltation, and;
- Populations are protected from physical disturbance and direct mortality.

To meet these goals, mitigation measures shall emphasize avoidance of siltation, changes to watercourses and changes to the climatic conditions via vegetation removal and increased solar inputs. On a particular rock slope if the presence of Coeur d’Alene Salamanders is considered likely (see Figure 2), their presence will be confirmed prior to the start of any work on a slope. This will be directed by the PCA representative and a qualified biologist will, using roped access techniques, investigate parts of a rock slope where salamanders are likely to occur such as moist open or gapped joints, fissures and other discontinuities. This species requires moist habitat and if rock areas are devoid of moisture they will not occur. Inspections will occur during overnight periods following or during wet weather, during which the chance of observing this species is considered to be higher than might otherwise be the case. The inspection will use methods based on Cassirer et al. 1994 and RISC standards No. 36 (BC MOE, 1999).

In the event that salamanders are detected the PCA MRG Field Unit ecologist team leader will be notified. Rock slope remediation work may continue, however, the techniques used will be modified to take into account the salamander presence. Rock scaling using pry bars and mechanical methods to remove loose rock may continue. However, rock scaling will not use high pressure compressed air or water to scale the rock face.

In the event that trim blasting is the only option, having exhausted all alternatives to stabilize the rock slope, a limited capture, hold, release program may be initiated in consultation with the MRG Field Unit and conducted under appropriate permits and approvals. If there is a requirement to capture, temporarily hold and release salamanders, methods described above and in RISC Standard No. 3 (Live Animal Capture and Handling Guidelines, 1998) and by P. Ohanjanian (pers. comm) will be incorporated into appropriate permit applications prior to works. The use of 6V lanterns has previously proven effective during time-constrained surveys (Cassirer et al. 1994) to view and probe the cracks and fissures to try and detect salamanders. Salamanders to be temporarily held (not longer than 24 hours) will be kept within closed, moist containers with suitable habitat elements such as moist moss, rocks etc. and then returned,

preferably upstream³ of the capture location where microhabitat conditions meet the species requirements following localized blasting, if it is necessary.

7.2.3 Mitigation of Fisheries Resource Impacts

Impacts to fisheries resources can be mitigated through application of Best Management Practices for working in or around water. Unless otherwise stated, the requirements related to sediment, drainage, and water quality management for the Project are applicable to all Project construction areas. The mitigation and monitoring measures described below will be used as the basis for preparing the final sediment, drainage, and water quality management plan:

- No works will occur instream.
- Best Management Practices for working in and around water will be applied when working near water courses, particularly at km 14.35, 15.7 and 15.883 along MISP and km 22.4 to 25.109 along the TCH. Considerations for working near water, such as erosion and sediment control measures, are to be incorporated into the project EMP.
- Disturbance to natural materials and vegetation that contribute to fish habitat or stream channel stability will be minimized. Should vegetation which contributes to fish habitat need to be removed, a restoration plan that meets the MRG Guidance document (Parks Canada 2011) for re-vegetation will be compiled subject to MRG review and acceptance.
- The natural rate of water flow must be maintained immediately upstream and downstream of the worksites during all phases of activity.
- Deleterious substance control and spill management will be incorporated into the project EMP/EPP and will include, but not be limited to, a Spill Response Plan, an Erosion and Sediment Control Plan and a Hazardous Waste Management Plan. EMP/EPP are subject to MRG review.
- Spill response should contain spill prevention and spill reporting requirements along with step-by-step procedures for responding to potential spill incidents.
- Work will be undertaken and completed in such a manner as to prevent the release of sediment-laden water, raw concrete or concrete leachate, or any other deleterious substance into a watercourse, tributary or drainage ditch which leads to fish habitat.
- Hydraulic fluids for on-site equipment will be biodegradable in case of accidental loss of fluids.
- Contractors shall ensure vehicles and equipment will not be serviced or refuelled within 30 m of any watercourse, tributary or drainage ditch which connects to fish habitat. Tanks, hoses and connections will be inspected prior to use. All hose connections will be wrapped and secured with absorbent pads during fuel/oil transfers. All hoses, valves and equipment are to be kept in a containment area whenever possible. Minimize hose length and the number of connections - use dripless connections if possible. Drain hoses when finished.

³ Above the location of disturbance where habitat remains undisturbed and mimics the required climatic conditions of the species.

- Hazardous materials must be labelled and disposed of according to the Workplace Hazardous Materials Information System criteria and the Transportation of Dangerous Goods (TDG) Regulations.
- Hydrocarbon and coolant storage, if required on site, shall be within an impermeable containment facility capable of holding 110% of the storage tank contents. This may be achieved through the use of double-walled storage tanks or constructing a containment berm out of durable material. These containment basins shall be inspected daily for leaks and wear points, kept clean and any measurable rainwater removed and disposed of appropriately. If practical, the containment area should be covered to prevent infilling with rainwater. Where leaks and/or wear points are found, they shall be repaired promptly to restore full containment.
- Contractors shall ensure that small containers (i.e., jerry cans) will be stored in a secure location, protected from weather. These containers must be designed solely for the purpose of storing and pouring fuel and shall not be more than 5 years old. Containers must not leak and must be sealed with a proper fitting cap or lid.
- Contractors shall stabilize any waste materials removed from the work site to prevent them from entering a watercourse. This shall include covering soil stockpiles with poly, or geotextile fabric when left for 24 hours or greater. All storage of waste materials shall be kept a minimum of 30 m from any watercourse to reduce the potential for any deleterious substance entering the water. All waste construction materials (rock, debris) will be hauled to the East Gate or alternate area for disposal approved by MRG operations.
- All work sites must have emergency spill kits (stocked with pads, sorbent booms, carbon dioxide cylinders, etc.) available on site. The kits shall be suitable for the quantities and types of material in use and stored at the site. All mobile equipment must contain fully stocked, dedicated spill kits. Contract personnel must be trained in the proper use of the kits in case of a spill.
- All spills to ground and water, regardless of volume, must be reported to the Contractors Project Manager, Environmental Monitor and MRG representative immediately.

7.2.4 Cultural or Historical Resources

Impacts to cultural or historical resources are not anticipated. However, in the unlikely event that a cultural or historical artifact is observed during works, the following mitigation measures are to be implemented:

- Any artifact uncovered during site activities will be left undisturbed and reported to MRG FU immediately;
- All known artifacts of historical importance at or near worksites will be left undisturbed;
- All wildlife artifacts (e.g. antlers, bones, skulls) at or near worksites will be left undisturbed.

7.2.5 Aesthetic and Visual Mitigation

Due to the anticipated short timeline of the proposed remediation works, potential negative impacts to aesthetic and visual values are estimated to be minimal and mitigable. The primary mitigation measure is keeping the Site clean through daily upkeep and waste management. Littering within Project Areas is

strictly prohibited and all waste products (hazardous or not) will be transported from site to the appropriate waste disposal facility. Noise and air pollution are other potential negative impacts to aesthetic and visual values of the site. In order mitigate these effects blasting will be kept to a minimum, thereby reducing noise and dust. Should dust become an issue for local air quality, a spray truck can be brought to site. Furthermore, reduction in unnecessary idling of construction equipment and vehicles as well as ensuring the equipment is in good working order can result in a lower emissions and exhaust.

7.2.6 Accidents and Malfunctions

During the proposed remediation works, there will be potential for the release of deleterious substances and/or the risk of project related accidents/malfunctions. The following mitigation will be implemented during proposed remediation work:

- An Environmental Management Plan (EMP) and Environmental Protection Plan (EPP) will be developed and implemented by the contractor prior to Project initiation. These plans will be submitted to the MRG Field Unit for review prior to implementation. These plans will be available to all staff during project activities and will detail appropriate work methods, spill response procedures, erosion control methods, spill and emergency response contacts, and a fire suppression plan.
- An on-site environmental professional should be utilized for construction/effects monitoring intermittently over the construction period or according to regulatory approval criteria.
- A spill containment kit will be kept on site and readily accessible. All equipment on site will be equipped with a spill kit adequate for the specific type and size of individual items.
- The storage of fuels and deleterious substances will be kept at least 100 m from any drainage course and will be sufficiently contained to accommodate at least 110% of the volume stored. All fuels and deleterious substances will be stored in accordance with applicable Workplace Hazardous Materials Information System (WHMIS) standards.
- All workers will be instructed to abide by all applicable Work Safe BC guidelines and will complete a project-specific worker safety orientation prior to working on site.
- Public access to the Project work area will be denied during Project activities.
- Erosion and sediment control measures will be kept in place and in good working order during the Project. These will be further specified in the EMP.
- No fires are permitted at work sites and adequate fire response equipment will be available in order to respond to accidental fires.

8.0 SIGNIFICANCE OF IMPACTS

8.1 Determination and Characterization of Residual Environmental Effects and Significance Ratings

Potential residual environmental effects of the Project were assessed, characterized and found to be negligible or of low magnitude and not significant with exception of the potential mortality of SARA listed species. Project impacts that can be mitigated are not considered to have a residual impact are therefore

have not been rated or incorporated into the Effects Table below. Table 8 presents detailed results of the assessment.

Table 8: Summary of Residual Impact and Significance Ratings

Potential Impact	Residual Impact	Residual Impact Rating						Significance
		Direction	Frequency	Extent	Duration	Reversibility	Magnitude	
Species at Risk loss	Yes	Negative	Intermittent	Local	Long-term	Non-reversible	Moderate-High	Significant
Deleterious substance spills as a result of accidents or malfunctions during construction (vegetation and wildlife).	Yes	Negative	Intermittent	Local	Short-term	Non-reversible	Moderate	Not Significant
Loss and/or disturbance of vegetation during remediation (vegetation).	Yes	Negative	Intermittent	Local	Long-term	Non-reversible	Low	Not Significant
Loss of wildlife habitat. Including habitat for SARA listed species.	Yes	Negative	Continuous	Local	Medium-term	Non-reversible	Low	Significant
Disruption or barriers to wildlife movement.	Yes	Negative	Continuous	Local	Medium-term	Reversible	Low	Not Significant
Wildlife disturbance (noise) during construction.	Yes	Negative	Continuous	Local	Short-term	Reversible	Low	Not Significant
Wildlife avoidance due to use; remediation.	Yes	Negative	Continuous	Local	Short-term	Reversible	Low	Not Significant

8.2 Determination of the Significance of Any Residual Environmental Effects

Despite implementation of mitigation measures and BMPs as described in this document the potential for loss of SARA listed individuals (Coeur d’Alene salamander, Western Toad and Whitebark Pine). Residual impacts of this nature, while considered to be unlikely, are significant.

Other residual impacts for the Project are related to potential of spilling of deleterious substances as a result of accidents or malfunctions, permanent loss of vegetation/wildlife habitat (excluding SARA listed species), disruption/barrier to wildlife movement, and disturbance to wildlife due to construction noise resulting in avoidance behaviour. Disturbances to wildlife will be localized as the proposed works will be limited to the specified Project locations. Excluding potential losses to SARA listed species, the magnitude of residual impacts are considered to be low to moderate and not significant should the mitigation measures of this document be honoured.

9.0 SUMMARY AND CONCLUSIONS

Review of background environmental information and Project activities resulted in the identification of potential impacts to VECs associated with the rock and soil slope remediation along the TCH, MISP and NNR in MRNP. EBA has concluded that the majority of the predicted impacts potentially resulting from the proposed Project activities can be mitigated within the timeframe of the project.

Potential residual impacts from the proposed Project include the loss of SARA listed individuals (salamander and tree species), while considered unlikely, are significant.

Other residual impacts identified are expected to be of negligible to low magnitude and not significant if the mitigation measures outlined in this report and outlined by regulatory authorities are adhered to.

10.0 CLOSURE

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Sincerely,
EBA Engineering Consultants Ltd.

Prepared by:



Jessica Banning, B.Sc.
Junior Environmental Scientist

Reviewed by:



Cameron Kulak, B.Sc., Dipl. T., R.P.Bio.
Biologist



David L. Morantz, M.Sc., R.P.Bio.
Senior Biologist

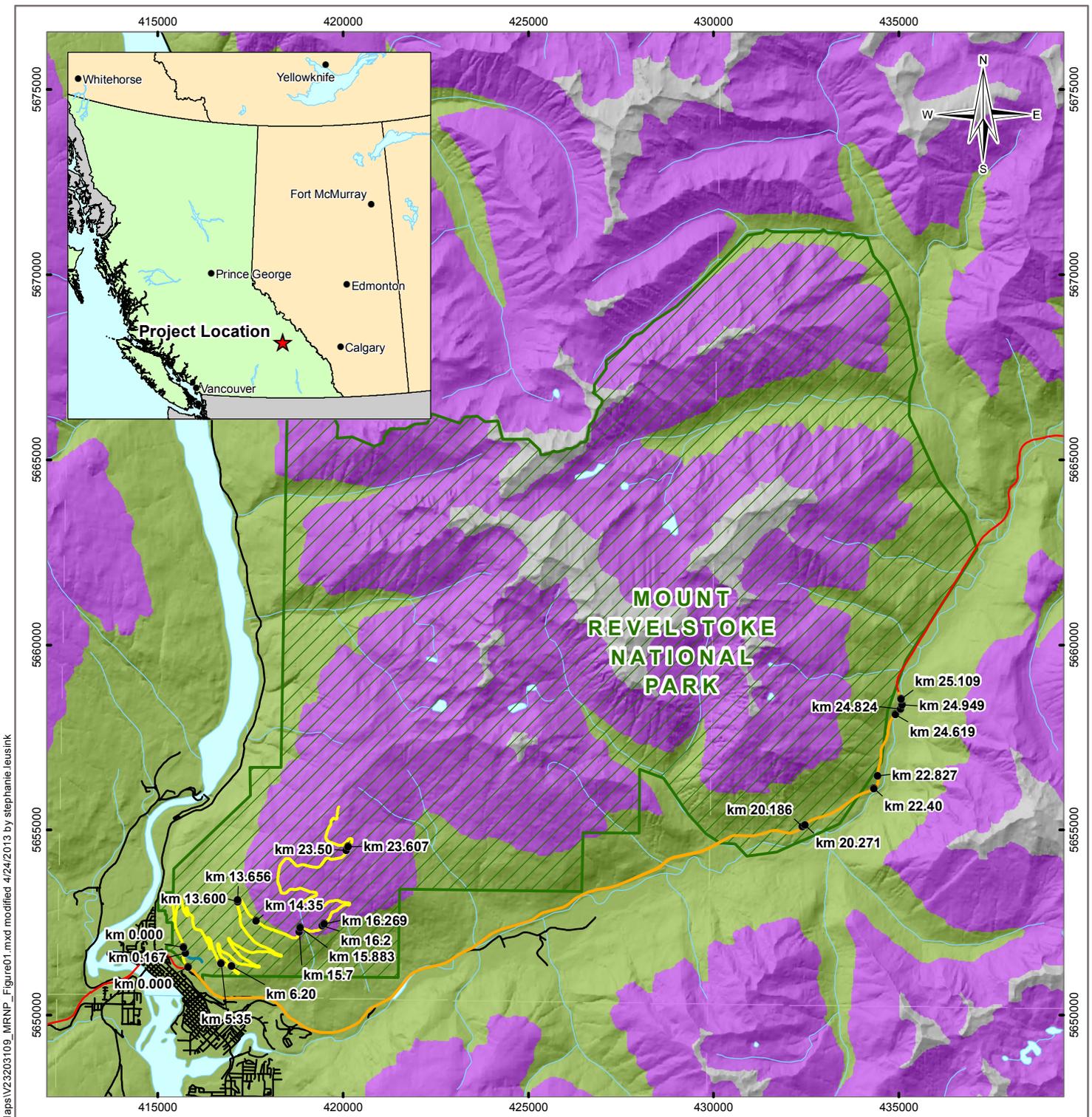
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FIGURES

- Figure 1 Project Location
- Figure 2 Mountain in the Sky Parkway Sensitive Features



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LEGEND

- Kilometre Markers
- Project Location
 - Meadows in the Sky Parkway
 - Nels Nelsen Road
 - Trans-Canada Highway
 - ▨ National Park
 - Trans-Canada Highway
 - Other Road
- Watercourse
- Waterbody
- Biogeoclimatic Zones of BC
 - Interior Mountain-heather Alpine (IMA)
 - Engelmann Spruce - Subalpine Fir (ESSF)
 - Interior Cedar - Hemlock (ICH)

NOTES
 BEC data from DataBC (Version 8, Feb 2012).
 Base data source: NTS 1:250,000; GeoBase DEM.

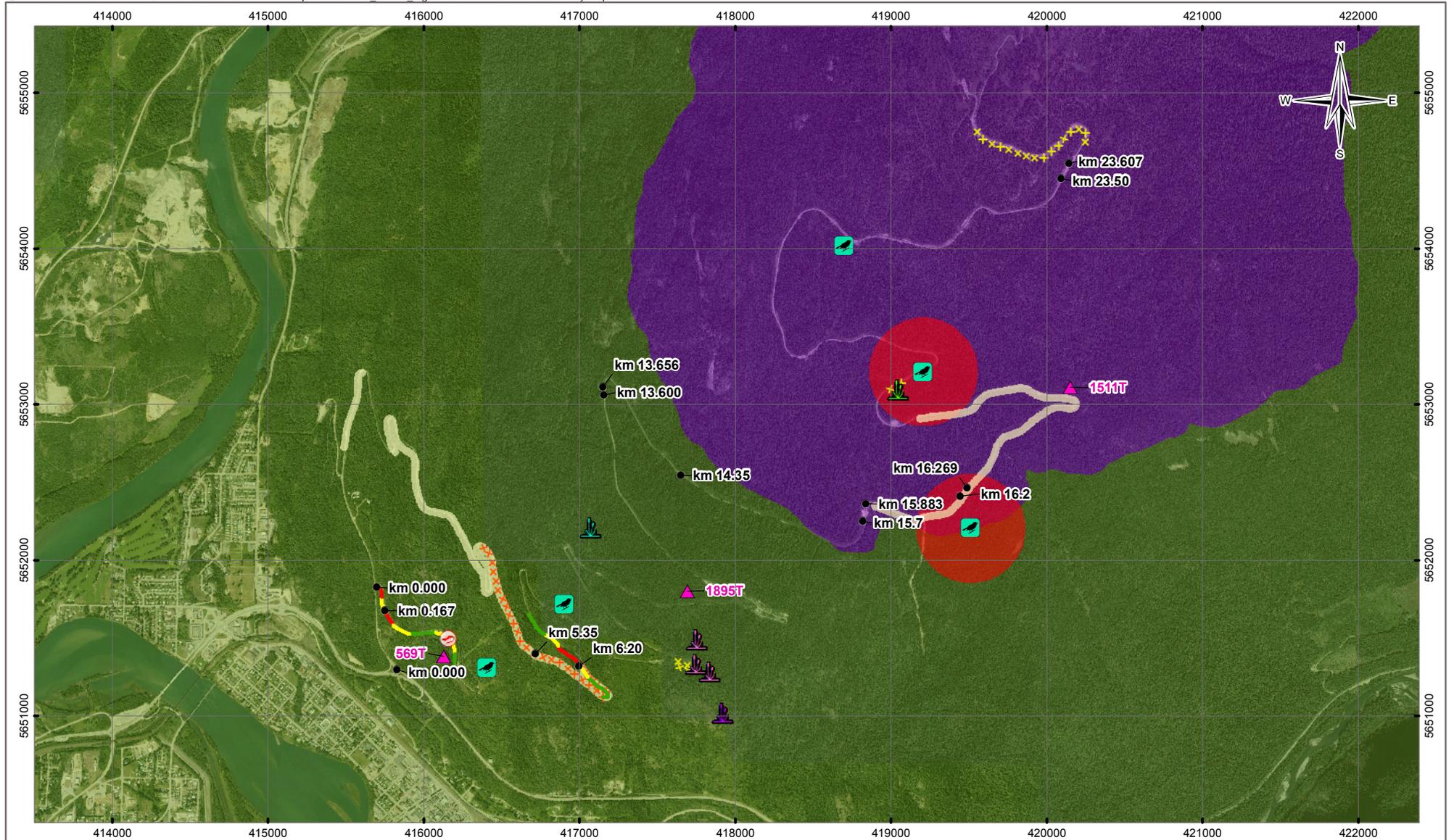
STATUS
 ISSUED FOR USE

ENVIRONMENTAL IMPACT ANALYSIS FOR ROCK SCALING AND REMEDIATION WORK IN MOUNT REVELSTOKE NATIONAL PARK

Project Location

PROJECTION UTM Zone 11		DATUM NAD83		CLIENT Parks Canada / Parcs Canada	
Scale: 1:150,000 					
FILE NO. V23203109_MRNPN_Figure01.mxd					
PROJECT NO. V23203109-01	DWN SL	CKD MEZ	APVD JB	REV 0	 A TETRA TECH COMPANY
OFFICE EBA-VANC	DATE April 24, 2013				

Figure 1



LEGEND

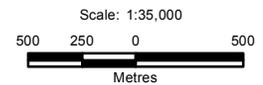
- Rare Plant Observation**
- Fairyslipper Orchid
 - Least Moonwort
 - Slender Spike-rush
 - Western Moonwort
 - Rock Scaling
 - Kilometre Marker
 - Cultural/Heritage Resource Site

- Olive-sided Flycatcher Observation
- Sensitive Amphibian Habitat
- No brushing or ditching with heavy machinery due to sensitive vegetation
- No brushing or ditching with heavy machinery due to sensitive wildlife
- Estimated territory of recent Olive-sided Flycatcher observation
- Area Paved in 2006

- Salamander Activity**
- Low
 - Moderate
 - High
- Biogeoclimatic Zones of BC**
- Engelmann Spruce - Subalpine Fir (ESSF)
 - Interior Cedar - Hemlock (ICH)

STATUS
ISSUED FOR USE

NOTES BEC data from DataBC (Version 8, Feb 2012).
Base data source: Google Earth Pro (2011); Parks Canada (2013).



PROJECTION UTM Zone 11	DATUM NAD83
FILE NO. V23203109_MRNP_Figure02.mxd	
CLIENT Parks Canada	
eba A TETRA TECH COMPANY	

ENVIRONMENTAL IMPACT ANALYSIS FOR ROCK SCALING AND REMEDIATION WORK IN MOUNT REVELSTOKE NATIONAL PARK

Meadows in the Sky Parkway Sensitive Features

PROJECT NO. V23203109-01	DWN SL	CKD MEZ	APVD CK	REV 0
OFFICE EBA-VANC	DATE April 24, 2013			

Figure 2

APPENDIX A

EBA'S GEO-ENVIRONMENTAL REPORT – GENERAL CONDITIONS

GENERAL CONDITIONS

GEO-ENVIRONMENTAL REPORT

This report incorporates and is subject to these “General Conditions”.

1.0 USE OF REPORT AND OWNERSHIP

This report pertains to a specific site, a specific development, and a specific scope of work. It is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site or proposed development would necessitate a supplementary investigation and assessment.

This report and the assessments and recommendations contained in it are intended for the sole use of EBA's client. EBA does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than EBA's Client unless otherwise authorized in writing by EBA. Any unauthorized use of the report is at the sole risk of the user.

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of EBA. Additional copies of the report, if required, may be obtained upon request.

2.0 ALTERNATE REPORT FORMAT

Where EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed EBA's instruments of professional service), only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by EBA shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of EBA's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except EBA. The Client warrants that EBA's instruments of professional service will be used only and exactly as submitted by EBA.

Electronic files submitted by EBA have been prepared and submitted using specific software and hardware systems. EBA makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

3.0 NOTIFICATION OF AUTHORITIES

In certain instances, the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by EBA in its reasonably exercised discretion.

4.0 INFORMATION PROVIDED TO EBA BY OTHERS

During the performance of the work and the preparation of the report, EBA may rely on information provided by persons other than the Client. While EBA endeavours to verify the accuracy of such information when instructed to do so by the Client, EBA accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

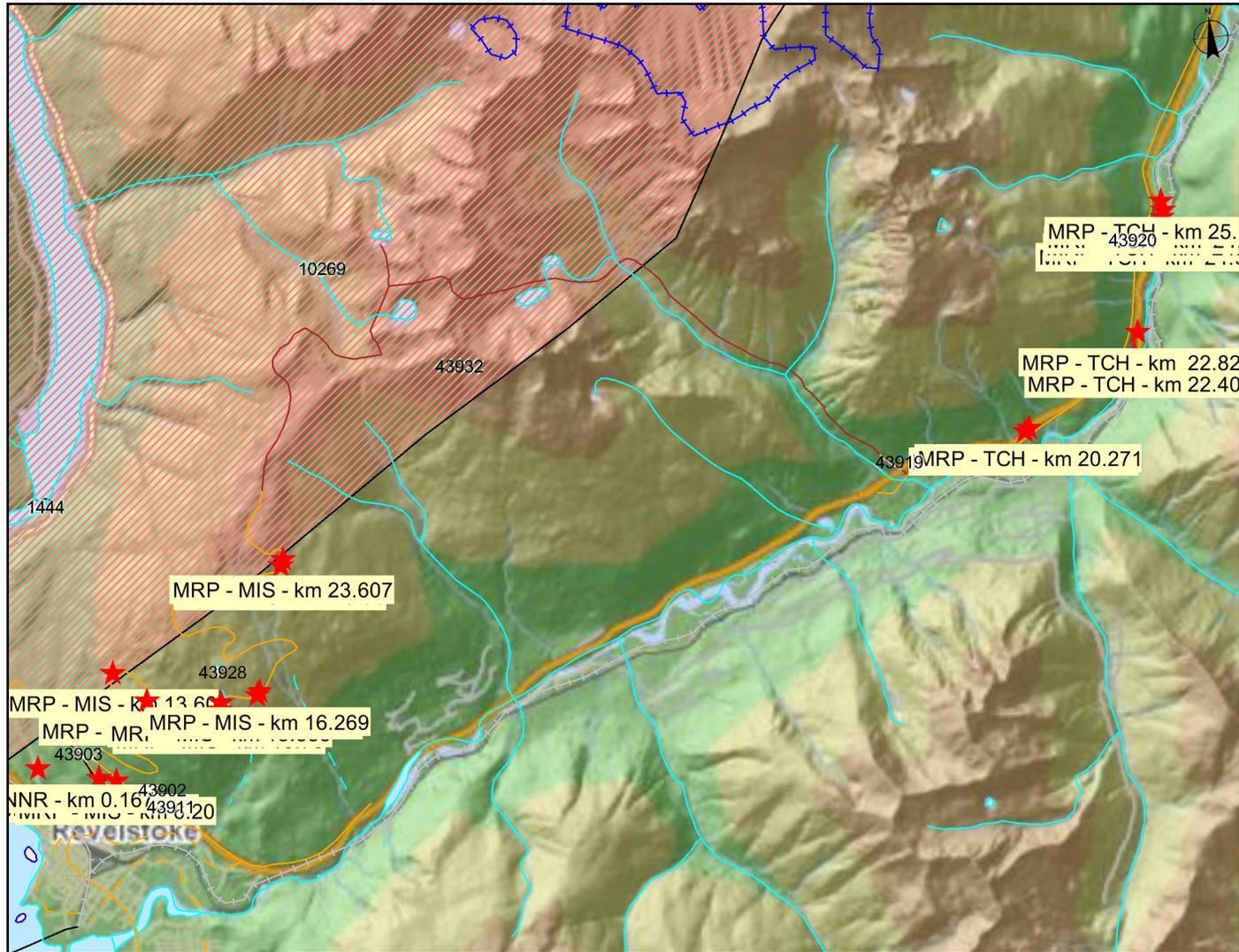
APPENDIX B

PROXIMITY OF ROCK WORKS TO WILDLIFE HABITAT IN MRNP



BC Conservation Data Centre - Occurrence Report

Proximity of Rock Works to Wildlife Habitat in MRNP



Legend

Non-sensitive Occurrences

- Animal - Vertebrate
- Animal - Invertebrate
- Plant - Vascular
- Plant - Non-vascular
- Ecological Community

Masked Sensitive Occurrences

- Big Trees

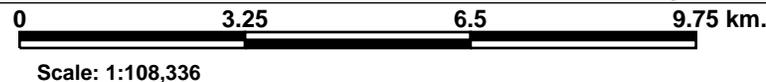
Occurrence data is updated frequently.
This map should be considered out of date 6 months after
January 30, 2013
For more information about the BC CDC
visit: <http://www.env.gov.bc.ca/cdc/>

Index Map



Map center: 51°2' N, 118°3' W

MAP COMPILATION
Projection: Albers Equal Area Conic
Datum: NAD 83



Province of British Columbia
Ministry of Environment

Map Created January 30, 2013