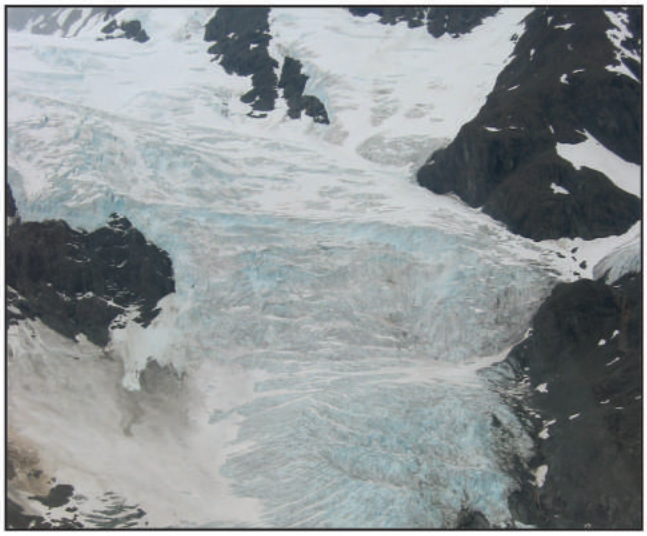
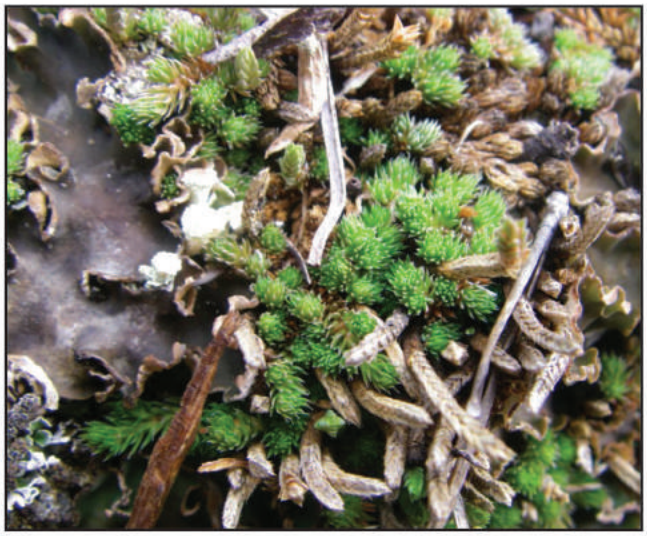
CopperFox Metals Inc.

Schaft Creek Project

British Columbia, Canada

Vegetation Baseline Report 2007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Executive Summary

Studies of the ecosystems and vegetation in the Schaft Creek Project area were conducted during the summer of 2007. Thirteen Biogeoclimatic Ecosystem Classification (BEC) units are present within the study Area. The Alpine Tundra zone (ATun) is predominant, as is the Engelmann Spruce Sub-Alpine Fir moist cold (ESSFmc).

No listed ecological communities tracked by the B.C. Conservation Data Centre (B.C. CDC) were identified during field surveys. Additionally, no plant species tracked by the B.C. CDC or the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) were identified in the field.

Eight plant species identified as being of cultural and/or traditional significance to members of First Nations groups of the area were identified from field plots surveyed during vegetation field studies conducted in 2007. The majority are berry-producing species (*e.g.*, blueberries, huckleberry, gooseberry) and are found throughout the study area.

One "nuisance weed" species: common horsetail (*Equisetum arvense*), was identified within the Schaft Creek Project area. This species is not regulated by the B.C. Weed Control Act.

A total of 30 plant tissue samples from five different species were collected for metals analysis. Sampling was carried out following common practices for plant tissue collection and methods specified by ALS Environmental who conducted the analyses. Baseline metal concentrations are reported.

Acknowledgements

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Glossary and Abbreviations

Algorithm: A set of mathematical instructions or problem-solving procedures designed to provide answers to complex problems. Used in modelling applications to portray the inter-relationships between different sets of data. A series of commands which specifically assign habitat capability and suitability ratings for an animal species to ecosystem unit polygons.

Alpine: Non-forested land at upper elevations above the tree line. Alpine vegetation on zonal sites is dominated by low shrubs, herbs, bryophytes and lichens. Alpine is considered to be above parkland forest, although treeless by definition, rare stunted (krummholz) trees may occur. Much of the alpine will be non-vegetated, covered primarily by rock and ice.

Attribute: Any feature of an ecosystem unit that is not represented by the site series/ecosystem unit, site modifier or structural stage. Attributes may either be recorded from fieldwork or inferred by extrapolating features from similar ecosystem units.

ATun: Alpine Tundra undifferentiated subzone.

BEC (Biogeoclimatic Ecosystem Classification):

Provincial hierarchical classification scheme identifying geographic areas under the influence of the same regional climate.

Biogeoclimatic subzone:

The basic unit in the BEC system, consisting of unique sequences of geographically related ecosystems, influenced by one type of regional climate. The subzone describes the zonal/or climax vegetation, and corresponding climate and soil.

Biogeoclimatic unit:

A general term referring to any level of Biogeoclimatic zone, subzone, variant or phase. Biogeoclimatic units are inferred from a system of ecological classification based on a floristic hierarchy of plant associations. The recognized units are a synthesis of climate, vegetation, and soil data.

Biogeoclimatic variant:

A further subdivision of biogeoclimatic subzone reflecting further differences in regional climate. Variants are described as warmer, colder, drier, wetter, or snowier than the "typical" subzone (*e.g.,* ESSFmm1-moist mild raush Engelmann Spruce-Subalpine Fir).

Biogeoclimatic zone:

Geographical areas having similar patterns of energy flow, vegetation and soils as a result of a broadly homogeneous macroclimate. Biogeoclimatic zones are comprised of biogeoclimatic subzones with similar zonal climax ecosystems.

Blue-list: List of ecological communities, and indigenous species and subspecies of special concern (formerly vulnerable) in British Columbia.

BWBSdk1: Boreal White and Black Spruce dry cool subzone – Stikine variant BEC classification.

CDC (Conservation Data Centre):

A part of the Ministry of Environment that tracks information on plants, animals and ecosystems (ecological communities) at risk in B.C.

COSEWIC (Committee on the Status of Endangered Wildlife in Canada):

A committee that produces the official list of Canadian endangered species.

Ecosystem (terrestrial):

A volume of earth-space that is composed of non-living parts (climate, geologic materials, groundwater, and soils) and living or biotic parts, which are all constantly in a state of motion, transformation, and development. No size or scale is inferred.

Ecosystem Unit:

A classification unit defined as a combination of site unit, site modifiers, and structural stage (and sometimes seral community type).

ESSFmc/mcp:

Engelmann Spruce Sub-Alpine Fir moist cold and moist cold parkland subzones. These subzones have been grouped together for the purpose of this report.

ESSFwv/wvp:

Engelmann Spruce Sub-Alpine Fir wet very cold and wet very cold parkland subzones. These subzones have been grouped together for the purpose of this report.

ESSFvv/vvp:

Engelmann Spruce Sub-Alpine Fir very wet very cold and very wet very cold parkland subzones. These subzones have been grouped together for the purpose of this report.

Floodplain: Area of unconsolidated, river-borne sediment in a river valley; subject to periodic flooding.

Forage: Plant material consumed by animals.

Forb: Non-graminoid herbaceous plants (*e.g.*, cow-parsnip).

GIS (Geographic Information System):

A computer-based system to process spatially-referenced data into information for a specific purpose. Primary processes include data input, management, query, analysis and visualization.

Habitat: Land and water surface used by wildlife. This may include biotic and abiotic aspects such as vegetation, exposed bedrock, water and topography.

Hectare: 10,000 m^2 or 0.01 km^2 or 2.47 acres.

Herb: A plant - annual, biennial or perennial - with stems that die back to the ground at the end of the growing season.

ICHwc: Interior Cedar Hemlock wet cold subzone.

Mesic: Water removed somewhat slowly in relation to supply; soil may remain moist for a significant, but sometimes short period of the year. Available soil moisture reflects climatic inputs.

Model: An idealized representation of reality developed to describe, analyze or understand the behaviour of some aspect of it; a mathematical representation of a relationship under investigation.

Moisture regime:

Indicates the available moisture for plant growth in terms of the soil's ability to hold, lose, or receive water. Described as moisture classes from Very Xeric (0) to Hydric (8) (B.C. MELP and B.C. MoFR, 1998).

Nuisance Weed:

Plant species, that when present in agricultural areas in particular, can cause economic losses. Are generally so widespread that enforcement is often impractical.

Nutrient regime:

Indicates the available nutrient supply for plant growth on a site, relative to the supply on all surrounding sites. Nutrient regime is based on a number of environmental and biotic factors, and is described as classes from Oligotrophic (A) to Hypereutrophic (F) (B.C. MELP and B.C. MoFR, 1998).

Parkland: Subalpine area characterized by forest clumps interspersed with open subalpine meadows and shrub thickets. Vegetation cover may vary in the proportion of treed patches, meadows, and shrub thickets. The term parkland can also be used for lower elevation forests that are open due to restricted moisture availability, such as occurs in the Ponderosa Pine zone.

PEM (Predictive Ecosystem Mapping):

Process designed to use available spatial data and knowledge of ecological-landscape relationships to automate the computer generation of ecosystem maps. PEM typically involves the spatial overlay of mapped themes and the processing of resultant attributes against a formalized knowledge base using automated inference methods.

Pixel: Short for picture element. Smallest display unit of a digital image that can be assigned a colour

Polygon: Delineations that represent discrete areas on a map, bounded by a line. On an ecosystem map, polygons depicting ecosystem map units are nested within larger polygons containing the biogeoclimatic and ecoregion map units. Polygons depicting ecosystem units represent areas from less than one hectare to several hundred hectares, depending on the scale of mapping.

Red-list: List of ecological communities, indigenous species and subspecies that are extirpated, endangered or threatened in British Columbia. Red listed species and sub-species have, or are candidates for, official Extirpated, Endangered or Threatened Status in B.C. Not all Red-listed taxa will necessarily become formally designated. Placing taxa on the red list flags them as being at risk and requiring investigation.

Riparian Habitat:

Vegetation growing close to a watercourse, lake, swamp or spring that is critical for wildlife cover, fish food organisms, stream nutrients, large organic debris and streambank stability.

Riverine: Associated with stream channels.

SBSmc: Sub-Boreal Spruce moist cold subzone.

SBSvv: Sub-Boreal Spruce very wet very cold subzone.

Scale: The degree of resolution at which ecological processes, structure, and changes across space and time are observed and measured. Common scales of terrestrial ecosystem mapping are 1:20 000 and 1:50 000.

Site series: Describes all land areas capable of producing the same late seral or climax plant community within a biogeoclimatic subzone or variant (Banner et al., 1993). Site series can be related to a specified range of soil moisture and nutrient regimes within a subzone or variant, but other factors, such as aspect or disturbance history may influence it as well. Site series form the basis of ecosystem units.

Structural Stage:

Describes the existing dominant stand appearance or physiognomy for a land area. Factors such as disturbance history, stand age, species composition and chance all influence structural stage. Structural stages range from non-vegetated to old forest.

SWBun/uns: Spruce Willow Birch undifferentiated and undifferentiated scrub subzones.

TEM (Terrestrial Ecosystem Mapping):

The stratification of a landscape into map units according to a combination of ecological features, including climate, physiography, surficial material, bedrock geology, soil, and vegetation (RIC, 1998).

Topography: The configuration of a surface, including its relief and the position of its natural and man-made features.

TRIM (Terrain Resource Information Management):

The TRIM program produces digital maps that are a collection of mapsheets covering British Columbia at a scale of 1:20 000. The mapsheets include information such as elevation (contours), anthropogenic features and natural features such as streams, lakes, *etc*., and official place names, such as city names, river names, *etc.*

Wetland: Semi-terrestrial sites where the water table is at, near, or above the soil surface and soils are water-saturated for a sufficient length of time such that excess water and low soil oxygen levels are principal determinants of vegetation and soils development. Wetlands must have either plant communities characterized by species that normally grow in soils water-saturated for a major portion of the growing season ("hydrophytes") soils with surface peat ("O") horizons, or gleyed mineral horizons (Bg or Cg) within 30 cm of the soil surface (MacKenzie and Moran, 2004).

1. Introduction

1.1 Schaft Creek Project Summary

Copper Fox Metals Inc. (Copper Fox) is a Canadian mineral exploration and development company focused on developing the Schaft Creek deposit located in north-western British Columbia, approximately 60 km south of the village of Telegraph Creek (Figure 1.1-1). The Schaft Creek deposit is a polymetallic (copper-gold-silver-molybdenum) deposit located in the Liard District of north-western British Columbia (Latitude 57^{o} 22' 4.2''; Longitude 130^{o}, 58' 48.9"). The property is comprised of 40 mineral claims covering an area totalling approximately 20,932 ha within the Cassiar Iskut-Stikine Land and Resource Management Plan (Figure 1.1-2).

The Schaft Creek Project is located within the traditional territory of the Tahltan Nation. Copper Fox has been in discussions with the Tahltan Central Council (TCC) and the Tahltan Heritage Resources Environmental Assessment Team (THREAT) since initiating exploration activities in 2005. Copper Fox has engaged in numerous agreements with the TCC including a Communications Agreement, Traditional Knowledge Agreement, Letter of Understanding with the Tahltan Nation Development Corporation (TNDC) and a THREAT Agreement. Copper Fox will continue to work together with the Tahltan Nation as work on the Schaft Creek Project continues.

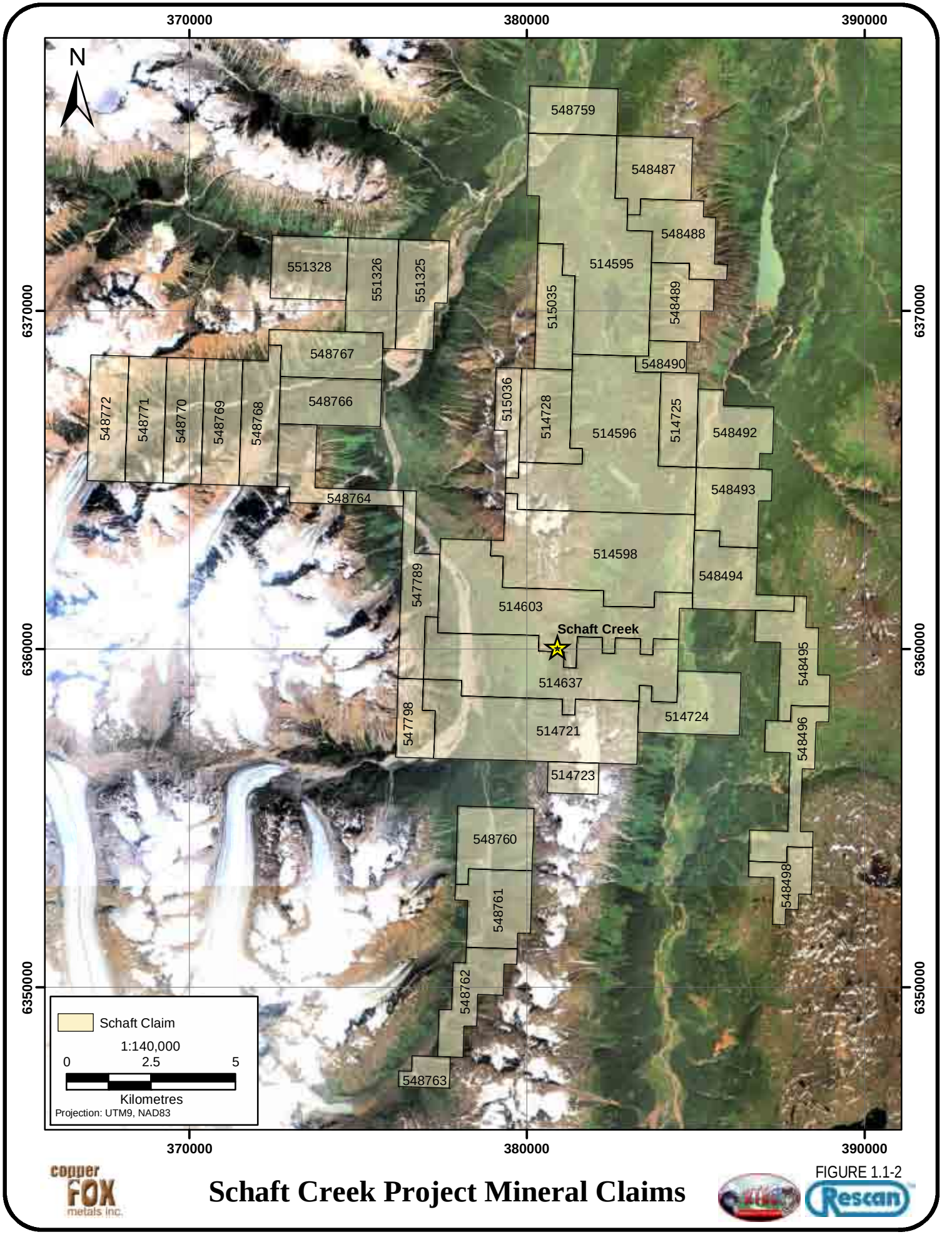
The Schaft Creek deposit was discovered in 1957 and has since been investigated by prospecting, geological mapping, geophysical surveys as well as diamond and percussion drilling. Over 65,000 meters of drilling has been completed on the property as of end of 2007. Additional drilling is planned for 2008 to support future economic assessments of the property and an environmental assessment application.

The Schaft Creek Project entered the British Columbia environmental assessment process in August 2006. Although a formal federal decision has not yet been made, the Project will likely require federal approval as per the Canadian Environmental Assessment Act. Copper Fox has targeted the end of 2008 for submission of their Schaft Creek Environmental Assessment Application.

Copper Fox has recently released a scoping level engineering and economic report for Schaft Creek. The mine and associated infrastructure are presented in Figure 1.1-3. The current mine plan has ore milled from an open pit at a rate of 65,000 tonnes/day. The Schaft deposit will be mined with large truck/shovel operations and typical drill and blast techniques. An explosives manufacturing facility will be constructed on-site to support blasting activities. The mine plan includes 719 million tonnes of minable ore over a 31 year mine life. The Project is estimated to generate up to 1,200 jobs during the construction phase of the Project and approximately 500 permanent jobs during the life of the mine.

Location Map for Schaft Creek Project

FIGURE 1.1-1



Schaft Creek Project Mineral Claims

FIGURE 1.1-2

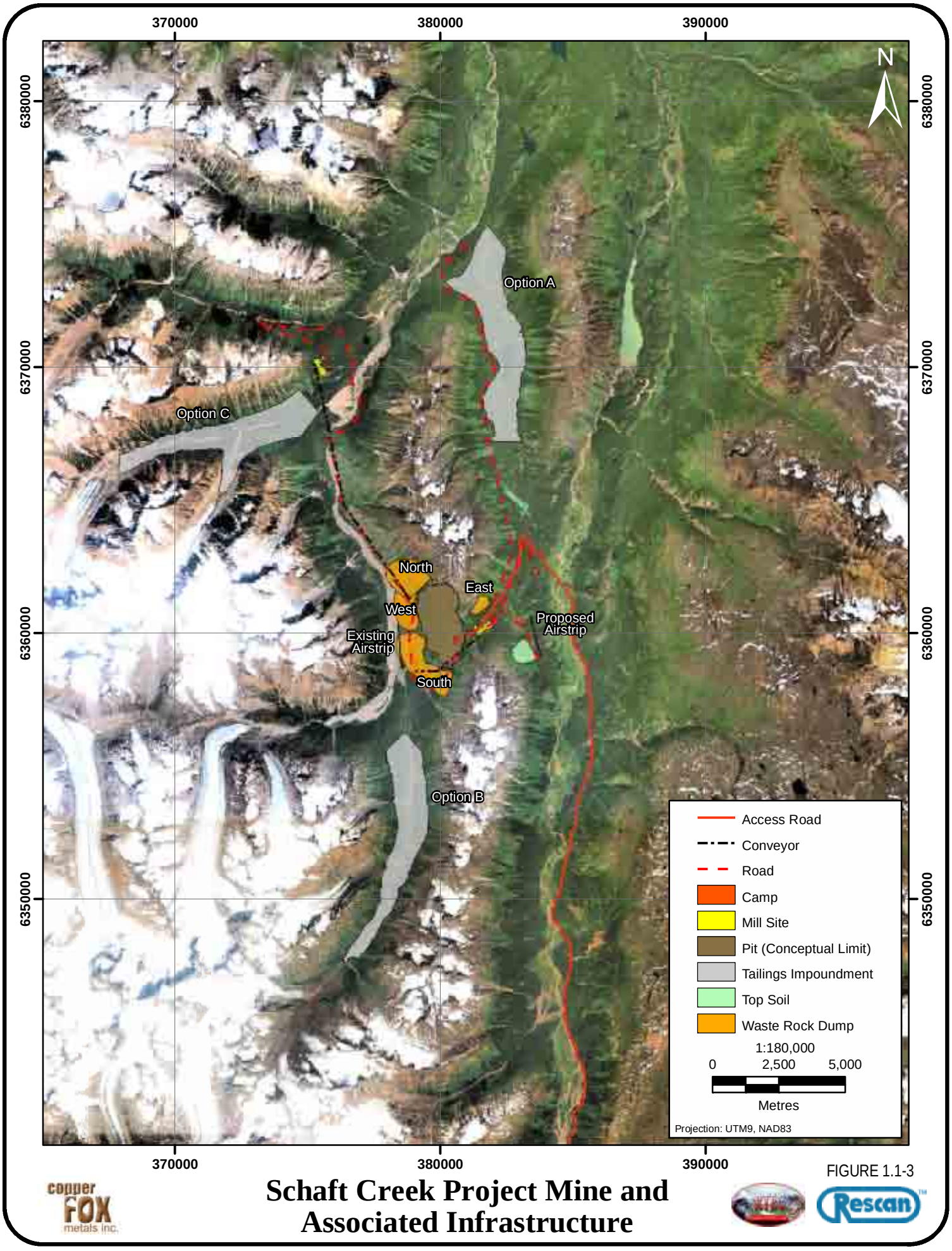


FIGURE 1.1-3

Schaft Creek Project Mine and Associated Infrastructure

Ore will be crushed, milled and filtered on-site to produce copper and molybdenum concentrates. The mill will include a typical comminution circuit (Semi-Autogenous Mill, Ball Mill and Pebble Crusher) followed by a flotation circuit and a copper circuit with thickener, filtration and concentrate loadout and shipping. The mill includes a designated molybdenum circuit with thickener, filtration circuit, drying and bagging. The filter plant will be located at the plant site. A tailings thickener and water reclaim system will be used to recycle process water. The circuit will have a design capacity of 70,652 tonnes per day and a nominal capacity of 65,000 tonnes per day (23,400,000 tonnes per year). The copper and molybdenum concentrates will be shipped via truck from the mill to the port of Stewart, BC.

Copper Fox will construct an access road from Highway 37 to the Schaft Creek property. Access to the property from Highway 37 will require approximately 105 km of new road. The first 65 km of the access road to the Schaft Creek property corresponds to the Galore Creek access road. NovaGold and Teck Cominco have currently put a hold on future construction efforts along their access road and the overall Galore Creek Project. Copper Fox will seek approval from the provincial government and NovaGold/Teck Cominco to construct the first 65 km of the Galore Creek access road should the status of the Project not change.

The route of the final 40 km of access road has not been finalized. Copper Fox has completed initial investigations of a route along Mess Creek. An alternative route is also being considered that utilizes the plateau to the east of Mess Creek. Copper Fox is currently investigating the feasibility, as it relates to geohazards, of the two alignments. Both alignments include a 30 m bridge on Mess Creek. Mess Creek is considered navigable as per Transportation Canada criteria. Figure 1.1-4 presents the access road alignment that follows the Galore Creek road (65 km from Highway 37) and the Mess Creek alignment (40 km) to the Schaft Creek property.

Over the life of the mine, the Schaft Creek Project will generate over 700 million tonnes of tailings. There are three tailings facilities being considered (Figure 1.1-3). The three options will undergo an alternatives assessment that will include engineering, construction and operating costs, geotechnical, geohazards, environmental and social considerations.

The Project will generate over a billion tonnes of waste rock. Waste rock dumps are proposed around the perimeter of the pit (Figure 1.1-3). This includes the flat area between the proposed pit and Schaft Creek.

A detailed water management plan has yet to be developed for the Project. A water management plan will be included in the next level of economic assessment (pre-feasibility) and the next Project description update. A waste water discharge is expected from the tailings facility, waste rock dumps and domestic waste water treatment plant. The management plan will detail the plans to minimize natural drainage into the tailings facility, the pit and the waste rock dumps. Pit water will be pumped to the tailings facility.

A new airfield will be constructed to the east of the pit (Figure 1.1-3). The Project will be a fly-in, fly-out operation. The new landing strip will be capable of handling a Boeing 737. Other facilities include a terminal building, fuelling, maintenance and control facilities.

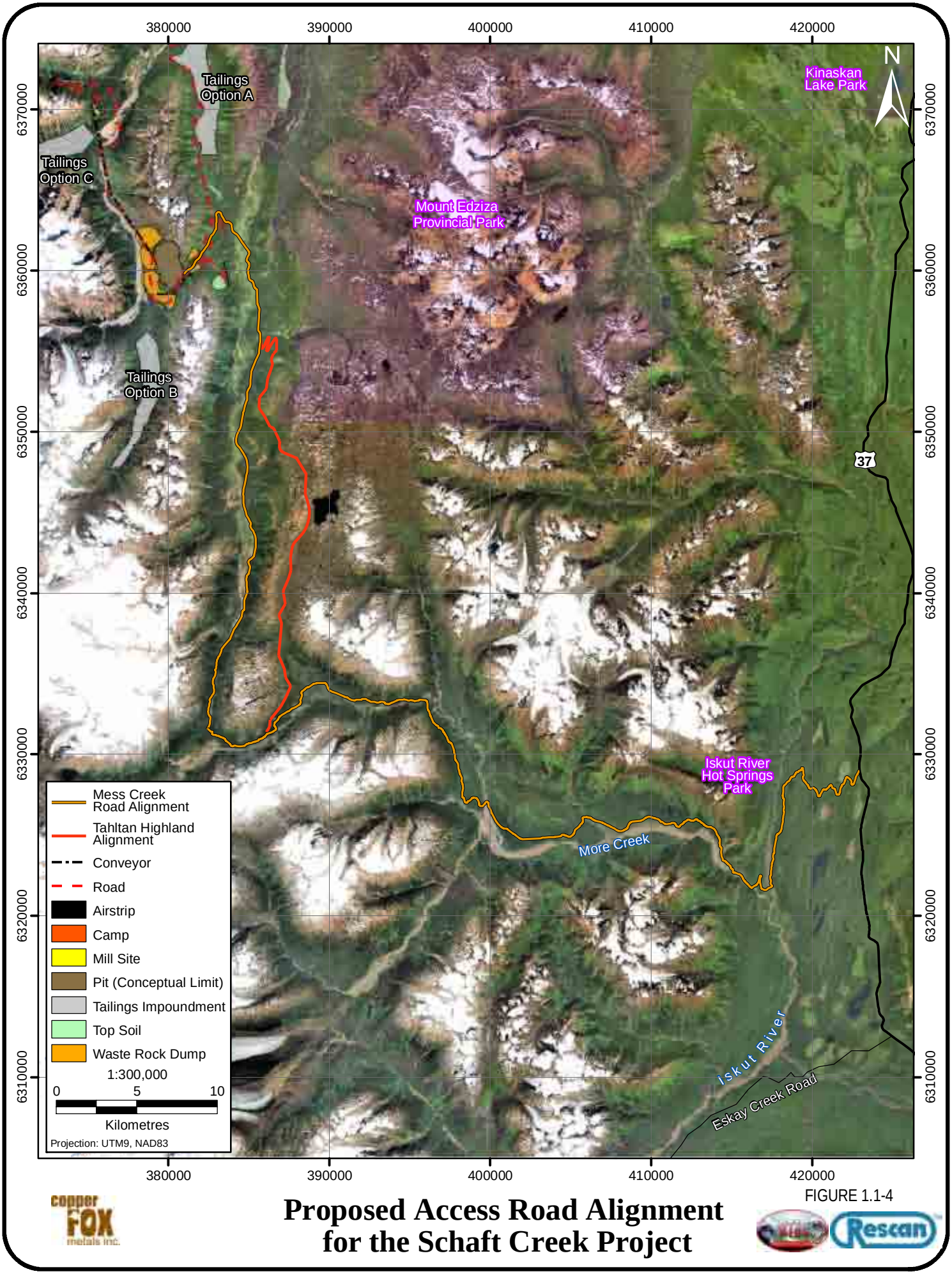


FIGURE 1.1-4

Proposed Access Road Alignment for the Schaft Creek Project

A permanent camp will be constructed to support a staff of approximately 500 employees. Other facilities include truck shop, warehouse, administration, maintenance laboratory, explosives storage, water treatment facilities and potable water storage.

Copper Fox has targeted the end of 2008 for submission of their Environmental Assessment Application and full Feasibility Report. Screening of the EA Application plus the 180 day review period will result in Project approval as early as July 2009. Copper Fox will likely seek concurrent permitting for strategic permits to facility the timely construction of key Project components. Construction is estimated to take two and half years. Thus, production could begin by early 2012.

1.2 Objectives

Baseline studies conducted in 2007 focused on describing the current ecological conditions of the potential development area and surrounding area. Field studies inventoried the ecosystems and plant species present in the Project area and searched for any invasive plants, rare ecological communities and rare plants tracked by provincial and federal conservation agencies. Plant tissue samples were collected to establish baseline metal concentrations for future monitoring following mine closure and reclamation. Development of an ecosystem map to further characterize the ecology of the area is ongoing. This report provides an inventory of the ecosystem types and vegetation characteristics present in the Schaft Creek proposed Project area.

The objectives of this report are to:

1. provide a description of the ecosystems and plant species present at field plots throughout the Project area;
2. present the methodology being used to develop the terrestrial and predictive ecosystem map;
3. identify and discuss the ecological communities and plants tracked by the British Columbia Conservation Data Centre (BC CDC) and Committee on the Status of Endangered Wildlife in Canada (COSEWIC).
4. identify and discuss invasive plants potentially occurring in the Project area, and;
5. identify the baseline metals concentrations of plant tissue and soil samples within the Project area (Rescan, 2008).

1.3 Study Area

The study area is located approximately 60 km south of Telegraph Creek within the asserted traditional territory of the Tahltan First Nations (Figure 1.3-1) and within the Cassiar Iskut-Stikine Land and Resource Management Planning (LRMP) District. The study area represents interior plateau and central plateau ecosystems and contains six of British Columbia's fourteen Biogeoclimatic Zones.

1.4 Biogeoclimatic Ecosystem Classification (BEC) System

Developed in the 1960s by Dr. Vladmir Krajina of the Department of Botany at the University of British Columbia, the Biogeoclimatic Ecosystem Classification (BEC) system is the primary means of classifying ecosystems in British Columbia (Meidinger and Pojar, 1991). The BEC system is a hierarchical classification method that uses a standardized terminology and methodology to organize and present information pertaining to the ecosystems of B.C. (Rescan, 2007). This system is based on soils, climate and indicator plants as described by Banner *et al.*, (1993) and Meidinger and Pojar, (1991). The hierarchical classification of BEC is organised into zones, named after the dominant climax plant species. Zones are divided into subzones which reflect climate and are determined from relative precipitation and from continentality or temperature. Subzones are divided into site series based on the site's potential to produce a similar stable plant community at late successional stages (Banner *et al.*, 1993). A full description of the BEC methodology and associated terms can be found in Banner *et al.* (1993) and on the B.C. Ministry of Forests and Range, (2007) internet site. A brief overview of the BEC system and its application to the Schaft Creek Project is provided below.

Site series are identified by site conditions, soil conditions and vegetation communities and generally refer to forested ecosystems. Each site series is assigned a two-digit, numerical code. The site series that best reflects the subzone and is least influenced by local topography and/or soil properties is termed "zonal". The zonal site series of any subzone or variant is always coded as "01". This site series typically has intermediate soil moisture (mesic) and nutrient regimes, occurs on mid-slope positions, and has moderately deep to deep soils with unrestricted drainage (Banner *et al.*, 1993). All other site series occurring within the same biogeoclimatic subzone or variant are measured in relation to the zonal site (*e.g.*, wetter or drier than zonal). Non-forested ecosystems remain largely undefined in the BEC system and are given a generic code of "00".

This report characterizes both the forested site series and undefined/non-forested ecosystems that occur throughout the Project area. For purposes of this report, all site series and undefined units have been referred to as "ecosystems." In an effort to simplify report summaries, ecosystems have been further categorized according to their relative moisture status and vegetation type (*e.g.*, mesic forest, wet shrub, wetland herb). These categories have been termed "general ecosystem types" and are described in Table 1.4-1. They are used to summarize ecosystem information within the Project area.

Table 1.4-1
General Ecosystem Types and Descriptions

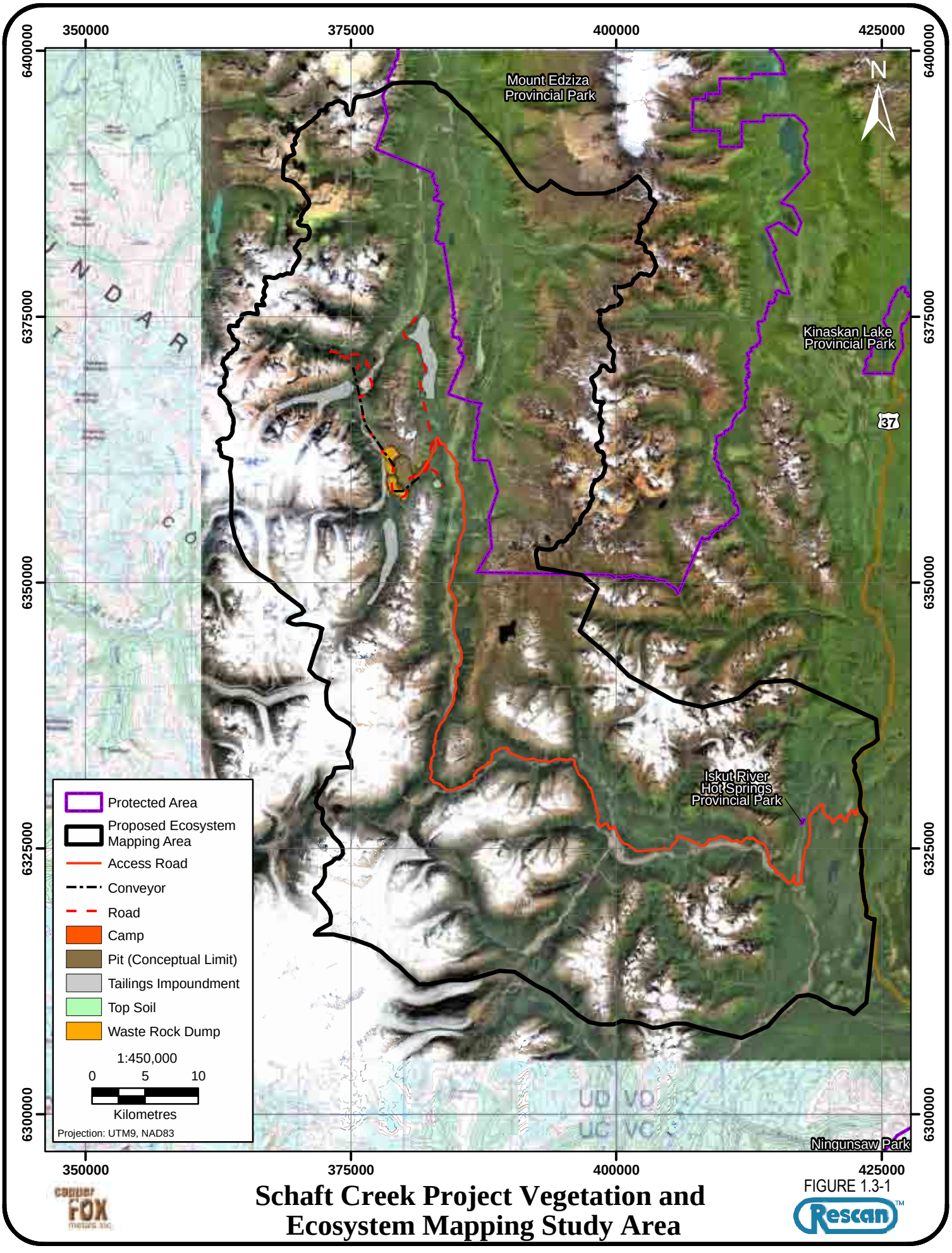
General Ecosystem Type	Description[1]
Mesic Forest	Mesic to moist forest-dominated communities
Moist Forest	Mesic to wet forest-dominated communities
Moist Shrub	Moist to wet shrub-dominated communities
Drier Forest	Dry to mesic forest or patchy/stunted conifer trees
Wetter Forest	Very moist to wet forest-dominated communities
Drier Grassland	Dry grassland community dominated by herbs

(continued)

Table 1.4-1
General Ecosystem Types and Descriptions (completed)

General Ecosystem Type	Description[1]
Wetland Shrub/Herb	Shrub/herb-dominated wetland communities
Drier Herb	Mesic to dry herb dominated communities
Mesic Shrub	Mesic to moist shrub-dominated communities
Mesic Herb	Mesic to moist herb dominated communities
Sparse/Unvegetated	Sparsely vegetated and/or unvegetated areas
Mesic Parkland	Dry parkland communities dominated by herbs interspersed with tree/ shrub islands
Moist Herb	Moist to wet herb dominated communities
Moist Parkland	Moist parkland communities dominated by herbs interspersed with tree/ shrub islands
Drier Shrub	Dry to mesic forest or patchy/stunted conifer trees

[1] Moisture Regime is relative to the BEC unit within which the ecosystem occurs



Schaft Creek Project Vegetation and Ecosystem Mapping Study Area

FIGURE 1.3-1

2. Methods

2.1 Field Guide and Reference Data

The Field Guide to Site Identification and Interpretation for the Prince Rupert Forest Region (Banner *et al.*, 1993) was used to describe and classify reconnaissance field sites. This book was used in conjunction with biogeoclimatic maps, TRIM data and satellite imagery to classify ecosystems encountered during the 2007 field surveys. Collectively, this information (along with terrain maps) provides the basis for the ongoing ecosystem mapping for the proposed Schaft Creek Project area.

2.2 Field Plots

Baseline studies, conducted in 2007, focused on describing the ecological conditions of the proposed mine site and the proposed haul route south along Mess Creek and east to Highway 37. Two field trips, each approximately 8 days long, were completed during July and August of 2007. Field teams consisted of a plant ecologist, soil scientist, wildlife biologist and a Tahltan assistant. Study sites (*i.e.*, plots) were selected to represent areas that will be most influenced by the Project development and that represent the ecosystem types present within the proposed Project area. All data were collected in accordance with the Field Manual for Describing Terrestrial Ecosystems (B.C. MoFR, 1998)

The primary goal of the field surveys was to characterize the vegetation ecosystems present within the Project Area. The assessment of vegetation, soils and wildlife habitat suitability was carried out at each ground survey location. Visual surveys were also conducted and included assessments of the ecosystem types and wildlife values.

General site and vegetation characteristics were assessed in plots measuring 20 m x 20 m. At each location, the following attributes were recorded: geographic location (*e.g.*, UTM coordinate), slope, aspect, elevation, relative slope position (*e.g.*, crest, mid-slope, etc.), soil drainage, and ecosystem unit (*e.g.*, BEC, ecosystem, and structural stage). The Ground Inspection Form (GIF) was used during field data collection. More detailed surficial material and soils information was also recorded and is discussed in the *Schaft Creek Soil Baseline Report* (Rescan, 2008a). Percent cover was estimated for four possible vegetation layers (tree, shrub, herb, moss/lichen) present in the plot. Field data were entered into the provincial data entry program VENUS (version 5.0) and are being used to develop the Terrestrial Ecosystem Map (ongoing). The majority of the plots were surveyed from the ground. Detailed field notes were also taken to document the area traversed in between formal survey locations.

2.3 Ecosystem Mapping

2.3.1 Terrestrial Ecosystem Mapping

Ecosystem mapping is an effective way of stratifying the landscape into meaningful ecological units that reflect a combination of attributes, such as climate, surficial material, soil and vegetation (RIC, 1998). Terrestrial Ecosystem Mapping (TEM) was originally developed as

B.C.'s provincial mapping methodology and is founded on years of ecological mapping experience conducted throughout B.C. This approach uses air photo interpretation to identify map units (called polygons) and is carried out in two stages. The first stage involves the identification of terrain units (which describe surficial material), while the second involves the identification of ecosystems mapped within the terrain polygons. Ecosystems are defined by RIC (1998) as pure polygons (one ecosystem) or complex polygons (two or three ecosystems). Each ecosystem within a polygon is recorded as a decile on a scale from one to ten, which represents its proportional area within the polygon on a scale from 1 to 100 percent (RIC, 1998). Typically, decile 1 contains the most dominant ecosystem type and decile 2 and 3 contain the second and third most dominant ecosystem types, respectively.

Mapping of the Project Area is ongoing and is being conducted according to the Standards for Terrestrial Ecosystem Mapping (RIC, 1998; RIC, 2000). The air photo interpretation is being performed using 1:10,000 and 1:20, 000-scale colour aerial photographs. Descriptions of the ecosystem units in the study area are based on the BEC classification system. The Terrestrial Ecozone Classification System was used for a broad interpretation of the area. Field survey data collected in 2007 is being used to refine the identification of TEM vegetation units.

2.3.2 Predictive Ecosystem Mapping

Predictive Ecosystem Mapping (PEM) is a process designed to use available spatial data and knowledge of ecological-landscape relationships to automate the computer generation of ecosystem maps. PEM typically involves the spatial overlay of mapped themes and the processing of resultant attributes against a formalized knowledge base using automated inference methods. The Schaft Creek PEM is ongoing using a suite of custom programs and procedures developed by LandMapper Environmental Solutions Inc. (LMES). The programs are known collectively as the LandMapR toolkit, while the associated procedures are termed the LMES Digital-Direct-to-Site-Series (LMES DSS) method.

The LMES DSS method incorporates the logic and decision making processes contained within the B.C. MoFR regional field guides. The Field Guide to Site Identification and Interpretation for the Prince Rupert Forest Region, Land Management Handbook 26 (Banner *et al.* 1993) is being used as a guide for ecosystem identification within the Schaft Creek proposed Project area.

2.3.3 Potentially Rare or at Risk Plants

A list of ecological communities and species at risk within the proposed Project area was compiled prior to the commencement of field work (Appendices 1 and 2, respectively). Sites were assessed for ecological communities and plants of special concern that may be threatened, extirpated or endangered according to the COSEWIC (plants) and the B.C. CDC (plant and ecosystems). The B.C. CDC further classifies species as red, blue or yellow depending on their respective conservation risks.

Definitions of these designations are as follows:

> *The Red list includes species that have been legally designated as Endangered or Threatened under the Wildlife Act, are extirpated, or are candidates for such*

> *designation. The Blue List includes species not immediately threatened, but of concern because of characteristics that make them particularly sensitive to human activities or natural events.* (B.C. CDC, 2007)

The B.C. CDC currently tracks 17 red and blue-listed ecological communities in the Skeena-Stikine region of the Cassiar Forest District. The B.C CDC is interested in knowing the occurrence of such communities as their lists are not exhaustive and they rely on field surveys to help update, refine, and guide the content contained within them.

Where listed ecological communities and plants were suspected in the field, they were documented and photographed. Site details and location were noted and voucher specimens of listed plants were collected at sites where the local population was not at risk.

The habitat of listed plants is often linked to fine-scale and uncommon landscape features (ANPC, 2000); therefore, efforts were made to identify unusual substrates and vegetation patterns during the preliminary air photo interpretation stage of mapping. Field surveys were scheduled during peak growing times to capture differences in plant phenology.

2.4 Invasive Plant Species

Invasive plants or weeds generally refer to species (native or non-native) that have the ability to out-compete native species when introduced into natural settings (Haber, 1997). Typically, invasive plants aggressively establish in disturbed areas, thereby decreasing biodiversity, forest and range productivity (Polster, 2005).

A detailed list of plants in each field plot was recorded and evaluated for the presence of invasive plants according to the B.C. Ministry of Forests and Range list of invasive species for British Columbia (Klinkenberg, 2007).

2.5 Baseline Metal Concentrations in Plant Tissues and Soils

Plant species used traditionally and/or currently by members of First Nations for nourishment, medicine, construction materials, as well as in legends, songs, or dances are termed “culturally and traditionally significant”. Monitoring plant tissue metal levels is a requirement of the mine permit application (B.C. Ministry of Energy and Mines, 1998) and is used to guide reclamation planning and end land use objectives. Plant tissue samples were collected in 2007 within the proposed Project area.

Plant tissues were collected from various locations within the potential footprint of the mine and associated infrastructure to establish baseline metals concentrations. The metals analysis identified current metal levels that occur naturally in the vegetation growing within the mine footprint area. These data will be used as a basis to monitor any changes in metal levels in soils and plants during mine operations and will also feed into post-closure soils and vegetation monitoring. Post-closure soils and vegetation monitoring will help ensure that plants re-establishing on mine workings are not becoming toxic to wildlife or people in the area. The plant species collected will be used in reclamation planning.

Plant species targeted for collection were those commonly found throughout the study area and likely to be a food source for wildlife or people. Human consumers were included due to the historical use of plants in the area.

Whenever possible, the same plant species were collected, however site variability sometimes resulted in the collection of different species. Only the above-ground portion of herbaceous plants and newest/younger growth of woody species (shrubs) were sampled. Samples consisted of several individual herbs of the same species or the stems and leaves from shrubs of the same species. Berries from some shrub species were also collected for analysis from several locations.

Several plant specimens were collected to characterize baseline tissue chemistry. Species collected were: Labrador tea (*Ledum groenlandicum*), black gooseberry (*Ribes lacustre*), Canada buffaloberry (*Shepherdia Canadensis*), black huckleberry (*Vaccinium membranaceum*) and common horsetail (*Equisetum arvense*). Species were chosen based on their consumption by wildlife and humans.

The sampling was conducted by hand and care was taken to ensure hands were clean during sampling and any dirt or root material was removed prior to the sample being placed into a plastic sampling bag. Only the above-ground portion of herbaceous plants and newest/younger growth of woody species (shrubs) were collected. Plant samples were shipped to ALS Environmental in Vancouver, B.C., for analysis. Table 2.5-1 shows the suite of metals for which the plant tissue samples were analysed and their associated detection limits.

Table 2.5-1
Plant Tissue Metals Analyzed and their Associated Detection Limits

Metal	Abbreviation	Detection Limit (mg/kg wet wt)
Aluminum	Al	2
Antimony	Sb	0.01
Arsenic	As	0.01
Barium	Ba	0.01
Beryllium	Be	0.1
Bismuth	Bi	0.03
Cadmium	Dc	0.005
Calcium	Ca	2
Chromium	Cr	0.1
Cobalt	Co	0.02
Copper	Cu	0.01
Iron	Fe	0.2
Lead	Pb	0.02
Lithium	Li	0.1
Magnesium	Mg	1
Manganese	Mn	0.01
Mercury	Hg	0.001
Molybdenum	Mo	0.01

Table 2.5-1
Plant Tissue Metals Analyzed and their Associated Detection Limits (completed)

Metal	Abbreviation	Detection Limit (mg/kg wet wt)
Nickel	Ni	0.1
Phosphorus	P	5
Potassium	K	20
Selenium	Se	0.2
Sodium	Na	20
Strontium	Sr	0.01
Thallium	Tl	0.01
Tin	Sn	0.05
Titanium	Ti	0.1
Uranium	U	0.002
Vanadium	V	0.1
Zinc	Zn	0.1

3. Results and Discussion

3.1 Overview

The area within the proposed Schaft Creek Project consists largely of rugged mountainous terrain. At high elevations it is dominated by subalpine boreal and alpine ecosystems interspersed with tree islands, heath meadows, and grasslands (Meidinger and Pojar, 1991). The proposed Schaft Creek Project contains the forested, grassland/parkland and alpine BEC units presented in Table 3.1-1.

Table 3.1-1
BEC Units

BEC Unit Name	BEC Unit	Forested[1]	Grassland / Parkland	Alpine
Engelmann Spruce Subalpine Fir Moist Cold Subzone	ESSFmc	√	-	-
Engelmann Spruce Subalpine Fir Wet Very Cold Subzone	ESSFwv	√	-	-
Engelmann Spruce Subalpine Fir Moist Cold Parkland Subzone	ESSFmcp	-	√	-
Engelmann Spruce Subalpine Fir Wet Very Cold Parkland Subzone	ESSFwvp	-	√	-
Boreal White and Black Spruce Dry Cool Subzone – Stikine Variant	BWBSdk1	√	-	-
Spruce Willow Birch Very Wet Cool Subzone	SWBvk	√	-	-
Spruce Willow Birch Undifferentiated Subzone	SWBun	√	-	-
Spruce Willow Birch Moist Cool Scrub Subzone	SWBmks	-	√	-
Alpine Tundra Undifferentiated	BAFAun/ unp	-	-	√

3.2 Field Studies

3.2.1 BEC Units

A total of 104 sites within nine BEC units were surveyed within the proposed Project area. The majority of the plots are located in the ESSFmc (57%) subzone, followed by the ATun (14%), BWBSdk1 (9%), ESSFmcp (7%) and ESSFwvp (6%) subzones. The distribution of field plots within BEC units is summarized in Table 3.2-1 (Figure 3.2-1). A complete list of BEC units and site series encountered in the field is presented in Appendix 3.

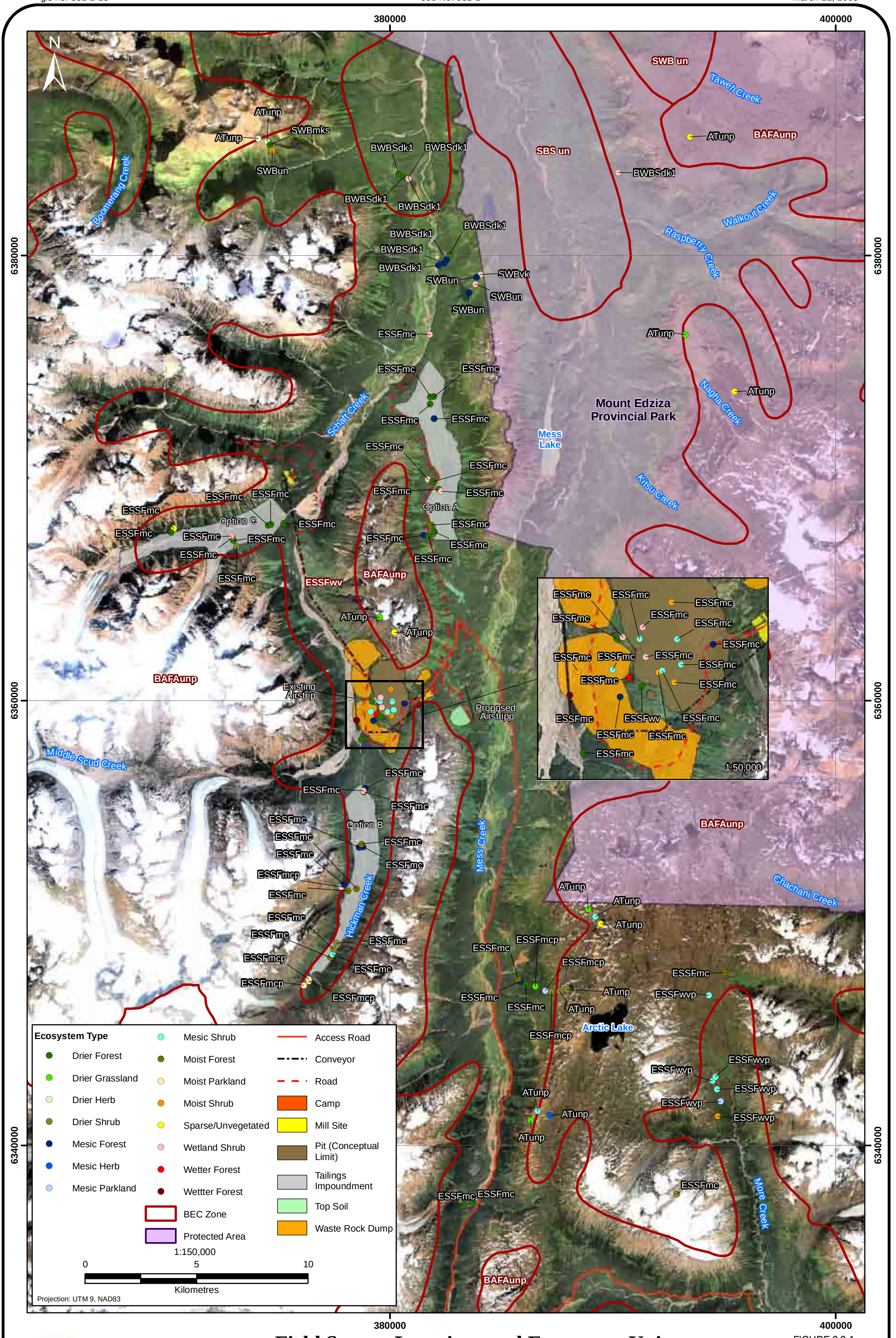
3.2.2 General Ecosystem Field Site Units

Drier forests are the most common ecosystem field unit and account for 23% of the total plots (Table 3.2-1). The drier forest field units were generally dominated by subalpine fir (*Abies lasiocarpa*), interspersed with lodgepole pine (*Pinus contorta*) and hybrid white spruce (*Picea engelmanni x glauca*). Typical shrubs included black huckleberry (*Vaccinium membranaceum*), and black gooseberry (*Ribes lacustre*). Mesic forests account for 14% of the total field plots. They are

Table 3.2-1
Schaft Creek Distribution of Field Plots

General Ecosystem Type	Biogeoclimatic Unit									
BEC Unit	**BWBSdk1**	**ESSFmc**	**ESSFmcp**	**SWBmks**	**SWBun**	**ATunp**	**SWBvk**	**ESSFwv**	**ESSFwvp**	**Total**
Drier Forest	4	17		1				1		**23**
Drier Grassland			1			4				**5**
Drier Herb						2				**2**
Drier Shrub		4	1			2				**7**
Mesic Forest	3	9			2					**14**
Mesic Herb						1				**1**
Mesic Parkland			1						1	**2**
Mesic Shrub		6				2				**12**
Moist Forest		9								**9**
Moist Parkland			3							**3**
Moist Shrub		4			1				1	**6**
Sparse/ Unvegetated		1				4				**5**
Wetland Shrub/Herb	2	8	1		1		1			**13**
Wettter Forest		2								**2**
Total	**9**	**60**	**7**	**1**	**4**	**15**	**1**	**1**	**6**	**104**

[1]Forests in the SWBmk may not meet the crown closure requirements commonly used to describe "forests" (*e.g.*, as outlined in B.C. MELP and B.C. MoFR, 1998). Dashes indicate "not applicable".



Field Survey Locations and Ecosystem Units in Schaft Creek, 2007

FIGURE 3.2-1

floristically similar to the drier forest ecosystems but generally have a more well developed understorey and healthier tree growth. Moist forests account for 13% of the plots and are typically dominated by subalpine fir combined with black huckleberry and Sitka alder (*Alnus crispa*).

3.3 Potentially Rare or at Risk Plants

3.3.1 Listed Plant Species

The B.C. CDC currently tracks 140 vascular plants and one lichen species in the Skeena Stikine and Fort Nelson forest districts (Appendix 2). An additional 13 species tracked by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) could also potentially occur in the study area.

Several unconfirmed specimens of potentially blue-listed species were identified in the field. Voucher specimens were collected and submitted to the B.C. CDC for confirmation. None of the samples submitted were identified as rare or at risk.

3.3.2 Species Richness

Approximately 230 plant species (including those identified to family only) representing 55 different families were identified in the Schaft Creek area. Herbaceous species (primarily forbs) were the most abundant, with approximately 100 different species documented overall.

3.3.3 Invasive Plant Species

Common horsetail (*Equisetum arvense*) is the only invasive plant identified within the proposed NTL corridor. It is a native species in B.C. and is defined by the Ministry of Agriculture and Lands as a "nuisance weed" (Cranston *et al.*, 2002). It is a valuable food source for grizzly bear and waterfowl (Hope *et al.*, 1991) but can be toxic to young sheep and horses in dry hay or in pastures (MoAF, 2002). Horsetail reproduces vegetatively and through the production of spores, which are often short lived. Primarily dispersed by water, spores and vegetative fragments can also be spread by humans, animals and machinery. Common horsetail is widespread throughout the province (MoAFF, 2002) and is not considered a significant concern within the proposed NTL development area.

3.4 Baseline Metal Concentrations in Plant Tissues and Soils

Tissue samples from five different plant species were collected throughout the Schaft Creek Project area in 2007 to establish baseline metal concentrations. Species collected are those that could be used for reclamation purposes as well as those that are likely eaten by either wildlife or humans. (Figure 3.3-1, Appendix 4). Leaf tissues of common horsetail (*Equisetum arvense*), Labrador tea (*Ledum groenlandicum*) and black gooseberry (*Ribes lacustre*) were collected. Leaves and/or berries were collected from black huckleberry (*Vaccinium membranaceum*) and soopolallie (*Shepherdia canadensis*).

A total of 30 samples were analyzed for metals concentrations. Details of detection limits for individual tissue samples are available in Appendix 5. In cases where the samples were below analytical detection limits, half the detection limit value was reported in the data summaries found in Appendix 5. Results of the lab analyses are presented as wet weight concentrations

(Table 3.3-1). Wet weight reflects *in situ* conditions and provides an approximation of the conditions under which consumers (wildlife or humans) may naturally encounter and ingest these plants. A more in- depth analysis of these plants and their potential risk to humans is provided in the Schaft Creek Project Country Foods Baseline Assessment (Rescan, 2008b).

Plant tissue metal concentrations will be used for future monitoring during mine operations, closure and reclamation. Future metal levels in plant tissue will be compared to baseline values in order to determine if changes in metal levels are occurring. Results of the analysis of plant tissues with a small sample size (*e.g.*, $n<5$) should be viewed as anecdotal until additional samples have been collected to increase the sample size. Collections contributing to baseline conditions will include those made prior to any Project-related construction activity. Until further samples are collected, the identification of possible trends in metals concentrations in plant tissues will be restricted to those species with a sufficient sample size.

Table 3.3-1
Wet Weight Metal Concentrations in Plant Tissues Collected in Schaft Creek, 2007

	Species Collected								
	Labrador Tea (n = 7)		Black Huckleberry (n = 6)		Soopolallie (n = 4)		Black Gooseberry	Common Horsetail (n = 12)	
Physical Tests	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**	**(n = 1)**	**Avg**	**Max**
% Moisture	63.0	74.6	77.6	86.4	77.5	82.3	76.5	81.3	85.4
Total Metals									
Aluminum (Al)-Total	78.98	124.00	78.98	124.00	6.83	9.20	15.70	3.96	9.60
Antimony (Sb)-Total	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01	0.00
Arsenic (As)-Total	N/A	0.01	N/A	0.01	N/A	N/A	N/A	0.01	0.00
Barium (Ba)-Total	20.16	32.10	20.16	32.10	3.21	6.81	6.01	5.92	10.50
Beryllium (Be)-Total	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bismuth (Bi)-Total	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium (Cd)-Total	0.01	0.02	0.01	0.02	N/A	0.01	0.01	0.02	0.05
Calcium (Ca)-Total	1486.50	2590.00	1486.50	2590.00	1200.50	1750.00	5350.00	6602.50	9730.00
Chromium (Cr)-Total	0.22	0.27	0.22	0.27	0.25	0.39	0.13	0.20	0.27
Cobalt (Co)-Total	0.04	0.05	0.04	0.05	N/A	0.02	0.02	0.13	0.36
Copper (Cu)-Total	2.08	2.90	2.08	2.90	1.46	1.93	1.49	1.21	1.97
Iron (Fe)-Total	21.69	41.50	21.69	41.50	14.49	19.30	29.90	8.46	14.40
Lead (Pb)-Total	0.05	0.10	0.05	0.10	0.03	0.04	0.08	0.04	0.07
Lithium (Li)-Total	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Magnesium (Mg)-Total	648.67	1020.00	648.67	1020.00	642.75	1130.00	1270.00	906.17	1290.00
Manganese (Mn)-Total	544.65	1200.00	544.65	1200.00	12.27	23.40	13.40	9.88	26.80
Mercury (Hg)-Total	0.00	N/A	0.00	N/A	0.00	0.00	0.00	0.00	0.00
Molybdenum (Mo)-Total	0.48	1.15	0.48	1.15	0.33	0.44	0.42	4.23	25.30
Nickel (Ni)-Total	0.29	0.43	0.29	0.43	1.47	3.89	1.18	0.50	1.50
Phosphorus (P)-Total	414.17	495.00	414.17	495.00	466.25	563.00	627.00	200.08	248.00
Potassium (K)-Total	2203.50	3090.00	2203.50	3090.00	3017.50	4710.00	5860.00	4953.33	6560.00
Selenium (Se)-Total	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.70	1.20
Sodium (Na)-Total	N/A	21.00	N/A	21.00	N/A	31.00	90.00	56.00	68.00
Strontium (Sr)-Total	1.60	3.60	1.60	3.60	2.24	3.98	6.32	32.63	58.90
Thallium (Tl)-Total	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tin (Sn)-Total	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Titanium (Ti)-Total	0.81	1.49	0.81	1.49	0.32	0.59	0.97	0.19	0.40
Uranium (U)-Total	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium (V)-Total	N/A	0.12	N/A	0.12	N/A	N/A	N/A	N/A	N/A
Zinc (Zn)-Total	7.28	12.40	7.28	12.40	3.55	4.35	3.51	7.29	11.90

N/A indicates that concentrations were below detection

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