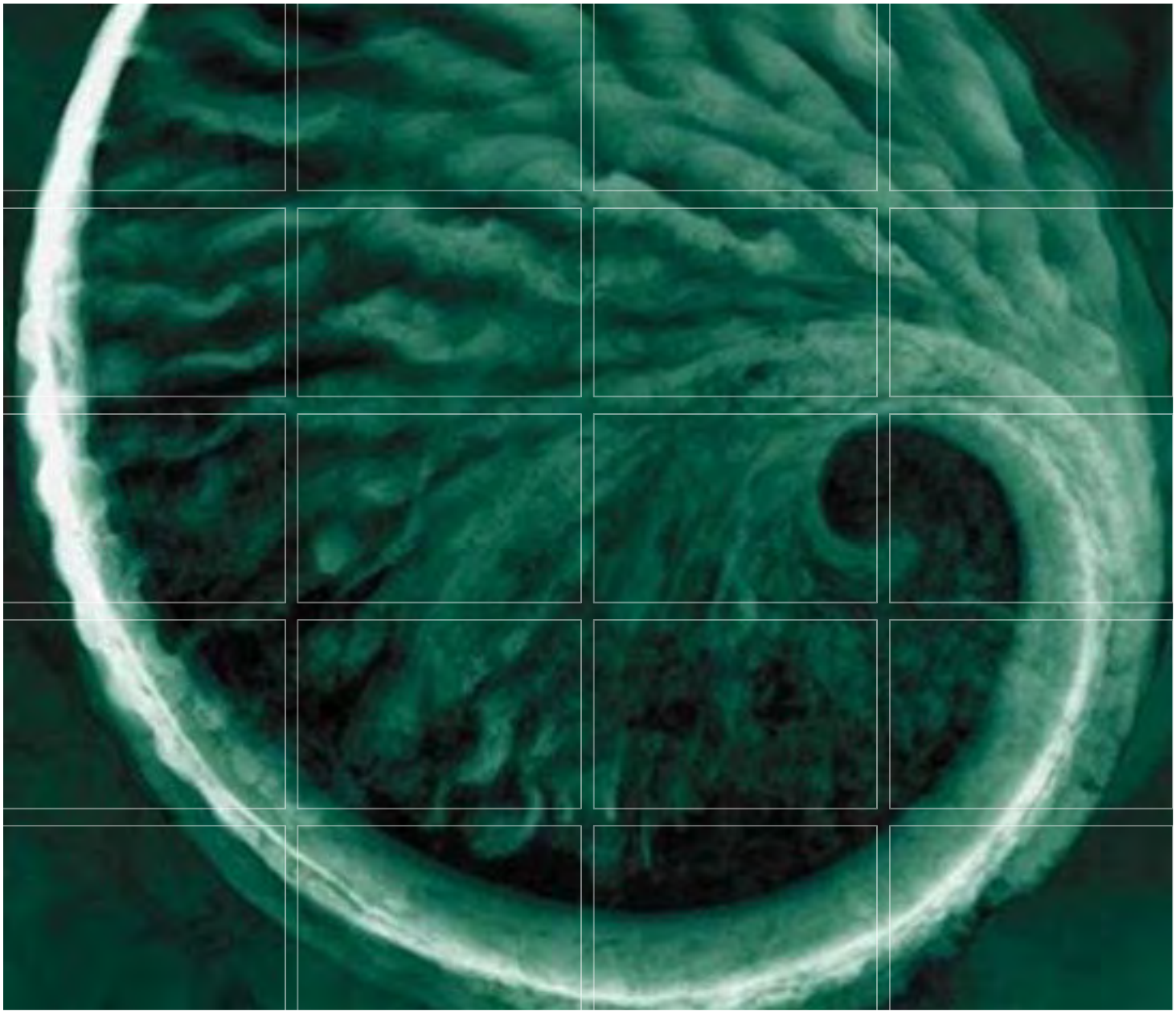
Appendix 5-B

Terrain and Soils Baseline Report



Prepared for:

HARPER CREEK MINING CORP.

HARPER CREEK PROJECT

Terrain and Soils Baseline Report

July 2014

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ERM

Harper Creek Mining Corporation

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Terrain and Soils Baseline Report

July 2014

Project #0230881-0011

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EXECUTIVE SUMMARY

Harper Creek Mining Corporation (HCMC) proposes to construct and operate the Harper Creek Project (the Project), an open pit copper mine near Vavenby, British Columbia (BC). The Project has an estimated 28-year mine life based on a process plant throughput of 70,000 tonnes per day (25 million tonnes per year). Ore will be processed on site through a conventional crushing, grinding and flotation process to produce a copper concentrate, with gold and silver by-products, which will be trucked from the Project Site along approximately 24 km of existing access roads to a rail load-out facility located at Vavenby. The concentrate will be transported via the existing Canadian National Railway network to the existing Vancouver Wharves storage, handling and loading facilities located at the Port of Vancouver for shipment to overseas smelters.

The Project consists of an open pit mine, on-site processing facility, tailings management facility (TMF) (for tailings solids, subaqueous storage of PAG waste rock, and recycling of water for processing), waste rock stockpiles, low grade and overburden stockpiles, a temporary construction camp, ancillary facilities, mine haul roads, sewage and waste management facilities, a 24 km access road between the Project Site and a rail load-out facility located on private land owned by HCMC in Vavenby, and a 12 km power line connecting the Project Site to the BC Hydro transmission line corridor in Vavenby.

This report describes the baseline conditions of terrain and soils for the purposes of the Application for an Environmental Assessment (EA) Certificate under the British Columbia Environmental Assessment Act (BC EAA 2002) and the Environmental Impact Statement (EIS) under the Canadian Environmental Assessment Act (CEAA 2012) in accordance with the Approved Project Application Information Requirements (AIR) issued October 21, 2011. ERM has compiled and utilized the terrain mapping and soils data collected for HCMC by its consultants, including Knight Piésold Ltd., SRK Consulting (Canada) Inc. and Keystone Wildlife Research Limited.

The soil baseline field studies, conducted to support the Application/EIS, were undertaken primarily in 2012 and 2011 but include data from 2008 fieldwork as well. The goal of this report is to map and characterize the soils and their associated parent materials that could be affected directly or indirectly by the Project. The area studied includes the vicinity of the proposed Project Site, transmission line, rail load-out facility and existing access road, collectively referred to as the terrestrial Local Study Area (LSA).

The terrain mapping indicates the bedrock is generally overlain by a blanket of glacial till in the Project Site, in the vicinity of the open pit. A surface veneer of colluvium is interpreted to be generally present in the steeper areas of terrain and weathered bedrock is interpreted to be present at ground surface. Colluvium is expected to be more prevalent, particularly on the moderately steep slopes. Small organic swamps locally overlie glacial till and/or possibly glacial lake deposits.

The southeast portion of the Project Site, the area of the proposed TMF, comprises a broad valley with gentle side slopes in the headwaters of the Harper Creek Catchment. On the valley side slopes, the weathered bedrock is generally mantled by glacial till. The surficial geology on the valley floor

was mapped as glacial lake deposits with local organic swamps. Veneers of colluvium were mapped, locally, in the areas of steeper terrain.

The north portion of the proposed powerline alignment crosses glaciofluvial outwash deposits and alluvial deposits on the floor of the North Thompson River Valley and a kame deposit at the toe of the North Thompson River Valley slopes. Colluvium was mapped in the steeper areas and there is an organic swamp at the south end of the alignment. The site of the proposed rail load-out facility is located on a fluvial terrace.

Geohazards and erosion are discussed only briefly in this report but are introduced in a reconnaissance terrain report (Knight Piésold 2012a) and in the more recently prepared Terrain Stability Report (Polar Geosciences 2014, in prep).

The local climate influences terrain, soil and ecological processes. Regional climate is reflected in three Biogeoclimatic Ecosystem Classification (BEC) zones: Interior Douglas-Fir (IDF) - warm, dry, low elevation (500 to 700 masl), valley bottom; Interior Cedar-Hemlock (ICH) - mid elevation (700 to approximately 1,400 masl), valley side-slopes; and Engelmann Spruce-Subalpine Fir (ESSF) - upper elevation (> 1,400 to 2,025 masl). There are seven subzone variants within these three BEC zones.

The proposed developments within the LSA include:

- The approximately 3,500 ha Project Site, in the ESSF zone;
- the linear developments that cross through all climatic subzones except the parkland; and
- the Rail Load-out area which is in the IDF.

The proposed Project Site is situated primarily in the ESSF, an environment of significant soil leaching. Much of the area around the proposed Project Site is rolling to near level (nearly 90% of slope gradients are less than 26%). Locally, soils include shallow, slightly gravelly to cobbly or silty to sandy till, colluvium and weathered bedrock. Soils include very strongly acidic Podzols and less well developed medium acidic Brunisols. Local soils display coarse to medium textures, commonly sandy loams. In the Project Site, lithic (shallow to bedrock) soils occupy approximately one-third of the area. Organic (peaty) soils represent a minor portion of the mapped area. At the south end of the LSA in the east-central portion of the Project Site, a thin, possibly discontinuous, silty to fine sandy lacustrine veneer is mapped in parts of the lowland.

The existing Access Road and the proposed Transmission Line extend from the valley bottom and across the valley side-slopes to the Project Site located on the upper elevation plateau. In the lower elevations of the valley, infrastructure exists or is proposed along the North Thompson River, where the terrain is predominately floodplain with coarse gravels and sands occasionally capped by silty deposits. Along the river, soils show little pedogenesis. They are typical Regosolic soils developing in areas of recent deposition. They commonly include Eutric and Dystric Brunisols on the slightly elevated terraces and older portions of fluvial fans. On mid-slopes, Luvisolic soils developed on morainal (glacial till) materials are common. At the higher elevations, soils are the same as described for the Project Site.

Soils in the vicinity of the rail load-out facility, located in the valley bottom, include both those disturbed by urbanization and industrial development (including some anthropogenic non-soils) and those typical of the 'young' terraced and active floodplain deposits (including Eutric and Dystric Brunisols and Regosolic fluvial soils).

General analytical results of samples of soil (n=54) and overburden (n=52) from the Project Site, indicate the following;

- Soil textures are most often sandy loam but range from silt loam, loam and loamy sand;
- Soil coarse fragment content (particles > 2 mm diameter) ranges from less than 20% to approximately 70%;
- Soils are non-saline, non-calcareous;
- Soil reaction (pH) is generally very strongly acidic to medium acidic (pH ranges 4.4 to 6.7);
- Overburden is non-saline,
- Weathered overburden, near surface (sample range starts within 1.0 m of the surface) is often strongly acidic (median pH 5.4), though ranges extremely acidic to moderately alkaline; and
- Slightly weathered to unweathered overburden (samples from > 1.0 m of the surface) is commonly slightly to moderately calcareous, with a median pH of 7.9 (ranges 6.7 to 9.1, neutral to strongly alkaline).

As part of the baseline studies, soil and overburden samples were collected and analyzed to establish the range of metal concentrations in the area. Samples collected and analyzed included both soil and overburden. Fifty-four soil samples from 32 soil inspection sites were obtained from the Project Site portion of the LSA. These samples were analyzed for a suite of 31 'available or extractable' metals, of which 19 have CCME (2007) Industrial Use guideline criteria values. Ten of the 19 metals were noted to exceed agricultural use criteria at least once. In total, 22 of the 32 sampled sites tested exceed the most restrictive criteria. Copper and arsenic were the most frequently occurring metals of concern, though other metals exceeding CCME Agricultural Use critical limits include, in order of frequency of exceedance (numbers in brackets indicate frequency of exceedances in the 54 samples tested):

- Cu (30) > As (22) > Se (15) >> Ni (8) > Cd (5), Pb (5), Cr (4) > Co (2), Mo (1), Zn (1)

A total of eight metals exceed the less restrictive, CCME Industrial Use guideline concentrations:

- Cu (22), As (22) >> Ni (8) > Cr (3), Co (2), Se (2) > Pb (1), Zn (1)

Only three metals exceed the least restrictive land use criteria, namely the Contaminated Site Regulation (CSR) (BC Reg. 375/96) for industrial situations; these include Cu, Pb, and Zn. Two of these are single high values (Pb and Zn) and all come from one, somewhat disturbed site (HC-40), located slightly southeast of the proposed Open Pit.

Fifty-two overburden (soil and soil parent material) samples from 37 geotechnical/geochemical inspection sites were obtained from the Project Site portion of the LSA. Static testing, for ML/ARD purposes, provided total metal content concentration for these samples. Metals of potential concern include As, Cu, Mo, Pb, Se and Zn. Initial ML/ARD testing suggests correlations of bulk characteristics to leachable concentrations were only apparent for copper, selenium and zinc (not As, Mo, Se).

Geological exploration soil geochemical sampling has been conducted extensively in portions of the LSA, including over the proposed Open Pit area. Nearly 6,900 soil samples have been analyzed for total copper concentration. These data, combined with the extractable copper data obtained from recently sampled soils, provide a reasonable definition of soil copper enrichment across the areas of proposed development, with the possible exception of the area of the proposed Rail Load-out (an area of no reference soil metal data).

ACKNOWLEDGEMENTS

This report was produced for Harper Creek Mining Corporation by ERM Consultants Canada Ltd. (ERM Rescan). It is the compilation and interpretation of a number of works by others including Knight Piésold Ltd. (terrain mapping geotechnical data, and soils data, as provided by their subconsultant Polar Geoscience Ltd.), Keystone Wildlife Research Ltd. (bioterrain and TEM mapping, and soil inspections), SRK Consulting (Canada) Inc. (overburden characterization). All field work for this report was conducted by these companies.

This report was written by Don McQueen (B.Sc., P.Ag.) and reviewed by Ben Andrew (M.Sc., RPF).

HARPER CREEK PROJECT

Terrain and Soils Baseline Report

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GLOSSARY AND ABBREVIATIONS

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

AIR	Application Information Requirements
BC	British Columbia
BC EAA	British Columbia *Environmental Assessment Act*
BC EAO	British Columbia Environmental Assessment Office
BEC	Biogeoclimatic Ecosystem Classification
CEA Agency	Canadian Environmental Assessment Agency
CEAA	*Canadian Environmental Assessment Act*
EA	Environmental Assessment
EAO	Environmental Assessment Office
EIS	Environmental Impact Statement
ESSFwc2	Northern Monashee Wet Cold Engelmann Spruce – Subalpine Fir variant
ESSFwcp	Wet Cold Engelmann Spruce – Subalpine Fir Parkland subzone
ESSFwcw	Wet Cold Engelmann Spruce – Subalpine Fir Woodland subzone
FSR	Forest Service Road
GIS	Geographic Information System
HCMC	Harper Creek Mining Corporation
ICHdw3	North Thompson Dry Warm Interior Cedar – Hemlock variant
ICHmw3	Thompson Moist Warm Interior Cedar – Hemlock variant
ICHwk1	Wells Gray Wet Cool Interior Cedar – Hemlock variant
IDFmw2	Thompson Moist Warm Interior Douglas-Fir variant
LMU	Land Management Unit
LSA	Local Study Area (terrestrial)
masl	Metres above sea level

ML/ARD	Metal Leaching/Acid Rock Drainage
MOE	Ministry of Environment
MOF	Ministry of Forests
NTS	National Topographic Series
PAG	Potentially acid generating
Project, the	The Harper Creek Mining Project
Proponent, the	Harper Creek Mining Corporation
RSA	Regional Study Area
SMR	Soil Moisture Regime
SMU	Soil Map Unit
TEM	Terrestrial Ecosystem Mapping
TMF	Tailings Management Facility
TRIM	Terrain Resource Information Mapping
TSX	Toronto Stock Exchange
UTM	Universal Transverse Mercator
YMI	Yellowhead Mining Inc.

1. INTRODUCTION

1.1 PROJECT DESCRIPTION

Harper Creek Mining Corporation (HCMC) proposes to construct and operate the Harper Creek Project (the Project), an open pit copper mine near Vavenby, British Columbia (BC). The Project has an estimated 28-year mine life based on a process plant throughput of 70,000 tonnes per day (25 million tonnes per year). Ore will be processed on site through a conventional crushing, grinding and flotation process to produce a copper concentrate, with gold and silver by-products, which will be trucked from the Project Site along approximately 24 km of existing access roads to a rail load-out facility located at Vavenby. The concentrate will be transported via the existing Canadian National Railway network to the existing Vancouver Wharves storage, handling and loading facilities located at the Port of Vancouver for shipment to overseas smelters.

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This report describes the air quality baseline conditions for the purposes of the Application for an Environmental Assessment (EA) Certificate under the British Columbia *Environmental Assessment Act* (BC EAA) in accordance with the Application Information Requirements (AIR) for the Project approved on October 21, 2011. This report also meets the purposes of the Environmental Impact Statement (EIS) in accordance with the 'Background Information for the Initial Federal Public Comment Period on the Comprehensive Study pursuant to the *Canadian Environmental Assessment Act* of the Harper Creek Mine Project near Kamloops British Columbia'.

1.2 PROJECT LOCATION

The Project is located in the Thompson-Nicola area of BC, approximately 150 km north-east of Kamloops along Yellowhead Highway #5, approximately 10 km southwest of the unincorporated municipality of Vavenby, British Columbia. The Project is located within National Topographic System (NTS) map sheets 82M/5 and 82M/12, is geographically centred at 51°30'N latitude and 119°48'W longitude, and is situated at approximately 1800 Metres above sea level (masl). The mineral claims comprising the Project cover an area of 42,636.48 hectares. The Project location is shown in Figure 1.2-1.

1.3 PROJECT PROPONENT

The Proponent of the Project is HCMC, a wholly owned subsidiary of Yellowhead Mining Inc. (YMI). YMI was formed in 2005 as a private British Columbia company specifically to acquire, explore and, if feasible, develop the Project. YMI is now a publicly owned BC based mineral development company trading on the Toronto Stock Exchange (TSX) in Canada. HCMC's strategy is to engineer, permit, finance, construct, and operate the Project.

Figure 1.1-1
Project Location and Infrastructure

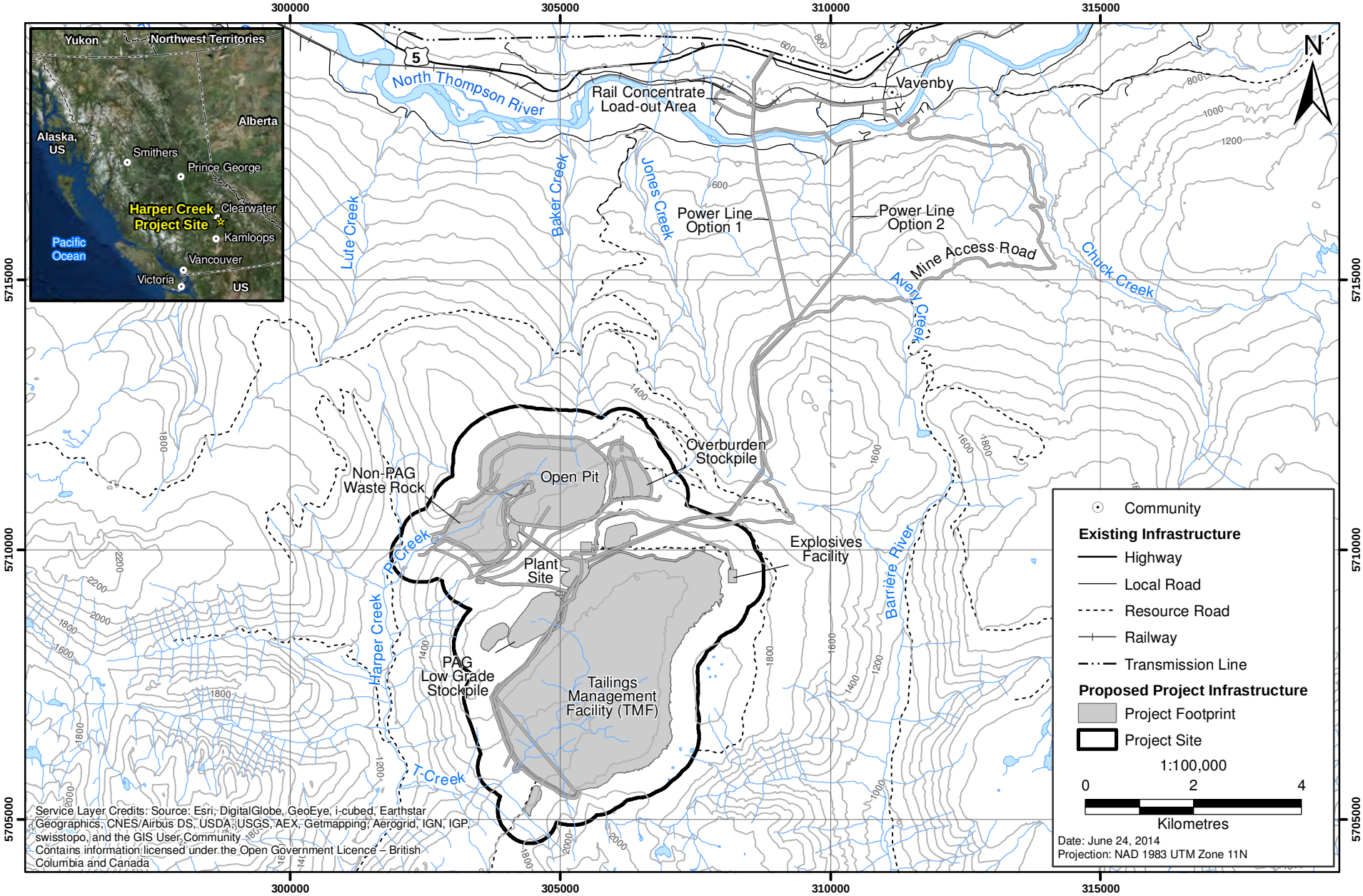
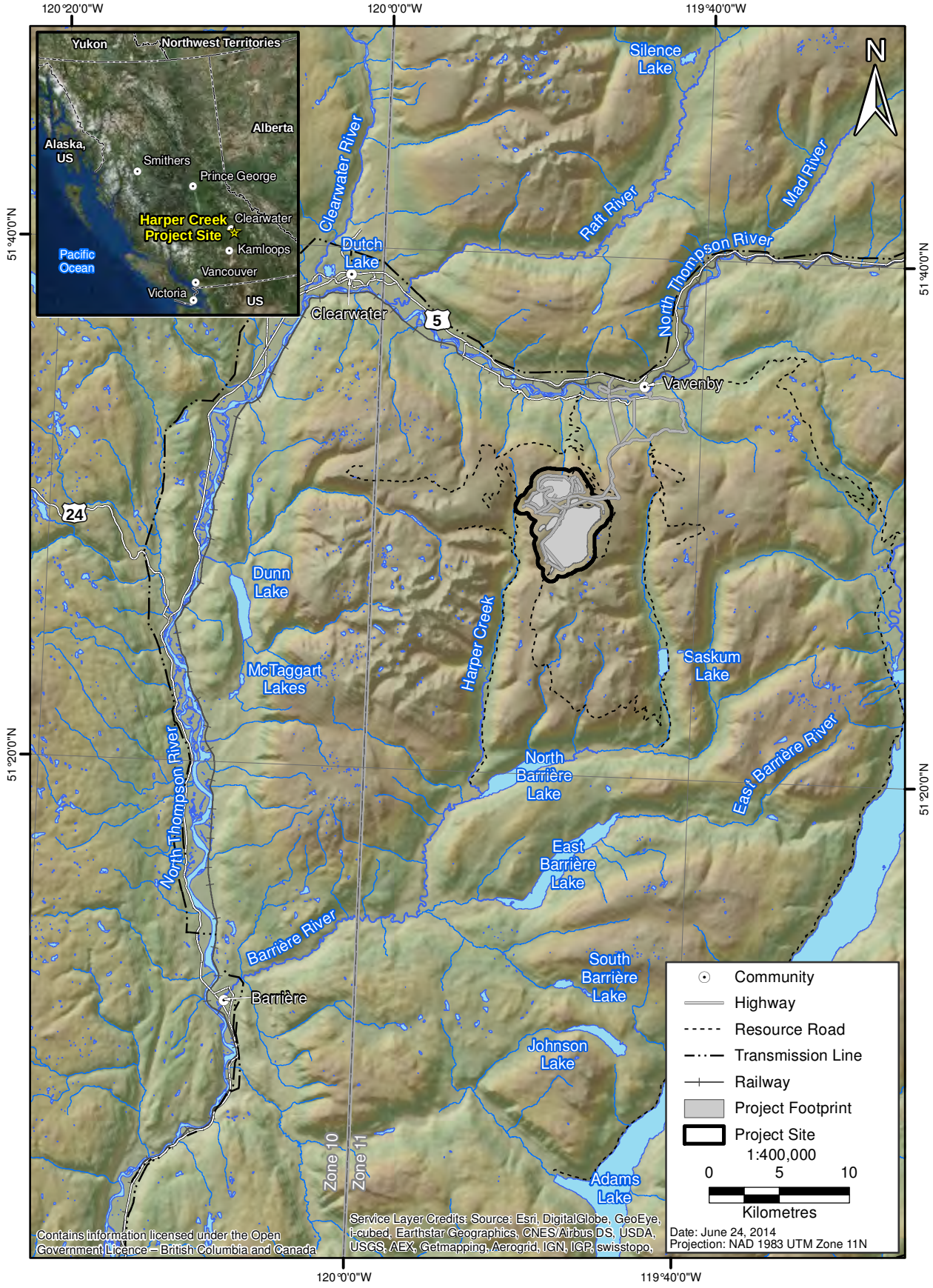


Figure 1.2-1

Project Location



1.4 PROJECT SETTING

The Project is located in south-central BC, west of Vavenby and east of Clearwater. It is within the Shuswap Highlands physiographic subdivision of the Interior Plateau. The Shuswap Highland region is generally characterized by gently or moderately sloping plateau areas rising from 1,220 m above sea level (masl) to over 2,135 masl, and is dissected by a system of rivers and numerous lakes. The region is underlain predominantly by gneiss, granite, granodiorite and quartz monzonite bedrock. An inclusion of phyllite, limestone, greenstone and schist bedrock is found in the lower North Thompson River area and basalt bedrock is found in the Clearwater River area. Elevations for the local study area range from slightly below 500 masl, along the North Thompson River, to slightly above 2,000 masl in the Saskum Plateau area.

The Project is within the Shuswap Highland (SHH) ecosection of BC, encompassed by the Columbia Highlands (COH) ecoregion and Southern Interior Mountains (SIM) ecoprovince. It primarily overlaps the watersheds of Jones Creek and Baker Creek (tributaries of the North Thompson River), and Harper Creek (a tributary of the Barriere River).

1.5 STUDY OBJECTIVES

ERM Consultants Canada Ltd. was retained by HCMC to compile and prepare a terrain and soil baseline report to support the Application for an Environmental Assessment Certificate for the Project.

The main objectives of this baseline report are as follows:

- map and characterize terrain and surficial materials for the Project;
- map and characterize soils in the local study area;
- summarize soil chemical and physical characteristics significant to soil management; and
- determine baseline soil metal concentrations.

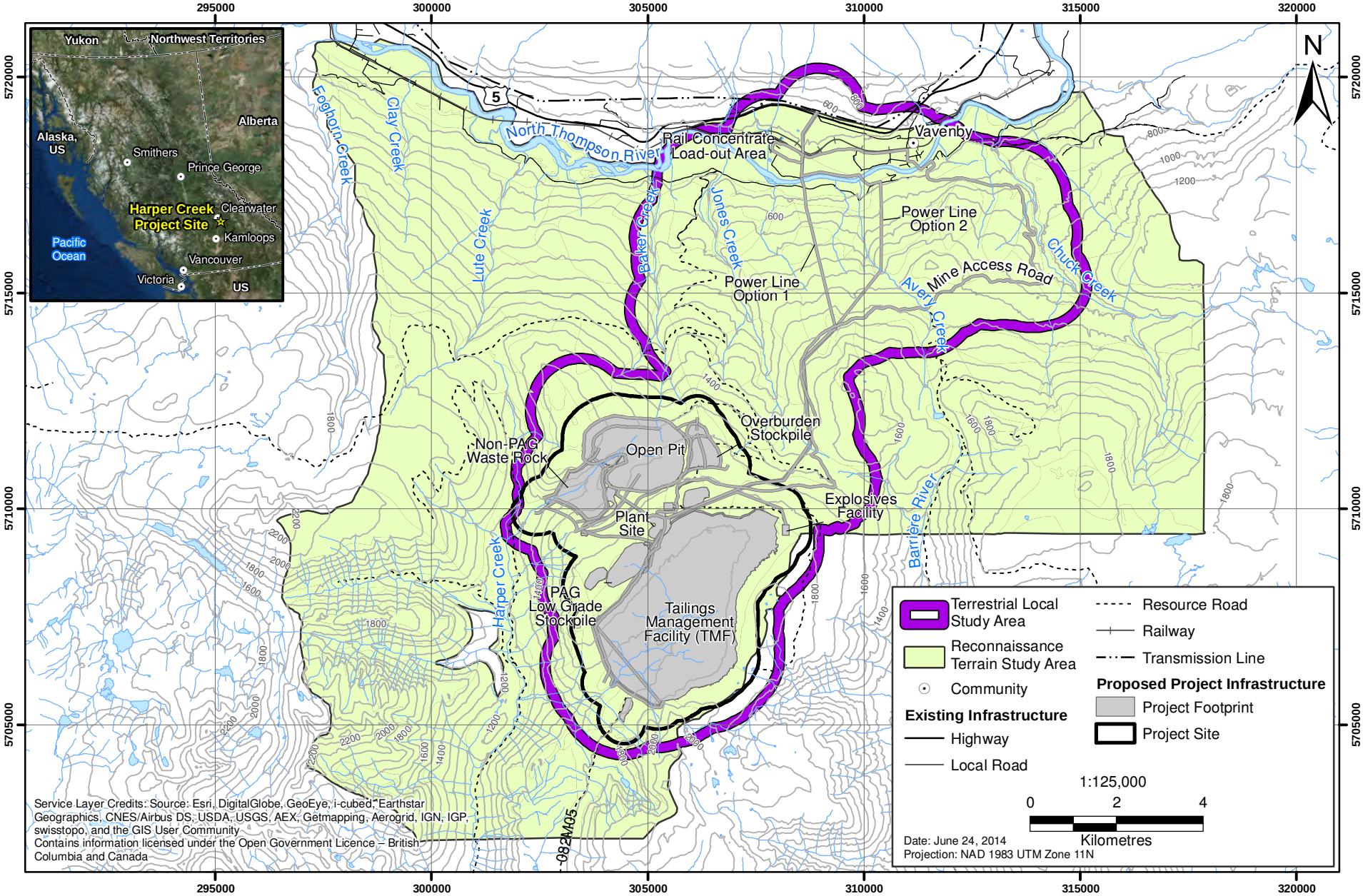
1.6 BASELINE STUDY AREA

Terrain and soils were characterized for two different study areas, a Reconnaissance Terrain Study Area and a smaller, Terrestrial Local Study Area (LSA) (Figure 1.6-1). The primary difference in these study areas was the need to assess terrain further upslope to include possible areas of slope instability or initiation zones. The terrain study area, as defined in the reconnaissance terrain report (Knight Piésold 2012a), comprises the full extent of the catchments that are upslope from the Project Site and extends down to the flood plain of the North Thompson River, an area of 25,027 ha. The majority of the LSA is within this area.

To facilitate an ecologically consistent approach, the LSA was selected to match the area used for the wildlife and vegetation baseline LSA. The LSA (11,021 ha) includes the Project components (i.e. pit, waste rock dumps, haul roads, power line, tailings facility, etc.) and a buffered area at least 1 km on all sides of the Project facilities (Figure 1.6-1). For discussion purposes, a subcomponent of the LSA, the Project Site (3,502 ha), is highlighted as it is the area of proposed intense soil handling and management.

Figure 1.6-1

Reconnaissance Terrain Study Area and Terrestrial Local Study Area



2. BACKGROUND REVIEW

2.1 LEGISLATION, REGULATIONS, AND GUIDELINES

The Project is subject to both provincial and federal EAs under the BC *Environmental Assessment Act* (2002) and *Canadian Environmental Assessment Act* (CEAA; 2012). The EA will undergo a coordinated review in accordance with the 2004 Canada-BC Agreement on Environmental Assessment Cooperation. The requirements for the EA are defined in the AIR for the Project, approved by the BC Environmental Assessment Office (EAO) on October 21, 2011. This baseline report has been prepared to support the submission of the Application/EIS.

A number of legislated requirements exist to guide mining proponents on the development of a mine site and on the management of terrain and surface soil disturbance. These requirements include the *Mines Act* (1996), , and the BC *Environmental Management Act* (2003). General guidance for various soils parameters is also provided via the *Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health* (CCME 2007). Each of these requirements and relevant guidance is discussed in the following subsections in relation to terrain, surficial geology, and soil management and monitoring.

2.1.1 *Mines Act*

British Columbia's *Mines Act* (1996) governs mining activities in BC from exploration through to development, production, closure, and reclamation. The Project proponent must obtain a permit approving the work system and reclamation program prior to conducting any mining activities. To obtain this permit, a detailed Mine Development Plan and Reclamation Program must be submitted to the British Columbia Ministry of Energy and Mines (BC MEM) for approval.

2.1.2 Health, Safety and Reclamation Code for Mines in British Columbia

Under the *Mines Act* (1996), the *Health, Safety and Reclamation Code for Mines in British Columbia* (BC MEMPR 2008) requires proponents to provide:

- information on surficial geology, terrain mapping, soil characterization (including soil metals), as provided in this document;
- plans for salvaging and stockpiling of soils and overburden (*separate section of the EIS document*); and
- an erosion control plan (*separate section of the EIS document*).

2.1.3 Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health

Matters related to contamination of the soil and its impact on various potential land uses are discussed in the *Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health* (CCME 2007). These guidelines provide Canada-wide standards for the maximum limits of various

toxic substances (e.g., metals, hydrocarbons, pesticides, etc.) in the soil as they may impact potential land uses. The Contaminated Sites Regulation (BC Reg. 375/96) included in BC *Environmental Management Act* (2003) lists soil criteria for toxicity to soil invertebrates and plants. These provide numerical standards to define whether a site is contaminated, to determine liability for site remediation, and to assess reclamation success. Background soil metal concentration data have been compiled as part of this baseline report.

The following sections provide baseline terrain and soils information to support the closure and reclamation plan and permitting requirements for the Project.

2.2 PREVIOUS ENVIRONMENTAL STUDIES

There are a number of key background studies, produced by both government agencies and private companies, which have been used in the development of this report. These include provincial government geology, terrain and soils maps and reports, as well as studies commissioned by HCMC including terrain mapping, bioterrain and ecosystem mapping, geotechnical site investigations and Metal Leaching/Acid Rock Drainage (ML/ARD) characterization of overburden.

Published regional 1:50,000-scale terrain mapping covering the entire LSA is available from the BC Geological Survey's 'Digital Terrain Map Library' (Kowall 1975). There is a regional (1:100,000-scale) soil map and a soil report that cover the Project Site. This information provides a good biophysical assessment (climate, geology, terrain and soils) of the area from a regional perspective (Kowall 1980). The findings of this report are described in more detail in the Results section (4.4) of the current document.

The Project Site is within the Shuswap Highlands physiographic subdivision of the Interior Plateau (Holland 1976). According to Kowall (1980), the Shuswap Highland region is generally characterized by gently or moderately sloping plateau areas rising from 1,220 masl to over 2,135 masl, and is dissected by a system of rivers and dotted with numerous lakes. The region is underlain predominantly by gneiss, granite, granodiorite and quartz monzonite bedrock. An inclusion of phyllite, limestone, greenstone and schist bedrock is found in the lower North Thompson River area and southwestern part of the map sheet and some basalt bedrock is found in the Clearwater River and Hemp Creek areas. Elevations range from 345 m on Seymour Arm of Shuswap Lake to 2,635 m at Dunn Peak.

As described by Knight Piésold (2012a), the regional geology consists of deformed and metamorphosed Lower Cambrian and Upper Devonian to Mississippian sedimentary and volcanic rocks with sills and dikes consisting of foliated granite to diorite. These rock units comprise what is known as the Eagle Bay Assemblage. This assemblage is intruded by Middle to Upper Jurassic and Cretaceous granitic plutons. Eocene-age Kamloops Group volcanic rocks overlay the Eagle Bay Assemblage rocks. The regional structure consists typically of east-west striking, low to moderately dipping stratigraphy. Thrust faults disrupt the stratigraphic sequence by positioning Cambrian rocks overtop of younger Paleozoic strata. A series of steeply southeast-dipping normal faults are present, hosting Tertiary dikes.

HCMC commissioned a number of reports as background for the original Project Application/EIS (HCMC 2013). The primary reports used in the compilation of this baseline report include:

- geotechnical investigations (Knight Piésold 2012b and 2013);
- reconnaissance terrain mapping (Knight Piésold 2012a);
- terrestrial ecosystem mapping, including bioterrain attribution (Keystone 2013); and
- overburden ML/ARD characterization (SRK 2013).

3. METHODOLOGY

The following section provides general information of the methods used by others and specific information on methods used by ERM in the development of maps and acquisition of data for this baseline. Specific information for data provided by others is contained in the original documents which form appendices to the Project Application/EIS.

3.1 MAPPING

A series of thematic maps of the LSA are presented in this report. Some of these are reproduced from supporting reports, as they present important background information for the terrain and soil related interpretations, and others have been developed specifically for this report:

Prepared by others:

- Local geology (Massey et al. 2005);
- Reconnaissance terrain/surficial materials (Knight Piésold 2012a);
- Bioterrain attributes on the Terrestrial Ecosystem Map (TEM) (Keystone 2013); and
- Regional soils (Kowall 1980).

Compiled by ERM:

- Slope gradient – 7 gradient classes;
- Soil inspection locations;
- LSA soils;
- Land Management Units ; and
- Soil Metals.

The following provides a brief description of the methods used in the development of these maps. More complete descriptions are contained in the original reports, as referenced.

3.1.1 Slope Gradient Class Mapping

In order to assess the topography of the LSA a slope gradient class map was developed using best available digital elevation models. A seven class system was used to model the area (Table 3.1-1).

ARCsys geographic information system (GIS) software was used to interpret the digital information. Slope gradient class maps of the LSA were prepared using *ArcView 3d-Analyst* (see Chapter 4). The Slope Gradient Map was generated from a combination of 20 m TRIM contours and 5 m contours provided by HCMC.

Table 3.1-1. Slope Gradient Class Definitions

Slope Class	Minimum (%)	Maximum (%)	Description
0	0	2	Level
1	>2	5	Very gentle
2	>5	15	Gentle
3	>15	26	Moderate
4	>26	50	Strong
5	>50	70	Moderately steep
6	>70		Steep

Pixel resolution and the related interpretative reliability vary across the LSA. Approximately 8,000 ha was developed using 20 m (nominal size, TRIM based) pixels. Approximately 4,000 ha was developed during the original Application using 5m pixels (Merit 2013). These areas are noted on the index map on the Slope Gradient Class map (see Section 4). For additional interpretative clarity, a water/wetland features layer (TRIM based) has been added to refine the definition between terrestrial and aquatic environments.

3.1.2 Terrain and Bioterrain Mapping

Two terrain-themed maps have been developed for the Project. The reconnaissance terrain map is used to assess both general type/distribution of terrain materials and active geo-processes (Figure 1.6-1) (Knight Piésold 2012a). The second map, a bio-terrain base, was used for the development of the TEM (Figure 4.2.1) (Keystone 2013). The terrain information included in the bioterrain mapping in the LSA was provided in digital form only, no bio-terrain map was provided in the previous Project Application/EIS (HCMC 2013).

An abbreviated description of the methodology for the development of each of these terrain data sources follows:

3.1.2.1 Reconnaissance Terrain (Knight Piésold 2012a)

The key elements related to the production of the reconnaissance terrain map are as follows:

- prepared from color air photos, of 1:15,000 nominal scale, year flown 2000;
- covers approximately 25,000 ha;
- presented at a nominal scale of 1:16,667;
- using standard terrain mapping conventions (per Howes and Kenk 1997);
- terrain survey intensity level (TSIL) D, (approximately 11% of the polygons were field checked);
- includes approximately 60 site inspections (see Appendix A2-4 of the current document) and numerous photos of typical surficial material types encountered; and
- references some geotechnical site investigation test pit and borehole data (Knight Piésold 2012b, 2013).

3.1.2.2 Bioterrain (Keystone 2013)

A bioterrain layer for the TEM map was developed for TEM mapping. The key features of that mapping include:

- initially (2008) prepared from hard copy aerial photographs, additional mapping was completed on digital photos using 3-D mapping software;
- using standard terrain mapping conventions (per Howes and Kenk 1997);
- terrain survey intensity level (TSIL) not specified;
- color air photos, of 1:15,000 nominal scale, year flown 2000;
- covers approximately 11,000 ha;
- prepared for presentation of a TEM figure at a scale of 1:20,000; and
- approximately 175 inspections sites with varying levels of detail on soils, including 17 detailed profiles (Appendix A1-2 and Appendix A3, current document).

3.1.3 Soil Mapping

Two soils maps are presented for the LSA:

- a regional soil map at 1:50,000 scale (copied from Kowall 1980); and
- a local soil map at 1:20,000 scale (developed from recently conducted, multidisciplinary investigations).

3.1.3.1 Regional Soils Map

The regional mapping provides a general description of soils within the LSA, in terms of type (climate as inferred by biophysical forest class zones (pre-dating the BEC system), parent material and profile development, and approximate extent. These regional soil types (soil associations) are roughly correlated with the Soil Map Units (SMU), and the more general Land Management Units (LMU) developed for the local soil map.

The regional soils information provided for mapsheet 082M (NW and SW), covers a very large area and includes the entire LSA. Soil associations are mapped at a scale of 1:50,000 on National Topographic Series mapsheets 82M 05 and 82M 12. These data were subsequently incorporated into the regional terrain and soil report and published at a scale of 1:100,000.

3.1.3.2 Local Soils Map

The local soil map produced for the Project covers the same LSA used for the TEM (Keystone 2013). The soil map polygons are developed, in-part, from the following maps and other data sources:

- BEC subzone and variant map (Keystone 2013);
- local geology map (Massey et al 2005);

- TEM - bioterrain layer (Keystone 2013);
- reconnaissance terrain map and inspection data (Knight Piésold 2012a);
- TEM – Soil Moisture Regime (SMR) - soil drainage relationship interpretations; and
- soil inspection data from soil survey profiles, and geotechnical test pit logs and sample analyses (Knight Piésold 2012b, 2013.

Soil climate is primarily defined by the BEC zones (subzones and variants), as shown on Figure 3.1-1. The soil map of the LSA is based on the bio-terrain layer polygon boundaries. Some of the original TEM polygons were joined to form a new larger soil polygon, if non-soil attributes like structural stage were the reason for the TEM boundary placement. A total of 782 polygons have unique soil polygon identifiers. Soil moisture regime (SMR) data, based on the TEM site series, are used as a guide to soil drainage interpretation (Lloyd et al. 2005; MacKenzie and Moran 2004). SMR and soil drainage are related to soil development. Areas of active geo-processes result in a range of variable soil development (i.e., active fluvial plains often retard soil development, resulting in 'younger' often neutral reaction soils). Soil polygons with active geo-processes are noted on the reconnaissance terrain or bio-terrain databases.

Inspection sites include both detailed soil profile descriptions (32 sites) and observations and sampling of surficial materials as part of other site investigations (>200 sites). Soil map inspection density is highly variable and is highest in the Project Site (Figure 3.1-1). Few soil inspections were undertaken along the existing access roads leading to the Project Site. No inspections were made along the proposed electrical transmission line or in the area of the rail load-out facility.

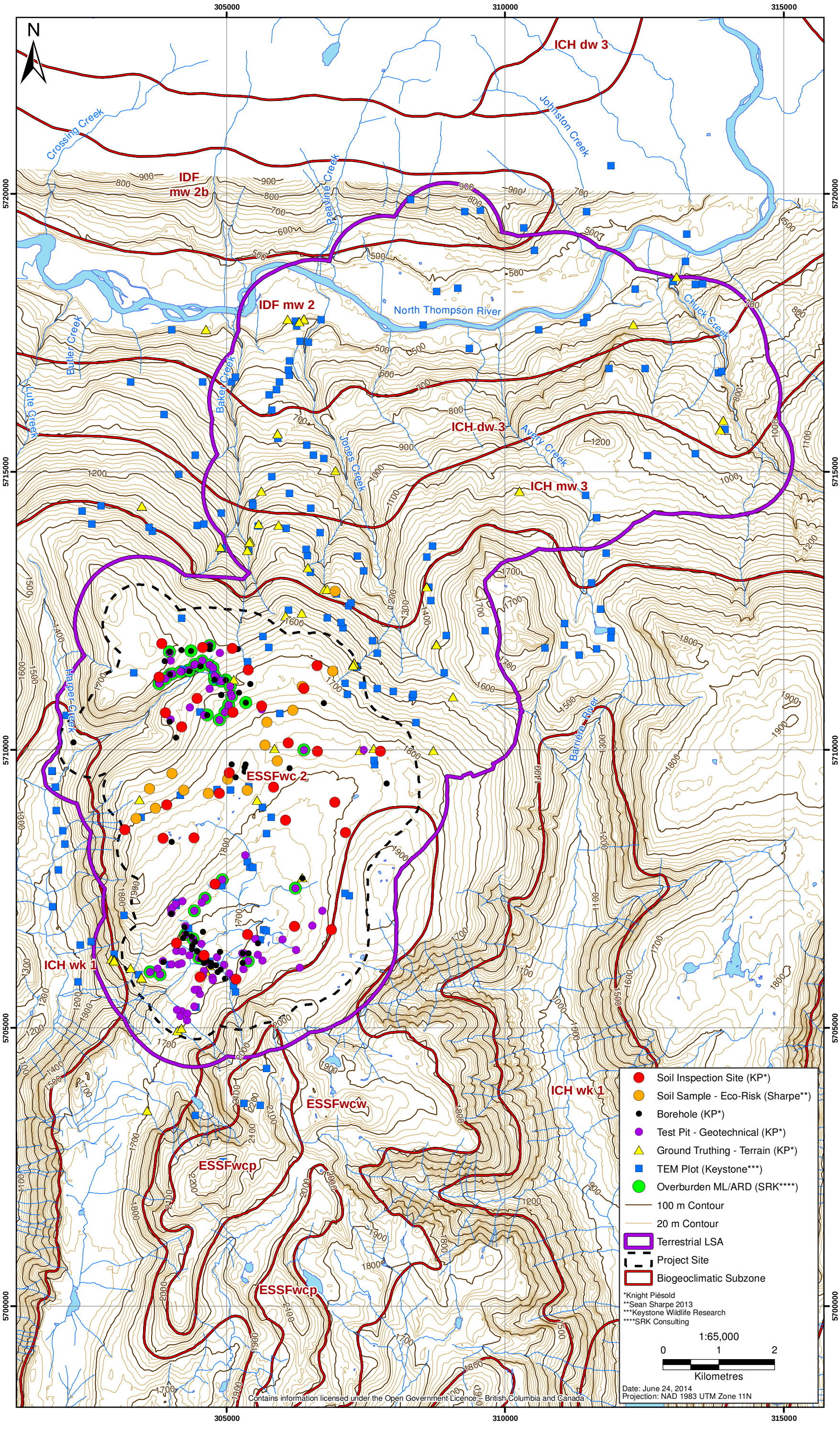
An open form legend is used in the current soil mapping to describe select soil and landscape properties or attributes through the use of a series of letters and numbers, as defined in the legend (Mapping Systems Working Group 1981). These attributes define the SMUs for each polygon on the soil map. The SMUs for each polygon have unique properties presented as labels. The label includes:

- a polygon number;
- the surficial material type;
- SMR;
- soil order, with some additional qualifier (subgroup/phase like); and
- if complex i.e. comprises more the a single soil type, a decile is added, along with additional SMU data.

The soil qualifier information is included where considered relevant to further interpretation for project related soil management (i.e. soil salvage). Soil taxonomic groups are often combined on this map where separation is not justified for interpretive purposes or for lack of field confirmation. Soil qualifier information is commonly provided for SMUs which are shallow to bedrock and/or affected by seepage. Slopes for each soil polygon are shown on the slope gradient class map (see Figure 4.1-1). General comments on typical slope attributes (slope class) for the various SMUs/LMUs are presented in Table 4.3-5.

Figure 3.1-1

Terrain and Soil Inspection Site Locations in the Vicinity of the Terrestrial Local Study Area



The soil map includes the following:

- colour coded polygons reflecting the primary surficial material within each polygon;
- soil survey site and sampling locations identifier;
- combined TEM, Terrain and geotechnical inspection locations (no identifier);
- 20-m contours;
- Provincial BEC subzone variant boundaries; and
- polygon labels that includes polygon number ID, primary SMU and qualifiers (if any).

3.1.4 Soil Metal Mapping

Two soil metal maps (see Figures 4.4-1 and 4.4-2) were developed and indicate the degree and extent of soil metal enrichment, using copper as a proxy, within the LSA and in the Project Site. These maps include:

- soil copper concentrations (mg/kg) over areas primarily within the LSA. This figure is based on soil geochemical (total copper) results from exploration, geochemical data from samples collected for overburden ML/ARD assessment (total copper) and soil samples from the soils survey (extractible soil copper); and
- soil metal concentrations ratings, in the Project Site, relative to land use guidelines for metals (CCME, CSR). Each point shows whether concentrations exceed or do not exceed the specified guideline values, and the number of metal species that exceed guidelines at that criteria level (where two samples were taken at an inspection site the highest exceedance is noted).

3.2 SOIL MAPPING AND CHARACTERIZATION

3.2.1 Soil Inspections

Soil inspection and sampling has been conducted as part of seven general types of programs:

1. Environmental assessment - Baseline soil survey and sampling results (profile descriptions and the physical and chemical analyses of surface soil); This included soil surveys that were conducted in September, 2012 under direction of Knight Piésold with generally two samples per inspection site;
2. Terrestrial Ecosystem Mapping - Inspection sites generally include data on SMR, and surficial material type, some sites include detailed soil profile descriptions (no soil samples were collected);
3. Reconnaissance Terrain Mapping - Inspection sites generally include descriptions of surficial material type and descriptions of landform as per the Terrain Classification System for British Columbia (Howes and Kenk 1997; no soil samples were collected);
4. Geotechnical site investigations - Test pit and borehole logs; select physical analyses of near surface soil/overburden; Site Investigations were conducted in 2011 and 2012 and collected data on soil particle size distribution from the near surface materials;

5. ML/ARD characterization studies - Chemical analyses for total metal and other parameters, of near surface soil/overburden; Overburden ML/ARD information was collected in 2013 on soil chemistry, including total metals and other soil parameters;
6. Exploration soil geochemical surveys - Grid sampling and chemical analyses of total soil metal content, variable metal species depending on the project objectives; no profile descriptions. This included exploration soil geochemistry in a historic database containing total soil metal concentration from soil geochemical grid sampling programs was reviewed (HCMC, pers. comm.; Table B3-4); and
7. Ecological Risk/Human Health studies - the physical and chemical analyses of surface soil with no soil profiles.

Inspection sites from all but the exploration soil geochemical surveys are indicated on Figure 3.1-1. Inspection sites from the exploration program coincide with the copper concentration sampling sites described in Section 4 (see Figure 4.4-2). The majority of inspections undertaken in the Project Site are shown on Figure 3.1-1, summarized in Table 3.2-1 and listed in Appendix C (Table C-2).

3.2.2 Sampling Program

The sample collection programs reported here are from four of the seven programs described in Section 3.2.1 that were conducted in the Project Site (Table 3.2-2). These included (as listed above):

1. Environmental assessment;
4. Geotechnical site investigations;
5. ML/ARD characterization studies; and
6. Exploration soil geochemical surveys.

Note that the Ecological Risk surveys conducted in 2012 included the collection of soil samples of the surface mineral layer from each of 15 sites. Sampling details are provided in the report by Sean Sharpe and Associates (2013).

3.2.2.1 Soil Surveys

Soil samples were collected from 32 sites (a total of 54 samples, i.e., some sites with surface and shallow subsurface samples). Samples typically represent the surface 15 cm (organic or organo-mineral horizon) and a mineral subsoil sample to a depth of 40 cm (maximum depth 60 cm site HC-27). The sampled horizons are displayed with the schematic soil profiles on Figure 3.2-1.

These samples represent soils with different soil order classes and a variety of parent materials, as indicated by their respective SMU designations (see Section 4). Sampling of soils within the LSA was mostly restricted to the Project Site.

Soil samples were shipped to Maxxam Labs in Burnaby, BC for analysis of physical properties and total metals. The analysis undertaken on these is indicated below (Section 3.2.3, Analytical Methods). These sample sites are denoted as 'Soil Inspection Site (KP*)' on Figure 3.1-1.

Table 3.2-1. Summary of Site Inspection Types within the Local Study Area

Description of Inspection	Soil Survey - Knight Piésold/ Polar (soil)	TEM Survey - Keystone[a] (no analyses with detailed profiles)	Reconn. Terrain - Knight Piésold[b] (terrain)	Geotechnical Test Pit - Knight Piésold[c] (geotechnical)	Geotechnical Boreholes - Knight Piésold[c] (geotechnical)	Geochemical Testing – SRK[d] (some duplication of sites with Test Pits – Knight Piésold)	Eco-Risk/ Human Health – Sharpe[e]	Total
Detailed Soil Profiles/ analyses	33	17						50
Surficial Material/ SMR		116						116
Surficial Material/ terrain			50					50
Overburden (descriptive log)/ analyses (physical)				92	62			154
Overburden/analyses (chemical)						39		39
Soil Samples (surface mineral)/analyses							15	15
Total								**424**

[a] *Keystone (2013).*
[b] *Knight Piésold (2012a).*
[c] *Knight Piésold (2013).*
[d] *SRK (2013).*
[e] *Sean Sharpe and Associates (2013).*

Figure 3.2-1

Soil Inspection Site Horizon Classification and Sampling Depths, Terrestrial Local Study Area

F5_R
HC-01

Horizons	depth (cm)
Om1	0-9
C1	9-13
Om2	13-17
C2	17-19
om3	19-21
C3	21-33
Om4	33-47
C4	47-55

M3_P
HC-02

Horizons	depth (cm)
LHF	3-0
Ae	0-3
Bf	3-14
C	14-43

M4_P.li
HC-04

Horizons	depth (cm)
LFH	5-0
Ah	0-13
Bf	13-30
C	30-45

M3_P.li
HC-05

Horizons	depth (cm)
LM	7-8
Fm	1-7
Hr	0-1
Ae	0-4
Bf	4-35

F5_R.cug
HC-06

Horizons	depth (cm)
Ah	0-17
C1	17-20
Oh1	2-32
C2	32-34
Oh2	34-37
C3	37-45

M6_G.pt
HC-07

Horizons	depth (cm)
Om	17-0
Bg	0-40

G3_P
HC-08

Horizons	depth (cm)
LHF	4-0
Ae	0-5
Bf1	5-21
Bf2	21-38
C	38-55

F4_R.cu
HC-09

Horizons	depth (cm)
Oh	10-0
C1	0-15
C2	15-20
C3	20-32
C4	32-50

M5_P.so
HC-10

Horizons	depth (cm)
LHF	25-21
Om	21-0
Bhf	0-14
Bf	14-25

M3_P
HC-11

Horizons	depth (cm)
LHF	3.5-0
Ae	0-3
Bf	3-36
C	36-50

M3_P
HC-12

Horizons	depth (cm)
LHF	4-0
Ae	0-0.5
Bf	0.5-49

M3_P
HC-13

Horizons	depth (cm)
LHF	3-0
Ae	0-3
Bf	3-49
C	-

O6_O.mt
HC-15

Horizons	depth (cm)
Om1	0-19
C1	19-22
Om2	22-27
C2	27-30
om3	30-37
C3	37-40
Om4	40-53

M3_P
HC-16

Horizons	depth (cm)
LHF	12-0
Ae	0-4
Bf	4-21
C	21-35

M4_P.so
HC-17

Horizons	depth (cm)
LHF	8-0
Ah	0-10
Bhf	10-27
C	27-38

M4_P
HC-18

Horizons	depth (cm)
LHF	3-0
Ae	0-4
Bhf	4-21
Bf1	21-39
C	39-50

M3_P,li
HC-19

Horizons	depth (cm)
LHF	3-0
Ae	0-10
Bf	10-35

M3_P
HC-21

Horizons	depth (cm)
Ap	0-13
Bf	13-44

M3_P
HC-23

Horizons	depth (cm)
LHF	2-0
Ae	0-0.5
Bf	0.5-50

R0_n
HC-24

Horizons	depth (cm)
Bedrock	-

C2_P
HC-25

Horizons	depth (cm)
LHF	3-0
Ae	0-1
Bf	1-55

M4_P
HC-27

Horizons	depth (cm)
LHF	2-0
Ae	0-1
Bf	1-34
C	34-60

M4_P
HC-28

Horizons	depth (cm)
LHF	2-0
Bf	0-60

M(C)4_P
HC-29

Horizons	depht (cm)
LHF	2-0
Bf	0-31
BC	31-50

M5_B.m
HC-31

Horizons	depth (cm)
LHF	5-0
Ah	0-10
Bm	10-45

M3_P.li
HC-32

Horizons	depth (cm)
LM	1-4.5
FH	0-1
Ae	0-4
Bf	4.-20
C	20-55

M3_P
HC-33

Horizons	depth (cm)
LFH	2-0
Ae	0-5
Bf	5-38
C	38-55

M4_P
HC-34

Horizons	depth (cm)
LFH	3-0
Ae	0-4
Bf	4-39
BC	39-50

M5_P.g
HC-36

Horizons	depth (cm)
LFH	13-0
Ah	0-26
Bf	26-36
BC	36-45

M3_P
HC-37

Horizons	depth (cm)
LHF	4-0
Bf	0-45

M3_P
HC-38

Horizons	depth (cm)
LHF	6-0
Ae	0-8
Bf	8-38
C	38-44

M4_P
HC-39

Horizons	depth (cm)
LHF	2-0
Ap	0-16
Bf	16-28
BC	28-50

M6_R.g
HC-40

Horizons	depth (cm)
LHF	4-0
C1	0-21
C2	21-44

Organic
Mineral
Bedrock

SMU
Site ID
Sampled Horizon

Table 3.2-2. Integrated Sampling for Soil Physical and Chemical Testing, Harper Creek Project

Parameters	Programs			
	Soil Surveys	Overburden Geotechnical	Overburden ML/ARD	Exploration Soil Geochemistry
Soil Texture	X	X		
Coarse Fragment Content (> 2 mm)	X	X		
Carbonate (CaCO3 equivalent)	X		X	
Soil Reaction (pH)	X		X	
Total Carbon (%)	X			
Total Sulphur (%)			X	
Soil Metals (extractable)	X			
Soil Metals (totals)			X	X

3.2.2.2 Overburden Geotechnical

Shallow overburden is often representative of the soil parent materials. Samples of overburden were obtained from boreholes and test pits as part of the geotechnical investigation programs. Select data from this program, including only data from samples from the surface to a maximum depth of 2.0 m, are incorporated in this report (Appendix B – Table B1-3). Sampling locations are provided in Figure 3.1-1, and sites are denoted as either 'Borehole (KP*)' or 'Test Pit – Geotechnical (KP*). Complete details on sample protocols are provided in the original reports (Knight Piésold 2012b, 2013).

3.2.2.3 Overburden ML/ARD

Three phases of overburden characterization sampling were completed for SRK:

- 16 samples from road cut faces in the open pit area;
- 13 samples from test pits in the footprint of the tailings management facility; and
- 23 samples from drill holes in the open pit area. Ten samples were described as overburden, the balance were weathered bedrock collected below overburden. All 52 overburden samples were collected by Knight Piésold (KP) and provided to SRK for analysis. Sampling locations are provided in Figure 3.1-1. These sites are denoted as 'Overburden ML/ARD (SRK)'.

3.2.2.4 Exploration Soil Geochemistry

A number of soil geochemical surveys have been conducted for exploration purposes since the ore body was first discovered. The project proponent, HCMC, provided results for eight soil grid sampling programs as listed below and shown in Section 4 (see Figure 4.4-2).

1. HC_SL.csv
2. Soils_AreaA_1972
3. Soils_AreaC_1971
4. Soils_AreaHC_1971

5. Soils_AreaHC_1992
6. Soils_Historical_AreaK
7. Soils_AreaMA04
8. Soils_AreaMA05

These surveys collected 6,886 samples, which were analysed for various metals. No review of the information on field sampling protocols, techniques (depths and target horizons) or laboratory analyses procedures was conducted on the data contained in these files. All soil geochemical analyses included an assessment of total copper commonly paired with zinc. In recent years a wider spectrum of metals was included.

3.2.3 Analytical Methods

The laboratory methods used to analyse samples from the four soil sampling programs discussed above included a combination of chemical and physical assessments, as described below.

3.2.3.1 Soils Survey

Soil samples were tested for: soil texture (3 point i.e. sand, silt and clay), $CaCO_3$ equivalence, total organic carbon, pH, soluble cations (SAR calculation and % water content at saturation) and CCME Tier 1 metals (discussed below). All other comments regarding soil chemistry or physical analytical results, for areas outside of the Project Site, are inferred from information presented in the regional soil survey (per Kowall 1980). The methods used to analyze the samples are listed in Table 3.2-3. The detection limits and criteria used to assess the metal concentrations in soils are presented in Table 3.2-4. Chain of Custody and the original lab data reports are provided in Appendix B.

Table 3.2-3. Soil Analytical Methods (Maxxam Labs)

Physical Properties	Units	Method[1]
% sand by hydrometer	%	SSMA CH.55.3
% silt by hydrometer	%	SSMA CH.55.3
Clay Content	%	SSMA CH.55.3
Texture	-	Classification SSMA CH.55.3
Gravel	%	SSMA CH.55.3
Soluble Parameters		
Soluble paste		SSMA 15.5
Soluble Conductivity	µS/cm	SM-2510 B
Sodium Adsorption Ratio	N/A	Calculation SSMA CH.15.4.4
Soluble Calcium (Ca)	mg/L	EPA 200.7
Saturation %	%	Carter, SSMA 16.2
Soluble Magnesium (Mg)	mg/L	EPA 200.7
Soluble Sodium (Na)	mg/L	EPA 200.7

(continued)

Table 3.2-3. Soil Analytical Methods (Maxxam Labs; completed)

Physical Properties	Units	Method[1]
Soluble Potassium (K)	mg/L	EPA 200.7
Saturation %	%	Carter SSMA 18.2.2
Soluble Sulphate (SO4)	mg/L	EPA 200.7
Soil Properties		
Total Organic Carbon		LECO Method (2) Combustion
Calcium Carbonate Equivalent	%	SSMA 20.2.2
pH (2:1 DI Water Extract)	Units	
CSR/CCME Metals Elements (total)	mg/kg	EPA 6020A

[1] *Methods are reported in Appendix B1-3*

Table 3.2-4. Soil Metal Concentration Detection Limits and CCME and CSR Land Use Guideline Criteria

Metal	Detection Limits RDL[1] mg / kg (ppm)	BC CSR Use Criteria		CCME Use Criteria	
		Livestock Criteria mg / kg (ppm)	Industrial Criteria mg / kg (ppm)	Agricultural Criteria mg / kg (ppm)	Industrial Criteria mg / kg (ppm)
Antimony	0.1	20	40	20	40
Arsenic	0.5	25	100	12	12
Barium	0.1	400	1,500	750	2,000
Beryllium	0.4	4	8	4	8
Cadmium	0.05	70	500	1.4	22
Chromium	1	50	700	64	87
Cobalt	0.3	40	300	40	300
Copper	0.5	150	250	63	91
Lead	0.1	350	2,000	70	600
Mercury	0.05	0.6	150	6.6	50
Molybdenum	0.1	5	40	5	40
Nickel	0.8	150	500	50	50
Selenium	0.50	2	10	1	2.9
Silver	0.050	20	40	20	40
Thallium	0.050	2		1	1
Tin	0.10	5	300	5	300
Uranium	0.05			23	300
Vanadium	2	200		130	130
Zinc	1	200	600	200	360

[1] *RDL = Reportable Detection Limit (Maxxam Labs).*

3.2.3.2 Overburden Geotechnical Testing

As part of the geotechnical testing program, a particle size distribution analysis was carried out on soil samples. The particle size distribution tests were conducted in accordance with ASTMD-422 procedures (ASTM 1998) (using both screen and hydrometer methods) and classified according to the Unified Soil Classification System (USCS) (ASTM D2487-00). The hydrometer analysis was used to determine silt and clay fraction particles sizes for material with a fine fraction exceeding 15% of the total sample. It should be noted that the USCS definition of sand and silt size particles is not the same as that described in the Canadian System of Soil Classification (Soil Classification Working Group 1998). Results for the near surface geotechnical soil samples, collected from within 2 m of the ground surface, were selected from this data set as potentially useful for characterizing the soil or soil parent material in the LSA.

3.2.3.3 Overburden ML/ARD

The methods and standard static geochemical tests performed on all overburden samples included:

- total sulphur [S (T)] by Leco furnace;
- sulphate S (SO4) determined using hydrochloric acid;
- neutralization potential (NP) by Modified Acid Base Account (Coastech 1991) method;
- total inorganic carbon (TIC) determined by coulometric methods;
- paste pH determined by the Sobek et al (1978);
- paste conductivity using the same procedure as the paste pH;
- $CaCO_3$ equivalence;
- fizz test (reaction to addition of acid); and
- element scan (including sulphur) using inductively coupled plasma (ICP) following a 4-acid digestion, including low level Hg.

Overburden sample particle size distribution, as classed within the USCS, is inferred from data presented in the geotechnical investigation report. Complete details of sampling procedures and methods of analyses are included in the ML/ARD Characterization report (SRK 2013).

3.3 LIMITATIONS AND ASSUMPTIONS

This report has been compiled using data developed by a range of sources, sampling methods and analytical approaches. The soil survey intensity varies across the LSA and most inspections and sampling was performed in the vicinity of the Project Site.

Soil metal concentrations were determined with methods to either remove into solution 'total' or 'extractible' (environmentally available) metals from the soil material. CCME and CSR guideline criteria are based on 'extractible' concentrations not 'total'. Caution should be used when reviewing these data in comparison to guideline limits. Methods to obtain the total metal data provided in the exploration soil geochemical studies have not been reviewed by the author. Specific depths of sampling and methods of analyses are not known to the author.

4. RESULTS AND DISCUSSION

The following section presents and discusses the results of the surveys and sampling undertaken to describe the terrain and soil conditions within the LSA.

4.1 SLOPE GRADIENT CLASS MAPPING

Within the LSA, elevation ranges from a low of approximately 500 masl in the North Thompson River valley, near Vavenby, to a high of 2,025 masl along the southern-most boundary of the Project Site portion of the LSA. Slope gradients range from near level to very gentle, on the floodplains and fans along the North Thompson River, to steep in the gullies and on mountain sides (Figure 4.1-1). The LSA is characterized by gentle to moderate slopes (approximately 80% of the area exhibits slopes ranging 5% to 50% slope gradient). A summary of the slope gradient classes within the LSA is provided in Table 4.1-1. Within the Project Site elevations range from a low of approximately 1,600 masl, to a high of 2,000 masl. Slope gradients are near level to moderate, with more than 70% being gentle to strong (5% to 26% slope gradient; Table 4.1-1).

Table 4.1-1. Extent (ha) of Slope Gradient Classes within the Local Study Area and Project Site

Slope Class	Slope Range (grade %)	Slope Description	LSA Area (ha)	% LSA	Project Site (ha)	% Project Site
0	< 2	Near Level	758.5	7%	319.0	9%
1	2 – 5	Very Gentle	480.7	4%	177.2	5%
2	>5 – 15	Gentle	2,673.6	24%	1,499.1	43%
3	>15 – 26	Strong	3,190.7	29%	1,009.1	29%
4	>26 – 50	Moderate	3,092.7	28%	398.5	11%
5	>50 – 70	Moderately Steep	646.1	6%	79.2	2%
6	> 70	Steep	178.4	2%	20.1	1%
Total			**11,020.7**		**3,502.2**	

Climate influences soil processes and defines the suitability of land for a variety of uses. It was useful, especially for reclamation planning purposes, to define soil climate by grouping BEC subzones and variants into three general BEC zones (Table 4.1-2):

- IDF (IDFmw2, IDFmw2b);
- ICH (ICHdw2, ICHmw3 and ICHwk1); and
- ESSF (ESSF wc2, ESSFwcw and ESSFwcp).

The relatively warm, dry IDF is in the valley bottom, an area of extensive agricultural and urban development, primarily on young, floodplain soils (Brunisols and Regosols). The cooler, moist ICH, is along the mid to upper valley sideslopes, and is an area of extensive forest cover with forestry and livestock range uses. There is a wide range of soils including Luvisols, Brunisols and more weathered Podzols. The cold, wet ESSF occurs on the rolling, highland plateau, an area primarily covered by forest and dominated by shallow to deep, weathered, Podzolic soils.

Table 4.1-2. Extent of BEC Subzone Variants within the Local Study Area

BEC Subzone variant	Extent (ha)	Extent (%)	BEC Zone Extent (%)	Approximate Forest Biophysical Zone Equivalent [1]
IDFmw2	2,098.2	19%	19%	IWB IwH-wC:a
ICHdw3	1,725.7	16%	33%	IWB IwH-wC:b (minor overlap IWB IwH-wC:a)
ICHmw3	1,815.3	16%		IWB IwH-wC:b (minor overlap IWB SAeS-alF:a)
ICHwk1	115.1	1%		IWB SAeS-alF:a
ESSFwc2	4,450.1	40%	48%	IWB SAeS-alF:a
ESSFwcw	758.7	7%		IWB SAeS-alF:b
ESSFwcp	58.3	1%		IWB At
Total	**11,021.3**	**100%**	**100%**	

[1] *as per R. C. Kowal 1980 (used in defining regional soil associations).*

The regional scale geology of the LSA is outlined in Figure 4.1-2 (source Massey et al 2005). Geologic units are highlighted in this figure along with commonly occurring rock types. The LSA comprises geologic materials ranging in age from the Upper Proterozoic/Paleozoic - Carboniferous (approximately 1,000 MY to 300 MY BP), Eagle Bay Assemblage, to the Cretaceous/Neogene (approximately 148 MY to 2 MY BP), Baldy Batholith.

Commonly occurring rock types within the LSA include:

- sedimentary (sf – mudstone, siltstone; lm - limestone);
- metamorphics (gs, og, pg; granodioritic, orthogneiss, paragneiss);
- igneous extrusive (va - andesitic); and
- intrusives (qm – quartz monzonite).

The primary rock types mapped in the LSA and Project Site are indicated in Figure 4.1-2. Their approximate extent is summarized in Table 4.1-3. Within the LSA, metamorphic rocks (predominantly greenstone/greenschist as well as gneiss) account for slightly more than half of the mapped area. Fine and often base rich, sedimentary rocks of the Eagle Bay Assemblage, underlay near a third of the LSA, mostly in the northern half. Relatively minor areas are mapped as volcanic or intrusive rock types.

The primary rock types mapped in the Project Site are metamorphic, typically comprising orthogneiss and paragneiss, though a small amount of greenstone/greenschist is also present. Igneous intrusive rock (quartz monzonite) is mapped along the southern boundary of this area, part of the larger Baldy Batholith. Small in extent, though significant in mineralization, andesitic and calc-alkaline, volcanic rocks occupy approximately 10% of the Project Site. Typically fine textured, sedimentary rocks of the Eagle Bay Assemblage occur along the northern edge of the Project Site.

Figure 4.1-1

Slope Gradient Class and Soil Inspection Map of the Terrestrial Local Study Area

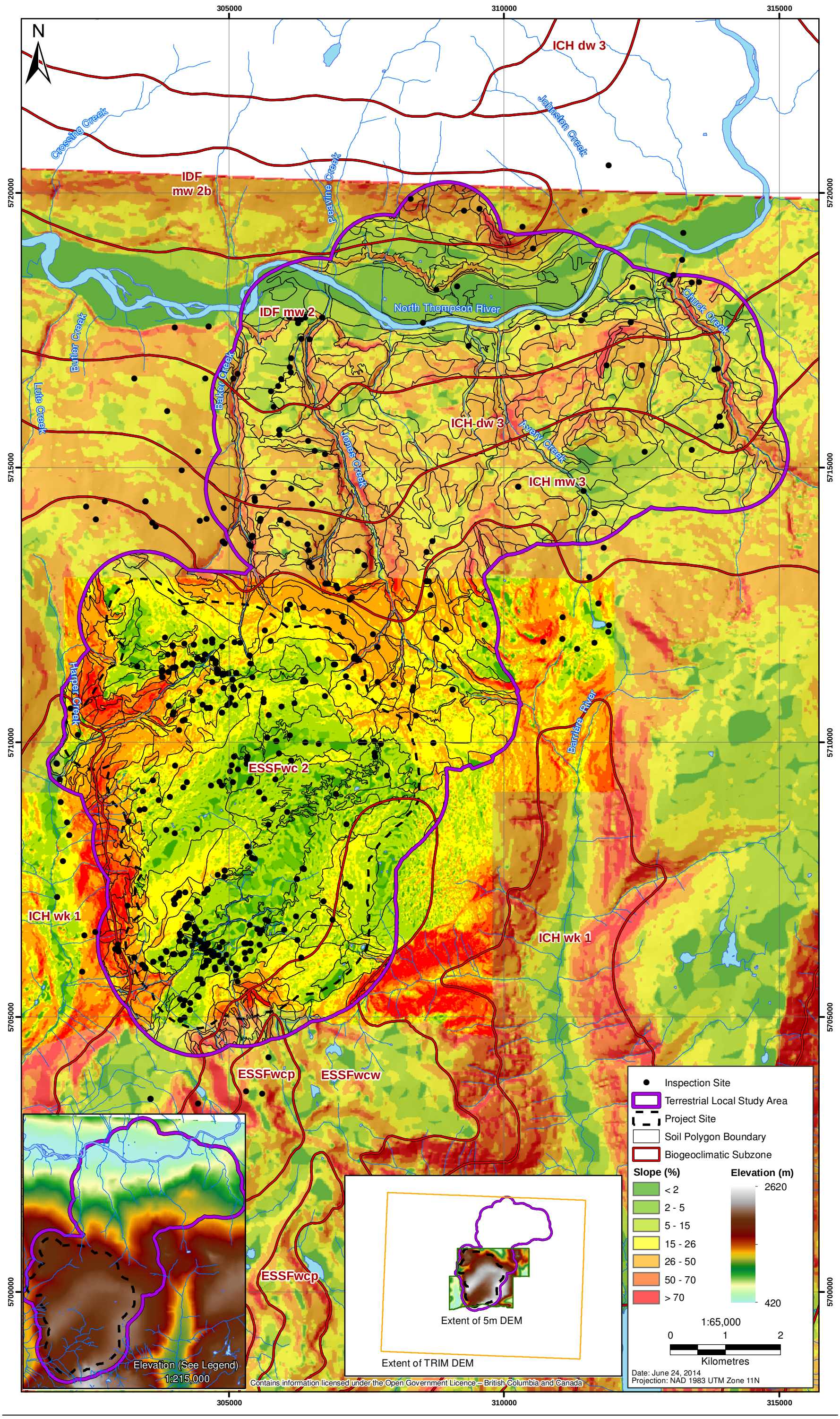


Figure 4.1-2

Geologic Setting and Rock Types in the Terrestrial Local Study Area

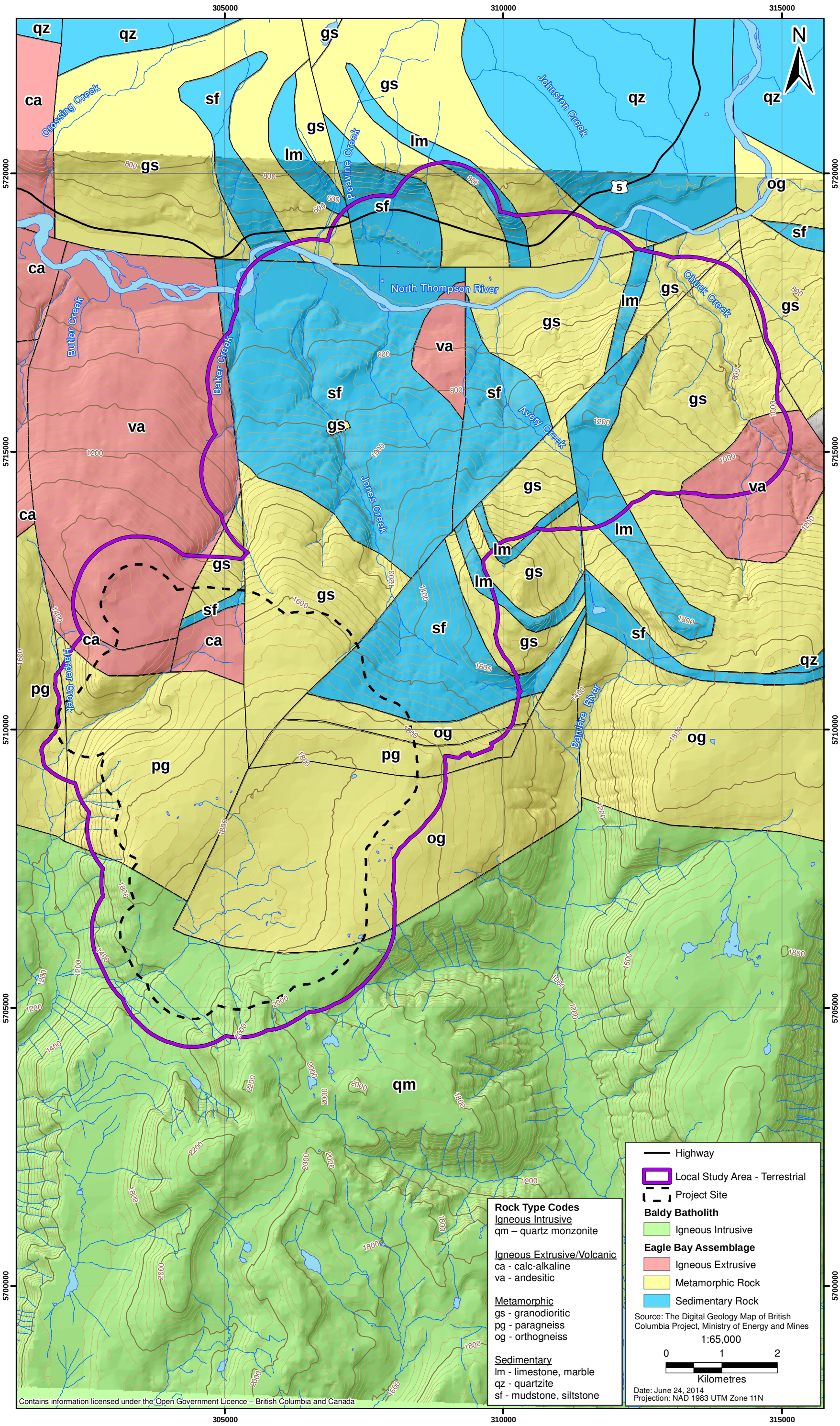


Table 4.1-3. Extent (ha) of Major Geologic Assemblages and Rock Types in the Terrestrial Local Study Area

Symbol	Rock Type	Extent (ha)	Extent (%)
Sedimentary			
sf	mudstone, siltstone	2,923	27%
lm	limestone	398	4%
Metamorphic			
gs	granodioritic	3,122	28%
pg	paragneiss	1,350	12%
og	orthogneiss	1,328	12%
Igneous Extrusive			
va	andesitic	801	7%
ca	calc-alkaline	229	2%
Igneous Intrusive			
qm	quartz monzonite	871	8%
Total		**11,020**	**100%**

Though often masked and/or shifted by glaciation and other depositional processes, geologic materials can influence soil textures, mineralogy and characteristics such as metal content and alkalinity. An inset map of rock types is provided with the LSA Soil Map (Figure 4.1-2).

Soils textures appear to be somewhat influenced by the local rock types. Moderately fine or 'silty' textures are associated with finer sedimentary, metamorphosed and volcanic rocks and coarse or sandy textures are associated with igneous intrusive, plutonic granitic rocks. Base rich tills, high in calcium and magnesium, are likely associated with local limestone and some calcium rich volcanic rocks.

4.2 TERRAIN AND BIOTERRAIN MAPPING

The following description of the geological model, surficial geology and geological materials is excerpted and summarized from the reconnaissance terrain report (Knight Piésold 2012a). Geohazard information is also summarized below and is excerpted from terrain stability report in Appendix 5-C prepared by Polar Geoscience Ltd.

4.2.1 Geological Model

The terrain mapping facilitated the development of a geological model for the Project Site. The surficial geology and landforms within the Reconnaissance Terrain Study Area are predominantly the result of previous glaciations (Figure 4.2-1). It is interpreted, based on the rounded nature of the mountain tops, that most of the Reconnaissance Terrain Study Area was glaciated with a large thickness of ice. Glacial till was deposited at the base of the ice sheet. Glacial lakes developed locally on the flat mountain-top areas as the ice retreated. Fine sediments, comprising silts and fine sands, accumulated in the lakes and coarser beach deposits, comprising gravelly sands, accumulated along the shorelines. With the continuing retreat of the ice sheet, the ice dams breached and the lakes dissipated, giving way to swamps. Organic soils accumulated in the swamps as a result of the

decomposition of vegetation. Extensive kames, comprising hummocky terrain and terraces, accumulated at the toe of the North Thompson River Valley. Glacial outwash deposits accumulated as the ice retreated further. These deposits were subsequently incised by the North Thompson River, resulting in the formation of glaciofluvial terraces. Colluvium has developed locally on the steeper side slopes of the valley as a result of soil creep and landslides. Fluvial terraces have developed over time as the river eroded to a lower level. The North Thompson River is actively depositing coarse alluvium within its channel and finer sediments on its floodplain

4.2.2 Surficial Geology

The terrain mapping indicates the bedrock is generally overlain by a blanket of glacial till in the Project Site, in the vicinity of the open pit. A surface veneer of colluvium is interpreted to be generally present in the steeper areas of terrain and weathered bedrock is interpreted to be present at ground surface. Colluvium is expected to be more prevalent, particularly on the moderately steep slopes. Small organic swamps locally overlie glacial till and/or possibly glacial lake deposits (Figure 4.2-1).

The southeast portion of the Project Site, the area of the proposed TMF, comprises a broad valley with gentle side slopes in the headwaters of the Harper Creek Catchment. On the valley side slopes, the weathered bedrock is generally mantled by glacial till. The surficial geology on the valley floor was mapped as glacial lake deposits with local organic swamps. Veneers of colluvium were mapped, locally, in the areas of steeper terrain.

The north portion of the proposed powerline alignment crosses glaciofluvial outwash deposits and alluvial deposits on the floor of the North Thompson River Valley and a kame deposit at the toe of the North Thompson River Valley slopes. Colluvium was mapped in the steeper areas and there is an organic swamp at the south end of the alignment. The site of the proposed rail load-out facility is located on a fluvial terrace.

4.2.3 Characterization of Geological Materials

The organic soils encountered ranged from brown-black spongy fibrous peat to organic silt with some fine sand and many plant remains (Figure 4.2-2). The alluvium is anticipated to predominantly comprise coarse soils. This is especially so along the North Thompson River, where it is expected to comprise predominantly gravel and cobbles. Flood plain deposits were mapped locally. These deposits are expected to be finer-grained, typically comprising silty sands with some gravel. A fluvial terrace was field-truthed, and the material encountered comprised gravelly fine to medium sand with trace cobbles. A glaciofluvial terrace, comprising gravelly cobbles with some fine to coarse sand, was also mapped.

The glacial till encountered in the field-truthing generally comprised fine to coarse gravel with trace to some sand and silt and trace cobbles. The glacial till was found to comprise fine to medium sand with some to much gravel, trace to some silt and trace to some cobbles. The test pitting program, undertaken at the site of the proposed TMF , indicated the glacial till on the east side of the valley contains a slightly higher proportion of 'fines' than that on the west side. The texture of the kame deposits at the toe of the North Thompson River Valley was found to range from fine to medium sand with some gravel, trace silt and trace cobbles to fine to coarse gravel with some cobbles and trace sand. The kame deposit includes beds of silty fine sand. The glacial lake deposits encountered in the field-truthing varied from a silt with some fine sand to a fine to coarse sand with much fine to coarse gravel.

Figure 4.2-1

Simplified Bioterrain Surficial Material Map of the Terrestrial Local Study Area

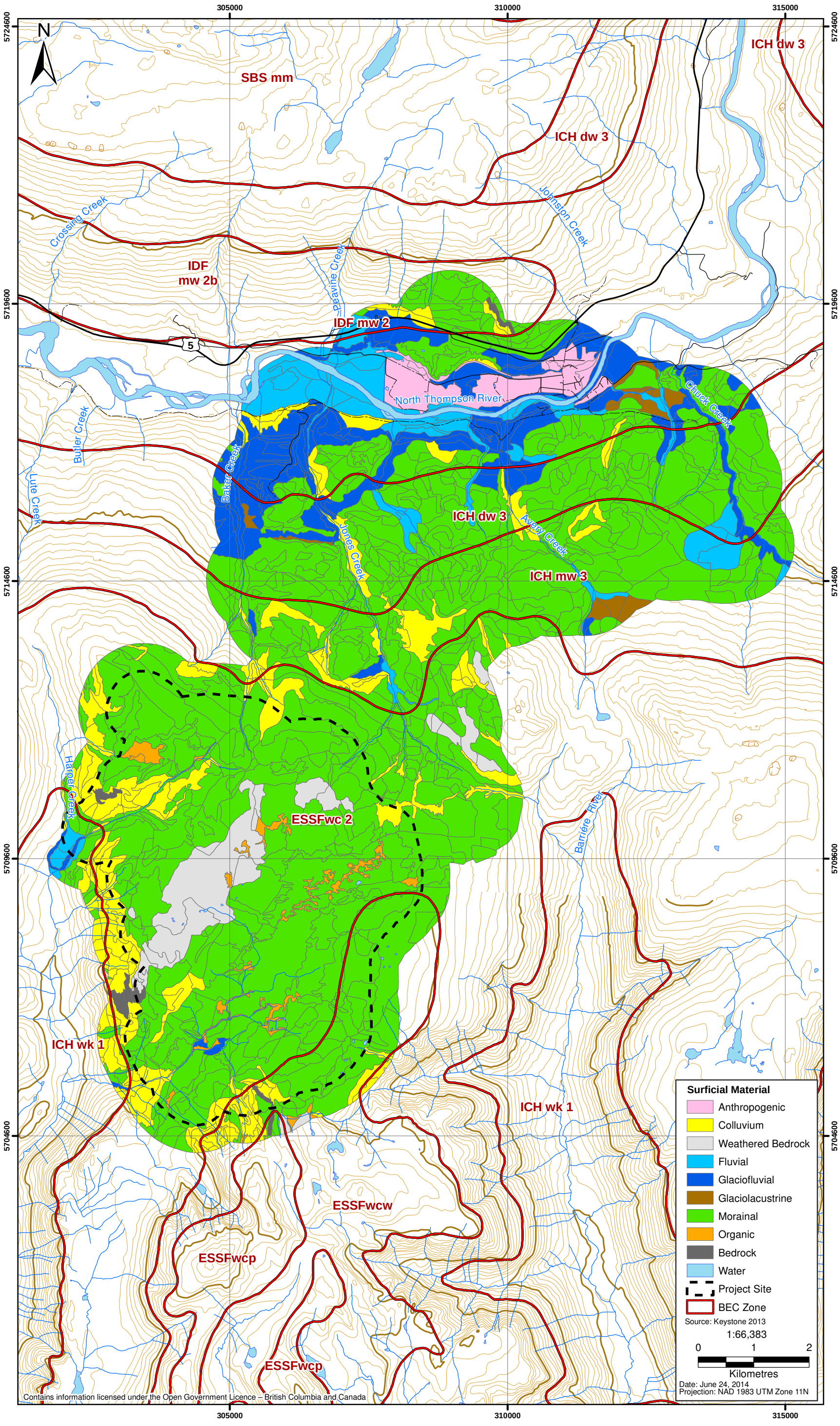
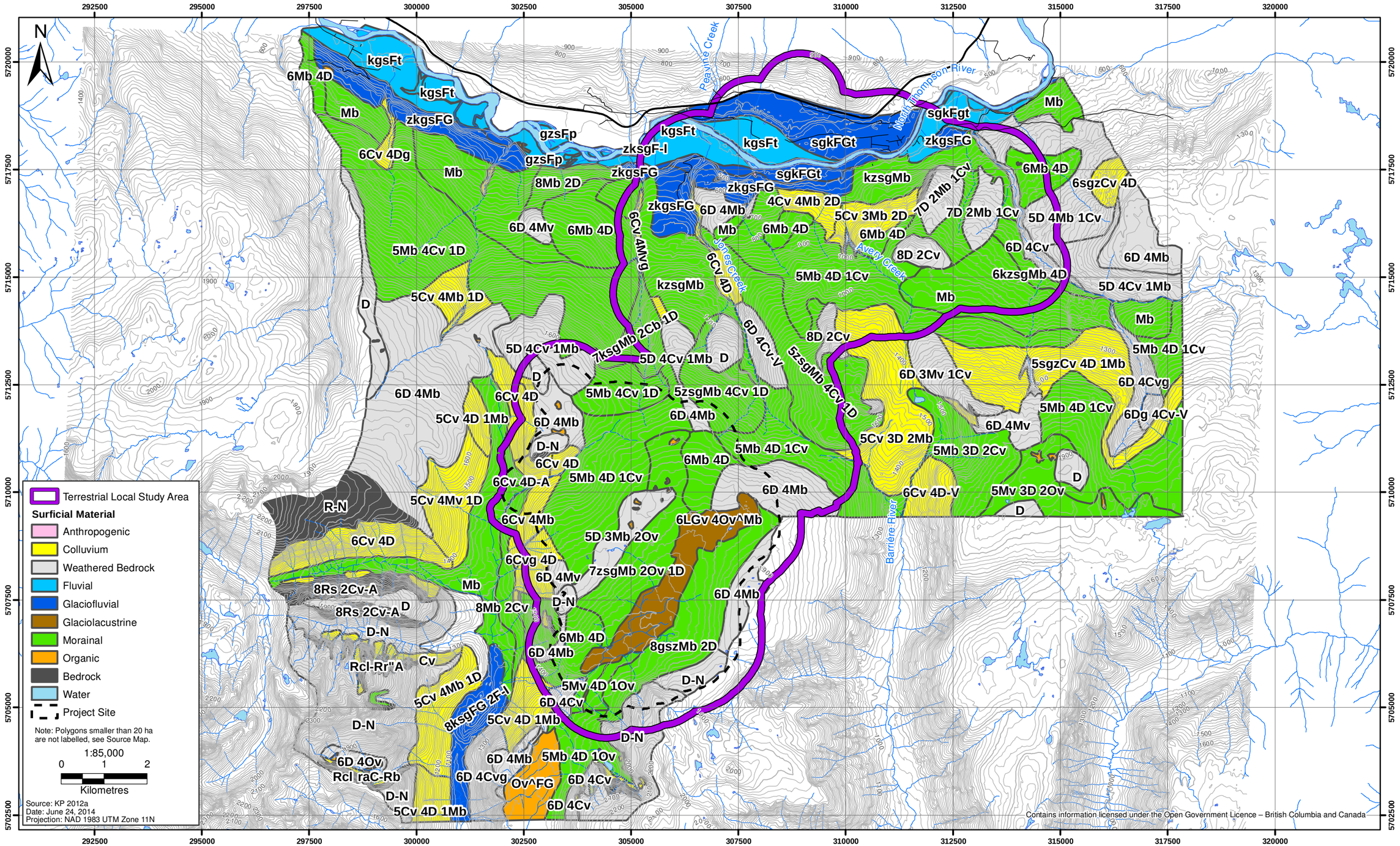


Figure 4.2-2
Reconnaissance Terrain Map

ERM



The colluvium encountered in the field-truthing comprised silty fine to medium sand with some gravel and trace cobbles and soft silt with some gravel and trace sand and trace clay.

The phyllite bedrock observed at the ground surface was generally weak to very weak and moderately to highly weathered, becoming medium strong and slightly weathered with depth. Very weak and friable highly weathered granite bedrock was observed. A ridgeline outcrop of medium strong, slightly weathered granite with medium to widely spaced discontinuities was also observed.

4.2.4 Geohazards

This section is an exerptof geohazards described in *Harper Creek Project: Terrain Mapping and Geohazards* in Appendix 5-C. Table 4.2-1 shows a summary of geohazards in relation to Project infrastructure.

Geohazards mapped within the study area include:

- debris slides;
- debris flows;
- debris slumps;
- rockfall;
- slumping in bedrock; and
- snow avalanche.

Steep-sided gully walls of all the larger creeks on the south side of the North Thompson River, including Baker, Jones, Avery, Chuck, P and T creeks, are the most common terrain types where debris slides, debris flows, and debris slumps occur. These landslides initiated in till, glaciofluvial sediments and weak rock types (fissile sedimentary bedrock and foliated metamorphic bedrock). Debris slides and slumps are present on the steep river banks of the North Thompson River, especially where these slopes are undercut by the river. Along the river banks, the landslides initiated in till and glaciofluvial sediments. Project infrastructure in close proximity to gullies on the north facing slopes of the North Thompson River banks and its valley to the south include the mine access road and the power lines. Mine infrastructure in P Creek may be affected by debris slides. (Figure 1.1-1).

Rockfall occurs from isolated bedrock cliffs scattered throughout the Study Area. Mine infrastructure in P Creek could be affected by rock fall. A small area at the south edge of the main embankment and adjacent tailings beach overlap with polygons mapped with rockfall.

A large bedrock slump is located below the main embankment and north of T Creek (Figure 1.1-1). Further detailed assessment of the identified bedrock slump is recommended as well as the potential impacts the main embankment could have on the slope.

Snow avalanching is uncommon in the study area, however evidence of it present where mine infrastructure is located in P Creek.

Table 4.2-1. Summary of the Proximity of Existing and Proposed Infrastructure to Geohazards and Potentially Unstable Terrain

Infrastructure Type	Geohazards with Potential to Affect Project Infrastructure		Potentially Unstable or Unstable Terrain[1]		
	Type	Polygon	Polygons containing Project infrastructure	Polygons downslope of Project infrastructure	Polygons upslope of Project infrastructure
Rail Concentrate Loadout Area	-	-	-	-	-
Mine Access Road	Debris slide	535, 643	141, 686, 709	483, 647, 756	-
Non-PAG Waste Rock Water Management Pond and Non-PAG Waste Rock	Debris slide	219, 229, 252, 244, 208, 237, 267	240, 251, 259, 208, 254, 237, 229, 219, 252, 288, 287	267, 275, 291	236, 276, 281
	Snow Avalanche	251, 259			
	Rockfall and Snow Avalanche	240			
Open Pit	Debris slide	219, 229, 208	219, 229, 208	Polygons consisting of steep gully walls in Baker Creek and P Creek	-
Overburden Stockpile	-	-	-	-	-
West Topsoil Stockpile	-	-	-	-	-
PAG, Non-PAG, Processing Plant, East Topsoil Stockpile, North TMF Water Management Pond	-	-	-	-	-
Tailings Pipeline	Debris slide	252, 208, 219	252, 208, 219, 288	Polygons consisting of steep gully walls in P Creek	-

(continued)

Table 4.2-1. Summary of the Proximity of Existing and Proposed Infrastructure to Geohazards and Potentially Unstable Terrain (completed)

Infrastructure Type	Geohazards with Potential to Affect Project Infrastructure		Potentially Unstable or Unstable Terrain[1]		
Tailings Management Facility Pond and North TMF Water Management Pond	Rockfall	404, 409	404, 409, 476	-	412
Main Embankment and South TMF Water Management Pond	Rockfall	404, 409	404, 409, 476	347, 357, 341, 339, 350, 356, 361, 354, 370, 371, 375, 373, 396, 403,368	-
South Topsoil Stockpile	-	-	-	-	-
Explosives Facility	-	-	-	-	-
Power Lines	Debris slide	Option 1: 519	519, 555, 522, 463, 141	-	709
	Debris slide	Option 2, Alt. 1: 602	602, 555, 627, 626, 141	-	709
		Option 2, Alt 2:	555, 638, 627, 141	-	709

Notes: [1]. Terrain Stability Class IV and V
Source: Appendix 5-C:. Harper Creek Project: Terrain Mapping and Geohazards prepared by Polar Geoscience

Section 6.0 in Appendix 5-C provides a detailed description of the proximity of geohazards and potentially unstable terrain with respect to existing and proposed Project infrastructure. This information is summarized in Table 6.1 in Appendix 5-C. Section 6.0 also discusses locations where potential instability from unstable terrain could impact Project infrastructure. This is summarized in Table 4.2-1, which show the Project infrastructure in relation to the type of geohazard and terrain polygon number.

Proposed mine infrastructure is located on and above potentially unstable and unstable terrain in P Creek. Geohazards initiating in P Creek could potentially impact the main embankment. The Main Embankment and South TMF Water Management Pond are located upslope from potentially unstable terrain and unstable terrain in T Creek and adjacent the bedrock slump. Geohazards initiating from these areas could potentially impact infrastructure if slope failure occurs. It is unlikely that proposed and existing mine infrastructure will trigger a geohazard that will impact areas to the east of the TMF. See Appendix 5-C for a complete listing of geohazards and Project infrastructure.

4.3 SOIL MAPPING AND SOIL CHARACTERIZATION

4.3.1 Regional Soil Mapping

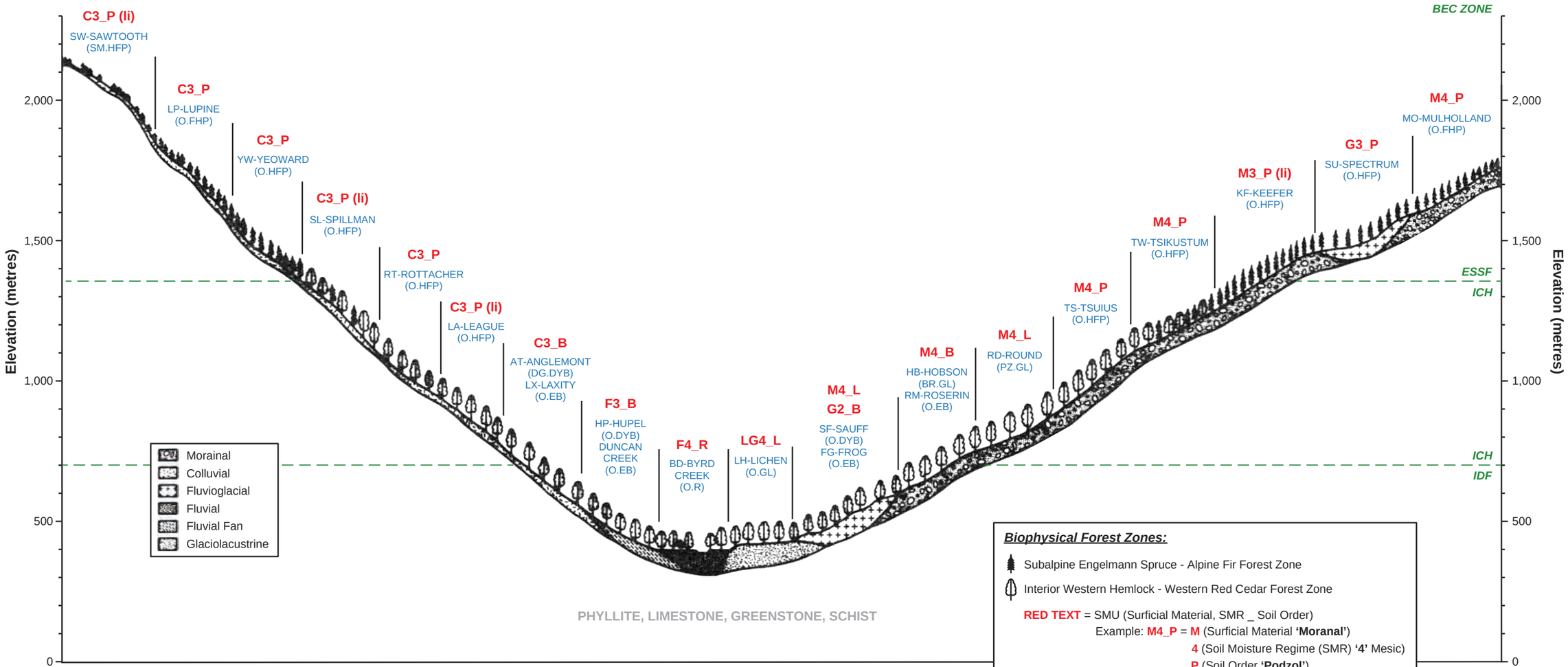
The soil landscapes in the Shuswap Highland region are described at an exploratory level by Valentine et al (1978) and described and mapped at the association level by Kowall (1980). The regional soil association concept uses two higher level differentiating criteria: climate (as inferred from biophysical forest classes) and geology (major bedrock type underlying the soil mantle). The LSA is entirely within an area described as the Interior Wet Belt. Within the LSA, the milder, lower elevation forests are classified as IwH-wC (similar to the lower elevations of the ICH and IDF BEC Units). The IwH-Wc includes the proposed load-out facility and lower sections of the power-line and access road corridor (below approximately 1,300 masl) (Figure 4.3-1). The colder, wetter higher elevation forests are classified as SAeS-alF (generally similar to the ESSF BEC Unit). The SAeS-alF class includes the upper portions of the infrastructure corridor (road and power-line) and the proposed Project Site facilities. The current BEC zone equivalents of the biophysical forest classes are noted on the cross section in Figure 4.3-1.

Major bedrock type differences occur in a north to south direction in the vicinity of the proposed Project Site; the northern extension of the 'Baldy Batholith: quartz monzonite' borders the 'Eagle Assemblage: orthogneiss' (granite to diorite sill and dyke) and other assemblage units to the north of the Project Site include metamorphic and volcanic rocks, flows and tuffs.

A simplified soil legend for the regional soil map is presented in Table 4.3-1. The schematic cross-section of soil development and parent materials, and biophysical forest zonation from valley bottom (below 500 masl) to ridge top (2,100 masl) is provided in Figure 4.3-1 (excerpt from Kowall 1980). Other cross sections in the regional report show Soil Association by parent material and biophysical forest zonation overlying two additional general bedrock types, volcanic (typical of the central LSA) and gneiss/granitic (typical of the extreme southern edge of the LSA). The regional soil association mapping covers the entire LSA (southern portion and northern portion, respectively; Figure 4.3-2). Polygon colours are based on the soil parent material of the primary soil association of each polygon.

Figure 4.3-1

Typical Regional Soil Association Landscape Cross Section within the Shuswap Highlands overlying Bedrock comprising Phyllite, Limestone, Greenstone and Schist



Source: Revised from Kowall, 1980.

Figure 4.3-2

Regional Soil Association Map of the Terrestrial Local Study Area

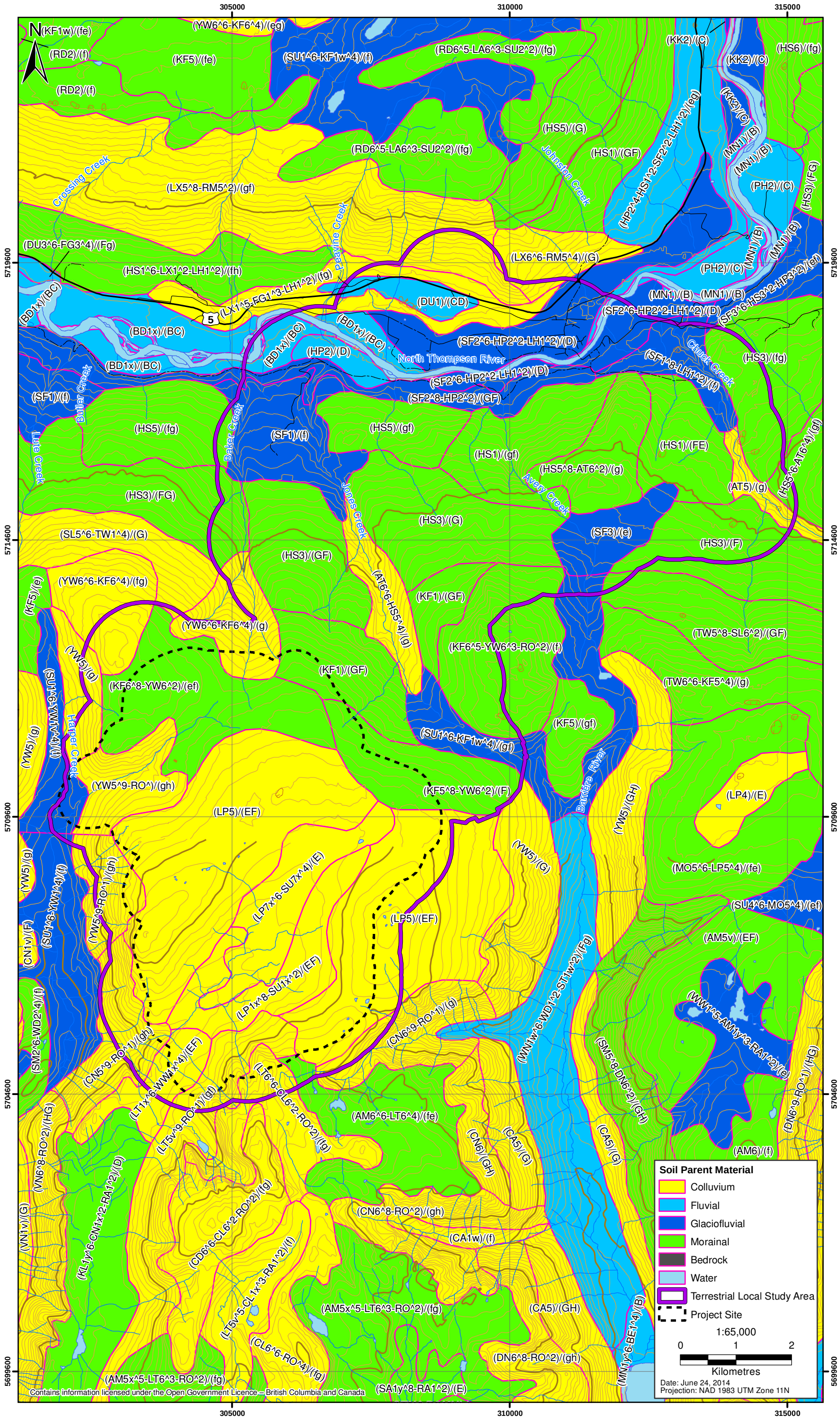


Table 4.3-1. Simplified Soil Legend for Regional Soil Associations

Symbol	Name	Climate Forest Zone[1]	Parent Material	Texture	Drainage	Soils Type	Description
BD	Bird Creek	I	Fluvial	Silt loam, fine sandy loam	moderately well drained - imperfect	Regosol	Undulating floodplain terraces
DU	Duncan Creek	I	Fluvial	Gravelly sand	Well	Eutric Brunisol	Moderately sloping fans
FG	Frog	I	Fluvio-glacial	Gravelly sand	Rapid	Eutric Brunisol	Undulating or rolling terraces (sometimes gullied)
HP	Hupel	I	Fluvial	Gravelly sand	Well (some seepage)	Dystric Brunisol	Moderately sloping fans
HS	Hobson	I	Morainal	Gravelly loam	moderately well drained	Luvisol	Rolling hillside to steep valley slope
KF	Keefer	III	Morainal	gravelly sandy loam, gravelly loam	moderately well drained	Orthic humo-ferric Podzol	Rolling plateaus and steep mountainous slopes
LH	Lichen	I	Glaciolacustrine	Silt loam	Well to imperfect	Orthic Gray Luvisol	Rolling and undulating plain
LP	Lupine	III	Colluvial	Gravelly loam, gravelly sandy loam	well drained	Orthic ferro-humic Podzol	Rolling plateaus and steep mountainous slopes
LT	Lost	III	Colluvial	Gravelly loam, gravelly sandy loam	well drained	Lithic ferro-humic Podzol	Rolling plateaus and steep mountainous slopes
LX	Laxity	I	Colluvial	gravelly sandy loam	well drained	Eutric and Dystric Brunisols (lithic)	Steeply sloping valley walls, mountainous slopes
MO	Mulholland	III	Morainal	Gravelly loam, gravelly sandy loam	Moderately well (some seepage)	Orthic humo-ferric Podzol	Rolling plateaus to steep mountain slopes
RA	Rayonier	III	Organic	Fibric	Very poor	Fibrisol	Flat to depressional
RM	Roserim	I	Morainal	gravelly sandy loam, gravelly loam	Well drained	Brunisol	Steeply sloping valley walls
RO	Rock Outcrop	-		-	rapidly drained	Non-soil	Exposed bedrock
SF	Sauff	I	Fluvio-glacial	(Gravelly) sand	Rapid (some seepage)	Dystric Brunisol	Rolling hillside to steep valley slope

(continued)

Table 4.3-1. Simplified Soil Legend for Regional Soil Associations (completed)

Symbol	Name	Climate Forest Zone[1]	Parent Material	Texture	Drainage	Soils Type	Description
SL	Spillman	II	Colluviul	Gravelly loam, gravelly sandy loam	Rapid (some seepage)	Lithic humo-ferric Podzol	Rolling hillside to steep valley slope
SU	Spectrum	III	Fluvio-glacial	gravelly sand	Rapid	Orthic humo-ferric Podzol	Gently to strongly rolling terrain
TW	Tsikustum	II	Morainal	Gravelly loam, gravelly sandy loam	Moderately well	Orthic humo-ferric Podzol	Steeply sloping valley walls
WW	Warsaw	III	Fluvio-glacial	gravelly sand	Rapid	Orthic humo-ferric Podzol	Gently to strongly rolling
YW	Yeoward	III	Colluvial	gravelly sandy loam, gravelly loam	well drained	Orthic humo-ferric Podzol	Rolling plateaus and steep mountainous slopes

Notes:
See Figures 4.3-1 and 4.3-2.
[1] Climate codes (Biophysical Forest zones): I – Interior western hemlock – red cedar 'ICH':a', II – ICH:b, III –Subalpine Engelmann spruce-alpine fir 'ESSF':a

A summary of generalized Soil Association type and extent for the LSA, as outlined on Figure 4.3-2, is presented in Table 4.3-2. The summary is by the parent material of the dominant Soil Association in each polygon, and by biophysical forest zonation groupings reflective of two general soil climates.

Table 4.3-2. Extent (ha) of Regional Soil Association Types by Soil Climate and Parent Material within the Local Study Area

Parent Material	Generalized Elevation		Extent	
	Low; Mid[1]	High[1]	ha	% of LSA
	Regional Soil Association			
C - Colluvial	AT, LX; SL	CN, LP, LT, YW	4,351	39%
M - Morainal	HS, RM; TW	AM, KF	4,591	42%
G - GlacioFluvial	FG, SF	SU, WW	1,674	15%
F- Fluvial	BD, DU, HP		339	3%
LG-Glaciolacustrine	LH	LH	-	0%
O- Organic		RA	-	0%
non-soil			66	1%
Total			**11,021**	**100%**
Extent (ha)	5,052	5,969		
Extent (%)	46%	54%		

[1] *Soil Climate is determined as follows:*

Generalized Elevation	*Climate (Biophysical Forest Zonation)*	*BEC Subzone Equivalent (approx.)*
Low; Mid	*IWB IwH-wC:a*	*IDFmw2; ICHdw3, ICHmw3*
Mid	*IWB IwH-wC:b*	*ICHmw3, ESSFwc2*
High	*IWB SAeS-alF:a*	*ESSFwc2, wcw, wcp*

The most common soils mapped in the LSA, are well to moderately well drained, Humo-Ferric Podzol and Ferro-Humic Podzol great groups, reflective of the wet, cool environment that affects soil formation. Soil parent materials commonly include both gravelly, sandy to loamy textured, compact morainal and loose colluvial materials. These materials occur on the valley side slopes and the rolling, upper highland areas (Soil Associations: morainal AM, KF, KL, MO, TW; colluvial CL, CN, LP, LT, YW).

Gray Luvisols, developed on gravelly, loamy morainal materials are common on the lower elevation, north aspect slopes above the North Thompson River (Soil Association: HS - Brunisolic Gray Luvisols, RD- Podzolic Gray Luvisols). Recent, variably gravelly, coarse to medium textured, fluvial materials are extensive in the North Thompson River valley bottom plains and terraces. Young, weakly developed, neutral reaction, Orthic Regosols and Eutric Brunisols (Soil Associations BD, DU) are common in these areas, though slightly more weathered Dystric Brunisols (Soil Association HP) also occur on older terraces and fans. Sinuous and fan-like fluvial deposits occur in the narrow valleys on the upper highland plateau (Soil Associations: HP, MN, WN). Gravelly, sandy glaciofluvial materials occur sporadically within the LSA at both lower and upper elevations (Soil Association: SU, WW). Organic soils occur rarely in the LSA (Soil Association: RA).

4.3.2 Local Soil Mapping and Characterization

Understanding the characteristics and extent of soil types within the LSA is essential to managing the soil resources of the area. To meet these objectives, additional soil data were compiled and more intensive soil mapping undertaken. A range of project-specific soils data was compiled both spatially (sites noted on a map) and in tabular format (Appendix A and Appendix B). The data were obtained from both a recent site-specific soil survey and from other project reports containing soil-related data. The compiled data are for use in the current baseline report as well as for more detailed future assessments (Appendix A and Appendix B). The more detailed mapping (1:20,000 scale at SIL 3 to 2) was undertaken to provide information to spatially assess project impacts. The soil map of the LSA is presented in Figure 4.3-3 with complete label attribution and data summaries for that map in Appendix C.

Figure 4.3-3 shows uniquely numbered, soil polygons that are labelled to reflect the dominant SMUs in each polygon. Appendix C provides a comprehensive list of SMU composition by soil polygon number. At its highest level, the soil map reflects soil climate variation by BEC subzone variants. Soil climate affects both general soil weathering processes and the range of vegetation that is adapted to this climate zone. Individual soil polygons reflect changes in one or more of parent material, soil moisture (drainage), depth to bedrock and soil development depths.

The current soil studies characterize the landscape according to interpretable soil units, described previously as SMUs. The SMUs reflect characteristics important for soil impact assessment and management, especially related to reclamation and soil handling considerations. SMUs are described in the following subsection.

4.3.2.1 Soil Map Units

Individual SMU's are defined by a combination of attributes, including: soil climate, parent material (bioterrain surficial material), drainage (as derived from soil moisture regime 'SMR'), and probable soil development to the order level of classification according to the Soil Classification Working Group 1998).

Characterization of SMU soil properties including horizon type and depths, texture, coarse fragment content, and basic chemistry are derived from the field soil inspection and sampling analytical site data (Appendix A; Appendix B). Each soil inspection site is assigned an SMU designation based on these attributes (Tables A1-1 and A1-2, Appendix A).

Photos of soil profiles of typical SMUs in the Project Site are included in Plates 4.3-1 through 4.3-12.

Over 100 unique SMUs are defined in this GIS-based process. For management purposes these SMUs are grouped into three generalized landscape positions, resulting in 18 groupings according to their most significant management characteristics (see discussion of Land Management Units in Section 4.4.2.3 below).

Plate 4.3-1. Soil profile typical of SMU M3_P, Site HC-38.

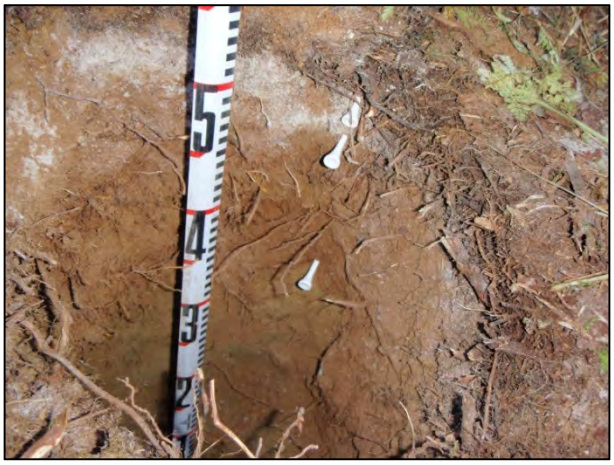


Plate 4.3-2. Soil profile typical of M3_P.li, Site HC-32.

Plate 4.3-3. Soil profile typical of SMU M5_Bm.g, Site HC-31.

Plate 4.3-4. Soil profile typical of SMU M3_P.li, Site HC-19.

Plate 4.3-5. Soil profile typical of SMU M4_P, Site HC-18.

Plate 4.3-6. Soil profile typical of SMU D(M)3_P, Site HC-13.

Plate 4.3-7. Soil profile typical of SMU C2_P, Site HC-25.

Plate 4.3-8. Soil profile typical of SMU C2_P, Site HC-25.

Plate 4.3-9. Soil profile typical of SMU C4_P, Site HC-29.

Plate 4.3-10. Soil profile typical of SMU G3_P, Site HC-08.

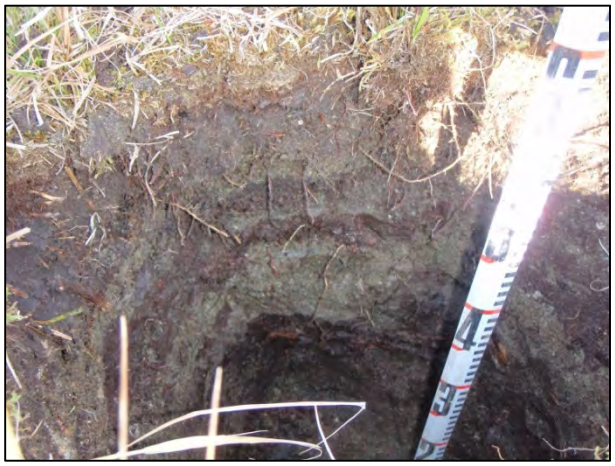


Plate 4.3-11. Soil profile typical of SMU F5_R.cu, Site HC-01.

Plate 4.3-12. Soil profile typical of SMU O6_M.t, Site HC-15.

4.3.2.2 Soil Map of the LSA

The most general level of soil landscape differentiation is soil climate, which was derived from BEC zone mapping. It should be noted that the provincial BEC subzone variant boundaries have been altered slightly as part of the TEM survey (Keystone 2013) and these BEC attributes form part of the soil polygon attributes included in Appendix C.

In a specific soil climate (BEC) zone, the primary attribute in defining an SMU is the soil parent material, as defined by the bioterrain mapping surficial material. Soil Moisture Regime is the secondary attribute and is a proxy for soil drainage. It is derived from the TEM site series data for the polygon. Soil Moisture Regime has a strong influence on soil horizon development and is a principal parameter used in defining probable soil order classification for each SMU based on local soil development/landscape relationships.

A total of 782 soil polygons with unique combinations of SMUs are defined for the LSA. These polygons are based on TEM linework. TEM polygons are only combined where TEM attributes do not reflect differences in soil type (i.e. no structural stage differences within the same site series).

The soil map provides an interpretation of the approximate extent of various soil types across the LSA. Site-specific confirmation of the soil parent material characteristics (thickness of material and physical characteristics) are derived from both the reconnaissance terrain inspections (Appendix A; Table A2-4), the geotechnical test pit log/photo (Table A3-2) and lab sample analyses (Table B2-3). This information is provided in Appendices A and B.

4.3.2.3 Land Management Units (LMUs)

For general discussion and management purposes the range of individual SMUs, identified on Figure 4.3-3, are grouped into land management units reflective of characteristics that are important for soil management, particularly soil salvage and use in reclamation. These characteristics include:

- soil climate and general topography;
- soil parent material;
- site drainage (grouped by dry-moist- SMR 1-4, or wet, SMR 5-7);
- soil development (non-soil, developed);
- depth to bedrock (> 1 m, <1 m, exposed bedrock); and
- non-soil: areas of bedrock, disturbed areas and or open water.

Using these general criteria the range of SMUs, noted on the Soil Map (Figure 4.3-3) and listed in Table 4.3-3, are reclassified into 15 LMUs, as correlated in Table 4.3-4. Photos typical of SMUs within the LMUs common to the Project Site are noted in the previous subsection.

Table 4.3-3. Extent (ha) of Generalized Soil Map Units (SMUs) within the LSA

	Extent of SMU within LSA		Surficial Material	
UniqueSoils	ha	% LSA	ha	%
An_n	233.2	2.1%	233.2	2.1%
C0_n	1.0	0.0%	-	-
C1_P	1.3	0.0%	-	-
C1_P.li	23.2	0.2%	-	-
C1_R	0.7	0.0%	-	-
C2_B	7.0	0.1%	-	-
C2_B.dy	19.8	0.2%	-	-
C2_B.e	6.9	0.1%	-	-
C2_B.li	21.2	0.2%	-	-
C2_P	16.3	0.1%	-	-
C2_P.li	5.8	0.1%	-	-
C3_B	51.3	0.5%	-	-
C3_B.dy	18.2	0.2%	-	-
C3_B.e	7.8	0.1%	-	-
C3_B.li	12.0	0.1%	-	-
C3_B.m	1.6	0.0%	-	-
C3_Be	4.2	0.0%	-	-
C3_P	256.7	2.3%	-	-
C3_P.li	165.5	1.5%	-	-
C4_B	25.8	0.2%	-	-
C4_B.li	12.8	0.1%	-	-
C4_P	284.0	2.6%	-	-
C4_P.g	28.3	0.3%	-	-
C4_P.li	93.6	0.8%	-	-
C5_B	3.0	0.0%	-	-
C5_B.g	31.3	0.3%	-	-
C5_G	11.6	0.1%	-	-
C5_L.g	2.0	0.0%	-	-
C5_P.g	32.0	0.3%	-	-
C5_R	1.3	0.0%	-	-
C6_G	10.3	0.1%	1,156.6	10.5%
D1_B.li	23.6	0.2%	-	-
D1_n	7.1	0.1%	-	-
D1_R	9.9	0.1%	-	-
D2_P	3.8	0.0%	-	-
D2_P.li	8.3	0.1%	-	-

(continued)

Table 4.3-3. Extent (ha) of Generalized Soil Map Units (SMUs) within the LSA (continued)

	Extent of SMU within LSA		Surficial Material	
UniqueSoils	ha	% LSA	ha	%
D3_B	1.5	0.0%	-	-
D3_B.li	116.6	1.1%	-	-
D3_Bli	0.3	0.0%	-	-
D3_P	4.6	0.0%	-	-
D3_P.li	67.7	0.6%	-	-
D3_R	7.8	0.1%	-	-
D3_R.li	1.8	0.0%	-	-
D4_B	242.4	2.2%	-	-
D4_B.li	52.6	0.5%	-	-
D4_P	28.7	0.3%	-	-
D5_B.li	1.3	0.0%	-	-
D5_P.g	1.7	0.0%	579.6	5.3%
F1_R	1.9	0.0%	-	-
F2_B	48.1	0.4%	-	-
F2_B.e	14.8	0.1%	-	-
F2_R	1.0	0.0%	-	-
F3_B	178.3	1.6%	-	-
F3_n	0.4	0.0%	-	-
F3_R	13.8	0.1%	-	-
F4_B	86.3	0.8%	-	-
F4_B.dy	5.5	0.0%	-	-
F4_B.g	48.3	0.4%	-	-
F4_L	32.4	0.3%	-	-
F4_P	27.7	0.3%	-	-
F4_R	19.4	0.2%	-	-
F4_R.g	11.8	0.1%	-	-
F5_B.g	34.9	0.3%	-	-
F5_G	27.1	0.2%	-	-
F5_G.p	1.7	0.0%	-	-
F5_P.g	2.7	0.0%	-	-
F5_R.g	25.0	0.2%	-	-
F6_G	2.4	0.0%	-	-
F6_G.p	2.5	0.0%	-	-
F6_G.pt	2.6	0.0%	-	-
F7_G	4.9	0.0%	-	-
Fn_n	8.9	0.1%	602.4	5.5%

(continued)

Table 4.3-3. Extent (ha) of Generalized Soil Map Units (SMUs) within the LSA (continued)

	Extent of SMU within LSA		Surficial Material	
UniqueSoils	ha	% LSA	ha	%
G2_B	81.3	0.7%	-	-
G2_B.dy	25.9	0.2%	-	-
G2_B.e	12.0	0.1%	-	-
G3_B	280.5	2.5%	-	-
G3_B.dy	214.6	1.9%	-	-
G3_B.m	3.7	0.0%	-	-
G3_P	74.9	0.7%	-	-
G4_B	59.6	0.5%	-	-
G4_B.dy	236.0	2.1%	-	-
G4_B.g	24.6	0.2%	-	-
G4_P	29.7	0.3%	-	-
G5_B.g	3.4	0.0%	-	-
G5_G	12.4	0.1%	-	-
G5_P.g	8.0	0.1%	-	-
G7_G	1.0	0.0%	-	-
Gn_n	8.1	0.1%	1,075.7	9.8%
L4_L	0.7	0.0%	-	-
L5_L.g	4.7	0.0%	-	-
LG2_L	10.8	0.1%	-	-
LG3_L	24.0	0.2%	-	-
LG3_P	10.9	0.1%	-	-
LG4_B.g	2.3	0.0%	-	-
LG4_L	36.1	0.3%	89.5	0.8%
M_P.li	14.3	0.1%	-	-
M1_B	10.8	0.1%	-	-
M1_B.e	2.4	0.0%	-	-
M1_B.li	67.7	0.6%	-	-
M1_P	25.4	0.2%	-	-
M1_P.li	3.0	0.0%	-	-
M2_B	67.4	0.6%	-	-
M2_B.e	1.2	0.0%	-	-
M2_B.li	7.3	0.1%	-	-
M2_B.m	7.9	0.1%	-	-
M2_L	51.8	0.5%	-	-
M2_n	1.1	0.0%	-	-
M2_P	25.2	0.2%	-	-

(continued)

Table 4.3-3. Extent (ha) of Generalized Soil Map Units (SMUs) within the LSA (completed)

	Extent of SMU within LSA		Surficial Material	
UniqueSoils	ha	% LSA	ha	%
M2_P.li	4.3	0.0%	-	-
M3_B	154.7	1.4%	-	-
M3_B.dy	2.6	0.0%	-	-
M3_B.m	6.2	0.1%	-	-
M3_L	445.2	4.0%	-	-
M3_P	477.9	4.3%	-	-
M3_P.li	275.5	2.5%	-	-
M4_B	211.0	1.9%	-	-
M4_B.g	19.4	0.2%	-	-
M4_B.li	2.5	0.0%	-	-
M4_L	693.3	6.3%	-	-
M4_P	2,949.5	26.8%	-	-
M4_P.g	4.8	0.0%	-	-
M4_P.li	1,074.1	9.7%	-	-
M5_B	5.0	0.0%	-	-
M5_B.g	7.9	0.1%	-	-
M5_G	26.9	0.2%	-	-
M5_P.g	212.8	1.9%	-	-
M6_G	17.2	0.2%	-	-
M6_G.p	3.2	0.0%	-	-
Mn_n	1.6	0.0%	6,880.9	62.4%
n_n	14.8	0.1%	14.8	0.1%
O7_M	201.8	1.8%	-	-
O7_M.t	1.0	0.0%	202.8	1.8%
OW	72.1	0.7%	-	-
ow9_n	2.3	0.0%	74.4	0.7%
R0_n	6.2	0.1%	-	-
R1_n	94.8	0.9%	-	-
R1_R	6.0	0.1%	-	-
R2_R	0.8	0.0%	-	-
R3_n	0.7	0.0%	-	-
R3_P.li	0.3	0.0%	-	-
R5_B	2.4	0.0%	111.3	1.0%
Total	**11,021.3**	**100.0%**	**11,021.3**	**100.0%**

Table 4.3-4. Correlation of Land Management Units (LMUs) and Soil Map Units (SMUs)

LMU	Surficial Material	BEC Zone (typical)	Soil Map Units (SMU) Included in LMU
Soil Landscape – Rolling Highland Plateau (Soil climate[1]: ESSFwc2, ESSFwcw)			
1	M	ESSF	M_P.li, M1_B, M1_B.e, M1_B.li, M1_PM1_P.li, M2_B, M2_B.e, M2_B.li, M2_B.m, M2_n, M2_P, M2_P.li, M3_B, M3_B.dy, M3_B.m, M3_P, M3_P.li, M4_B, M4_B.g, M4_B.li, M4_P, M4_P.g, M4_P.li
2	M	ESSF	M5_B, M5_B.g, M5_G, M5_P.g, M6_GM6_G.p, Mn_n, M6_G.p, Mn_n
3	D	ESSF	D1_B.li, D2_P, D2_P.li, D3_B, D3_B.liD3_Bli, D3_P, D3_P.li, D3_R, D3_R.li, D4_B, D4_B.li, D4_P, D5_B.li, D5_P.g, D1_R
4	O	ESSF	O7_M, O7_M.t
5'	C	ESSF	*included in LMU '5'*
Soil Landscape – Mid to upper Valley Side Slopes (Soil climate[1]: ICHdw3, ICHmw3, ICHwk1)			
5	C	ICH	C1_P, C1_P.li, C2_B, C2_B.dy, C2_B.e, C2_B.li, C2_P, C2_P.li, C3_B, C3_B.dyC3_B.eC3_B.li, C3_B.m, C3_Be, C3_P, C3_P.li
6	C	ICH	C5_B, C5_B.g, C5_G, C5_L.g, C5_P.g, C5_R, C6_G
7	M	ICH	M2_L, M3_L, M4_L
8	LG (L)	ICH	L4_L, LG2_L, LG3_L, LG3_P, LG4_LL5_L.g, LG4_B.g
Soil Landscapes – Valley bottom and lower valley slopes (Soil Climate [1]: IDFmw2, lower portion of ICHdw3)			
7'	M	IDF	*included in LMU '7'*
9	G	IDF	G2_B, G2_B.dy, G2_B.e, G3_B, G3_B.dyG3_B.m, G3_P, G4_B, G4_B.dy, G4_B.g, G4_P, G5_B.g, G5_G, G5_P.g, G7_G
10	F	IDF	F2_B, F2_B.e, F3_B, F4_B, F4_B.dyF4_B.g, F4_L, F4_P
11	F	IDF	F1_R, F2_R, F3_n, F3_R, F4_R, Fn_n, Gn_n; C0_n, C1_R
12	F	IDF	F4_R.g, F5_B.g, F5_G, F5_G.p, F5_P.gF5_R.g, F6_G, F6_G.p, F6_G.pt, F7_G
Non-soil Landscapes			
13	R	-	R0_n, R1_n, R1_R, R2_R, R3_n, R3_P.li, D1_n
14	A	3	An_n, n_n
15	OW	-	OW

[1] *Soil Climate as described by the BEC subzone variant.*

In the following discussion LMUs are separated into three groups according to their general regional position in the landscape and BEC Units as follows:

1. rolling Highland Plateau (ESSF including the ESSFwc2 and ESSFwcw);
2. mid to upper valley side-slopes (ICH including the ICHdw3 and ICHmw3); and
3. valley bottom and lower valley slopes (IDFmw2 and the lower portion of ICHdw3).

The general attributes of each LMU group are summarized in Table 4.3-5. The regional soil survey Soil Association(s) closest to that being described by the LMU is indicated in the table. Descriptions of soils in areas not sampled as part of the current project are from the regional survey (Kowall 1980).

Table 4.3-5. Land Management Unit (LMU) Landscape and Soil Characteristics and Approximate Regional Soil Association Equivalents

LMU Symbol	Climate Class [1]	Parent Material	Texture	Drainage	Soils Type	Soil Association Equivalent	Landscape Description
Soil Landscape I - rolling valley bottom and lower valley slopes							
1	1, 2	Morainal	Gravelly loam, gravelly sandy loam	Moderately well (some seepage)	Orthic humo-ferric Podzol	MO, KF, TW	Rolling plateaus to steep mountain slopes
2	1	Morainal	gravelly sandy loam, gravelly loam	Imperfect to poor	Gleysols and Gleyed humo-ferric Podzol	MOx, KFx	lower slopes and depressions in Rolling plateaus and steep mountainous slopes
3	1, 2	Residual	Gravelly loam, gravelly sandy loam	Rapid (some seepage)	Lithic. Humo-ferric Podzol, Lithic Brunisols	$LT_{5,6}$; $SL_{5,6}$	Rolling hillside to steep valley slope
4	1	Organic	Fibric	Very poor	Fibrisol	RA	Flat to depressional
Soil Landscape II - mid to upper valley side slopes							
5	1, 2	Colluvial	gravelly loam, gravelly sandy loam	Well drained	Orthic and lithic ferro-humic Podzol	LP, LT, LX, YW	Rolling plateaus and steep mountainous slopes
6	1, 2	Colluvial	gravelly loam, gravelly sandy loam	Imperfect to poor	Gleysols and Gleyed humo-ferric Podzol	LPx, LTx, Ywx	lower slopes and depressions in Rolling plateaus and steep mountainous slopes
7	1, 2	Morainal	gravelly loam, gravelly sandy loam	Moderately well, well	Luvisol, Brunisol	HS, RM,	Rolling hillside to steep valley slope

(continued)

Table 4.3-5. Land Management Unit (LMU) Landscape and Soil Characteristics and Approximate Regional Soil Association Equivalents (completed)

LMU Symbol	Climate Class [1]	Parent Material	Texture	Drainage	Soils Type	Soil Association Equivalent	Landscape Description
Soil Landscape III - valley bottom and lower valley slopes							
8	3	Glaciolacustrine	Silt loam	Well to imperfect	Orthic Gray Luvisol	LH	Rolling and undulating plain
9	3 (1)	Fluvio-glacial	Gravelly sand - sandy	Rapid (some seepage)	Eutric Brunisol, Dystric Brunisol (includes upper elevation Orthic humo-ferric Podzol)	FG, SF (SU, WW)	Undulating or rolling hillside and terraces (sometimes gullied); upper elevation gently to strongly rolling
10	3	Fluvial	Gravelly sand	Well (some seepage)	Eutric Brunisol, Dystric Brunisol	DU, HP	Moderately sloping fans
Soil Landscape III - valley bottom and lower valley slopes *(cont'd)*							
11	3	Fluvial	Silt loam, fine sandy loam	Moderately well drained - imperfect	Regosol	BD	Undulating floodplain terraces
12	3	Fluvial	variable	Poor to imperfect	Gleysols and Gleyed Brunisols, Regosols	BDx, HPx	depressions of undulating floodplain terraces; lowbank terraces
Non-Soils							
13	-	bedrock	-	-	Non-soil	RO	Exposed bedrock
14	3	Anthropogenic and urban lands			Non-soil	none	Areas disturbed by human activity
15	-	water	-	-	Non-soil	-	Open water (commonly rivers)

[1] *Soil climate codes: 1 - ESSF, 2 - ICH, 3 – IDF.*
See Figure 4.3-4.

Soil Landscape I – Rolling Highland Plateau (Soil climate BEC Units: ESSFwc2 and ESSFwcw)

LMU 1: Regional soils MO, KF; gl, gsl

LMU 1 soils are typically rapidly to well drained (SMR ranges 1 to 4). Podzols have developed in course to medium textured, gravelly to cobbly, compact, morainal materials. Coarse fragments are often subangular to subrounded. These soils occur on undulating to rolling and at times steep terrain. Typical SMUs include M3-P, M4-P as illustrated by sites includeing HC-02, HC-11, HC-12, HC-13 (Plate 4.3-1). Lithic variants are common in the steeper terrain: SMU M3/M4-P.li (HC-04, HC-05). LMU 1 includes some morainal soils in the upper part of the ICH (similar to soil association KF).

LMU 2: Regional soil MO2; gl, gsl

Poorly to imperfectly drained (SMR 6 to 5), Gleysols and gleyed Brunisols and gleyed Podzols developed in moderately course to medium textured, non-gravelly to gravelly, occasionally cobbly, compact morainal materials. Typical SMUs include M5-P.g and M6-R.g, as illustrated by sites including HC-36 and HC-40 (Plate 4.3-3, HC-31). Morainal soils with cappings or veneers of medium to moderately fine textured (clay loam), glaciolacustrine materials have been observed in the basin area in association with shallow organic soils (LMU 4), similar to a wet soil association LH (wet phase). LMU 2 includes small areas of poorly drained, morainal soils in the ICH.

LMU 3: Regional soil shallow LP_{5-6},(SL_{5-6} in ICH); gl, gsl

Soils of LMU 3 are characteristically, rapidly to well drained (SMR ranges 1 to 4). They are Brunisolic and Podzolic soils developed in medium to coarse textured, skeletal, often angular, gravelly to cobbly, weathered bedrock material (lithic contact shallow to irregular). LMU 3 soils typically occur in moderately steep and strongly sloping, rolling terrain commonly associated with bedrock outcrops. Shallow, often discontinuous veneers of glacial till, may occur in this unit. Typical SMUs include D3-P.li and D2-B.li (Plate 4.3-6, HC-13).

LMU 4: Regional soils RL, RA; organic

LMU 4 soils are very poorly drained (SMR 6 and 7), shallow to moderately deep, organic soils. They are commonly classified as terric Fibrisols and terric Mesisols, depending the degree of organic matter decomposition exhibited in the profile. Some profiles exhibit cumulic characteristics, i.e., organic matter layers with thin to thick, horizontal mineral layers. An associated soil, exhibiting shallow, surface, peaty layers (> 0.1m, < 0.4m thick) is classified as peaty phase Regosol. The deepest recorded organic soil was at site TP43. It displayed a mineral contact at 1.1 m. Typical SMUs include O7_M, O6_M.t and M6_G.pt. Typical sites include TP43 (O7_M), HC-07 (M6_G.pt), HC-15 (O6_M.t), KS PU09072011-02 (O7_G.pt), HC08-12 (O6), HC08-110 (O6), HC08-18, and 114 (O6_G.pt)

Soil Landscape II – Mid to Upper Valley Side Slopes (Soil climate BEC Units: ICHdw3 and ICHmw3)

LMU 5: Regional soil LX (ICH); LT, YW, LP at higher elevations ESSF; gsl, gl

LMU 5 typically occurs in steep, moderately steep and strongly sloping colluvial terrain. It is commonly associated with bedrock outcrops and gully slopes on the mid to upper valley side slopes, extending up into the Highland plateau. Soils are commonly rapidly to well drained (SMR ranges 1 to 4). The well-developed Brunisolic and Podzolic soils developed in loose to firm, medium to coarse textured, gravelly to cobbly (rarely rubbly) 'skeletal', and colluvial materials. Coarse

fragments are often subangular to angular in shape. Typical SMUs include C2_P, C4_P. Sites HC-25, HC-29 (Plates 4.3-7, 4.3-8, and 4.3-9) and HC08-49 are examples of LMU 5.

LMU 6: Regional soil AT, SL, YW, seep/impeded drainage v,w,x,y

LMU 6 soils are the poorly to imperfectly drained (SMR 5 to 6), Gleysols and gleyed Brunisols or gleyed Podzols. Soils are commonly developed in course to medium textured, gravelly to skeletal colluvial materials. These soils are typically found in lower slope positions, seepage areas, gully bottoms and seep affected lower slopes. Typical SMUs include C5_P.g, C6_G, as illustrated by sites including HC08-38 and HC08-98.

LMU 7: Regional soil RM, HS; gsl,gl, gl

LMU 7 terrain includes undulating to rolling hillsides to steep valley side slopes, extending from the valley bottom to about mid-way up the valley sides slopes of the Thompson River valley. Soils typically include well drained, Luvisolic and Brunisolic soils, developed in gravelly sandy loam, gravelly loam or gravelly clay loam, moderately compact, calcareous, basal till, common to the low to mid elevation (IDF, ICH zones). The luvisolic soils display a clay enriched B horizon. Typical SMUs include M4_L, M3-B, as illustrated by sites including LAF3, and LAF4.

<u>Soil Landscapes III– Valley Bottom and Lower Valley Slopes (Soil Climate BEC Units: IDFmw2 and the lower portion of ICHdw3)</u>

LMU 8: Regional soil LH1; SiL

Soils within LMU 8 are of glaciolacustrine (LG) origin, are often well to moderately well drained (SMR 2-4), and silty to fine sandy textured. The less weathered subsoil often displays a platy structure and is slowly pervious. These soils are not extensive and typically occur on undulating to rolling terrain. They have been mapped as Luvisols, displaying relative clay enrichment in the subsoil horizon.

Other glaciolacustrine, or possibly more recent lacustrine (L) materials, have been identified by others (Knight Piésold 2012a) as occurring in the Highland Plateau associated with the less well drained lowlands. This second group of lacustrine soils, whose approximate location is shown with a dashed line on the Soil Map (Figure 4.3-3) is thought to occur discontinuously as a thin to thick veneer or mantle within an extensive morainal plain (see LMU 2).

LMU 9: Regional soil SF, FG (IDF), upper elevation SU, WW (ESSF)

LMU 9 soils occur commonly on the lower slopes of the North Thompson River valley on undulating to rolling terraces and include steep, gullied embankments. These soils are developed in sandy to very gravelly, single grained, often calcareous, glaciofluvial materials. They are typically rapidly to well drained (SMR 2 to 3), weakly developed Brunisols (neutral to moderately acidic). There are minor inclusions of imperfectly drained gleyed Brunisols. Typical SMUs included in the lower elevation LMU 9 are G2_B and G3_B. Examples include sites HC08-75 to HC08-83.

At higher elevations (ESSF and upper ICH), minor areas of sandy, variably gravelly, non-calcareous, glaciofluvial material have been mapped on undulating to gently rolling terrain. These soils include the more strongly weathered, acidic Podzol and Brunisols, characteristically with a grayish eluviated

(Ae) horizon. Typical SMUs included in the upper elevation LMU 9 are G4_P and G3_P. An example includes site HC-08, Plate 4.3-10.

LMU 10: Regional soil HP, DU; gs

Soils within LMU 10 include rapidly to moderately well drained (SMR ranges 2 to 4), weakly to moderately developed Brunisols (neutral to moderately acidic; Eutric and Dystric Brunisols). These soils are developed on fluvial fans and upper (less active) fluvial terraces. Soil parent materials are commonly neutral to calcareous, gravelly sands. The upper, near surface horizons are non-calcareous and are often less gravelly and commonly mixed, sandy loam, loamy sand and fine sandy soil textures. Soil development is relatively shallow (< 0.6 m). Typical SMUs included in LMU 10 are F3_B and F4_B. Examples include sites HC08-94 and LAV81.

LMU 11: Regional soil BD; SiL,fSL

LMU 11 represents the recent fluvial deposits on active floodplains that form low terraces and gently to moderately sloping fans. Soils are very weakly developed Regosols with surface mineral horizons exhibiting generally neutral to slightly acidic soil reaction. These soils are developed in silt loam to fine sandy loam and sandy overlying stratified sandy to sandy gravelly fluvial materials. The surface soil textures reflect the relatively slow velocity of the overbank floodwaters, and it is common to have a capping of non-gravelly, silts and very fine sands along the main valley bottom of the North Thompson River (descriptions as per Kowall 1980).

LMU 12: Regional soil BDx HPx, DUw,x; gs

LMU 12 includes poorly and imperfectly drained Gleysols, weakly developed Rego-Gleysols, gleyed Regosols, and gleyed Brunisols developed in fluvial materials on fan and floodplain areas. These areas are subject to temporal, excess water due to either flooding, fluctuating groundwater levels and/or seepage. This LMU is not extensive. Management, especially trafficability of these soils, is strongly related to soil water content.

Though common adjacent to the North Thompson River, imperfectly and poorly drained fluvial materials are also common in the ESSF. These fluvial materials occur in the drainage-ways within the basin of the proposed TMF. The soils often reflect periodic flooding and sediment deposition through their 'cumulic' characteristics. Typical SMUs included in LMU 12 are F5_R.cug and F6_G. Examples include sites HC-01 and HC-06.

Non-soil Landscape Components

LMU 13

Exposed bedrock and areas with minor accumulations (< 0.1 m) of unconsolidated mineral material or less than 0.1 m of forest litter (folic material).

LMU 14

Land Management Unit 14 includes areas of intensive human activity, characterized by urban and industrial landscapes with scattered occurrences of native soils or devoid of native soil. LMU 14 includes the area of the proposed rail load-out facility.

LMU 15

Water covered areas that primarily include rivers in the valley bottom and small ponds at higher elevations.

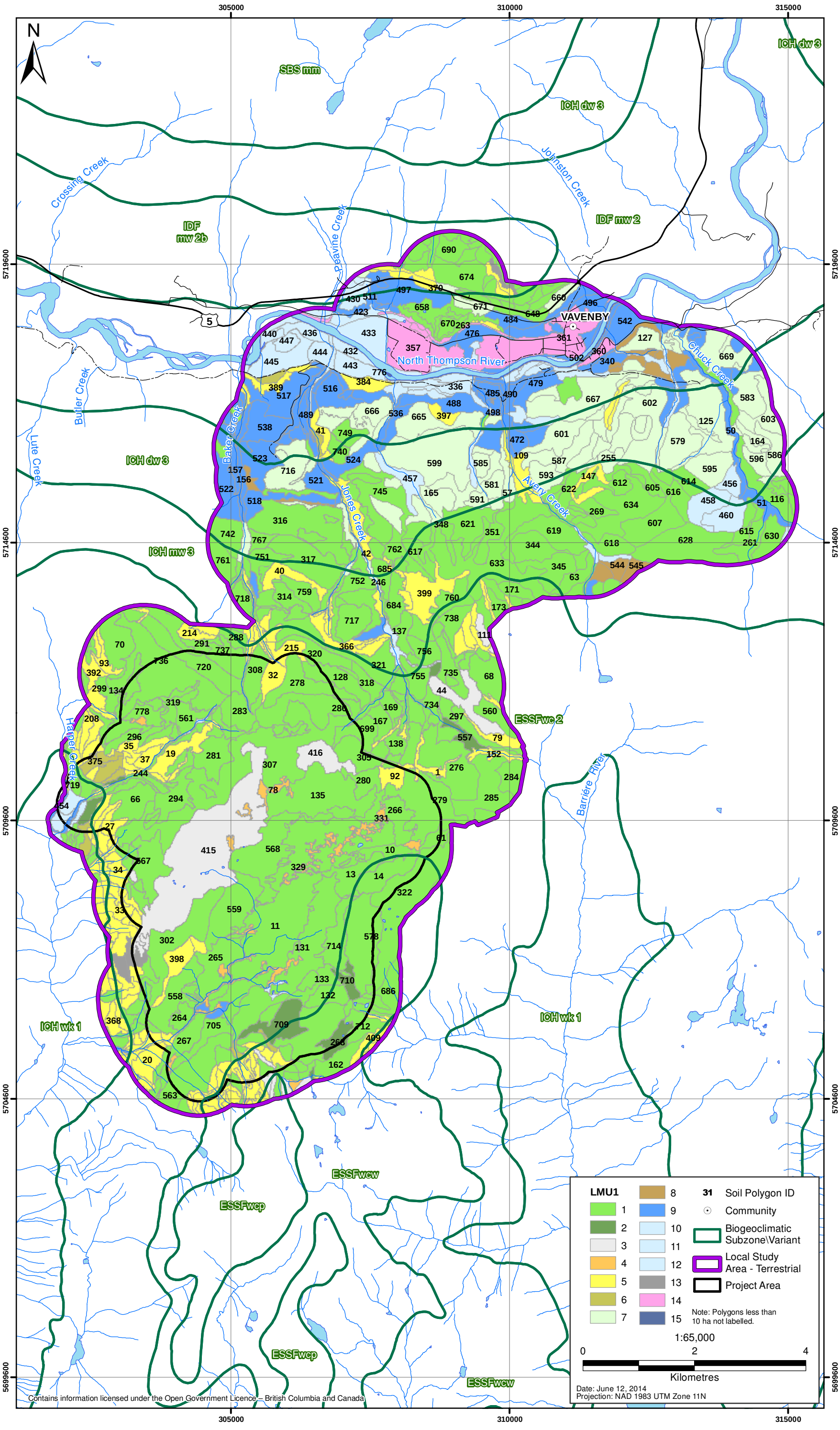
A summary of the extent of the LMUs shown on Figure 4.3-4, and described above, is provided in Table 4.3-6. The table includes a brief outline of the LMU parent material, common classification (to the order level) and typical range of drainage and SMR.

Table 4.3-6. Extent of Land Management Units within the LSA

LMU	BEC	Extent		Surficial Material	Common Soil Order	Drainage (common)	SMR (range)
		ha	%				
Soil Landscape – Rolling Highland Plateau (Soil climate: ESSFwc2, ESSFwcw)							
1	1	5,416	49%	M	Podzols	Moderately Well - Well	1 - 4
2	1	275	2%	M	Gleysol, gleyed subgoups of other orders	Poor - Imperfect	5 - 6
3	1	573	5%	D	Podzols, Brunisols (lithic)	Rapid-well (restricted)	1 - 4
4	1	203	2%	O	Fibrisols, Mesisols (terric)	very Poor	7
5'	1	included in 5		C	Podzol, Brunisol	Rapid-Well	1 - 3
9'	1	included in 9		G	Podzols	Rapid - Well	2 - 5
Soil Landscape – Mid to upper Valley Side Slopes (Soil climate: ICHdw3 ICHmw3)							
5	2	1,063	10%	C	Podzol, Brunisol	Rapid-Well	1 - 3
6	2	91	1%	C	Gleysol, gleyed subgoups of other orders	Poor-Imperfect	5 - 6
7	2	1,190	11%	M	Luvisol	Moderately Well - Well	2 - 4
8	2	90	1%	LG (L)	Luvisols	Moderately Well - Well	2 - 4
Soil Landscapes – Valley bottom and lower valley slopes (Soil Climate [1]: IDFmw2, lower portion of ICHdw3)							
9	3	1,068	10%	G	Brunisols	Rapid - Well	2 - 5
10	3	441	4%	F	Brunisol	Moderately Well-Rapid	2 - 4
11	3	55	1%	F	Regosol	variable	1 - 4
12	3	116	1%	F	Gleysol, gleyed subgoups of other orders	Poor - Imperfect	4 - 7
7'	3	included in 7		M	Luvisol, Brunisol	Moderately Well - Well	2 - 4
13	-	118	1%	R	Bedrock	restricted	
14	1	248	2%	A	Anthropogenic and Urbanized	variable	
11'	-	included in 11		mixed	eroded, recent deposits	variable	
15	-	74	1%	OW	Open Water	-	9
Total	**5**	**11,021**	**100.0%**				

Figure 4.3-4

Land Management Unit Map of the Terrestrial Local Study Area



4.4 SOIL CHARACTERIZATION AND ANALYTICAL RESULTS

4.4.1 Soil Physical and Chemical (Non-metal) Characteristics

Physical and chemical characteristics influence the behavior of soils and are important in their management and potential use. The following discussion is based not only on the 54 samples analyzed in the Knight Piésold directed 2012 soil survey program, but is augmented with physical data from the geotechnical test pit investigations and chemical data from the ML/ARD static testing.

Soil analyses have been conducted as part of four general project baseline programs:

- soil surveys and sampling results as part of the Environmental Assessment baseline (physical and chemical analyses of surface soil);
- geotechnical site investigations (physical analyses of near surface soil/overburden);
- ML/ARD characterization studies (chemical analyses of near surface soil/overburden); and
- exploration soil geochemical surveys (chemical analyses of soil metal content).

The samples listed in Table 4.4-1 represent soils exhibiting a range of development (soil order classes) and a variety of parent materials (surficial material types) as indicated by their respective SMU designations. Sampling of soils within the LSA was restricted to the Project Site, an area of strong leaching associated with its wet, cold, high elevation, soil climate (ESSFwc2). The majority of these soils are weathered Podzols. Samples were routinely tested for: texture (sand, silt and clay), $CaCO_3$ equivalence, total organic carbon, pH, soluble cations (SAR calculation, % water content at saturation) and CCME Tier 1 metals. Under Tier-1, the soil quality index is calculated by using the most stringent guideline for all pathways (CCME 2007). All other comments regarding soil chemistry or physical analytical results characteristics, for areas outside of the Project Site, are inferred from information presented in the regional soil survey (per Kowall 1980).

Soil parent material or overburden material sample results were obtained from the ML/ARD characterization program. Tests were conducted on 52 overburden samples within the Project Site. These results are included in this section to provide a basis for interpretation for potential management and suitability for their use in reclamation (Table 4.4-2). The data provide additional characterization of some near surface soils (road-cut samples; 0 – 1 m depth) and deeper, less weathered soil parent materials. The properties examined included: fizz test (reaction to addition of acid), $CaCO_3$ equivalence, paste electrical conductivity, paste pH, total sulphur, sulphate-sulphur, and total metals (using a stronger extractant than used for the soils mentioned previously). Overburden sample particle size distribution, as classed within the Unified Soil Classification System, is inferred from the interpretation of data presented in the geotechnical investigation report (Knight Piésold 2012b).

To facilitate comparison, the soil and overburden laboratory results (Tables 4.4-1 and 4.4-2) are discussed together by soil parameter. The discussion of results includes reference to SMUs, where appropriate.

4.4.1.1 Total Organic Carbon

The surface soil (all samples combined) total organic carbon ranges from 0.6% (Site HC-27; SMU M4_P, horizon C), to 23% (Site HC-15; SMU O6_O.mt, horizon O). The median carbon content is 3.2%.

Soil carbon enrichment is commonly noted in the 'O' and 'Ah' horizons of wet soils (Gleysols, gleyed Regosols, and gleyed Podzols), and cumulic Regosols, which may display 'muck-like' characteristics (9 to 17% organic carbon). Weathered subsoils (B horizons) generally contain approximately 3% organic C, ranging 0.9 to 8.6%. The lowest organic C content is associated with the BC and C horizons, with a median of < 2.0% (ranging 0.6 to 5.3%). Cumulic Regosols commonly display relatively high carbon content in the subsoil layers (typical of F4, F5 and LG 5 soils).

Total Organic Carbon was not determined on overburden materials. Only inorganic carbon was determined. Local overburden materials are expected to display negligible organic carbon content with the exception of peat materials.

4.4.1.2 Soil Reaction

The soil includes samples taken from the organic surface and within the 0 - 60 cm depth range. The soil reaction ranges from extremely acidic, pH less than 4.5 (minimum pH 4.4; sites HC-08, HC-19; horizons Bf and Ae respectively) to neutral (maximum pH 6.7 in site HC-10 in soil horizon Bhf or possibly Bmg). The majority of the samples are very strongly acidic to medium acidic in reaction (pH 4.5 to 6.0).

The organic and muck soil layers (organic C > 9%) display a soil reaction range from medium to slightly acidic (pH 4.9 to 5.9; pH code 4 - 5). The surface mineral horizons (Ah or Ae) display extremely to medium acidic reaction (pH 4.4 to 5.9, median 5.4; pH code 1 - 4). The upper subsoil (typically or Bfh) horizons, are generally similar to the surface mineral layer, displaying a range of very strongly to medium acid in reaction (pH 4.7 to 5.7, median 5.2; pH code 2 – 4; median pH code 3, Table 4-4-1). Deeper subsoil (C and BC) horizons range from strongly to slightly acidic (pH 5.3 to 6.1; pH code 3 – 5).

The pH of overburden, as described by the ML/ARD sampling program ranges widely from extremely acidic to strongly alkaline (pH 4.4 to 9.1; SRK 2013). This range can be broken down by general material type or depth below surface and appears to be reflective of relative exposure to weathering, as described in the following four groupings:

- road cut (to 1 m depth) – similar to surface soils with a very strongly to medium acidic reaction and median strongly acidic (pH 5.2) ranges (4.4 to 6.6);
- shallow soil/overburden (Test Pits; to 5 m depth) – more variable than surface soils with a slightly acidic to moderately alkaline reaction and median pH 7.1, though pH ranges widely (pH 5.0 to 8.0);
- deep overburden (geotechnical drill samples to 5 m depth) - more alkaline than surface soils with a neutral to moderately alkaline reaction and median pH 7.8, though the pH range is narrow (6.8 to 8.6); and
- deep weathered rock (geotechnical drill samples to 12 m depth) - more alkaline than surface soils with a mildly to strongly alkaline reaction and median pH 8.3, and pH has a moderate range of reaction (7.3 to 9.1).

Table 4.4-1. Soil Analytical Results used for Soil Management and Suitability Characterization (Soils)

Sample Description			Soil Reaction			Soil Physical Characteristics				Soil Texture (Revised)						Soluble Constituents		
Site ID	Horizon	SMU	pH (units)	pH (code)	$CaCO_3$ Equivalent (%)	Total Organic Carbon (%)	Organic Content (code)	Coarse Fragments [3] (%)	Soil Portion <2 mm [3] (%)	Texture [1] (%)	Texture Class [2] (code)	Sand [1] (%)	Silt [1] (%)	Clay [1] (%)	Moisture at Saturation (%)	Electrical Conductivity (µS/cm EC)	SAR (calculat.)	SO_4 Soluble (mg/L)
HC-01	O1	F5_R	4.9	2	0.82	15%	muck	11	89	Sandy Loam	4	62%	31%	7%	230	92.7	0.8	50
HC-01	C3	F5_R	5.6	4	<0.60	2%	1	15	85	Loamy Sand	5	77%	19%	4%	64	63.7	0.9	12
HC-02	Bf	M3_P	5.0	2	<0.60	5%	2	19	81	Sandy Loam	4	60%	29%	10%	82	59.7	NC	<5.0
HC-02	C	M3_P	5.3	3	<0.60	1%	1	36	64	Sandy Loam	4	67%	28%	4%	54	69.9	0.7	<5.0
HC-04	Ah	M4_P.li	5.4	3	<0.60	3%	2	35	66	Sandy Loam	4	55%	37%	9%	78	52.5	2.6	5.8
HC-04	Bf	M4_P.li	5.8	4	<0.60	2%	1	30	70	Sandy Loam	4	60%	34%	5%	47	39.5	NC	<5.0
HC-05	Bf	M3_P.li	5.9	4	<0.60	2%	2	28	72	SL-LS	4	71%	28%	1%	70	80.1	1.9	<5.0
HC-06	Ah	F5_R.cug	4.9	2	<0.60	11%	muck	<2.0	100	Sandy Loam	4	57%	30%	13%	180	108	2.3	14
HC-06	C1	F5_R.cug	5.6	4	0.74	6%	2	<2.0	98	Silt Loam	3	34%	55%	11%	130	68.3	NC	8.4
HC-07	Om (Ah)	M6_G.pt	5.4	3	0.77	12%	muck	6	94	Sandy Loam	4	71%	21%	8%	96	81.2	1.9	5.3
HC-07	Bg	M6_G.pt	5.6	4	<0.60	1%	1	47	53	Loam	3	47%	34%	19%	42	139	NC	11
HC-08	Bf1	G3_P	4.4	1	0.7	5%	2	18	82	Sandy Loam	4	67%	29%	4%	71	82.1	NC	<5.0
HC-08	Bf2	G3_P	5.3	3	0.64	2%	2	45	55	Sandy Loam	4	69%	29%	2%	53	55.3	0.8	20
HC-09	C1	F4_R.cu	5.6	4	0.79	6%	2	13	87	Silt Loam	3	36%	52%	13%	130	70.8	NC	<5.0
HC-09	C3	F4_R.cu	6.1	5	0.67	2%	1	58	43	Loamy Sand	5	82%	16%	2%	51	42.9	NC	<5.0
HC-10	Ah (Om)	M5_P.so	6.3	5	0.87	7%	2	<2.0	100	Sandy Loam	4	60%	34%	6%	110	83.2	1.1	11
HC-10	Bhf	M5_P.so	6.7	6	0.68	3%	2	5	95	Sandy Loam	4	57%	38%	5%	68	80.5	0.7	<5.0
HC-11	Bf	M3_P	5.6	4	0.73	3%	2	39	61	Sandy Loam	4	63%	33%	4%	85	48.1	NC	<5.0
HC-11	C	M3_P	5.3	3	0.69	2%	1	55	45	Loamy Sand	5	73%	24%	2%	61	60.6	NC	<5.0
HC-12	Bf	M3_P	5.2	3	0.91	5%	2	35	67	Loamy Sand	5	73%	25%	1%	93	48.1	NC	<5.0
HC-13	Bf	M3_P	5.3	3	0.76	4%	2	42	58	Loamy Sand	5	78%	21%	2%	76	70.8	NC	<5.0
HC-15	O1	O6_Omt	5.2	3	1.1	23%	organic	7	94	Sandy Loam	4	81%	5%	14%	180	153	0.8	44
HC-16	Bf	M3_P	4.7	2	<0.60	4%	2	33	67	Sandy Loam	4	51%	43%	6%	80	64.6	NC	<5.0
HC-16	BC	M3_P	5.2	3	<0.60	2%	1	43	58	Sandy Loam	4	62%	33%	5%	56	64.9	0.7	21
HC-17	Ah	M4_P.so	5.9	4	1.2	9%	muck	<2.0	98	Sandy Loam	4	47%	49%	4%	160	74.1	0.9	<5.0
HC-17	Bhf	M4_P.so	6.1	5	1.1	9%	2	20	81	Sandy Loam	4	59%	40%	1%	140	64.1	0.8	<5.0
HC-18	Bhf	M4_P	5.2	3	<0.60	5%	2	30	70	Loam	3	52%	37%	11%	110	73.7	0.9	<5.0
HC-18	Bf	M4_P	5.6	4	<0.60	1%	1	37	63	Sandy Loam	4	54%	36%	10%	61	67.6	NC	<5.0
HC-19	Ae	M3_P,li	4.4	1	<0.60	2%	1	33	67	Sandy Loam	4	54%	42%	4%	94	69.4	NC	<5.0
HC-19	Bf	M3_P,li	4.9	2	<0.60	4%	2	66	34	Sandy Loam	4	61%	29%	9%	80	42	NC	<5.0
HC-21	Bf	M3_P	5.2	3	<0.60	2%	2	42	57	Loam	3	45%	42%	13%	79	66	NC	<5.0
HC-23	Bf	M3_P	5.3	3	<0.60	3%	2	65	35	Silt Loam	3	11%	74%	15%	64	52.8	NC	<5.0
HC-25	Bf	C2_P	5.5	3	<0.60	3%	2	47	54	Sandy Loam	4	57%	41%	2%	92	96.2	NC	<5.0

(continued)

Table 4.4-1. Soil Analytical Results used for Soil Management and Suitability Characterization (Soils) (completed)

Sample Description			Soil Reaction			Soil Physical Characteristics				Soil Texture (Revised)						Soluble Constituents		
Site ID	Horizon	SMU	pH (units)	pH (code)	$CaCO_3$ Equivalent (%)	Total Organic Carbon (%)	Organic Content (code)	Coarse Fragments [3] (%)	Soil Portion <2 mm [3] (%)	Texture [1] (%)	Texture Class [2] (code)	Sand [1] (%)	Silt [1] (%)	Clay [1] (%)	Moisture at Saturation (%)	Electrical Conductivity (µS/cm EC)	SAR (calculat.)	SO_4 Soluble (mg/L)
HC-27	Bf	M4_P	5.1	3	<0.60	2%	2	27	74	Sandy Loam	4	55%	38%	7%	78	107	NC	<5.0
HC-27	C	M4_P	5.5	3	<0.60	1%	-	46	54	Sandy Loam	4	58%	35%	7%	47	62.1	NC	<5.0
HC-28	Bf	M4_P	5.2	3	<0.60	3%	2	37	63	Sandy Loam	4	67%	29%	4%	86	61	NC	<5.0
HC-29	Bf	M(C)4_P	5.3	3	0.66	4%	2	34	66	Sandy Loam	4	60%	35%	5%	95	86.2	1.6	<5.0
HC-29	BC	M(C)4_P	5.7	4	<0.60	2%	1	40	60	Sandy Loam	4	60%	33%	7%	60	93.9	1.3	<5.0
HC-31	Ah	M5_B.m(g)	5.7	4	<0.60	4%	2	18	82	Loam	3	51%	40%	8%	76	138	1.7	8.4
HC-31	Bm	M5_B.m(g)	5.7	4	<0.60	4%	2	9	91	Sandy Loam	4	65%	30%	6%	83	103	0.7	<5.0
HC-32	Bf	M3_P.li	5.1	3	<0.60	2%	1	57	43	Loamy Sand	5	75%	23%	2%	63	76.1	NC	<5.0
HC-32	C	M3_P.li	5.4	3	<0.60	1%	-	55	45	Loam	3	45%	42%	13%	49	71.5	NC	<5.0
HC-33	Bf	M3_P	5.6	4	<0.60	5%	2	25	75	Sandy Loam	4	49%	45%	5%	110	81.3	NC	<5.0
HC-33	C	M3_P	5.7	4	<0.60	1%	1	30	70	Sandy Loam	4	60%	36%	4%	59	76	NC	<5.0
HC-34	Bf	M4_P	4.9	2	<0.60	2%	2	64	36	Sandy Loam	4	62%	31%	8%	53	72.5	NC	<5.0
HC-34	BC	M4_P	5.4	3	<0.60	5%	2	38	62	Sandy Loam	4	66%	31%	4%	100	62.8	1.0	<5.0
HC-36	Ah	M5_P.g	5.5	4	<0.60	9%	muck	12	89	Sandy Loam	4	60%	33%	7%	120	106	1.4	9.3
HC-36	Bf	M5_P.g	5.7	4	<0.60	3%	2	32	68	Sandy Loam	4	63%	25%	12%	65	82.2	1.2	6.1
HC-37	Bf	M3_P	5.2	3	<0.60	3%	2	27	72	Silt Loam	3	40%	51%	9%	93	92.3	1.9	<5.0
HC-38	Bf	M3_P	5.1	3	0.69	6%	2	17	83	Sandy Loam	4	62%	30%	8%	90	76.6	NC	<5.0
HC-39	Bf	M4_P	5.0	3	<0.60	3%	2	61	40	Sandy Loam	4	63%	28%	9%	61	75	1.4	<5.0
HC-39	C	M4_P	5.4	3	<0.60	3%	2	84	15	Sandy Loam	4	56%	37%	7%	38	83.4	NC	<5.0
HC-40	C1	M6_G(R.g)	5.7	4	0.67	5%	2	6	95	Loam	3	42%	46%	12%	110	90.6	NC	6.9
HC-40	C2	M6_G(R.g)	5.9	4	<0.60	3%	2	56	45	Sandy Loam	4	72%	22%	6%	65	58.7	NC	<5.0
=COUNT			54	54	19	54	48	50	54	54	54	54	54	54	54	54	24	15
=MEDIAN			*5.41*	*3*	*0.74*	*3%*	*2*	*35*	*67*		*4*	*60%*	*33%*	*6%*	*78.5*	*73.1*	*1.1*	*11*
=MAX			*6.69*	*6*	*1.2*	*23%*	*2*	*84*	*100*		*5*	*82%*	*74%*	*19%*	*230*	*153*	*2.6*	*50*
=MIN			*4.37*	*1*	*0.64*	*1%*	-	*5*	*15*		*3*	*11%*	*5%*	*1%*	*38*	*39.5*	*0.7*	*5.3*
=AVERAGE			*5.41*	*3*	*0.80*	*4%*	*2*	*35*	*68*		*4*	*59%*	*34%*	*7%*	*86*	*76.7*	*1.2*	*15.5*
=STDEV			*0.43*	*1*	*0.17*	*4%*	*1*	*18*	*20*		*1*	*13%*	*11%*	*4%*	*38*	*23.1*	*0.6*	*13.6*

Table 4.4-2. Overburden Analytical Results for use with Soil Management and Suitability Characterization (Soil Parent Material)

Sample ID	Area	Type	Depth from Surface (top) (m)	Depth from Surface (bottom) (m)	Particle Size Class (Unified)	Particle Size Class (Unified)	Co.Fragments (% by mass > 5 mm)	Paste EC			Paste (pH)	Rxn (pH)	S (Total) (%)	S (SO_4) (%)	C-Inorganic (%)	$CaCO_3$ (kg $CaCO_3$/t)	Fizz Test	Fizz CO_3 code
								(µS/cm)	(dS/m)	(EC code)								
Method Code			*see KP site info*		*see KP site info*						Sobek	Class		CSA07V		Calc.	Sobek	
LOD											0.2			0.01		#N/A	#N/A	
OP01 <2mm	Pit	Road Cut	0	1	gravelly SILT					n	4.73	2	0.02	0.02		0.8	none	0
OP02 <2mm	Pit	Road Cut	0	1	gravelly SILT					n	5.47	3	0.04	0.01		1.7	none	0
OP03 <2mm	Pit	Road Cut	0	1	SILT some gravel					n	4.98	2	0.03	0.01		0.8	none	0
OP04 <2mm	Pit	Road Cut	0	1	SILT some gravel					n	5.15	3	0.06	0.01		0.8	none	0
OP05 <2mm	Pit	Road Cut	0	1	gravelly SILT					n	5.08	3	0.08	0.02		0.8	none	0
OP06 <2mm	Pit	Road Cut	0	1	gravelly SILT					n	5.39	3	0.01	0.02		0.8	none	0
OP07 <2mm	Pit	Road Cut	0	1	Till					n	5.14	3	0.01	0.02		1.7	none	0
OP08 <2mm	Pit	Road Cut	0	1	gravelly SILT					n	5.19	3	0.02	0.01		0.8	none	0
OP09 <2mm	Pit	Road Cut	0	1	clayey SILT					n	5.62	4	0.01	0.01		0.8	none	0
OP10 <2mm	Pit	Road Cut	0	1	gravelly SILT					n	4.67	2	0.02	0.01		0.8	none	0
OP11 <2mm	Pit	Road Cut	0	1	clayey SILT					n	6.54	5	0.01	0.01		0.8	none	0
OP12 <2mm	Pit	Road Cut	0	1	SILT some gravel					n	5.05	3	0.01	0.01		1.7	none	0
OP13 <2mm	Pit	Road Cut	0	1	gravelly, clayey SILT					n	6.55	6	0.01	0.01		1.7	none	0
OP14 <2mm	Pit	Road Cut	0	1	SILT trace gravel					n	4.36	1	0.01	0.01		1.7	none	0
OP15 <2mm	Pit	Road Cut	0	1	clayey SILT					n	5.18	3	0.01	0.01		0.8	none	0
OP16 <2mm	Pit	Road Cut	0	1	clayey SILT					n	5.94	4	0.01	0.01		0.8	none	0
OP12-01 Overburden Sample #1	Pit	Deep Overburden	1.1	1.5	gvlSANDsZ			291	0.291	1	7.76	7	0.28	0.01		96.4	MODERATE	2
OP12-01 Overburden Sample #2	Pit	Deep Overburden	2.7	3.1	gvlSANDsZ			175	0.175	1	8.57	9	0.42	0.01		112.3	MODERATE	2
OP12-02 Overburden Sample #1	Pit	Deep Overburden	1	1.5	SANDsGvl_C			268	0.268	1	7.93	8	0.18	0.01		28	SLIGHT	1
OP12-02Overburden Sample #2	Pit	Deep Overburden	4.2	4.8	SANDsGvl_C			269	0.269	1	7.78	7	0.09	0.01		5.5	NONE	0
OP12-03 Overburden Sample #1	Pit	Deep Overburden	1.2	1.7	SAND, GRAVEL			335	0.335	1	7.81	7	0.07	0.01		50	MODERATE	2
OP12-05 Overburden Sample #1	Pit	Deep Overburden	1	1.5	SANDtG			314	0.314	1	6.84	6	0.03	0.01		0.5	NONE	0
OP12-06Overburden Sample #1	Pit	Deep Overburden	1	1.4	SANDsGvl			250	0.25	1	8	8	0.2	0.01		4.1	SLIGHT	1
OP12-07 Overburden Sample #1	Pit	Deep Overburden	2.6	4.6	SANDsGvl			357	0.357	1	7.96	8	0.09	0.01		46.6	MODERATE	2
OP12-09 Overburden Sample #1	Pit	Deep Overburden	0	0.6	SAND, GRAVEL			204	0.204	1	7.35	7	0.03	0.01		0.5	NONE	0
OP12-10 Overburden Sample #1	Pit	Deep Overburden	0	2.4	SAND			92	0.092	1	7.11	6	0.05	0.01		1.1	NONE	0
OP12-01 Weathered Rock Sample #1	Pit	Weathered Bedrock	9.1	11.6				475	0.475	1	7.97	8	2.98	0.01		40.5	SLIGHT	1
OP12-01 Weathered Rock Sample #2	Pit	Weathered Bedrock	9.1	11.6				628	0.628	1	8.29	8	3.71	0.01		95.9	SLIGHT	1
OP12-02 Weathered Rock Sample #1	Pit	Weathered Bedrock	5.5	10.4				217	0.217	1	7.68	7	0.07	0.01		0.7	NONE	0
OP12-03 Weathered Rock Sample #1	Pit	Weathered Bedrock	4.9	10.4				87	0.087	1	7.57	7	0.13	0.01		0.9	NONE	0
OP12-04 Weathered Rock Sample #1	Pit	Weathered Bedrock	3.4	7.2				266	0.266	1	8.28	8	1.86	0.01		74.1	MODERATE	2
OP12-05 Weathered Rock Sample #1	Pit	Weathered Bedrock	4.0	5.5				202	0.202	1	8.81	9	0.02	0.01		4.3	SLIGHT	1
OP12-05 Weathered Rock Sample #2	Pit	Weathered Bedrock	4.0	5.5				159	0.159	1	8.55	9	0.06	0.01		5.7	SLIGHT	1

(continued)

Table 4.4-2. Overburden Analytical Results for use with Soil Management and Suitability Characterization (Soil Parent Material; completed)

Sample ID	Area	Type	Depth from Surface (top) (m)	Depth from Surface (bottom) (m)	Particle Size Class (Unified)	Particle Size Class (Unified)	Co.Fragments (% by mass > 5 mm)	Paste EC			Paste (pH)	Rxn (pH)	S (Total) (%)	S (SO_4) (%)	C-Inorganic (%)	$CaCO_3$ (kg $CaCO_3$/t)	Fizz Test	Fizz CO_3 code
								(µS/cm)	(dS/m)	(EC code)								
OP12-06 Weathered Rock Sample #1	Pit	Weathered Bedrock	3.7	5.6				409	0.409	1	7.31	6	4.45	0.01		14.3	NONE	0
OP12-07 Weathered Rock Sample #1	Pit	Weathered Bedrock	6.6	11.7				273	0.273	1	9.05	9	0.56	0.01		135.5	SLIGHT	1
OP12-08 Weathered Rock Sample #1	Pit	Weathered Bedrock	2.0	5.8				212	0.212	1	9.09	9	0.11	0.01		6.8	NONE	0
OP12-09 Weathered Rock Sample #1	Pit	Weathered Bedrock	0.6	2.6				269	0.269	1	7.64	7	0.11	0.01		3	NONE	0
OP12-09 Weathered Rock Sample #2	Pit	Weathered Bedrock	2.6	4.3				310	0.31	1	7.6	7	0.23	0.01		48.9	NONE	0
OP12-10 Weathered Rock Sample #1	Pit	Weathered Bedrock	2.4	4.3				316	0.316	1	8.78	7	1.4	0.01		76.8	MODERATE	2
TP01-1 <2 mm	TMF	Overburden	0.7	3.2	sandySILT	ML	14			n	5.2	3	0.01	0.01		0.8	none	0
TP02-1 <2 mm[a]	TMF	Overburden	0.4	1.9	gravellySAND	SM				n	7.95	8	0.01	0.01		2.5	none	0
TP5-1 <2 mm	TMF	Overburden	1.0	2.2		GM	50			n	6.7	6	0.01	0.01		0.8	none	0
TP12-1 <2 mm	TMF	Overburden	0.7	1.5		SM	29			n	6.21	5	0.03	0.01		1.7	none	0
TP12-2 <2 mm	TMF	Overburden	1.5	2.0		SC-SM	28			n	7.57	7	0.15	0.01		12.5	none	0
TP15-4 <2 mm	TMF	Overburden	2.0	3.9		SC-SM	14			n	8	8	0.15	0.01		33.3	slight	1
TP26-1 <2 mm	TMF	Overburden	1.1	5.0		GC	28			n	7.88	8	0.1	0.01		20.0	slight	1
TP27-1 <2 mm	TMF	Overburden	0.5	2.5	till (S&G)	GM	43			n	6.61	6	0.01	0.01		0.8	none	0
TP29-1 <2 mm	TMF	Overburden	1.8	2.2	siltySAND	SM	16			n	6.8	6	0.01	0.01		0.8	none	0
TP30-1 <2 mm	TMF	Overburden	-	0.7	siltySAND	SM	26			n	4.96	2	0.02	0.01		0.8	none	0
TP30-2 <2 mm	TMF	Overburden	0.7	3.3	GRAVEL	GM	41			n	7.06	6	0.01	0.01		0.8	none	0
TP32-1 <2 mm	TMF	Overburden	1.4	2.5	GRAVEL	GW	69			n	7.91	8	0.01	0.01		19.2	slight	1
TP51-3 <2 mm	TMF	Overburden	2.0	2.5	GRAVEL	GW	67			n	7.13	6	0.01	0.03		0.8	none	0
=COUNT			52	52				12	23	23	23	53	52	52		52		52
=MEDIAN			1.0	2.1				28.5	269	0.269	1	7.13	6	0.035		1.7		0
=MAX			9.1	11.7				69.0	628	0.628	1	9.09	9	4.45		135.5		2
=MIN			-	0.6				14.0	87	0.087	1	0.2	1	0.01		0.5		0
=AVERAGE			1.7	3.3				35.4	277.30	0.28	1.00	6.77	6	0.35		18.6		0.42
=STDEV			2.2	3.1				19.0	118.37	0.12	-	1.62	2	0.91		32.8		0.70

Source: Knight Piésold 2012b (Table 3.1, 3.5); KP, 2013 (Table 3.1 App. A1).
[a] *listed as TP2 <2 mm on SRK table.*
$CaCO_3$ based on Reaction to HCl.

4.4.1.3 Soil Salinity Soluble Macro-Constituents and Carbonate Presence

The surface soils sampled in the current program are non-saline. They were measured on a saturated extract as soluble electrical conductivity (EC). The maximum reported EC is 153 µS (siemens)/cm (sample HC15-Om) well below the common limit of 4,000 µS/cm for a saline soil designation. These soils contain relatively low amounts of soluble macro-constituents (cations Ca, Mg, K and Na). Soluble sulphate is below detection in most soils (n = 39). The highest sulphate content is often related to high organic carbon content (generally noted in the organic and muck horizons). Exceptions to this trend are noted in the mineral horizons, with organic C less than 2.0%, at site HC-01, HC-07 and HC-16 in C, BC and Bg horizons.

Soils are non-sodic as indicated by the calculated low Sodium Adsorption Ratios values. All 24 calculated values were less than 4 (median 1.1). Numerous values were not calculated because one or more critical soluble constituents (Ca, Mg or Na) were below detection.

The surface soils are non-calcareous, as would be expected with these mostly acidic reaction soils. Calcium carbonate equivalence ($CaCO_3$ Equiv) was measured on all 52 soil samples and was below detection on 31 samples, and did not exceed 1.2%.Overburden results from the ML/ARD sampling in the proposed open pit area showed the materials to be non-saline. Paste electrical conductivity (EC_paste) values did not exceed 700 μScm^{-1}. Samples included 'deep' overburden (ranging from near surface to < 5 m below the surface) and 'weathered bedrock'. Surface samples and test pit samples from the TMF were not analyzed.

All overburden samples were tested for the presence of free carbonates. Free carbonates were absent (no fizz reaction to addition of acid; <2 kg $CaCO_3$/t) from the proposed open pit 'road cut' surface samples (series OP01 to OP16). The shallow test pits sites in the TMF exhibited a range of none to slight reaction to acid. Three of the 13 samples exhibited a slight reaction to acid (ranging 19 to 33 kg $CaCO_3$/t). These three samples were from 1.1 m below the surface or deeper. Both the weathered bedrock and the deep overburden for the proposed open pit displayed a range of none to moderate reaction to acid addition. The highest carbonate content in overburden (112 kg $CaCO_3$/t) was from below 2.7 m depth; the highest value in weathered bedrock (136 kg $CaCO_3$/t) came from a sample from below 6.6 m.

4.4.1.4 Soil Texture and Particle Size Distribution

Soil texture is determined on the minus 2.00 mm size fraction of the soil material as is standard for determination of the Canadian System of Soil Classification textural classes. Material larger than 2 mm is considered to be coarse fragments. The surface soils displayed medium to coarse textures with sandy loam textures being most common. This was based on adjusted laboratory sand, silt, and clay proportions (Table 4.4-1). The most common soils are derived from morainal materials that often display sandy loam texture, though textures range from silt loam/loam to loamy sand.

The maximum sand content, 82%, was noted at site HC-09 (a loamy sand from a deep, C3 horizon sample in a fluvial soil in SMU F4_R.cu). The minimum sand content, 11%, was noted at site HC-23 (a silt loam from a shallow, Bf horizon sample in a morainal soil in SMU M3_P). The median clay content was 6%. The maximum clay content was 19% and was noted at site HC-07 (a loam from a wet, Bg horizon sample in a morainal soil in SMU M6_G.pt). Numerous loamy sand textured

samples displayed very low clay content (<2%) in a variety of soils (various SMUs). The median silt content was 33% (mineral soil silt content ranged from 16%, (site HC-09 in SMU F4_R.cu) to 74% (site HC-23 in SMU M3_P)).

Coarse fragment contents are calculated for the sample received by the laboratory and are not generally reflective of the total coarse fragment content noted in the field profile assessment (Table 4.4-1). The field coarse fragment content estimate is used to assess this characteristic.

No soil textures, according to the Canadian System of Soil Classification textural classes, are provided for overburden materials. However, soil particle distribution size classes, based on the USCS, are provided for the majority of these materials (see summary of near surface samples provided in Appendix B2-3). These data (n = 91) are selected from 0 to 2 m below the soil surface and are collected as part of the geotechnical investigations program. They indicate that the sampled overburden materials are classified mostly as silty sand (SM) or clayey sand (SC) and often include coarser, silty gravel (GM) and less commonly poorly graded gravel (GP) and well-graded gravel (GW) materials. One peat sample was obtained (site TP43).

The median gravel content (material >5 mm) for the 91 samples tested was 28%. It ranged from 0 to 69% by mass, with nearly 90% containing less than 50% coarse fragments. Approximately 25% of the samples are non-gravelly materials, with less than 20% gravel content. The clay content was determined on 47 samples, mostly non to slightly gravelly materials. The adjusted 'soil' clay content was determined by dividing the clay content by the total mass of the 'soil' portion, excluding the gravel content. It displayed a median clay content of 10% and ranged from 2% to 27%.

The USCS designations for the materials used in the ML/ARD program are indicated in Table 4.4-2. Select laboratory coarse fragment data are provided for 12 samples taken from some test pits in the TMF. These display a median of approximately 28% coarse fragments (ranging 14 to 69%). Additional estimates of total coarse fragment are available from field log observations presented in the geotechnical site investigation reports (Knight Piésold 2012b, 2013).

4.4.1.5 Soil Moisture (Soil Saturation Percent)

Soil moisture at saturation ranges widely for the soils in the study area from a minimum 38% to a maximum of 230% with a median of 79%. The highest values (>95% moisture) are generally associated with organic soil layers or organically enriched 'muck' mineral soils (approximately 5% organic Carbon or higher). The lowest saturation percentages (38% to 60% moisture at saturation) are associated with soils with low organic carbon and/or higher sand content. No soil moisture at saturation values have been determined for overburden.

4.4.2 Soil Metals

4.4.2.1 Background

The following general discussion of relative soil metal content enrichment in the LSA and specific enrichment of certain metals in the Project Site is meant to provide perspective on background soil metal concentrations within this area. As discussed previously, soil metal content data from three

distinct types of soil sampling programs are available: baseline soil survey (HCMC 2013), ML/ARD testing of Project Site overburden (SRK 2013), and exploration related soil geochemical surveys (HCMC, pers. comm.). Baseline sampling sites (extractable metals analyses) and overburden sampling sites (total metals analyses) are noted previously in Figure 4.3-3. Extractable metal content values are rated against land use criteria and presented in Figure 4.4-1. If an exceedance occurs the number of different species that exceeded criteria at that level are indicated in the site label. Geochemical soil exploration sites are indicated in a separate figure (Figure 4.4-2).

The soil and overburden data are complimentary in so far as the overburden often represents the slightly weathered or unweathered parent material of the overlying, local soils. Data from both these programs are presented in this section. Testing procedures on soil samples were used to obtain extractible or 'environmentally available' concentration results. A stronger extractant, to obtain total metal content, was used on the overburden samples. The primary difference in the methods is thought to be the degree to which the respective extracts solubilize crystalline bound metals. Crystalline bound metals are less environmentally available. For this reason, the results are not directly comparable, and the discussion of metals is commonly separated into soils and overburden.

A third set of data is available from past soil geochemical surveys undertaken for mineral exploration purposes. The sampling and analytical methods used to obtain these data have not been reviewed as part of the current study. These data cover a wide range of areas within and near the LSA, including the open pit. It is thought that these results are generally comparable to those obtained for overburden and that they approximate 'total' metal concentrations. A single element, copper, has been used to illustrate the extent of historic sampling and provide a relative range of concentrations reflective of mineralization throughout portions of the LSA.

Soil metal concentration results for the 19 'critical' metals are compared directly to land use guideline criteria (federal CCME and provincial CSR). These guideline criteria, ranging from the most stringent – CCME Agricultural Use, to least potentially restrictive – CSR Industrial Use, provide a framework for discussion.

The complete list of soil metal concentration results for all 31 metals routinely tested are provided in a summary table in Appendix B. Though not discussed as critical elements in this report, these 12 additional metals are part of the standard ICP scan and form part of the project soils' data base for future comparisons, should this be required.

The following discussion of soil metal content is provided in three parts:

1. Soils extractible metal concentration data from local surface and near surface soil horizons taken from inspection sites within the Project Site and compared to Land Use Criteria.
2. Overburden (soil parent material), select data from the ML/ARD program, including total metal concentrations, on overburden material types typical of local soil parent material (local to the Project Site).
3. Soil copper geochemical data (total metal concentration), as obtained from past exploration programs, for portions of the LSA (intense grids sampling from the open pit and Project Site as well as others within the Reconnaissance Terrain Study Area).

4.4.2.2 Soil Extractible Metal Concentration Compared to Land Use Guideline Criteria

The results of the analyses conducted on the soil samples collected from the Project Site, are presented in Appendix B (Table B3-1). For illustrative purposes these results are compared to CCME land use guideline soil concentration criteria and the ten metals which exhibit at least one exceedance of the most stringent criteria are listed in Table 4.4-3, displayed on Figure 4.4-1.

Nine of the 19 metals species with land use criteria display concentrations that are below the most stringent criteria, as set for Agricultural land. These metals include: Sb, Ba, Be, Hg, Ag, Tl, Sn, U and V. Many of these metals are present in concentration below detection limits used in this assessment. For statistical purposes samples with concentrations below the detection limit were assumed to be 50% of the detection limit (Table B1-3).

The ten metals of potential concern are those that exceed some criteria considered in potential land use suitability assessments (CCME Agricultural use) and include: As, Cd, Co, Cr, Cu, Pb, Mo, Ni, Se and Zn. In terms of frequency of exceedance of the most stringent criteria, the metals aligned as follows (numbers in brackets indicate frequency of exceedances in the 54 samples tested):

- Cu (30) > As (22) > Se (15) >> Ni (8) > Cd (5), Pb (5), Cr (4) > Co (2), Mo (1), Zn (1)

Using less restrictive federal criteria, CCME industrial land use guidelines, eight metals are of potential concern:

- Cu (22), As (22) >> Ni (8) > Cr (3), Co (2), Se (2) > Pb (1), Zn (1)

Using the least stringent criteria, provincial CSR industrial land use guidelines, three metals are of potential concern:

- Cu (11) > > Pb (1), Zn (1)

As seen in Figure 4.4-1, exceedances of the CCME Agricultural Use criteria occurred at 28 of 47 sampled inspection sites. Of the samples listed in Table 4.4-3, a total of 34 of the 54 samples display at least one exceedance (26 of these 34 display at least two metals exceeding criteria). Some individual sampled inspection sites display exceedance of CCME Agricultural use criteria for multiple metals samples. The maximum number of metals in one sample was eight (Site HC-36).

Soil inspection sites displaying the highest concentrations of critical metals with exceedances of the least stringent criteria, CSR Industrial, include:

- Site HC-31 (Cu), Site 36 (Cu), and Site 40 (Cu, Pb, Zn) – both upper and lower horizon samples; and
- Sites HC-17, 23, 27, 28 and 29 – all single samples displaying copper exceedance.

These soil extractable metal concentrations give some indication of the potential metals of concern, considering a variety of potential land uses, and, in combination with spatial mapping, provide an initial view of where they may occur within the Project Site portion of the LSA.

Figure 4.4-1
Soil Extractable Metal Content Relative to Exceedance of Land Use Criteria for the Project Site

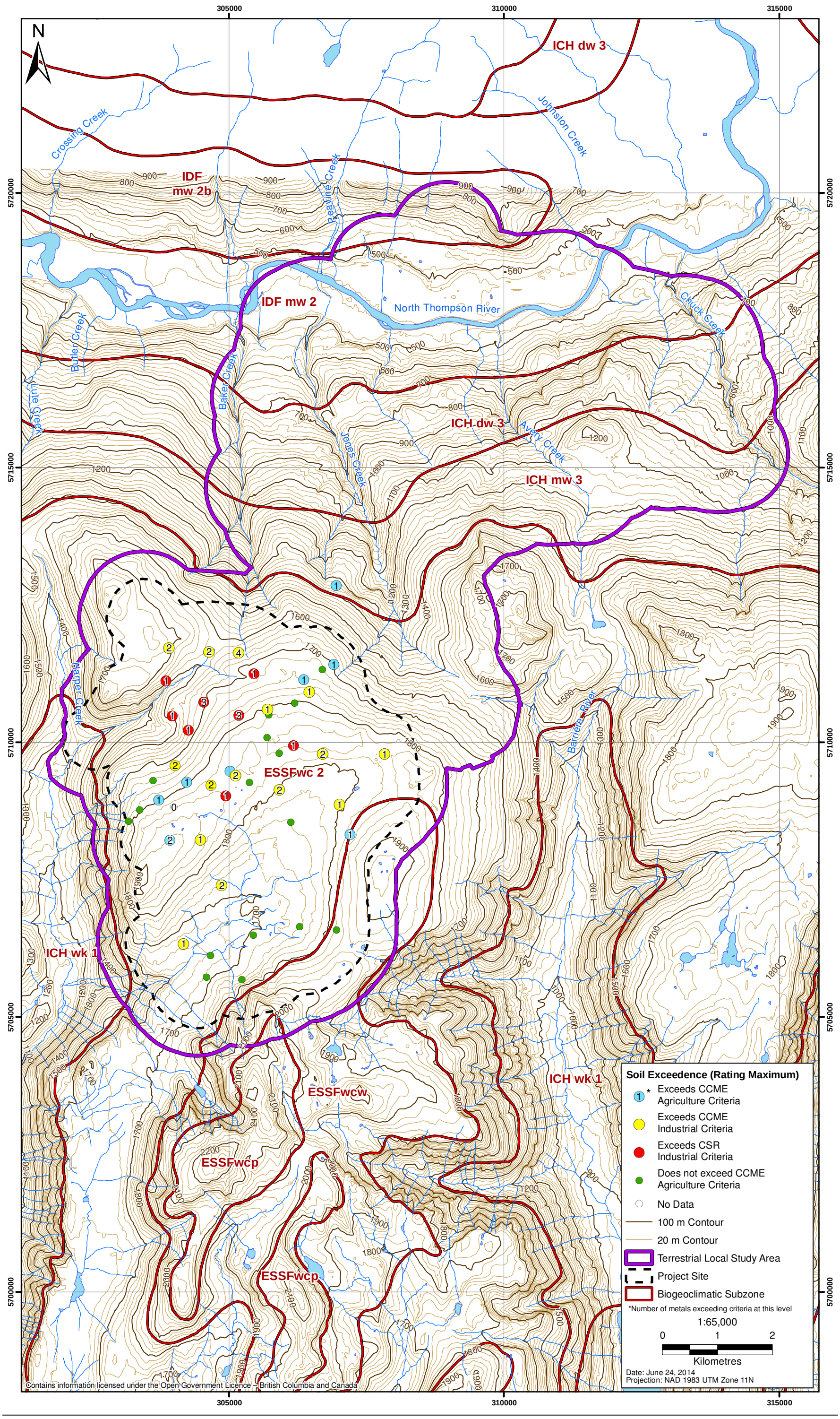


Figure 4.4-2
Relative Soil Copper Concentration in the Vicinity of the Harper Creek Local Study Area - Total and Environmentally Available Copper in Soil and near Surface Overburden

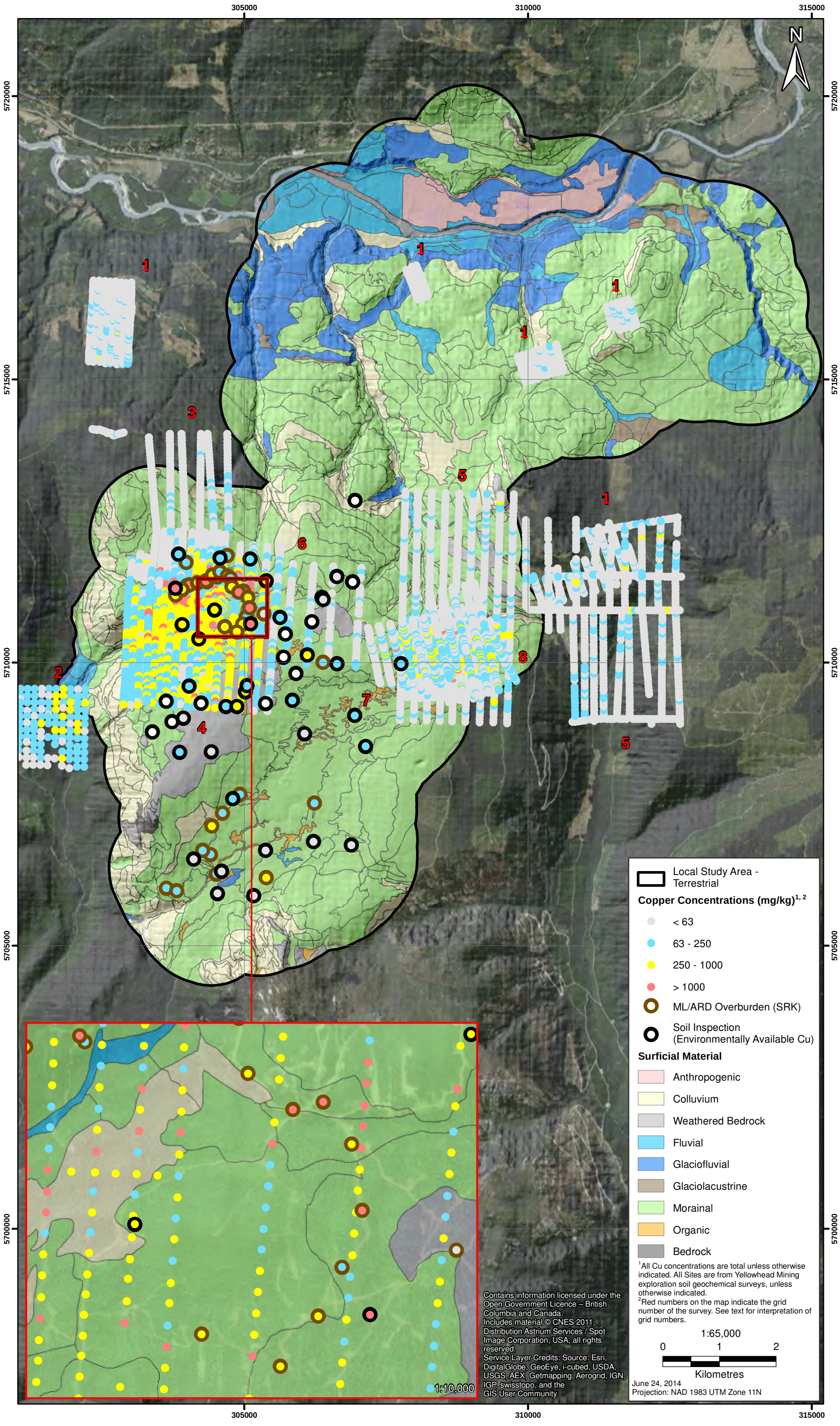


Table 4.4-3. Extractable Soil Metal Concentrations for Metals that Exceed CCME Land Use Criteria

SITE (HC-)	Horizon	SMU	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Zinc (Zn)	Exceed Agric.	Exceed (# species)
Criteria: CCME_Industrial			12	22	87	300	91	600	40	50	2.9	360		
Criteria: CCME_Agricultural			12	1.4	64	40	63	70	5	50	1	200		
Criteria: Industrial CSR			crustal X	500	700		250	2,000	40	500	10	600		
1	O1	F5_R	1.03	0.872	7.3	3.53	101	6.71	0.69	3.09	1.88	43.6	Yes	2
1	C3	F5_R	1.05	0.244	8.7	5.93	91	6.15	0.61	4.41	0.84	136	Yes	1
2	Bf	M3_P	6.69	0.104	10.5	5	42.2	8.89	0.77	5.71	0.52	40.6		
2	C	M3_P	9.56	0.165	12.5	9.16	81	17.5	0.65	8.78	0.25	57.8	Yes	1
4	Ah	M4_P.li	2.18	0.157	7.8	3.09	13.8	7.86	0.65	4.12	0.25	24.2		
4	Bf	M4_P.li	4.25	0.089	9.7	5.73	29.3	5.53	0.51	7.66	0.25	34.9		
5	Bf	M3_P.li	9.18	0.228	12.8	8.6	23.5	4.97	1.12	5.52	0.25	61.1		
6	Ah	F5_R.cug	0.25	0.164	3.6	1.01	4.58	4.95	0.25	1.36	0.25	6.4		
6	C1	F5_R.cug	0.25	0.08	3.1	1.09	7.95	5.03	0.05	1.34	0.62	7.5		
7	Bg	M6_G.pt	10.4	0.141	13.6	7.48	48.5	8.29	1.18	8.99	0.25	57.8		
7	Om	M6_G.pt	5.84	0.061	5.6	2.68	11.8	5.47	1.34	1.33	0.56	15.4		
8	Bf2	G3_P	7.99	0.258	9.6	4.87	32.5	7.15	0.57	5.76	0.25	42		
8	Bf1	G3_P	2.78	0.225	5.6	1.81	11.4	8.31	0.76	2.44	0.25	18.2		
9	C3	F4_R.cu	7.8	0.141	10.2	7.11	53.5	9.27	0.58	5.86	0.25	36.9		
9	C1	F4_R.cu	0.25	0.119	3.9	0.82	7.51	6.06	0.42	1.33	0.25	5.7		
10	Bhf	M5_P.so	16.6	0.368	11.9	5.12	52.4	10.7	0.57	5.09	0.25	42.7	Yes	1
10	Om	M5_P.so	6.33	0.428	6.4	4.3	44.4	7.01	1.21	4.23	0.77	35.7		
11	Bf	M3_P	67.4	0.339	20.9	14	199	33.1	1.11	17.4	0.52	132	Yes	2
11	C	M3_P	8.06	0.413	17.3	7.01	74.3	15.1	1.49	8.69	0.25	98.3	Yes	1
12	Bf	M3_P	19.7	0.269	22.4	7.06	56.9	22.3	1.04	8.33	0.25	77.5	Yes	1
13	Bf	M3_P	6.35	0.553	19.8	9.58	68.1	18	1.24	8.95	0.25	232	Yes	2

(continued)

Table 4.4-3. Extractable Soil Metal Concentrations for Metals that Exceed CCME Land Use Criteria (continued)

SITE (HC-)	Horizon	SMU	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Zinc (Zn)	Exceed Agric.	Exceed (# species)
15	O1	O6_Omt	1.01	0.54	2.6	0.64	6.79	4.74	0.5	1.66	0.5	5.3		
16	Bf	M3_P	5.23	0.104	10	3.07	18.9	12.1	0.85	4.59	0.25	29.3		
16	Bc	M3_P	12.9	0.193	20.7	13.5	146	21.6	0.76	23.5	0.58	117	Yes	2
17	Ah	M4_P.so	3.37	1.07	11.5	15.3	70.9	22.1	1.48	13.9	1.48	85	Yes	2
17	Bhf	M4_P.so	6.92	1.58	23.9	14.5	272	58.7	1.13	53.3	1.81	228	Yes	5
18	Bhf	M4_P	7.15	0.187	15.9	8.39	66.6	11	4.01	25.5	0.6	60.4	Yes	1
18	Bf	M4_P	8.79	0.21	23.7	29.3	181	15.9	11.7	63.3	1.13	107	Yes	4
19	Bf	M3_P,li	10.9	0.24	15.5	8.37	196	21	1.53	19.3	1.22	68	Yes	2
19	Ae	M3_P,li	1.28	0.118	3.3	0.91	14.1	7.13	0.73	1.81	0.25	9.6		
21	Bf	M3_P	25.8	0.222	34.5	12.3	225	18.7	1.75	27.1	1.31	95.1	Yes	3
23	Bf	M3_P	22.5	0.258	36.6	12.9	252	28.3	2.32	26.2	0.86	119	Yes	2
25	Bf	C2_P	7.63	0.553	17.2	7.22	28.1	17.8	1.29	7.71	0.25	162		
27	C	M4_P	55	0.381	34.3	18.9	261	40.1	1.01	38.8	1.34	122	Yes	3
27	Bf	M4_P	47.3	0.58	32	10.1	113	26.3	1.33	24.9	0.77	92.5	Yes	2
28	Bf	M4_P	76.5	0.491	9	23.4	480	43.4	1.97	15.3	3.35	119	Yes	3
29	Bf	M(C)4_P	25.2	0.318	61.6	19.8	172	14.8	1.82	68.8	0.25	96.5	Yes	3
29	Bc	M(C)4_P	53.2	0.343	108	37.7	542	21.3	2.32	159	0.72	119	Yes	4
31	Bm	M5_B.m(g)	27.5	0.678	21	25.1	487	42.5	2.18	29.6	1.2	113	Yes	3
31	Ah	M5_B.m(g)	21.7	0.598	24.4	9.98	548	32.3	2.09	24.2	1.09	90.4	Yes	3
32	Bf	M3_P.li	49.6	0.182	136	20.7	82.5	15.1	1.9	93.9	0.25	92.3	Yes	4
32	C	M3_P.li	39.2	0.232	158	39.2	128	13.2	1.29	115	0.25	90.6	Yes	4
33	Bf	M3_P	10.8	0.223	37.5	14.8	49.3	13.4	1.37	21	0.25	52.3		
33	C	M3_P	17.5	0.252	69.9	29.5	137	17.9	1.49	46.6	0.62	70.6	Yes	3
34	Bf	M4_P	7.78	0.31	14.3	4.94	32.1	50.3	2.05	7.63	0.57	41		

(continued)

Table 4.4-3. Extractable Soil Metal Concentrations for Metals that Exceed CCME Land Use Criteria (completed)

SITE (HC-)	Horizon	SMU	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Zinc (Zn)	Exceed Agric.	Exceed (# species)
34	Bc	M4_P	14.1	0.222	21	13.5	115	48.9	2.53	17.9	1.54	76.4	Yes	3
36	Bf	M5_P.g	67.3	1.48	57.2	43.6	3,310	129	3.45	68	1.98	246	Yes	8
36	Ah	M5_P.g	8.14	1.59	10.9	118	5,150	24.4	4.19	12.2	2.1	93.5	Yes	4
37	Bf	M3_P	3.71	0.119	11.2	2.53	7.86	9.28	0.41	5.03	0.25	17.3		
38	Bf	M3_P	14.4	0.111	36.4	10.5	22.1	28.4	0.64	34.1	0.25	106	Yes	1
39	C	M4_P	28.3	0.399	20.6	15.9	71	79.8	0.79	26	0.71	220	Yes	4
39	Bf	M4_P	45.6	0.371	20.8	16.7	56.3	78.3	1.2	28	0.85	212	Yes	3
40	C1	M6_G(R.g)	10.4	3.32	21.3	36.7	345	159	1.28	33.4	2.19	143	Yes	4
40	C2	M6_G(R.g)	28.6	3.88	22.7	34.1	1,090	3,230	3.45	67.3	3.77	1,200	Yes	7
=COUNT			54	54	54	54	54	54	54	54	54	54	34	
=MIN			0.3	0.1	2.6	0.6	4.6	4.7	0.1	1.3	0.25	5.3		
=MAX			76.5	3.9	158.0	118.0	5,150	3,230.0	11.7	159.0	3.77	1,200		
=AVERAGE			17.8	0.5	25.3	14.6	291.3	84.7	1.5	24.5	0.81	105.7		
=MEDIAN			9.4	0.3	16.6	9.4	71.0	16.7	1.2	13.1	0.57	81.3		
=STDEV			19.3	0.7	30.5	18.0	822.2	437.1	1.7	30.9	0.78	163.5		
< Dectect			3	-	-	-	-	-	1	-	23	-		

4.4.2.3 Overburden (ML/ARD Testing) Total Metal Results

The overburden static testing, total metals summary illustrates that there is enrichment of numerous metal species in the Project Site and that the metal species of enrichment varies between general areas (Open Pit area: five species exceed criteria, including As, Cu, Mo, Se and Zn; Tailings Management Facility area: two species exceed criteria, As, and Pb).

4.4.2.4 Overburden Total Metal Concentration

For general comparative purposes the static (total) metal concentrations in the overburden from the Project Site are presented in Table 4.4-4. These metal species include both those identified in the ML/ARD characterization assessment as being elevated compared to crustal abundance (As, Cu, Mo, Pb, Se and Zn) and those of potential concern based on the soils metal data (Cd, Co, Cr, and Ni).

The concentration results for overburden are based on a stronger extractant than used to obtain the soils results presented previously in Table 4.4-3, and as a result, likely exhibit concentration values that would exceed those using the weaker extractant (so-called 'extractable' metal concentration). Shading of results highlights comparisons to CCME/CSR criteria concentrations, and is meant as a relative guide to trends in elevated metal species in these two materials (overburden and soils). Data presented in this table are not meant to be an absolute comparison to published guidelines for the determination of suitable land uses.

Based on the ML/ARD testing program undertaken by SRK (2013), the following comments and conclusions regarding overburden metal content in the Project Site are provided:

- Trace element analyses showed that overburden in the pit area was enriched with similar elements to the deposit host rocks (arsenic, copper, molybdenum, selenium and zinc). Correlations of bulk characteristics to leachable concentrations were only apparent for copper, selenium, and zinc; and
- Overburden in the TMF area showed widespread lead enrichment (average of 710 mg/kg compared to assumed global average of 7 mg/kg). Enrichment of arsenic was also apparent (average 80 mg/kg compared to global average of 1 to 3 mg/kg). However, there is no indication that these elevated concentrations correlate with elevated leachability based on shake flask extraction, nor is there a geological explanation such as the documented presence of lead mineralization. Additional mineralogical characterization was in progress at the time of report preparation.

SRK conclusions regarding overburden:

- overburden in the pit footprint has variable ARD potential; and
- overburden in the TMF area has low ML/ARD potential. Elevated lead and arsenic concentrations were found in this overburden but it does not appear to be leachable.

Table 4.4-4. Overburden (Soil Parent Material) Metals Concentrations for Metals of Potential Concern

Sample ID	Area	Type	Paste (pH)	As* (ppm)	Cu* (ppm)	Mo* (ppm)	Pb* (ppm)	Se* (ppm)	Zn* (ppm)	Cd (ppm)	Co (ppm)	Cr (ppm)	Ni (ppm)	# Occurences
Method Code			Sobek	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	
LOD			0.2	1	0.5	0.05	0.2	1	1	0.01	0.1	1	0.5	
OP01 <2 mm	Pit	Road Cut	4.73	34	500	2.7	91.1	2	212	0.32	15.2	125	41.9	1
OP02 <2 mm	Pit	Road Cut	5.47	176	976	3.38	264	2	288	1.67	44.5	208	82.6	2
OP03 <2 mm	Pit	Road Cut	4.98	66	1,850	2.75	88.7	2	165	0.42	27.4	75	28.8	2
OP04 <2 mm	Pit	Road Cut	5.15	53	803	3.03	46.8	1	110	0.32	34.9	163	69.3	1
OP05 <2 mm	Pit	Road Cut	5.08	60	1,400	2.84	34.4	2	86	0.28	30.3	95	42.8	2
OP06 <2 mm	Pit	Road Cut	5.39	94	423	1.99	26.1	1	93	0.27	33.7	96	55.3	2
OP07 <2 mm	Pit	Road Cut	5.14	49	125	2.25	28	1	119	0.46	24.9	105	51.9	
OP08 <2 mm	Pit	Road Cut	5.19	53	309	4.78	39	1	126	0.31	27.1	74	46.5	1
OP09 <2 mm	Pit	Road Cut	5.62	43	125	2.24	25.1	1	115	0.28	28.3	119	71.7	
OP10 <2 mm	Pit	Road Cut	4.67	26	333	1.93	24.2	1	98	0.14	16.4	88	40.6	1
OP11 <2 mm	Pit	Road Cut	6.54	55	4,300	4.05	34.1	1	188	0.56	28.5	138	69.5	1
OP12 <2 mm	Pit	Road Cut	5.05	23	684	3.87	27.5	1	98	0.27	16.5	175	33.6	1
OP13 <2 mm	Pit	Road Cut	6.55	38	1,580	5.76	29.8	1	172	0.54	27.9	106	81.3	1
OP14 <2 mm	Pit	Road Cut	4.36	22	187	2.17	18.9	1	82	0.19	14.3	108	43.4	1
OP15 <2 mm	Pit	Road Cut	5.18	24	520	3.07	41.7	1	157	0.38	16	59	44.6	1
OP16 <2 mm	Pit	Road Cut	5.94	35	961	3.88	35	1	168	0.4	31.3	146	106	1
OP12-01 Overburden Sample #1	Pit	Deep Overburden	7.76	25.4	156	4.13	22.9	0.4	92.4	0.26	29.9	186	74.4	
OP12-01 Overburden Sample #2	Pit	Deep Overburden	8.57	19.5	153	2.56	35.9	0.7	76.3	0.22	27	168	71.5	
OP12-02 Overburden Sample #1	Pit	Deep Overburden	7.93	92	292	3.11	91.8	0.8	178	0.93	22.4	124	56.3	2
OP12-02Overburden Sample #2	Pit	Deep Overburden	7.78	30.9	519	5.79	41.2	0.7	102	0.38	18.1	136	44.1	1
OP12-03 Overburden Sample #1	Pit	Deep Overburden	7.81	45.2	202	2.34	21.9	0.3	101	0.28	28.4	126	72.7	1

(continued)

Table 4.4-4. Overburden (Soil Parent Material) Metals Concentrations for Metals of Potential Concern (continued)

Sample ID	Area	Type	Paste (pH)	As* (ppm)	Cu* (ppm)	Mo* (ppm)	Pb* (ppm)	Se* (ppm)	Zn* (ppm)	Cd (ppm)	Co (ppm)	Cr (ppm)	Ni (ppm)	# Occurences
OP12-05 Overburden Sample #1	Pit	Deep Overburden	6.84	22.6	117	1.24	10.5	0.2	48	0.09	13.4	102	22.7	
OP12-06Overburden Sample #1	Pit	Deep Overburden	8	24	530	3.7	41.3	1	129	0.43	22	95.1	41.3	1
OP12-07 Overburden Sample #1	Pit	Deep Overburden	7.96	26.9	1,180	4.93	15.3	0.9	109	0.37	24.2	156	55.4	1
OP12-09 Overburden Sample #1	Pit	Deep Overburden	7.35	10.5	56.3	0.79	34.1	0.1	144	0.36	14.4	64.1	32.3	
OP12-10 Overburden Sample #1	Pit	Deep Overburden	7.11	9.2	952	5.61	35.8	0.7	107	0.17	39.9	57.1	39.6	1
OP12-01 Weathered Rock Sample #1	Pit	Weathered Bedrock	7.97	1,010	179	1.51	191	1.4	770	4.7	12.8	98	10.3	2
OP12-01 Weathered Rock Sample #2	Pit	Weathered Bedrock	8.29	1,360	250	1.27	244	2.4	618	3.85	13.8	88.5	9.2	3
OP12-02 Weathered Rock Sample #1	Pit	Weathered Bedrock	7.68	16.2	762	8.83	10.6	0.8	46.5	0.31	8.1	78.7	17.9	1
OP12-03 Weathered Rock Sample #1	Pit	Weathered Bedrock	7.57	40.9	282	1.48	4.52	1.5	31.5	0.1	4.2	114	14.7	1
OP12-04 Weathered Rock Sample #1	Pit	Weathered Bedrock	8.28	36.3	157	2.01	40.1	0.9	111	0.24	38.3	75	36.3	
OP12-05 Weathered Rock Sample #1	Pit	Weathered Bedrock	8.81	26.8	26	0.81	5.76	0.1	51.4	0.08	5.9	120	10.3	
OP12-05 Weathered Rock Sample #2	Pit	Weathered Bedrock	8.55	164	152	2.69	113	0.1	221	0.81	11.9	121	15	1
OP12-06 Weathered Rock Sample #1	Pit	Weathered Bedrock	7.31	99.7	451	2.4	93	5.6	408	2.19	25.8	80.1	15	2
OP12-07 Weathered Rock Sample #1	Pit	Weathered Bedrock	9.05	0.4	1,710	12.5	6.67	3.9	43.2	0.26	7	82.2	15.1	1
OP12-08 Weathered Rock Sample #1	Pit	Weathered Bedrock	9.09	1	240	9.31	3.31	0.5	15.1	0.13	2.1	98.3	10.7	1

(continued)

Table 4.4-4. Overburden (Soil Parent Material) Metals Concentrations for Metals of Potential Concern (completed)

Sample ID	Area	Type	Paste (pH)	As* (ppm)	Cu* (ppm)	Mo* (ppm)	Pb* (ppm)	Se* (ppm)	Zn* (ppm)	Cd (ppm)	Co (ppm)	Cr (ppm)	Ni (ppm)	# Occurences
OP12-09 Weathered Rock Sample #1	Pit	Weathered Bedrock	7.64	19.2	72.4	0.89	25.4	0.1	79.3	0.26	11.6	107	23.8	
OP12-09 Weathered Rock Sample #2	Pit	Weathered Bedrock	7.6	14.2	49.4	1.03	21.6	0.1	89.1	0.24	11.7	80.4	25.4	
OP12-10 Weathered Rock Sample #1	Pit	Weathered Bedrock	8.78	8.7	6,210	2.96	9.54	8.1	73.2	0.69	34.6	140	87.1	1
TP01-1 <2 mm	TMF	Overburden	5.2	16	87.7	0.79	177	1	118	0.27	10.3	70	12.1	
TP5-1 <2 mm	TMF	Overburden	6.7	9	149	0.97	450	1	137	0.29	14	65	14.2	
TP12-1 <2 mm	TMF	Overburden	6.21	17	91.7	0.79	790	1	78	0.12	10.8	73	11	
TP12-2 <2 mm	TMF	Overburden	7.57	18	88.5	1.2	1,480	1	85	0.27	11.9	70	14	
TP15-4 <2 mm	TMF	Overburden	8	11	123	0.97	1,090	1	81	0.23	14.3	57	18.7	
TP2 <2 mm	TMF	Overburden	7.95	16	83.1	1.03	1,720	1	90	0.24	11.2	64	10.6	
TP26-1 <2 mm	TMF	Overburden	7.88	9	90.6	1.06	1,310	1	70	0.17	12.1	69	17.7	
TP27-1 <2 mm	TMF	Overburden	6.61	34	94.4	0.52	193	1	45	0.15	6.8	53	5.2	
TP29-1 <2 mm	TMF	Overburden	6.8	325	533	1.68	1,880	1	80	0.28	28.1	66	7.7	2
TP30-1 <2 mm	TMF	Overburden	4.96	27	139	0.83	22	1	112	0.23	12.5	49	15.1	
TP30-2 <2 mm	TMF	Overburden	7.06	30	160	0.87	39.1	1	128	0.41	15.4	75	15.5	
TP32-1 <2 mm	TMF	Overburden	7.91	503	296	2.59	98.2	1	106	0.45	12.9	49	7.2	2
TP51-3 <2 mm	TMF	Overburden	7.13	23	151	2.58	20.3	1	108	0.29	25.4	94	83.9	
=COUNT				52	52	52	52	52	52	52	52	52	52	
=MEDIAN				27.0	245	2.37	35.9	1.0	107	0.28	16.2	95.1	33.0	
=MAX				1,360	6,210	13	1,880	8	770	5	45	208	106	
=PERCENTILE(90TH)				158	1,378	6	756	2	210	1	33	155	74	

Note: Criteria exceedances assume 100% environmental availability of metal species.

Legend:

** Metals - elevated compared to crustal abundance;*

Metals of CCME Industrial concern in Soils;

Value exceeds CCME Agriculture Use criteria;

Value exceeds CCME Industrial Use criteria;

Value exceeds CSR Industrial Use criteria (except As);

Value exceeds 5X CCME Industrial Use criteria for As.

4.4.2.5 Soil and Overburden Metal Concentration Overview

An overview summary of the extractable soil metal concentration criteria exceedance data is combined with the total metal information from the other soil/overburden geochemical assessments (Table 4.4-5). This table provides a clearer picture of the ten metals that may be of concern in the soil environment and considered for monitoring, where soil and overburden, handling/movement is anticipated. The comments in the table suggests that three of the 10 metals (Cd, Co and Mo) may be of secondary concern compared to the seven others as noted below.

Table 4.4-5. Potential Metals of Concern for Local (Project Site[1]) Soil and Overburden

Metal	Soil (Extractible)	Overburden (Total)
Arsenic (As)	Common (no high concentrations)	Elevated[2]; commonly, moderate to high values[3] in Open Pit area; rarely, low.
Cadmium (Cd)	Moderately common (no high concentration)	Not elevated[2]; commonly, low to rarely slightly elevated.
Chromium (Cr)	Moderately common (no high concentration)	Not elevated; commonly, slightly to moderately elevated; rarely, low.
Cobalt (Co)	Uncommon (no high values)	Not elevated; low (only one sample slightly elevated)
Copper (Cu)	Most common (multiple high concentrations)	Elevated[2]; commonly, high to moderately high in the Open Pit; slightly elevated to moderately elevated outside of Open Pit area; very rarely within Agricultural Use limits
Lead (Pb)	Moderately common (single high concentration)	Elevated[2]; commonly, low to slightly elevated (moderate in some shallow soil outside Open Pit)
Molybdenum (Mo)	Uncommon (no high values)	Elevated[2]; commonly, low to rarely, slightly elevated
Nickel (Ni)	Moderately common (no high concentrations)	Not elevated; rarely above low
Selenium (Se)	Common (no high concentrations)	Elevated[2]; commonly, low to slightly elevated (moderate in some weathered rock)
Zinc (Zn)	Uncommon (single high concentration)	Elevated[2]; commonly, low to rarely, slightly elevated; (moderately to high in some weathered rock)

Notes:
High soil values (exceed CSR Industrial Use criteria).
[1] Project Site refers to the approximately 3,500 ha area, in the southern portion of the LSA, encompassing the general area of proposed mine infrastructure.
[2] elevated concentration compared to normal crustal abundance for local, Project Site rock types.
[3] value modifiers refer to relative total concentrations compared to land use guideline criteria (i.e., low: always below most stringent criteria; high: above least stringent criteria; though an imperfect comparison it is extremely conservative in its rating).

The overburden data generally corroborate the extractible soil data, indicating there are seven primary or common soil metals of potential concern for the Project Site, those identified as enriched relative to crustal abundance, namely As, Cu, Pb, Se, Zn, and, to a lesser extent, non-enriched species Cr, and Ni. These are the same metal species as identified in the CCME Industrial Use criteria assessment.

Soil materials (surface soils and overburden) are expected to reflect the same metal concentration characteristics and management of their handling will be reflective of these potential limitations for use. It is important to note that the weathered rock overburden (as represented by fractured drillcore samples OP12-01 through OP12-10) is to be treated separately from other overburden materials, as described in the management of rock and overburden wastes by SRK (2013). These will be treated as ARD wastes.

4.4.2.6 Geographic Soil Geochemical Enrichment – Soil Copper

Indicators for evidence of known mineralization in soils in the LSA were examined. To provide context for the relatively few soil inspection sites and samples taken and analyzed for a range of extractable metals (31 sites; 54 soil samples), the soil geochemical database, as developed for geologic exploration, was queried (HCMC, pers. comm.). As described in Section 3, Methods, a number of soil geochemical surveys have been conducted for exploration purposes. The Project proponent provided results for eight soil grid sampling programs as indicated on Figure 4.4-2.

A single metal species, copper (Cu), was chosen since it is:

- commonly associated with a range of other metals enrichment (i.e. arsenic);
- the element with the most abundant data set (n = approximately 6,900), going back to sampling programs conducted in the 1970's; and
- covers an extensive range of areas within and adjacent to the LSA.

Figure 4.4-2 provides a general display of known, relative soil copper mineralization levels in the LSA and includes both total Cu class results (exploration soils and ML/ARD overburden samples) and extractible Cu class results (surface soil sample). These data are available for more detailed assessments as may be required for soil handling, as part of reclamation planning, or for background comparison in the event of accident spills or malfunctions resulting in potential soil metal contamination. Additional element analyses (addition metal species) are available in this database but are not presented in this baseline.

Figure 4.4-2 illustrates the distribution of sampling and the variation in soil metal concentration, primarily for total Cu concentration, within the LSA and nearby adjacent areas. A four class rating system was chosen to illustrate the general range of total Cu concentration in soil:

1. 0 to 63 ppm (suitable for Agriculture Use CCME);
2. 63 to 250 ppm (suitable for Industrial Use CSR);
3. 250 to less than 1,000 ppm (unsuitable for most uses); and
4. Equal to or greater 1,000 ppm.

The first three classes equate to criteria used for various CCME and CSR land uses and the fourth, greater than 1,000 ppm Cu, is roughly equivalent to the 98th percentile concentration based on local soil geochemical sampling/analyses. These total Cu results are not meant to be definitive for the CCME nor CSR guidelines but rather simply indicate geographic trends across the areas of sampling. Caution should be exercised when interpreting this figure, as it includes two types of

copper data, total and extractible. The primary difference being in the strength of the extractant used to release copper from the soil material.

The soil geochemical results presented on Figure 4.4-2 suggest the surface soil materials along the north facing slopes into the North Thompson River valley, common to the northern portion of the LSA, have relatively low concentrations of total copper (Grid 1, three sub-areas). No geochemical or surface soil data are available for review for the area of the proposed rail load-out facility in the bottom of this valley.

Data for the Project Site, especially its northwestern corner (Grid 3, 4 and 6, open pit area), display a frequent occurrence of both elevated total and extractible copper. A similar trend, though not as frequently expressed, is present in the northeastern corner of the Project Site (Grids 1, 5, 7, and 8, northeast of the proposed TMF). Both these areas are in relatively close proximity to exposed or weathered bedrock, generally comprising the Upper Proterozoic unit of the Eagle Bay Assemblage. This bedrock unit includes the commonly mineralized paragneiss, metamorphic rock according to the regional geologic map (Figure 4.1-2). Soil parent materials are generally thin. Veneers are commonly mapped in these areas though deeper materials are present.

5. CONCLUSIONS

This baseline report provides information on the general terrain and soil conditions in the terrestrial local study area of the Project. Terrain mapping and soil mapping is complete for this area. Sampling and analyses of soil materials for a variety of purposes has been undertaken in this area and the results are included in this report.

5.1 TERRAIN

Terrain information presented in this baseline is derived from two sources, a Reconnaissance Terrain report, prepared by Knight Piésold (2012a), and more detailed, bioterrain mapping, prepared as part of the project TEM program (Keystone 2013).

A description of typical surficial material types and terrain features is provided in the reconnaissance report. Samples of typical surficial materials from within the proposed project facilities are analyzed for both physical and chemical characteristics as part of other project baseline reporting, i.e., geotechnical and ML/ARD assessments (Knight Piésold 2012b, 2013 and SRK 2013, respectively). The results of these analyses are used for determining soil management issues and suitability of these overburden types for potential use in future site reclamation.

The bioterrain mapping is interpreted at a more detailed level than the reconnaissance mapping. It is to a level sufficient for the interpretations required for terrain related impacts and is used as the basis for soil mapping. Terrain stability mapping (Appendix 5-C), uses this map as a base onto which further assessment information is being added.

5.2 SOIL

The soil baseline field studies, conducted to support the environmental assessment application, were undertaken primarily in 2012 and 2011 but include data from 2008 fieldwork as well. A variety of soil-related data from various project sources (geotechnical, geochemical and ecosystem) has been compiled in GIS to assist in assessments required during permitting. Soil mapping was completed to characterize these resources in the LSA. The information collected during the baseline program will be used to carry out the effects assessments, develop management and mitigation plans, and guide the reclamation and closure plan.

The local climate influences terrain, soil and ecological processes. Regional climate is reflected in three BEC zones: Interior Douglas-fir - warm, dry, low elevation (500 to 700 masl), valley bottom; Interior Cedar-Hemlock - mid elevation (700 to approximately 1,400 masl), valley side-slopes; and the Engelmann Spruce-Subalpine Fir - upper elevation (> 1,400 to 2,025 masl). There are seven subzone variants within these three BEC zones.

The proposed Project Site is situated primarily in the ESSF, an environment of significant soil leaching. Much of the area around the proposed Project Site is rolling to near level (nearly 90% of slope gradients are less than 26%). Locally, soils include shallow, slightly gravelly to cobbly or silty

to sandy till, colluvium and weathered bedrock. Soils include very strongly acidic Podzols and less well developed medium acidic Brunisols. Local soils display coarse to medium textures, commonly sandy loams. In the Project Site, lithic (shallow to bedrock) soils occupy approximately one-third of the area. Organic (peaty) soils represent a minor portion of the mapped area. At the south end of the LSA in the east-central Project Site, a thin, possibly discontinuous, silty to fine sandy lacustrine veneer is mapped in parts of the lowland.

General analytical results of samples of soil (n=54) and overburden (n=52) from the Project Site, indicate the following:

- soil textures are most often sandy loam but range from silt loam, loam and loamy sand;
- soil coarse fragment content (particles > 2 mm diameter) ranges from less than 20% to approximately 70%;
- soils are non-saline and non-calcareous;
- soil reaction (pH) is generally very strongly acidic to medium acidic (pH ranges 4.4 to 6.7);
- overburden is non-saline;
- weathered overburden near the surface (sample range starts within 1.0 m of the surface) is often strongly acidic (median pH 5.4) but ranges from extremely acidic to moderately alkaline; and
- slightly weathered to unweathered overburden samples from > 1.0 m below the surface are often slightly to moderately calcareous with a median pH of 7.9 (ranges 6.7 to 9.1, neutral to strongly alkaline).

The existing Access Road and the proposed Power Line extend from the valley bottom and across the valley side-slopes to the Project Site located on the upper elevation plateau. In the lower elevations of the valley, infrastructure exists or is proposed along the North Thompson River, where the terrain is predominately floodplain with coarse gravels and sands occasionally capped by silty deposits. Along the river, soils show little pedogenesis. They are typical Regosolic soils developing in areas of recent deposition. They commonly include Eutric and Dystric Brunisols on the slightly elevated terraces and older portions of fluvial fans. On mid-slopes, Luvisolic soils developed on morainal (glacial till) materials are common. At the higher elevations, soils are the same as described for the Project Site.

Soils in the vicinity of the Rail Load-out, located in the valley bottom, include both those disturbed by urbanization and industrial development (including some anthropogenic non-soils) and those typical of the 'young' terraced and active floodplain deposits (including Eutric and Dystric Brunisols and Regosolic fluvial soils).

As part of the baseline studies, soil and overburden samples were collected and analyzed to establish the range of metal concentrations in the area. Fifty-four soil samples from 32 soil inspection sites were obtained from the Project Site portion of the LSA as part of the soil survey. These samples were analyzed for a suite of 31 'available' or 'extractable' metals, of which 19 have CCME Industrial Use Guideline criteria values. Ten of the nineteen metals were noted to exceed agricultural use

criteria at least once. Copper and arsenic were the most frequently occurring metals of concern, though other metals exceeding CCME Agricultural use critical limits include, in order of frequency of exceedance (numbers in brackets indicate frequency of exceedances in the 54 samples tested):

- Cu (30) > As (22) > Se (15) >> Ni (8) > Cd (5), Pb (5), Cr (4) > Co (2), Mo (1), Zn (1)

In total, 22 of the 32 sampled sites tested exceed the most restrictive criteria.

A total of 7 metals exceed the less restrictive, CCME Industrial Use guideline concentrations:

- Cu (22), As (22) >> Ni (8) > Cr (3), Co (2), Se (2) > Pb (1), Zn (1)

Only three metals exceed the least restrictive land use criteria, CSR Industrial, these include Cu, Pb and Zn. Two of these are single high values (Pb and Zn) and all come from one disturbed site (HC-40), located slightly southeast of the proposed Open Pit.

Soil samples analyzed as part of the Ecological Risk assessment re-confirmed these same trends in metals of concern. Of the individual samples taken from fifteen sites predominantly from the Project Site, half showed some exceedance of either or both extractable arsenic and copper.

Fifty-two overburden (soil and soil parent material) samples from 37 geotechnical/geochemical inspection sites were obtained from the Project Site portion of the LSA. Metals of potential concern include As, Cu, Mo, Pb, Se and Zn. Initial ML/ARD testing suggests correlations of bulk characteristics to leachable concentrations were only apparent for copper, selenium and zinc (not As, Mo, Se).

Geological exploration soil geochemical sampling has been conducted extensively in portions of the LSA, including over the proposed Open Pit area. Nearly 6,900 soil samples have been analyzed for total copper concentration. These data, combined with the extractable copper data obtained from recently sampled soils, provides a reasonable definition of soil copper enrichment across the areas of proposed development, with the possible exception of the area of the proposed Rail Load-out (an area of no reference soil metal data).

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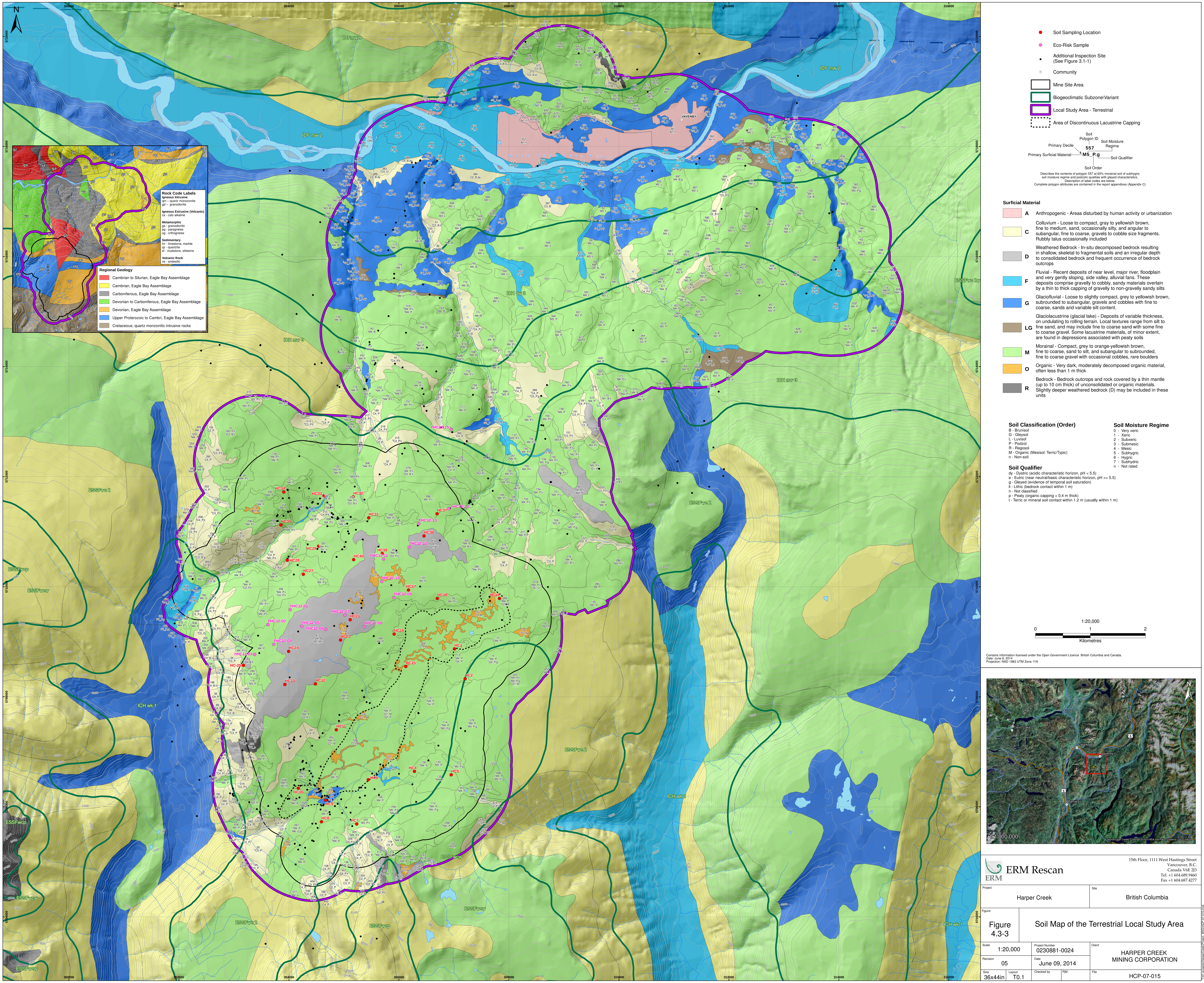
Oversized Maps



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Project	Site
Harper Creek	British Columbia

Figure: Figure 4.3-3 — Soil Map of the Terrestrial Local Study Area

Scale	Project Number	Client
1:20,000	0230881-0024	HARPER CREEK MINING CORPORATION
Revision: 05	Date: June 09, 2014	
Size: 36x44in / Layout: T0.1	Checked by / PjM	File: HCP-07-015

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Appendix A

Soil Inspection Site Summary

A-1. Soil Inspection

A-2. Surficial Material and Overburden

A-3. Soil Profiles

Appendix A-1

Soil Inspection

A1-1. Soil Inspection Summary - Knight Piésold Soil Survey

A1-2. Soil Inspection Summary - Keystone Wildlife Research

Table A1-1. Site Inspection Summary - Knight Piesold Soil Survey

Site ID	Location (UTM)		BEC		CSSC		Parent	Soil		Notes
	Northing (m)	Easting (m)	Subzone Variant	SMU	Order	Subgroup	Material	Texture Code [1]	SMR [2]	
HC - 1	5,709,064	306,943	EFFSwc2	F5_R	R	CU.R	Fluvial	4	5	contains 'O' layers
HC - 2	5,708,519	307,135	EFFSwc2	M3_P	P	O.FHP	Morainal	4	3	
HC - 4	5,706,838	306,214	EFFSwc2	M4_P.li	P	O.HFP	Morainal	4	4	profile with diagnostic Bf
HC - 5	5,706,777	306,883	EFFSwc2	M3_P.li	P	O.HFP	Morainal	4	3	
HC - 6	5,706,686	305,374	EFFSwc2	F5_R.cug	R	Cu.R	Fluvial	4	5	
HC - 7	5,705,882	305,164	EFFSwc2	M6_G.pt	G	O.G	Morainal	4	6	peaty phase
HC - 8	5,705,922	304,524	EFFSwc2	G	P	O.FHP	Glaciofluvial	4	3	
HC - 9	5,706,315	304,598	EFFSwc2	F4_R.cu	R	Cu.R	Fluvial	3	4	
HC - 10	5,706,531	304,103	EFFSwc2	M5_P.so	P	O.HFP	Morainal	4	5	
HC - 11	5,707,594	304,793	EFFSwc2	M3_P	P	O.HFP	Morainal	4	3	
HC - 12	5,708,427	304,413	EFFSwc2	M3_P	P	O.FHP	Morainal	5	3	
HC - 13	5,708,417	303,858	EFFSwc2	M3_P	P	O.HFP	Morainal	5	3	
HC - 15	5,708,743	306,056	EFFSwc2	O6_M.t	M	Cu.M	Organic	4	6	
HC - 16	5,709,333	305,844	EFFSwc2	M3_P	P	O.HFP	Morainal	4	3	
HC - 17	5,710,134	306,106	EFFSwc2	M4_P.so	P	O.FHP	Morainal	4	4	
HC - 18	5,709,981	306,629	EFFSwc2	M4_P	P	O.HFP	Morainal	3	4	
HC - 19	5,709,980	307,761	EFFSwc2	M3_P.li	P	O.HFP	Morainal	4	3	
HC - 21	5,709,594	305,046	EFFSwc2	M3_P	P	O.HFP	Morainal	3	3	
HC - 23	5,709,224	304,868	EFFSwc2	M3_P	P	O.HFP	Morainal	3	3	
HC - 24	5,709,016	303,926	EFFSwc2	R0	n	-	Bedrock	-	0	bedrock < 10cm soil
HC - 25	5,708,572	303,174	EFFSwc2	C2_P	P	O.HFP	Colluvial	4	2	
HC - 27	5,710,419	304,194	EFFSwc2	M4_P	P	O.HFP	Morainal	4	4	
HC - 28	5,710,675	303,902	EFFSwc2	M4_P	P	O.HFP	Morainal	4	4	
HC - 29	5,710,931	304,471	EFFSwc2	M(C)4_P	P	O.FHP	Morainal	4	4	
HC - 31	5,711,446	305,383	EFFSwc2	M5_B.m	B	O.MB	Morainal	3	5	
HC - 32	5,711,828	305,100	EFFSwc2	M3_P.li	P	O.HFP	Morainal	5	3	
HC - 33	5,711,846	304,567	EFFSwc2	M3_P	P	O.FHP	Morainal	4	3	
HC - 34	5,711,915	303,839	EFFSwc2	M4_P	P	O.FHP	Morainal	4	4	
HC - 36	5,711,316	303,786	EFFSwc2	M5_P.g	P	O.HFP	Morainal	4	5	Ah(?) / Bf; SM.HFP - Sawtooth 'SW'
HC - 37	5,711,519	306,625	EFFSwc2	M3_P	P	O.HFP	Morainal	3	3	
HC - 38	5,711,116	306,388	EFFSwc2	M3_P	P	O.FHP	Morainal	4	3	
HC - 39	5,710,795	305,629	EFFSwc2	M4_P	P	O.FHP	Morainal	4	4	
HC - 40	5,710,685	305,108	EFFSwc2	M6_R.g	R	O.R	Morainal	3	6	R- disturbed

[1] *Soil Texture Code: 2- moderate fine (SiCL, CL,SCL) 3-medium (Si, SiL, L) 4- moderately coarse (SL) 5-coarse (LS,S)*

[2] *Soil Moisture Regime codes: 0-very xeric 2-subxeric 3-submesic 4-mesic 5-subhygric 6-hygric*

Table A1-2. Site Inspection Summary - Keystone Wildlife Research

Plot ID	Plot Number	UTM Zone	UTM Northing	UTM Easting	Elevation (m)	BEC Zone	SubZone variant	Site Series	PM-SMR (SMU)	Detailed Profile [1]	Soil Order	Soil Great Group	Terrain Symbol	SMR [2]	Slope Gradient (%)	Structural Stage	Notes
474	HC08-01	11	5,711,427	306,929	1,690	ESSF	wcw	01	M4				dzsMw.	4	15	3	well drained
480	HC08-07	11	5,708,796	303,463	1,810	ESSF	wcw	04	M4				srMbh.u	4	30	3	
481	HC08-08	11	5,706,202	304,693	1,660	ESSF	wc2	92	F5				psFAp.	5	3	3	
482	HC08-09	11	5,705,651	305,153	1,722	ESSF	wc2	03	M3				dzsMb.	3	58	7	
483	HC08-10	11	5,705,769	305,123	1,715	ESSF	wc2	04	M5				zdsMv.dzsMbj	5	18	5	
484	HC08-11	11	5,706,586	305,601	1,704	ESSF	wc2	92	F5				zsFv.Mb	5	5	2b	
485	HC08-12	11	5,706,752	305,712	1,722	ESSF	wc2	W11	O6				hOvb.	6	0	2b	
486	HC08-13	11	5,706,772	305,662	1,730	ESSF	wc2	02	M2				zdsMbu.	2	8	7	
488	HC08-15	11	5,707,267	304,099	1,779	ESSF	wc2	04	M5				dsmMb.	5	25	2	
489	HC08-16	11	5,707,216	304,094	1,770	ESSF	wc2	06	C5				hszCv.dsmMb	5	25	6	Drn: mw-i
491	HC08-18	11	5,708,504	305,715	1,772	ESSF	wc2	Wf4	O6.pt				hOv.zsFw	6	0	3	
493	HC08-20	11	5,709,188	304,169	1,806	ESSF	wc2	02	D2				zsrDxv.Ruj	2	18	4	
496	HC08-23	11	5,711,208	307,128	1,677	ESSF	wc2	01	M4				dmsMv.zrsDv	4	25	4	w-imp
497	HC08-24	11	5,711,166	307,444	1,666	ESSF	wc2	04	D3				zsrDv.Rja	3	30	6	shallow R
498	HC08-25	11	5,711,109	307,704	1,610	ESSF	wc2	07	M5				dszMks.	5	35	3	
501	HC08-28	11	5,712,385	306,804	1,520	ESSF	wc2	01	M4				dsmMb.	4	30	5	w-mw
502	HC08-29	11	5,712,043	305,650	1,630	ESSF	wc2	01	C4	0	B	SB	hszCl.zsrDv	4	20	7	stratig Cfo/>35
504	HC08-31	11	5,711,264	304,886	1,672	ESSF	wc2	03	M3				zdsMvw.sdmMb	3	25	3	
505	HC08-32	11	5,711,232	304,880	1,662	ESSF	wc2	09	F5				srFAja.	5	12	3	
506	HC08-33	11	5,711,260	304,792	1,658	ESSF	wc2	02	D1				srDx.Ru	1	20	3	R outcrop
509	HC08-36	11	5,712,370	304,189	1,637	ESSF	wc2	01	M4				cszMb.	4	25	4	w 05
511	HC08-38	11	5,713,666	308,693	1,355	ICH	mw3	10	C5				hszCIv.dsmMb	5	18	3	
512	HC08-39	11	5,713,469	308,588	1,380	ICH	mw3	06	M5				dszMb.	5	32	6	
513	HC08-40	11	5,712,933	308,626	1,438	ICH	mw3	01	D5				zsrDv.Ruj	5	20	3	shallow to R, some wetter
514	HC08-41	11	5,712,688	308,663	1,446	ICH	mw3	06	M5				sdmMb.	5	30	4	
516	HC08-43	11	5,711,745	307,705	1,629	ESSF	wc2	03	C3				szrCb.	3	65	3	
518	HC08-45	11	5,711,969	307,622	1,440	ESSF	wc2	01	M3				zsdMb.	3	45	7	
519	HC08-46	11	5,712,600	307,193	1,400	ICH	mw3	01	M4				zdsMwb.	4	38	7	
521	HC08-48	11	5,712,809	306,969	1,370	ICH	mw3	01	C4				zsrCvb.	4	40	3	forest-cut
522	HC08-49	11	5,713,198	306,504	1,310	ICH	mw3	05	C3				zsrCvb.	3	55	3	shallow R; dry
523	HC08-50	11	5,713,500	306,449	1,260	ICH	mw3	01	M4				dsmMb.	4	33	6	
526	HC08-53	11	5,714,038	305,561	1,155	ICH	mw3	01	M4				dsmMbu.	4	25	5	
527	HC08-54	11	5,713,578	305,392	1,140	ICH	mw3	08	F5				bgFAj.	5	25	3/b	
529	HC08-56	11	5,714,061	302,579	1,510	ESSF	wc2	01	M4				dzsMvx.zsrDv	4	50	3	shallow to R
530	HC08-57	11	5,714,293	302,404	1,455	ESSF	wc2	07	M5				dsmMb.	5	33	7	
534	HC08-61	11	5,714,270	304,903	1,260	ICH	mw3	06	M5				zdsMb.	5	40	4	
535	HC08-62	11	5,714,044	304,471	1,229	ICH	mw3	01	M4				dmsMb.	4	38	2	
539	HC08-66	11	5,713,226	307,461	1,208	ICH	mw3	01	M4				zdsMbw.	4	45	2	
541	HC08-68	11	5,714,348	306,511	1,080	ICH	mw3	01	M4				dsmMbv.mrDv	4	25	6	
542	HC08-69	11	5,714,617	306,130	1,022	ICH	mw3	01	M4				dsmMb.	4	30	3	
544	HC08-71	11	5,714,447	305,465	1,015	ICH	mw3	08	M5				dsmMb.	5	10	6	
546	HC08-73	11	5,715,310	306,560	840	ICH	dw3	05	L5				czLGb.Md	5	0	6	SMR: 5 (6)
548	HC08-75	11	5,715,492	306,440	810	ICH	dw3	01	G3				zpsFGjb.	3	23	6	SMR: (4) 3
550	HC08-77	11	5,716,114	305,807	710	ICH	dw3	3YS	G3				zpsFGb.Mj	3	15	3	

Notes:

[1] *Sites with Detailed Profiles (see data in Appendix A3)*

[2] *Soil Moisture Regime codes: 0-very xeric 1- xeric 2-subxeric 3-submesic 4-mesic 5-subhygric 6-hygric 7-subhydric*

Table A1-2. Site Inspection Summary - Keystone Wildlife Research

Plot ID	Plot Number	UTM Zone	UTM Northing	UTM Easting	Elevation (m)	BEC Zone	SubZone variant	Site Series	PM-SMR (SMU)	Detailed Profile 1	Soil Order	Soil Great Group	Terrain Symbol	SMR [2]	Slope Gradient (%)	Structural Stage	Notes
551	HC08-78	11	5,716,484	305,895	660	IDF	mw2	01	G4				zsFGv.sgFGuj	4	20	6	
552	HC08-79	11	5,716,395	305,760	680	ICH	dw3	01	G3				psFGuj.	3	15	6	
553	HC08-80	11	5,716,617	305,947	628	IDF	mw2	01	G4				psFGv.dsmMj	4	22	3	
554	HC08-81	11	5,716,738	306,123	610	IDF	mw2	03	G2				kspFGa.	2	45	6	
556	HC08-83	11	5,716,999	306,130	580	IDF	mw2	01	G4				sFGv.gsFu	4	10	6	
557	HC08-84	11	5,717,351	306,317	580	IDF	mw2	01	M4				dsmMb.	4	60	6	SMR: (5) 4
558	HC08-85	11	5,717,341	306,464	475	IDF	mw2	05	F5				sgFAp.	5	4	6	w-mw
559	HC08-86	11	5,717,629	306,256	500	IDF	mw2	01	G3				sFGv.kspFGp	3	3	4	
560	HC08-87	11	5,717,715	306,234	485	IDF	mw2	01	G3				gsFGks.	3	65	6	
565	HC08-92	11	5,710,624	302,113	1,356	ESSF	wc2	01	M4				sdMh.	4	35	4	w 06_07
566	HC08-93	11	5,709,615	301,870	1,308	ESSF	wc2	06	F5				zsFv.sdFf	5	12	7	Drn: w-mw, Ff
569	HC08-96	11	5,708,914	301,940	1,272	ICH	wk1	06	M5				zsdMbh.	5	35	2	
571	HC08-98	11	5,708,317	302,093	1,300	ICH	wk1	06	C5				sdCIf.	5	20	7	SMR: 4 (5)
573	HC08-100	11	5,707,189	301,876	1,180	ICH	wk1	06	F5				sFAvx.gFAp	5	2	7	Fp; SMR 5 (4-6)
574	HC08-101	11	5,706,557	302,566	1,309	ICH	wk1	02	C2				bdsCb.	2	70	4	
575	HC08-102	11	5,706,492	302,371	1,220	ICH	wk1	03	G3				dsFGbt.	3	30	7	
577	HC08-104	11	5,703,607	305,598	2,160	AT			M3				bgsMvr.Rur	3	12	2	shallow to R
578	HC08-105	11	5,703,648	305,307	2,160	ESSF	wcp	FL	D1				xsDvx.Rr	1	12	3	SMR: 1-2; Krumhlz
579	HC08-106	11	5,704,276	305,715	2,090	ESSF	wcp	SG	M5				bgsMvw.	5	18	2b	
582	HC08-109	11	5,705,378	304,450	1,700	ESSF	wc2	04	M4				bdsMbw.	4	15	4	
583	HC08-110	11	5,709,743	307,657	1,830	ESSF	wc2	W16	O6				hOp.	6	0	2b	6 (5) SMR; fen
594	HC08-02	11	5,710,659	305,953	1,805	ESSF	wcw	03	D3				rszDvx.Ru	3	4	4	r-w; rubbly; shallow R
595	HC08-03	11	5,708,790	305,796	1,795	ESSF	wcw	06	M5				zdsMbh.	5	10	6	
596	HC08-04	11	5,706,337	302,982	1,574	ICH	wk1	02	C2				arsCxv.Rskh	2	50	4	
597	HC08-05	11	5,705,962	303,418	1,627	ESSF	wc2	03	M3				bsdMw.dzsM	3	48	4	
598	HC08-06	11	5,708,976	305,641	1,805	ESSF	wc2	04	M5				zdsMb.	5	4	3	
599	HC08-114	11	5,711,388	303,333	1,710	ESSF	wc2	W11	O6.pt				hOvb.dszMw	6	0	2b	6 (7) SMR
600	HCV08-17	11	5,707,563	304,910	1,720	ESSF	wc2	02	M2				zdsMbuh.	2	20	0	
601	HCV08-19	11	5,709,338	305,395	1,840	ESSF	wc2	02	A0				Avxu.	0	25	1	Quarry: R_metamorphic
602	HCV08-21	11	5,709,289	304,823	1,830	ESSF	wcw	01	D2				zsrDv.Rju	2	15	3	rev Dry; shallow; SL
603	HCV08-22	11	5,709,283	305,064	1,840	ESSF	wc2	Wf4	F7				hzsFv.rzDvx	7	2	3	
604	HCV08-26	11	5,711,498	307,340	1,575	ESSF	wc2	06	M4				dszMBks.	4	4	0	gully:06 -slopes: 01
605	HCV08-27	11	5,712,200	307,088	1,520	ESSF	wc2	04	C2				zdsCw.Ra	2	35	0	
606	HCV08-30	11	5,711,443	304,752	1,640	ESSF	wc2	04	M4				dszMBmwd.	4	20	0	logged
607	HCV08-34	11	5,711,450	304,218	1,610	ESSF	wc2	01	M4				dmsMbmw.	4	30	0	
609	HCV08-37	11	5,712,298	307,053	1,490	ESSF	wc2	03	D2				zsrDv.Raj	2	30	0	
610	HCV08-42	11	5,712,061	308,944	1,480	ESSF	wc2	09	M6				sdmMb.	6	20	0	
611	HCV08-44	11	5,712,146	309,642	1,700	ESSF	wc2	03	C1				srCv.Rskr	1		0	
612	HCV08-47	11	5,712,646	307,235	1,370	ICH	mw3	05	C3				Cv.Rk	3	57	7	w-r drn; shallow
613	HCV08-51	11	5,713,604	306,425	1,260	ICH	mw3	01	M4				sdmMb.	4	35	3	
614	HCV08-52	11	5,713,986	306,066	1,220	ICH	mw3	01	D3				zsrDv.Ra	3		6	
616	HCV08-58	11	5,714,396	302,741	1,420	ICH	mw3	01	M4				zsdMb.	4	30	0	
617	HCV08-59	11	5,713,939	303,670	1,430	ESSF	wc2	03	M3				zsdMb.	3	45	0	clearcut
618	HCV08-63	11	5,714,067	304,595	1,240	ICH	mw3	01	M4				dsmMb.	4	30	0	texture: fine

Notes:

[1] *Sites with Detailed Profiles (see data in Appendix A3)*

[2] *Soil Moisture Regime codes: 0-very xeric 1- xeric 2-subxeric 3-submesic 4-mesic 5-subhygric 6-hygric 7-subhydric*

Table A1-2. Site Inspection Summary - Keystone Wildlife Research

Plot ID	Plot Number	UTM Zone	UTM Northing	UTM Easting	Elevation (m)	BEC Zone	SubZone variant	Site Series	PM-SMR (SMU)	Detailed Profile 1	Soil Order	Soil Great Group	Terrain Symbol	SMR [2]	Slope Gradient (%)	Structural Stage	Notes
619	HCV08-64	11	5,713,631	304,920	1,200	ICH	mw3	08	F5				kbFja.	5	37	0	
620	HCV08-65	11	5,713,913	306,680	1,160	ICH	mw3	01	M4				dszMb.	4	28	0	
621	HCV08-67	11	5,713,489	307,347	1,175	ICH	mw3	01	M4				dsmMb.	4	30	6	
622	HCV08-70	11	5,714,402	305,468	1,000	ICH	mw3	01	M4				dsmMb.	4	42	0	minor 07; lush veg.
623	HCV08-72	11	5,714,919	305,812	935	ICH	dw3	01	M4				dsmMb.	4	20	0	mw-w
624	HCV08-74	11	5,715,249	306,746	840	ICH	dw3	01	M4				dsmMb.	4	23	0	logged
625	HCV08-76	11	5,715,606	305,912	766	ICH	dw3	01	M4				ssmMb.	4	15	0	logged
626	HCV08-82	11	5,716,832	306,107	610	IDF	mw2	01	G3				kspFGa.	3	50	0	
627	HCV08-88	11	5,717,559	304,017	470	IDF	mw2	01	M4				asdMbja.	4	30	0	
628	HCV08-89	11	5,716,626	304,570		ICH	dw3	01	M4				dmsMb.	4		0	
629	HCV08-90	11	5,716,036	303,878	900	ICH	dw3	01	M4				mdsMw.	4	20	0	logged
630	HCV08-91	11	5,716,625	303,276	780	ICH	mw3	01	M3				asdMb.	3	40	3/c	drier; abltn till
631	HCV08-94	11	5,709,627	301,863	1,303	ESSF	wc2	04	F4				zsFv.sdFf	4	15	0	
632	HCV08-95	11	5,709,335	301,921	1,265	ESSF	wc2	05	F5				dFApj.	5		0	
633	HCV08-97	11	5,708,552	302,054	1,250	ICH	wk1	06	F5				dsFf.	5		4	Ff or Cf
634	HCV08-99	11	5,707,848	301,977	1,220	ICH	wk1	06	F5				sdFf.	5	17	0	moist
635	HCV08-103	11	5,705,835	302,328	1,165	ICH	wk1	01	G4				dsFGtvj.	4	40	3	
636	HCV08-107	11	5,702,597	304,935	2,500	AT			D0				Dv.	0		0	Talus: SMR 0_1 ?
637	HCV08-108	11	5,703,430	304,441		ESSF	wcw	73	C0		n	n	aCb.Rb	0		0	R.talus
638	HCV08-112	11	5,707,033	303,154		ESSF	wc2		C0				Cx.	0		0	rock- Cx Oz, R-TA (blocky)
640	HCV08-55	11	5,713,587	305,391	1,160	ICH	mw3	08	M5				dsmMb.	5	70	0	
641	HCV08-60	11	5,714,003	303,605	1,430	ESSF	wc2	04	M4				zsdMb.	4	45	0	
645	HCV111	11	5,709,819	307,648	1,840	ESSF	wcw	01	M3				dszMv.	3		0	dry forest (SMR 2-3 ? dkm)
652	HCV08-14	11	5,706,800	304,317	1,695	ESSF	wc2	02	M2				zdsMbu.	2	25	0	
654	0622-1	11	5,717,741	306,695	465	IDF	mw2	05	4				.	4	0	5	
663	KS01	11	5,707,432	307,125	1,842	ESSF	wcw	04	5				.	5	11	4	w sphag seeps
666	KS04	11	5,707,906	305,413	1,733	ESSF	wc2	02	M2				dzsMud.	2	14	7	
667	KS05	11	5,707,889	305,470	1,728	ESSF	wc2	Wf15	O7					7	0	3	65000
668	PU09072011-01	11	5,707,378	307,204	1,860	ESSF	wcw	06	M5	1	P	HFP	dzsMb.	5	17	7	
673	PU09072011-02	11	5,706,295	304,580	1,657	ESSF	wc2	Wf11	L7-R.pt	1	R	R.pt	ezOLvv.M	7	0	2	
674	PU09072011-03	11	5,706,146	303,978	1,658	ESSF	wc2	04	2	1	P	HFP	.	2	11	7	
675	PU09072011-04	11	5,707,998	305,367	1,742	ESSF	wc2	04	5	1	P	HFP	.	5	24	7	
676	PU09082011-05	11	5,711,286	303,781	1,702	ESSF	wc2	02	M2	1	P	HFP	dszMvb.	2	25	4	
677	PU09082011-06	11	5,710,690	304,520	1,687	ESSF	wc2	04	M4	1	P	HFP	dzsMbv.	4	12	4	
678	PU09082011-07	11	5,710,494	308,398	1,689	ESSF	wc2	03	M3	1	P	HFP	zsxMbv.	3	29	3	
680	PU09082011-08	11	5,711,388	308,906	1,492	ESSF	wc2	09	M6	1	B	DYB	dsmMb.	6	4	6	
704	LAV1	11	5,717,787	311,467	501	IDF	mw2	00	E3				zsEvx.psFGt	3	2	2	terrace (fan above)
706	LAF2	11	5,717,684	311,408	517	IDF	mw2	03	G3	1	B	EB	gsFGj.	3	14	4	
707	LAF3	11	5,717,557	310,607	536	IDF	mw2	04	M4	1	B	EB	dzsMb.	4	8	5	
709	LAF4	11	5,715,771	313,947	917	ICH	dw3	01	M4	1	P	HFP	dmsMv.	4	20	5	
710	LAF5	11	5,717,224	309,355	510	IDF	mw2	05	F5	1			zsFv.gsFp	5	4	6	
711	LAF6	11	5,716,626	305,077	641	IDF	mw2	04	M3	1	R	R	dmsMbs.	3	67	5	04g
713	LAG7	11	5,719,903	308,302	788	IDF	mw2	82	M2				dmsMvb.	2	53	2b	
714	LAF8	11	5,719,692	309,271	721	IDF	mw2	02	M2	1	B	EB	dzsMb.	2	46	6	

Notes:

[1] *Sites with Detailed Profiles (see data in Appendix A3)*

[2] *Soil Moisture Regime codes: 0-very xeric 1- xeric 2-subxeric 3-submesic 4-mesic 5-subhygric 6-hygric 7-subhydric*

Table A1-2. Site Inspection Summary - Keystone Wildlife Research

Plot ID	Plot Number	UTM Zone	UTM Northing	UTM Easting	Elevation (m)	BEC Zone	SubZone variant	Site Series	PM-SMR (SMU)	Detailed Profile 1	Soil Order	Soil Great Group	Terrain Symbol	SMR [2]	Slope Gradient (%)	Structural Stage	Notes
715	LAV9	11	5,719,719	309,554	772	IDF	mw2	02	M2				dmsMv.	2	52	5	
716	LAV11	11	5,720,515	311,902	710	IDF	mw2	$01	M4				dmsMb.	4	23	3	
717	LAV12	11	5,719,399	310,334	743	IDF	mw2	03	M3				zsdMvb.	3	18	5	
718	LAV13	11	5,719,689	311,462	577	IDF	mw2	03	M3				zsdMb.	3	31	3	
719	LAV14	11	5,718,995	310,525	600	IDF	mw2	03	M3				msdMb.	3	47	6	forest;
720	LAV15	11	5,718,253	308,768	474	IDF	mw2	03	M3				msdMak.	3	39	4	
721	LAV16	11	5,718,313	309,148	470	IDF	mw2	03	G2				zgsFGpu.	2	0	4	
722	LAV17	11	5,718,290	312,331	482	IDF	mw2	03	LG3				mLGk.	3	55	4	
723	LAV18	11	5,718,433	313,015	515	IDF	mw2	06	C5				msdCa.sgFt	5	11	6	mw-imp
724	LAV20	11	5,718,791	313,238	467	IDF	mw2	06	M5				smdMks.	5	0	6	well-impf
725	LAV21	11	5,718,381	313,410	532	IDF	mw2	04	G3				gsFGfj.	3	19	4	SMR 3/4 w-mw
726	LAG22	11	5,716,787	313,825	780	ICH	dw3	01	G3	0	P	_P	zsFGv.gsFGp	3	2	4	Fv/FG
727	LAG23	11	5,716,812	313,887	760	ICH	dw3	04	G3				gsFGsk.dsmMsk	3	76	4	
729	LAG25	11	5,717,643	308,524	404	IDF	mw2	08	F5	1			zsFAv.	5	0	5	mw-imp
730	LAF26	11	5,715,331	313,410	1,020	ICH	mw3	06	C5	1	FO	FO	uOv.zsCv	5	12	7	01 / 06
731	LAG27	11	5,715,295	312,554	1,098	ICH	mw3	01	M3				dsmMb.	3	1	3	
732	LAG28	11	5,714,579	311,448	1,151	ICH	mw3	08	F6				zsFAv.gsFp	6	2	7	
733	LAG29	11	5,714,178	311,644	1,229	ICH	mw3	06	M4				dczMb.	4	16	7	
734	LAG30	11	5,714,177	311,644	1,262	ICH	mw3	08	M5				smdMb.	5	31	7	
735	LAV31	11	5,713,547	311,816	1,384	ESSF	wc2	05	M5				dzsMv.	5	23	7	mw-imp
736	LAV35	11	5,713,012	311,551	1,396	ESSF	wc2	01	M4				dmsMb.	4	17	3	w OW and R(Ls)
737	LAV41	11	5,711,819	311,643	1,498	ESSF	wc2	06	M5				dmsMb.	5	22	3	
738	LAV42	11	5,711,707	311,331	1,537	ESSF	wc2	01	M4				dzsMb.	4	11	3	
739	LAF43	11	5,712,013	311,898	1,482	ESSF	wc2	Wm01	L7.pt	1			Ovx	7	0	3a	wetland
740	LAV44	11	5,712,137	311,912		ESSF	wc3		G3				gsFGt.	3	24	3	
741	LAV45	11	5,712,531	311,719	1,474	ESSF	wc2	01	M4				dmsMb.	4	26	4	
742	LAV46	11	5,712,516	306,105	1,590	ESSF	wc2	03	M3				Mvx.xzsDx	3	3	4	
743	LAV47	11	5,711,058	307,997	1,566	ESSF	wc2	01	M3				dmsMv.	3	19	3	R_schist
777	LAV81	11	5,719,284	313,257		IDF	mw2	03	F3				F.	3		0	03 grassland
794	LAV107	11	5,716,867	311,868		ICH	dw3	03	M3				sM.	3		3	
795	LAV108	11	5,716,866	312,507		ICH	dw3	02	M2				M.	2		3	
811	LAV125	11	5,715,304	304,437		ICH	dw3	04	M4				M.	4		3	
813	LAV127	11	5,716,711	305,152		IDF	mw2	03	M3				sM.	3		0	03_04 (M gully)
820	LAG92	11	5,711,585	305,374	1,671	ESSF	wc2	03	M3				M.	3	36	5	
822	LAG93	11	5,711,853	305,753	1,662	ESSF	wc2	01	M3	0	B	_B	M.	3	22	4	w-mw_Brunisol
823	LAG97	11	5,711,011	307,168	1,708	ESSF	wc2	01	M3	0	B	_B	M.	3	23	3	mw-w_Brun
824	LAV98	11	5,710,954	308,334	1,577	ESSF	wc2	01	M4				M.	4		3	forest-cut
825	LAV99	11	5,711,011	308,351	1,578	ESSF	wc2	01	M4				M.	4		5	forest
830	LAG123	11	5,714,959	304,140	1,096	ICH	mw3	01	3				.	3	12	5	01 (04)
834	LAV39	11	5,711,887	311,064		ESSF	wc2	TA	C0				Ck.	0		1	R_limestone
837	LAV37	11	5,711,841	310,717		ESSF	wc2	RO	R0				Rs.	0		1	
838	LAV38	11	5,712,279	311,065		ESSF	wc2	RO	R0				Rs.	0		1	
839	LAV22	11	5,718,391	313,542	549	IDF	mw2	04	M4				smdMb.	4		4	

Notes:

[1] *Sites with Detailed Profiles (see data in Appendix A3)*

[2] *Soil Moisture Regime codes: 0-very xeric 1- xeric 2-subxeric 3-submesic 4-mesic 5-subhygric 6-hygric 7-subhydric*

Appendix A-2

Surficial Material and Overburden

A2-1. 2011 Geotechnical Site Investigation Summary of Test Pits and Road Cuts

A2-2. Summary of 2011 and 2012 Drillhole Locations and Depth to Bedrock (Overburden Thickness)

A2-3. Summary of ML/ARD Overburden Sampling Locations

A2-4. Summary of Reconnaissance Terrain Field Truthing Inspections

Table A2-1. 2011 Geotechnical Site Investigation Summary of Test Pits and Road Cuts

Test Pit ID	Location	Easting (m)	Northing (m)	Elevation (m)	Total depth (m)	Number of Samples Collected
TP 1	Borrow Site	303,624	5,706,017	1,670	3.1	1
TP 2	Borrow Site	303,808	5,705,967	1,677	3.7	2
TP 3	Borrow Site	303,762	5,706,071	1,678	3.4	0
TP 4	Borrow Site	303,856	5,706,212	1,688	3.2	0
TP 5	Borrow Site	304,919	5,707,673	1,746	2.5	2
TP 6	Borrow Site	304,008	5,706,150	1,666	2.67	0
TP 7	Borrow Site	304,137	5,706,150	1,370	1.75	0
TP 8	Borrow Site	305,333	5,708,115	1,755	2.8	0
TP 9	TMF Embankment	304,098	5,706,396	1,681	2.1	0
TP 10	TMF Embankment	304,210	5,706,384	1,685	5.0	0
TP 11	TMF Embankment	304,333	5,706,314	1,672	3.6	0
TP 12	TMF Embankment	304,504	5,706,264	1,688	2.0	2
TP 13	TMF Embankment	304,592	5,706,027	1,682	2.1	0
TP 14	TMF Embankment	304,576	5,705,953	1,666	2.0	0
TP 15	Borrow Site	306,233	5,707,520	1,745	3.9	2
TP 16	Borrow Site	304,522	5,705,619	1,677	2.9	0
TP 17	Borrow Site	306,718	5,707,114	1,785	2.0	0
TP 18	Borrow Site	304,199	5,705,307	1,685	0.9	0
TP 19	Borrow Site	304,295	5,705,259	1,697	2.8	1
TP 20	Borrow Site	304,169	5,705,225	1,684	2.0	1
TP 21	TMF Embankment	304,739	5,705,908	1,693	1.6	0
TP 22	TMF Embankment	305,042	5,705,990	1,696	1.8	1
TP 23	TMF Embankment	304,950	5,706,140	1,687	2.6	0
TP24	TMF Embankment	304,823	5,706,280	1,679	3.7	0
TP 25	TMF Embankment	304,551	5,706,520	1,668	3.2	0
TP 26	TMF Embankment	304,403	5,706,610	1,684	5.0	1
TP 27	TMF Embankment	304,264	5,706,684	1,695	2.5	1
TP 28	TMF Embankment	304,255	5,706,838	1,714	4.2	0
TP 29	Borrow Site	304,423	5,707,112	1,719	4.0	2
TP 30	Borrow Site	304,613	5,707,341	N/A	3.3	2
TP 31	TMF Embankment	305,122	5,705,898	1,711	2.6	0
TP 32	Borrow Site	305,385	5,706,206	1,713	2.5	1
TP 33	TMF Embankment	305,277	5,706,350	1,720	3.1	0
TP 34	Borrow Site	305,316	5,706,353	1,704	3.5	0
TP 35	Borrow Site	305,515	5,706,606	1,778	3.1	0
TP 36	Borrow Site	305,639	5,706,218	1,745	1.7	0
TP 37	Borrow Site	306,003	5,706,601	1,747	4.5	0
TP 38	Borrow Site	306,313	5,706,092	1,771	2.0	1
TP 39	Borrow Site	306,535	5,706,846	1,771	1.9	0
TP 40	Borrow Site	306,246	5,706,412	1,749	3.4	0
TP 41	Borrow Site	304,106	5,705,331	1,682	2.3	1
TP 42	Borrow Site	304,490	5,705,697	1,675	3.6	0
TP 43	Borrow Site	304,426	5,705,697	1,679	2.9	1
TP 44	Borrow Site	304,192	5,706,171	1,672	1.6	0
TP 45	TMF Embankment	304,607	5,706,197	1,664	1.1	0
TP 46	Borrow Site	305,559	5,706,324	1,753	3.2	0
TP 47	Borrow Site	304,210	5,707,283	1,763	4.0	0

Notes:

1. All depths measurements are taken with respect to ground surface level.

2. Samples were selected to be representative of the region.

3. "TP" denotes Test Pit, "RC" denotes Road Cut, and "OP" denotes test pit excavated in the Open Pit area

Source: Table 3.1 (KP 2012). 2011 Geotechnical Site Investigations Factual Report

Table A2-1. 2011 Geotechnical Site Investigation Summary of Test Pits and Road Cuts

Test Pit ID	Location	Easting (m)	Northing (m)	Elevation (m)	Total depth (m)	Number of Samples Collected
TP 48	Borrow Site	304,554	5,707,261	1,740	3.7	0
TP 49	Borrow Site	305,297	5,706,067	1,713	2.1	0
TP 50	South-east waste dump	307,462	5,710,002	1,850	1.2	1
TP 51	South-east waste dump	306,386	5,710,006	1,869	2.5	0
TP 52	Borrow Site	304,422	5,705,391	1,697	4.4	0
TP 53	Borrow Site	304,292	5,705,142	1,695	3.5	0
TP 54	TMF Embankment	304,746	5,705,865	1,686	1.8	0
TP 55	TMF Embankment	304,719	5,706,131	1,680	1.0	2
RC01	Road 7	304,422	5,711,529	1,686	3.8	1
RC02	Road 7	304,188	5,711,410	1,611	5.0	0
RC03	Road 7	303,984	5,711,368	1,640	2.8	0
RC04	Road 7	303,797	5,711,198	1,679	varies	1
RC05	Jones Creek	304,805	5,711,315	1,649	varies	1
RC06	Road 8	304,699	5,711,101	1,682	1.4	0
RC07	Road 8	304,342	5,710,772	1,662	varies	0
RC08	Road 8B	303,994	5,710,551	1,641	3.0	1
RC09	Ring Road	303,979	5,711,760	1,707	1.5	0
RC10	Ring Road	304,001	5,711,616	1,687	1.5	0
RC11	Road 7	303,796	5,711,305	1,702	2.5	0
RC12	Road 9	304,600	5,710,636	1,715	0.5	0
RC13	Road 9B	305,010	5,710,727	1,748	0.5	0
RC14	Road 5D	305,628	5,710,731	1,785	0.5	0
RC15	Road 9	305,074	5,711,009	1,733	2.0	0
RC16	Jones Creek	304,874	5,711,751	1,623	0.5	0
RC17	Road 9	304,694	5,711,885	1,626	2.0	0
RC18	GT14 Road Cut	304,011	5,707,065	1,767	3.1	0
RC19	GT14 Road Cut	304,001	5,707,136	1,785	1.0	0
RC20	GT14 Road Cut	304,034	5,707,170	1,788	0.8	0
RC21	GT14 Road Cut	304,086	5,707,230	1,775	0.9	0
OP01	Open Pit	303,787	5,711,194	N/A	1.0	1
OP02	Open Pit	303,902	5,711,290	1,657	1.0	1
OP03	Open Pit	304,027	5,711,374	1,643	1.0	1
OP04	Open Pit	304,176	5,711,412	1,652	1.0	1
OP05	Open Pit	304,322	5,711,442	1,612	1.0	1
OP06	Open Pit	304,436	5,711,542	1,615	1.0	1
OP07	Open Pit	304,565	5,711,606	1,615	1.0	1
OP08	Open Pit	304,698	5,711,531	1,618	1.0	1
OP09	Open Pit	304,754	5,711,489	1,637	1.0	1
OP10	Open Pit	304,779	5,711,339	1,656	1.0	1
OP11	Open Pit	304,901	5,711,242	1,677	1.0	1
OP12	Open Pit	305,060	5,711,148	1,696	1.0	1
OP13	Open Pit	305,089	5,710,968	1,721	1.0	1
OP14	Open Pit	305,034	5,710,814	1,742	1.0	1
OP15	Open Pit	304,969	5,710,681	1,751	1.0	1
OP16	Open Pit	304,867	5,710,544	1,753	1.0	1

Notes:

1. All depths measurements are taken with respect to ground surface level.

2. Samples were selected to be representative of the region.

3. "TP" denotes Test Pit, "RC" denotes Road Cut, and "OP" denotes test pit excavated in the Open Pit area

Source: Table 3.1 (KP 2012). 2011 Geotechnical Site Investigations Factual Report

Table A2-2. Summary of 2011 and 2012 Drillhole Locations and Depth to Bedrock (Overburden Thickness)

Drillhole ID	Year Drilled	Drillhole Location	Area Code[5]	Coordinates[1, 2] Northing (m)	Easting (m)	Elevation (m)	Azimuth (°)	Dip (°)	Drill Method	Total Depth[3] (m)	Depth to Rock[3,4] (m)
HC11-GM01	2011	Open Pit	1	5,710,997	304,901	1,703			HQ3		
HC11-GM01A	2011	Open Pit	1	5,710,997	304,901	1,703	180	75	HQ3	373.4	3.0
HC11-GM02	2011	Open Pit	1	5,711,609	303,890	1,709	277	60	HQ3	271.3	6.1
HC11-GM03	2011	Open Pit	1	5,711,799	304,191	1,670	350	60	HQ3	241.2	3.1
HC11-GM04	2011	Open Pit	1	5,711,819	304,699	1,607	20	60	HQ3	339.8	9.1
HC11-GM05	2011	Open Pit	1	5,711,823	305,198	1,608	30	60	HQ3	390.1	6.1
HC11-GM06	2011	Open Pit	1	5,711,190	305,426	1,706	80	60	HQ3	420.6	7.6
HC11-GM07	2011	Open Pit	1	5,711,036	305,218	1,710	160	70	HQ3	358.1	6.1
HC11-GT01 / MW11-01D	2011	West Waste Dump	1	5,711,338	303,200	1,723	-	90	5.5" ODEX	51.5	n/a
HC11-GT01 / MW11-01S	2011	West Waste Dump	1	5,711,327	303,206	1,725	-	90	5.5" ODEX	25.6	n/a
OP12-01	2012	Open Pit	1	5,711,886	304,697	1,594	000	90	4.75" ODEX	11.6	9.1
OP12-02	2012	Open Pit	1	5,711,511	304,523	1,593	000	90	4.75" ODEX	10.4	5.5
OP12-03	2012	Open Pit	1	5,711,426	304,337	1,593	000	90	4.75" ODEX	10.4	4.9
OP12-04	2012	Open Pit	1	5,711,788	304,364	1,629	000	90	4.75" ODEX	7.2	3.4
OP12-05	2012	Open Pit	1	5,711,767	303,976	1,679	000	90	4.75" ODEX	5.5	1.2
OP12-06	2012	Open Pit	1	5,711,361	303,988	1,629	000	90	4.75" ODEX	5.6	3.7
OP12-07	2012	Open Pit	1	5,711,262	304,983	1,663	000	90	4.75" ODEX	11.7	6.6
OP12-08	2012	Open Pit	1	5,711,267	304,781	1,639	000	90	4.75" ODEX	5.8	0.0
OP12-09	2012	Open Pit	1	5,710,860	305,344	1,732	000	90	4.75" ODEX	4.3	0.6
OP12-10	2012	Open Pit	1	5,710,632	304,653	1,696	000	90	4.75" ODEX	4.3	2.4
HC11-GT02	2011	Low-Grade Ore Stockpile	2	5,708,354	304,015	1,873	-	90	HQ3	34.1	2.6
HC11-GT03 / MW11-03	2011	Low-Grade Ore Stockpile	2	5,709,297	304,308	1,795	-	90	HQ3	31.0	0.5
HC11-GT04 / MW11-04	2011	Low-Grade Ore Stockpile	2	5,708,919	303,771	1,797	-	90	HQ3	31.2	0.6
HC11-GT05	2011	Southeast Waste Dump	2	5,709,676	306,131	1,817	-	90	HQ3	35.7	5.2
HC11-GT06	2011	Southeast Waste Dump	2	5,709,398	307,875	1,832	-	90	HQ3	34.1	4.2
HC11-GT07	2011	Southeast Waste Dump	2	5,707,702	306,358	1,749	-	90	HQ3	44.5	7.6
HC11-GT08	2011	Plant Site (Crusher)	2	5,710,511	303,975	1,617	-	90	HQ3	46.6	5.5
HC11-GT09	2011	Plant Site (SAG Mill)	2	5,709,750	305,335	1,838	-	90	HQ3	33.2	15.8
HC11-GT10	2011	Plant Site (Ball Mill)	2	5,709,699	305,317	1,839	-	90	HQ3	34.1	4.6

NOTES: 2011

1. UTM NAD 83 coordinates

2. Coordinates are based on base map locations

3. Measurements are taken with respect to ground surface level (if hole is angled, depth refers to the inclined depth)

4. Colors indicate overburden thickness range: Pink - 0 to <2m; Yellow - 2 to <5m; Green - 5 to 16m; Dark green >16m to 25m

5. Area Code - refers to general development areas: 1 - Open Pit, 2 - Plant site and area east of Open Pit, 3 - TMF (embankment and upstream), 4 - valley to SW of Open Pit

Source: Table 3.1 KP. 2012 . 2011 Geotechnical Site Investigation Factual Report

NOTES: 2012

2. Coordinates are based on final collar survey data except for GT12-08, MW12-05D and MW12-05S which were based on handheld GPS measurement

Source: Table 3.2 KP. 2013 . 2012 Geotechnical Site Investigation Factual Report

Table A2-2. Summary of 2011 and 2012 Drillhole Locations and Depth to Bedrock (Overburden Thickness)

Drillhole ID	Year Drilled	Drillhole Location	Area Code[5]	Coordinates[1, 2] Northing (m)	Coordinates[1, 2] Easting (m)	Coordinates[1, 2] Elevation (m)	Azimuth (°)	Dip (°)	Drill Method	Total Depth[3] (m)	Depth to Rock[3,4] (m)
HC11-GT11	2011	Plant Site (Flotation)	2	5,709,615	305,319	1,839	-	90	HQ3	32.9	0.3
HC11-GT12	2011	Plant Site (Coarse Ore Stockpile)	2	5,709,746	305,090	1,831	-	90	HQ3	32.0	2.7
HC11-GT13	2011	Plant Site (Truckshop)	2	5,709,516	305,159	1,837	-	90	HQ3	33.5	2.1
GT12-04	2012	Crusher Site	2	5,710,396	304,159	1,621	000	90	HQ3	38.1	5.9
GT12-05	2012	Overburden Stockpile	2	5,711,114	306,344	1,726	000	90	HQ3	38.4	4.6
GT12-06	2012	Overburden Stockpile	2	5,710,844	306,746	1,752	000	90	HQ3	35.1	1.8
GT12-07	2012	Non-PAG Waste Rock Stockpile	2	5,710,224	304,090	1,602	000	90	HQ3	42.1	10.1
MW12-01D	2012	Northwest of Non-PAG Low Grade Stockpile	2	5,709,413	303,440	1,702	000	90	5" ODEX	44.0	2.9
MW12-01S	2012	Northwest of Non-PAG Low Grade Stockpile	2	5,709,415	303,434	1,702	000	90	5" ODEX	30.9	3.6
MW12-02D	2012	East of Overburden Stockpile	2	5,711,320	306,995	1,669	000	90	5" ODEX	51.2	6.1
MW12-02S	2012	East of Overburden Stockpile	2	5,711,328	306,992	1,670	000	90	5" ODEX	27.4	5.2
HC11-GT14	2011	TMF Embankment	3	5,707,065	304,011	1,767	-	90	HQ3	39.0	7.6
HC11-GT15	2011	TMF Embankment	3	5,706,625	304,218	1,688	320	75	HQ3	74.7	12.2
HC11-GT16	2011	TMF Embankment	3	5,706,736	304,579	1,682	-	90	HQ3	52.6	6.1
HC11-GT17	2011	TMF Embankment	3	5,706,390	304,473	1,660	-	90	HQ3	42.1	8.1
HC11-GT18	2011	TMF Embankment	3	5,706,372	304,882	1,673	-	90	HQ3	98.5	11.1
HC11-GT19	2011	TMF Embankment	3	5,706,178	304,726	1,665	-	90	HQ3	128.6	6.5
HC11-GT20	2011	TMF Embankment	3	5,705,890	304,969	1,695	-	90	HQ3	130.1	6.1
HC11-GT21A / MW11-21D	2011	TMF Embankment	3	5,705,788	304,579	1,676	-	90	HQ3	64.6	4.3
HC11-GT21B / MW11-21S	2011	TMF Embankment	3	5,705,787	304,579	1,676	-	90	5.5" ODEX	13.1	4.3
HC11-GT22 B / MW11-22S	2011	TMF Embankment	3	5,706,438	304,058	1,679	-	90	5.5" ODEX	16.2	0.6
HC11-GT22A / MW11-22D	2011	TMF Embankment	3	5,706,436	304,060	1,679	-	90	HQ3	64.6	0.6
HC11-GT23A / MW11-23D	2011	TMF Embankment	3	5,705,875	304,055	1,635	-	90	HQ3	49.4	1.1
HC11-GT23B / MW11-23S	2011	TMF Embankment	3	5,705,878	304,059	1,635	-	90	5.5" ODEX	18.3	1.1
HC11-GT24	2011	TMF Embankment	3	5,706,527	305,564	1,708	-	90	HQ3	46.6	12.5
GT12-01	2012	Rock Quarry	3	5,706,192	303,869	1,654	000	90	HQ3	30.2	6.6
GT12-02	2012	TMF Embankment	3	5,706,349	304,623	1,648	000	60	HQ3	101.2	9.3

NOTES: 2011

1. UTM NAD 83 coordinates

2. Coordinates are based on base map locations

3. Measurements are taken with respect to ground surface level (if hole is angled, depth refers to the inclined depth)

4. Colors indicate overburden thickness range: Pink - 0 to <2m; Yellow - 2 to <5m; Green - 5 to 16m; Dark green >16m to 25m

5. Area Code - refers to general development areas: 1 - Open Pit, 2 - Plant site and area east of Open Pit, 3 - TMF (embankment and upstream), 4 - valley to SW of Open Pit

Source: Table 3.1 KP. 2012 . 2011 Geotechnical Site Investigation Factual Report

NOTES: 2012

2. Coordinates are based on final collar survey data except for GT12-08, MW12-05D and MW12-05S which were based on handheld GPS measurement

Source: Table 3.2 KP. 2013 . 2012 Geotechnical Site Investigation Factual Report

Table A2-2. Summary of 2011 and 2012 Drillhole Locations and Depth to Bedrock (Overburden Thickness)

Drillhole ID	Year Drilled	Drillhole Location	Area Code[5]	Coordinates[1, 2] Northing (m)	Coordinates[1, 2] Easting (m)	Coordinates[1, 2] Elevation (m)	Azimuth (°)	Dip (°)	Drill Method	Total Depth[3] (m)	Depth to Rock[3,4] (m)
GT12-03	2012	TMF Embankment	3	5,706,424	304,379	1,646	180	60	HQ3	101.2	5.2
MW12-03D	2012	Northeast of TMF	3	5,708,972	308,111	1,829	000	90	5" ODEX	50.3	2.9
MW12-03S	2012	Northeast of TMF	3	5,708,977	308,119	1,829	000	90	5" ODEX	18.3	2.4
MW12-04D	2012	East of TMF	3	5,706,350	307,049	1,830	000	90	5" ODEX	49.4	5.0
MW12-04S	2012	East of TMF	3	5,706,357	307,059	1,830	000	90	5" ODEX	29.0	4.0
TMF12-01	2012	TMF - Upstream Area	3	5,706,353	305,287	1,687	000	90	4.75" ODEX	14.9	11.9
TMF12-02	2012	TMF - Upstream Area	3	5,706,349	305,389	1,694	000	90	4.75" ODEX	10.1	5.2
TMF12-03	2012	TMF - Upstream Area	3	5,706,172	305,289	1,694	000	90	4.75" ODEX	8.5	4.3
TMF12-04	2012	TMF Embankment East	3	5,706,056	304,888	1,664	000	90	4.75" ODEX	10.4	3.1
TMF12-05	2012	TMF Embankment East	3	5,706,016	304,837	1,667	000	90	4.75" ODEX	8.7	3.1
TMF12-06	2012	TMF Embankment East	3	5,706,131	304,806	1,660	000	90	4.75" ODEX	10.1	7.3
TMF12-07	2012	TMF Embankment East	3	5,706,115	304,719	1,655	000	90	4.75" ODEX	10.1	7.3
TMF12-08	2012	TMF Embankment Central	3	5,706,206	304,652	1,648	000	90	4.75" ODEX	9.1	6.1
TMF12-09	2012	TMF Embankment Central	3	5,706,173	304,593	1,641	000	90	4.75" ODEX	7.6	1.8
TMF12-10	2012	TMF Embankment Central	3	5,706,259	304,529	1,646	000	90	4.75" ODEX	13.4	10.4
TMF12-11	2012	TMF Embankment Central	3	5,706,328	304,547	1,645	000	90	4.75" ODEX	13.7	10.7
TMF12-12	2012	TMF Embankment Central	3	5,706,384	304,475	1,645	000	90	4.75" ODEX	11.6	8.5
TMF12-13	2012	TMF Embankment West	3	5,706,488	304,117	1,666	000	90	4.75" ODEX	8.8	5.2
TMF12-14	2012	TMF Embankment West	3	5,706,818	304,245	1,692	000	90	4.75" ODEX	8.8	5.3
TMF12-15	2012	TMF Embankment West	3	5,706,698	304,272	1,673	000	90	4.75" ODEX	8.8	3.1
TMF12-16	2012	TMF Embankment West	3	5,706,655	304,373	1,665	000	90	4.75" ODEX	8.8	4.3
TMF12-17	2012	TMF Embankment West	3	5,706,553	304,433	1,656	000	90	4.75" ODEX	8.7	4.4
TMF12-18	2012	TMF Embankment West	3	5,706,485	304,384	1,652	000	90	4.75" ODEX	8.8	4.3
GT12-08	2012	Southwest of Non-PAG Waste Rock Stockpile	4	5,709,998	302,226	1,363	000	90	HQ3	56.2	24.4
MW12-05D	2012	Southwest of Non-PAG Waste Rock Stockpile	4	5,709,989	302,230	1,350	000	90	5" ODEX	44.2	25.0
MW12-05S	2012	Southwest of Non-PAG Waste Rock Stockpile	4	5,709,995	302,232	1,341	000	90	5" ODEX	18.5	15.8

NOTES: 2011

1. UTM NAD 83 coordinates

2. Coordinates are based on base map locations

3. Measurements are taken with respect to ground surface level (if hole is angled, depth refers to the inclined depth)

4. Colors indicate overburden thickness range: Pink - 0 to <2m; Yellow - 2 to <5m; Green - 5 to 16m; Dark green >16m to 25m

5. Area Code - refers to general development areas: 1 - Open Pit, 2 - Plant site and area east of Open Pit, 3 - TMF (embankment and upstream), 4 - valley to SW of Open Pit

Source: Table 3.1 KP. 2012 . 2011 Geotechnical Site Investigation Factual Report

NOTES: 2012

2. Coordinates are based on final collar survey data except for GT12-08, MW12-05D and MW12-05S which were based on handheld GPS measurement

Source: Table 3.2 KP. 2013 . 2012 Geotechnical Site Investigation Factual Report

Table A.2-3. Summary of ML/ARD Overburden Sampling Locations

Location ID	Location	Easting (m)	Northing (m)	Elevation (m)	Total depth[1] (m)	ML/ARD OVB Samples
Test Pit ID						
TP 1	Borrow Site	303,624	5,706,017	1,670	3.1	x
TP 2	Borrow Site	303,808	5,705,967	1,677	3.7	x
TP 5	Borrow Site	304,919	5,707,673	1,746	2.5	x
TP 12	TMF Embankment	304,504	5,706,264	1,688	2.0	x
TP 15	Borrow Site	306,233	5,707,520	1,745	3.9	x
TP 26	TMF Embankment	304,403	5,706,610	1,684	5.0	x
TP 27	TMF Embankment	304,264	5,706,684	1,695	2.5	x
TP 29	Borrow Site	304,423	5,707,112	1,719	4.0	x
TP 30	Borrow Site	304,613	5,707,341	N/A	3.3	x
TP 32	Borrow Site	305,385	5,706,206	1,713	2.5	x
TP 51	South-east waste dump	306,386	5,710,006	1,869	2.5	x
OP01	Open Pit	303,787	5,711,194	N/A	1.0	x
OP02	Open Pit	303,902	5,711,290	1,657	1.0	x
OP03	Open Pit	304,027	5,711,374	1,643	1.0	x
OP04	Open Pit	304,176	5,711,412	1,652	1.0	x
OP05	Open Pit	304,322	5,711,442	1,612	1.0	x
OP06	Open Pit	304,436	5,711,542	1,615	1.0	x
OP07	Open Pit	304,565	5,711,606	1,615	1.0	x
OP08	Open Pit	304,698	5,711,531	1,618	1.0	x
OP09	Open Pit	304,754	5,711,489	1,637	1.0	x
OP10	Open Pit	304,779	5,711,339	1,656	1.0	x
OP11	Open Pit	304,901	5,711,242	1,677	1.0	x
OP12	Open Pit	305,060	5,711,148	1,696	1.0	x
OP13	Open Pit	305,089	5,710,968	1,721	1.0	x
OP14	Open Pit	305,034	5,710,814	1,742	1.0	x
OP15	Open Pit	304,969	5,710,681	1,751	1.0	x
OP16	Open Pit	304,867	5,710,544	1,753	1.0	x
Borehole ID						
OP12-01	Open Pit	304,697	5,711,886	1,594	9.1	x
OP12-02	Open Pit	304,523	5,711,511	1,593	5.5	x
OP12-03	Open Pit	304,337	5,711,426	1,593	4.9	x
OP12-04	Open Pit	304,364	5,711,788	1,629	3.4	x
OP12-05	Open Pit	303,976	5,711,767	1,679	1.2	x
OP12-06	Open Pit	303,988	5,711,361	1,629	3.7	x
OP12-07	Open Pit	304,983	5,711,262	1,663	6.6	x
OP12-08	Open Pit	304,781	5,711,267	1,639	0.0	x
OP12-09	Open Pit	305,344	5,710,860	1,732	0.6	x
OP12-10	Open Pit	304,653	5,710,632	1,696	2.4	x

Notes:

[1] *Total depth to bedrock for Borehole sites*

Source 1: Table 3.1 (SRK 2013). ML/ARD Characterization Study

Source 2: Table 3.1 (KP 2012). 2011 Geotechnical Site Investigations Factual Report

Source 3: Table D.1 (KP 2013). 2012 Geotechnical Site Investigations Factual Report

Table A2-4. Summary of Reconnaissance Terrain Field Truthing Inspections

Inspection ID	Location (UTM)		Elevation (masl)	Soil Polygon ID	BEC Subzone Variant	Terrain Material	Terrain Symbol Interpretation (ERM)	Descriptions
	Northing (m)	Easting (m)						
19	5,717,747	306,098	469	388	IDFmw2	G'	(s)kg|sFG'	Approx. 10 m-high cut slope. Kame deposit exposed - Loose, yellow brown subrounded to subangular fine to coarse Gravel, some cobbles, trace fine to medium sand. Some beds (approx. 15 to 30 cm thick) of loose silty fine sand
20	5,715,686	305,914	759	716	ICHdw3	M	(zk)sgMb	Approx. 3 m cut slope. Glacial Till exposed - Compact yellow brown, angular to subangular fine to coarse Gravel, some sand, trace silt, trace subrounded cobbles. Contact between the glacial till and kame deposit is approximately 50 m down the road.
21	5,714,657	305,625	981	767	ICHdw3	M		Approx. 5 m cut slope. Glacial Till - Grey brown, subangular to subrounded fine to coarse Gravel, some silt, trace clay, trace fine to medium sand, trace cobbles.
22	5,714,054	305,929	1,197	40	ICHmw3	D		Approx 3 m cut slope. Weathered bedrock - Weak, green grey with orange brown discolouration Phyllite
23	5,713,281	306,457	1,290	366	ICHmw3	R		Weak to very weak dark grey graphite phyllite
24	5,712,894	306,763	1,333	366	ICHmw3	C	Cv/Rk	Approx 5 m Cut. Colluvial veneer overlying weathered bedrock. Recent slump in very weak moderately weathered graphite phyllite (10 m wide x 7 m long x 1.5 m deep). Natural slope angle = 30 to 35° (58% to 70%).
25	5,711,271	305,126	1,689	283	ESSFwc2	M	(z)sgMb + D	Generally weak to very weak red brown moderately weathered phyllite. Local pocket (approx 2 m thick) of glacial till - orange brown angular to subangular fine to coarse gravel, some fine to medium sand, trace silt
26	5,712,418	306,060	1,593	278	ESSFwc2	R - D	R	Medium strong grey slightly weathered Phyllite
27	5,712,465	306,347	1,562	128	ESSFwc2	M	(z)sgMb + D	Glacial Till (as WP 25)
28	5,710,029	305,862	1,836	135	ESSFwc2	L	szL	Glacial Lake Deposit - stiff brown grey silt, some fine sand
29	5,709,104	305,544	1,812	568	ESSFwc2	L	zL-F	Firm dark grey sandy organic silt with many plant remains
30	5,706,674	304,212	1,690	265	ESSFwc2	M	(g)bkzsMb	Glacial Till - Compact yellow brown fine Sand, some silt, trace subangular to subrounded gravel, some subangular cobbles and boulders
31	5,706,278	304,562	1,663	328	ESSFwc2	O	fOb	Firm brown grey spongy fibrous peat
33	5,706,128	304,699	1,673	467	ESSFwc2	LG	gsLG/szLG	Glacial Lake Deposit - approx 2 m thick band of loose red brown fine to coarse Sand, much angular to subrounded fine to coarse gravel. Overlies firm yellow brown sandy Silt.
34	5,706,034	304,630	1,675	705	ESSFwc2	M	(sk)zgMb	Glacial Till - Yellow brown subangular to subrounded Gravel, much silt, trace sand, trace cobbles
36	5,707,708	306,355	1,753	131	ESSFwc2	M	Mb	Old borrow pit in glacial till
39	5,711,542	307,307	1,571	343	ESSFwc2	M ?	M-L	Seepage
40	5,711,551	307,282	1,593	307	ESSFwc2	C	(k)gzsCv/Rk-R	Back scarp of planar debris slide (20 m long x 15 m wide x 0.75 m deep). Natural slope = 60%. Colluvium - compact yellow brown fine to medium Sand, much silt, some subangular to angular gravel, trace subangular cobbles. Bedrock comprises phyllite.
41	5,711,552	307,284	1,592	307	ESSFwc2	R	Rk-R	Back scarp of planar slide (20 m long x 15 m wide x 1.0 m deep). Bedrock comprises phyllite. Natural slope = 60%.
42	5,711,569	307,292	1,588	307	ESSFwc2	R	Rk-R	Back scarp of slide, spoon shaped source zone (15 m long x 10 m wide x 1.0 m deep). Bedrock comprises phyllite. Natural slope = 60%.
43	5,711,523	307,276	1,598	343	ESSFwc2	R	Rk-R	Back scarp of planar slide (10 m long x 15 m wide x 1.0 m deep). Bedrock comprises Phyllite. Natural slope = 60%.
44	5,706,247	302,930	1,520	220	ICHwk1	D	Ds-R	Landslide upslope from old cut slope. Spoon shaped source zone (15 m long x 10 m wide x 1.5 m deep). Natural slope = 75%. The road was constructed by side-casting. Weathered bedrock - Very weak, friable, pink light grey highly weathered medium grained granite.
45	5,706,202	302,993	1,563	220	ICHwk1	D & M	D (zk)gs + Mw; slope class -Steep	Recent slide (approx. 30 m wide x 20 m long) in road cut slope. Landslide occurred mainly in very weak, friable, highly weathered granite; partly within glacial till (compact yellow brown fine to medium Sand, trace silt, some subangular to subrounded gravel, trace subangular to subrounded cobbles). Natural slope = 37° (75%). Access track was built by side casting.
46	5,706,237	302,978	1,560	220	ICHwk1	R	Rk	Ridgeline outcrop of medium strong slightly weathered granite with medium to widely spaced joints.
48	5,706,088	303,279	1,611	287	ESSFwc2	M	(sk)zgMb	Blanket of Glacial Till - boundary between orange brown glacial till (possibly derived from granite bedrock) and grey glacial till (possibly derived from phyllite bedrock). The grey glacial till is more silty - compact dark grey angular to subrounded fine to coarse Gravel, some silt, trace fine to medium sand, trace subrounded cobbles.
49	5,705,896	303,480	1,628	287	ESSFwc2	M	(z)skbMbks	
50	5,705,910	303,470	1,626	237	ESSFwc2	M	same 49	Edges of a debris slide in cut slope of access track (20 m wide x 15 m long x 1.5 m deep). Natural slope = 30 to 40° (58% to 84%) . Landslide occurred in glacial till - compact, yellow brown subrounded to subangular cobbles and boulders, some fine to medium sand, trace silt.
51	5,703,514	303,576	1,696	out-North	ESSFwc2	M	bMb	Bouldery glacial till.
53	5,704,953	304,122	1,685	563	ESSFwc2	M	Mv/D Mb-Ov/Mb D	In the area north from here - Mv/D. In the areas south from here - Mb//D//Ov
54	5,705,002	304,193	1,700	563	ESSFwc2	L	zL-F	Soft dark grey organic Silt, some fine sand, many plant remains
55	5,709,112	303,440	1,765	567	ESSFwc2	M	(zkb)gsM	Glacial Till - Compact orange brown fine to medium sand, much angular to subrounded gravel, trace silt, trace subangular cobbles and boulders

Note:

Source: Table 6.1 (KP. 2012). Reconnaissance Terrain Mapping.

Table A2-4. Summary of Reconnaissance Terrain Field Truthing Inspections

Inspection ID	Location (UTM)		Elevation (masl)	Soil Polygon ID	BEC Subzone Variant	Terrain Material	Terrain Symbol Interpretation (ERM)	Descriptions
	Northing (m)	Easting (m)						
56	5,710,004	307,393	1,851	135	ESSFwc2	D	D	Weathered bedrock (Phyllite)
57	5,710,030	307,642	1,825	266	ESSFwc2	Fv/M	szFLv/(zk)sgMb	Soft dark grey Silt, some sand to 0.3 m depth, then Glacial Till - compact yellow brown subangular to subrounded fine to coarse gravel, some fine to medium sand, some silt, trace cobbles
58	5,709,997	308,710	1,762	279	ESSFwc2	D	D	Weathered bedrock
59	5,710,962	309,064	1,562	276	ESSFwc2	M	M	2 m Cut Slope in glacial till
60	5,711,903	308,767	1,490	44	ESSFwc2	M	(zk)sgMb	2 m Cut Slope in glacial till - compact grey red brown subangular to subrounded fine to coarse Gravel, some fine to medium sand, trace silt, trace subangular cobbles
63	5,711,903	308,764	1,487	44	ESSFwc2	Cv/M	ksgCvx/(zk)sgMb	2 m Cut Slope - approx. 0.3 m of colluvium overlying glacial till. Colluvium - loose brown grey angular to subangular fine to coarse Gravel, some fine to medium sand, some angular to subangular cobbles. Glacial till - as WP 60.
64	5,712,937	308,592	1,430	701	ICHmw3	Cv/D	Cv/D	
65	5,712,937	308,591	1,430	701	ICHmw3	Cv/D	Cv/D	Colluvial veneer over weathered bedrock
66	5,714,660	310,260	1,233	344	ICHmw3	R	R	approx. 50 m wide bedrock outcrop on hillside spur (exposed in 3 m cut slope).
67	5,715,757	313,863	910	456	ICHdw3	M	(zk)sgMb	3 m cut slope in glacial till - compact orange brown subrounded to subangular fine to coarse Gravel, some fine to medium sand, trace silt, trace subangular cobbles and boulders
68	5,715,929	313,919	888	456	ICHdw3	D	D	4 m cut slope in weathered bedrock
69	5,717,652	312,299	610	667	IDFmw2	M	M	3 m cut slope in glacial till
70	5,715,030	306,953	868	316	ICHdw3	C	Cks-R	Landslide on old access track - debris slide. Gully side slope. Natural slope = 70%. Pistol-butted trees in area. Road was built by side casting.
71	5,714,067	305,574	1,137	626	ICHmw3	C	(sc)gzC-L	Colluvium - soft brown grey silt, some angular to subangular Gravel, trace sand, trace clay, some plant remains. Seepage
72	5,713,763	305,418	1,125	474	ICHmw3	M	Mb-R	
73	5,713,738	305,410	1,123	474	ICHmw3	M	Mbk	Fill slope failure (approx. 20 m wide). Natural slope = 67%. Blanket of glacial till.
74	5,713,594	305,370	1,119	242	ICHmw3	M	Mbk-L	Slide in road cut slope (approx. 7 m wide x 10 m long). Blanket of glacial till. Seepage. Natural slope = 70%.
76	5,714,392	303,483	1,324	out-East	ICH	R	RO	Bedrock outcrop
77	5,714,492	300,093	1,526	out-East	ICH	R	RO	Bedrock outcrop
78	5,713,658	304,884	1,195	out-East	ICHmw3	M	gsMb	Blanket of Glacial Till -compact yellow brown sandy subrounded to angular gravel, trace subangular cobbles
79	5,717,743	306,385	519	388	IDFmw2	G'		
80	5,717,751	306,388	519	388	IDFmw2	G'	gsFG't	5 m cut slope in Kame Deposit - compact grey yellow brown fine to medium Sand, some subrounded fine to coarse gravel, trace silt, trace subrounded cobbles
81	5,717,703	306,305	526	388	IDFmw2	G'	FG'tk	Recent slide in 10 m high 40 degree cut slope. Run-out extended down to lower road. Road was constructed by side casting. Natural slope = 70%. Kame terrace deposit.
82	5,717,571	304,633	464	out-West	IDFmw2	M	Mb	5 m cut slope blanket of glacial till
83	5,720,223	298,477	439	out-West	IDFmw2	F	(k)gsFt	Fluvial Terrace - Loose brown gravelly fine to medium Sand, trace subrounded cobbles
84	5,718,515	313,074	499	out-East	IDFmw2	G	sgFGt	5 m cut slope in Fluvioglacial Terrace - compact grey brown gravelly subrounded cobbles, some fine to coarse sand

Note:

Source: Table 6.1 (KP. 2012). Reconnaissance Terrain Mapping.

Appendix A-3

Soil Profiles

A3-1. Soil Survey (Knight Piésold/Polar Geoscience)

A3-2. Photos of Typical SMU Soil Profiles (Knight Piésold/Polar Geoscience)

A3-3. TEM Survey (Keystone)

A3-4. Geotechnical Test Pits - Example (Knight Piésold)

A3-1. Soil Survey (Knight Piésold/Polar Geoscience)

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 17

PLOT NO: 12 – 4801 32

PROJECT ID: Harper Soil Sampling

FIELD NO: HC32

SURVEYOR(S): PU DS

SITE DESCRIPTION

LOCATION

GENERAL LOCATION: N 12km along Jones Cr. Road

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
		11U	305100	5711828	

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT	LONG	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING: Ae to thin to sample
Took samples from Bf & C

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS / DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
3	B-C			

ELEV	SLOPE	ASPECT	MESO SLOPE POS	SURFACE SHAPE	MICROTOPOG
1594 m	35 %	350 °			

NOTES: Site consists of 2nd growth forest, there are skid trails near site. LFH may have been disturbed when the site was logged. Pit has developed LFH, Ae, B bedrock @ 60cm

SITE DIAGRAM

dzs mv
DX
bedrock
greenschist

PHOTO:

SITE DIST.	EXPOS. TYPE

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

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7610003484

greenschist

SOIL DESCRIPTION

GEOLOGY: BEDROCK SC | C. F. LITH. SC | SURVEYOR(S) PU DS | PLOT NO. HC 32

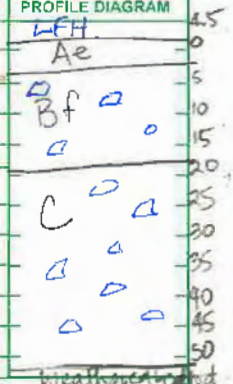
TERRAIN: TEXTURE 1 dzs | 2 | SURFICIAL MATERIAL 1 M 2 D | SURFACE EXPR. 1 V 2 X | GEOMORPH PROCESS 1 | 2

SOIL CLASS: O.HFP. | HUMUS FORM: HR | PHASE | HYDROGEO.: U

ROOTING DEPTH: 4 cm | ROOT RESTRICT LAYER: TYPE L, DEPTH 60 cm | WATER SOURCE: P | DRAINAGE: W

R. Z. PART. SIZE: CL | SEEPAGE: N P cm | FLOOD RG: X

PROFILE DIAGRAM



ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB.	FECAL AB.	ROOTS AB.	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc):
Ln	1-4.5	S	NM						
FH	0-1	M	SP						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP.	TEXT.	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB.	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
Ae	0-4	10YR6/2	f	LS	5	0	0	0	S					4.5	
B	4-20	10YR4/4	f	L	20	0	0	20	S-A					5.5	
C	20-55	10YR4/3	f	L	20	1	0	21	S-A					6.5	

NOTES: bedrock & coarse fragments are greenschist

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 18 | PLOT NO.: 12 – 4803 HC1

PROJECT ID: Harper Soil Sampling | FIELD NO.: HC1 | SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION: end of 15 road

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR.(m)
		11U	3 0 6 9 4 3	5 7 0 9 0 6 4	4

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING:

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS / DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
5	D			

ELEV.	SLOPE	ASPECT	MESO SLOPE POS.	SURFACE SHAPE	MICROTOPOG.
1797 m	1 %	999 °	dep.		

NOTES:

SITE DIAGRAM

PHOTO:

SITE DIST.			EXPOS TYPE	

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY BEDROCK: fm | C. F. LITH: SC | SURVEYOR(S): PU | PLOT NO.: HC1

TERRAIN: TEXTURE 1: U, 2: S | SURFICIAL MATERIAL 1: O, 2: F | SURFACE EXPR 1: X, 2: X | GEOMORPH PROCESS 1: U, 2:

SOIL CLASS.: CU. R | HUMUS FORM: MR | PHASE | HYDROGEO.: P | lh?

ROOTING DEPTH: 35 cm | ROOT RESTRICT. LAYER TYPE: N, DEPTH: cm | WATER SOURCE: G | SEEPAGE: NP cm | DRAINAGE: m-i | FLOOD RG: R

R. Z. PART SIZE: S

ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB.	FECAL AB.	ROOTS AB.	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc)
Om1	0-9	W	MA						
Om2	3-17	W	MA						
Om3	19-21	W	MA					6.5	
OM4	33-47	W	MA						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB.	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
C1	9-13			LS	1	0	0	1	A						
C2	17-19			LS	1	0	0	1	A						
C3	21-33	10YR2/1		LS	1	0	0	1	A					7	
C4	47-55			LS	1	0	0	1	A						

PROFILE DIAGRAM: O1, C1, O2, O3, C3, O4, C4 (0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55)

NOTES: This area is occasionally flooded thus alternating organic & fluvial
Sample O1 & C1 in pit 3ft from pit that is being described

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE: Y 18 M 09 D 12 | PLOT NO: 12 – 4804 HC2

PROJECT ID: Harper Soil Sampling | FIELD NO: HC2 | SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION: end of 15 road

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR. (m)
		11U	310711315	5710515119	

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG.	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING: samples from Bf & C

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS./ DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
3	B-C			

ELEV.	SLOPE	ASPECT	MESO SLOPE POS.	SURFACE SHAPE	MICROTOPOG.
1821 m	9 %	187 °	mid		

NOTES:

SITE DIAGRAM

PHOTO:

SITE DIST.			EXPOS. TYPE		

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY: BEDROCK fm | C. F. LITH. fm, SC | SURVEYOR(S): PU DS NN | PLOT NO. HC2

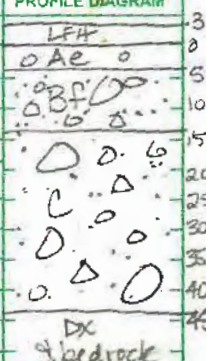
TERRAIN: TEXTURE 1 L dSZ | SURFICIAL MATERIAL 1 M, 2 D | SURFACE EXPR. 1 Y, 2 X | GEOMORPH PROCESS

SOIL CLASS: O. HFP | HUMUS FORM: HR | PHASE | HYDROGEO. 4

ROOTING DEPTH: 36 cm | ROOT RESTRICT. LAYER: TYPE L, DEPTH 43 cm | WATER SOURCE: P | SEEPAGE: NP cm | DRAINAGE: W | FLOOD RG: X

R. Z. PART. SIZE: CL

PROFILE DIAGRAM



ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB	FECAL AB	ROOTS AB	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc.)
LFH	3-0	S	1CM						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc.):
Ae	0-3	10YR5/1	8	SL	5	0	0	5	S					4	orthogneiss
Bf	3-14	10YR4/4	8	SL	15	5	0	20	S					6	
C	14-43	2.5Y5/4	8	L	15	5	0	20	S					5	

NOTES: moderately consolidated till. Area has been logged, LFH patchy surface disturbed in many areas (several skid trails)

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE: Y 12 M 09 D 19 | PLOT NO. 12 – 4805

PROJECT ID: Harper Soil Sampling | FIELD NO. HC5 | SURVEYOR(S)

SITE DESCRIPTION

LOCATION

GENERAL LOCATION: off of 15 road

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR.(m)
		11U	306883	5706777	

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG	ECOSEC.
			only		

SITE INFORMATION

PLOT REPRESENTING: Sample from bhorizon (no Chorizon+ Ae horizon too thin to get full sample)

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS./ DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
3	B-C			

ELEV.	SLOPE	ASPECT	MESO SLOPE POS.	SURFACE SHAPE	MICROTOPOG.
1814 m	16 %	238 °	mid		

NOTES: the area has been logged. The stumps are fresher so likely winter logging. Surface doesn't seem to be disturbed

SITE DIAGRAM

PHOTO:

SITE DIST.	EXPOS. TYPE

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

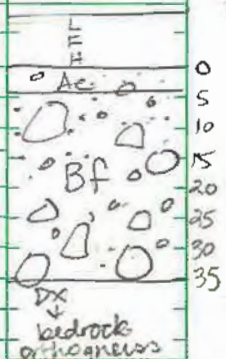
GEOLOGY BEDROCK: fm | C.F. LITH: fm | SURVEYOR(S): PU DS NN | PLOT NO. HC5

TERRAIN	TEXTURE 1	SURFICIAL 1	SURFACE 1	GEOMORPH 1
	dSZ	M	N	
	TEXTURE 2	MATERIAL 2	EXPR. 2	PROCESS 2
	zSX	D	X	

SOIL CLASS.	HUMUS FORM	PHASE	HYDROGEO.
O.HFP	HR		U

ROOTING DEPTH	ROOT RESTRICT. LAYER TYPE	WATER SOURCE	DRAINAGE
52 cm	N	P	W
R. Z. PART. SIZE	DEPTH cm	SEEPAGE	FLOOD RG.
CL		NP cm	X

PROFILE DIAGRAM



ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB	FECAL AB	ROOTS AB	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc.):
Ln	7-8	W	SP						
Fm	1-7	M	M						
Hr	0-1	W	M						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc.):
Ae	0-4	10YR6/1	8	SL	5	0	0	5	S					6.5	
Bf	4-35	10YR4/6	8	L	20	10	0	30	S					7	

NOTES:

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE: Y 12 M 09 D 18 | PLOT NO. 12 – 4806

PROJECT ID: Harper Soil Sampling | FIELD NO. HC4 | SURVEYOR(S) PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
		11U	306211	5706838	

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING: samples from Ah + Bf

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS./ DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
4	C			

ELEV.	SLOPE	ASPECT	MESO SLOPE POS.	SURFACE SHAPE	MICROTOPOG.
1738 m	2 %	999°	level		

NOTES: Site has been logged in the past – likely winter logging as stumps are tall.

SITE DIAGRAM

PHOTO:

SITE DIST.	EXPOS. TYPE

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY BEDROCK: fm | C. F. LITH: fm | SURVEYOR(S): PU DS NN | PLOT NO. HC4

TERRAIN: TEXTURE 1: dzS | SURFICIAL MATERIAL 1: M | SURFACE EXPR 1: V | GEOMORPH PROCESS 1:

SOIL CLASS: O.HR | HUMUS FORM: HR | PHASE: | HYDROGEO.: U

ROOTING DEPTH: 42 cm | ROOT RESTRICT. LAYER: TYPE L, DEPTH 50 cm | WATER SOURCE: P | DRAINAGE: m

R. Z. PART. SIZE: CL | SEEPAGE: NP cm | FLOOD RG: X

PROFILE DIAGRAM: LFH 5–0; Ah 0–5; Bf 5–30; C 30–40; DX bedrock 40–50

ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB	FECAL AB	ROOTS AB	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc.)
LFH	5-0	5	CM						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc.)
Ah	0-13	10YR 2/2	8	SL	10	0	0	10						7	
Bf	13-30	10YR 4/5	8	SL	20	5	0	25						6.5	
C	30-45	2.5Y 4/4	8	L	20	5	0	25						6	

NOTES:

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE: Y 12 M 09 D 18 | PLOT NO: 12 – 4807

PROJECT ID: Harper Soil Sampling | FIELD NO: HC6 | SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
		11U	305374	5701666	

AIR PHOTO NO	X CO-ORD	Y CO-ORD	LAT	LONG	ECOSEC

SITE INFORMATION

PLOT REPRESENTING: samples taken from Ah + C1

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS / DISTRIB	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT STAGE	STAND AGE

ELEV	SLOPE	ASPECT	MESO SLOPE POS	SURFACE SHAPE	MICROTOPOG
1698 m	8 %	38 °			

NOTES: meadow

SITE DIAGRAM

PHOTO:

SITE DIST	EXPOS TYPE

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY: BEDROCK fm | C. F. LITH | SURVEYOR(S) PU DS NN | PLOT NO. HC6

TERRAIN: TEXTURE 1 SZ, 2 h | SURFICIAL 1 F, MATERIAL 2 O | SURFACE 1 V, EXPR 2 X | GEOMORPH 1, PROCESS 2

SOIL CLASS: CU. R | HUMUS FORM ZL | PHASE | HYDROGEO. P, Th

ROOTING DEPTH 30 cm | ROOT RESTRICT LAYER TYPE N, DEPTH cm | WATER SOURCE G | SEEPAGE NP cm | DRAINAGE I | FLOOD RG R

R. Z. PART. SIZE CL

PROFILE DIAGRAM: Ah (5) | C1 (20) | O1 (25) | O2 (35) | C3 (40) | (45) | (50) | (55)

ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB	FECAL AB	ROOTS AB	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc)
Oh1	20-32	VJ	MA						
Oh2	32-37	W	MA						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
Ah	0-17	10YR2/1	7	FSL				0						5	
C1	17-20	10YR3/1	7	FSL				0						6	
C2	32-34	10YR4/4	7	SL				0						6.5	
C3	37-45	10YR3/1	7	S				0							

NOTES:

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE: Y 12 M 09 D 18 | PLOT NO. 12 – 4808

PROJECT ID: Harper Soil Sampling | FIELD NO. HC 8 | SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
		11U	304524	5710539	

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT	LONG	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING: samples taken from Bf1 & Bf2.

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS./ DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
3	B-C			

ELEV.	SLOPE	ASPECT	MESO SLOPE POS	SURFACE SHAPE	MICROTOPOG.
1670 m	20 %	284 °	lower		

NOTES: No sign of logging here.

SITE DIAGRAM

PHOTO:

SITE DIST.	EXPOS. TYPE

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY: BEDROCK gm | C.F. LITH gmi (M?) | SURVEYOR(S) PU DS NN | PLOT NO. HC 8

TERRAIN: TEXTURE 1 dzS | SURFICIAL MATERIAL 1 FG | SURFACE EXPR. 1 j | GEOMORPH. PROCESS

SOIL CLASS: O. HFP | HUMUS FORM HR | PHASE | HYDROGEO. U

ROOTING DEPTH: 30 cm | ROOT RESTRICT. LAYER TYPE N, DEPTH cm | WATER SOURCE P | DRAINAGE W

R. Z. PART. SIZE: CL | SEEPAGE NP cm | FLOOD HG X

PROFILE DIAGRAM: LFH 0 | Ae 5 | Bf1 10 | 15 | 20 | 25 | Bf2 30 | 35 | 40 | C 45 | 50

ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB	FECAL AB	ROOTS AB	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc)
LFH	4-0	W	SP						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
Ae	0-5	10YR6/1	8	LS	5	0	0	5	S					4	
Bf1	5-21	10YR3/6	8	SL	10	5	0	15	S					5	
Bf2	21-38	10YR5/8	8	SL	10	5	0	15	S					5	
C	38-55	10YR5/6	8	SL	10	5	0	15	S					6.5	

NOTES: possibly ablation till. more likely kame terraces (FG)

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 18 | PLOT NO.: 12 – 4809

PROJECT ID: Harper soil sampling | FIELD NO.: HC7 | SURVEYOR(S): PUPS, NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
		11U	305164	5705882	

AIR PHOTO NO	X CO-ORD	Y CO-ORD	LAT	LONG	ECOSEC

SITE INFORMATION

PLOT REPRESENTING:

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS./ DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
6	C			

ELEV	SLOPE	ASPECT	MESO SLOPE POS	SURFACE SHAPE	MICROTOPOG
713 m	2 %	999 °			

NOTES: The area has been logged & likely winter logging to ground not disturbed

SITE DIAGRAM

PHOTO:

SITE DIST.	EXPOS. TYPE

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY: BEDROCK gm | C. F. LITH. gm, fm | SURVEYOR(S): PU DS NN | PLOT NO. HC7

TERRAIN: TEXTURE 1 u, 2 dsZ | SURFICIAL MATERIAL 1 O, 2 M | SURFACE EXPR. 1 X, 2 b | GEOMORP. PROCESS 1 L, 2

SOIL CLASS: G | HUMUS FORM: MR | PHASE | HYDROGEO.: U

ROOTING DEPTH: 17 cm | ROOT RESTRICT. LAYER TYPE: W, DEPTH: 17 cm | WATER SOURCE: G | DRAINAGE: i

R. Z. PART. SIZE | SEEPAGE: NP cm | FLOOD RG: X

PROFILE DIAGRAM: Om; Bg

ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB	FECAL AB	ROOTS AB	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc.)
Om	17-0	M	MA					5.5	

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc.)
Bg	0-40	GLEY 4/10Y	8	L	10	5	0	15	A-S					6.5	the soil is gleyed and has no mottling

NOTES: ~~No~~ roots in the gleyed layer - the gleying appears to be No to few a root restricting layer

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE Y M D: 12 09 18 | PLOT NO: 12 – 4810

PROJECT ID: Harper Soil Sampling | FIELD NO: HC9 | SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
		10U	304598	5710615	15

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING: This site is in the transition between the meadow & the treed areas mentioned below. Samples taken from C1 & C3

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS./ DISTRIB	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
4	BC			

ELEV.	SLOPE	ASPECT	MESO SLOPE POS.	SURFACE SHAPE	MICROTOPOG.
1669 m	0 %	999 °	depression		

NOTES: In the "LG" unit there isn't any glaciolacustrine. In the meadows there is alternating layers of fluvial & organic + organic soils. In the treed areas, it is till & /or FG sediments

SITE DIAGRAM

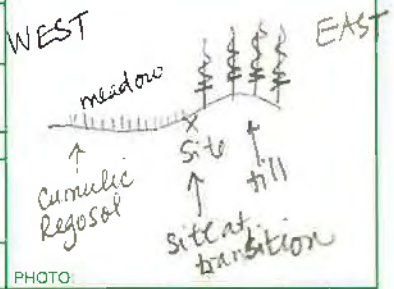


PHOTO:

SITE DIST.			EXPOS. TYPE		

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

7610003484

FS882 (1) HRE 2008/03

3 layers

SZFV
dzsM6

SOIL DESCRIPTION

GEOLOGY: BEDROCK gz | C. F. LITH. fm gz | SURVEYOR(S): PU DS NN | PLOT NO. HC9

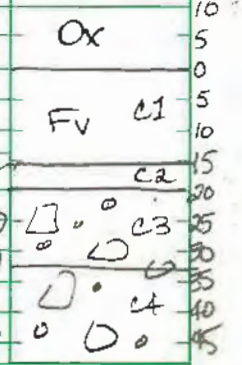
TERRAIN: TEXTURE 1 SZ, 2 dzs | SURFICIAL MATERIAL 1 F, 2 M | SURFACE EXPR. 1 V, 2 b | GEOMORPH PROCESS 1, 2

SOIL CLASS: CU.R | HUMUS FORM SD | PHASE | HYDROGEO. P . lh

ROOTING DEPTH 34 cm | ROOT RESTRICT. LAYER TYPE N, DEPTH cm | WATER SOURCE G | DRAINAGE L

R. Z. PART. SIZE CL | SEEPAGE N.P cm | FLOOD RG R

PROFILE DIAGRAM



ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL. AB.	FECAL AB.	ROOTS AB.	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc.)
Oh	10-0	W	MA						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT.	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB.	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
C1	0-15	10YR 3/2	7	L	0			0						5	
C2	15-20	10YR 4/3	7	L				0						6	
C3	20-32	10YR 5/6	7	SL	15	5	0	20						6.5	
C4	32-50	10YR 5/6	7	L	15	5	0	20						6.5	

NOTES:

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 20 | PLOT NO: 12 – 4820

PROJECT ID: Harper Soil Sampling | FIELD NO: HC10 | SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
		11U	304103	5706531	

AIR PHOTO NO	X CO-ORD	Y CO-ORD	LAT	LONG	ECOSEC

SITE INFORMATION

PLOT REPRESENTING:

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS / DISTRIB	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT STAGE	STAND AGE
5	D			

ELEV	SLOPE	ASPECT	MESO SLOPE POS	SURFACE SHAPE	MICROTOPOG
1691 m	20 %	125 °			

NOTES: Seepage area. The area was logged several years ago.

SITE DIAGRAM

PHOTO:

SITE DIST.		EXPOS TYPE	

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY: BEDROCK fm | C.F. LITH fm | SURVEYOR(S) PU DS NN | PLOT NO. HC10

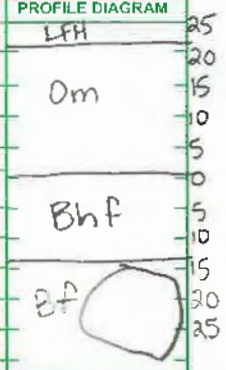
TERRAIN: TEXTURE 1 h, 2 gsz | SURFICIAL 1 O, MATERIAL 2 M | SURFACE 1 X, EXPR. 2 b | GEOMORPH 1 L, PROCESS 2

SOIL CLASS. FHP | HUMUS FORM RD | PHASE | HYDROGEO.

ROOTING DEPTH 34 cm | ROOT RESTRICT. LAYER TYPE N, DEPTH cm | WATER SOURCE G | DRAINAGE i

R. Z. PART. SIZE CL | SEEPAGE NP cm | FLOOD RG X

PROFILE DIAGRAM



ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL. AB	FECAL AB	ROOTS AB	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc):
LFH	25-21	M	MA						
Om	21-0	M	MA					6.5	seepage inspring

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
Bhf	0-14	10YR 3/3	7	L	0	0	0	0						6.5	
Bf	14-25	10YR 4/4	7	L	0	5	0	5	S					5	

NOTES:

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 20 | PLOT NO.: 12 – 4821

PROJECT ID: Harper Soil Sampling | FIELD NO.: HC11 | SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR.(m)
		11U	304793	5707594	

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG.	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING:

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS./ DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
3	B-C			

ELEV.	SLOPE	ASPECT	MESO SLOPE POS.	SURFACE SHAPE	MICROTOPOG.
1740 m	14 %	125 °	mid		

NOTES:
- area formerly logged
- thick till in road cut nearby

SITE DIAGRAM

PHOTO:

SITE DIST.			EXPOS. TYPE	

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY BEDROCK: fm | C.F. LITH: ia | fm | SURVEYOR(S): PU DS NN | PLOT NO.: HC11

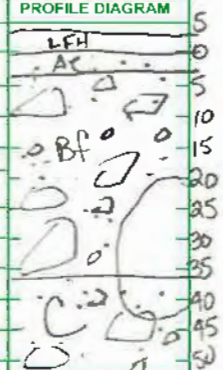
TERRAIN: TEXTURE 1: LdzS | SURFICIAL MATERIAL 1: M | SURFACE EXPR. 1: b | GEOMORPH PROCESS 1: | 2: 3.5

SOIL CLASS: O. HFP | HUMUS FORM: HR | PHASE: | HYDROGEO.: U

ROOTING DEPTH: 41 cm | ROOT RESTRICT. LAYER TYPE: N | DEPTH: cm | WATER SOURCE: P | SEEPAGE: NP cm | DRAINAGE: W-M | FLOOD RG: X

R.Z. PART. SIZE: CLS

PROFILE DIAGRAM



ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB.	FECAL AB.	ROOTS AB.	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc)
LFH	3.5-0	S	NM						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB.	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc);
Ae	0-3	10YR 6/1	8	LS	0	0	0	0						4.5	
Bf	3-36	10YR 5/6	8	SL	20	10	5	35	S					6.5	
C	36-50	2.5Y 6/6		SL	20	10	5	35	S					6.5	

NOTES: parent materials moderately consolidated

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 20 | PLOT NO: 12 – 4822

PROJECT ID: Harper Soil Sampling | FIELD NO: HC13 | SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
			3 0 3 8 5 8	5 7 0 8 4 1 7	5

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG.	ECOSEC.
			--		

SITE INFORMATION

PLOT REPRESENTING: sample from Bf horizon

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS / DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
3	B-C			

ELEV.	SLOPE	ASPECT	MESO SLOPE POS.	SURFACE SHAPE	MICROTOPOG.
1864 m	Ave. 10 %	338 °	upper		

NOTES: Area has been logged

SITE DIAGRAM

PHOTO:

SITE DIST.			EXPOS TYPE		

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

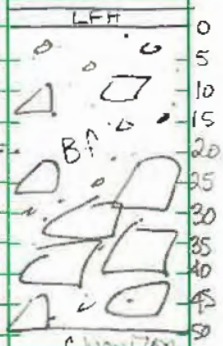
FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY BEDROCK: Pm | C.F. LITH: fm | SURVEYOR(S): PU DS NN | PLOT NO. HC13

PROFILE DIAGRAM



TERRAIN	TEXTURE 1	TEXTURE 2	SURFICIAL MATERIAL 1	SURFICIAL MATERIAL 2	SURFACE EXPR 1	SURFACE EXPR 2	GEOMORPH PROCESS 1	GEOMORPH PROCESS 2
	dzS		M					

SOIL CLASS.	HUMUS FORM	PHASE	HYDROGEO.
O.HFP	HR		U

ROOTING DEPTH	ROOT RESTRICT LAYER TYPE	ROOT RESTRICT LAYER DEPTH	WATER SOURCE	DRAINAGE
34 cm	N	cm	P	W

R. Z. PART. SIZE	SEEPAGE	FLOOD RG
CLS	NP cm	X

ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB.	FECAL AB.	ROOTS AB.	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc):
LFH	3-0	W	SP						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB.	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
Ae	0-3	10YR 6/2	8	LS	0	0	0	0						4.5	
Bf	3-49	10YR 5/6	8	SL	20	30	5	55	A-S					6.5	

NOTES:

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 20

PLOT NO: 12 – 4823

PROJECT ID: Harper soil sampling

FIELD NO: HC12

SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR.(m)
		11U	304435	7084227	6

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG.	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING: sample from Bf horizon

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS / DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
3	B-C			

ELEV.	SLOPE	ASPECT	MESO SLOPE POS.	SURFACE SHAPE	MICROTOPOG.
1875 m	Ave 12 %	65 °	upper		

NOTES: area has been logged

SITE DIAGRAM

PHOTO:

SITE DIST.	EXPOS. TYPE

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY — BEDROCK: fm | C.F. LITH: fm | SURVEYOR(S): PU DS NN | PLOT NO.: HC12

TERRAIN — TEXTURE 1: dZS | 2: | SURFICIAL MATERIAL 1: M | 2: | SURFACE EXPR 1: D | 2: | GEOMORPH PROCESS 1: AE | 2: | PROFILE DIAGRAM

SOIL CLASS.: O.HFP | HUMUS FORM: HR | PHASE: | HYDROGEO.: U

ROOTING DEPTH: 38 cm | ROOT RESTRICT. LAYER TYPE: N | DEPTH: cm | WATER SOURCE: P | SEEPAGE: N? | DRAINAGE: W | FLOOD RG: X

R. Z. PART. SIZE: CLS

ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB.	FECAL AB.	ROOTS AB.	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc):
LFH	4-0	M	MA						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP.	TEXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB.	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
Ae	0-0.5		8												← too thin to describe
Bf	0.5-49	10YR4/6	8	L	25	25	0	50	A-S					6.5	further

NOTES:

PROFILE DIAGRAM: LFH, Bf; 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 20

PLOT NO: 12 – 4824

PROJECT ID: Harper Soil Sampling

FIELD NO: HC25

SURVEYOR(S): PU, DS, NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
		11U	303174	5908573	6

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG.	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING: sample from Bf horizon

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS / DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE

ELEV.	SLOPE	ASPECT	MESO SLOPE POS.	SURFACE SHAPE	MICROTOPOG.
1787 m	60 %	252 °	upper.		

NOTES: on steep slope below road

SITE DIAGRAM

PHOTO:

SITE DIST.		EXPOS. TYPE	

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY — BEDROCK: fm | C. F. LITH: fm | SURVEYOR(S): PU DS NN | PLOT NO.: HC25

TERRAIN — TEXTURE 1: | 2: | SURFICIAL MATERIAL 1: | 2: | SURFACE EXPR. 1: | 2: | GEOMORPH PROCESS 1: | 2:

SOIL CLASS.: O. HFP | HUMUS FORM: HR | PHASE: | HYDROGEO.: U

ROOTING DEPTH: cm | ROOT RESTRICT. LAYER: TYPE | DEPTH: cm | WATER SOURCE: P | SEEPAGE: NP cm | DRAINAGE: W | FLOOD RG: X

R. Z. PART. SIZE: CLS

PROFILE DIAGRAM

ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB	FECAL AB	ROOTS AB	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc)
LFH	3	M	NM						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	*EXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
Ae	D-1		8		0	0	0	0							← this layer is there
Bf	1-55	10YR5/4	8	SL	25	30	5	60	A					6.5	to non-ex site, * - too thin to texture or describe further

NOTES:

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 20

PLOT NO: 12 – 4825

PROJECT ID: Harper soil sampling

FIELD NO: HC24

SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR.(m)
		11U	303926	5709016	5

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT	LONG	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING:

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS./ DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE

ELEV.	SLOPE	ASPECT	MESO SLOPE POS.	SURFACE SHAPE	MICROTOPOG.
m	18 %	322 °			

NOTES: area was winter logged – slightly less ground disturbance

SITE DIAGRAM

Hit bedrock at 10cm
bedrock near surface in road cut too
- too shallow for sample collection
- gneiss bedrock

PHOTO:

SITE DIST.	EXPOS. TYPE

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 20

PLOT NO: 12 – 4826

PROJECT ID: ~~Soil~~ Harper soil sampling

FIELD NO: HC23

SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR.(m)
		11U	304868	5709224	7

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT	LONG	ECOSEC.
		//			

SITE INFORMATION

PLOT REPRESENTING: samples from Bf horizon

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS./ DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
3	BC			

ELEV.	SLOPE	ASPECT	MESO SLOPE POS.	SURFACE SHAPE	MICROTOPOG.
1837 m	5 %	299 °	undulating crest		

NOTES: area has been logged.

SITE DIAGRAM

PHOTO:

SITE DIST.	EXPOS. TYPE

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY BEDROCK: SC | C. F. LITH: SC fm | SURVEYOR(S): PU DS NN | PLOT NO.: HC23

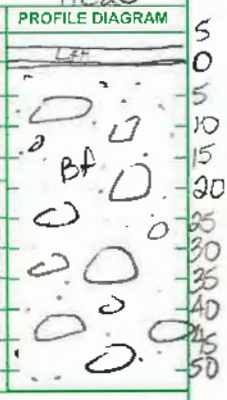
TERRAIN | TEXTURE 1: dSZ | 2: | SURFICIAL MATERIAL 1: M | 2: | SURFACE 1: V | EXPR. 2: | GEOMORPH PROCESS 1: | 2:

SOIL CLASS.: O. HFP | HUMUS FORM: disturbed | PHASE: | HYDROGEO.: U

ROOTING DEPTH: 31 cm | ROOT RESTRICT. LAYER: TYPE: L | DEPTH: cm | WATER SOURCE: P | SEEPAGE: NP cm | DRAINAGE: W | FLOOD RG.: X

R. Z. PART. SIZE: CL

PROFILE DIAGRAM



ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB	FECAL AB	ROOTS AB	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc)
LFH	2-0	W	SP						disturbed + thin

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
Ae	0-05														thin + discontinuous
Bf	0.5-30	10YR 4/6	8	L	25	5	0	30	A-S					5.5	↑ too thin to describe further

NOTES:

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 20 | PLOT NO.: 12 – 4827

PROJECT ID: Harper Soil Sampling | FIELD NO.: HC21 | SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR.(m)
		11 U	305046	5709594	6

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING: 1 sample from Bf horizon

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS./ DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
3	B-C			

ELEV.	SLOPE	ASPECT	MESO SLOPE POS.	SURFACE SHAPE	MICROTOPOG.
842 m	10 %	267 °			

NOTES: Area has been logged - several skid trails

SITE DIAGRAM

PHOTO:

SITE DIST.	EXPOS TYPE

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY BEDROCK: fm | C. F. LITH.: fm | SURVEYOR(S): PU DS NN | PLOT NO.: HC21

TERRAIN | TEXTURE 1: dzS | 2: | SURFICIAL MATERIAL 1: m | 2: | SURFACE EXPR. 1: b | 2: | GEOMORPH PROCESS 1: | 2:

SOIL CLASS.: D. HFP | HUMUS FORM: | PHASE | HYDROGEO.: U

ROOTING DEPTH: 28 cm | ROOT RESTRICT. LAYER TYPE: N | DEPTH: cm | WATER SOURCE: P | DRAINAGE: W

R. Z. PART. SIZE: CL | SEEPAGE: NP cm | FLOOD RG: X

PROFILE DIAGRAM: Ap; Bf; base of pit (0, 5, 10, 15, 20, 25, 30, 35, 40, 45)

ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB	FECAL AB	ROOTS AB	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc):

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP.	TEX.	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB.	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
Ap	0-13	•													← mixed colours.
Bf	13-44	10YR4/6	8	L	25	5	0	25	A-S					6.5	

NOTES:

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 20 | PLOT NO.: 12 – 4828

PROJECT ID: Harpi soil sampling | FIELD NO.: HC 15 | SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
		11U	306056	5708743	5

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG.	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING: samples from 01

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS./ DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
6	D			

ELEV.	SLOPE	ASPECT	MESO SLOPE POS.	SURFACE SHAPE	MICROTOPOG.
1772 m	1 %	999 °	depression		

NOTES

SITE DIAGRAM

PHOTO:

SITE DIST.: | EXPOS. TYPE:

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY BEDROCK fm | C. F. LITH | SURVEYOR(S) PU DS NN | PLOT NO. HC15

TERRAIN | TEXTURE 1 LI 2 S | SURFICIAL MATERIAL 1 O 2 F | SURFACE 1 X EXPR 2 X | GEOMORPH 1 U PROCESS 2

SOIL CLASS. Cu. R | HUMUS FORM MR | PHASE | HYDROGEO. P lh

ROOTING DEPTH 53 cm | ROOT RESTRICT. LAYER TYPE W ? DEPTH >53 cm | WATER SOURCE G | DRAINAGE L

R. Z. PART. SIZE M | SEEPAGE NP cm | FLOOD RG. R

PROFILE DIAGRAM

Om1
C1
Om2
C2
Om3
C3
Oh4

0 5 10 15 20 25 30 35 40 45 50

ORGANIC HORIZONS/LAYERS

seepage likely earlier in the season

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB.	FECAL AB.	ROOTS AB	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc):
Om1	0-19	M	MA					7	
Om2	22-27	M	MA					6.5	
Om3	30-37	M	MA					7	
Oh4	40-53	M	MA	2.				6.5	

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB	SIZE	STRUCTURE CLASS	KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
C1	19-22	10YR4/4	7	S				0						7	These mineral layers are too thin to take samples from
C2	27-30	10YR4/4	7	FSL				0						6.5	
C3	37-40	10YR3/6	7	FSL				0						7	

NOTES:

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS AND RANGE
MINISTRY OF ENVIRONMENT

DATE Y M D 12 09 20 | PLOT NO. 12 – 4829

PROJECT ID Harper soil sampling | FIELD NO. HC16 | SURVEYOR(S) PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
			3 0 5 8 4 4	5 7 0 9 3 3 3	6

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG.	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING samples from Bf & BC

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS./ DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
3	B-C			

ELEV.	SLOPE	ASPECT	MESO SLOPE POS	SURFACE SHAPE	MICROTOPOG.
1816 m	Ave 8 %	077 °			

NOTES Area has been logged in the past.

SITE DIAGRAM

PHOTO:

SITE DIST.	EXPOS TYPE

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY BEDROCK fm		C. F. LITH fm		SURVEYOR(S) PL DS NN	PLOT NO. HC16
TERRAIN TEXTURE 1 dSZ / 2	SURFICIAL MATERIAL 1 M / 2	SURFACE 1 b / EXPR 2	GEOMORPH 1 1 / PROCESS 2	PROFILE DIAGRAM	
SOIL CLASS. O. HFP	HUMUS FORM LR	PHASE	HYDROGEO.		
ROOTING DEPTH 40 cm	ROOT RESTRICT. LAYER TYPE N / DEPTH cm	WATER SOURCE P	DRAINAGE W		
R. Z. PART. SIZE CL		SEEPAGE NP cm	FLOOD RG X		

ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB	FECAL AB	ROOTS AB	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc):
LFH	12-0	S	NM						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
Ae	0-4	10YR 6/2	8	LS	0	0	0	0						4.5	
Bf	4-21	10YR 5/6	8	L	20	0	0	0						5.0	
C	21-35	10YR 5/6	8	L	20	0	0	0						5.5	

NOTES:

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 21

PLOT NO: 12 – 4830

PROJECT ID: Harper Soil sampling

FIELD NO: HC37

SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR.(m)
		11U	306625	5711519	7

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT	LONG.	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING: sample from Bf

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS / DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
3	B-C			

ELEV.	SLOPE	ASPECT	MESO SLOPE POS	SURFACE SHAPE	MICROTOPOG.
1720 m	20 %	357 °	mid		

NOTES: This area was logged several years ago

SITE DIAGRAM

PHOTO:

SITE DIST.			EXPOS TYPE		

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY BEDROCK: fm | C. F. LITH: fm sc | SURVEYOR(S): PU DS NN | PLOT NO. HC37

TERRAIN TEXTURE 1: dzs | SURFICIAL MATERIAL 1: M | SURFACE EXPR 1: Vb | GEOMORPH PROCESS 1:

SOIL CLASS.: O.HFP | HUMUS FORM: HR | PHASE: | HYDROGEO.: U

ROOTING DEPTH: 32 cm | ROOT RESTRICT. LAYER TYPE: N | DEPTH: cm | WATER SOURCE: P | SEEPAGE: NP | DRAINAGE: W | FLOOD RG: X

R. Z. PART. SIZE: CLS

ORGANIC HORIZONS/LAYERS

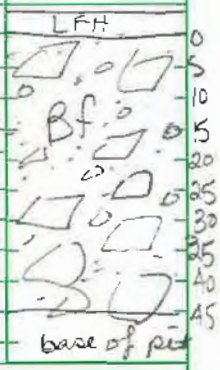
HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL. AB.	FECAL AB.	ROOTS AB.	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc)
LFH	A-O	S	MA						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEX.	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB.	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
Bf	O-45	10YR5/6	8	SL	25	25	0	50	AS					5	

NOTES:

PROFILE DIAGRAM



FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS AND RANGE
MINISTRY OF ENVIRONMENT

DATE Y	M	D	PLOT NO
12	09	21	12 – 4831

PROJECT ID: Harper soil sampling
FIELD NO.: HC38
SURVEYOR(S): PU DS NN

LOCATION

GENERAL LOCATION					
FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE: 11 U	EAST: 3 0 6 3 8 8	NORTH: 5 7 1 1 1 1 6	ACCUR (m): 5
AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG.	ECOSEC

SITE INFORMATION

PLOT REPRESENTING: Sample from Bf

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS./ DISTRIB.	MAP UNIT
SMR: 3	SNR: B-C	SUCCESS. STATUS	STRUCT. STAGE	STAND AGE
ELEV.: 1749 m	SLOPE: 15 %	ASPECT: 45 °	MESO SLOPE POS: mid	SURFACE SHAPE / MICROTOPOG

NOTES: area has been logged several years ago

SITE DIAGRAM

PHOTO:

SITE DIST.		EXPOS. TYPE	

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

SITE DESCRIPTION

FS882 (1) HRE 2008/03 7610003484

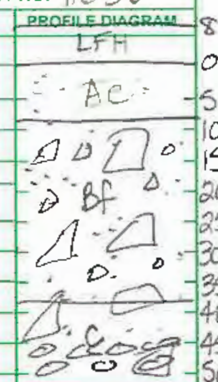
SOIL DESCRIPTION

← greenstone + greenschist

GEOLOGY BEDROCK: Pm | C. F. LITH.: Pm | SC | SURVEYOR(S): PU DS NN | PLOT NO.: HC 38

TERRAIN	TEXTURE 1 / 2	SURFICIAL MATERIAL 1: M	SURFACE EXPR. 1: Vb	GEOMORPH. PROCESS 1 / 2
SOIL CLASS.: O.HFP	HUMUS FORM: HR	PHASE	HYDROGEO.: U	
ROOTING DEPTH: 39 cm	ROOT RESTRICT. LAYER TYPE: L?		WATER SOURCE: P	DRAINAGE: W
R.Z. PART. SIZE: CL	DEPTH: 55? cm		SEEPAGE: NP cm	FLOOD RG.: X

PROFILE DIAGRAM



ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB.	FECAL AB.	ROOTS AB.	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc):
LFH	6-0	M	SP						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT	G	C	S	TOTAL	SHAPE	ROOTS AB	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
Ae	0-8	10YR6/2	8	LS	0	0	0	0						5	
Bf	8-38	10YR5/6	8	SL	20	10	0	30	A-S					5.5	
C	38-44	2.5Y6/8	8	SiL	20	10	0	30	A-S					6.5	a lot of fractured schist in this C layer – may have reached the weathered bedrock layer above bedrock.

NOTES: C horizon highly consolidated – too difficult to dig in to get sample
roots generally are not penetrating this parent material

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 21

PLOT NO: 12 – 4832

PROJECT ID: Harper Soil Sampling

FIELD NO: HC17

SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
		11U	306106	5710134	

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG.	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING: Samples from Ah & Bhf

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS./ DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
4	4 D			

ELEV.	SLOPE	ASPECT	MESO SLOPE POS.	SURFACE SHAPE	MICROTOPOG.
1843 m	1 %	999 °	level		

NOTES:

SITE DIAGRAM

PHOTO:

SITE DIST.	EXPOS. TYPE

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

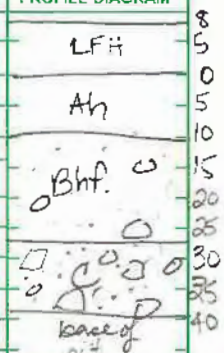
GEOLOGY BEDROCK fm | | C. F. LITH fm | | SURVEYOR(S) PU DS NN | PLOT NO. HC17

TERRAIN	TEXTURE 1	SURFICIAL 1	SURFACE 1	GEOMORPH 1
	dzS	M	b	
	2	MATERIAL 2	EXPR. 2	PROCESS 2

SOIL CLASS.	HUMUS FORM	PHASE	HYDROGEO.
FHP	HR		U

ROOTING DEPTH	ROOT RESTRICT. LAYER TYPE	WATER SOURCE	DRAINAGE
40 cm	N	P	m
R. Z. PART. SIZE: CL	DEPTH cm	SEEPAGE NP cm	FLOOD RG: X

PROFILE DIAGRAM



ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB.	FECAL AB.	ROOTS AB.	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc):
LFH	8-0	M	NM						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
Ah	0-10	10YR3/2	8	L	0	0	0	0	0					6.5	
Bhf	10-27	10YR3/4	8	L	5	0	0	0	SA					6.5	
C	27-38	10YR5/4	8	SL	15	0	0	15	SA					5.5	

NOTES:

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 21 | PLOT NO: 12 – 4833

PROJECT ID: Harper Soil Sampling | FIELD NO: HC18 | SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
	~~###~~	11U	306629	5709981	6

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG.	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING: samples from Bhf & Bf

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS./ DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
4	C			

ELEV.	SLOPE	ASPECT	MESO SLOPE POS.	SURFACE SHAPE	MICROTOPOG.
1854 m	Ave 7 %	189 °	upper		

NOTES: area not logged

SITE DIAGRAM

PHOTO:

SITE DIST.				EXPOS TYPE			

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY: BEDROCK SC | C. F. LITH. fm SC | SURVEYOR(S): PU DS NN | PLOT NO. HC18

TERRAIN: TEXTURE 1 dzS 2 | SURFICIAL 1 M MATERIAL 2 | SURFACE 1 b EXPR 2 | GEOMORPH. 1 PROCESS 2

SOIL CLASS. O.HFP | HUMUS FORM HR | PHASE | HYDROGEO. U

ROOTING DEPTH 38 cm | ROOT RESTRICT. LAYER TYPE N DEPTH cm | WATER SOURCE D | SEEPAGE NP cm | DRAINAGE m | FLOOD RG X

R. Z. PART. SIZE CL

PROFILE DIAGRAM

ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB	FECAL AB	ROOTS AB	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc)
LFH	3-0								

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
Ae	0-4	10YR5/1	8	LS	0	0	0	0						4.5	
Bhf	4-21	10YR3/6	8	L	5	0	0	5	A-S					5	
Bf	21-39	10YR5/6	8	L	20	0	0	20	A-S					5.5	
C	39-50	2.5Y4/3	8	L	65	0	0	65	A-S					6	

NOTES: basal till is moderately consolidated

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 21

PLOT NO: 12 – 4834

PROJECT ID: Harper soil sampling

FIELD NO: HC19

SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR.(m)
		11U	307761	5709980	5

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING:

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS./ DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
3	B			

ELEV.	SLOPE	ASPECT	MESO SLOPE POS.	SURFACE SHAPE	MICROTOPOG.
1834 m	5 %	17 °	upper		

NOTES: area doesn't appear to have been logged
site is adjacent to an old cutblock. SS
shallow soils in road cut.

SITE DIAGRAM

PHOTO:

SITE DIST.		EXPOS TYPE	

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY BEDROCK: SC | C. F. LITH: SC fm | SURVEYOR(S): PU DS NN | PLOT NO.: HC19

TERRAIN	TEXTURE 1	TEXTURE 2	SURFICIAL 1	SURFICIAL 2	SURFACE 1	SURFACE 2	GEOMORPH 1	GEOMORPH 2
	dzS	SZX	M	D	V	X		

SOIL CLASS	HUMUS FORM	PHASE	HYDROGEO.
O. HFP	HR		U

ROOTING DEPTH	ROOT RESTRICT. LAYER TYPE	ROOT RESTRICT. LAYER DEPTH	WATER SOURCE	DRAINAGE	R. Z. PART. SIZE	SEEPAGE	FLOOD RG.
28 cm	L	38 cm	P	W	CLS	NP cm	X

PROFILE DIAGRAM

ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB.	FECAL AB.	ROOTS AB	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc.)
LFH	3-0								

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP.	TEX.	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc.)
Ae	0-10	10YR6/1	8	LS	5	0	0	5	S-A					4.5	
Bf	10-35	10YR4/4	8	L	15	5	0	20	S-A					5	
				L	20	20	0	40	A						

NOTES:

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 19

PLOT NO: 12 – 4811

PROJECT ID: Harper Soil Sampling

FIELD NO: HC33

SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
		11 U	304567	5711184 6	

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG.	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING: samples taken from Bf + C

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS / DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
3	B-C			

ELEV	SLOPE	ASPECT	MESO SLOPE POS.	SURFACE SHAPE	MICROTOPOG.
1593 m	13 %	030 °	mid		

NOTES: area was logged several years ago

SITE DIAGRAM

PHOTO:

SITE DIST.			EXPOS. TYPE		

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY — BEDROCK: cb (greenstone) | C.F. LITH: nf | SURVEYOR(S): PU DS NN | PLOT NO.: HC33

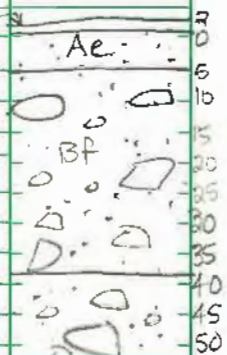
TERRAIN — TEXTURE 1: L dzs | 2: | SURFICIAL MATERIAL 1: m | 2: | SURFACE EXPR. 1: b | 2: | GEOMORPH PROCESS 1: LFH | 2:

SOIL CLASS.: O. HFP | HUMUS FORM: HR | PHASE: | HYDROGEO.: U

ROOTING DEPTH: 46 cm | ROOT RESTRICT. LAYER TYPE: N | DEPTH: cm | WATER SOURCE: P | DRAINAGE: W

R. Z. PART. SIZE: CL | SEEPAGE: NP cm | FLOOD RG.: X

PROFILE DIAGRAM



ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB	FECAL AB	ROOTS AB	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc)
LFH	2-0	M	NM						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
Ae	0-5	10YR 6/1	8	LS	0	0	0	0						4.5	
Bf	5-38	7.5YR 4/6	8	L	10	5	0	15	SA					5.5	
C	38-55	10YR 4/3	8	L	10	5	0	15	SA					6.5	

NOTES: moderately consolidated base of till
very thin LFH likely disturbed when area was logged.

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE: Y 12 M 09 D 19

PLOT NO: 12 – 4812

PROJECT ID: Harper Soil Sampling

FIELD NO: HC36

SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
			303786	5711316	

AIR PHOTO NO	X CO-ORD	Y CO-ORD	LAT	LONG	ECOSEC

SITE INFORMATION

PLOT REPRESENTING:

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS / DISTRIB	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
5	D			

ELEV	SLOPE	ASPECT	MESO SLOPE POS	SURFACE SHAPE	MICROTOPOG
1690m	Ave 20 %	95 °			

NOTES: no sign of logging here but there are older trails in the area. Likely from exploration in the 70's

SITE DIAGRAM

PHOTO:

SITE DIST.			EXPOS TYPE	

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

bedrock geology map says volcanic rocks?

SOIL DESCRIPTION

GEOLOGY — BEDROCK: SC | | C.F. LITH: nf | ii | sc — SURVEYOR(S): PU DS NN — PLOT NO: HC36

TERRAIN — TEXTURE 1: dzs; 2: — SURFICIAL 1: M; MATERIAL 2: — SURFACE 1: b; EXPR. 2: — GEOMORPH 1: L; PROCESS 2: — PROFILE DIAGRAM

SOIL CLASS: HP. — HUMUS FORM: ZL — PHASE: — HYDROGEO: U

ROOTING DEPTH: 49 cm — ROOT RESTRICT. LAYER: TYPE: N; DEPTH: cm — WATER SOURCE: GWP — DRAINAGE: L

R. Z. PART. SIZE: CL — SEEPAGE: NP cm — FLOOD RG: X

ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB.	FECAL AB.	ROOTS AB.	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc):
LFH	13-0	S	NM						there would be seepage earlier in the season
									seepage may be present at depth below soil pit

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB.	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
Ah	0-26	10YR2/1	7	L	0	0	0	0						6.5	
Bf	26-36	10YR3/6	7	L	15	10	0	25	S					6.5	
BC	36-45	10YR4/4	7	L	15	10	0	25	S					6.5	

NOTES: Site in a seepage zone, hellebore growing nearby
double check with lab results the Ah is not organic horizon

PROFILE DIAGRAM: LFH; check from lab results if this is Ah or Om; Bf; BC

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 19

PLOT NO.: 12 – 4813

PROJECT ID: Harper Soil Sampling

FIELD NO.: HC34

SURVEYOR(S): Pu DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
		11U	3 0 3 8 2 ?	5 7 1 1 9 1 5	

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG.	ECOSEC

SITE INFORMATION

PLOT REPRESENTING: samples taken from Bf, BC

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS./ DISTRIB.	MAP UNIT
4	BC			

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE

ELEV.	SLOPE	ASPECT	MESO SLOPE POS.	SURFACE SHAPE	MICROTOPOG.
1726 m	22 %	50 °	mid		

NOTES:

SITE DIAGRAM

PHOTO:

SITE DIST.			EXPOS TYPE	

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY — BEDROCK: an | C. F. LITH: | SURVEYOR(S): Pu DS NN | PLOT NO.: HC 34

TERRAIN — TEXTURE 1: dzS | 2: | SURFICIAL MATERIAL 1: M | 2: | SURFACE EXPR. 1: b | 2: | GEOMORPH. PROCESS 1: | 2:

SOIL CLASS.: O.HFP | HUMUS FORM: HR | PHASE: | HYDROGEO.: U

ROOTING DEPTH: 32 cm | ROOT RESTRICT. LAYER TYPE: N | DEPTH: cm | WATER SOURCE: P | DRAINAGE: W-M

R. Z. PART. SIZE: CL | SEEPAGE: NP cm | FLOOD RG.: X

PROFILE DIAGRAM

ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB.	FECAL AB.	ROOTS AB.	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc):
LFH	3-0	M	NM						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP.	TEXT.	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB.	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
Ae	0-4	10YR6/1	8	LS	0	0	0	0						4.5	
Bf	4-39	10YR4/6	8	L	15	10	0	25						5.5	
BC	39-50	10YR5/8	8	L	15	10	0	25						5.5	

NOTES:

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 19

PLOT NO.: 12 – 4814

PROJECT ID: Harper Soil Sampling

FIELD NO.: HC28

SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
		11U	303902	5710675	

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG.	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING:

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS / DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
4	B-C			

ELEV	SLOPE	ASPECT	MESO SLOPE POS.	SURFACE SHAPE	MICROTOPOG.
1627 m	25 %	294 °	Mid		

NOTES: Hellabore growing in the area
no sign of logging however there is rock + LFH is very thin
There is signs of an old fire

SITE DIAGRAM

PHOTO:

SITE DIST.			EXPOS. TYPE		

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY — BEDROCK: gn | | C. F. LITH: fm iii | ei — SURVEYOR(S): PU DS NN — PLOT NO.: HC28

TERRAIN — TEXTURE 1: Y | TEXTURE 2: dzs — SURFICIAL MATERIAL 1: M | 2: — SURFACE EXPR. 1: b | 2: — GEOMORPH PROCESS 1: | 2:

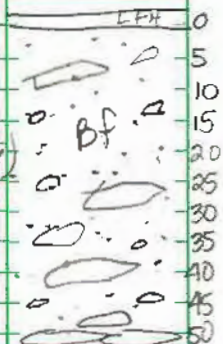
SOIL CLASS.: 0.4FP — HUMUS FORM: HR — PHASE: — HYDROGEO.: U

ROOTING DEPTH: 55 cm — ROOT RESTRICT. LAYER TYPE: N — DEPTH: cm — WATER SOURCE: P (some G) — DRAINAGE: M-C

R. Z. PART. SIZE: CL — SEEPAGE: NP cm — FLOOD RG.: X

↳ some seepage nearby (hellabore)

PROFILE DIAGRAM



ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB	FECAL AB	ROOTS AB	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc):
LFH	2-0	S	CM						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEX	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
Bf	0-60	7.5YR4/4	8	SL	20	5	0	25	A-S					5.5	

NOTES:

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE: Y 12 M 09 D 19 | PLOT NO: 12 – 4815

PROJECT ID: Harper Soil Sampling | FIELD NO: HC27 | SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
		11U	304194	5710419	

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG.	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING: Samples taken from Bf & C horizons.

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS./ DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
4	BC			

ELEV	SLOPE	ASPECT	MESO SLOPE POS.	SURFACE SHAPE	MICROTOPOG.
1653 m	25 Ave. %	254 °			

NOTES: no sign of logging at site
heelabore scattered around site

SITE DIAGRAM

PHOTO:

SITE DIST.	EXPOS TYPE

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY BEDROCK: fm | C. F. LITH.: fm | SURVEYOR(S): PU DS NN | PLOT NO.: HC27

TERRAIN | TEXTURE 1: dsz | 2: | SURFICIAL MATERIAL 1: M | 2: | SURFACE EXPR 1: b | 2: | GEOMORPH PROCESS 1: | 2:

SOIL CLASS: O. HFP | HUMUS FORM: HR | PHASE: | HYDROGEO.: U

ROOTING DEPTH: 47 cm | ROOT RESTRICT. LAYER TYPE: N | DEPTH: cm | WATER SOURCE: P | DRAINAGE: m-i

R. Z. PART. SIZE: CL | SEEPAGE: NP cm | FLOOD RG.: X

ORGANIC HORIZONS/LAYERS

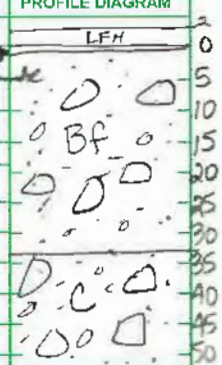
HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB.	FECAL AB.	ROOTS AB.	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc)
LFH	2-0	M	MA						scattered needles
									maybe seepage in spring?

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT.	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB.	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
AC	0-1				0	0	0	0							toothin to collect sample
Bf	1-34	10YR5/6	8	SL	15	5	0	15	S-A					6.5	for texturing + getting
C	34-60	10YR5/4	8	L	15	5	0	15	S-A					6.5	colour etc.

NOTES: Thick till in road cut below - appears to be finer grained at this location.

PROFILE DIAGRAM



FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE: Y 12 M 09 D 19 | PLOT NO: 12 – 4816

PROJECT ID: Harper soil sampling | FIELD NO: HC29 | SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
		11U	304471	5711093131	

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG.	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING:

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS / DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT STAGE	STAND AGE
A	B-C			

ELEV.	SLOPE	ASPECT	MESO SLOPE POS	SURFACE SHAPE	MICROTOPOG
1678 m	23 %	291 °	mid		

NOTES: no sign of logging

SITE DIAGRAM

PHOTO:

SITE DIST.			EXPOS TYPE	

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY: BEDROCK SC | C. F. LITH. SC | fm | SURVEYOR(S) PU DS NN | PLOT NO. HC29

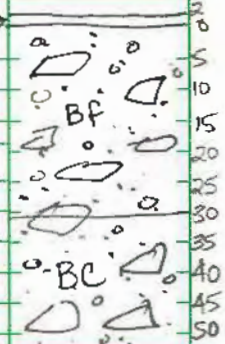
TERRAIN: TEXTURE 1 dzS 2 | SURFICIAL 1 M MATERIAL 2 | SURFACE 1 V EXPR 2 | GEOMORPH 1 PROCESS 2 LFH →

SOIL CLASS: O. HFP | HUMUS FORM HR | PHASE | HYDROGEO. U

ROOTING DEPTH 44 cm | ROOT RESTRICT LAYER TYPE N DEPTH cm | WATER SOURCE P | DRAINAGE m-v

R. Z. PART SIZE CL | SEEPAGE NP cm | FLOOD RG X

PROFILE DIAGRAM



ORGANIC HORIZONS/LAYERS

Ls Humic likely near base of pit

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB	FECAL AB	ROOTS AB	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc):
LFH	2-0	M	MA						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
Bf	0-31	7.5YR4/6	S	L	15	10	0	25	A					6.5	
BC	31-50	10YR5/6	S	L	20	15	0	35	A					5.5	

NOTES: scattered heelaspore – area disturbed by fire
bedrock outcropping in road cut downslope

no Ae ↓
LFH thick ↓
patchy

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 19 | PLOT NO: 12 – 4817

PROJECT ID: Harper soil Sampling | FIELD NO: HC39 | SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
		11U	305629	5710795	

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG.	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING: samples from Bf + C

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS./ DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
4	B-			

ELEV.	SLOPE	ASPECT	MESO SLOPE POS	SURFACE SHAPE	MICROTOPOG.
1773 m	16 AVE %	350 °			

NOTES: bedrock near surface at 40cm
too many rocks in pit to dig deeper

SITE DIAGRAM

PHOTO:

SITE DIST.		EXPOS. TYPE	

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY — BEDROCK: SC | | C.F. LITH: SC | fm | SURVEYOR(S): PU DS NN | PLOT NO.: HC39

TERRAIN — TEXTURE 1: dSz | 2: | SURFICIAL MATERIAL 1: M | 2: | SURFACE EXPR 1: V | 2: | GEOMORPH PROCESS 1: | 2:

PROFILE DIAGRAM

SOIL CLASS.: O. HFP | HUMUS FORM: HR | PHASE: | HYDROGEO.: U

ROOTING DEPTH: 32 cm | ROOT RESTRICT LAYER TYPE: NP | DEPTH: cm | WATER SOURCE: P | DRAINAGE: m

R.Z. PART SIZE: CLS | SEEPAGE: NP cm | FLOOD RG: X

→ likely lithic a little deeper in soil

ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST.	MYCEL. AB.	FECAL AB.	ROOTS AB.	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc):
LFH	2-0	S	NM						LFH patchy + thin

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB.	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
Ap	0-16														too disturbed to describe
Bf	16-28	7.5YR4/6	8	SL	25	25	0	50	A-S					4.5	further mixed Ae+
C	28-50	10YR5.5/4	8	L	25	25	5	55	A-S					5	Bf

NOTES: The area has been logged & there are several skid trails and much of the ground between skid trails appears disturbed

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 19

PLOT NO.: 12 – 4818

PROJECT ID: Harper Soil Sampling

FIELD NO.: HC40

SURVEYOR(S): PU DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
		11U	305108	5711068	5

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG.	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING: Soil pits from C1 + C2

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS./ DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT. STAGE	STAND AGE
6	C			

ELEV.	SLOPE	ASPECT	MESO SLOPE POS	SURFACE SHAPE	MICROTOPOG.
1750 m	9 %	010 °	m		

NOTES: Seepage in polygon + pit. The area has been logged a little ground was disturbed

SITE DIAGRAM

PHOTO:

SITE DIST.	EXPOS. TYPE

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY BEDROCK: SC | C. F. LITH.: SC fm | SURVEYOR(S): PU DS NN | PLOT NO.: HC40

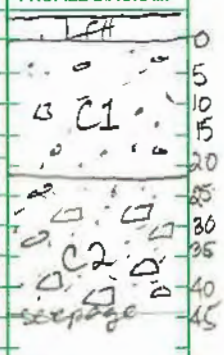
TERRAIN TEXTURE 1: dSZ | SURFICIAL MATERIAL 1: M(FG*) | SURFACE EXPR. 1: b | GEOMORPH PROCESS 1:

SOIL CLASS: R. | HUMUS FORM: HR | PHASE: | HYDROGEO.: U

ROOTING DEPTH: 25 cm | ROOT RESTRICT LAYER TYPE: W? | WATER SOURCE: G | DRAINAGE: i

R. Z. PART. SIZE: CL | ROOT RESTRICT LAYER DEPTH: 48 cm | SEEPAGE: 48 cm | FLOOD RG: X

PROFILE DIAGRAM



ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB	FECAL AB	ROOTS AB	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc)
LFH	4-0	S	NM						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc):
C1	0-21	10YR 4/2	7	SiL	5	0	0	5	A-S					6.5	C1 may be an Ap layer + C2 may be a Bf from a U buried by the Ap or the orange colour is staining from the fluctuating water table
C2	21-44	7.5YR 3/4	7	L	25	0	0	25	A-S					7.0	

NOTES:

FS882 (2) HRE 2008/03

ECOSYSTEM FIELD FORM

MINISTRY OF FORESTS
AND RANGE
MINISTRY OF ENVIRONMENT

DATE (Y M D): 12 09 19 | PLOT NO: 12 – 4819

PROJECT ID: Harper soil sampling | FIELD NO: HC31 | SURVEYOR(S): Pu DS NN

SITE DESCRIPTION

LOCATION

GENERAL LOCATION:

FOREST REGION/ DISTRICT	MAPSHEET	UTM ZONE	EAST	NORTH	ACCUR (m)
		11 U	310538	5711446	

AIR PHOTO NO.	X CO-ORD.	Y CO-ORD.	LAT.	LONG.	ECOSEC.

SITE INFORMATION

PLOT REPRESENTING: layers sampled are Ah + Bm

BGC UNIT	SITE SERIES	REALM/ CLASS	TRANS / DISTRIB.	MAP UNIT

SMR	SNR	SUCCESS STATUS	STRUCT STAGE	STAND AGE
5	D			

ELEV	SLOPE	ASPECT	MESO SLOPE POS.	SURFACE SHAPE	MICROTOPOG.
1698 m	Ave 19 %	345 °	mid		

NOTES: scattered seepage zones

SITE DIAGRAM

PHOTO:

SITE DIST.		EXPOS TYPE	

SUBSTRATE (%)

ORG. MATTER		ROCKS	
DEC. WOOD		MINERAL SOIL	
BEDROCK		WATER	

FS882 (1) HRE 2008/03

7610003484

SOIL DESCRIPTION

GEOLOGY BEDROCK: SC | C. F. LITH: SC | fm | SURVEYOR(S): Pu DS NN | PLOT NO.: HC31

TERRAIN: TEXTURE 1: dsz; 2: | SURFICIAL MATERIAL 1: M; 2: | SURFACE EXPR. 1: b; 2: | GEOMORPH. PROCESS 1: L; 2: | PROFILE DIAGRAM

SOIL CLASS: MB. | HUMUS FORM: HR | PHASE: | HYDROGEO.: U

ROOTING DEPTH: 36 cm | ROOT RESTRICT. LAYER: TYPE: N, DEPTH: cm | WATER SOURCE: G | DRAINAGE: 4 | R. Z. PART. SIZE: CL | SEEPAGE: NP cm | FLOOD RG: X

PROFILE DIAGRAM: LFH; Ah; Bm; 5 0 5 10 15 20 25 30 35 40 45 50

ORGANIC HORIZONS/LAYERS

HOR/ LAYER	DEPTH	FABRIC STRUCTURE	FABRIC vPOST	MYCEL AB	FECAL AB	ROOTS AB	ROOTS SIZE	pH	COMMENTS (consistency, character, fauna, etc)
LFH	5-0	M	MA						

MINERAL HORIZONS/LAYERS

HOR/ LAYER	DEPTH	COLOUR	ASP	TEXT.	% COARSE FRAGMENTS G	C	S	TOTAL	SHAPE	ROOTS AB	ROOTS SIZE	STRUCTURE CLASS	STRUCTURE KIND	pH	COMMENTS (mottles, clay films, effervesc., etc)
Ah	0-10	10YR2/2	7	L	5	0	0	0	A-S					6.5	
Bm	10-45	10YR3/3	7	L	20	5	0	25	A-S					6.5	

NOTES:

FS882 (2) HRE 2008/03

A3-2. Photos of Typical SMU Soil Profiles (Knight Piésold/Polar Geoscience)

APPENDIX A3-2. PHOTOS OF TYPICAL SMU SOIL PROFILES (KNIGHT PIÉSOLD/POLAR GEOSCIENCE)

Plate 4-1. Site HC-38 SMU M3_P.

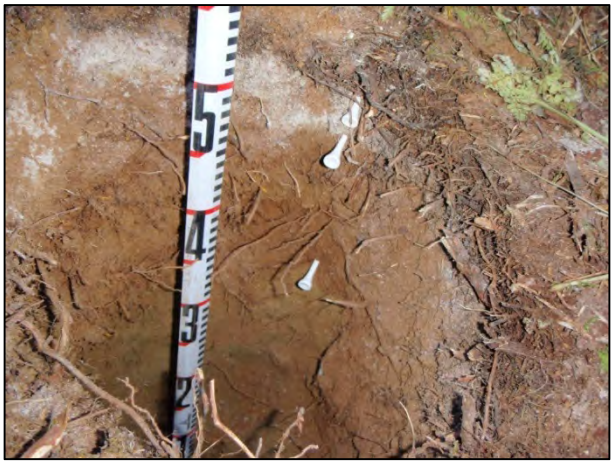


Plate 4-2. Site HC-32 M3_P.li.

Plate 4-3. Site HC-31 SMU M5_Bm.g.

Plate 4-4. Site HC-19 SMU M3_P.li.

Plate 4-5. Site HC-18 SMU M4_P.

Plate 4-6. Site HC-13 SMU D(M)3_P.

Plate 4-7. Site HC-25 SMU C2_P.

Plate 4-8. Site HC-25 SMU C2_P.

Plate 4-9. Site HC-29 SMU C4_P.

Plate 4-10. Site HC-08 SMU G3_P.

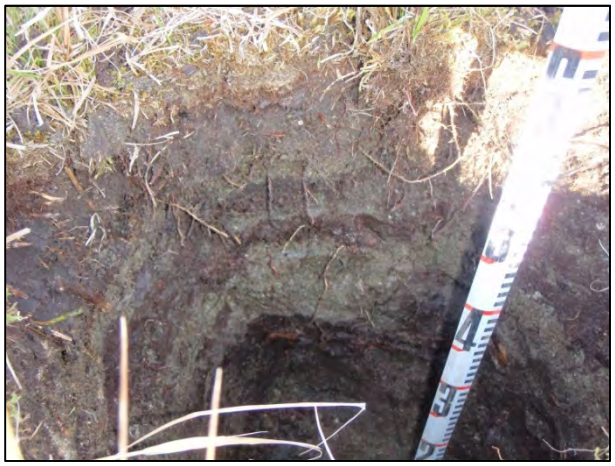


Plate 4-11 Site HC-01 SMU F5_R.cu.

Plate 4-12 Site HC-15 SMU O6_M.t.

A3-3. TEM Survey (Keystone)

Table A3-3a. Summary of Mineral Horizons at each Keystone Inspection Site - Detailed Profile

Mineral Horizon ID	Plot ID	PM-SMR (SMU)	Horizon	Percent Coarse Frags					Depth		Horizon Thickness	Comments	Structure			Roots		Texture	Texture Code	Colour Aspect	Colour
				Gravel	Cobbles	Stones	Total %	Shape	Upper	Lower			Grade	Kind	Class	Size	Abundance				
39	668	M5	Bf1	5	0	0	5	S	0	18	18			GR	M	F	F	L	3	7	10YR 3/4
40	668		Bf2	10	0	0	10	S	18	40	22							SL	4	7	10YR 4/4
41	668		C	10	10	0	20	S	40			Imperfect drainage elsewhere in polygon						SL	4	7	10YR 5/3
42	673	L7-R.pt	C1	0	0	0	0		0	45	45	LV						Si	3	7	10YR 2/2
43	673		C2	10	0	0	10	S	45	47	2	Mb too fine textured for FG, it is slightly cohesive eOv/zLv/dzsMb - U no gleying in pit adjacent to pit. There is standing water 20cm below surface but no water was seeping into the pit.						L	3	7	10YR 2/2
44	674		Ae	5	0	0	5	S	0	4	4	slightly to moderately consolidated						SL	4	8	10YR 6.5/3
45	674		Bf	15	10	5	30	S	4	51	47							SL	4	8	10YR 5/6
46	674		C	15	10	5	30	S	51	60	9							SL	4	8	10YR 6/3
47	675		Ah	0	0	0	0		0	2	2							L	3	7	10YR 3/2
48	675		Bf	10	5	5	20	S	2	39	37							L	3	7	10YR 3/6
49	675		C	15	10	5	30	S	39									L	3	7	10YR 5/6
50	676		Ac	0	0	0	0		0	6	6	greenschist (almost phyllite) out cropping 40m from side. Blanket till outcropping beyond greenschist.						SL	4	8	10YR 6/1
51	676		Bfl	15	5	0	20	S	6	30	24							L	3	8	10YR 5/4
52	676		Bf2	20	5	0	25	S	30	57	27							L	3	8	10YR 6/4
53	676		C	20	5	0	25	S	57									L	3	8	10YR 6/3
54	677		Ac	10	5		15	S	0	3	3	Hellibore common, likely some seepage. Bedrock is greenschist not volcanic as mapped.						SL	4	7	10YR 5/2
55	677		Bf	15	5		20	S	3	40	37							L	3	7	10YR 4/4
56	677		C	20	80		100	A	40			weathered bedrock, bedrock near surface							-		
57	678		Ac	5	0	0	5	A	0	3	3	shape: A/S						SL	4	7	10YR 6/1
58	678		Bf	20	15	5	40	A	3	47	44	shape: A/S						L	3	7	10YR 4/5
59	678		C	20	20	5	45	A	47			shape: A/S						SiL	3	7	10YR 3/3
60	680		Bm	10	5	0	15	S	0	16	16	Mod consolidated and mod cohesive, small drainage 50m south in polygon						SiL	3		10YR 2/1
61	680		C	15	5	25	45	S	16	60	44							SiL	3		10YR 4/1
62	706		Bm	15	0	0	15	S	0	50	50							SL	4	8	10DYR5/4
63	707		Bm	5	0	0	5	S	0	18	18							SL	4	8	10YRU4
64	707		FH	25	5	0	30	S	18	40	22							L	3	8	10YR7/2
65	709		Ae	0	0	0	0		0	9	9	Bedrock out cropping						SL	4	7	10YR7/1
66	709		Bf	20	5	0	25	A	9	39	30	Shape: A and S in road cut down road						SL	4	7	10YR4/6
67	709		C	20	10	5	35		39			N 100m						SiL	3	7	10YR5/4
68	710		C1	40	0	0	40	S	0	10	10								-	7	10YR4/4
69	710		C2	0	0	0	0		10	20	10							FSL	4	7	10YR4/4
70	710		C3	10	0	0	10	S	20	60	40								-	7	10YR4/4
71	711		C	10	5	0	15	S	0	60	60							SiL	3	8	10YR6/2
72	714		Bm	15	5	0	15	S	0	55	55	Highly consolidated						L	3	8	10Y5/4
73	714		C	15	10	5	30	S	55			slightly to mod inundated						L	3	8	10YR6/3
74	728		BP	15	5	2	22	S	0	38	38							L	3	7	10YR4/6
75	728		C	15	5	5	25	S	38	68	30							SiL	3	7	10YR6/2
76	730	C5_FO	C	0	0	0	0		0	10	10	Mb//Ov/C1v/Mb						L	3	7	10YR2/2
77	739	L7_R.pt	C	20	0	0	40	S	30	60								S	5	7	10YR3/1

Table A3-3b. Summary of Organic Horizons at Each Keystone Inspection Site - Detailed Profile

Organic Horizon ID	Plot ID	PM-SMR	Total Organic Thickness (cm)	Horizon	Depth		Thickness (cm)	Comment	Roots Size	Abundance			von Post	Structure Degree	Structure Kind
					Upper	Lower				Roots	Fecal	Mycel			
40	668	M5	7	Ln	7	6.9	0.1							W	SP
41	668			Fm	6.9	6.5	0.4							M	NM
42	668			H	6.5	0	6.5							S	CM
43	673	see A1-2	22	Lv	22	21	1							W	SP
44	673			Of	21	0	21						2	S	CM
45	674		2	Ln	2	0.5	1.5					F		W	SP
46	674			FH	0.5	0	0.5							M	CM
47	675		4	Ln	4	2	2							W	SP
48	675			Fm	2	0.5	1.5							M	NM
49	675			Hr	0.5	0	0.5							S	CM
50	676		2	LFH	2	0	2								
51	677		2	LFH	2	0	2								
52	678		2	LFH	2	0	2	disturbed by logging							
53	680		4	LFH	4	0	4								
54	706		11	LV	10	11	1							W	SP
55	706			Fa	0	10	10							M	NM
56	707		4	LV	1	4	3							W	SP
57	707			FH	0	1	1							W	BK
58	709		9	LV	6	9	9							W	SP
59	709			FH	0	6	6							W	BK
60	710		6	LV	3	6	3							S	SP
61	710			FH	0	3	3							W	GR
62	711		10	LV	1	10	9							W	SP
63	711			FH	0	1	1							M	NM
64	714		1	LFH	0	1	1							W	SP
65	728		7	LV	5	7	2							W	SP
66	728			FH	0	5	5							M	NM
67	730	C5_FO	47	LV	40	47	7							W	SP
68	730			Fa	20	40	20						5	W	BK
69	730			Hr	0	20	20						6	W	MA
70	739	L7_R.pt	30	Fa	0	30	30						3	S	NM

A3-4. Geotechnical Test Pits - Example (Knight Piésold)

Project: HARPER CREEK PROJECT | **Test Pit No.:** TP-04 | **Page** 1 of 1

Contractor: Chinook Cove Contracting | Equipment Used: Volvo 330 Excavator | Date Started: 21 Sep 11

Location: Borrow Site | Total Depth: 3.2 m | Date Completed: 21 Sep 11

Coordinates 5,706,212 N , 303,856 E (UTM NAD 83) | Elevation: 1688 m | Logged by: LD1

Reviewed by: GM

DEPTH - (m)	ELEVATION - (m)	SAMPLES	SAMPLE NO.	GRAPHIC LOG	MATERIAL DESCRIPTION	COMMENTS
0					ORGANICS, dark brown.	Wall stability: poor to average; ease of excavation: easy; groundwater ~0.5 L/s; Weather: Overcast.
					Gravelly SAND, angular to subangular, well graded, non-plastic, brown dark orange/red, loose to compact. Boulders at 0.05-0.2 m.	
1					SAND and GRAVEL, angular to subangular, trace silt, well graded, non-plastic, dark brown, compact to dense, moist to wet.	
2						
3	1687				Bottom of Test Pit at 3.2 m.	Terminated at 3.2 m due to bedrock contact.
4						

GENERAL REMARKS:

YELLOWHEAD MINING INC
HARPER CREEK PROJECT
TEST PIT LOG FOR TP-04

Knight Piésold CONSULTING

PROJECT/ASSIGNMENT NO. VA101-458/03 | REF NO. 1

FIGURE Appendix A1-4 | REV. 0

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File:M:\1\01\00458\03\A\DAT A\2011 SI DAT A\G IN\TPROJECTS\TEST PITS\HARPER_CREEK_TESTPITS_2011.GPJ
Library: M:\1\01\00458\03\A\DAT A\2011 SI DAT A\GINT\LIBRARY\HARPER_CREEK_2011 G.B._TEST PIT LOG WITH PHOTO-1 PAGE_HARPER_CREEK_TESTPITS_2011.GDT, 09-Jan-12

Appendix B

Soil Laboratory Data

B-1. Soil Lab Report (Maxxam)

B-2. Suitability Parameters

B-3. Soil Metals

Appendix B-1

Soil Lab Report (Maxxam)

B1-1. Chain of Custody

B1-2. Methods (Certificates of Analysis)

B1-3. Results

B1-1. Chain of Custody

Maxxam Analytics Inc
4606 Canada Way
Burnaby, BC V5G 1K5
www.maxxam.ca
Phone: (604) 734- 7276
Fax.: (604) 630-0110
Toll-Free: 1-800-665-8566

CHAIN-OF CUSTODY RECORD AND ANALYSIS REQUEST

LAB USE ONLY — MAXXAM JOB #

ANALYSIS REQUEST

LAB USE ONLY — COC #

COMPANY NAME: #8484 Knight Piesold Ltd.

CLIENT PROJECT NO.: VA101-00458/06

CLIENT PROJECT NAME: Knight Piésold Ltd.

COMPANY ADDRESS: 1400 - 750 West Pender, Vancouver, BC

TEL.: (604) 685- 0543
E-MAIL: ogustafson@knightpiesold.com
FAX: (604) 685-0147

SAMPLER NAME (PRINT): Damien Salgues

PROJECT MANAGER: Oscar Gustafson

LABORATORY CONTACT: Lanoy Luangkhamdeng

	FIELD SAMPLE ID (Location / Bag ID / Horizon / Surficial Mate)	MAXXAM LAB # (LAB USE ONLY)	MATRIX: GROUNDWATER	SURFACE WATER	DRINKING WATER	SOIL	OTHER	SAMPLING: DATE DD/MM/YY	TIME	# CONTAINERS	CCME Total Metals	pH	SAR	Conductivity	Alkalinity (CaCO3 equivalent)	Total Organic Carbon	Coarse Fragments >2mm	Texture (%sand, silt, clay)
1	HC-1 20302 - wide tag — O1 Glacial lake sediments					√		18-Sep-12		3	√	√	√	√	√	√	√	√
2	HC-1 20302 - thin tag — C3 Glacial lake sediments					√		18-Sep-12		3	√	√	√	√	√	√	√	√
3	HC-2 20303 - wide tag — Bf Silt, sand, gravel					√		18-Sep-12		3	√	√	√	√	√	√	√	√
4	HC-2 20303 - thin tag — C Silt, sand, gravel					√		18-Sep-12		3	√	√	√	√	√	√	√	√
5	HC-4 20305 - wide tag — Ah Silt, sand, gravel					√		18-Sep-12		3	√	√	√	√	√	√	√	√
6	HC-4 20305 - thin tag — Bf Silt, sand, gravel					√		18-Sep-12		3	√	√	√	√	√	√	√	√
7	HC-5 20304 — Bf Silt, sand, gravel					√		18-Sep-12		3	√	√	√	√	√	√	√	√
8	HC-6 20306 - wide tag — Ah Glacial lake sediments					√		18-Sep-12		3	√	√	√	√	√	√	√	√
9	HC-6 20306 - thin tag — C1 Glacial lake sediments					√		18-Sep-12		3	√	√	√	√	√	√	√	√
10	HC-7 20307 - wide tag — Om Silt, sand, gravel					√		18-Sep-12		3	√	√	√	√	√	√	√	√
11	HC-7 20307 - thin tag — Bg Silt, sand, gravel					√		18-Sep-12		3	√	√	√	√	√	√	√	√
12	HC-8 20308 - wide tag — Bf1 Till					√		18-Sep-12		3	√	√	√	√	√	√	√	√
13	HC-8 20308 - thin tag — Bf2 Till					√		18-Sep-12		3	√	√	√	√	√	√	√	√
14	HC-9 20309 - wide tag — C1 Glacial lake sediments					√		18-Sep-12		3	√	√	√	√	√	√	√	√
15	HC-9 20309 - thin tag — C3 Glacial lake sediments					√		12-Sep-12		3	√	√	√	√	√	√	√	√
16	HC-10 20319 - wide tag — Om Till					√		20-Sep-12		3	√	√	√	√	√	√	√	√
17	HC-10 20319 - thin tag — Bhf Till					√		20-Sep-12		3	√	√	√	√	√	√	√	√
18	HC-11 20320 - wide tag — Bf Silt, sand, gravel					√		20-Sep-12		3	√	√	√	√	√	√	√	√
19	HC-11 20320 - thin tag — C Silt, sand, gravel					√		20-Sep-12		3	√	√	√	√	√	√	√	√
20	HC-12 20322 — Bf Weathered bedrock					√		20-Sep-12		3	√	√	√	√	√	√	√	√
21	HC-13 20321 — Bf Till					√		20-Sep-12		3	√	√	√	√	√	√	√	√
22	HC-15 20326 — O1 Glacial lake sediments					√		20-Sep-12		3	√	√	√	√	√	√	√	√
23	HC-16 20327 - wide tag — Bf Silt, sand, gravel					√		20-Sep-12		3	√	√	√	√	√	√	√	√
24	HC-16 20327 - thin tag — Bc Silt, sand, gravel					√		20-Sep-12		3	√	√	√	√	√	√	√	√
25	HC-17 20330 - wide tag — Ah Silt, sand, gravel					√		21-Sep-12		3	√	√	√	√	√	√	√	√
26	HC-17 20330 - thin tag — Bhf Silt, sand, gravel					√		21-Sep-12		3	√	√	√	√	√	√	√	√
27	HC-18 20331 - wide tag — Bhf Till					√		21-Sep-12		3	√	√	√	√	√	√	√	√
28	HC-18 20331 - thin tag — Bf Till					√		21-Sep-12		3	√	√	√	√	√	√	√	√
29	HC-19 20332 - wide tag — Ae Weathered bedrock					√		21-Sep-12		3	√	√	√	√	√	√	√	√
30	HC-19 20332 - thin tag — Bf Weathered bedrock					√		21-Sep-12		3	√	√	√	√	√	√	√	√
31	HC-21 20325 — Bf Weathered bedrock					√		20-Sep-12		3	√	√	√	√	√	√	√	√
32	HC-23 20324 — Bf Weathered bedrock					√		20-Sep-12		3	√	√	√	√	√	√	√	√
33	HC-25 20323 — Bf Colluvium					√		20-Sep-12		3	√	√	√	√	√	√	√	√
34	HC-27 20314 - wide tag — Bf Till					√		19-Sep-12		3	√	√	√	√	√	√	√	√
35	HC-27 20314 - thin tag — C Till					√		19-Sep-12		3	√	√	√	√	√	√	√	√
36	HC-28 20313 — Bf Till					√		19-Sep-12		3	√	√	√	√	√	√	√	√
37	HC-29 20315 - wide tag — Bf Till					√		19-Sep-12		3	√	√	√	√	√	√	√	√
38	HC-29 20315 - thin tag — Bc Till					√		19-Sep-12		3	√	√	√	√	√	√	√	√
39	HC-31 20318 - wide tag — Ah Till					√		19-Sep-12		3	√	√	√	√	√	√	√	√
40	HC-31 20318 - thin tag — Bm Till					√		19-Sep-12		3	√	√	√	√	√	√	√	√
41	HC-32 20301 - wide tag — Bf Till					√		17-Sep-12		3	√	√	√	√	√	√	√	√
42	HC-32 20301 - thin tag — C Till					√		17-Sep-12		3	√	√	√	√	√	√	√	√
43	HC-33 20310 - wide tag — Bf Till					√		19-Sep-12		3	√	√	√	√	√	√	√	√
44	HC-33 20310 - thin tag — C Till					√		19-Sep-12		3	√	√	√	√	√	√	√	√
45	HC-34 20312 - wide tag — Bf Weathered bedrock					√		19-Sep-12		3	√	√	√	√	√	√	√	√
46	HC-34 20312 - thin tag — Bc Weathered bedrock					√		19-Sep-12		3	√	√	√	√	√	√	√	√
47	HC-36 20311 - wide tag — Ah Weathered bedrock					√		19-Sep-12		3	√	√	√	√	√	√	√	√
48	HC-36 20311 - thin tag — Bf Weathered bedrock					√		19-Sep-12		3	√	√	√	√	√	√	√	√
49	HC-37 20328 — Bf Weathered bedrock					√		21-Sep-12		3	√	√	√	√	√	√	√	√
50	HC-38 20329 — Bf Till					√		21-Sep-12		3	√	√	√	√	√	√	√	√
51	HC-39 20316 - wide tag — Bf Silt, sand, gravel					√		19-Sep-12		3	√	√	√	√	√	√	√	√
52	HC-39 20316 - thin tag — C Silt, sand, gravel					√		19-Sep-12		3	√	√	√	√	√	√	√	√
53	HC-40 20317 - wide tag — C1 Till					√		19-Sep-12		3	√	√	√	√	√	√	√	√
54	HC-40 20317 - thin tag — C2 Till					√		19-Sep-12		3	√	√	√	√	√	√	√	√

TAT (Turnaround Time)

LESS THAN 5 DAY TAT MUST HAVE PRIOR APPROVAL

* Some exceptions apply - please contact laboratory

STANDARD 5 BUSINESS DAYS
RUSH 3 BUSINESS DAYS
RUSH 2 BUSINESS DAYS
URGENT 1 BUSINESS DAY

OTHER BUSINESS DAYS

PO NUMBER OR QUOTE NUMBER: B21122

SPECIAL DETECTION LIMITS / CONTAMINANT TYPE:

x CCME
CSR
AB TIER 1
OTHER

LAB USE ONLY — ARRIVAL TEMPERATURE °C: | DUE DATE: | LOG IN CHECK:

ACCOUNTING CONTACT: Oscar Gustafson

SPECIAL REPORTING OR BILLING INSTRUCTIONS: N/A

JARS USED: 108

RELINQUINSHED BY SAMPLER: Damien Salgues	DATE: 240912	TIME:	RECEIVED BY: Mike Carter
RELINQUINSHED BY:	DATE: DD/MM/YY	TIME:	RECEIVED BY:
RELINQUINSHED BY:	DATE: DD/MM/YY	TIME:	RECEIVED BY LABORATORY:

CUSTODY RECORD

B1-2. Methods (Certificates of Analysis)

Your Project #: B286537
Your C.O.C. #: NA

Attention: Lanoy Luangkhamdeng
Maxxam Analytics
4606 Canada Way
Burnaby, BC
V5G 1K5

Report Date: 2012/10/05

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B2F3089
Received: 2012/10/03, 09:00

Sample Matrix: Soil
Samples Received: 54

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Total Organic Carbon in Soil	34	N/A	2012/10/04	CAM SOP-00468	LECO Combustion
Total Organic Carbon in Soil	20	N/A	2012/10/05	CAM SOP-00468	LECO Combustion

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Ken Pomeroy
05 Oct 2012 16:14:28 -04:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Ken Pomeroy,
Email: kpomeroy@maxxam.ca
Phone# (905) 817-5700

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 1

Your Project #: VA101-00458/06
Your C.O.C. #: 08358467

Attention: Oscar Gustafson
Knight Piesold Ltd.
1400 - 750 West Pender
Vancouver, BC
CANADA V6C 2T8

Report Date: 2012/10/26

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B286537
Received: 2012/09/24, 13:25

Sample Matrix: Soil
Samples Received: 54

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Calcium Carbonate Equivalent (1)	54	N/A	2012/10/04	AB SOP-00019	SSMA 20.2.2
Conductivity (Soluble)	54	2012/10/06	2012/10/09	BBY6SOP-00029	SM-2510 B
Elements by ICPMS (total)	51	2012/09/28	2012/09/28	BBY7SOP-00001	EPA 6020A
Elements by ICPMS (total)	1	2012/09/29	2012/10/02	BBY7SOP-00001	EPA 6020A
Elements by ICPMS (total)	2	2012/10/02	2012/10/03	BBY7SOP-00001	EPA 6020A
pH (2:1 DI Water Extract)	21	2012/09/28	2012/09/28	BBY6SOP-00028	Carter, SSMA 16.2
pH (2:1 DI Water Extract)	11	2012/10/01	2012/10/01	BBY6SOP-00028	Carter, SSMA 16.2
pH (2:1 DI Water Extract)	20	2012/10/03	2012/10/03	BBY6SOP-00028	Carter, SSMA 16.2
pH (2:1 DI Water Extract)	2	2012/10/04	2012/10/04	BBY6SOP-00028	Carter, SSMA 16.2
Sodium Adsorption Ratio (1)	54	N/A	2012/10/03	AB WI-00065	SSMA 15.4.4
Ca,Mg,Na,K,SO4 (Soluble) (1)	54	2012/10/02	2012/10/02	AB SOP-00042	EPA 200.7
Saturated Paste	40	2012/10/05	2012/10/05	BBY6SOP-00030	Carter SSMA 18.2.2
Saturated Paste	14	2012/10/06	2012/10/06	BBY6SOP-00030	Carter SSMA 18.2.2
Soluble Paste (1)	54	2012/10/02	2012/10/02	AB SOP-00033	SSMA 15.2
Total Organic Carbon LECO Method (2)	54	2012/10/05	2012/10/05		
Texture by Hydrometer, incl Gravel (Wet) (1)	54	2012/10/02	2012/10/05	AB SOP-00030	SSMA CH55.3
Texture Class (1)	54	N/A	2012/10/05	AB SOP-00030	SSMA CH55.3

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Calgary Environmental
(2) This test was performed by Maxxam Ontario (From Burnaby)

../2

Your Project #: VA101-00458/06
Your C.O.C. #: 08358467

Attention: Oscar Gustafson
Knight Piesold Ltd.
1400 - 750 West Pender
Vancouver, BC
CANADA V6C 2T8

Report Date: 2012/10/26

CERTIFICATE OF ANALYSIS

Encryption Key

Lanoy Luangkhamdeng
26 Oct 2012 11:50:19 -07:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Lanoy Luangkhamdeng, Burnaby Project Manager
Email: LLuangkhamdeng@maxxam.ca
Phone# (604) 638-2636

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

B1-3. Results

Complete data is available on separate media.
A sample of each set of analysis is included in this report.

Maxxam Job #: B2F3089
Report Date: 2012/10/05

Maxxam Analytics
Client Project #: B286537

RESULTS OF ANALYSES OF SOIL

Maxxam ID		PB4954	PB4955	PB4956	PB4957	PB4957	PB4958		
Sampling Date		2012/09/18	2012/09/18	2012/09/18	2012/09/18	2012/09/18	2012/09/18		
COC Number		NA	NA	NA	NA	NA	NA		
	Units	**EO5167 \ HC-1 20302-WIDE TAO1 GLACIAL LAKE SEDIMENTS**	**EO5168 \ HC-1 20302-THIN TAG C3 GLACIAL LAKE SEDIMENTS**	**EO5169 \ HC-2 20303-WIDE TAG BF SILT, SAND, GRAVEL**	**EO5170 \ HC-2 20303-THIN TAG C SILT, SAND, GRAVEL**	**EO5170 \ HC-2 20303-THIN TAG C SILT, SAND, GRAVEL Lab-Dup**	**EO5171 \ HC-4 20305-WIDE TAG AH SILT, SAND, GRAVEL**	**RDL**	**QC Batch**
Total Organic Carbon	mg/kg	150000	15000	50000	13000	15000	34000	500	2990678

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		PB4959	PB4960	PB4961	PB4962	PB4963	PB4964		
Sampling Date		2012/09/18	2012/09/18	2012/09/18	2012/09/18	2012/09/18	2012/09/18		
COC Number		NA	NA	NA	NA	NA	NA		
	Units	**EO5172 \ HC-4 20305-THIN TAG BF SILT, SAND, GRAVEL**	**EO5173 \ HC-5 20304-BF SILT, SAND, GRAVEL**	**EO5174 \ HC-6 20306-WIDE TAG AH GLACIAL LAKE SEDIMENTS**	**EO5175 \ HC-6 20306-THIN TAG C1 GLACIAL LAKE SEDIMENTS**	**EO5176 \ HC-7 20307-WIDE TAG OM SILT, SAND, GRAVEL**	**EO5177 \ HC-7 20307-THIN TAG BG SILT, SAND, GRAVEL**	**RDL**	**QC Batch**
Total Organic Carbon	mg/kg	18000	23000	110000	60000	120000	9100	500	2990678

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		PB4965	PB4966	PB4967	PB4968	PB4969	PB4970		
Sampling Date		2012/09/18	2012/09/18	2012/09/18	2012/09/12	2012/09/20	2012/09/20		
COC Number		NA	NA	NA	NA	NA	NA		
	Units	**EO5178 \ HC-8 20308-WIDE TAG BF1 TILL**	**EO5179 \ HC-8 20308-THIN TAG BF2 TILL**	**EO5180 \ HC-9 20309-WIDE TAG C1 GLACIAL LAKE SEDIMENTS**	**EO5181 \ HC-9 20309-THIN TAG C3 GLACIAL LAKE SEDIMENTS**	**EO5182 \ HC-10 20319-WIDE TAG OM TILL**	**EO5183 \ HC-10 20319-THIN TAG BHF TILL**	**RDL**	**QC Batch**
Total Organic Carbon	mg/kg	53000	22000	60000	19000	66000	26000	500	2990678

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B286537
Report Date: 2012/10/26

Knight Piesold Ltd.
Client Project #: VA101-00458/06

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		EO5167	EO5168	EO5169	EO5170		
Sampling Date		2012/09/18	2012/09/18	2012/09/18	2012/09/18		
COC Number		08358467	08358467	08358467	08358467		
	UNITS	**HC-1 20302-WIDE TAO1 GLACIAL LAKE SEDIMENTS**	**HC-1 20302-THIN TAG C3 GLACIAL LAKE SEDIMENTS**	**HC-2 20303-WIDE TAG BF SILT,SAND,GRAVEL**	**HC-2 20303-THIN TAG C SILT, SAND, GRAVEL**	**RDL**	**QC Batch**
Physical Properties							
% sand by hydrometer	%	55 (1)	66 (1)	49 (1)	43	2.0	6220586
% silt by hydrometer	%	28 (1)	16 (1)	24 (1)	18	2.0	6220586
Clay Content	%	6.1 (1)	3.3 (1)	8.4 (1)	2.8	2.0	6220586
Gravel	%	11 (1)	15 (1)	19 (1)	36	2.0	6220586
Soluble Parameters							
Soluble Conductivity	uS/cm	92.7	63.7	59.7	69.9	1.0	6234485
Sodium Adsorption Ratio	N/A	0.79	0.85	NC	0.70	0.10	6204812
Soluble Calcium (Ca)	mg/L	9.7	3.8	<1.5	<1.5	1.5	6219472
Saturation %	%	125	80.1	103	82.4	1.0	6230512
Soluble Magnesium (Mg)	mg/L	3.9	<1.0	<1.0	2.1	1.0	6219472
Soluble Sodium (Na)	mg/L	11	6.0	7.0	4.7	2.5	6219472
Soluble Potassium (K)	mg/L	<1.3	<1.3	2.0	3.9	1.3	6219472
Saturation %	%	230	64	82	54	N/A	6217995
Soluble Sulphate (SO4)	mg/L	50	12	<5.0	<5.0	5.0	6219472
Soil Properties							
Calcium Carbonate Equivalent	%	0.82	<0.60	<0.60	<0.60	0.60	6218976
Physical Properties							
Texture	N/A	SANDY LOAM	SANDY LOAM	LOAM	SILT LOAM	N/A	6205246

RDL = Reportable Detection Limit
(1) Texture results may have a higher variability in samples that contain greater than approximately 5% organic matter.

Maxxam Job #: B286537
Report Date: 2012/10/26

Knight Piesold Ltd.
Client Project #: VA101-00458/06

MISCELLANEOUS (SOIL)

Maxxam ID		EO5167	EO5168	EO5169	EO5170	EO5171		
Sampling Date		2012/09/18	2012/09/18	2012/09/18	2012/09/18	2012/09/18		
COC Number		08358467	08358467	08358467	08358467	08358467		
	UNITS	**HC-1 20302-WIDE TAO1 GLACIAL LAKE SEDIMENTS**	**HC-1 20302-THIN TAG C3 GLACIAL LAKE SEDIMENTS**	**HC-2 20303-WIDE TAG BF SILT,SAND,GRAVEL**	**HC-2 20303-THIN TAG C SILT, SAND, GRAVEL**	**HC-4 20305-WIDE TAG AH SILT,SAND, GRAVEL**	**RDL**	**QC Batch**
Misc. Inorganics								
Total Organic Carbon (C)	%	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	0.020	6234344

RDL = Reportable Detection Limit

Maxxam ID		EO5172	EO5173	EO5174	EO5175	EO5176	EO5177		
Sampling Date		2012/09/18	2012/09/18	2012/09/18	2012/09/18	2012/09/18	2012/09/18		
COC Number		08358467	08358467	08358467	08358467	08358467	08358467		
	UNITS	**HC-4 20305-THIN TAG BF SILT, SAND, GRAVEL**	**HC-5 20304 BF SILT,SAND, GRAVEL**	**HC-6 20306-WIDE TAG AH GLACIAL LAKE SEDEMENTS**	**HC-6 20306-THIN TAG C1 GLACIAL LAKE SEDIMENTS**	**HC-7 20307-WIDE TAG OM SILT, SAND, GRAVEL**	**HC-7 20307-THIN TAG BG SILT, SAND, GRAVEL**	**RDL**	**QC Batch**
Misc. Inorganics									
Total Organic Carbon (C)	%	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	0.020	6234344

RDL = Reportable Detection Limit

Maxxam ID		EO5178	EO5179	EO5180	EO5181	EO5182	EO5183		
Sampling Date		2012/09/18	2012/09/18	2012/09/18	2012/09/12	2012/09/20	2012/09/20		
COC Number		08358467	08358467	08358467	08358467	08358467	08358467		
	UNITS	**HC-8 20308-WIDE TAG BF1 TILL**	**HC-8 20308-THIN TAG BF2 TILL**	**HC-9 20309-WIDE TAG C1 GLACIAL LAKE SEDIMENTS**	**HC-9 20309-THIN TAG C3 GLACIAL LAKE SEDIMENTS**	**HC-10 20319-WIDE TAG OM TILL**	**HC-10 20319-THIN TAG BHF TILL**	**RDL**	**QC Batch**
Misc. Inorganics									
Total Organic Carbon (C)	%	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	0.020	6234344

RDL = Reportable Detection Limit

Maxxam Job #: B286537
Report Date: 2012/10/26

Knight Piesold Ltd.
Client Project #: VA101-00458/06

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		EO5167		EO5168	EO5169	EO5170	EO5171		
Sampling Date		2012/09/18		2012/09/18	2012/09/18	2012/09/18	2012/09/18		
COC Number		08358467		08358467	08358467	08358467	08358467		
	UNITS	**HC-1 20302-WIDE TAO1 GLACIAL LAKE SEDIMENTS**	**QC Batch**	**HC-1 20302-THIN TAG C3 GLACIAL LAKE SEDIMENTS**	**HC-2 20303-WIDE TAG BF SILT,SAND,GRAVEL**	**HC-2 20303-THIN TAG C SILT, SAND, GRAVEL**	**HC-4 20305-WIDE TAG AH SILT,SAND, GRAVEL**	**RDL**	**QC Batch**
Physical Properties									
Soluble (2:1) pH	pH Units	4.92	6210370	5.59	4.98	5.32	5.35	0.010	6210361
Total Metals by ICPMS									
Total Aluminum (Al)	mg/kg	18700	6210363	20200	24200	27600	12400	100	6210356
Total Antimony (Sb)	mg/kg	<0.10	6210363	<0.10	0.11	0.15	<0.10	0.10	6210356
Total Arsenic (As)	mg/kg	1.03	6210363	1.05	6.69	9.56	2.18	0.50	6210356
Total Barium (Ba)	mg/kg	64.1	6210363	109	54.7	79.3	45.4	0.10	6210356
Total Beryllium (Be)	mg/kg	0.58	6210363	<0.40	<0.40	<0.40	<0.40	0.40	6210356
Total Bismuth (Bi)	mg/kg	0.19	6210363	0.17	0.31	0.40	0.23	0.10	6210356
Total Cadmium (Cd)	mg/kg	0.872	6210363	0.244	0.104	0.165	0.157	0.050	6210356
Total Calcium (Ca)	mg/kg	3550	6210363	4560	316	316	929	100	6210356
Total Chromium (Cr)	mg/kg	7.3	6210363	8.7	10.5	12.5	7.8	1.0	6210356
Total Cobalt (Co)	mg/kg	3.53	6210363	5.93	5.00	9.16	3.09	0.30	6210356
Total Copper (Cu)	mg/kg	101	6210363	91.0	42.2	81.0	13.8	0.50	6210356
Total Iron (Fe)	mg/kg	9690	6210363	18000	30400	33500	12600	100	6210356
Total Lead (Pb)	mg/kg	6.71	6210363	6.15	8.89	17.5	7.86	0.10	6210356
Total Lithium (Li)	mg/kg	9.9	6210363	12.6	11.0	12.5	7.6	5.0	6210356
Total Magnesium (Mg)	mg/kg	4090	6210363	6650	5580	8130	3200	100	6210356
Total Manganese (Mn)	mg/kg	116	6210363	260	250	366	127	0.20	6210356
Total Mercury (Hg)	mg/kg	<0.050	6210363	<0.050	0.054	<0.050	0.059	0.050	6210356
Total Molybdenum (Mo)	mg/kg	0.69	6210363	0.61	0.77	0.65	0.65	0.10	6210356
Total Nickel (Ni)	mg/kg	3.09	6210363	4.41	5.71	8.78	4.12	0.80	6210356
Total Phosphorus (P)	mg/kg	607	6210363	475	226	167	273	10	6210356
Total Potassium (K)	mg/kg	319	6210363	2060	556	871	472	100	6210356
Total Selenium (Se)	mg/kg	1.88	6210363	0.84	0.52	<0.50	<0.50	0.50	6210356
Total Silver (Ag)	mg/kg	0.277	6210363	0.128	0.184	0.112	0.267	0.050	6210356
Total Sodium (Na)	mg/kg	404	6210363	727	<100	<100	127	100	6210356
Total Strontium (Sr)	mg/kg	14.0	6210363	19.3	3.55	3.16	7.35	0.10	6210356
Total Thallium (Tl)	mg/kg	0.083	6210363	0.112	0.072	0.084	<0.050	0.050	6210356
Total Tin (Sn)	mg/kg	0.52	6210363	0.53	0.91	0.98	0.56	0.10	6210356
Total Titanium (Ti)	mg/kg	243	6210363	699	209	144	429	1.0	6210356

RDL = Reportable Detection Limit

Maxxam Job #: B286537
Report Date: 2012/10/26

Knight Piesold Ltd.
Client Project #: VA101-00458/06

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		EO5167		EO5168	EO5169	EO5170	EO5171		
Sampling Date		2012/09/18		2012/09/18	2012/09/18	2012/09/18	2012/09/18		
COC Number		08358467		08358467	08358467	08358467	08358467		
	UNITS	**HC-1 20302-WIDE TAO1 GLACIAL LAKE SEDIMENTS**	**QC Batch**	**HC-1 20302-THIN TAG C3 GLACIAL LAKE SEDIMENTS**	**HC-2 20303-WIDE TAG BF SILT,SAND,GRAVEL**	**HC-2 20303-THIN TAG C SILT, SAND, GRAVEL**	**HC-4 20305-WIDE TAG AH SILT,SAND, GRAVEL**	**RDL**	**QC Batch**
Total Uranium (U)	mg/kg	5.31	6210363	2.36	0.478	0.651	0.695	0.050	6210356
Total Vanadium (V)	mg/kg	26.1	6210363	40.1	29.6	31.1	26.3	2.0	6210356
Total Zinc (Zn)	mg/kg	43.6	6210363	136	40.6	57.8	24.2	1.0	6210356
Total Zirconium (Zr)	mg/kg	1.03	6210363	0.78	1.38	1.97	0.68	0.50	6210356

RDL = Reportable Detection Limit

Knight Piesold Ltd.
Attention: Oscar Gustafson
Client Project #: VA101-00458/06
P.O. #:
Site Location:

Quality Assurance Report

Maxxam Job Number: VB286537

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
6210172	DJ	Matrix Spike	Total Antimony (Sb)	2012/09/28		89	%	75 - 125
			Total Arsenic (As)	2012/09/28		92	%	75 - 125
			Total Barium (Ba)	2012/09/28		NC	%	75 - 125
			Total Beryllium (Be)	2012/09/28		98	%	75 - 125
			Total Cadmium (Cd)	2012/09/28		98	%	75 - 125
			Total Chromium (Cr)	2012/09/28		NC	%	75 - 125
			Total Cobalt (Co)	2012/09/28		93	%	75 - 125
			Total Copper (Cu)	2012/09/28		NC	%	75 - 125
			Total Lead (Pb)	2012/09/28		96	%	75 - 125
			Total Lithium (Li)	2012/09/28		96	%	75 - 125
			Total Manganese (Mn)	2012/09/28		NC	%	75 - 125
			Total Mercury (Hg)	2012/09/28		99	%	75 - 125
			Total Molybdenum (Mo)	2012/09/28		102	%	75 - 125
			Total Nickel (Ni)	2012/09/28		NC	%	75 - 125
			Total Selenium (Se)	2012/09/28		92	%	75 - 125
			Total Silver (Ag)	2012/09/28		97	%	75 - 125
			Total Strontium (Sr)	2012/09/28		NC	%	75 - 125
			Total Thallium (Tl)	2012/09/28		88	%	75 - 125
			Total Tin (Sn)	2012/09/28		92	%	75 - 125
			Total Titanium (Ti)	2012/09/28		NC	%	75 - 125
			Total Uranium (U)	2012/09/28		99	%	75 - 125
			Total Vanadium (V)	2012/09/28		NC	%	75 - 125
			Total Zinc (Zn)	2012/09/28		NC	%	75 - 125
		QC Standard	Total Aluminum (Al)	2012/09/28		113	%	70 - 130
			Total Antimony (Sb)	2012/09/28		85	%	70 - 130
			Total Arsenic (As)	2012/09/28		98	%	70 - 130
			Total Barium (Ba)	2012/09/28		96	%	70 - 130
			Total Cadmium (Cd)	2012/09/28		101	%	70 - 130
			Total Calcium (Ca)	2012/09/28		95	%	70 - 130
			Total Chromium (Cr)	2012/09/28		101	%	70 - 130
			Total Cobalt (Co)	2012/09/28		88	%	70 - 130
			Total Copper (Cu)	2012/09/28		88	%	70 - 130
			Total Iron (Fe)	2012/09/28		96	%	70 - 130
			Total Lead (Pb)	2012/09/28		97	%	70 - 130
			Total Magnesium (Mg)	2012/09/28		93	%	70 - 130
			Total Manganese (Mn)	2012/09/28		98	%	70 - 130
			Total Mercury (Hg)	2012/09/28		83	%	70 - 130
			Total Molybdenum (Mo)	2012/09/28		130	%	70 - 130
			Total Nickel (Ni)	2012/09/28		92	%	70 - 130
			Total Phosphorus (P)	2012/09/28		87	%	70 - 130
			Total Strontium (Sr)	2012/09/28		94	%	70 - 130
			Total Thallium (Tl)	2012/09/28		88	%	70 - 130
			Total Titanium (Ti)	2012/09/28		99	%	70 - 130
			Total Uranium (U)	2012/09/28		93	%	70 - 130
			Total Vanadium (V)	2012/09/28		94	%	70 - 130
			Total Zinc (Zn)	2012/09/28		89	%	70 - 130
		Spiked Blank	Total Antimony (Sb)	2012/09/28		96	%	75 - 125
			Total Arsenic (As)	2012/09/28		93	%	75 - 125
			Total Barium (Ba)	2012/09/28		96	%	75 - 125
			Total Beryllium (Be)	2012/09/28		98	%	75 - 125
			Total Cadmium (Cd)	2012/09/28		95	%	75 - 125
			Total Chromium (Cr)	2012/09/28		99	%	75 - 125
			Total Cobalt (Co)	2012/09/28		99	%	75 - 125
			Total Copper (Cu)	2012/09/28		99	%	75 - 125
			Total Lead (Pb)	2012/09/28		99	%	75 - 125

Appendix B-2

Suitability Parameters

B2-1. Physical and Chemical Properties from Soils Samples Collected within the Project Site

B2-2. Soil Management and Reclamation Suitability Characteristics at Overburden

B2-3. Summary of 2011 and 2012 Laboratory Test Results for Near Surface (0-2 m Depth) Samples, Knight Piésold

B2-4. Eco-Risk Soil Samples General Characteristics

Table B2-1. Physical and Chemical Properties from Soils Samples Collected within the Project Site

Site	SMU	Field Horizon	Soluble (2:1) pH	Calcium Carbonate Equivalent	Total Organic Carbon	% Sand by Hydrometer	% Silt by Hydrometer	Clay Content	Gravel	Soluble Parameters							
										Soluble Conductivity	Sodium Adsorption Ratio	Soluble Calcium (Ca)	Soluble Magnesium (Mg)	Soluble Sodium (Na)	Soluble Potassium (K)	Saturation %	Soluble Sulphate (SO_4)
			pH Units	%	mg/kg	%	%	%	%	uS/cm	N/A	mg/L	mg/L	mg/L	mg/L	%	mg/L
HC-1	F5_R	O1	4.92	0.82	150,000	55	28	6.1	11	92.7	0.79	9.7	3.9	11	<1.3	230	50
	F5_R	C3	5.59	<0.60	15,000	66	16	3.3	15	63.7	0.85	3.8	<1.0	6.0	<1.3	64	12
HC-2	M3_P	Bf	4.98	<0.60	50,000	49	24	8.4	19	59.7	NC	<1.5	<1.0	7.0	2.0	82	<5.0
	M3_P	C	5.32	<0.60	14,000	43	18	2.8	36	69.9	0.70	<1.5	2.1	4.7	3.9	54	<5.0
HC-4	M4_P.li	Ah	5.35	<0.60	34,000	36	24	5.6	35	52.5	2.6	1.5	<1.0	12	<1.3	78	5.8
	M4_P.li	Bf	5.84	<0.60	18,000	42	24	3.7	30	39.5	NC	<1.5	<1.0	6.9	<1.3	47	<5.0
HC-5	M3_P.li	Bf	5.87	<0.60	23,000	51	20	<2.0	28	80.1	1.9	1.9	<1.0	9.3	<1.3	70	<5.0
HC-6	F5_R.cug	Ah	4.87	<0.60	110,000	57	30	13	<2.0	108	2.3	1.7	<1.0	11	1.6	180	14
	F5_R.cug	C1	5.57	0.74	60,000	33	54	11	<2.0	68.3	NC	<1.5	<1.0	8.4	1.3	130	8.4
HC-7	M6_G.pt	Om	5.43	0.77	120,000	67	20	7.3	5.8	81.2	1.9	1.8	<1.0	8.9	1.6	96	5.3
	M6_G.pt	Bg	5.62	<0.60	9,100	25	18	10	47	139	NC	<1.5	<1.0	11	<1.3	42	11
HC-8	G3_P	Bf1	4.37	0.70	53,000	55	24	3.1	18	82.1	NC	<1.5	<1.0	5.6	<1.3	71	<5.0
	G3_P	Bf2	5.33	0.64	22,000	38	16	<2.0	45	55.3	0.82	4.2	1.7	7.9	<1.3	53	20
HC-9	F4_R.cu	C1	5.59	0.79	60,000	31	45	11	13	70.8	NC	<1.5	<1.0	5.3	<1.3	130	<5.0
	F4_R.cu	C3	6.09	0.67	19,000	35	6.9	<2.0	58	42.9	NC	<1.5	<1.0	4.5	<1.3	51	<5.0
HC-10	M5_P.so	Om	6.31	0.87	66,000	60	34	5.9	<2.0	83.2	1.1	5.6	<1.0	9.6	1.7	110	11
	M5_P.so	Bhf	6.69	0.68	26,000	54	36	4.8	5.2	80.5	0.71	7.0	1.0	7.6	1.5	68	<5.0
HC-11	M3_P	Bf	5.62	0.73	33,000	38	20	2.5	39	48.1	NC	<1.5	<1.0	6.7	<1.3	85	<5.0
	M3_P	C	5.28	0.69	16,000	33	11	<2.0	55	60.6	NC	<1.5	<1.0	4.6	<1.3	61	<5.0
HC-12	M3_P	Bf	5.22	0.91	47,000	49	17	<2.0	35	48.1	NC	<1.5	<1.0	3.1	<1.3	93	<5.0
HC-13	M3_P	Bf	5.30	0.76	44,000	45	12	<2.0	42	70.8	NC	<1.5	<1.0	4.5	<1.3	76	<5.0
HC-15	O6_M.t	O1	5.24	1.1	230,000	76	4.5	13	7	153	0.76	13	1.6	11	6.8	180	44
HC-16	M3_P	Bf	4.67	<0.60	36,000	34	29	4.1	33	64.6	NC	<1.5	<1.0	6.2	<1.3	80	<5.0
	M3_P	BC	5.19	<0.60	15,000	36	19	2.7	43	64.9	0.66	2.8	2.4	6.3	<1.3	56	21
HC-17	M4_P.so	Ah	5.88	1.2	91,000	46	48	4.2	<2.0	74.1	0.88	2.8	<1.0	5.3	<1.3	160	<5.0
	M4_P.so	Bhf	6.14	1.1	86,000	48	32	<2.0	20	64.1	0.84	1.7	<1.0	4.0	<1.3	140	<5.0
HC-18	M4_P	Bhf	5.16	<0.60	47,000	36	26	7.7	30	73.7	0.86	2.7	<1.0	5.1	<1.3	110	<5.0
	M4_P	Bf	5.58	<0.60	10,000	34	23	6.2	37	67.6	NC	<1.5	<1.0	5.0	<1.3	61	<5.0
HC-19	M3_P,li	Ae	4.39	<0.60	19,000	36	28	2.9	33	69.4	NC	<1.5	<1.0	6.6	1.9	94	<5.0
	M3_P,li	Bf	4.85	<0.60	36,000	21	10	3.2	66	42.0	NC	<1.5	<1.0	3.9	<1.3	80	<5.0
HC-21	M3_P	Bf	5.21	<0.60	23,000	26	24	7.3	42	66.0	NC	<1.5	<1.0	4.0	<1.3	79	<5.0
HC-23	M3_P	Bf	5.32	<0.60	25,000	4.0	26	5.2	65	52.8	NC	<1.5	<1.0	4.4	<1.3	64	<5.0
HC-25	C2_P	Bf	5.47	<0.60	31,000	31	22	<2.0	47	96.2	NC	<1.5	<1.0	5.4	<1.3	92	<5.0
HC-27	M4_P	Bf	5.07	<0.60	21,000	41	28	5.1	27	107	NC	<1.5	<1.0	7.5	<1.3	78	<5.0
	M4_P	C	5.47	<0.60	5,800	31	19	3.8	46	62.1	NC	<1.5	<1.0	3.9	<1.3	47	<5.0
HC-28	M4_P	Bf	5.23	<0.60	30,000	42	18	2.8	37	61.0	NC	<1.5	<1.0	4.3	<1.3	86	<5.0
HC-29	M(C)4_P	Bf	5.33	0.66	44,000	40	23	3.2	34	86.2	1.6	2.1	<1.0	8.6	<1.3	95	<5.0
	M(C)4_P	Bc	5.71	<0.60	16,000	36	20	4.2	40	93.9	1.3	2.0	<1.0	6.6	<1.3	60	<5.0
HC-31	M5_B.m(g)	Ah	5.65	<0.60	40,000	42	33	6.9	18	138	1.7	1.8	<1.0	8.4	2.7	76	8.4
	M5_B.m(g)	Bm	5.73	<0.60	36,000	59	27	5.1	8.8	103	0.69	3.3	1.3	5.8	1.6	83	<5.0
HC-32	M3_P.li	Bf	5.07	<0.60	15,000	32	9.7	<2.0	57	76.1	NC	<1.5	<1.0	5.0	1.4	63	<5.0
	M3_P.li	C	5.42	<0.60	6,700	20	19	5.8	55	71.5	NC	<1.5	<1.0	4.2	1.8	49	<5.0
HC-33	M3_P	Bf	5.63	<0.60	47,000	37	34	3.9	25	81.3	NC	<1.5	<1.0	5.5	2.3	110	<5.0
	M3_P	C	5.65	<0.60	14,000	42	25	2.9	30	76.0	NC	<1.5	<1.0	4.5	<1.3	59	<5.0

Table B2-1. Physical and Chemical Properties from Soils Samples Collected within the Project Site

										Soluble Parameters							
Site	SMU	Field Horizon	Soluble (2:1) pH	Calcium Carbonate Equivalent	Total Organic Carbon	% Sand by Hydrometer	% Silt by Hydrometer	Clay Content	Gravel	Soluble Conductivity	Sodium Adsorption Ratio	Soluble Calcium (Ca)	Soluble Magnesium (Mg)	Soluble Sodium (Na)	Soluble Potassium (K)	Saturation %	Soluble Sulphate (SO_4)
			pH Units	%	mg/kg	%	%	%	%	uS/cm	N/A	mg/L	mg/L	mg/L	mg/L	%	mg/L
HC-34	M4_P	Bf	4.88	<0.60	22,000	22	11	2.7	64	72.5	NC	<1.5	<1.0	7.0	<1.3	53	<5.0
	M4_P	Bc	5.4	<0.60	48,000	41	19	2.2	38	62.8	1.0	1.6	<1.0	4.5	1.7	100	<5.0
HC-36	M5_P.g	Ah	5.52	<0.60	91,000	53	29	6.5	12	106	1.4	1.5	<1.0	6.3	2.3	120	9.3
	M5_P.g	Bf	5.68	<0.60	31,000	43	17	8.3	32	82.2	1.2	1.6	<1.0	5.3	2.5	65	6.1
HC-37	M3_P	Bf	5.21	<0.60	32,000	29	37	6.4	27	92.3	1.9	1.6	<1.0	8.8	2.5	93	<5.0
HC-38	M3_P	Bf	5.06	0.69	55,000	52	25	6.3	17	76.6	NC	<1.5	<1.0	5.6	1.4	90	<5.0
HC-39	M4_P	Bf	5.03	<0.60	29,000	25	11	3.5	61	75.0	1.4	1.7	<1.0	6.7	<1.3	61	<5.0
	M4_P	C	5.42	<0.60	25,000	8.4	5.6	<2.0	84	83.4	NC	<1.5	<1.0	6.2	<1.3	38	<5.0
HC-40	M6_R.g	C1	5.74	0.67	53,000	40	44	11	5.9	90.6	NC	<1.5	<1.0	6.2	<1.3	110	6.9
	M6_R.g	C2	5.89	<0.60	27,000	32	10	2.5	56	58.7	NC	<1.5	<1.0	4.1	<1.3	65	<5.0

Table B2-2. Soil Management and Reclamation Suitability Characteristics of Overburden

Sample ID	Area	Type	Depth from Surface (top)[1]	Depth from Surface (bottom)[1]	General Description	Particle Size Class	% Coarse Fragments	Paste EC	Paste EC	Paste	Rxn	S (Total)	$S(SO_4)$	$CaCO_3$	Fizz Test	Fizz
Units			m	m		Unified	% mass > 5mm	uS/cm	dS/m	pH	pH	%	%	kg $CaCO_3$/t	Reaction	
Method Code										Sobek	Class		CSA07V	Calc.	Sobek	Fizz
LOD										0.2			0.01	#N/A	#N/A	code
OP01 <2mm	Pit	Road Cut	0	1	gravelly SILT					4.73	2	0.02	0.02	0.8	none	**0**
OP02 <2mm	Pit	Road Cut	0	1	gravelly SILT					5.47	3	0.04	0.01	1.7	none	**0**
OP03 <2mm	Pit	Road Cut	0	1	SILT some gravel					4.98	2	0.03	0.01	0.8	none	**0**
OP04 <2mm	Pit	Road Cut	0	1	SILT some gravel					5.15	3	0.06	0.01	0.8	none	**0**
OP05 <2mm	Pit	Road Cut	0	1	gravelly SILT					5.08	3	0.08	0.02	0.8	none	**0**
OP06 <2mm	Pit	Road Cut	0	1	gravelly SILT					5.39	3	0.01	0.02	0.8	none	**0**
OP07 <2mm	Pit	Road Cut	0	1	Till					5.14	3	0.01	0.02	1.7	none	**0**
OP08 <2mm	Pit	Road Cut	0	1	gravelly SILT					5.19	3	0.02	0.01	0.8	none	**0**
OP09 <2mm	Pit	Road Cut	0	1	clayey SILT					5.62	4	0.01	0.01	0.8	none	**0**
OP10 <2mm	Pit	Road Cut	0	1	gravelly SILT					4.67	2	0.02	0.01	0.8	none	**0**
OP11 <2mm	Pit	Road Cut	0	1	clayey SILT					6.54	5	0.01	0.01	0.8	none	**0**
OP12 <2mm	Pit	Road Cut	0	1	SILT some gravel					5.05	3	0.01	0.01	1.7	none	**0**
OP13 <2mm	Pit	Road Cut	0	1	gavelly, clayey SILT					6.55	6	0.01	0.01	1.7	none	**0**
OP14 <2mm	Pit	Road Cut	0	1	SILT trace gravel					4.36	1	0.01	0.01	1.7	none	**0**
OP15 <2mm	Pit	Road Cut	0	1	clayey SILT					5.18	3	0.01	0.01	0.8	none	**0**
OP16 <2mm	Pit	Road Cut	0	1	clayey SILT					5.94	4	0.01	0.01	0.8	none	**0**
OP12-01 Overburden Sample #1	Pit	Deep Overburden	1.1	1.5	gvlSANDsZ			291	0.291	7.76	7	0.28	0.01	96.4	MODERATE	2
OP12-01 Overburden Sample #2	Pit	Deep Overburden	2.7	3.1	gvlSANDsZ			175	0.175	8.57	9	0.42	0.01	112.3	MODERATE	2
OP12-02 Overburden Sample #1	Pit	Deep Overburden	1	1.5	SANDsGvl_C			268	0.268	7.93	8	0.18	0.01	28	SLIGHT	1
OP12-02Overburden Sample #2	Pit	Deep Overburden	4.2	4.8	SANDsGvl_C			269	0.269	7.78	7	0.09	0.01	5.5	NONE	**0**
OP12-03 Overburden Sample #1	Pit	Deep Overburden	1.2	1.7	SAND, GRAVEL			335	0.335	7.81	7	0.07	0.01	50	MODERATE	2
OP12-05 Overburden Sample #1	Pit	Deep Overburden	1	1.5	SANDtG			314	0.314	6.84	6	0.03	0.01	0.5	NONE	**0**
OP12-06Overburden Sample #1	Pit	Deep Overburden	1	1.4	SANDsGvl			250	0.25	8	8	0.2	0.01	4.1	SLIGHT	1
OP12-07 Overburden Sample #1	Pit	Deep Overburden	2.6	4.6	SANDsGvl			357	0.357	7.96	8	0.09	0.01	46.6	MODERATE	2
OP12-09 Overburden Sample #1	Pit	Deep Overburden	0	0.6	SAND, GRAVEL			204	0.204	7.35	7	0.03	0.01	0.5	NONE	**0**
OP12-10 Overburden Sample #1	Pit	Deep Overburden	0	2.4	SAND			92	0.092	7.11	6	0.05	0.01	1.1	NONE	**0**
OP12-01 Weathered Rock Sample #1	Pit	Weathered Bedrock	9.1	11.6				475	0.475	7.97	8	2.98	0.01	40.5	SLIGHT	1
OP12-01 Weathered Rock Sample #2	Pit	Weathered Bedrock	9.1	11.6				628	0.628	8.29	8	3.71	0.01	95.9	SLIGHT	1
OP12-02 Weathered Rock Sample #1	Pit	Weathered Bedrock	5.5	10.4				217	0.217	7.68	7	0.07	0.01	0.7	NONE	**0**
OP12-03 Weathered Rock Sample #1	Pit	Weathered Bedrock	4.9	10.4				87	0.087	7.57	7	0.13	0.01	0.9	NONE	**0**
OP12-04 Weathered Rock Sample #1	Pit	Weathered Bedrock	3.4	7.2				266	0.266	8.28	8	1.86	0.01	74.1	MODERATE	2
OP12-05 Weathered Rock Sample #1	Pit	Weathered Bedrock	4	5.5				202	0.202	8.81	9	0.02	0.01	4.3	SLIGHT	1
OP12-05 Weathered Rock Sample #2	Pit	Weathered Bedrock	4	5.5				159	0.159	8.55	9	0.06	0.01	5.7	SLIGHT	1
OP12-06 Weathered Rock Sample #1	Pit	Weathered Bedrock	3.7	5.6				409	0.409	7.31	6	4.45	0.01	14.3	NONE	**0**
OP12-07 Weathered Rock Sample #1	Pit	Weathered Bedrock	6.6	11.7				273	0.273	9.05	9	0.56	0.01	135.5	SLIGHT	1
OP12-08 Weathered Rock Sample #1	Pit	Weathered Bedrock	2	5.8				212	0.212	9.09	9	0.11	0.01	6.8	NONE	**0**
OP12-09 Weathered Rock Sample #1	Pit	Weathered Bedrock	0.6	2.6				269	0.269	7.64	7	0.11	0.01	3	NONE	**0**
OP12-09 Weathered Rock Sample #2	Pit	Weathered Bedrock	2.6	4.3				310	0.31	7.6	7	0.23	0.01	48.9	NONE	**0**
OP12-10 Weathered Rock Sample #1	Pit	Weathered Bedrock	2.4	4.3				316	0.316	8.78	7	1.4	0.01	76.8	MODERATE	2

Table B2-2. Soil Management and Reclamation Suitability Characteristics of Overburden

Sample ID	Area	Type	Depth from Surface (top)[1]	Depth from Surface (bottom)[1]	General Description	Particle Size Class	% Coarse Fragments	Paste EC	Paste EC	Paste	Rxn	S (Total)	$S(SO_4)$	$CaCO_3$	Fizz Test	Fizz
Units			m	m		Unified	% mass > 5mm	uS/cm	dS/m	pH	pH	%	%	kg $CaCO_3$/t	Reaction	
TP01-1 <2mm	TMF	Overburden	0.7	3.2	sandySILT	ML	14			5.2	3	0.01	0.01	0.8	none	**0**
TP02-1 <2mm [2]	TMF	Overburden	0.4	1.9	gravellySAND	SM				7.95	8	0.01	0.01	2.5	none	**0**
TP5-1 <2mm	TMF	Overburden	1	2.2	'till'	GM	50			6.7	6	0.01	0.01	0.8	none	**0**
TP12-1 <2mm	TMF	Overburden	0.7	1.5	'till'	SM	29			6.21	5	0.03	0.01	1.7	none	**0**
TP12-2 <2mm	TMF	Overburden	1.5	2	'till'	SC-SM	28			7.57	7	0.15	0.01	12.5	none	**0**
TP15-4 <2mm	TMF	Overburden	2	3.9	'till'	SC-SM	14			8	8	0.15	0.01	33.3	slight	1
TP26-1 <2mm	TMF	Overburden	1.1	5	'till'	GC	28			7.88	8	0.1	0.01	20.0	slight	1
TP27-1 <2mm	TMF	Overburden	0.5	2.5	till (S&G)	GM	43			6.61	6	0.01	0.01	0.8	none	**0**
TP29-1 <2mm	TMF	Overburden	1.8	2.2	siltySAND	SM	16			6.8	6	0.01	0.01	0.8	none	**0**
TP30-1 <2mm	TMF	Overburden	0	0.7	siltySAND	SM	26			4.96	2	0.02	0.01	0.8	none	**0**
TP30-2 <2mm	TMF	Overburden	0.7	3.3	GRAVEL	GM	41			7.06	6	0.01	0.01	0.8	none	**0**
TP32-1 <2mm	TMF	Overburden	1.4	2.5	GRAVEL	GW	69			7.91	8	0.01	0.01	19.2	slight	1
TP51-3 <2mm	TMF	Overburden	2	2.5	GRAVEL	GW	67			7.13	6	0.01	0.03	0.8	none	**0**
=COUNT			52	52			12	23	23	52	52	52	52	52		52
=MEDIAN			1	2.1			28.5	269	0.269	7.22	6	0.035	0.01	1.7		0
=MAX			9.1	11.7			69.0	628	0.628	9.09	9	4.45	0.03	135.5		2
=MIN			0	0.6			14.0	87	0.087	4.36	1	0.01	0.01	0.5		0
=AVERAGE			1.7	3.3			35.4	277	0.28	6.90	6	0.35	0.01	18.6		0.4
=STDEV			2.2	3.1			19.0	118	0.12	1.35	2	0.91	0.00	32.8		0.7

[1] *source: KP, 2012 (Tble 3.1, 3.5); KP, 2013 (Table 3.1 App. A1)*

[2] *listed as TP2 <2mm in SRK table*

Table B2-3. Summary of 2011 and 2012 Laboratory Test Results for Near Surface (0-2 m Depth) Samples, Knight Piesold

Sample Location	Year Sampled	Sample I.D.	Sample General Area	Coordinates (Easting, Northing)	Depth (m)	Natural Moisture Content (%)	Percent Passing 3/8" Sieve	Percent Passing #200 Sieve	Particle Size Distribution					Adjusted Clay		Description
									Gravel Code[98]	Gravel %	Sand %	Silt %	Clay %	%		
									+ 5 mm	+ 5 mm	5 to 0.074 mm	0.074 to 0.002 mm	- 0.002 mm	%C/Soil[99] Fraction	USCS	
HC11-GT19	2011	GRAB #1 (HC11-GT19 Borrow Area - Lacustrine)[4]	Central Embankment	304726, 5706179	-	16.7	97.9	42.3	1	3.6	54.1	40.8	1.5	2%	SM	GRAB SAMPLE: SAND and SILT with trace gravel and clay
HC11-GT19	2011	GRAB #2 (HC11-GT19 Borrow Area - Sand & Gravel)	Central Embankment	304726, 5706179	-	16.6	83.0	6.6	2	30.0	63.4	6.6			SW-SM	GRAB SAMPLE: Well-graded gravelly SAND with trace silt and clay
Jones Creek Road[5]	2011	GRAB #3 (HC003)	Sand and Gravel Deposit	307120, 5717592	-	10.7	96.0	28.7	1	9.3	62.0	22.2	6.5	7%	SM	GRAB SAMPLE: Silty SAND with trace gravel and clay
Jones Creek Road	2011	GRAB #4 (HC001)	Sand and Gravel Deposit	304953, 5717694	-	3.0	52.0	4.3	3	59.6	36.1	4.3			GP	GRAB SAMPLE: Poorly-graded GRAVEL and SAND with trace silt and clay
TMF Embankment	2011	GRAB #5 (Waypoint 34)	East Abutment	305776, 5706559	-	24.5	73.7	23.1	2	33.3	43.6	23.1			SM	GRAB SAMPLE: Silty, gravelly SAND
Jones Creek Road	2011	GRAB #6 (Waypoint 80)	Sand and Gravel Deposit	306388, 5717751	-	7.7	96.0	29.4	1	7.1	63.5	20.1	9.3	10%	SM	GRAB SAMPLE: Silty SAND with some gravel and trace clay
Open Pit	2011	RC01 (RC01 RD 5 - Sample #1)	Road Cut #1	304422, 5711529	0.2 - 0.8	14.5	88.4	37.9	1	18.9	43.2	34.6	3.3	4%	SM	GRAB SAMPLE: Silty SAND with some gravel and trace clay
Open Pit	2011	RC04 (RC04 RD 5 - Sample #2)	Road Cut #4	303797, 5711198	0.02	13.4	85.5	19.1	2	25.6	55.3	19.1			SM	GRAB SAMPLE: Gravelly SAND with some silt
Spur Road #3	2011	GRAB #7 (Spur Road #3 Sample #2)	TMF Impoundment	305288, 5708261	-	16.5	84.9	23.0	2	25.8	51.2	23.0			SM	GRAB SAMPLE: Gravelly, silty SAND
Open Pit	2011	RC05 (Site #5: Sample #3)	Road Cut #5	304805, 5711315	0.05	10.9	76.4	18.6	2	39.8	41.6	18.6			SM	GRAB SAMPLE: SAND and GRAVEL with some silt
Open Pit	2011	RC08 (Sample #4)	Road Cut #8	303994, 5710551	1.0 - 3.0	12.5	89.8	42.2	1	19.0	38.8	35.8	6.4	8%	SM	GRAB SAMPLE: SAND and SILT with some gravel and trace clay
Spur Road #2	2011	GRAB #8 (Spur Road #2 Sample 1)	West Abutment	304530, 5707252	-	6.4	78.6	22.2	2	32.4	45.4	22.2			SM	GRAB SAMPLE: Gravelly, silty SAND
HC11-GT02	2011	SPT #1	Low Grade Stockpile	304015, 5708354	0.61 - 1.22	10.8	68.4	22.6	2	43.4	34.0	22.6			GM	Sandy, silty GRAVEL
HC11-GT02	2011	SPT #2	Low Grade Stockpile	304015, 5708354	1.52 - 1.83	8.4	65.6	16.8	3	50.7	32.5	16.8			GM	Sandy GRAVEL with some silt
HC11-GT05	2011	SPT #1	Southeast Waste Dump	306131, 5709676	0.76 - 1.37	9.7	93.0	35.8	1	9.2	55.0	30.1	5.7	6%	SM	Silty SAND with trace gravel and clay
HC11-GT05	2011	SPT #2	Southeast Waste Dump	306131, 5709676	1.52 - 2.13	6.3	73.5	15.3	2	46.9	37.8	15.3			GM	SAND and GRAVEL with some silt
HC11-GT06	2011	SPT #1	Southeast Waste Dump	307875, 5709398	0.76 - 1.37	9.8	85.3	42.9	2	25.4	31.7	37.1	5.8	8%	SM	Gravelly, sandy SILT with trace clay
HC11-GT06	2011	SPT #2	Southeast Waste Dump	307875, 5709398	1.62 - 2.13	3.0	58.5	10.5	3	55.4	34.1	10.5			GP-GM	Poorly-graded, sandy GRAVEL with some silt
HC11-GT07	2011	SPT #1	East Abutment	306358, 5707702	1.62 - 2.13	9.0	80.3	30.1	2	37.0	32.9	23.2	6.9	11%	GM	Silty, sandy GRAVEL
HC11-GT08	2011	SPT #1	Primary Crusher	303975, 5710511	0.91 - 1.52	6.9	66.1	30.8	2	43.1	26.1	30.8			GM	Silty, sandy GRAVEL
HC11-GT10	2011	SPT #1	Plant Site	305317, 5709699	0.61 - 1.22	9.5	77.0	22.9	2	37.1	40.0	22.9			SM	Silty SAND and GRAVEL
HC11-GT10	2011	SPT #2	Plant Site	305317, 5709699	1.52 -1.83	8.5	77.4	27.8	2	36.9	35.3	27.8			-	Silty SAND and GRAVEL
HC11-GT13	2011	SPT #1	Plant Site	305159, 5709516	0.0 - 0.61	30.2	83.0	32.5	2	27.9	39.6	32.5			-	Silty, gravelly SAND
HC11-GT13	2011	SPT #2	Plant Site	305159, 5709516	1.54 - 2.13	6.5	94.8	15.0	1	18.3	66.7	15.0			SM	SAND with some gravel and silt
HC11-GT14	2011	SPT #1	West Abutment	304011, 5707066	0 - 0.46	5.6	89.0	41.8	2	22.6	35.6	28.1	13.7	18%	SC	Silty, gravelly SAND with some clay
HC11-GT14	2011	SPT #2	West Abutment	304011, 5707066	1.52 - 1.98	1.3	72.8	29.2	2	38.5	32.3	29.2			GC	Silty, sandy GRAVEL
HC11-GT15	2011	SPT #1	West Abutment	304218, 5706625	0 - 0.61	10.6	57.0	16.8	3	52.4	30.8	16.8			GM	Sandy GRAVEL with some silt
HC11-GT15	2011	SPT #2	West Abutment	304218, 5706625	1.52 - 2.13	9.7	84.3	28.8	2	26.9	44.3	28.8			SM	Silty, gravelly SAND
HC11-GT16	2011	SPT #1	West Abutment	304579, 5706736	0.61 - 1.22	5.0	88.0	43.3	2	21.9	34.8	43.3			SM	Sandy, gravelly SILT
HC11-GT16	2011	SPT #2	West Abutment	304579, 5706736	1.52 - 2.13	4.4	85.6	43.9	2	23.8	32.3	32.1	11.8	15%	SC-SM	Gravelly SAND and SILT with some clay
HC11-GT17	2011	SPT #1	Central Embankment	304473, 5706390	1.52 - 1.98	4.9	73.7	20.1	2	38.8	41.1	20.1			SM	Silty SAND and GRAVEL
HC11-GT18	2011	SPT #1	Central Embankment	304882, 5706372	1.52 - 2.13	8.3	94.3	52.3	1	13.2	34.5	35.6	16.7	19%	CL	Sandy SILT with some gravel and clay
HC11-GT19	2011	SPT #1	Central Embankment	304726, 5706179	0.61 - 1.22	8.6	85.2	16.8	2	27.7	55.5	16.8			SM	Gravelly SAND with some silt
HC11-GT19	2011	SPT #2	Central Embankment	304726, 5706179	1.52 - 2.13	7.8	86.4	23.2	2	30.3	46.5	23.2			SM	Gravelly, silty SAND
HC11-GT20	2011	SPT #1	East Abutment	304969, 5705890	0.61 - 1.22	11.7	60.5	14.7	3	51.8	33.5	14.7			GM	Sandy GRAVEL with some silt

[98] *Gravel Code: 1 0-20%, 2 >20-50%, 3 >50-90%, 4 >90% GRAVEL*

[99] *Soil Refers to Sum of 'Sand, Silt and Clay' (Excludes Gravel)*

Notes: 2011

1. NP = Non-plastic.

2. Sample "TP-15 Composite' Comprised of TP15-1, TP15-2 and TP15-3 for Modified Proctor Testing.

3. Sample is Peat and Lost all Weight during Standard Drying for Moisture Determination.

4. Labels in Brackets are Names Listed on Lab Report. Labels Outside Brackets Correspond to Drawings Showing Sample Location.

5. Not Shown on Map.

Source: Table 3.5, (KP. 2012). 2011 Geotechnical Site Investigations Factual Report

Notes: 2012

1. NP = Non-plastic.

2. Entire Sample Used for PSA.

3. Entire Sample Used for PSA and Hydrometer.

4. Soil Descriptions Provided by KP Denver Soil Testing Laboratory

Source: Appendix D1, (KP. 2013). 2012 Geotechnical Site Investigation Factual Report.

Table B2-3. Summary of 2011 and 2012 Laboratory Test Results for Near Surface (0-2 m Depth) Samples, Knight Piesold

Sample Location	Year Sampled	Sample I.D.	Sample General Area	Coordinates (Easting, Northing)	Depth (m)	Natural Moisture Content (%)	Percent Passing 3/8" Sieve	Percent Passing #200 Sieve	Particle Size Distribution					Adjusted Clay % %C/Soil[99] Fraction	USCS	Description
									Gravel Code[98]	Gravel %	Sand % 5 to 0.074 mm	Silt % 0.074 to 0.002 mm	Clay % - 0.002 mm			
									+ 5 mm	+ 5 mm						
HC11-GT20	2011	SPT #2	East Abutment	304969, 5705890	1.52 - 2.13	10.4	81.4	33.0	2	28.7	38.3	33.0			SM	Silty, gravelly SAND
HC11-GT21	2011	SPT #1	East Abutment	304579, 5705788	0 - 0.61	11.7	76.5	25.7	2	35.3	39.0	25.7			SM	Silty SAND and GRAVEL
HC11-GT21	2011	SPT #2	East Abutment	304579, 5705788	1.52 - 2.13	12.1	88.4	27.3	2	21.5	51.2	27.3			SM	Silty, gravelly SAND
HC11-GT23	2011	SPT #1	Central Embankment	304055, 5705875	0.61 - 1.07	0.6	78.9	13.0	2	33.8	53.2	13.0			SM	Gravelly SAND with some silt
HC11-GT24	2011	SPT #1	East Abutment	305564, 5706527	0 - 0.46	5.8	92.9	48.0	1	16.5	35.5	48.0			SC	SILT and SAND with some gravel
HC11-GT24	2011	SPT #2	East Abutment	305564, 5706527	1.52 - 1.98	5.2	90.7	44.3	2	20.3	35.4	31.2	13.1	16%	SC	Silty, gravelly SAND with some clay
Borrow Site	2011	TP01-1	West Abutment	303624, 5706017	0.7 - 3.2	44.1	93.4	58.7	1	9.4	31.9	57.2	1.5	2%	ML	Sandy SILT with trace gravel and clay
Borrow Site	2011	TP02-1	West Abutment	303808, 5705967	0.4 - 1.9	11.3	86.9	14.8	2	24.3	60.9	14.8			SM	Gravelly SAND with some silt
Borrow Site	2011	TP02-2	West Abutment	303808, 5705967	1.9 - 3.7	9.7	92.4	48.8	1	14.8	36.4	33.6	15.2	18%	SC	Silty SAND with some clay and gravel
Borrow Site	2011	TP05-1	West Abutment	304919, 5707673	1.0 - 2.2	9.0	55.7	30.4	3	50.3	19.3	26.7	3.7	7%	GM	Silty GRAVEL with some sand and trace clay
Borrow Site	2011	TP05-2	West Abutment	304919, 5707673	0.0	5.9	44.4	12.7	3	61.9	15.1	12.7			GM	GRAVEL with some sand and silt
TMF Embankment	2011	TP12-1	Central Embankment	304504, 5706264	0.7 - 1.5	13.1	76.0	27.7	2	28.9	39.5	22.1	5.6	8%	SM	Gravelly, silty SAND with trace clay
TMF Embankment	2011	TP12-2	Central Embankment	304504, 5706264	1.5 - 2.0	6.5	66.2	30.6	2	28.0	29.2	23.0	7.6	11%	SC-SM	Silty SAND and GRAVEL with trace clay
Borrow Site	2011	TP-15 Composite[2]	East Abutment	306233, 5707520	0.43 - 2.0		70.6	33.2	2	32.8	29.7	33.2			GM	Sandy SILT and GRAVEL
Borrow Site	2011	TP15-1	East Abutment	306233, 5707520	0.43 - 2.0	8.2			0							
Borrow Site	2011	TP15-2	East Abutment	306233, 5707520	0.43 - 2.0	7.3			0							
Borrow Site	2011	TP15-3	East Abutment	306233, 5707520	0.43 - 2.0	7.3			0							
Borrow Site	2011	TP19-1	Central Embankment	304295, 5705259	0.8 - 2.8	9.2	67.5	15.7	2	35.8	42.8	15.7			SM	SAND and GRAVEL with some silt
Borrow Site	2011	TP20-1	Central Embankment	304169, 5705225	0.8 - 2.0	7.9	95.0	9.5	1	15.5	75.0	9.5			SW-SM	SAND with some gravel and trace silt
TMF Embankment	2011	TP22-1	East Abutment	305042, 5705990	1.0 - 1.8	19.0	80.7	19.7	2	30.8	49.5	19.7			SM	Gravelly SAND with some silt
TMF Embankment	2011	TP26-1	West Abutment	304403, 5706610	1.1 - 5.0	7.3	78.5	45.6	2	28.1	26.3	32.8	12.8	18%	GC	Gravelly, sandy SILT with some clay
TMF Embankment	2011	TP27-1	West Abutment	304264, 5706684	0.5 - 2.5	10.2	65.3	23.8	2	42.8	33.4	23.8			GM	Sandy, silty GRAVEL
Borrow Site	2011	TP29-1	West Abutment	304423, 5707112	1.8 - 2.3	14.8	95.9	34.5	1	6.4	59.1	24.6	9.9	11%	SC	Silty SAND with trace gravel and clay
Borrow Site	2011	TP30-1	West Abutment	304613, 5707341	0 - 0.7	11.9	84.1	27.3	2	25.9	46.8	27.3			SM	Silty, gravelly SAND
Borrow Site	2011	TP30-2	West Abutment	304613, 5707341	0.7 - 3.3	10.0	69.3	19.3	2	40.5	40.2	19.3			GM	GRAVEL and SAND with some silt
Borrow Site	2011	TP32-1	East Abutment	305385, 5706206	1.4 - 2.5	5.3	15.0	3.3	3	69.3	7.3	3.3			GW	Well-graded GRAVEL with trace sand and silt
Borrow Site	2011	TP38-1	East Abutment	306313, 5706092	0.4 - 2.0	8.3	82.9	40.4	2	26.3	33.3	29.8	10.6	14%	SC	Silty, gravelly SAND with some clay
Borrow Site	2011	TP41-1	Central Embankment	304166, 5705331	0.8 - 2.3	11.7	82.8	34.1	2	26.2	39.7	27.0	7.1	10%	SC-SM	Silty, gravelly SAND with trace clay
TMF Embankment	2011	TP43-1	Central Embankment	304426, 5705697	0.2 - 1.1	660.5[3]			0							PEAT
Southeast Waste Dump	2011	TP50-1	Southeast Waste Dump	307462, 5710002	0.2 - 0.8	2.5	10.3	1.5	3	53.8	5.3	1.5			GW	Well-graded GRAVEL with trace sand and silt
Southeast Waste Dump	2011	TP51-1	Southeast Waste Dump	306386, 5710006	0.9 - 1.7	10.5	69.3	37.1	2	22.3	27.9	35.1	2.0	3%	SM	Sandy, gravelly SILT with trace clay
Southeast Waste Dump	2011	TP51-2	Southeast Waste Dump	306386, 5710006	1.7 - 2.0	7.9	65.6	10.4	2	41.0	48.6	10.4			SP-SM	Poorly graded SAND and GRAVEL with some silt
Borrow Site	2011	TP53-1	Central Embankment	304292, 5705142	0.8 - 2.1	12.8	97.1	19.6	1	17.4	63.0	19.6			SM	SAND with some silt and gravel
TMF Embankment	2011	TP55-1	Central Embankment	304719, 5706131	0 - 0.8	6.9	80.8	4.2	2	30.0	65.8	4.2			SP	Gravelly SAND with trace silt
TMF Embankment	2011	TP55-2	Central Embankment	304719, 5706131	0.8 - 1.0	24.7	100.0	23.3	0	0.0	76.7	23.3			SM	Silty SAND
GT12-01	2012	SPT #1	Rock Quarry	303869, 5706192	0.91 - 1.52	4.7	92.0	52.5	1	15.4	32.1	31.3	21.2	25%	CL	Silty SAND with gravel
GT12-04	2012	SPT #1	Crusher Site	304159, 5710396	0.61 - 1.22	7.5	71.3	34.6	2	39.0	26.4	27.4	7.2	12%	GM	Silty GRAVEL with sand
GT12-04	2012	SPT #2	Crusher Site	304159, 5710396	1.22 - 1.83	4.0	77.1	18.7	2	43.4	37.9	12.7	6.0	11%	GM	Silty GRAVEL with sand

[98] Gravel Code: 1 0-20%, 2 >20-50%, 3 >50-90%, 4 >90% GRAVEL

[99] Soil Refers to Sum of 'Sand, Silt and Clay' (Excludes Gravel)

Notes: 2011

1. NP = Non-plastic.

2. Sample "TP-15 Composite' Comprised of TP15-1, TP15-2 and TP15-3 for Modified Proctor Testing.

3. Sample is Peat and Lost all Weight during Standard Drying for Moisture Determination.

4. Labels in Brackets are Names Listed on Lab Report. Labels Outside Brackets Correspond to Drawings Showing Sample Location.

5. Not Shown on Map.

Source: Table 3.5, (KP. 2012). 2011 Geotechnical Site Investigations Factual Report

Notes: 2012

1. NP = Non-plastic.

2. Entire Sample Used for PSA.

3. Entire Sample Used for PSA and Hydrometer.

4. Soil Descriptions Provided by KP Denver Soil Testing Laboratory

Source: Appendix D1, (KP. 2013). 2012 Geotechnical Site Investigation Factual Report.

Table B2-3. Summary of 2011 and 2012 Laboratory Test Results for Near Surface (0-2 m Depth) Samples, Knight Piesold

Sample Location	Year Sampled	Sample I.D.	Sample General Area	Coordinates (Easting, Northing)	Depth (m)	Natural Moisture Content (%)	Percent Passing 3/8" Sieve	Percent Passing #200 Sieve	Particle Size Distribution					Adjusted Clay % %C/Soil[99] Fraction	USCS	Description
									Gravel Code[98]	Gravel %	Sand %	Silt %	Clay %			
									+ 5 mm	+ 5 mm	5 to 0.074 mm	0.074 to 0.002 mm	- 0.002 mm			
GT12-05	2012	SPT #1	Overburden Stockpile	306344, 5711114	0 - .61	4.1	74.5	14.2	2	43.8	42.0	10.2	4.0	7%	GM	Silty GRAVEL with sand
GT12-05	2012	SPT #2	Overburden Stockpile	306344, 5711114	1.07 - 1.68	1.9	81.1	17.7	2	36.3	46.0	14.1	3.6	6%	SM	Silty SAND with gravel
GT12-06	2012	SPT #1[2][3]	Overburden Stockpile	306746, 5710844	0 - 0.61	10.8	100.0	27.9	1	8.6	63.5	21.9	6.0	7%	-	-
GT12-06	2012	SPT #2	Overburden Stockpile	306746, 5710844	0.91 - 1.07	0.5	99.0	22.6	1	17.4	60.0	18.2	4.4	5%	SM	Silty SAND with gravel
TMF12-01	2012	SPT #1	TMF - Upstream Area	305287, 5706353	1.22 - 1.83	8.6	66.6	32.3	2	40.5	27.2	21.3	11.0	18%	GC	Clayey GRAVEL with sand
TMF12-02	2012	SPT #1	TMF - Upstream Area	305389, 5706349	1.22 - 1.83	7.5	87.4	44.3	2	21.2	34.5	25.6	18.7	24%	SC	Clayey SAND with gravel
TMF12-03	2012	SPT #1	TMF - Upstream Area	305289, 5706172	1.22 - 1.83	12.3	76.9	27.8	2	30.4	41.8	18.4	9.4	14%	SC	Clayey SAND with gravel
TMF12-04	2012	SPT #1	TMF Embankment East	304888, 5706056	1.22 - 1.83	9.2	89.2	40.2	1	16.9	42.9	23.9	16.3	20%	SC	Clayey Sand with gravel
TMF12-05	2012	SPT #1	TMF Embankment East	304837, 5706016	1.22 - 1.83	8.3	82.1	27.1	2	25.8	47.1	19.4	7.7	10%	SC-SM	Silty, clayey SAND with gravel
TMF12-06	2012	SPT #1	TMF Embankment East	304806, 5706131	0.91 - 1.52	4.3	59.1	11.9	3	50.9	37.2	10.0	1.9	4%	-	-
TMF12-07	2012	SPT #1	TMF Embankment East	304719, 5706115	1.22 - 1.83	6.6	70.6	14.8	2	40.6	44.6	13.5	1.3	2%	-	-
TMF12-08	2012	SPT #1	TMF Embankment Central	304652, 5706206	1.07 - 1.68	4.8	84.3	28.1	2	25.3	46.6	21.7	6.4	9%	-	-
TMF12-09	2012	SPT #1	TMF Embankment Central	304593, 5706173	1.22 - 1.83	10.4	80.6	19.9	2	29.0	51.1	17.0	2.9	4%	-	-
TMF12-10	2012	SPT #1	TMF Embankment Central	304529, 5706173	1.22 - 1.83	5.9	70.0	29.3	2	37.4	33.3	20.9	8.4	13%	-	-
TMF12-11	2012	SPT #1	TMF Embankment Central	304546, 5706328	1.22 - 1.83	8.5	84.6	45.9	2	22.9	31.2	25.1	20.8	27%	SC	Clayey SAND with gravel
TMF12-12	2012	SPT #1	TMF Embankment Central	304475, 5706384	1.22 - 1.83	4.9	91.1	42.4	1	18.0	39.6	24.6	17.8	22%	-	-
TMF12-13	2012	SPT #1	TMF Embankment West	304117, 5706488	1.22 - 1.83	5.8	84.7	28.4	2	24.0	47.6	23.7	4.7	6%	-	-
TMF12-14	2012	SPT #1	TMF Embankment West	304245, 5706818	1.37 - 1.98	9.4	87.9	44.1	1	16.9	39.0	33.0	11.1	13%	-	-
TMF12-15	2012	SPT #1	TMF Embankment West	304272, 5706698	1.37 - 1.98	3.9	54.7	16.9	3	54.1	29.0	12.9	4.0	9%	-	-
TMF12-16	2012	SPT #1	TMF Embankment West	304373, 5706655	1.22 - 1.83	8.5	88.5	32.0	1	19.7	48.3	27.2	4.8	6%	-	-
TMF12-17	2012	SPT #1	TMF Embankment West	304433, 5706553	1.22 - 1.83	3.5	85.1	37.6	2	27.1	35.3	22.2	15.4	21%	-	-
TMF12-18	2012	SPT #1	TMF Embankment West	304384, 5706485	1.37 - 1.98	8.3	93.3	54.7	1	11.9	33.4	36.2	18.5	21%	CL	Sand lean CLAY

[98] *Gravel Code: 1 0-20%, 2 >20-50%, 3 >50-90%, 4 >90% GRAVEL*

[99] *Soil Refers to Sum of 'Sand, Silt and Clay' (Excludes Gravel)*

Notes: 2011

1. NP = Non-plastic.

2. Sample "TP-15 Composite' Comprised of TP15-1, TP15-2 and TP15-3 for Modified Proctor Testing.

3. Sample is Peat and Lost all Weight during Standard Drying for Moisture Determination.

4. Labels in Brackets are Names Listed on Lab Report. Labels Outside Brackets Correspond to Drawings Showing Sample Location.

5. Not Shown on Map.

Source: Table 3.5, (KP. 2012). 2011 Geotechnical Site Investigations Factual Report

Notes: 2012

1. NP = Non-plastic.

2. Entire Sample Used for PSA.

3. Entire Sample Used for PSA and Hydrometer.

4. Soil Descriptions Provided by KP Denver Soil Testing Laboratory

Source: Appendix D1, (KP. 2013). 2012 Geotechnical Site Investigation Factual Report.

Table B2-4. Eco-Risk Soil Samples General Characteristics

				Particle Size									
Sample ID	Date Sampled	Time Sampled	pH (1:2 soil:water)	% Gravel (>2mm)	% Sand (2.0mm - 0.063mm)	% Silt (0.063mm - 4um)	% Clay (<4um)	Texture [1]	SOIL SuM_Fines	Sand - ADJ	Silt - ADJ	Clay - ADJ	Total Organic Carbon
			units	% mass	% mass	% mass	% mass	-	% mass	% soil	% soil	% soil	%
HC12-01 0304022 5709585	21-AUG-12	12:00	5.59	34.5	26.9	30.4	8.17	Loam	65	41%	46%	12%	4.03
HC12-02 0303619 5709313	21-AUG-12	13:48	4.66	26.5	33.5	35.4	4.71	Silt loam	74	46%	48%	6%	11.0
HC12-03 0303378 5708771	21-AUG-12	15:14	5.44	11.9	32.2	48.4	7.52	Silt loam	88	37%	55%	9%	5.09
HC12-04 0303726 5708956	22-AUG-12	11:05	4.20	29.0	26.0	37.7	7.34	Silt loam	71	37%	53%	10%	10.1
HC12-05 0304235 5709282	22-AUG-12	12:45	5.94	40.4	22.3	33.3	3.97	Silt loam	60	37%	56%	7%	3.21
HC12-06 0304673 5709227	22-AUG-12	14:00	4.83	25.7	27.1	44.4	2.79	Silt loam	74	36%	60%	4%	4.81
HC12-07 0305019 5709486	22-AUG-12	15:18	5.31	20.1	25.4	42.3	12.1	Silt loam	80	32%	53%	15%	2.59
HC12-08 0305372 5709277	23-AUG-12	11:56	4.93	20.9	18.3	50.9	9.92	Silt loam	79	23%	64%	13%	6.03
HC12-09 0305909 5709806	23-AUG-12	13:03	4.37	19.4	25.9	47.3	7.48	Silt loam	81	32%	59%	9%	6.25
HC12-10 0305689 5710097	23-AUG-12	13:39	5.06	16.1	28.1	49.1	6.64	Silt loam	84	34%	59%	8%	8.48
HC12-11 0305722 5710505	23-AUG-12	14:13	5.23	13.7	28.8	50.6	6.92	Silt loam	86	33%	59%	8%	7.84
HC12-12 0306188 5710724	23-AUG-12	14:52	5.02	14.7	39.1	43.6	2.64	Silt loam	85	46%	51%	3%	4.47
HC12-13 0306363 5711147	24-AUG-12	11:35	5.01	1.05	16.8	79.2	3.02	Silt loam / Silt	99	17%	80%	3%	8.04
HC12-14 0306906 5711421	24-AUG-12	12:30	5.11	24.7	25.9	47.9	1.55	Silt loam	75	34%	64%	2%	3.29
HC12-15 0306949 5712860	24-AUG-12	13:43	6.29	34.4	30.1	28.2	7.34	Loam	66	46%	43%	11%	3.10
	=COUNT		15	15	15	15	15	15	15	15	15	15	15
	=MEDIAN		5.06	20.9	26.9	44.4	6.9		79	36%	56%	8%	5.09
	=MAX		6.29	40.4	39.1	79.2	12.1		99	46%	80%	15%	11.00
	=MIN		4.20	1.1	16.8	28.2	1.6		60	17%	43%	2%	2.59
	=AVERAGE		5.13	22.2	27.1	44.6	6.1		78	35%	57%	8%	5.89
	=STDEV		0.55	10.2	5.6	12.1	3.0		10	8%	9%	4%	2.66

Texture [1] - particle size breaks are not conventional to CSSC/CanSIS textural class boundaries

Appendix B-3

Soil Metals

B3-1. Summary of Extractable Soil Metal Concentrations at Soil Survey Inspection Sites

B3-2. Overburden Static Test Results Total Metals (SRK)

B3-3. Soil Geochemistry: Exploration Total Copper Concentration

B3-4. Eco-Risk Soil Samples Extractable Metal Concentrations

Table B3-1. Summary of Extractable Soil Metal Concentrations at Soil Survey Inspection Sites

Site ID	SMU	Field Horizon	Aluminum (Al)	Antimony (Sb)[1]	Arsenic (As)[1]	Barium (Ba)[1]	Beryllium (Be)[1]	Bismuth (Bi)[1]	Cadmium (Cd)[1]	Calcium (Ca)	Chromium (Cr)[1]	Cobalt (Co)[1]	Copper (Cu)[1]	Iron (Fe)	Lead (Pb)[1]	Lithium (Li)	Magnesium (Mg)	Manganese (Mn)
HC-01	F5_R	O1	18700	0.05	1.03	64.1	0.58	0.19	0.872	3550	7.3	3.53	101	9690	6.71	9.9	4090	116
HC-01	F5_R	C3	20200	0.05	1.05	109	0.2	0.17	0.244	4560	8.7	5.93	91	18000	6.15	12.6	6650	260
HC-02	M3_P	Bf	24200	0.11	6.69	54.7	0.2	0.31	0.104	316	10.5	5	42.2	30400	8.89	11	5580	250
HC-02	M3_P	C	27600	0.15	9.56	79.3	0.2	0.4	0.165	316	12.5	9.16	81	33500	17.5	12.5	8130	366
HC-04	M4_P.li	Ah	12400	0.05	2.18	45.4	0.2	0.23	0.157	929	7.8	3.09	13.8	12600	7.86	7.6	3200	127
HC-04	M4_P.li	Bf	18800	0.05	4.25	40.9	0.2	0.25	0.089	870	9.7	5.73	29.3	20500	5.53	9.8	5240	200
HC-05	M3_P.li	Bf	21200	0.26	9.18	68.4	0.43	0.29	0.228	2290	12.8	8.6	23.5	32600	4.97	17.4	7020	304
HC-06	F5_R.cug	Ah	6310	0.05	0.25	20.8	0.2	0.05	0.164	1130	3.6	1.01	4.58	2150	4.95	2.5	324	35.8
HC-06	F5_R.cug	C1	21800	0.05	0.25	11.2	0.2	0.05	0.08	1390	3.1	1.09	7.95	3180	5.03	2.5	1020	42.2
HC-07	M6_G.pt	Bg	20500	0.16	10.4	73.5	0.2	0.3	0.141	754	13.6	7.48	48.5	21100	8.29	12.9	7560	246
HC-07	M6_G.pt	Om	7890	0.05	5.84	34.4	0.2	0.18	0.061	1210	5.6	2.68	11.8	33500	5.47	2.5	485	226
HC-08	G3_P	Bf2	23500	0.13	7.99	31.1	0.2	0.22	0.258	550	9.6	4.87	32.5	23200	7.15	9.6	3830	142
HC-08	G3_P	Bf1	9480	0.05	2.78	32.2	0.2	0.24	0.225	243	5.6	1.81	11.4	15900	8.31	2.5	1440	63.2
HC-09	F4_R.cu	C3	28700	0.1	7.8	35.9	0.2	0.24	0.141	806	10.2	7.11	53.5	22400	9.27	10.7	5260	205
HC-09	F4_R.cu	C1	11900	0.05	0.25	21.7	0.2	0.12	0.119	600	3.9	0.82	7.51	6360	6.06	2.5	305	18.4
HC-10	M5_P.so	Bhf	14500	0.53	16.6	48.2	0.2	0.28	0.368	4080	11.9	5.12	52.4	19400	10.7	12	3480	151
HC-10	M5_P.so	Om	11700	0.28	6.33	36	0.41	0.13	0.428	6320	6.4	4.3	44.4	11500	7.01	2.5	1030	331
HC-11	M3_P	Bf	38600	0.57	67.4	110	0.57	1.26	0.339	1150	20.9	14	199	44800	33.1	14.7	10500	376
HC-11	M3_P	C	32800	0.2	8.06	74.5	0.45	0.38	0.413	698	17.3	7.01	74.3	35900	15.1	16.1	6360	241
HC-12	M3_P	Bf	33900	0.31	19.7	54.6	0.2	0.64	0.269	457	22.4	7.06	56.9	36500	22.3	13.2	6410	526
HC-13	M3_P	Bf	43000	0.14	6.35	71.7	0.5	0.42	0.553	985	19.8	9.58	68.1	37700	18	18.1	9970	470
HC-15	O6_Omt	O1	3590	0.05	1.01	28.4	0.2	0.05	0.54	4840	2.6	0.64	6.79	6490	4.74	2.5	319	7.46
HC-16	M3_P	Bf	13400	0.05	5.23	27.9	0.2	0.42	0.104	194	10	3.07	18.9	24900	12.1	5.2	2540	377
HC-16	M3_P	Bc	27400	0.14	12.9	63	0.2	0.64	0.193	422	20.7	13.5	146	42600	21.6	13.4	9370	484
HC-17	M4_P.so	Ah	23900	0.05	3.37	42.8	0.93	0.33	1.07	3690	11.5	15.3	70.9	23000	22.1	8	2000	2580
HC-17	M4_P.so	Bhf	49400	0.22	6.92	60.4	1.36	0.81	1.58	4820	23.9	14.5	272	39700	58.7	16	3510	967
HC-18	M4_P	Bhf	15600	0.05	7.15	54	0.2	0.54	0.187	878	15.9	8.39	66.6	41500	11	9.9	4390	237
HC-18	M4_P	Bf	21800	0.14	8.79	44.5	0.48	0.77	0.21	437	23.7	29.3	181	60800	15.9	13.9	8090	615
HC-19	M3_P,li	Bf	18700	0.22	10.9	31.9	0.2	0.59	0.24	321	15.5	8.37	196	44400	21	8.4	4330	281
HC-19	M3_P,li	Ae	3460	0.1	1.28	14	0.2	0.22	0.118	125	3.3	0.91	14.1	6940	7.13	2.5	441	32.9
HC-21	M3_P	Bf	22100	0.43	25.8	36.2	0.4	1.24	0.222	222	34.5	12.3	225	58400	18.7	12.4	7520	290
HC-23	M3_P	Bf	26500	0.35	22.5	57	0.48	0.98	0.258	765	36.6	12.9	252	57600	28.3	13.8	8660	333
HC-25	C2_P	Bf	30100	0.3	7.63	157	0.47	0.49	0.553	651	17.2	7.22	28.1	35800	17.8	22.5	5640	261
HC-27	M4_P	C	17000	0.31	55	34.7	0.2	0.95	0.381	585	34.3	18.9	261	42400	40.1	9.7	6840	483
HC-27	M4_P	Bf	18300	0.29	47.3	39.9	0.2	0.76	0.58	391	32	10.1	113	41100	26.3	10.8	5140	268
HC-28	M4_P	Bf	24200	1.82	76.5	49.7	0.8	2.19	0.491	2190	9	23.4	480	120000	43.4	16.4	6870	1700
HC-29	M(C)4_P	Bf	22800	0.69	25.2	93.8	0.47	0.38	0.318	1240	61.6	19.8	172	55000	14.8	14.9	5500	719
HC-29	M(C)4_P	Bc	28700	2.51	53.2	73.2	0.54	0.52	0.343	3310	108	37.7	542	66800	21.3	18.3	11400	711
HC-31	M5_B.m(g)	Bm	15200	0.15	27.5	55.3	0.52	0.63	0.678	1710	21	25.1	487	49900	42.5	9.1	4040	2960
HC-31	M5_B.m(g)	Ah	14900	0.11	21.7	69.4	0.57	0.57	0.598	2570	24.4	9.98	548	43700	32.3	10.8	4340	983
HC-32	M3_P.li	Bf	30000	0.27	49.6	44.9	0.2	0.19	0.182	931	136	20.7	82.5	52800	15.1	17.1	17400	438
HC-32	M3_P.li	C	32400	0.26	39.2	46.8	0.2	0.16	0.232	1440	158	39.2	128	52700	13.2	17.6	23000	693
HC-33	M3_P	Bf	27900	0.23	10.8	65.1	0.62	0.46	0.223	2350	37.5	14.8	49.3	44700	13.4	13.5	10100	561
HC-33	M3_P	C	28600	0.37	17.5	53.9	0.69	0.66	0.252	5080	69.9	29.5	137	56500	17.9	15.6	18200	740
HC-34	M4_P	Bf	20400	0.34	7.78	44.4	0.2	0.18	0.31	1210	14.3	4.94	32.1	36500	50.3	9.5	4850	323
HC-34	M4_P	Bc	29700	0.5	14.1	47.9	0.48	0.16	0.222	1150	21	13.5	115	45600	48.9	18.4	10900	446
HC-36	M5_P.g	Bf	34300	0.54	67.3	34.3	0.66	1.12	1.48	3470	57.2	43.6	3310	63800	129	11.5	13400	1170
HC-36	M5_P.g	Ah	15300	0.05	8.14	74.1	0.77	0.25	1.59	2160	10.9	118	5150	29900	24.4	2.5	1270	4690
HC-37	M3_P	Bf	15900	0.05	3.71	23.7	0.2	0.15	0.119	268	11.2	2.53	7.86	13200	9.28	5.6	1030	105
HC-38	M3_P	Bf	21400	0.16	14.4	32.9	0.2	0.26	0.111	509	36.4	10.5	22.1	38800	28.4	14.4	5660	315
HC-39	M4_P	C	17100	0.19	28.3	31.6	0.2	0.47	0.399	401	20.6	15.9	71	40900	79.8	8.9	4890	581
HC-39	M4_P	Bf	16400	0.36	45.6	32.7	0.2	0.68	0.371	473	20.8	16.7	56.3	57600	78.3	9.1	4230	635
HC-40	M6_G(R.g)	C1	22200	0.12	10.4	101	0.63	1.28	3.32	1190	21.3	36.7	345	52400	159	9	3710	3110
HC-40	M6_G(R.g)	C2	19800	1.2	28.6	33.8	0.98	23.2	3.88	1400	22.7	34.1	1090	164000	3230	2.5	2400	2080
		count	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54
		min	3,460	0.05	0.3	11.2	0.20	0.05	0.06	125	2.6	0.6	4.6	2150	4.7	2.5	305	7.5
		Max	49,400	2.51	76.5	157.0	1.36	23.20	3.88	6320	158.0	118.0	5150	164000	3,230.0	22.5	23000	4690
		Average	21,780	0.30	17.8	52.2	0.39	0.9	0.5	1567	25.3	14.6	291.3	38543	84.7	10.7	5923	645.8
		Median	21,300	0.16	9.4	46.1	0.20	0.4	0.3	958	16.6	9.4	71.0	37100	16.7	10.8	5190	332.0
		STDev	9,226	0.43	19.3	26.8	0.25	3.1	0.7	1517	30.5	18.0	822.2	26990	437.1	5.2	4626	886.6
		< Dectect	-	15	3	-	30	3	-	-	-	-	-	-	-	10	-	-

[1] *Metals with land use guideline criteria*

Green indicates metal concentrations below detection, value indicated is equal to 1/2 of the detection limit concentration

Table B3-1. Summary of Extractable Soil Metal Concentrations at Soil Survey Inspection Sites

Site ID	SMU	Field Horizon	Mercury (Hg)[1]	Molybdenum (Mo)[1]	Nickel (Ni)[1]	Phosphorus (P)	Potassium (K)	Selenium (Se)[1]	Silver (Ag)	Sodium (Na)	Strontium (Sr)	Thallium (Tl)	Tin (Sn)[1]	Titanium (Ti)	Uranium (U)	Vanadium (V)[1]	Zinc (Zn)[1]	Zirconium (Zr)
HC-01	F5_R	O1	0.025	0.69	3.09	607	319	1.88	0.277	404	14	0.083	0.52	243	5.31	26.1	43.6	1.03
HC-01	F5_R	C3	0.025	0.61	4.41	475	2060	0.84	0.128	727	19.3	0.112	0.53	699	2.36	40.1	136	0.78
HC-02	M3_P	Bf	0.054	0.77	5.71	226	556	0.52	0.184	50	3.55	0.072	0.91	209	0.478	29.6	40.6	1.38
HC-02	M3_P	C	0.025	0.65	8.78	167	871	0.25	0.112	50	3.16	0.084	0.98	144	0.651	31.1	57.8	1.97
HC-04	M4_P.li	Ah	0.059	0.65	4.12	273	472	0.25	0.267	127	7.35	0.025	0.56	429	0.695	26.3	24.2	0.68
HC-04	M4_P.li	Bf	0.025	0.51	7.66	243	810	0.25	0.1	50	4.98	0.061	0.29	275	0.688	26.5	34.9	0.7
HC-05	M3_P.li	Bf	0.025	1.12	5.52	199	843	0.25	0.176	128	11.1	0.071	0.48	668	1.05	49.9	61.1	0.96
HC-06	F5_R.cug	Ah	0.025	0.25	1.36	677	178	0.25	0.362	195	8.48	0.068	0.19	110	0.497	6.2	6.4	0.53
HC-06	F5_R.cug	C1	0.025	0.05	1.34	554	110	0.62	0.335	357	8.35	0.025	0.36	415	0.947	6.2	7.5	1.65
HC-07	M6_G.pt	Bg	0.025	1.18	8.99	153	1380	0.25	0.074	50	6.08	0.073	0.44	354	0.824	35.2	57.8	0.25
HC-07	M6_G.pt	Om	0.025	1.34	1.33	320	165	0.56	0.237	118	8.01	0.025	0.31	297	1.32	28.6	15.4	0.68
HC-08	G3_P	Bf2	0.025	0.57	5.76	222	350	0.25	0.065	50	3.39	0.054	0.31	380	0.574	26.4	42	2.95
HC-08	G3_P	Bf1	0.025	0.76	2.44	227	279	0.25	0.187	50	4.53	0.025	0.6	528	0.466	34.5	18.2	0.87
HC-09	F4_R.cu	C3	0.025	0.58	5.86	131	545	0.25	0.09	103	4.39	0.053	0.42	485	0.924	33.6	36.9	3.04
HC-09	F4_R.cu	C1	0.025	0.42	1.33	220	185	0.25	0.361	136	5.74	0.025	0.42	433	0.694	15	5.7	1.93
HC-10	M5_P.so	Bhf	0.025	0.57	5.09	185	993	0.25	0.343	50	17.3	0.091	0.6	781	3.92	32.5	42.7	1.23
HC-10	M5_P.so	Om	0.061	1.21	4.23	357	249	0.77	0.627	165	27.7	0.079	0.37	381	10.8	27	35.7	1.39
HC-11	M3_P	Bf	0.025	1.11	17.4	259	1570	0.52	0.22	149	6.43	0.124	0.83	547	0.733	46.4	132	4.01
HC-11	M3_P	C	0.025	1.49	8.69	201	648	0.25	0.202	129	5.43	0.08	1.04	923	0.649	56.3	98.3	7.44
HC-12	M3_P	Bf	0.025	1.04	8.33	375	845	0.25	0.195	108	3.95	0.078	0.91	975	0.72	54.9	77.5	5.15
HC-13	M3_P	Bf	0.066	1.24	8.95	303	672	0.25	0.175	50	6.31	0.073	0.9	639	0.752	57.9	232	7.2
HC-15	O6_Omt	O1	0.064	0.5	1.66	1020	344	0.5	0.344	50	19.7	0.025	0.33	20	0.647	6.2	5.3	0.55
HC-16	M3_P	Bf	0.025	0.85	4.59	253	281	0.25	0.155	50	3.01	0.069	0.6	246	0.403	29.4	29.3	0.55
HC-16	M3_P	Bc	0.057	0.76	23.5	378	1100	0.58	0.214	50	3.18	0.082	0.62	126	0.755	27.9	117	1.76
HC-17	M4_P.so	Ah	0.102	1.48	13.9	1590	298	1.48	1.31	134	15.2	0.116	0.41	160	3.75	28.3	85	1.87
HC-17	M4_P.so	Bhf	0.17	1.13	53.3	1210	557	1.81	1.42	107	18.7	0.102	0.77	465	9.09	25	228	6.99
HC-18	M4_P	Bhf	0.025	4.01	25.5	388	303	0.6	0.219	50	6.12	0.025	0.29	113	1.17	17.1	60.4	0.59
HC-18	M4_P	Bf	0.025	11.7	63.3	427	351	1.13	0.219	50	5.08	0.025	0.12	23.3	2.12	14.3	107	1.75
HC-19	M3_P,li	Bf	0.025	1.53	19.3	380	363	1.22	0.127	50	3.27	0.051	0.31	87.8	0.886	18.7	68	1.73
HC-19	M3_P,li	Ae	0.025	0.73	1.81	180	174	0.25	0.297	136	2.24	0.025	0.37	250	0.211	15	9.6	0.25
HC-21	M3_P	Bf	0.025	1.75	27.1	377	393	1.31	0.138	50	2.68	0.115	0.45	163	1.02	33	95.1	0.65
HC-23	M3_P	Bf	0.025	2.32	26.2	419	495	0.86	0.101	50	5.06	0.078	0.63	224	0.78	34.5	119	1.03
HC-25	C2_P	Bf	0.025	1.29	7.71	175	692	0.25	0.485	149	6.68	0.11	1.11	929	0.517	62.2	162	7.28
HC-27	M4_P	C	0.025	1.01	38.8	448	468	1.34	0.107	50	3.85	0.025	0.22	98.1	0.688	20.3	122	1.06
HC-27	M4_P	Bf	0.025	1.33	24.9	452	469	0.77	0.44	50	3.63	0.06	0.34	150	0.559	27.2	92.5	0.67
HC-28	M4_P	Bf	0.056	1.97	15.3	3290	315	3.35	0.877	50	14.8	0.157	1.26	109	0.388	38.6	119	1.77
HC-29	M(C)4_P	Bf	0.025	1.82	68.8	963	216	0.25	0.401	50	7.92	0.025	0.61	517	0.444	53	96.5	1.45
HC-29	M(C)4_P	Bc	0.025	2.32	159	1490	284	0.72	0.187	50	13.8	0.06	0.32	180	0.421	57.1	119	0.91
HC-31	M5_B.m(g)	Bm	0.025	2.18	29.6	628	435	1.2	0.162	50	9.71	0.084	0.28	146	1.46	22	113	0.71
HC-31	M5_B.m(g)	Ah	0.025	2.09	24.2	687	489	1.09	0.328	50	15.5	0.084	0.51	138	1.29	28.8	90.4	0.25
HC-32	M3_P.li	Bf	0.025	1.9	93.9	523	304	0.25	0.195	50	4.61	0.025	0.21	482	0.517	59.7	92.3	1.11
HC-32	M3_P.li	C	0.025	1.29	115	576	316	0.25	0.102	50	6.06	0.025	0.2	536	0.556	69.4	90.6	0.73
HC-33	M3_P	Bf	0.025	1.37	21	966	400	0.25	0.298	50	13.7	0.067	0.82	1390	0.462	59	52.3	2.2
HC-33	M3_P	C	0.025	1.49	46.6	2020	694	0.62	0.12	50	26.6	0.112	0.38	903	0.401	67.8	70.6	1.62
HC-34	M4_P	Bf	0.07	2.05	7.63	409	331	0.57	0.226	50	10.4	0.066	0.65	611	0.5	39.8	41	2.03
HC-34	M4_P	Bc	0.025	2.53	17.9	407	437	1.54	0.131	50	8.91	0.069	0.33	376	0.617	31.4	76.4	1.92
HC-36	M5_P.g	Bf	0.058	3.45	68	1480	376	1.98	0.206	50	13.4	0.025	0.49	252	1.34	49.8	246	2.72
HC-36	M5_P.g	Ah	0.025	4.19	12.2	1070	224	2.1	0.553	116	12.6	0.13	0.58	308	1.82	45.2	93.5	0.95
HC-37	M3_P	Bf	0.025	0.41	5.03	350	175	0.25	0.223	131	3.5	0.056	0.43	325	0.407	16.8	17.3	2.27
HC-38	M3_P	Bf	0.025	0.64	34.1	409	368	0.25	0.104	50	3.85	0.055	0.13	43.9	0.532	17.7	106	1.7
HC-39	M4_P	C	0.025	0.79	26	363	296	0.71	0.09	50	2.62	0.025	0.15	37.4	0.673	11.9	220	1.14
HC-39	M4_P	Bf	0.025	1.2	28	426	267	0.85	0.14	50	3.36	0.051	0.23	138	0.663	19.2	212	0.68
HC-40	M6_G(R.g)	C1	0.14	1.28	33.4	702	431	2.19	1.71	50	8.36	0.124	0.56	190	2.38	25.2	143	0.88
HC-40	M6_G(R.g)	C2	0.149	3.45	67.3	976	151	3.77	3.72	50	5.57	0.125	0.37	100	3.8	27.9	1200	3.06
		count	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54
		min	0.025	0.1	1.3	131	110	0.25	0.07	50.0	2.2	0.025	0.12	20.0	0.2	6.2	5.3	0.25
		Max	0.170	11.7	159.0	3290	2060	3.77	3.72	727.0	27.7	0.157	1.26	1390	10.8	69.4	1200	7.44
		Average	0.039	1.5	24.5	589	498	0.81	0.37	99.4	8.6	0.068	0.50	366	1.4	33.1	105.7	1.86
		Median	0.025	1.2	13.1	408	372	0.57	0.21	50.0	6.2	0.069	0.44	286	0.7	29.1	81.3	1.31
		STDev	0.032	1.7	30.9	555	369	0.78	0.57	112.0	6.1	0.035	0.26	290	2.0	16.2	163.5	1.80
		< Dectect	41	1	-	-	-	23	-	35	-	15	-	-	-	-	-	3

[1] *Metals with land use guideline criteria*

Green indicates metal concentrations below detection, value indicated is equal to 1/2 of the detection limit concentration

Table B3-2. Overburden Static Test Results Total Metals (SRK)

				Metals																					
Sample ID				Al	B	Ba	Ca	Cr	Cu	Fe	K	Li	Mg	Mn	Na	Ni	P	S	Sr	Ti	V	Zn	Zr	Ag	As	Be
Units	Area	Type	Rinse pH	%	ppm	ppm	%	ppm	ppm	%	%	ppm	%	ppm	%	ppm	ppm	%	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
Method Code			MEND	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B
LOD			0.01	0.01	10	5	0.01	1	0.5	0.01	0.01	1	0.01	2	0.01	0.5	50	0.01	0.5	0.01	1	1	0.5	0.01	1	0.1
OP01 <2mm	Pit	Road Cut	5.1	2.69	50	67	0.1	125	500	5.63	0.1	22	1.61	378	0.03	41.9	960	0.04	9.6	0.03	46	212	2	0.39	34	0.3
OP02 <2mm	Pit	Road Cut	5.45	3.34	60	39	0.31	208	976	8.66	0.08	23	2.61	769	0.03	82.6	1440	0.05	13.5	0.06	80	288	4	0.54	176	0.4
OP03 <2mm	Pit	Road Cut	5.21	2.18	50	34	0.42	75	1850	6.08	0.06	15	1.46	675	0.02	28.8	2180	0.04	15.1	0.04	44	165	2.6	1.4	66	0.3
OP04 <2mm	Pit	Road Cut	5.01	2.62	60	52	0.51	163	803	7.28	0.09	16	1.81	1050	0.02	69.3	2410	0.08	22.1	0.13	63	110	3	0.26	53	0.5
OP05 <2mm	Pit	Road Cut	5.37	2.48	60	49	0.42	95	1400	6.46	0.08	14	1.45	776	0.02	42.8	2000	0.13	17.9	0.13	50	86	3.1	0.39	60	0.5
OP06 <2mm	Pit	Road Cut	5.56	2.64	50	67	0.62	96	423	6.67	0.12	18	1.91	774	0.02	55.3	2810	0.03	28.3	0.13	62	93	2.6	0.16	94	0.6
OP07 <2mm	Pit	Road Cut	5.49	2.73	60	96	0.68	105	125	5.67	0.09	22	1.69	1300	0.02	51.9	2170	0.04	33.2	0.14	61	119	3.6	0.4	49	0.5
OP08 <2mm	Pit	Road Cut	5.63	1.77	50	48	0.28	74	309	5.06	0.06	15	1.14	754	0.01	46.5	1080	0.03	14.5	0.04	39	126	1	0.23	53	0.3
OP09 <2mm	Pit	Road Cut	5.68	2.69	50	94	0.2	119	125	5.69	0.1	20	1.95	976	0.01	71.7	870	0.01	11.8	0.05	63	115	2.3	0.07	43	0.4
OP10 <2mm	Pit	Road Cut	5.16	2.35	50	72	0.06	88	333	4.81	0.09	17	1.03	323	0.02	40.6	680	0.03	5.5	0.03	38	98	3.2	0.29	26	0.4
OP11 <2mm	Pit	Road Cut	5.76	2.31	60	72	0.35	138	4300	5.94	0.18	18	1.71	1030	0.02	69.5	1790	0.02	19.4	0.05	52	188	6.1	0.39	55	0.4
OP12 <2mm	Pit	Road Cut	5.53	1.74	50	56	0.18	175	684	4.32	0.11	14	0.68	490	0.05	33.6	670	0.03	13.2	0.05	36	98	1.7	0.87	23	0.3
OP13 <2mm	Pit	Road Cut	6.34	1.93	50	63	0.3	106	1580	5.58	0.15	17	1.32	909	0.02	81.3	1360	0.01	18.2	0.01	33	172	5.8	0.64	38	0.2
OP14 <2mm	Pit	Road Cut	4.74	1.66	50	57	0.08	108	187	5.34	0.06	13	0.68	458	0.03	43.4	560	0.02	7	0.05	50	82	1.3	0.25	22	0.2
OP15 <2mm	Pit	Road Cut	5.26	1.34	50	56	0.11	59	520	4.02	0.09	11	0.76	663	0.01	44.6	660	0.01	6.8	0.01	23	157	4.2	0.09	24	0.3
OP16 <2mm	Pit	Road Cut	5.71	2.59	60	57	0.44	146	961	6.83	0.12	20	1.83	1010	0.02	106	2450	0.01	23.9	0.03	55	168	4.8	0.25	35	0.3
OP12-01 Overburden Sample #1	Pit	Deep Overburden	5.73	2.69	20	60	3.92	186	156	4.8	0.14	#N/A	2.27	858	0.008	74.4	1710	0.19	137	0.054	61	92.4	#N/A	0.117	25.4	#N/A
OP12-01 Overburden Sample #2	Pit	Deep Overburden	6.94	2.5	20	49.7	4.65	168	153	4.3	0.14	#N/A	2.23	810	0.009	71.5	1730	0.4	142	0.064	56	76.3	#N/A	0.14	19.5	#N/A
OP12-02 Overburden Sample #1	Pit	Deep Overburden	7.67	1.84	20	53.3	1.26	124	292	4.22	0.14	#N/A	1.35	731	0.012	56.3	850	0.18	38.1	0.024	35	178	#N/A	0.374	92	#N/A
OP12-02Overburden Sample #2	Pit	Deep Overburden	7.32	1.44	20	53.6	0.39	136	519	3.78	0.13	#N/A	0.86	470	0.015	44.1	560	0.08	16.4	0.015	24	102	#N/A	0.512	30.9	#N/A
OP12-03 Overburden Sample #1	Pit	Deep Overburden	7.45	2.35	20	55.5	2.51	126	202	4.58	0.16	#N/A	1.77	802	0.007	72.7	1670	0.06	85	0.042	52	101	#N/A	0.15	45.2	#N/A
OP12-05 Overburden Sample #1	Pit	Deep Overburden	5.62	2.38	20	39.8	0.22	102	117	3.07	0.07	#N/A	2.37	454	0.017	22.7	500	0.02	9.6	0.021	50	48	#N/A	0.034	22.6	#N/A
OP12-06Overburden Sample #1	Pit	Deep Overburden	7.38	1.88	20	40.9	0.56	95.1	530	4.54	0.12	#N/A	1.39	932	0.021	41.3	910	0.18	17.8	0.045	38	129	#N/A	0.272	24	#N/A
OP12-07 Overburden Sample #1	Pit	Deep Overburden	7.6	1.96	20	53.6	2.32	156	1180	4.41	0.15	#N/A	1.44	808	0.013	55.4	1250	0.09	68.6	0.036	42	109	#N/A	0.621	26.9	#N/A
OP12-09 Overburden Sample #1	Pit	Deep Overburden	6.14	0.46	20	45.8	0.06	64.1	56.3	3.14	0.18	#N/A	0.12	425	0.012	32.3	340	0.03	4.3	0.001	4	144	#N/A	0.089	10.5	#N/A
OP12-10 Overburden Sample #1	Pit	Deep Overburden	5.28	4.06	20	30	1.39	57.1	952	8.15	0.06	#N/A	3.18	994	0.003	39.6	6400	0.04	33.6	0.089	67	107	#N/A	0.654	9.2	#N/A
OP12-01 Weathered Rock Sample #1	Pit	Weathered Bedrock	7.31	1.23	20	26.7	0.84	98	179	4.47	0.14	#N/A	1.26	404	0.019	10.3	230	2.91	31.1	0.001	15	770	#N/A	0.992	1010	#N/A
OP12-01 Weathered Rock Sample #2	Pit	Weathered Bedrock	7.69	1	20	56.9	1.77	88.5	250	5.38	0.13	#N/A	1.46	842	0.013	9.2	220	3.7	55.7	0.001	11	618	#N/A	1.51	1360	#N/A
OP12-02 Weathered Rock Sample #1	Pit	Weathered Bedrock	7.09	0.43	20	39.2	0.1	78.7	762	2.52	0.12	#N/A	0.16	147	0.014	17.9	410	0.08	7.5	0.005	8	46.5	#N/A	0.544	16.2	#N/A
OP12-03 Weathered Rock Sample #1	Pit	Weathered Bedrock	6.55	0.49	20	35.9	0.03	114	282	2.59	0.13	#N/A	0.23	80	0.01	14.7	150	0.14	2.1	0.001	4	31.5	#N/A	0.147	40.9	#N/A
OP12-04 Weathered Rock Sample #1	Pit	Weathered Bedrock	6.4	3.93	20	33.6	4.68	75	157	8.44	0.05	#N/A	2.9	1300	0.003	36.3	5240	1.77	136	0.162	112	111	#N/A	0.159	36.3	#N/A
OP12-05 Weathered Rock Sample #1	Pit	Weathered Bedrock	7.35	1.67	20	24.6	0.78	120	26	1.73	0.09	#N/A	1.7	228	0.025	10.3	320	0.02	27.2	0.02	30	51.4	#N/A	0.019	26.8	#N/A
OP12-05 Weathered Rock Sample #2	Pit	Weathered Bedrock	7.42	2.37	20	32.1	0.59	121	152	2.96	0.09	#N/A	2.29	369	0.021	15	290	0.06	20.4	0.011	39	221	#N/A	0.208	164	#N/A
OP12-06 Weathered Rock Sample #1	Pit	Weathered Bedrock	6.42	2.25	20	32	0.12	80.1	451	9.31	0.18	#N/A	1.81	458	0.012	15	260	4.49	4.3	0.006	29	408	#N/A	0.695	99.7	#N/A
OP12-07 Weathered Rock Sample #1	Pit	Weathered Bedrock	8.17	0.28	20	28.2	2.39	82.2	1710	1.51	0.11	#N/A	1.66	429	0.032	15.1	200	0.54	53.8	0.001	8	43.2	#N/A	0.545	0.4	#N/A
OP12-08 Weathered Rock Sample #1	Pit	Weathered Bedrock	7.95	0.24	20	17.7	0.2	98.3	240	0.63	0.07	#N/A	0.16	170	0.047	10.7	90	0.11	12.6	0.001	2	15.1	#N/A	0.075	1	#N/A
OP12-09 Weathered Rock Sample #1	Pit	Weathered Bedrock	5.94	0.31	20	41.2	0.09	107	72.4	2.02	0.16	#N/A	0.09	249	0.012	23.8	240	0.12	5	0.002	3	79.3	#N/A	0.115	19.2	#N/A
OP12-09 Weathered Rock Sample #2	Pit	Weathered Bedrock	5.92	0.26	20	31.2	0.16	80.4	49.4	2.49	0.14	#N/A	0.6	336	0.009	25.4	270	0.23	6.4	0.002	5	89.1	#N/A	0.148	14.2	#N/A
OP12-10 Weathered Rock Sample #1	Pit	Weathered Bedrock	6.98	3.29	20	7.8	4.23	140	6210	6.97	0.01	#N/A	2.56	849	0.013	87.1	3850	1.32	126	0.144	85	73.2	#N/A	1.71	8.7	#N/A
TP01-1 <2mm	TMF	Overburden	5.53	2.4	50	85	0.19	70	87.7	3.02	0.21	27	0.81	535	0.03	12.1	460	0.02	12.2	0.09	46	118	1.9	0.15	16	0.4
TP5-1 <2mm	TMF	Overburden	6.84	2.49	60	213	0.44	65	149	4.24	0.65	17	1.35	995	0.06	14.2	580	0.02	19.7	0.1	66	137	2.7	0.12	9	0.3
TP12-1 <2mm	TMF	Overburden	6.15	1.96	50	140	0.39	73	91.7	3.68	0.34	15	0.89	556	0.06	11	510	0.03	17.2	0.07	51	78	2.6	0.19	17	0.3
TP12-2 <2mm	TMF	Overburden	7.58	1.82	50	141	0.71	70	88.5	3.35	0.41	15	0.95	625	0.06	14	490	0.19	22.4	0.05	44	85	3.6	0.2	18	0.3
TP15-4 <2mm	TMF	Overburden	7.78	1.88	50	152	1.37	57	123	3.82	0.36	15	1.09	789	0.04	18.7	450	0.21	28.2	0.02	35	81	4.3	0.2	11	0.4
TP2 <2mm	TMF	Overburden	8.18	2.16	50	172	0.51	64	83.1	3.33	0.53	17	1.03	652	0.07	10.6	450	0.03	24.9	0.07	51	90	3.4	0.16	16	0.3
TP26-1 <2mm	TMF	Overburden	7.91	1.89	50	147	0.94	69	90.6	3.49	0.4	17	1.03	708	0.05	17.7	470	0.14	28.3	0.04	42	70	4	0.19	9	0.3
TP27-1 <2mm	TMF	Overburden	6.48	1.17	40	81	0.18	53	94.4	2.05	0.29	13	0.59	440	0.03	5.2	340	0.01	9.3	0.05	26	45	1.5	0.23	34	0.3
TP29-1 <2mm	TMF	Overburden	6.7	0.77	30	74	0.24	66	533	4.61	0.28	27	0.3	1160	0.01	7.7	390	0.01	9	0.01	36	80	2.2	0.49	325	1.1
TP30-1 <2mm	TMF	Overburden	5.14	2.51	40	116	0.15	49	139	3.65	0.16	15	0.81	420	0.02	15.1	370	0.03	8.5	0.03	47	112	2.4	0.18	27	0.5
TP30-2 <2mm	TMF	Overburden	6.68	2.05	50	188	0.6	75	160	3.98	0.38	15	0.94	823	0.07	15.5	900	0.01	25.2	0.05	52	128	2.9	0.26	30	0.5
TP32-1 <2mm	TMF	Overburden	8.09	0.89	40	176	1.17	49	296	4.17	0.28	9	0.34	1200	0.02	7.2	290	0.01	18.7	0.01	30	106	2.2	5.05	503	1.6
TP51-3 <2mm	TMF	Overburden	7.24	0.45	50	42	0.09	94	151	9.03	0.15	2	0.13	638	0.02	83.9	880	0.03	9.6	0.01	1	108	23.3	0.35	23	0.4

Table B3-2. Overburden Static Test Results Total Metals (SRK)

				Metals																				
Sample ID				Bi	Cd	Ce	Co	Cs	Ga	Ge	Hf	Hg	In	La	Lu	Mo	Nb	Pb	Rb	Sb	Sc	Se	Sn	Ta	Tb	Te
Units	Area	Type	Rinse pH	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Method Code			MEND	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B
LOD			0.01	0.02	0.01	0.05	0.1	0.05	0.1	0.1	0.05	0.01	0.02	0.1	0.01	0.05	0.05	0.2	0.2	0.05	0.1	1	0.3	0.05	0.02	0.05
OP01 <2mm	Pit	Road Cut	5.1	1.06	0.32	25.3	15.2	0.78	6.6	0.1	0.05	0.02	0.2	12.1	0.04	2.7	1.06	91.1	7.2	0.3	3.7	2	0.8	0.05	0.23	0.54
OP02 <2mm	Pit	Road Cut	5.45	1.39	1.67	48.8	44.5	0.72	9.9	0.1	0.09	0.03	0.57	19.2	0.08	3.38	1.88	264	4.2	0.5	7.5	2	1.5	0.05	0.44	0.71
OP03 <2mm	Pit	Road Cut	5.21	0.97	0.42	47	27.4	0.35	6.9	0.1	0.06	0.02	0.26	28.2	0.11	2.75	1.34	88.7	3.6	0.81	4.1	2	0.9	0.05	0.63	0.57
OP04 <2mm	Pit	Road Cut	5.01	1.03	0.32	56.2	34.9	0.79	8.1	0.1	0.06	0.02	0.18	23.9	0.07	3.03	3.72	46.8	6	0.52	4.7	1	0.9	0.05	0.53	0.32
OP05 <2mm	Pit	Road Cut	5.37	1.08	0.28	48.7	30.3	0.85	7.3	0.1	0.07	0.02	0.14	22.5	0.07	2.84	4.15	34.4	5.6	0.45	3.6	2	0.7	0.05	0.47	0.43
OP06 <2mm	Pit	Road Cut	5.56	0.64	0.27	63.8	33.7	1.61	8.5	0.1	0.05	0.03	0.08	27.4	0.12	1.99	3.61	26.1	11.2	0.44	4.3	1	0.6	0.05	0.61	0.29
OP07 <2mm	Pit	Road Cut	5.49	0.65	0.46	48.4	24.9	2.63	9.2	0.1	0.07	0.06	0.07	20.7	0.09	2.25	4.33	28	12	0.33	3.6	1	0.7	0.05	0.44	0.2
OP08 <2mm	Pit	Road Cut	5.63	0.65	0.31	49.1	27.1	1	6.2	0.1	0.05	0.02	0.06	20	0.05	4.78	1.37	39	5.9	0.26	2.3	1	0.3	0.05	0.34	0.28
OP09 <2mm	Pit	Road Cut	5.68	0.37	0.28	58.3	28.3	0.64	8.7	0.1	0.05	0.03	0.05	26.8	0.08	2.24	1.1	25.1	6.1	0.18	5.7	1	0.4	0.05	0.51	0.11
OP10 <2mm	Pit	Road Cut	5.16	0.62	0.14	33.1	16.4	0.76	5.7	0.1	0.05	0.04	0.08	16.9	0.03	1.93	1.59	24.2	8.3	0.22	3	1	0.6	0.05	0.26	0.24
OP11 <2mm	Pit	Road Cut	5.76	0.6	0.56	58.1	28.5	0.96	7.4	0.1	0.1	0.02	0.08	30.6	0.12	4.05	0.79	34.1	7.8	0.19	5.7	1	0.5	0.05	0.63	0.27
OP12 <2mm	Pit	Road Cut	5.53	0.91	0.27	33.8	16.5	0.72	6.1	0.1	0.05	0.03	0.12	16.7	0.06	3.87	1.46	27.5	6	0.15	1.8	1	0.8	0.05	0.31	0.43
OP13 <2mm	Pit	Road Cut	6.34	0.85	0.54	41.5	27.9	0.79	5.8	0.1	0.1	0.03	0.13	22.6	0.08	5.76	0.34	29.8	6.3	0.19	4.3	1	0.5	0.05	0.48	0.43
OP14 <2mm	Pit	Road Cut	4.74	0.74	0.19	27.1	14.3	0.81	8	0.1	0.05	0.03	0.07	13.3	0.03	2.17	1.21	18.9	6	0.17	1.7	1	0.5	0.05	0.2	0.11
OP15 <2mm	Pit	Road Cut	5.26	0.48	0.38	51.7	16	0.63	4.3	0.1	0.08	0.01	0.04	26.2	0.06	3.07	0.45	41.7	5.8	0.13	2.8	1	0.3	0.05	0.4	0.09
OP16 <2mm	Pit	Road Cut	5.71	0.5	0.4	59.7	31.3	1.26	8.5	0.1	0.1	0.02	0.13	28.8	0.1	3.88	0.66	35	6.9	0.23	5.2	1	0.4	0.05	0.68	0.11
OP12-01 Overburden Sample #1	Pit	Deep Overburden	5.73	0.29	0.26	#N/A	29.9	#N/A	8.5	#N/A	#N/A	0.005	#N/A	#N/A	20.1	4.13	#N/A	22.9	#N/A	0.16	6	0.4	#N/A	#N/A	#N/A	0.2
OP12-01 Overburden Sample #2	Pit	Deep Overburden	6.94	0.34	0.22	#N/A	27	#N/A	8.2	#N/A	#N/A	0.005	#N/A	#N/A	18.7	2.56	#N/A	35.9	#N/A	0.17	5.7	0.7	#N/A	#N/A	#N/A	0.23
OP12-02 Overburden Sample #1	Pit	Deep Overburden	7.67	0.59	0.93	#N/A	22.4	#N/A	5.7	#N/A	#N/A	0.005	#N/A	#N/A	14.9	3.11	#N/A	91.8	#N/A	0.26	4.2	0.8	#N/A	#N/A	#N/A	0.23
OP12-02Overburden Sample #2	Pit	Deep Overburden	7.32	0.66	0.38	#N/A	18.1	#N/A	4.4	#N/A	#N/A	0.005	#N/A	#N/A	17.2	5.79	#N/A	41.2	#N/A	0.22	3.2	0.7	#N/A	#N/A	#N/A	0.6
OP12-03 Overburden Sample #1	Pit	Deep Overburden	7.45	0.25	0.28	#N/A	28.4	#N/A	7.9	#N/A	#N/A	0.005	#N/A	#N/A	20.6	2.34	#N/A	21.9	#N/A	0.16	5.5	0.3	#N/A	#N/A	#N/A	0.1
OP12-05 Overburden Sample #1	Pit	Deep Overburden	5.62	0.09	0.09	#N/A	13.4	#N/A	6.6	#N/A	#N/A	0.005	#N/A	#N/A	20.2	1.24	#N/A	10.5	#N/A	0.14	6.8	0.2	#N/A	#N/A	#N/A	0.06
OP12-06Overburden Sample #1	Pit	Deep Overburden	7.38	0.32	0.43	#N/A	22	#N/A	5.1	#N/A	#N/A	0.012	#N/A	#N/A	12.6	3.7	#N/A	41.3	#N/A	0.22	5.1	1	#N/A	#N/A	#N/A	0.12
OP12-07 Overburden Sample #1	Pit	Deep Overburden	7.6	0.31	0.37	#N/A	24.2	#N/A	6.2	#N/A	#N/A	0.005	#N/A	#N/A	18.5	4.93	#N/A	15.3	#N/A	0.12	4.5	0.9	#N/A	#N/A	#N/A	0.27
OP12-09 Overburden Sample #1	Pit	Deep Overburden	6.14	0.31	0.36	#N/A	14.4	#N/A	1.3	#N/A	#N/A	0.005	#N/A	#N/A	22.6	0.79	#N/A	34.1	#N/A	0.03	1.4	0.1	#N/A	#N/A	#N/A	0.02
OP12-10 Overburden Sample #1	Pit	Deep Overburden	5.28	0.08	0.17	#N/A	39.9	#N/A	17.3	#N/A	#N/A	0.005	#N/A	#N/A	17	5.61	#N/A	35.8	#N/A	0.18	3.3	0.7	#N/A	#N/A	#N/A	0.19
OP12-01 Weathered Rock Sample #1	Pit	Weathered Bedrock	7.31	2.44	4.7	#N/A	12.8	#N/A	3.1	#N/A	#N/A	0.005	#N/A	#N/A	3.7	1.51	#N/A	191	#N/A	1.84	2.7	1.4	#N/A	#N/A	#N/A	0.7
OP12-01 Weathered Rock Sample #2	Pit	Weathered Bedrock	7.69	3.55	3.85	#N/A	13.8	#N/A	2.3	#N/A	#N/A	0.005	#N/A	#N/A	2.4	1.27	#N/A	244	#N/A	1.88	2.5	2.4	#N/A	#N/A	#N/A	0.35
OP12-02 Weathered Rock Sample #1	Pit	Weathered Bedrock	7.09	0.63	0.31	#N/A	8.1	#N/A	1.3	#N/A	#N/A	0.005	#N/A	#N/A	11.8	8.83	#N/A	10.6	#N/A	0.13	1.2	0.8	#N/A	#N/A	#N/A	0.55
OP12-03 Weathered Rock Sample #1	Pit	Weathered Bedrock	6.55	0.74	0.1	#N/A	4.2	#N/A	1.5	#N/A	#N/A	0.005	#N/A	#N/A	12.7	1.48	#N/A	4.52	#N/A	0.1	0.9	1.5	#N/A	#N/A	#N/A	0.45
OP12-04 Weathered Rock Sample #1	Pit	Weathered Bedrock	6.4	0.4	0.24	#N/A	38.3	#N/A	16.7	#N/A	#N/A	0.005	#N/A	#N/A	19.3	2.01	#N/A	40.1	#N/A	0.57	6.2	0.9	#N/A	#N/A	#N/A	0.11
OP12-05 Weathered Rock Sample #1	Pit	Weathered Bedrock	7.35	0.03	0.08	#N/A	5.9	#N/A	4.1	#N/A	#N/A	0.005	#N/A	#N/A	9.2	0.81	#N/A	5.76	#N/A	0.06	6.2	0.1	#N/A	#N/A	#N/A	0.02
OP12-05 Weathered Rock Sample #2	Pit	Weathered Bedrock	7.42	0.26	0.81	#N/A	11.9	#N/A	5.5	#N/A	#N/A	0.006	#N/A	#N/A	10.8	2.69	#N/A	113	#N/A	0.19	7.7	0.1	#N/A	#N/A	#N/A	0.17
OP12-06 Weathered Rock Sample #1	Pit	Weathered Bedrock	6.42	2.2	2.19	#N/A	25.8	#N/A	4.9	#N/A	#N/A	0.005	#N/A	#N/A	2	2.4	#N/A	93	#N/A	0.43	4.9	5.6	#N/A	#N/A	#N/A	0.5
OP12-07 Weathered Rock Sample #1	Pit	Weathered Bedrock	8.17	0.52	0.26	#N/A	7	#N/A	0.9	#N/A	#N/A	0.005	#N/A	#N/A	1.5	12.5	#N/A	6.67	#N/A	0.04	2.8	3.9	#N/A	#N/A	#N/A	0.86
OP12-08 Weathered Rock Sample #1	Pit	Weathered Bedrock	7.95	0.16	0.13	#N/A	2.1	#N/A	0.4	#N/A	#N/A	0.005	#N/A	#N/A	2.6	9.31	#N/A	3.31	#N/A	0.02	0.5	0.5	#N/A	#N/A	#N/A	0.35
OP12-09 Weathered Rock Sample #1	Pit	Weathered Bedrock	5.94	0.21	0.26	#N/A	11.6	#N/A	0.8	#N/A	#N/A	0.005	#N/A	#N/A	16.8	0.89	#N/A	25.4	#N/A	0.04	0.9	0.1	#N/A	#N/A	#N/A	0.04
OP12-09 Weathered Rock Sample #2	Pit	Weathered Bedrock	5.92	0.36	0.24	#N/A	11.7	#N/A	0.7	#N/A	#N/A	0.01	#N/A	#N/A	9.8	1.03	#N/A	21.6	#N/A	0.04	0.7	0.1	#N/A	#N/A	#N/A	0.04
OP12-10 Weathered Rock Sample #1	Pit	Weathered Bedrock	6.98	0.04	0.69	#N/A	34.6	#N/A	16.2	#N/A	#N/A	0.043	#N/A	#N/A	12.7	2.96	#N/A	9.54	#N/A	0.24	5.1	8.1	#N/A	#N/A	#N/A	0.41
TP01-1 <2mm	TMF	Overburden	5.53	0.32	0.27	58	10.3	2.59	5.8	0.1	0.1	0.03	0.04	31.9	0.21	0.79	2.64	177	23.6	0.24	5	1	0.7	0.05	0.56	0.05
TP5-1 <2mm	TMF	Overburden	6.84	0.45	0.29	26.9	14	2.93	6.9	0.1	0.08	0.02	0.06	14.6	0.11	0.97	0.48	450	41.5	0.19	8.4	1	0.9	0.05	0.29	0.08
TP12-1 <2mm	TMF	Overburden	6.15	0.5	0.12	25.2	10.8	2.4	5.5	0.1	0.05	0.01	0.03	13.4	0.11	0.79	1.15	790	24.4	0.24	6.4	1	0.9	0.05	0.27	0.06
TP12-2 <2mm	TMF	Overburden	7.58	0.5	0.27	24.5	11.9	2.47	5.1	0.1	0.09	0.01	0.03	13.2	0.09	1.2	0.34	1480	22.6	0.29	5.8	1	0.7	0.05	0.26	0.06
TP15-4 <2mm	TMF	Overburden	7.78	0.72	0.23	27.3	14.3	1.69	4.8	0.1	0.11	0.01	0.03	14.6	0.11	0.97	0.14	1090	17	0.12	4.7	1	0.5	0.05	0.28	0.15
TP2 <2mm	TMF	Overburden	8.18	0.47	0.24	27	11.2	2.78	6	0.1	0.09	0.01	0.03	14.7	0.1	1.03	0.22	1720	29.6	0.21	6.8	1	0.9	0.05	0.27	0.06
TP26-1 <2mm	TMF	Overburden	7.91	0.51	0.17	28.3	12.1	1.85	5.1	0.1	0.09	0.01	0.02	15.2	0.09	1.06	0.23	1310	21.6	0.12	5	1	0.6	0.05	0.26	0.05
TP27-1 <2mm	TMF	Overburden	6.48	0.32	0.15	23.9	6.8	1.93	3.3	0.1	0.05	0.01	0.04	13.4	0.05	0.52	0.54	193	20.9	1.59	3.5	1	0.7	0.05	0.18	0.05
TP29-1 <2mm	TMF	Overburden	6.7	1.07	0.28	37.5	28.1	8.41	2.2	0.1	0.05	0.01	0.07	23.2	0.15	1.68	0.11	1880	20.1	16.3	12.1	1	1.6	0.05	0.4	0.1
TP30-1 <2mm	TMF	Overburden	5.14	0.58	0.23	26.3	12.5	3.55	5.3	0.1	0.05	0.04	0.06	11.9	0.06	0.83	1.3	22	16	0.6	5.7	1	0.9	0.05	0.21	0.08
TP30-2 <2mm	TMF	Overburden	6.68	0.61	0.41	32.9	15.4	4.03	5.4	0.1	0.08	0.01	0.06	18.2	0.13	0.87	0.33	39.1	23.9	0.61	6.9	1	1	0.05	0.37	0.06
TP32-1 <2mm	TMF	Overburden	8.09	0.61	0.45	43.2	12.9	8.01	2.9	0.1	0.05	0.03	0.05	25.6	0.17	2.59	0.22	98.2	17.6	15.1	8.1	1	0.7	0.05	0.41	0.05
TP51-3 <2mm	TMF	Overburden	7.24	3.86	0.29	65.2	25.4	0.9	1.9	0.1	0.45	0.02	0.02	35.8	0.09	2.58	0.07	20.3	6.3	0.41	1.5	1	0.5	0.05	0.47	0.29

Table B3-2. Overburden Static Test Results Total Metals (SRK)

Sample ID				Metals							
				Th	Tl	U	W	Y	Yb	Au	Hg on Solids
Units	Area	Type	Rinse pH	ppm	ppm	ppm	ppm	ppm	ppm	ppb	mg/kg
Method Code			MEND	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B	ICM14B		
LOD			0.01	0.1	0.02	0.05	0.1	0.05	0.1		
OP01 <2mm	Pit	Road Cut	5.1	3.2	0.05	0.52	0.1	3.08	0.3	#N/A	#N/A
OP02 <2mm	Pit	Road Cut	5.45	3.3	0.05	0.58	0.1	7	0.6	#N/A	#N/A
OP03 <2mm	Pit	Road Cut	5.21	3.6	0.04	0.69	0.1	11.4	0.8	#N/A	#N/A
OP04 <2mm	Pit	Road Cut	5.01	3.3	0.07	0.57	0.2	7.76	0.6	#N/A	#N/A
OP05 <2mm	Pit	Road Cut	5.37	3	0.07	0.57	0.2	7.74	0.6	#N/A	#N/A
OP06 <2mm	Pit	Road Cut	5.56	3.3	0.13	0.6	0.2	10.9	0.9	#N/A	#N/A
OP07 <2mm	Pit	Road Cut	5.49	1.5	0.12	0.77	0.2	7.81	0.7	#N/A	#N/A
OP08 <2mm	Pit	Road Cut	5.63	2	0.05	0.75	0.1	5.01	0.4	#N/A	#N/A
OP09 <2mm	Pit	Road Cut	5.68	5.5	0.08	1.32	0.1	7.55	0.6	#N/A	#N/A
OP10 <2mm	Pit	Road Cut	5.16	4.3	0.06	0.63	0.1	3.23	0.3	#N/A	#N/A
OP11 <2mm	Pit	Road Cut	5.76	7.5	0.08	0.91	0.1	10	0.8	#N/A	#N/A
OP12 <2mm	Pit	Road Cut	5.53	1.7	0.05	1.01	0.2	5.12	0.4	#N/A	#N/A
OP13 <2mm	Pit	Road Cut	6.34	7.2	0.06	1.33	0.1	7.89	0.6	#N/A	#N/A
OP14 <2mm	Pit	Road Cut	4.74	0.8	0.06	0.62	0.2	2.55	0.2	#N/A	#N/A
OP15 <2mm	Pit	Road Cut	5.26	8.8	0.08	1.74	0.1	5.25	0.4	#N/A	#N/A
OP16 <2mm	Pit	Road Cut	5.71	5.6	0.1	1.24	0.1	10.2	0.7	#N/A	#N/A
OP12-01 Overburden Sample #1	Pit	Deep Overburden	5.73	4.1	0.05	0.3	0.1	#N/A	#N/A	6.8	0.01
OP12-01 Overburden Sample #2	Pit	Deep Overburden	6.94	4.2	0.05	0.4	0.2	#N/A	#N/A	5.3	0.01
OP12-02 Overburden Sample #1	Pit	Deep Overburden	7.67	5.5	0.07	0.9	0.3	#N/A	#N/A	11.8	0.01
OP12-02Overburden Sample #2	Pit	Deep Overburden	7.32	7.1	0.06	0.9	0.2	#N/A	#N/A	19.7	0.01
OP12-03 Overburden Sample #1	Pit	Deep Overburden	7.45	5.2	0.07	0.5	0.2	#N/A	#N/A	7.1	0.01
OP12-05 Overburden Sample #1	Pit	Deep Overburden	5.62	5.3	0.04	0.5	0.1	#N/A	#N/A	3	0.01
OP12-06Overburden Sample #1	Pit	Deep Overburden	7.38	4.2	0.04	0.6	0.1	#N/A	#N/A	6.6	0.01
OP12-07 Overburden Sample #1	Pit	Deep Overburden	7.6	5.2	0.07	0.5	0.1	#N/A	#N/A	7	0.01
OP12-09 Overburden Sample #1	Pit	Deep Overburden	6.14	10.6	0.07	1.2	0.1	#N/A	#N/A	2.5	0.01
OP12-10 Overburden Sample #1	Pit	Deep Overburden	5.28	2.5	0.02	0.2	0.4	#N/A	#N/A	15.6	0.01
OP12-01 Weathered Rock Sample #1	Pit	Weathered Bedrock	7.31	2	0.06	0.4	0.5	#N/A	#N/A	114	0.01
OP12-01 Weathered Rock Sample #2	Pit	Weathered Bedrock	7.69	1.5	0.09	0.4	0.8	#N/A	#N/A	109	0.014
OP12-02 Weathered Rock Sample #1	Pit	Weathered Bedrock	7.09	6	0.04	0.9	1	#N/A	#N/A	6.2	0.01
OP12-03 Weathered Rock Sample #1	Pit	Weathered Bedrock	6.55	5.8	0.04	0.4	0.6	#N/A	#N/A	3.7	0.01
OP12-04 Weathered Rock Sample #1	Pit	Weathered Bedrock	6.4	1.5	0.04	0.1	0.3	#N/A	#N/A	9.4	0.01
OP12-05 Weathered Rock Sample #1	Pit	Weathered Bedrock	7.35	4.1	0.02	0.4	0.1	#N/A	#N/A	1	0.01
OP12-05 Weathered Rock Sample #2	Pit	Weathered Bedrock	7.42	3.8	0.03	0.6	0.1	#N/A	#N/A	9.2	0.014
OP12-06 Weathered Rock Sample #1	Pit	Weathered Bedrock	6.42	1.1	0.09	0.4	0.2	#N/A	#N/A	34.2	0.01
OP12-07 Weathered Rock Sample #1	Pit	Weathered Bedrock	8.17	1.4	0.03	0.3	0.5	#N/A	#N/A	20.5	0.01
OP12-08 Weathered Rock Sample #1	Pit	Weathered Bedrock	7.95	5	0.02	0.1	0.4	#N/A	#N/A	5.5	0.01
OP12-09 Weathered Rock Sample #1	Pit	Weathered Bedrock	5.94	8.5	0.05	0.9	0.5	#N/A	#N/A	6.1	0.01
OP12-09 Weathered Rock Sample #2	Pit	Weathered Bedrock	5.92	4.9	0.04	1.2	0.7	#N/A	#N/A	0.4	0.01
OP12-10 Weathered Rock Sample #1	Pit	Weathered Bedrock	6.98	2.8	0.02	0.2	6.7	#N/A	#N/A	58.9	0.03
TP01-1 <2mm	TMF	Overburden	5.53	3.6	0.2	4.76	0.5	13.9	1.4	#N/A	#N/A
TP5-1 <2mm	TMF	Overburden	6.84	6.5	0.29	0.98	0.5	7.01	0.7	#N/A	#N/A
TP12-1 <2mm	TMF	Overburden	6.15	6.4	0.18	0.96	0.5	6.64	0.7	#N/A	#N/A
TP12-2 <2mm	TMF	Overburden	7.58	6.4	0.17	1	0.4	5.93	0.6	#N/A	#N/A
TP15-4 <2mm	TMF	Overburden	7.78	6.7	0.14	0.96	0.3	6.6	0.7	#N/A	#N/A
TP2 <2mm	TMF	Overburden	8.18	6.7	0.21	1.19	0.5	6.24	0.6	#N/A	#N/A
TP26-1 <2mm	TMF	Overburden	7.91	6.9	0.16	1.09	0.5	5.68	0.6	#N/A	#N/A
TP27-1 <2mm	TMF	Overburden	6.48	7	0.15	1.04	0.5	4	0.4	#N/A	#N/A
TP29-1 <2mm	TMF	Overburden	6.7	7.2	0.71	2.75	1.1	9.78	1	#N/A	#N/A
TP30-1 <2mm	TMF	Overburden	5.14	4.5	0.14	0.65	0.5	4.35	0.4	#N/A	#N/A
TP30-2 <2mm	TMF	Overburden	6.68	6	0.21	0.8	0.4	8.63	0.9	#N/A	#N/A
TP32-1 <2mm	TMF	Overburden	8.09	8.9	0.18	1.5	1.3	11.4	1.2	#N/A	#N/A
TP51-3 <2mm	TMF	Overburden	7.24	12.1	0.24	3.87	0.1	4.87	0.6	#N/A	#N/A

Table B3-3. Soil Geochemistry: Exploration Total Copper Concentration

Sort	GRID	Northing UTM	Easting UTM	SAMPLE	Cu
1	1	5,710,990	310,257	39200E3000N	52
2	1	5,711,014	310,245	39200E3025N	32
3	1	5,711,026	310,239	39200E3050N	30
4	1	5,711,049	310,239	39200E3075N	42
5	1	5,711,067	310,235	39200E3100N	60
6	1	5,711,092	310,227	39200E3125N	21
7	1	5,711,115	310,221	39200E3150N	
8	1	5,711,137	310,216	39200E3175N	58
9	1	5,711,161	310,209	39200E3200N	33
10	1	5,711,186	310,201	39200E3225N	31
11	1	5,711,209	310,192	39200E3250N	61
12	1	5,711,230	310,185	39200E3275N	42
13	1	5,711,253	310,178	39200E3300N	31
14	1	5,711,278	310,170	39200E3325N	28
15	1	5,711,301	310,161	39200E3350N	64
16	1	5,711,326	310,155	39200E3375N	51
17	1	5,711,347	310,146	39200E3400N	39
18	1	5,711,371	310,138	39200E3425N	40
19	1	5,711,393	310,131	39200E3450N	59
20	1	5,711,419	310,124	39200E3475N	87
21	1	5,711,438	310,119	39200E3500N	63
22	1	5,711,461	310,111	39200E3525N	56
23	1	5,711,482	310,105	39200E3550N	63
24	1	5,711,504	310,100	39200E3575N	154
25	1	5,711,528	310,095	39200E3600N	112
26	1	5,711,038	310,434	39400E3000N	21
27	1	5,711,056	310,429	39400E3025N	57
28	1	5,711,076	310,420	39400E3050N	19
29	1	5,711,093	310,418	39400E3075N	41
30	1	5,711,116	310,414	39400E3100N	25
31	1	5,711,139	310,410	39400E3125N	43
32	1	5,711,160	310,398	39400E3150N	85
33	1	5,711,188	310,394	39400E3175N	33
34	1	5,711,210	310,388	39400E3200N	22
35	1	5,711,234	310,380	39400E3225N	30
36	1	5,711,257	310,372	39400E3250N	37
37	1	5,711,283	310,366	39400E3275N	33
38	1	5,711,304	310,361	39400E3300N	82
39	1	5,711,329	310,355	39400E3325N	116
40	1	5,711,348	310,349	39400E3350N	51
41	1	5,711,372	310,341	39400E3375N	42
42	1	5,711,396	310,334	39400E3400N	50
43	1	5,711,421	310,327	39400E3425N	
44	1	5,711,440	310,320	39400E3450N	48

Table B3-4. Eco-Risk Soil Samples Extractable Metal Concentrations

			Physical Tests	Metals														
Sample ID	Date Sampled	Time Sampled	pH (1:2 soil:water)	Aluminum (Al)	Antimony (Sb)	Arsenic (As)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Cadmium (Cd)	Calcium (Ca)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Lithium (Li)	Magnesium (Mg)	Manganese (Mn)
HC12-01 0304022 5709585	21-AUG-12	12:00	5.59	17,300	0.35	28.8	63.40	0.38	0.99	0.48	1370	19.80	13.50	139.0	36,100	23.20	11.80	7,180	509.00
HC12-02 0303619 5709313	21-AUG-12	13:48	4.66	8,820	0.28	6.7	59.20	<0.20	0.85	0.23	1130	8.68	3.83	62.9	28,300	17.60	5.10	2,540	864.00
HC12-03 0303378 5708771	21-AUG-12	15:14	5.44	15,100	0.12	2.9	62.30	0.34	0.29	0.34	1650	9.32	8.70	17.8	21,200	9.89	12.10	3,260	788.00
HC12-04 0303726 5708956	22-AUG-12	11:05	4.20	7,170	0.62	16.7	108.00	<0.20	0.30	0.21	2210	6.66	4.87	29.0	17,900	17.30	6.40	1,270	160.00
HC12-05 0304235 5709282	22-AUG-12	12:45	5.94	12,300	0.54	51.7	80.20	<0.20	1.30	0.16	3070	15.70	5.58	54.9	40,800	40.00	7.70	4,200	589.00
HC12-06 0304673 5709227	22-AUG-12	14:00	4.83	11,000	0.24	26.8	52.80	<0.20	0.75	0.21	1460	22.60	6.22	114.0	31,600	22.90	7.80	5,090	346.00
HC12-07 0305019 5709486	22-AUG-12	15:18	5.31	22,800	0.33	26.5	48.40	0.39	1.25	0.24	563	52.60	14.70	256.0	55,400	21.40	13.90	10,600	416.00
HC12-08 0305372 5709277	23-AUG-12	11:56	4.93	18,700	<0.10	3.6	29.10	0.21	0.40	0.08	228	9.21	1.63	21.6	19,200	9.26	6.30	1,640	191.00
HC12-09 0305909 5709806	23-AUG-12	13:03	4.37	5,180	<0.10	3.1	41.30	<0.20	0.40	0.05	284	6.05	1.47	13.5	11,200	8.02	<5.0	767	81.10
HC12-10 0305689 5710097	23-AUG-12	13:39	5.06	6,980	0.13	7.2	57.10	<0.20	0.67	0.40	1770	15.60	5.04	36.1	18,700	27.30	<5.0	2,300	277.00
HC12-11 0305722 5710505	23-AUG-12	14:13	5.23	14,700	<0.10	4.2	46.60	0.47	0.28	0.32	753	10.40	5.90	49.9	18,400	32.10	6.20	2,320	407.00
HC12-12 0306188 5710724	23-AUG-12	14:52	5.02	6,870	<0.10	5.8	36.10	<0.20	0.26	0.34	1440	8.94	2.13	15.5	10,100	21.90	<5.0	1,810	65.40
HC12-13 0306363 5711147	24-AUG-12	11:35	5.01	15,600	0.18	14.9	128.00	0.56	0.38	0.31	2070	20.60	10.60	32.3	26,800	38.30	12.30	2,540	1620.00
HC12-14 0306906 5711421	24-AUG-12	12:30	5.11	22,700	0.23	12.4	60.20	0.46	0.35	0.16	366	38.10	12.30	22.6	40,800	51.90	12.70	3,910	557.00
HC12-15 0306949 5712860	24-AUG-12	13:43	6.29	15,100	0.40	19.9	85.30	0.47	0.54	0.13	1570	26.30	12.40	53.2	39,700	47.30	14.10	4,950	854.00
	=MEDIAN		5.06	14,700	0.3	12.4	59.2	0.4	0.4	0.2	1440	15.6	5.9	36.1	26,800	22.9	9.8	2,540	416.0
	=MAX		6.29	22,800	0.6	51.7	128.0	0.6	1.3	0.5	3070	52.6	14.7	256.0	55,400	51.9	14.1	10,600	1620.0
	=MIN		4.20	5,180	0.1	2.9	29.1	0.2	0.3	0.1	228	6.1	1.5	13.5	10,100	8.0	5.1	767	65.4
	=AVERAGE		5.13	13,355	0.3	15.4	63.9	0.4	0.6	0.2	1329	18.0	7.3	61.2	27,747	25.9	9.7	3,625	515.0
	=STDEV		0.55	5,661	0.2	13.6	26.8	0.1	0.4	0.1	799	13.0	4.5	64.8	12,821	13.6	3.4	2,570	402.5

Texture [1] - particle size breaks are not conventional to CSSC/CanSIS textural class boundaries
Yellow highlighting exceeds CCME industrial land use criteria guidelines
Pink highlighting exceeds CSR industrial land use criteria guidelines

Table B3-4. Eco-Risk Soil Samples Extractable Metal Concentrations

Sample ID	Date Sampled	Time Sampled	Metals														
			Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Phosphorus (P)	Potassium (K)	Selenium (Se)	Silver (Ag)	Sodium (Na)	Strontium (Sr)	Thallium (Tl)	Tin (Sn)	Titanium (Ti)	Uranium (U)	Vanadium (V)	Zinc (Zn)
HC12-01 0304022 5709585	21-AUG-12	12:00	0.04	0.80	20.40	436.00	760.00	0.58	0.29	<100	8.24	0.08	<2.0	247.00	0.77	33.10	175.00
HC12-02 0303619 5709313	21-AUG-12	13:48	0.08	1.07	6.12	668.00	690.00	0.31	0.64	<100	6.56	0.11	<2.0	472.00	0.72	38.90	60.00
HC12-03 0303378 5708771	21-AUG-12	15:14	0.05	1.04	4.30	287.00	330.00	<0.20	0.14	140.00	9.15	0.06	<2.0	666.00	1.40	45.30	75.50
HC12-04 0303726 5708956	22-AUG-12	11:05	0.09	1.17	3.34	405.00	720.00	<0.20	0.61	<100	9.21	0.11	<2.0	89.80	0.46	36.60	37.90
HC12-05 0304235 5709282	22-AUG-12	12:45	0.02	1.48	9.90	530.00	1030.00	0.28	0.24	100.00	11.50	0.10	<2.0	154.00	0.48	47.30	140.00
HC12-06 0304673 5709227	22-AUG-12	14:00	0.04	2.04	13.40	368.00	640.00	0.27	0.39	<100	7.82	0.06	<2.0	521.00	0.49	46.80	76.30
HC12-07 0305019 5709486	22-AUG-12	15:18	0.03	1.59	40.30	491.00	720.00	0.75	<0.10	<100	4.47	0.08	<2.0	192.00	0.68	41.80	121.00
HC12-08 0305372 5709277	23-AUG-12	11:56	0.05	0.96	2.46	405.00	310.00	0.25	0.40	<100	3.05	0.08	<2.0	461.00	0.58	44.70	15.50
HC12-09 0305909 5709806	23-AUG-12	13:03	0.05	0.66	3.51	306.00	240.00	<0.20	0.82	<100	4.36	<0.050	<2.0	292.00	0.32	20.40	13.00
HC12-10 0305689 5710097	23-AUG-12	13:39	0.10	0.62	12.80	493.00	290.00	0.28	0.78	<100	9.75	0.07	<2.0	153.00	0.50	19.30	76.00
HC12-11 0305722 5710505	23-AUG-12	14:13	0.08	1.02	10.40	623.00	280.00	0.72	0.46	<100	6.35	0.05	<2.0	217.00	2.03	22.30	56.20
HC12-12 0306188 5710724	23-AUG-12	14:52	0.04	<0.50	7.64	289.00	320.00	<0.20	0.58	<100	8.75	<0.050	<2.0	280.00	0.75	17.00	38.50
HC12-13 0306363 5711147	24-AUG-12	11:35	0.07	0.83	29.40	874.00	760.00	<0.20	0.66	130.00	17.00	0.12	<2.0	283.00	2.24	29.60	90.30
HC12-14 0306906 5711421	24-AUG-12	12:30	0.08	1.22	23.70	522.00	720.00	0.28	0.39	<100	4.61	0.08	<2.0	325.00	0.87	35.20	73.30
HC12-15 0306949 5712860	24-AUG-12	13:43	0.01	1.30	30.90	1020.00	2030.00	0.78	0.12	240.00	18.40	0.09	<2.0	85.80	2.19	15.70	89.90
	=MEDIAN		0.1	1.1	10.4	491.0	690.0	0.3	0.4	135.0	8.2	0.1	#NUM!	280.0	0.7	35.2	75.5
	=MAX		0.1	2.0	40.3	1020.0	2030.0	0.8	0.8	240.0	18.4	0.1	0.0	666.0	2.2	47.3	175.0
	=MIN		0.0	0.6	2.5	287.0	240.0	0.3	0.1	100.0	3.1	0.1	0.0	85.8	0.3	15.7	13.0
	=AVERAGE		0.1	1.1	14.6	514.5	656.0	0.5	0.5	152.5	8.6	0.1	#DIV/0!	295.9	1.0	32.9	75.9
	=STDEV		0.0	0.4	11.7	210.3	451.2	0.2	0.2	60.8	4.4	0.0	#DIV/0!	167.7	0.7	11.5	44.3

Texture [1] - particle size breaks are not conventional to CSSC/CanSIS textural class boundaries
Yellow highlighting exceeds CCME industrial land use criteria guidelines
Pink highlighting exceeds CSR industrial land use criteria guidelines

Appendix C

Soil and Land Management Unit Map Attributes

C1-1. Soil and Land Management Unit Map Polygon Attributes

C1-2. Inspection Point Attributes

Appendix C-1

Soil and Land Management Unit Map Polygon Attributes

Table C1-1. Soil and Land Management Unit Map Polygon Attributes

Poly ID	BECsbzVar	Dec 1	Soil 1	Dec 2	Soil 2	Dec 3	Soil 3	Area (m^2)	Area (ha)	Inspections (#)	Dec1 _LMU	LMU _1	Dec2 _LMU	LMU _2	Dec3 _LMU	LMU _3
1	ESSFwc2	7	C3_P	3	M3_P	0		110,956	11.1	1	7	5	3	1	0	0
2	ESSFwc2	5	C4_P	5	R1_n	0		25,250	2.5	0	5	5	5	13	0	0
3	ESSFwc2	7	C3_P	3	R1_n	0		92,406	9.2	0	7	5	3	13	0	0
4	ESSFwc2	7	C3_P	3	R1_n	0		20,763	2.1	0	7	5	3	13	0	0
5	ESSFwc2	7	C3_P.li	3	R1_n	0		75,236	7.5	0	7	5	3	13	0	0
6	ESSFwc2	6	C4_P	4	M3_P	0		71,994	7.2	0	6	5	4	1	0	0
7	ESSFwc2	6	C4_P	4	D3_B.li	0		511	0.1	0	6	5	4	3	0	0
8	ICHwk1	10	C4_P	0		0		12,105	1.2	0	10	5	0	0	0	0
9	ESSFwc2	8	M3_P	2	C1_P.li	0		62,191	6.2	0	8	1	2	5	0	0
10	ESSFwc2	6	M4_P	4	O7_M	0		192,305	19.2	0	6	1	4	4	0	0
11	ESSFwc2	6	M4_P	2	O7_M	2	G3_P	3,208,652	320.9	13	6	1	2	4	2	9
12	ESSFwc2	10	M4_P	0		0		53,596	5.4	0	10	1	0	0	0	0
13	ESSFwc2	8	M4_P	2	G4_P	0		375,012	37.5	1	8	1	2	9	0	0
14	ESSFwcw	8	M4_P	2	G5_P.g	0		372,280	37.2	0	8	1	2	9	0	0
15	ESSFwc2	8	M3_P.li	2	D4_B.li	0		28,857	2.9	0	8	1	2	3	0	0
16	ESSFwc2	6	F6_G.p	4	O7_M	0		42,430	4.2	1	6	12	4	4	0	0
17	IDFmw2	8	An_n	2	C3_B	0		75,839	7.6	1	8	14	2	5	0	0
18	ESSFwc2	8	C3_P	2	C4_P	0		59,590	6.0	0	8	5	2	5	0	0
19	ESSFwc2	8	C4_P	2	M3_P.li	0		301,565	30.2	1	8	5	2	1	0	0
20	ESSFwc2	5	C3_P	5	M3_P	0		250,611	25.1	0	5	5	5	1	0	0
21	ESSFwc2	10	C3_P	0		0		22,103	2.2	0	10	5	0	0	0	0
22	ESSFwcw	7	C4_P	3	M3_P	0		48,002	4.8	0	7	5	3	1	0	0
23	ESSFwcw	10	C3_P	0		0		74,571	7.5	0	10	5	0	0	0	0
24	ESSFwcw	10	C4_P	0		0		52,663	5.3	0	10	5	0	0	0	0
25	ESSFwc2	7	C3_P	3	R1_n	0		59,438	5.9	0	7	5	3	13	0	0
26	ESSFwcw	10	C3_P	0		0		39,442	3.9	0	10	5	0	0	0	0
27	ESSFwc2	7	C3_P.li	3	R1_n	0		124,861	12.5	0	7	5	3	13	0	0
28	ESSFwc2	10	C4_p	0		0		23,171	2.3	0	10	5	0	0	0	0
29	ESSFwc2	10	C4_P	0		0		36,207	3.6	0	10	5	0	0	0	0
30	ICHmw3	7	C4_P	3	R5_B	0		79,591	8.0	0	7	5	3	13	0	0
31	ESSFwc2	5	C1_P	5	R0_n	0		26,285	2.6	0	5	5	5	13	0	0
32	ESSFwc2	5	C4_P	5	M4_P	0		196,916	19.7	1	5	5	5	1	0	0
33	ESSFwc2	10	C3_P	0		0		127,449	12.7	0	10	5	0	0	0	0
34	ESSFwc2	8	C3_P	2	C3_P.li	0		186,022	18.6	0	8	5	2	5	0	0
35	ESSFwc2	10	C3_P	0		0		114,566	11.5	0	10	5	0	0	0	0
36	ICHwk1	10	C4_P	0		0		33,794	3.4	0	10	5	0	0	0	0
37	ESSFwc2	10	C3_P.li	0		0		114,187	11.4	0	10	5	0	0	0	0
38	ESSFwc2	10	C3_P.li	0		0		53,065	5.3	1	10	5	0	0	0	0
39	ICHdw3	10	C2_B.li	0		0		25,798	2.6	0	10	5	0	0	0	0
40	ICHmw3	8	C4_P.li	2	M3_P	0		237,677	23.8	2	8	5	2	1	0	0
41	IDFmw2	5	C2_B.li	5	M2_P	0		114,018	11.4	0	5	5	5	1	0	0
42	ICHdw3	5	C4_P.li	5	M4_P	0		266,479	26.6	0	5	5	5	1	0	0
43	ESSFwc2	7	D4_B.li	3	M1_B.li	0		20,455	2.0	0	7	3	3	1	0	0
44	ESSFwc2	8	D4_B.li	2	M3_P	0		433,093	43.3	2	8	3	2	1	0	0
45	ESSFwc2	6	G4_P	4	C5_P.g	0		21,479	2.1	0	6	9	4	6	0	0
46	IDFmw2	5	An_n	3	G2_B	2	C1_R	34,603	3.5	0	5	14	3	9	2	5
47	IDFmw2	10	G3_B.dy	0		0		50,621	5.1	0	10	9	0	0	0	0
48	IDFmw2	5	G2_B.dy	5	C3_B	0		38,729	3.9	2	5	9	5	5	0	0
49	IDFmw2	10	G2_B.dy	0		0		63,755	6.4	0	10	9	0	0	0	0
50	ICHdw3	7	G4_B.dy	3	C5_B.g	0		204,752	20.5	1	7	9	3	6	0	0
51	ICHdw3	8	G4_B.dy	2	C3_B	0		178,643	17.9	0	8	9	2	5	0	0
52	IDFmw2	5	G2_B.dy	5	C3_B	0		71,676	7.2	0	5	9	5	5	0	0
53	IDFmw2	10	LG3_L	0		0		89,946	9.0	0	10	8	0	0	0	0
54	IDFmw2	5	LG2_L	5	M3_B	0		48,643	4.9	0	5	8	5	1	0	0
55	IDFmw2	6	LG3_L	4	Mn_n	0		38,864	3.9	0	6	8	4	2	0	0
56	ICHwk1	8	M4_P	2	C5_R	0		64,164	6.4	0	8	1	2	6	0	0

Table C1-1. Soil and Land Management Unit Map Polygon Attributes

Poly ID	BECsbzVar	Dec 1	Soil 1	Dec 2	Soil 2	Dec 3	Soil 3	Area (m^2)	Area (ha)	Inspections (#)	Dec1 _LMU	LMU _1	Dec2 _LMU	LMU _2	Dec3 _LMU	LMU _3
57	ICHdw3	5	M4_L	3	C4_B	2	G4_B	174,190	17.4	0	5	7	3	5	2	9
58	IDFmw2	8	M4_B.g	2	C3_B	0		22,446	2.2	0	8	1	2	5	0	0
59	ESSFwc2	5	C4_P.li	5	M3_P	0		36,484	3.6	0	5	5	5	1	0	0
60	ESSFwc2	6	M3_P	4	C1_P.li	0		442	0.0	0	6	1	4	5	0	0
61	ESSFwc2	6	M3_P	4	C1_P.li	0		124,097	12.4	0	6	1	4	5	0	0
62	IDFmw2	10	M3_L	0		0		37,922	3.8	0	10	7	0	0	0	0
63	ICHmw3	10	M4_P	0		0		192,384	19.2	0	10	1	0	0	0	0
64	ESSFwc2	7	M4_P	3	O7_M	0		58,910	5.9	0	7	1	3	4	0	0
65	ESSFwcw	6	M4_P	4	O7_M	0		31,253	3.1	0	6	1	4	4	0	0
66	ESSFwc2	6	M4_P	4	C3_P.li	0		365,564	36.6	0	6	1	4	5	0	0
67	ESSFwc2	8	M3_P.li	2	C1_P.li	0		85,275	8.5	0	8	1	2	5	0	0
68	ESSFwc2	8	M3_P.li	2	D1_R	0		391,698	39.2	1	8	1	2	3	0	0
69	ESSFwc2	10	M3_P.li	0		0		40,055	4.0	0	10	1	0	0	0	0
70	ESSFwc2	5	M3_P.li	5	D3_B.li	0		433,950	43.4	0	5	1	5	3	0	0
71	ESSFwc2	10	M3_P.li	0		0		11,004	1.1	0	10	1	0	0	0	0
72	ESSFwc2	10	M3_P.li	0		0		66,818	6.7	0	10	1	0	0	0	0
73	ESSFwc2	10	M3_P.li	0		0		1,329	0.1	0	10	1	0	0	0	0
74	ESSFwc2	10	M3_P.li	0		0		8,861	0.9	0	10	1	0	0	0	0
75	ESSFwc2	8	M3_P.li	2	D1_B.li	0		50,198	5.0	0	8	1	2	3	0	0
76	ICHmw3	6	M4_P.li	4	C5_P.g	0		24,830	2.5	0	6	1	4	6	0	0
77	ESSFwcp	10	O7_M	0		0		11,203	1.1	0	10	4	0	0	0	0
78	ESSFwc2	6	O7_M	4	M4_P	0		101,384	10.1	0	6	4	4	1	0	0
79	ESSFwc2	8	C3_P	2	M1_P.li	0		148,240	14.8	0	8	5	2	1	0	0
80	ESSFwcp	8	C3_P	2	M2_P	0		38,390	3.8	0	8	5	2	1	0	0
81	ESSFwcp	10	C2_P	0		0		41,958	4.2	0	10	5	0	0	0	0
82	ESSFwcw	10	C3_P	0		0		51,793	5.2	0	10	5	0	0	0	0
83	ESSFwcw	10	C4_P	0		0		35,544	3.6	0	10	5	0	0	0	0
84	ESSFwc2	8	C3_P.li	2	M3_P	0		46,918	4.7	0	8	5	2	1	0	0
85	ESSFwc2	10	C3_P	0		0		21,157	2.1	0	10	5	0	0	0	0
86	ESSFwc2	6	C3_B	4	M4_B	0		112,418	11.2	0	6	5	4	1	0	0
87	ESSFwc2	8	C3_B	2	M4_B	0		34,381	3.4	0	8	5	2	1	0	0
88	ICHwk1	8	C3_B.li	2	M4_B	0		46,540	4.7	0	8	5	2	1	0	0
89	ICHwk1	8	C4_B	2	M5_B.g	0		43,131	4.3	0	8	5	2	2	0	0
90	ICHwk1	8	C4_B	2	M5_G	0		42,116	4.2	0	8	5	2	2	0	0
91	ICHwk1	10	C4_P	0		0		9,966	1.0	0	10	5	0	0	0	0
92	ESSFwc2	5	C4_P	5	M3_P	0		184,172	18.4	0	5	5	5	1	0	0
93	ESSFwc2	8	C3_P.li	2	R1_n	0		116,180	11.6	0	8	5	2	13	0	0
94	ESSFwc2	8	C3_P	2	R1_n	0		81,241	8.1	0	8	5	2	13	0	0
95	ICHmw3	4	C4_P	4	M3_P.li	2	M5_P.g	70,891	7.1	0	4	5	4	1	0	2
96	ICHwk1	8	C4_P	2	M3_P	0		9,511	1.0	0	8	5	2	1	0	0
97	ESSFwc2	5	C4_P	5	M3_P	0		18,256	1.8	0	5	5	5	1	0	0
98	ESSFwc2	6	C3_P	4	R1_n	0		98,895	9.9	0	6	5	4	13	0	0
99	ESSFwcw	10	C3_P	0		0		20,582	2.1	0	10	5	0	0	0	0
100	ICHwk1	6	C4_P	4	D3_P.li	0		54,971	5.5	0	6	5	4	3	0	0
101	ICHdw3	6	C4_B	4	F5_R.g	0		59,765	6.0	0	6	5	4	12	0	0
102	ESSFwc2	8	C4_B	2	F5_G	0		23,024	2.3	0	8	5	2	12	0	0
103	ESSFwc2	6	C4_P.g	4	F6_G	0		42,241	4.2	0	6	5	4	12	0	0
104	ESSFwc2	7	C4_P	3	F5_R.g	0		20,553	2.1	0	7	5	3	12	0	0
105	ESSFwc2	10	C3_P	0		0		38,963	3.9	0	10	5	0	0	0	0
106	ESSFwcw	10	C3_P	0		0		41,875	4.2	0	10	5	0	0	0	0
107	ESSFwcw	10	C4_P	0		0		28,179	2.8	0	10	5	0	0	0	0
108	ESSFwcw	10	C4_P	0		0		51,988	5.2	0	10	5	0	0	0	0
109	ICHdw3	5	C4_B.li	5	M3_B	0		186,842	18.7	0	5	5	5	1	0	0
110	ICHmw3	10	C4_P.li	0		0		36,731	3.7	0	10	5	0	0	0	0
111	ESSFwc2	6	D3_B.li	4	M3_P	0		114,165	11.4	0	6	3	4	1	0	0
112	ESSFwc2	10	F5_P.g	0		0		27,014	2.7	1	10	12	0	0	0	0

Table C1-1. Soil and Land Management Unit Map Polygon Attributes

Poly ID	BECsbzVar	Dec 1	Soil 1	Dec 2	Soil 2	Dec 3	Soil 3	Area (m^2)	Area (ha)	Inspections (#)	Dec1 _LMU	LMU _1	Dec2 _LMU	LMU _2	Dec3 _LMU	LMU _3
113	ICHmw3	10	M4_P	0		0		30,209	3.0	0	10	1	0	0	0	0
114	ESSFwc2	6	M4_P	4	C3_B	0		813	0.1	0	6	1	4	5	0	0
115	ICHdw3	5	M3_L	5	C0_n	0		20,962	2.1	0	5	7	5	5	0	0
116	ICHdw3	5	M4_P	3	C3_P	2	M5_G	364,383	36.4	0	5	1	3	5	2	2
117	ICHdw3	5	M4_B	3	C3_B.li	2	M5_G	61,269	6.1	0	5	1	3	5	2	2
118	IDFmw2	4	M4_B.g	4	M3_B	2	C2_B	78,574	7.9	0	4	1	4	1	0	5
119	ESSFwc2	7	M3_P	3	D1_B.li	0		95,832	9.6	1	7	1	3	3	0	0
120	ESSFwc2	8	M3_P	2	D1_B.li	0		94,146	9.4	0	8	1	2	3	0	0
121	ESSFwc2	10	M4_P	0		0		20,846	2.1	0	10	1	0	0	0	0
122	ESSFwcw	7	M4_P	3	D3_B.li	0		38,304	3.8	0	7	1	3	3	0	0
123	ESSFwcw	8	M4_P	2	D3_B.li	0		39,848	4.0	0	8	1	2	3	0	0
124	ICHdw3	5	M4_L	5	G3_B	0		80,094	8.0	0	5	7	5	9	0	0
125	ICHdw3	6	M4_L	4	G4_B	0		753,521	75.4	1	6	7	4	9	0	0
126	IDFmw2	10	M3_L	0		0		84,113	8.4	0	10	7	0	0	0	0
127	IDFmw2	6	M2_L	4	LG4_L	0		204,252	20.4	1	6	7	4	8	0	0
128	ESSFwc2	8	M3_P.li	2	C4_P	0		371,522	37.2	3	8	1	2	5	0	0
129	ESSFwc2	10	M3_P.li	0		0		25,388	2.5	1	10	1	0	0	0	0
130	ESSFwc2	8	M4_P	2	F5_G.p	0		84,239	8.4	1	8	1	2	12	0	0
131	ESSFwc2	8	M4_P	2	F4_P	0		1,385,633	138.6	21	8	1	2	10	0	0
132	ESSFwcw	6	M4_P	4	F3_B	0		225,629	22.6	0	6	1	4	10	0	0
133	ESSFwcw	6	M4_P	4	M5_P.g	0		208,165	20.8	2	6	1	4	2	0	0
134	ESSFwc2	6	M4_P.li	2	M6_G	2	O7_M	143,731	14.4	0	6	1	2	2	2	4
135	ESSFwc2	10	M4_P	0		0		1,112,385	111.2	9	10	1	0	0	0	0
136	ESSFwcw	6	M3_P.li	4	C4_P	0		72,144	7.2	0	6	1	4	5	0	0
137	ICHmw3	6	M3_P.li	4	C3_P.li	0		163,435	16.3	0	6	1	4	5	0	0
138	ESSFwc2	6	M3_P.li	4	C3_P.li	0		127,100	12.7	1	6	1	4	5	0	0
139	ESSFwc2	10	M4_P.li	0		0		76,433	7.6	0	10	1	0	0	0	0
140	IDFmw2	5	M1_B	5	D3_B	0		29,507	3.0	0	5	1	5	3	0	0
141	IDFmw2	10	M1_B.e	0		0		23,621	2.4	0	10	1	0	0	0	0
142	ESSFwcp	5	O7_M	5	D5_P.g	0		33,019	3.3	0	5	4	5	3	0	0
143	ESSFwcw	4	M5_B.g	3	O7_M	3	D3_B.li	20,499	2.0	0	4	2	3	4	3	3
144	ESSFwc2	6	R1_n	4	C3_P	0		59,667	6.0	1	6	13	4	5	0	0
145	ICHmw3	6	C2_P	4	F5_R.g	0		44,845	4.5	2	6	5	4	12	0	0
146	ICHmw3	5	C4_P	5	R1_n	0		68,002	6.8	0	5	5	5	13	0	0
147	ICHmw3	7	C3_P	3	C3_P.li	0		107,279	10.7	0	7	5	3	5	0	0
148	ICHwk1	8	C4_P.li	2	D3_R.li	0		39,229	3.9	0	8	5	2	3	0	0
149	ICHmw3	7	C4_P	3	F5_R.g	0		23,205	2.3	0	7	5	3	12	0	0
150	IDFmw2	10	C5_G	0		0		45,620	4.6	0	10	6	0	0	0	0
151	ESSFwc2	8	C3_P.li	2	F1_R	0		94,655	9.5	0	8	5	2	11	0	0
152	ESSFwc2	5	C4_P	5	M5_P.g	0		117,189	11.7	0	5	5	5	2	0	0
153	ESSFwcp	7	D2_P	3	M3_P	0		54,062	5.4	0	7	3	3	1	0	0
154	ESSFwcw	5	D3_B.li	5	M4_P	0		48,757	4.9	0	5	3	5	1	0	0
155	IDFmw2	7	G3_B	3	M3_L	0		100,281	10.0	0	7	9	3	7	0	0
156	ICHdw3	7	G3_B.dy	3	C3_B	0		100,851	10.1	0	7	9	3	5	0	0
157	ICHdw3	7	G4_B.dy	3	C4_B	0		117,642	11.8	0	7	9	3	5	0	0
158	IDFmw2	5	M3_L	5	C2_B	0		55,221	5.5	0	5	7	5	5	0	0
159	ICHdw3	5	M4_L	5	C3_B	0		43,616	4.4	0	5	7	5	5	0	0
160	ICHmw3	5	M4_P	5	C3_P	0		21,639	2.2	0	5	1	5	5	0	0
161	ICHmw3	7	M3_P	3	C3_B	0		28,053	2.8	0	7	1	3	5	0	0
162	ESSFwcw	6	M3_P	4	C4_P	0		290,840	29.1	0	6	1	4	5	0	0
163	ICHdw3	5	M3_L	5	G2_B	0		68,732	6.9	0	5	7	5	9	0	0
164	ICHdw3	7	M3_L	3	G3_B	0		104,724	10.5	0	7	7	3	9	0	0
165	ICHdw3	7	M4_L	3	G4_B	0		306,701	30.7	0	7	7	3	9	0	0
166	IDFmw2	5	M3_L	5	G4_B	0		89,884	9.0	0	5	7	5	9	0	0
167	ESSFwc2	8	M3_P.li	2	C4_P	0		158,224	15.8	0	8	1	2	5	0	0
168	ESSFwc2	8	M3_P.li	2	C4_P	0		37,688	3.8	0	8	1	2	5	0	0

Table C1-1. Soil and Land Management Unit Map Polygon Attributes

Poly ID	BECsbzVar	Dec 1	Soil 1	Dec 2	Soil 2	Dec 3	Soil 3	Area (m^2)	Area (ha)	Inspections (#)	Dec1 _LMU	LMU _1	Dec2 _LMU	LMU _2	Dec3 _LMU	LMU _3
169	ESSFwc2	8	M4_P.li	2	C3_P	0		129,501	13.0	1	8	1	2	5	0	0
170	ESSFwc2	10	M3_P.li	0		0		26,326	2.6	0	10	1	0	0	0	0
171	ESSFwc2	5	M4_P.li	5	D3_B.li	0		136,176	13.6	0	5	1	5	3	0	0
172	ESSFwc2	8	M4_P.li	2	D3_B.li	0		44,082	4.4	0	8	1	2	3	0	0
173	ESSFwc2	7	M1_B.li	3	D1_B.li	0		111,621	11.2	0	7	1	3	3	0	0
174	ESSFwc2	10	O7_M	0		0		24,599	2.5	0	10	4	0	0	0	0
175	ESSFwcw	10	C3_P	0		0		47,288	4.7	0	10	5	0	0	0	0
176	ICHdw3	10	C4_P	0		0		58,618	5.9	0	10	5	0	0	0	0
177	ESSFwc2	10	C3_P	0		0		29,523	3.0	0	10	5	0	0	0	0
178	ESSFwcw	10	C3_P	0		0		58,359	5.8	0	10	5	0	0	0	0
179	ESSFwc2	8	C3_P	2	R1_n	0		21,285	2.1	0	8	5	2	13	0	0
180	ESSFwc2	8	C3_P.li	2	R1_n	0		61,887	6.2	0	8	5	2	13	0	0
181	ESSFwc2	8	C3_P	2	R1_n	0		96,043	9.6	0	8	5	2	13	0	0
182	ESSFwc2	8	C4_P	2	R1_n	0		70,149	7.0	0	8	5	2	13	0	0
183	ESSFwc2	10	C3_P	0		0		20,195	2.0	0	10	5	0	0	0	0
184	ESSFwcp	8	C2_P	2	R1_n	0		13,273	1.3	0	8	5	2	13	0	0
185	ESSFwcw	8	C4_P	2	R3_P.li	0		16,765	1.7	0	8	5	2	13	0	0
186	ESSFwcw	10	C3_P	0		0		44,353	4.4	0	10	5	0	0	0	0
187	ESSFwcw	10	C3_P	0		0		76,202	7.6	0	10	5	0	0	0	0
188	ICHmw3	10	C3_P	0		0		45,499	4.5	0	10	5	0	0	0	0
189	ICHmw3	10	C4_P	0		0		44,810	4.5	0	10	5	0	0	0	0
190	ICHwk1	8	C4_P	2	D3_R.li	0		48,354	4.8	0	8	5	2	3	0	0
191	ICHwk1	8	C4_P	2	D3_R.li	0		2,507	0.3	0	8	5	2	3	0	0
192	ESSFwc2	8	C3_P	2	R1_n	0		44,128	4.4	0	8	5	2	13	0	0
193	ESSFwc2	8	C3_P	2	R1_n	0		54,644	5.5	0	8	5	2	13	0	0
194	ESSFwc2	8	C3_P	2	R1_R	0		90,217	9.0	0	8	5	2	13	0	0
195	ESSFwc2	10	C3_P	0		0		46,966	4.7	0	10	5	0	0	0	0
196	ESSFwc2	10	C3_P	0		0		25,493	2.5	0	10	5	0	0	0	0
197	ICHwk1	6	C3_B.li	2	R2_R	2	C4_B	41,178	4.1	0	6	5	2	13	2	5
198	ICHwk1	6	C4_B.li	2	D3_R	2	C5_B.g	57,125	5.7	0	6	5	2	3	2	6
199	ESSFwc2	10	C4_P	0		0		99,456	9.9	0	10	5	0	0	0	0
200	ESSFwc2	10	C5_P.g	0		0		25,467	2.5	0	10	6	0	0	0	0
201	ICHwk1	6	C5_G	4	C4_P	0		59,801	6.0	0	6	6	4	5	0	0
202	ESSFwc2	10	C4_P	0		0		99,898	10.0	0	10	5	0	0	0	0
203	ESSFwcp	6	C2_P.li	2	C6_G	2	C3_P	37,672	3.8	0	6	5	2	6	2	5
204	ESSFwcp	10	C2_P	0		0		70,395	7.0	0	10	5	0	0	0	0
205	ICHwk1	10	C4_P	0		0		36,151	3.6	0	10	5	0	0	0	0
206	ESSFwcw	10	C5_P.g	0		0		42,497	4.2	0	10	6	0	0	0	0
207	ESSFwcw	10	C5_P.g	0		0		32,231	3.2	0	10	6	0	0	0	0
208	ESSFwc2	6	C4_P.li	4	C3_P.li	0		100,667	10.1	0	6	5	4	5	0	0
209	ESSFwc2	10	C3_P.li	0		0		26,535	2.7	0	10	5	0	0	0	0
210	ESSFwc2	10	C4_P.li	0		0		87,684	8.8	0	10	5	0	0	0	0
211	ESSFwc2	10	C4_P.li	0		0		40,062	4.0	0	10	5	0	0	0	0
212	ESSFwcw	10	C3_P.li	0		0		13,888	1.4	0	10	5	0	0	0	0
213	ESSFwc2	10	C4_P.li	0		0		21,271	2.1	0	10	5	0	0	0	0
214	ESSFwc2	8	C3_P.li	2	M4_P	0		113,297	11.3	0	8	5	2	1	0	0
215	ESSFwc2	8	C3_P.li	2	M3_P	0		182,012	18.2	0	8	5	2	1	0	0
216	ESSFwc2	10	C3_P.li	0		0		26,678	2.7	0	10	5	0	0	0	0
217	ICHmw3	10	C4_P.li	0		0		20,549	2.1	0	10	5	0	0	0	0
218	ICHmw3	10	C4_P.li	0		0		56,011	5.6	0	10	5	0	0	0	0
219	ESSFwc2	6	C3_P.li	4	D1_R	0		50,985	5.1	0	6	5	4	3	0	0
220	ICHwk1	8	C4_P.li	2	D3_R	0		67,007	6.7	4	8	5	2	3	0	0
221	ESSFwc2	8	C3_P.li	2	R1_n	0		89,680	9.0	0	8	5	2	13	0	0
222	ESSFwc2	10	C3_P.li	0		0		34,009	3.4	0	10	5	0	0	0	0
223	ESSFwc2	10	D1_B.li	0		0		35,290	3.5	0	10	3	0	0	0	0
224	ICHmw3	5	F4_B.g	5	M5_B	0		99,634	10.0	0	5	10	5	2	0	0

Table C1-1. Soil and Land Management Unit Map Polygon Attributes

Poly ID	BECsbzVar	Dec 1	Soil 1	Dec 2	Soil 2	Dec 3	Soil 3	Area (m^2)	Area (ha)	Inspections (#)	Dec1 _LMU	LMU _1	Dec2 _LMU	LMU _2	Dec3 _LMU	LMU _3
225	IDFmw2	8	F2_B	2	G4_B	0		71,408	7.1	0	8	10	2	9	0	0
226	IDFmw2	10	F3_B	0		0		43,305	4.3	0	10	10	0	0	0	0
227	ICHdw3	10	F4_B	0		0		94,395	9.4	0	10	10	0	0	0	0
228	IDFmw2	8	G3_B	2	C2_B	0		87,117	8.7	0	8	9	2	5	0	0
229	ICHwk1	6	G4_P	4	R3_n	0		18,628	1.9	0	6	9	4	13	0	0
230	ICHdw3	5	M2_L	5	C3_B	0		84,477	8.4	1	5	7	5	5	0	0
231	ICHwk1	10	M4_P	0		0		2,655	0.3	0	10	1	0	0	0	0
232	ICHwk1	10	M4_P	0		0		4,611	0.5	0	10	1	0	0	0	0
233	ICHmw3	6	M4_P	2	C3_P	2	M5_P.g	94,542	9.5	0	6	1	2	5	2	2
234	ICHwk1	8	M4_P	2	C5_B.g	0		21,269	2.1	0	8	1	2	6	0	0
235	ICHwk1	10	M4_P	0		0		26,400	2.6	0	10	1	0	0	0	0
236	IDFmw2	5	M2_B.li	5	C3_B	0		77,501	7.8	0	5	1	5	5	0	0
237	ESSFwc2	8	M3_P	2	C4_P	0		40,895	4.1	1	8	1	2	5	0	0
238	ICHwk1	8	M4_P	2	C5_P.g	0		27,249	2.7	0	8	1	2	6	0	0
239	ICHdw3	10	M3_L	0		0		140,450	14.0	0	10	7	0	0	0	0
240	ICHdw3	8	M4_L	2	C5_L.g	0		98,991	9.9	0	8	7	2	6	0	0
241	ICHmw3	8	M3_P	2	C5_B.g	0		24,972	2.5	0	8	1	2	6	0	0
242	ICHmw3	8	M4_P	2	C5_P.g	0		73,884	7.4	1	8	1	2	6	0	0
243	ICHmw3	10	M4_P	0		0		45,988	4.6	0	10	1	0	0	0	0
244	ESSFwc2	8	M4_P	2	C4_P	0		189,368	18.9	0	8	1	2	5	0	0
245	ESSFwc2	10	M4_P	0		0		65,425	6.5	0	10	1	0	0	0	0
246	ICHdw3	8	M4_L	2	C5_B	0		150,635	15.1	0	8	7	2	6	0	0
247	ICHmw3	10	M4_P	0		0		56,915	5.7	0	10	1	0	0	0	0
248	ICHmw3	10	M4_P	0		0		25,316	2.5	0	10	1	0	0	0	0
249	ESSFwc2	10	M3_P	0		0		39,815	4.0	0	10	1	0	0	0	0
250	ESSFwc2	10	M4_P	0		0		52,804	5.3	0	10	1	0	0	0	0
251	ESSFwc2	10	M5_P.g	0		0		1,819	0.2	0	10	2	0	0	0	0
252	ESSFwcw	6	M4_P	4	D3_B.li	0		33,431	3.3	0	6	1	4	3	0	0
253	ESSFwcw	6	M4_P	4	D3_Bli	0		6,379	0.6	0	6	1	4	3	0	0
254	ICHdw3	5	M2_L	5	D3_B.li	0		55,723	5.6	0	5	7	5	3	0	0
255	ICHdw3	6	M3_L	4	D4_B	0		134,895	13.5	0	6	7	4	3	0	0
256	ICHdw3	10	M3_L	0		0		192,399	19.2	0	10	7	0	0	0	0
257	ICHmw3	10	M3_P	0		0		66,386	6.6	0	10	1	0	0	0	0
258	ICHmw3	10	M4_P	0		0		7,664	0.8	0	10	1	0	0	0	0
259	ESSFwc2	8	M4_P	2	F7_G	0		21,288	2.1	0	8	1	2	12	0	0
260	ESSFwc2	10	M4_P	0		0		54,920	5.5	0	10	1	0	0	0	0
261	ICHmw3	8	M4_P	2	F4_R.g	0		267,184	26.7	0	8	1	2	12	0	0
262	ICHdw3	8	M4_L	2	F5_R.g	0		54,633	5.5	0	8	7	2	12	0	0
263	IDFmw2	8	M3_B	2	G3_B	0		105,108	10.5	0	8	1	2	9	0	0
264	ESSFwc2	8	M4_P	2	O7_M	0		136,390	13.6	5	8	1	2	4	0	0
265	ESSFwc2	8	M4_P	2	O7_M	0		547,256	54.7	13	8	1	2	4	0	0
266	ESSFwc2	8	M4_P	2	O7_M	0		415,853	41.6	3	8	1	2	4	0	0
267	ESSFwc2	9	M4_P	1	M6_G.p	0		320,283	32.0	1	9	1	1	2	0	0
268	ESSFwcw	8	M5_P.g	2	O7_M	0		202,490	20.2	0	8	2	2	4	0	0
269	ICHmw3	6	M4_P	2	M5_P.g	2	O7_M	139,142	13.9	0	6	1	2	2	2	4
270	ESSFwcw	8	M4_P	2	D3_P.li	0		87,464	8.7	0	8	1	2	3	0	0
271	ICHdw3	10	M4_L	0		0		35,572	3.6	0	10	7	0	0	0	0
272	ICHmw3	6	M4_P	2	R1_R	2	M5_P.g	40,707	4.1	0	6	1	2	13	2	2
273	ESSFwc2	8	M3_P	2	R1_n	0		48,889	4.9	0	8	1	2	13	0	0
274	ESSFwc2	8	M4_P	2	R1_n	0		33,484	3.3	0	8	1	2	13	0	0
275	ESSFwc2	5	M4_P	5	D3_B.li	0		32,788	3.3	0	5	1	5	3	0	0
276	ESSFwc2	4	M4_P	4	D3_B.li	2	R1_n	805,898	80.6	1	4	1	4	3	0	13
277	ESSFwc2	4	M4_P.li	4	M3_P	2	R1_R	171,039	17.1	1	4	1	4	1	0	13
278	ESSFwc2	7	M4_P.li	3	D3_B.li	0		442,107	44.2	3	7	1	3	3	0	0
279	ESSFwc2	8	M4_P.li	2	R1_n	0		925,855	92.6	2	8	1	2	13	0	0
280	ESSFwc2	8	M4_P.li	2	R1_n	0		216,825	21.7	0	8	1	2	13	0	0

Table C1-1. Soil and Land Management Unit Map Polygon Attributes

Poly ID	BECsbzVar	Dec 1	Soil 1	Dec 2	Soil 2	Dec 3	Soil 3	Area (m^2)	Area (ha)	Inspections (#)	Dec1 _LMU	LMU _1	Dec2 _LMU	LMU _2	Dec3 _LMU	LMU _3
281	ESSFwc2	8	M4_P.li	2	R1_n	0		366,415	36.6	12	8	1	2	13	0	0
282	ESSFwc2	8	M4_P.li	2	R1_n	0		63,454	6.3	0	8	1	2	13	0	0
283	ESSFwc2	8	M4_P.li	2	D3_B.li	0		346,154	34.6	6	8	1	2	3	0	0
284	ESSFwc2	8	M3_P.li	2	D2_P.li	0		248,998	24.9	0	8	1	2	3	0	0
285	ESSFwc2	10	M4_P	0		0		627,462	62.7	0	10	1	0	0	0	0
286	ESSFwc2	10	M4_P.li	0		0		599,021	59.9	1	10	1	0	0	0	0
287	ESSFwc2	6	M3_P	2	M5_G	2	M4_P	85,243	8.5	3	6	1	2	2	2	1
288	ESSFwc2	6	M3_P.li	4	C4_P	0		131,070	13.1	0	6	1	4	5	0	0
289	ESSFwc2	10	M3_P.li	0		0		71,204	7.1	5	10	1	0	0	0	0
290	ESSFwc2	10	M4_P.li	0		0		28,564	2.9	0	10	1	0	0	0	0
291	ESSFwc2	8	M4_P.li	2	C4_P.li	0		110,828	11.1	0	8	1	2	5	0	0
292	ICHmw3	10	M4_P.li	0		0		19,666	2.0	0	10	1	0	0	0	0
293	ICHwk1	10	M4_P	0		0		33,710	3.4	0	10	1	0	0	0	0
294	ESSFwc2	8	M4_P.li	2	C4_P.li	0		343,292	34.3	2	8	1	2	5	0	0
295	ESSFwc2	5	M4_P	5	D3_B.li	0		70,554	7.1	0	5	1	5	3	0	0
296	ESSFwc2	6	M4_P.li	4	D3_B.li	0		180,703	18.1	3	6	1	4	3	0	0
297	ESSFwc2	8	M3_P.li	2	D4_B.li	0		190,509	19.1	0	8	1	2	3	0	0
298	ESSFwc2	8	M4_P.li	2	D1_B.li	0		34,050	3.4	0	8	1	2	3	0	0
299	ESSFwc2	8	M4_P	2	D3_B.li	0		139,604	14.0	0	8	1	2	3	0	0
300	ESSFwc2	8	M4_P	2	D5_B.li	0		66,768	6.7	3	8	1	2	3	0	0
301	ESSFwc2	10	M4_P.li	0		0		68,783	6.9	0	10	1	0	0	0	0
302	ESSFwc2	8	M4_P	2	D3_P.li	0		850,546	85.1	0	8	1	2	3	0	0
303	ESSFwc2	10	M4_P	0		0		56,458	5.6	0	10	1	0	0	0	0
304	ESSFwc2	10	M4_P	0		0		30,148	3.0	0	10	1	0	0	0	0
305	ESSFwc2	8	M4_P	2	D4_B.li	0		314,728	31.5	1	8	1	2	3	0	0
306	ESSFwc2	10	M4_P	0		0		66,185	6.6	0	10	1	0	0	0	0
307	ESSFwc2	8	M4_P	2	D3_P.li	0		2,337,031	233.7	25	8	1	2	3	0	0
308	ESSFwc2	8	M4_P.li	2	D4_B.li	0		293,039	29.3	0	8	1	2	3	0	0
309	ESSFwc2	10	M4_P	0		0		10,277	1.0	0	10	1	0	0	0	0
310	ESSFwc2	10	M4_P	0		0		6	0.0	0	10	1	0	0	0	0
311	ESSFwcp	6	D2_P.li	2	M6_G	2	M3_P	2,263	0.2	0	6	3	2	2	2	1
312	ESSFwcp	6	D2_P.li	2	M6_G	2	M3_P	53,624	5.4	0	6	3	2	2	2	1
313	ESSFwcp	8	M2_P	2	D3_P	0		53,538	5.4	0	8	1	2	3	0	0
314	ICHmw3	8	M4_P	2	D3_B.li	0		182,839	18.3	0	8	1	2	3	0	0
315	ESSFwc2	10	M4_P.g	0		0		33,634	3.4	0	10	1	0	0	0	0
316	ICHdw3	8	M4_P.li	2	M4_P	0		1,022,789	102.3	3	8	1	2	1	0	0
317	ICHmw3	8	M4_P	2	M_P.li	0		673,354	67.3	3	8	1	2	1	0	0
318	ESSFwc2	6	M3_P.li	4	M4_P	0		161,661	16.2	1	6	1	4	1	0	0
319	ESSFwc2	10	M4_P	0		0		191,110	19.1	9	10	1	0	0	0	0
320	ESSFwc2	10	M4_P.li	0		0		291,441	29.1	0	10	1	0	0	0	0
321	ICHmw3	10	M4_P.li	0		0		719,983	72.0	1	10	1	0	0	0	0
322	ESSFwcw	6	M4_P.li	2	M5_P.g	2	O7_M	1,410,968	141.1	0	6	1	2	2	2	4
323	ESSFwc2	8	M4_P.li	2	R1_n	0		109,422	10.9	1	8	1	2	13	0	0
324	ESSFwcw	10	M3_P.li	0		0		81,953	8.2	1	10	1	0	0	0	0
325	ESSFwcw	5	M4_P.li	5	M4_P	0		21,971	2.2	0	5	1	5	1	0	0
326	ESSFwc2	8	O7_M	2	F5_B.g	0		25,978	2.6	2	8	4	2	12	0	0
327	ESSFwc2	6	O7_M	4	F4_B	0		77,075	7.7	1	6	4	4	10	0	0
328	ESSFwc2	10	O7_M	0		0		86,067	8.6	3	10	4	0	0	0	0
329	ESSFwc2	8	O7_M	2	ow9_n	0		114,737	11.5	0	8	4	2	15	0	0
330	ESSFwc2	10	O7_M	0		0		23,278	2.3	0	10	4	0	0	0	0
331	ESSFwc2	10	O7_M	0		0		150,649	15.1	2	10	4	0	0	0	0
332	ESSFwc2	6	R1_n	4	C4_B	0		54,686	5.5	0	6	13	4	5	0	0
333	ESSFwc2	7	C5_B.g	3	C3_P	0		68,647	6.9	0	7	6	3	5	0	0
334	ESSFwcp	8	D3_R	2	C2_B.li	0		67,027	6.7	0	8	3	2	5	0	0
335	ESSFwc2	8	D1_n	2	C3_P	0		88,635	8.9	0	8	13	2	5	0	0
336	IDFmw2	10	F3_B	0		0		118,262	11.8	0	10	10	0	0	0	0

Table C1-1. Soil and Land Management Unit Map Polygon Attributes

Poly ID	BECsbzVar	Dec 1	Soil 1	Dec 2	Soil 2	Dec 3	Soil 3	Area (m^2)	Area (ha)	Inspections (#)	Dec1 _LMU	LMU _1	Dec2 _LMU	LMU _2	Dec3 _LMU	LMU _3
337	ICHdw3	10	F4_B.dy	0		0		54,568	5.5	0	10	10	0	0	0	0
338	IDFmw2	10	F4_B.g	0		0		44,086	4.4	0	10	10	0	0	0	0
339	IDFmw2	10	G3_B.dy	0		0		31,040	3.1	0	10	9	0	0	0	0
340	IDFmw2	10	G2_B	0		0		123,952	12.4	1	10	9	0	0	0	0
341	IDFmw2	10	G3_B.dy	0		0		50,593	5.1	0	10	9	0	0	0	0
342	IDFmw2	10	G5_G	0		0		8,258	0.8	1	10	9	0	0	0	0
343	ESSFwc2	10	M4_P	0		0		74,650	7.5	3	10	1	0	0	0	0
344	ICHmw3	9	M3_P	1	D3_P	0		350,223	35.0	1	9	1	1	3	0	0
345	ICHmw3	10	M4_P	0		0		380,163	38.0	0	10	1	0	0	0	0
346	ICHdw3	10	M4_L	0		0		61,142	6.1	0	10	7	0	0	0	0
347	ICHdw3	10	M4_L	0		0		54,880	5.5	0	10	7	0	0	0	0
348	ICHmw3	8	M3_P	2	F7_G	0		159,568	16.0	0	8	1	2	12	0	0
349	ICHmw3	8	M4_P	2	F3_B	0		39,314	3.9	0	8	1	2	10	0	0
350	ICHmw3	10	M4_P	0		0		39,464	3.9	0	10	1	0	0	0	0
351	ICHmw3	10	M4_P	0		0		207,269	20.7	0	10	1	0	0	0	0
352	ICHmw3	10	M4_P	0		0		47,526	4.8	0	10	1	0	0	0	0
353	ICHdw3	10	M4_L	0		0		29,963	3.0	0	10	7	0	0	0	0
354	ICHmw3	9	M3_P	1	F3_B	0		20,176	2.0	0	9	1	1	10	0	0
355	IDFmw2	10	An_n	0		0		35,312	3.5	0	10	14	0	0	0	0
356	IDFmw2	10	An_n	0		0		29,946	3.0	0	10	14	0	0	0	0
357	IDFmw2	10	An_n	0		0		1,379,841	138.0	0	10	14	0	0	0	0
358	IDFmw2	6	G3_B	4	An_n	0		67,810	6.8	0	6	9	4	14	0	0
359	IDFmw2	10	G3_B	0		0		30,250	3.0	0	10	9	0	0	0	0
360	IDFmw2	10	An_n	0		0		105,419	10.5	0	10	14	0	0	0	0
361	IDFmw2	10	An_n	0		0		584,848	58.5	0	10	14	0	0	0	0
362	ESSFwc2	5	C4_P	5	C3_P	0		24,698	2.5	0	5	5	5	5	0	0
363	ESSFwc2	7	C3_P	3	C4_P	0		60,418	6.0	0	7	5	3	5	0	0
364	ESSFwc2	10	C3_P.li	0		0		32,342	3.2	0	10	5	0	0	0	0
365	ESSFwc2	10	C4_P	0		0		22,170	2.2	0	10	5	0	0	0	0
366	ICHmw3	5	C4_P	5	C3_P	0		270,732	27.1	4	5	5	5	5	0	0
367	ICHwk1	10	C4_P	0		0		28,073	2.8	0	10	5	0	0	0	0
368	ICHwk1	10	C4_P	0		0		110,843	11.1	0	10	5	0	0	0	0
369	ICHwk1	10	C4_P	0		0		5,269	0.5	0	10	5	0	0	0	0
370	IDFmw2	5	C2_B.e	3	C3_Be	2	An_n	138,725	13.9	0	5	5	3	5	2	14
371	IDFmw2	8	C3_B.e	2	C2_B	0		48,489	4.8	0	8	5	2	5	0	0
372	IDFmw2	10	C3_B.e	0		0		39,605	4.0	0	10	5	0	0	0	0
373	IDFmw2	10	C3_B	0		0		51,372	5.1	0	10	5	0	0	0	0
374	ESSFwc2	7	C5_B.g	3	C4_B	0		44,277	4.4	0	7	6	3	5	0	0
375	ESSFwc2	8	C5_B.g	2	C3_B.li	0		190,028	19.0	0	8	6	2	5	0	0
376	ESSFwc2	8	C3_P.li	2	C4_P	0		53,509	5.4	0	8	5	2	5	0	0
377	ESSFwc2	8	C3_P	2	C4_P	0		1,606	0.2	0	8	5	2	5	0	0
378	ESSFwc2	10	C3_P	0		0		24,317	2.4	0	10	5	0	0	0	0
379	ESSFwc2	10	C3_P	0		0		33,132	3.3	0	10	5	0	0	0	0
380	ICHdw3	10	C2_B.li	0		0		53,213	5.3	0	10	5	0	0	0	0
381	ESSFwcw	5	C4_P	5	C3_P	0		38,416	3.8	0	5	5	5	5	0	0
382	ICHwk1	8	C4_B	2	C3_B.li	0		6,351	0.6	0	8	5	2	5	0	0
383	IDFmw2	5	C5_G	5	An_n	0		68,146	6.8	0	5	6	5	14	0	0
384	IDFmw2	10	C2_B.dy	0		0		178,648	17.9	0	10	5	0	0	0	0
385	IDFmw2	8	C2_B.dy	2	C3_B	0		24,609	2.5	0	8	5	2	5	0	0
386	IDFmw2	8	C2_B.dy	2	C3_B	0		12	0.0	0	8	5	2	5	0	0
387	IDFmw2	10	C3_B.dy	0		0		18,061	1.8	0	10	5	0	0	0	0
388	IDFmw2	10	C3_B.dy	0		0		44,584	4.5	5	10	5	0	0	0	0
389	IDFmw2	10	C3_B.dy	0		0		119,730	12.0	0	10	5	0	0	0	0
390	ESSFwc2	10	C3_P	0		0		4,406	0.4	0	10	5	0	0	0	0
391	ESSFwc2	10	C4_P	0		0		55,776	5.6	1	10	5	0	0	0	0
392	ESSFwc2	10	C4_P	0		0		135,393	13.5	0	10	5	0	0	0	0

Table C1-1. Soil and Land Management Unit Map Polygon Attributes

Poly ID	BECsbzVar	Dec 1	Soil 1	Dec 2	Soil 2	Dec 3	Soil 3	Area (m^2)	Area (ha)	Inspections (#)	Dec1 _LMU	LMU _1	Dec2 _LMU	LMU _2	Dec3 _LMU	LMU _3
393	ICHmw3	6	C2_P	4	C4_P	0		21,223	2.1	0	6	5	4	5	0	0
394	ICHmw3	6	C4_P	4	C5_P.g	0		75,539	7.6	0	6	5	4	6	0	0
395	IDFmw2	5	C2_B.li	5	C3_B.m	0		31,050	3.1	0	5	5	5	5	0	0
396	IDFmw2	8	C2_B.li	2	M2_B.e	0		59,171	5.9	0	8	5	2	1	0	0
397	IDFmw2	10	C3_B	0		0		109,642	11.0	0	10	5	0	0	0	0
398	ESSFwc2	10	C4_P.g	0		0		257,201	25.7	8	10	5	0	0	0	0
399	ICHmw3	5	C4_P	3	C5_P.g	2	C6_G	478,928	47.9	2	5	5	3	6	2	6
400	ESSFwc2	10	C3_P.li	0		0		25,986	2.6	0	10	5	0	0	0	0
401	ESSFwc2	10	C3_P.li	0		0		50,861	5.1	0	10	5	0	0	0	0
402	ESSFwc2	10	C3_P.li	0		0		1,069	0.1	0	10	5	0	0	0	0
403	ESSFwc2	10	C4_P	0		0		42,032	4.2	0	10	5	0	0	0	0
404	ESSFwcw	10	C3_P.li	0		0		82,149	8.2	0	10	5	0	0	0	0
405	ESSFwcw	10	C4_P	0		0		857	0.1	0	10	5	0	0	0	0
406	ESSFwcw	10	C4_P	0		0		19,342	1.9	0	10	5	0	0	0	0
407	ESSFwcw	10	C4_P.li	0		0		37,613	3.8	0	10	5	0	0	0	0
408	ICHmw3	10	C4_P.li	0		0		58,100	5.8	0	10	5	0	0	0	0
409	ESSFwc2	10	C1_P.li	0		0		152,568	15.3	0	10	5	0	0	0	0
410	ESSFwc2	10	C3_P.li	0		0		321	0.0	0	10	5	0	0	0	0
411	ESSFwc2	10	C3_P.li	0		0		278	0.0	0	10	5	0	0	0	0
412	ICHdw3	6	C2_P.li	4	R0_n	0		59,771	6.0	0	6	5	4	13	0	0
413	ESSFwc2	8	C4_P	2	C5_P.g	0		33,694	3.4	1	8	5	2	6	0	0
414	ESSFwcw	10	C3_P.li	0		0		44,302	4.4	0	10	5	0	0	0	0
415	ESSFwc2	8	D4_B	2	M1_B.li	0		2,962,274	296.2	19	8	3	2	1	0	0
416	ESSFwc2	8	D4_P	2	D1_B.li	0		358,305	35.8	2	8	3	2	3	0	0
417	ESSFwc2	10	D1_B.li	0		0		30,997	3.1	0	10	3	0	0	0	0
418	ICHwk1	6	F4_P	4	F5_P.g	0		248	0.0	0	6	10	4	12	0	0
419	IDFmw2	5	F4_B.g	5	F3_B	0		47,249	4.7	1	5	10	5	10	0	0
420	IDFmw2	6	F3_B	4	F2_B	0		47,328	4.7	0	6	10	4	10	0	0
421	IDFmw2	6	F4_R.g	2	F6_G	2	F3_R	37,746	3.8	1	6	12	2	12	2	11
422	IDFmw2	6	F4_B.g	4	F3_B	0		78,748	7.9	0	6	10	4	10	0	0
423	IDFmw2	6	F3_B	4	Fn_n	0		186,647	18.7	0	6	10	4	11	0	0
424	IDFmw2	10	F4_R	0		0		21,453	2.1	0	10	11	0	0	0	0
425	IDFmw2	7	F2_R	3	F3_n	0		167	0.0	0	7	11	3	11	0	0
426	IDFmw2	7	F2_R	3	F3_n	0		13,475	1.3	0	7	11	3	11	0	0
427	IDFmw2	7	F3_B	3	F5_B.g	0		88,052	8.8	0	7	10	3	12	0	0
428	IDFmw2	8	F4_B.g	2	F3_B	0		46,299	4.6	0	8	10	2	10	0	0
429	IDFmw2	8	F4_B	2	Fn_n	0		73,118	7.3	0	8	10	2	11	0	0
430	IDFmw2	10	F2_B.e	0		0		148,136	14.8	0	10	10	0	0	0	0
431	IDFmw2	10	F3_B	0		0		45,953	4.6	0	10	10	0	0	0	0
432	IDFmw2	10	F3_R	0		0		130,132	13.0	0	10	11	0	0	0	0
433	IDFmw2	10	F3_B	0		0		464,994	46.5	0	10	10	0	0	0	0
434	IDFmw2	10	F4_R.g	0		0		41,657	4.2	0	10	12	0	0	0	0
435	IDFmw2	10	F4_B.g	0		0		39,397	3.9	0	10	10	0	0	0	0
436	IDFmw2	10	F4_R	0		0		172,996	17.3	0	10	11	0	0	0	0
437	IDFmw2	10	F4_B.g	0		0		25,588	2.6	0	10	10	0	0	0	0
438	IDFmw2	10	F5_G	0		0		76,135	7.6	0	10	12	0	0	0	0
439	IDFmw2	10	F5_G	0		0		79,337	7.9	1	10	12	0	0	0	0
440	IDFmw2	10	F5_R.g	0		0		135,686	13.6	0	10	12	0	0	0	0
441	ICHmw3	6	F5_R.g	4	F4_B	0		58,564	5.9	1	6	12	4	10	0	0
442	ICHwk1	10	F5_R.g	0		0		303	0.0	0	10	12	0	0	0	0
443	IDFmw2	10	F2_B	0		0		254,706	25.5	0	10	10	0	0	0	0
444	IDFmw2	10	F2_B	0		0		150,516	15.1	0	10	10	0	0	0	0
445	IDFmw2	10	F3_B	0		0		463,260	46.3	0	10	10	0	0	0	0
446	IDFmw2	10	F5_R.g	0		0		12,908	1.3	0	10	12	0	0	0	0
447	IDFmw2	10	F5_G	0		0		111,159	11.1	0	10	12	0	0	0	0
448	ESSFwc2	10	F5_B.g	0		0		84,596	8.5	2	10	12	0	0	0	0

Table C1-1. Soil and Land Management Unit Map Polygon Attributes

Poly ID	BECsbzVar	Dec 1	Soil 1	Dec 2	Soil 2	Dec 3	Soil 3	Area (m^2)	Area (ha)	Inspections (#)	Dec1 _LMU	LMU _1	Dec2 _LMU	LMU _2	Dec3 _LMU	LMU _3
449	ESSFwc2	10	F5_B.g	0		0		50,158	5.0	0	10	12	0	0	0	0
450	IDFmw2	10	An_n	0		0		3,932	0.4	0	10	14	0	0	0	0
451	IDFmw2	8	F4_B.g	2	F7_G	0		65,113	6.5	0	8	10	2	12	0	0
452	IDFmw2	10	F3_B	0		0		68,658	6.9	0	10	10	0	0	0	0
453	IDFmw2	10	F4_B.g	0		0		93,030	9.3	1	10	10	0	0	0	0
454	ESSFwc2	10	F5_B.g	0		0		107,915	10.8	0	10	12	0	0	0	0
455	IDFmw2	10	F4_B.g	0		0		71,570	7.2	0	10	10	0	0	0	0
456	ICHdw3	10	F4_B	0		0		145,207	14.5	3	10	10	0	0	0	0
457	ICHdw3	10	F4_B	0		0		273,397	27.3	0	10	10	0	0	0	0
458	ICHmw3	5	F4_B	5	F3_B	0		335,027	33.5	1	5	10	5	10	0	0
459	ICHmw3	10	F4_B	0		0		40,346	4.0	0	10	10	0	0	0	0
460	ICHmw3	10	F4_L	0		0		323,519	32.4	0	10	10	0	0	0	0
461	ICHmw3	10	F5_B.g	0		0		20,279	2.0	0	10	12	0	0	0	0
462	ICHmw3	10	F5_B.g	0		0		53,985	5.4	0	10	12	0	0	0	0
463	IDFmw2	6	F3_B	4	F4_B	0		73,433	7.3	0	6	10	4	10	0	0
464	ESSFwc2	6	G4_P	4	G3_P	0		42,188	4.2	0	6	9	4	9	0	0
465	ESSFwc2	8	G4_P	2	G5_P.g	0		26,557	2.7	0	8	9	2	9	0	0
466	ESSFwc2	10	G4_P	0		0		24,920	2.5	3	10	9	0	0	0	0
467	ESSFwc2	10	G4_P	0		0		55,709	5.6	6	10	9	0	0	0	0
468	ICHdw3	6	G4_B.dy	4	G5_B.g	0		22,350	2.2	0	6	9	4	9	0	0
469	ICHdw3	7	G4_B.dy	3	G3_B	0		66,882	6.7	0	7	9	3	9	0	0
470	ICHdw3	10	G4_B.dy	0		0		41,235	4.1	0	10	9	0	0	0	0
471	ICHdw3	10	G4_B.dy	0		0		138,274	13.8	0	10	9	0	0	0	0
472	ICHdw3	10	G4_B.dy	0		0		112,565	11.3	0	10	9	0	0	0	0
473	ICHdw3	10	G4_B.dy	0		0		86,109	8.6	0	10	9	0	0	0	0
474	ICHmw3	6	G4_P	4	G3_B	0		45,849	4.6	2	6	9	4	9	0	0
475	ICHmw3	10	G4_P	0		0		43,659	4.4	0	10	9	0	0	0	0
476	IDFmw2	5	G2_B	5	G3_B	0		222,191	22.2	1	5	9	5	9	0	0
477	IDFmw2	5	G3_B	5	G4_B	0		44,681	4.5	0	5	9	5	9	0	0
478	IDFmw2	5	G3_B.dy	5	G2_B	0		50,697	5.1	0	5	9	5	9	0	0
479	IDFmw2	6	G4_B.g	4	G3_B	0		241,904	24.2	1	6	9	4	9	0	0
480	IDFmw2	7	G3_B	3	G4_B	0		75,732	7.6	0	7	9	3	9	0	0
481	IDFmw2	7	G3_B	3	G7_G	0		34,205	3.4	0	7	9	3	9	0	0
482	IDFmw2	8	G3_B	2	G4_B	0		43,342	4.3	0	8	9	2	9	0	0
483	IDFmw2	8	G3_B	2	G4_B	0		21,052	2.1	0	8	9	2	9	0	0
484	IDFmw2	8	G3_B	2	G2_B	0		170,715	17.1	0	8	9	2	9	0	0
485	IDFmw2	10	G2_B	0		0		140,513	14.1	0	10	9	0	0	0	0
486	IDFmw2	10	G2_B	0		0		137,539	13.8	0	10	9	0	0	0	0
487	IDFmw2	10	G3_B	0		0		35,473	3.5	0	10	9	0	0	0	0
488	IDFmw2	10	G3_B	0		0		324,762	32.5	0	10	9	0	0	0	0
489	IDFmw2	10	G3_B.dy	0		0		121,374	12.1	0	10	9	0	0	0	0
490	IDFmw2	10	G3_B	0		0		103,021	10.3	0	10	9	0	0	0	0
491	IDFmw2	10	G3_B	0		0		47,523	4.8	0	10	9	0	0	0	0
492	IDFmw2	10	G3_B	0		0		36,649	3.7	0	10	9	0	0	0	0
493	IDFmw2	10	G3_B.dy	0		0		45,049	4.5	0	10	9	0	0	0	0
494	IDFmw2	10	G3_B.dy	0		0		86,757	8.7	0	10	9	0	0	0	0
495	IDFmw2	10	G3_B	0		0		52,339	5.2	0	10	9	0	0	0	0
496	IDFmw2	10	G3_B	0		0		348,434	34.8	0	10	9	0	0	0	0
497	IDFmw2	10	G3_B	0		0		485,656	48.6	0	10	9	0	0	0	0
498	IDFmw2	10	G4_B.g	0		0		100,635	10.1	0	10	9	0	0	0	0
499	IDFmw2	10	Gn_n	0		0		50,537	5.1	0	10	11	0	0	0	0
500	IDFmw2	8	Gn_n	2	G2_B	0		38,390	3.8	0	8	11	2	9	0	0
501	ICHmw3	10	G3_P	0		0		90,161	9.0	0	10	9	0	0	0	0
502	IDFmw2	5	G4_B	5	n_n	0		100,584	10.1	0	5	9	5	14	0	0
503	IDFmw2	10	G3_B.dy	0		0		67,197	6.7	0	10	9	0	0	0	0
504	IDFmw2	10	G3_B	0		0		51,832	5.2	0	10	9	0	0	0	0

Table C1-1. Soil and Land Management Unit Map Polygon Attributes

Poly ID	BECsbzVar	Dec 1	Soil 1	Dec 2	Soil 2	Dec 3	Soil 3	Area (m^2)	Area (ha)	Inspections (#)	Dec1 _LMU	LMU _1	Dec2 _LMU	LMU _2	Dec3 _LMU	LMU _3
505	IDFmw2	10	G3_B.dy	0		0		28,849	2.9	0	10	9	0	0	0	0
506	IDFmw2	10	G3_B.m	0		0		37,396	3.7	0	10	9	0	0	0	0
507	ICHdw3	10	G4_B.dy	0		0		34,799	3.5	0	10	9	0	0	0	0
508	IDFmw2	10	G2_B.e	0		0		33	0.0	0	10	9	0	0	0	0
509	IDFmw2	10	G2_B.e	0		0		1,039	0.1	0	10	9	0	0	0	0
510	IDFmw2	10	G2_B.e	0		0		661	0.1	0	10	9	0	0	0	0
511	IDFmw2	10	G2_B.e	0		0		118,376	11.8	0	10	9	0	0	0	0
512	IDFmw2	10	G3_B.dy	0		0		37,158	3.7	0	10	9	0	0	0	0
513	IDFmw2	8	G3_B.dy	2	G2_B	0		22,704	2.3	0	8	9	2	9	0	0
514	IDFmw2	10	G2_B.dy	0		0		102,932	10.3	4	10	9	0	0	0	0
515	IDFmw2	10	G3_B.dy	0		0		14,280	1.4	0	10	9	0	0	0	0
516	IDFmw2	10	G3_B.dy	0		0		282,423	28.2	0	10	9	0	0	0	0
517	IDFmw2	10	G3_B.dy	0		0		489,454	48.9	1	10	9	0	0	0	0
518	ICHdw3	6	G4_B.dy	4	G5_G	0		289,871	29.0	1	6	9	4	9	0	0
519	ICHdw3	8	G5_B.g	2	n_n	0		30,999	3.1	0	8	9	2	14	0	0
520	ICHdw3	10	G3_B.dy	0		0		27,999	2.8	0	10	9	0	0	0	0
521	ICHdw3	10	G4_B.dy	0		0		203,327	20.3	0	10	9	0	0	0	0
522	ICHdw3	10	G4_B.dy	0		0		355,331	35.5	0	10	9	0	0	0	0
523	ICHdw3	10	G4_B.dy	0		0		381,448	38.1	2	10	9	0	0	0	0
524	ICHdw3	10	G4_B.dy	0		0		226,062	22.6	0	10	9	0	0	0	0
525	ICHdw3	10	G4_B.dy	0		0		93,794	9.4	0	10	9	0	0	0	0
526	ICHdw3	10	G4_B.dy	0		0		83,850	8.4	0	10	9	0	0	0	0
527	IDFmw2	8	G2_B	2	G3_B	0		25,113	2.5	0	8	9	2	9	0	0
528	IDFmw2	8	G2_B	2	G3_B	0		89,362	8.9	1	8	9	2	9	0	0
529	IDFmw2	10	G2_B	0		0		39,104	3.9	1	10	9	0	0	0	0
530	IDFmw2	10	G2_B.dy	0		0		37,221	3.7	0	10	9	0	0	0	0
531	IDFmw2	10	G2_B	0		0		18,613	1.9	0	10	9	0	0	0	0
532	IDFmw2	10	G2_B	0		0		34,564	3.5	0	10	9	0	0	0	0
533	IDFmw2	10	G3_B.dy	0		0		57,221	5.7	0	10	9	0	0	0	0
534	IDFmw2	10	G3_B.dy	0		0		65,327	6.5	0	10	9	0	0	0	0
535	IDFmw2	10	G3_B.dy	0		0		35,356	3.5	0	10	9	0	0	0	0
536	IDFmw2	10	G3_B	0		0		132,477	13.2	0	10	9	0	0	0	0
537	IDFmw2	10	G3_B	0		0		21,202	2.1	0	10	9	0	0	0	0
538	IDFmw2	10	G3_B.dy	0		0		404,158	40.4	1	10	9	0	0	0	0
539	IDFmw2	10	G3_B.dy	0		0		35,382	3.5	1	10	9	0	0	0	0
540	IDFmw2	10	G3_B.dy	0		0		74,655	7.5	0	10	9	0	0	0	0
541	IDFmw2	10	G3_B.dy	0		0		26,692	2.7	0	10	9	0	0	0	0
542	IDFmw2	10	G3_B	0		0		305,673	30.6	0	10	9	0	0	0	0
543	ICHmw3	5	LG4_L	5	L5_L.g	0		94,177	9.4	2	5	8	5	8	0	0
544	ICHmw3	10	LG3_P	0		0		109,176	10.9	0	10	8	0	0	0	0
545	ICHmw3	10	LG4_L	0		0		132,741	13.3	0	10	8	0	0	0	0
546	IDFmw2	7	LG3_L	3	L4_L	0		22,953	2.3	0	7	8	3	8	0	0
547	IDFmw2	10	LG2_L	0		0		57,503	5.8	0	10	8	0	0	0	0
548	IDFmw2	10	LG2_L	0		0		26,148	2.6	0	10	8	0	0	0	0
549	IDFmw2	10	LG3_L	0		0		20,535	2.1	0	10	8	0	0	0	0
550	IDFmw2	10	LG3_L	0		0		90,429	9.0	0	10	8	0	0	0	0
551	IDFmw2	10	LG4_B.g	0		0		23,070	2.3	0	10	8	0	0	0	0
552	ICHdw3	10	LG4_L	0		0		42,075	4.2	1	10	8	0	0	0	0
553	ICHdw3	10	LG4_L	0		0		57,294	5.7	0	10	8	0	0	0	0
554	ESSFwc2	5	M4_P	5	M3_P	0		1,148	0.1	0	5	1	5	1	0	0
555	ESSFwc2	5	M4_P	5	M3_P	0		88	0.0	0	5	1	5	1	0	0
556	ESSFwc2	6	M3_P	4	M4_P	0		104,886	10.5	0	6	1	4	1	0	0
557	ESSFwc2	6	M5_P.g	2	M4_P	2	M6_G	146,538	14.7	1	6	2	2	1	2	2
558	ESSFwc2	8	M4_P	2	M1_P	0		535,644	53.6	16	8	1	2	1	0	0
559	ESSFwc2	8	M4_P	2	M1_P	0		732,929	73.3	8	8	1	2	1	0	0
560	ESSFwc2	8	M4_P	2	M3_P	0		220,855	22.1	0	8	1	2	1	0	0

Table C1-1. Soil and Land Management Unit Map Polygon Attributes

Poly ID	BECsbzVar	Dec 1	Soil 1	Dec 2	Soil 2	Dec 3	Soil 3	Area (m^2)	Area (ha)	Inspections (#)	Dec1 _LMU	LMU _1	Dec2 _LMU	LMU _2	Dec3 _LMU	LMU _3
561	ESSFwc2	8	M4_P	2	M6_G	0		196,106	19.6	15	8	1	2	2	0	0
562	ESSFwc2	10	M3_P	0		0		73,590	7.4	0	10	1	0	0	0	0
563	ESSFwc2	10	M4_P	0		0		774,820	77.5	7	10	1	0	0	0	0
564	ESSFwc2	10	M4_P	0		0		29,836	3.0	0	10	1	0	0	0	0
565	ESSFwc2	10	M4_P	0		0		41,736	4.2	3	10	1	0	0	0	0
566	ESSFwc2	10	M4_P	0		0		55,901	5.6	0	10	1	0	0	0	0
567	ESSFwc2	10	M4_P	0		0		480,043	48.0	5	10	1	0	0	0	0
568	ESSFwc2	10	M4_P	0		0		939,423	93.9	5	10	1	0	0	0	0
569	ESSFwc2	10	M4_P	0		0		29,963	3.0	0	10	1	0	0	0	0
570	ESSFwc2	10	M4_P	0		0		277	0.0	0	10	1	0	0	0	0
571	ESSFwc2	10	M4_P	0		0		57,835	5.8	0	10	1	0	0	0	0
572	ESSFwc2	10	M4_P	0		0		23,243	2.3	0	10	1	0	0	0	0
573	ESSFwc2	10	M4_P	0		0		98,245	9.8	0	10	1	0	0	0	0
574	ESSFwcp	8	M2_P	2	M3_P	0		73,441	7.3	0	8	1	2	1	0	0
575	ESSFwcp	8	M3_P	2	M5_P.g	0		33,091	3.3	0	8	1	2	2	0	0
576	ESSFwcw	8	M4_P	2	M3_P	0		91,825	9.2	0	8	1	2	1	0	0
577	ESSFwcw	8	M4_p	2	M5_P.g	0		64,807	6.5	0	8	1	2	2	0	0
578	ESSFwcw	8	M4_P	2	M5_P.g	0		863,194	86.3	2	8	1	2	2	0	0
579	ICHdw3	7	M4_L	3	M3_L	0		493,560	49.4	0	7	7	3	7	0	0
580	ICHdw3	8	M3_L	2	M4_L	0		69,725	7.0	0	8	7	2	7	0	0
581	ICHdw3	8	M4_L	2	M5_P.g	0		147,798	14.8	0	8	7	2	2	0	0
582	ICHdw3	8	M4_L	2	M5_G	0		52,823	5.3	0	8	7	2	2	0	0
583	ICHdw3	8	M4_L	2	M5_P.g	0		356,762	35.7	0	8	7	2	2	0	0
584	ICHdw3	10	M3_L	0		0		47,471	4.7	0	10	7	0	0	0	0
585	ICHdw3	10	M3_L	0		0		106,962	10.7	0	10	7	0	0	0	0
586	ICHdw3	10	M3_L	0		0		269,406	26.9	0	10	7	0	0	0	0
587	ICHdw3	10	M3_L	0		0		365,689	36.6	0	10	7	0	0	0	0
588	ICHdw3	10	M3_L	0		0		122,754	12.3	1	10	7	0	0	0	0
589	ICHdw3	10	M4_L	0		0		124,872	12.5	0	10	7	0	0	0	0
590	ICHdw3	10	M4_L	0		0		173,909	17.4	0	10	7	0	0	0	0
591	ICHdw3	10	M4_L	0		0		104,468	10.4	0	10	7	0	0	0	0
592	ICHdw3	10	M4_L	0		0		48,655	4.9	0	10	7	0	0	0	0
593	ICHdw3	10	M4_L	0		0		254,887	25.5	0	10	7	0	0	0	0
594	ICHdw3	10	M4_L	0		0		73,487	7.3	0	10	7	0	0	0	0
595	ICHdw3	10	M4_L	0		0		365,773	36.6	0	10	7	0	0	0	0
596	ICHdw3	10	M4_L	0		0		144,799	14.5	0	10	7	0	0	0	0
597	ICHdw3	10	M4_L	0		0		37,983	3.8	0	10	7	0	0	0	0
598	ICHdw3	10	M4_L	0		0		67,178	6.7	0	10	7	0	0	0	0
599	ICHdw3	10	M4_L	0		0		1,425,779	142.6	0	10	7	0	0	0	0
600	ICHdw3	10	M4_L	0		0		138,961	13.9	0	10	7	0	0	0	0
601	ICHdw3	10	M4_L	0		0		390,631	39.1	0	10	7	0	0	0	0
602	ICHdw3	10	M4_L	0		0		682,867	68.3	0	10	7	0	0	0	0
603	ICHdw3	10	M4_L	0		0		334,539	33.5	0	10	7	0	0	0	0
604	ICHmw3	5	M3_P	5	M4_P	0		26,041	2.6	0	5	1	5	1	0	0
605	ICHmw3	5	M3_P	5	M4_P	0		137,555	13.8	0	5	1	5	1	0	0
606	ICHmw3	5	M4_P	5	M2_P	0		89,400	8.9	0	5	1	5	1	0	0
607	ICHmw3	5	M4_P	5	M3_P	0		495,195	49.5	0	5	1	5	1	0	0
608	ICHmw3	5	M4_P	5	M3_P	0		73,247	7.3	0	5	1	5	1	0	0
609	ICHmw3	5	M4_P	5	n_n	0		27,823	2.8	0	5	1	5	14	0	0
610	ICHmw3	6	M2_P	4	M4_P	0		68,798	6.9	0	6	1	4	1	0	0
611	ICHmw3	6	M4_P	4	M3_P	0		60,808	6.1	0	6	1	4	1	0	0
612	ICHmw3	6	M4_P	4	M3_P	0		127,996	12.8	0	6	1	4	1	0	0
613	ICHmw3	8	M3_P	2	M4_P	0		67,306	6.7	0	8	1	2	1	0	0
614	ICHmw3	8	M3_P	2	M4_P	0		188,370	18.8	0	8	1	2	1	0	0
615	ICHmw3	8	M4_P	2	M3_P	0		132,576	13.3	0	8	1	2	1	0	0
616	ICHmw3	8	M4_P	2	M3_P	0		216,348	21.6	0	8	1	2	1	0	0

Table C1-1. Soil and Land Management Unit Map Polygon Attributes

Poly ID	BECsbzVar	Dec 1	Soil 1	Dec 2	Soil 2	Dec 3	Soil 3	Area (m^2)	Area (ha)	Inspections (#)	Dec1 _LMU	LMU _1	Dec2 _LMU	LMU _2	Dec3 _LMU	LMU _3
617	ICHmw3	10	M3_P	0		0		165,891	16.6	0	10	1	0	0	0	0
618	ICHmw3	10	M3_P	0		0		237,976	23.8	0	10	1	0	0	0	0
619	ICHmw3	10	M3_P	0		0		517,081	51.7	0	10	1	0	0	0	0
620	ICHmw3	10	M3_P	0		0		60,262	6.0	0	10	1	0	0	0	0
621	ICHmw3	10	M3_P	0		0		432,935	43.3	0	10	1	0	0	0	0
622	ICHmw3	10	M3_P	0		0		155,241	15.5	0	10	1	0	0	0	0
623	ICHmw3	10	M3_P	0		0		83,431	8.3	0	10	1	0	0	0	0
624	ICHmw3	10	M3_P	0		0		84,351	8.4	0	10	1	0	0	0	0
625	ICHmw3	10	M4_P	0		0		46,726	4.7	0	10	1	0	0	0	0
626	ICHmw3	10	M4_P	0		0		32,923	3.3	2	10	1	0	0	0	0
627	ICHmw3	10	M4_P	0		0		64,665	6.5	0	10	1	0	0	0	0
628	ICHmw3	10	M4_P	0		0		955,730	95.6	0	10	1	0	0	0	0
629	ICHmw3	10	M4_P	0		0		153,774	15.4	0	10	1	0	0	0	0
630	ICHmw3	10	M4_P	0		0		262,734	26.3	0	10	1	0	0	0	0
631	ICHmw3	10	M4_P	0		0		35,151	3.5	0	10	1	0	0	0	0
632	ICHmw3	10	M4_P	0		0		73,357	7.3	0	10	1	0	0	0	0
633	ICHmw3	10	M4_P	0		0		1,418,434	141.8	0	10	1	0	0	0	0
634	ICHmw3	10	M4_P	0		0		736,683	73.7	1	10	1	0	0	0	0
635	ICHwk1	5	M4_P	5	M5_P.g	0		19,772	2.0	0	5	1	5	2	0	0
636	ICHwk1	6	M4_P	4	M5_B.g	0		36,159	3.6	0	6	1	4	2	0	0
637	ICHwk1	6	M4_P	4	M5_G	0		50,394	5.0	0	6	1	4	2	0	0
638	ICHwk1	10	M4_P	0		0		64,114	6.4	0	10	1	0	0	0	0
639	ICHwk1	10	M4_P	0		0		26,824	2.7	0	10	1	0	0	0	0
640	IDFmw2	5	M1_B	5	M3_B	0		67,050	6.7	1	5	1	5	1	0	0
641	IDFmw2	5	M2_B	5	M3_B	0		24,950	2.5	0	5	1	5	1	0	0
642	IDFmw2	5	M3_B	3	M4_B	2	An_n	67,756	6.8	0	5	1	3	1	2	14
643	IDFmw2	5	M3_B	5	M1_B	0		67,160	6.7	1	5	1	5	1	0	0
644	IDFmw2	5	M3_L	5	M2_L	0		34,844	3.5	0	5	7	5	7	0	0
645	IDFmw2	6	M2_B	4	M3_B	0		77,813	7.8	1	6	1	4	1	0	0
646	IDFmw2	6	M2_B	4	M3_B	0		30,113	3.0	0	6	1	4	1	0	0
647	IDFmw2	6	M2_L	4	M3_L	0		19,305	1.9	0	6	7	4	7	0	0
648	IDFmw2	6	M3_B	4	n_n	0		143,907	14.4	0	6	1	4	14	0	0
649	IDFmw2	7	M2_L	3	M4_L	0		48,173	4.8	0	7	7	3	7	0	0
650	IDFmw2	7	M3_L	3	n_n	0		66,892	6.7	0	7	7	3	14	0	0
651	IDFmw2	8	M2_B.li	2	M3_L	0		42,591	4.3	0	8	1	2	7	0	0
652	IDFmw2	8	M2_B	2	M3_B	0		24,592	2.5	0	8	1	2	1	0	0
653	IDFmw2	8	M3_L	2	M2_n	0		55,302	5.5	0	8	7	2	1	0	0
654	IDFmw2	8	M3_B	2	M2_B	0		53,034	5.3	0	8	1	2	1	0	0
655	IDFmw2	10	M2_L	0		0		74,471	7.4	0	10	7	0	0	0	0
656	IDFmw2	10	M2_L	0		0		16,922	1.7	0	10	7	0	0	0	0
657	IDFmw2	10	M2_L	0		0		31,846	3.2	0	10	7	0	0	0	0
658	IDFmw2	10	M2_B	0		0		243,935	24.4	0	10	1	0	0	0	0
659	IDFmw2	10	M2_B	0		0		122,030	12.2	0	10	1	0	0	0	0
660	IDFmw2	10	M2_L	0		0		139,302	13.9	0	10	7	0	0	0	0
661	IDFmw2	10	M2_B	0		0		932	0.1	0	10	1	0	0	0	0
662	IDFmw2	10	M2_B	0		0		13,136	1.3	0	10	1	0	0	0	0
663	IDFmw2	10	M2_B.m	0		0		78,587	7.9	1	10	1	0	0	0	0
664	IDFmw2	10	M2_B	0		0		12,910	1.3	0	10	1	0	0	0	0
665	IDFmw2	10	M3_L	0		0		512,911	51.3	0	10	7	0	0	0	0
666	IDFmw2	10	M3_L	0		0		236,050	23.6	0	10	7	0	0	0	0
667	IDFmw2	10	M3_L	0		0		869,072	86.9	1	10	7	0	0	0	0
668	IDFmw2	10	M3_L	0		0		51,228	5.1	0	10	7	0	0	0	0
669	IDFmw2	10	M3_L	0		0		444,750	44.5	1	10	7	0	0	0	0
670	IDFmw2	10	M3_B	0		0		114,277	11.4	0	10	1	0	0	0	0
671	IDFmw2	10	M3_L	0		0		139,758	14.0	0	10	7	0	0	0	0
672	IDFmw2	10	M3_B	0		0		39,980	4.0	0	10	1	0	0	0	0

Table C1-1. Soil and Land Management Unit Map Polygon Attributes

Poly ID	BECsbzVar	Dec 1	Soil 1	Dec 2	Soil 2	Dec 3	Soil 3	Area (m^2)	Area (ha)	Inspections (#)	Dec1 _LMU	LMU _1	Dec2 _LMU	LMU _2	Dec3 _LMU	LMU _3
673	IDFmw2	10	M3_B	0		0		221	0.0	0	10	1	0	0	0	0
674	IDFmw2	10	M3_B	0		0		523,667	52.4	0	10	1	0	0	0	0
675	IDFmw2	10	M3_B	0		0		34,598	3.5	0	10	1	0	0	0	0
676	IDFmw2	10	M3_B	0		0		16,769	1.7	0	10	1	0	0	0	0
677	IDFmw2	10	M3_B	0		0		62,801	6.3	0	10	1	0	0	0	0
678	ESSFwc2	7	M5_B.g	3	M4_B	0		24,996	2.5	0	7	2	3	1	0	0
679	ESSFwc2	8	M4_P	2	M5_G	0		33,276	3.3	0	8	1	2	2	0	0
680	ESSFwc2	8	M4_P	2	M5_G	0		14,082	1.4	0	8	1	2	2	0	0
681	ESSFwc2	10	M4_P	0		0		40,667	4.1	0	10	1	0	0	0	0
682	ESSFwc2	10	M4_P	0		0		13,687	1.4	0	10	1	0	0	0	0
683	ICHmw3	8	M4_P	2	M4_P.g	0		71,547	7.2	0	8	1	2	1	0	0
684	ICHmw3	8	M3_P	2	M5_P.g	0		243,196	24.3	0	8	1	2	2	0	0
685	ICHmw3	8	M4_P	2	M5_P.g	0		156,684	15.7	0	8	1	2	2	0	0
686	ESSFwcw	5	M4_P	5	M5_P.g	0		317,652	31.8	0	5	1	5	2	0	0
687	ESSFwcw	10	M4_P	0		0		25,537	2.6	0	10	1	0	0	0	0
688	ICHdw3	8	M4_L	2	M5_G	0		26,446	2.6	0	8	7	2	2	0	0
689	ICHmw3	8	M4_P	2	M5_G	0		82,521	8.3	0	8	1	2	2	0	0
690	IDFmw2	6	M2_B	4	M3_B	0		196,012	19.6	0	6	1	4	1	0	0
691	IDFmw2	7	M3_B.m	3	M1_B	0		88,464	8.8	0	7	1	3	1	0	0
692	IDFmw2	10	M2_B	0		0		28,235	2.8	0	10	1	0	0	0	0
693	IDFmw2	10	M2_B	0		0		28,035	2.8	0	10	1	0	0	0	0
694	IDFmw2	10	M3_L	0		0		100,225	10.0	0	10	7	0	0	0	0
695	IDFmw2	10	M3_B	0		0		27,013	2.7	0	10	1	0	0	0	0
696	IDFmw2	10	M3_B	0		0		99,960	10.0	0	10	1	0	0	0	0
697	IDFmw2	10	M4_B.g	0		0		144,829	14.5	0	10	1	0	0	0	0
698	ESSFwc2	10	M4_P.li	0		0		41,978	4.2	3	10	1	0	0	0	0
699	ESSFwc2	10	M4_P.li	0		0		280,593	28.1	2	10	1	0	0	0	0
700	ESSFwc2	10	M4_P.li	0		0		44,315	4.4	0	10	1	0	0	0	0
701	ICHmw3	10	M4_P.li	0		0		161,331	16.1	3	10	1	0	0	0	0
702	ESSFwc2	7	M4_P	3	M3_P	0		20,732	2.1	0	7	1	3	1	0	0
703	ESSFwc2	7	M4_P	3	M5_P.g	0		109,714	11.0	0	7	1	3	2	0	0
704	ESSFwc2	8	M3_P	2	M4_P	0		71,023	7.1	13	8	1	2	1	0	0
705	ESSFwc2	10	M4_P	0		0		260,856	26.1	14	10	1	0	0	0	0
706	ESSFwc2	10	M4_P	0		0		79,424	7.9	1	10	1	0	0	0	0
707	ESSFwc2	10	M4_P	0		0		27,271	2.7	0	10	1	0	0	0	0
708	ESSFwcw	6	M4_P	2	M5_P.g	2	O7_M.t	50,424	5.0	0	6	1	2	2	2	4
709	ESSFwcw	6	M5_P.g	4	M4_P	0		432,012	43.2	0	6	2	4	1	0	0
710	ESSFwcw	6	M5_P.g	4	M4_P	0		139,509	14.0	0	6	2	4	1	0	0
711	ESSFwcw	7	M4_P	3	M5_P.g	0		54,974	5.5	0	7	1	3	2	0	0
712	ESSFwcw	8	M4_P	2	M5_P.g	0		936,060	93.6	1	8	1	2	2	0	0
713	ESSFwcw	8	M4_P	2	M5_P.g	0		33,360	3.3	0	8	1	2	2	0	0
714	ESSFwcw	8	M4_P	2	M5_P.g	0		386,802	38.7	1	8	1	2	2	0	0
715	ICHdw3	6	M4_L	4	An_n	0		30,601	3.1	0	6	7	4	14	0	0
716	ICHdw3	10	M4_L	0		0		463,887	46.4	2	10	7	0	0	0	0
717	ICHmw3	10	M4_P	0		0		325,452	32.5	2	10	1	0	0	0	0
718	ICHmw3	10	M4_P	0		0		148,465	14.8	0	10	1	0	0	0	0
719	ESSFwc2	7	M4_P	3	M5_P.g	0		139,691	14.0	2	7	1	3	2	0	0
720	ESSFwc2	6	M3_P.li	4	M4_P	0		585,147	58.5	0	6	1	4	1	0	0
721	ESSFwc2	6	M4_P.li	4	M5_P.g	0		90,034	9.0	0	6	1	4	2	0	0
722	ESSFwc2	6	M4_P.li	4	M6_G	0		34,239	3.4	1	6	1	4	2	0	0
723	ESSFwc2	8	M4_P.li	2	M6_G	0		39,702	4.0	0	8	1	2	2	0	0
724	ESSFwc2	10	M3_P.li	0		0		33,343	3.3	0	10	1	0	0	0	0
725	ESSFwc2	10	M3_P.li	0		0		31,945	3.2	0	10	1	0	0	0	0
726	ESSFwc2	10	M4_P.li	0		0		73,977	7.4	0	10	1	0	0	0	0
727	ESSFwc2	10	M4_P.li	0		0		39,755	4.0	0	10	1	0	0	0	0
728	ESSFwc2	10	M4_P.li	0		0		70,757	7.1	0	10	1	0	0	0	0

Table C1-1. Soil and Land Management Unit Map Polygon Attributes

Poly ID	BECsbzVar	Dec 1	Soil 1	Dec 2	Soil 2	Dec 3	Soil 3	Area (m^2)	Area (ha)	Inspections (#)	Dec1 _LMU	LMU _1	Dec2 _LMU	LMU _2	Dec3 _LMU	LMU _3
729	ESSFwc2	10	M4_P.li	0		0		21,729	2.2	0	10	1	0	0	0	0
730	ESSFwc2	10	M4_P.li	0		0		114,122	11.4	0	10	1	0	0	0	0
732	ESSFwc2	10	M4_P.li	0		0		26,252	2.6	0	10	1	0	0	0	0
733	ESSFwc2	10	M4_P.li	0		0		61,969	6.2	0	10	1	0	0	0	0
734	ESSFwc2	10	M4_P.li	0		0		131,263	13.1	0	10	1	0	0	0	0
735	ESSFwc2	10	M4_P.li	0		0		256,267	25.6	0	10	1	0	0	0	0
736	ESSFwc2	5	M4_P.li	5	M4_P	0		1,598,919	159.9	11	5	1	5	1	0	0
737	ESSFwc2	8	M4_P	2	M4_P.li	0		553,013	55.3	0	8	1	2	1	0	0
738	ESSFwc2	8	M4_P	2	M4_P.li	0		211,096	21.1	0	8	1	2	1	0	0
739	ESSFwc2	8	M5_P.g	2	M_P.li	0		40,821	4.1	0	8	2	2	1	0	0
740	ICHdw3	8	M4_B	2	M3_B	0		130,630	13.1	0	8	1	2	1	0	0
741	ICHdw3	10	M4_B	0		0		73,224	7.3	0	10	1	0	0	0	0
742	ICHdw3	10	M4_B	0		0		292,524	29.3	0	10	1	0	0	0	0
743	ICHdw3	10	M4_B	0		0		23,399	2.3	0	10	1	0	0	0	0
744	ICHdw3	10	M4_B	0		0		106,181	10.6	0	10	1	0	0	0	0
745	ICHdw3	10	M4_B	0		0		663,649	66.4	0	10	1	0	0	0	0
746	ICHdw3	10	M4_B	0		0		58,929	5.9	0	10	1	0	0	0	0
747	ICHdw3	10	M4_B.li	0		0		25,456	2.5	0	10	1	0	0	0	0
748	ICHdw3	10	M4_B	0		0		1,103	0.1	0	10	1	0	0	0	0
749	ICHdw3	10	M4_B	0		0		170,479	17.0	0	10	1	0	0	0	0
750	ICHmw3	7	M4_P.li	3	M3_P	0		38,498	3.8	0	7	1	3	1	0	0
751	ICHmw3	8	M4_P	2	M2_P.li	0		215,981	21.6	2	8	1	2	1	0	0
752	ICHmw3	8	M4_P.li	2	M5_P.g	0		262,341	26.2	2	8	1	2	2	0	0
753	ICHmw3	10	M3_P.li	0		0		56,401	5.6	0	10	1	0	0	0	0
754	ICHmw3	10	M4_P.li	0		0		86,449	8.6	0	10	1	0	0	0	0
755	ICHmw3	10	M4_P.li	0		0		231,731	23.2	0	10	1	0	0	0	0
756	ICHmw3	10	M4_P.li	0		0		204,507	20.5	1	10	1	0	0	0	0
757	ICHmw3	10	M4_P.li	0		0		69,180	6.9	0	10	1	0	0	0	0
758	ICHmw3	10	M4_P	0		0		228,118	22.8	0	10	1	0	0	0	0
759	ICHmw3	10	M4_P.li	0		0		212,737	21.3	2	10	1	0	0	0	0
760	ICHmw3	10	M4_P.li	0		0		269,407	26.9	0	10	1	0	0	0	0
761	ICHmw3	10	M4_P.li	0		0		261,479	26.1	1	10	1	0	0	0	0
762	ICHmw3	10	M4_P.li	0		0		245,126	24.5	0	10	1	0	0	0	0
763	IDFmw2	8	M3_B.dy	2	M4_B	0		2,223	0.2	0	8	1	2	1	0	0
764	IDFmw2	8	M3_B.dy	2	M4_B	0		30,195	3.0	0	8	1	2	1	0	0
765	IDFmw2	10	M3_L	0		0		100,327	10.0	0	10	7	0	0	0	0
766	ESSFwc2	10	M5_G	0		0		96,626	9.7	0	10	2	0	0	0	0
767	ICHdw3	10	M4_B	0		0		112,116	11.2	1	10	1	0	0	0	0
768	ICHdw3	8	M4_B	2	M5_B.g	0		73,918	7.4	0	8	1	2	2	0	0
769	ICHdw3	8	M4_B	2	M5_B.g	0		50,245	5.0	0	8	1	2	2	0	0
770	ICHdw3	10	M4_B	0		0		78,261	7.8	0	10	1	0	0	0	0
771	ICHdw3	10	M4_B	0		0		54,400	5.4	0	10	1	0	0	0	0
772	ICHdw3	10	M4_B	0		0		125,048	12.5	0	10	1	0	0	0	0
773	ICHmw3	8	M4_P.li	2	M5_P.g	0		23,652	2.4	0	8	1	2	2	0	0
774	ICHdw3	8	M4_B	2	M5_B.g	0		25,595	2.6	0	8	1	2	2	0	0
775	IDFmw2	10	OW	0		0		88,696	8.9	0	10	15	0	0	0	0
776	IDFmw2	10	OW	0		0		632,059	63.2	0	10	15	0	0	0	0
777	ESSFwc2	10	F6_G.pt	0		0		25,526	2.6	0	10	12	0	0	0	0
778	ESSFwc2	6	M4_P	2	M6_G	2	O7_M	170,941	17.1	0	6	1	2	2	2	4
779	ESSFwc2	7	O7_M	3	M6_G	0		25,853	2.6	1	7	4	3	2	0	0
780	ESSFwc2	10	O7_M	0		0		20,829	2.1	0	10	4	0	0	0	0
781	ESSFwc2	5	O7_M	5	M4_P	0		34,925	3.5	0	5	4	5	1	0	0
782	ESSFwc2	10	O7_M	0		0		24,374	2.4	1	10	4	0	0	0	0
783	IDFmw2	6	R1_n	4	R0_n	0		62,398	6.2	0	6	13	4	13	0	0

Appendix C-2

Inspection Point Attributes

Table C1-2. Inspection Point Attributes

0	ID	Type	Easting	Northing	Elevation (m)	BEC Zone	Soil Polygon	Location	Strat Unit	Rock Type
1	GT12-01	Borehole	303,870	5,706,191	1669	ESSFwc 2	558	Project Site	Kqm	quartz monzonitic intrusive rocks
2	GT12-02	Borehole	304,624	5,706,348	1661	ESSFwc 2	11	Project Site	DEBog	orthogneiss metamorphic rocks
3	GT12-03	Borehole	304,380	5,706,423	1660	ESSFwc 2	558	Project Site	DEBog	orthogneiss metamorphic rocks
4	GT12-04	Borehole	304,160	5,710,395	1634	ESSFwc 2	294	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
5	GT12-05	Borehole	306,345	5,711,113	1740	ESSFwc 2	307	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
6	GT12-06	Borehole	306,747	5,710,843	1765	ESSFwc 2	416	Project Site	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
7	GT12-07	Borehole	304,091	5,710,223	1616	ESSFwc 2	294	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
8	GT12-08	Borehole	302,252	5,710,142	1350	ICH wk 1	719	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
9	HC11-GM01	Borehole	304,902	5,710,996	1703	ESSFwc 2	281	Project Site	DEBSk	calc-alkaline volcanic rocks
10	HC11-GM01A	Borehole	304,902	5,710,996	1703	ESSFwc 2	281	Project Site	DEBSk	calc-alkaline volcanic rocks
11	HC11-GM02	Borehole	303,891	5,711,608	1707	ESSFwc 2	319	Project Site	DMEBF	andesitic volcanic rocks
12	HC11-GM03	Borehole	304,192	5,711,798	1667	ESSFwc 2	319	Project Site	DEBSk	calc-alkaline volcanic rocks
13	HC11-GM04	Borehole	304,700	5,711,818	1607	ESSFwc 2	736	Project Site	DEBSk	calc-alkaline volcanic rocks
14	HC11-GM05	Borehole	305,199	5,711,822	1607	ESSFwc 2	283	Project Site	DEBSk	calc-alkaline volcanic rocks
15	HC11-GM06	Borehole	305,427	5,711,189	1705	ESSFwc 2	307	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
16	HC11-GM07	Borehole	305,219	5,711,035	1709	ESSFwc 2	307	Project Site	DEBSk	calc-alkaline volcanic rocks
17	HC11-GT02	Borehole	304,016	5,708,353	1874	ESSFwc 2	415	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
18	HC11-GT05	Borehole	306,132	5,709,675	1816	ESSFwc 2	568	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
19	HC11-GT06	Borehole	307,876	5,709,397	1829	ESSFwc 2	11	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
20	HC11-GT07	Borehole	306,359	5,707,701	1748	ESSFwc 2	131	Project Site	DEBog	orthogneiss metamorphic rocks
21	HC11-GT08	Borehole	303,976	5,710,510	1612	ESSFwc 2	38	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
22	HC11-GT09	Borehole	305,336	5,709,749	1838	ESSFwc 2	782	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
23	HC11-GT10	Borehole	305,318	5,709,698	1840	ESSFwc 2	415	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
24	HC11-GT11	Borehole	305,320	5,709,614	1840	ESSFwc 2	415	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
25	HC11-GT12	Borehole	305,091	5,709,745	1830	ESSFwc 2	415	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
26	HC11-GT13	Borehole	305,160	5,709,515	1835	ESSFwc 2	415	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
27	HC11-GT14	Borehole	304,012	5,707,064	1768	ESSFwc 2	398	Project Site	Kqm	quartz monzonitic intrusive rocks
28	HC11-GT15	Borehole	304,219	5,706,624	1687	ESSFwc 2	565	Project Site	DEBog	orthogneiss metamorphic rocks
29	HC11-GT16	Borehole	304,580	5,706,735	1680	ESSFwc 2	265	Project Site	DEBog	orthogneiss metamorphic rocks
30	HC11-GT17	Borehole	304,474	5,706,389	1660	ESSFwc 2	265	Project Site	DEBog	orthogneiss metamorphic rocks
31	HC11-GT18	Borehole	304,883	5,706,371	1675	ESSFwc 2	11	Project Site	DEBog	orthogneiss metamorphic rocks
32	HC11-GT19	Borehole	304,727	5,706,177	1665	ESSFwc 2	467	Project Site	Kqm	quartz monzonitic intrusive rocks
33	HC11-GT20	Borehole	304,970	5,705,889	1695	ESSFwc 2	705	Project Site	Kqm	quartz monzonitic intrusive rocks
34	HC11-GT24	Borehole	305,565	5,706,526	1706	ESSFwc 2	131	Project Site	DEBog	orthogneiss metamorphic rocks
35	OP12-01	Borehole	304,698	5,711,885	1609	ESSFwc 2	736	Project Site	DEBSk	calc-alkaline volcanic rocks
36	OP12-02	Borehole	304,533	5,711,510	1606	ESSFwc 2	561	Project Site	DEBSk	calc-alkaline volcanic rocks
37	OP12-03	Borehole	304,338	5,711,424	1606	ESSFwc 2	561	Project Site	DEBSk	calc-alkaline volcanic rocks
38	OP12-04	Borehole	304,365	5,711,786	1644	ESSFwc 2	736	Project Site	DEBSk	calc-alkaline volcanic rocks
39	OP12-05	Borehole	303,977	5,711,765	1694	ESSFwc 2	319	Project Site	DMEBF	andesitic volcanic rocks
40	OP12-06	Borehole	303,989	5,711,360	1644	ESSFwc 2	319	Project Site	DEBSk	calc-alkaline volcanic rocks
41	OP12-07	Borehole	304,984	5,711,261	1678	ESSFwc 2	704	Project Site	DEBSk	calc-alkaline volcanic rocks
42	OP12-08	Borehole	304,782	5,711,265	1654	ESSFwc 2	698	Project Site	DEBSk	calc-alkaline volcanic rocks
43	OP12-09	Borehole	305,345	5,710,859	1747	ESSFwc 2	307	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
44	OP12-10	Borehole	304,654	5,710,631	1709	ESSFwc 2	281	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
45	TMF12-01	Borehole	305,288	5,706,352	1700	ESSFwc 2	131	Project Site	DEBog	orthogneiss metamorphic rocks

Table C1-2. Inspection Point Attributes

0	ID	Type	Easting	Northing	Elevation (m)	BEC Zone	Soil Polygon	Location	Strat Unit	Rock Type
46	TMF12-02	Borehole	305,390	5,706,348	1708	ESSFwc 2	131	Project Site	DEBog	orthogneiss metamorphic rocks
47	TMF12-03	Borehole	305,290	5,706,171	1708	ESSFwc 2	131	Project Site	DEBog	orthogneiss metamorphic rocks
48	TMF12-04	Borehole	304,889	5,706,055	1679	ESSFwc 2	705	Project Site	Kqm	quartz monzonitic intrusive rocks
49	TMF12-05	Borehole	304,838	5,706,015	1680	ESSFwc 2	705	Project Site	Kqm	quartz monzonitic intrusive rocks
50	TMF12-06	Borehole	304,807	5,706,130	1672	ESSFwc 2	467	Project Site	Kqm	quartz monzonitic intrusive rocks
51	TMF12-07	Borehole	304,720	5,706,114	1668	ESSFwc 2	467	Project Site	Kqm	quartz monzonitic intrusive rocks
52	TMF12-08	Borehole	304,653	5,706,205	1662	ESSFwc 2	11	Project Site	Kqm	quartz monzonitic intrusive rocks
53	TMF12-09	Borehole	304,594	5,706,172	1656	ESSFwc 2	326	Project Site	Kqm	quartz monzonitic intrusive rocks
54	TMF12-10	Borehole	304,530	5,706,258	1659	ESSFwc 2	466	Project Site	DEBog	orthogneiss metamorphic rocks
55	TMF12-11	Borehole	304,548	5,706,327	1660	ESSFwc 2	328	Project Site	DEBog	orthogneiss metamorphic rocks
56	TMF12-12	Borehole	304,476	5,706,383	1660	ESSFwc 2	265	Project Site	DEBog	orthogneiss metamorphic rocks
57	TMF12-13	Borehole	304,118	5,706,487	1680	ESSFwc 2	558	Project Site	DEBog	orthogneiss metamorphic rocks
58	TMF12-14	Borehole	304,246	5,706,817	1706	ESSFwc 2	558	Project Site	Kqm	quartz monzonitic intrusive rocks
59	TMF12-15	Borehole	304,273	5,706,697	1688	ESSFwc 2	265	Project Site	DEBog	orthogneiss metamorphic rocks
60	TMF12-16	Borehole	304,374	5,706,653	1680	ESSFwc 2	565	Project Site	DEBog	orthogneiss metamorphic rocks
61	TMF12-17	Borehole	304,434	5,706,552	1669	ESSFwc 2	265	Project Site	DEBog	orthogneiss metamorphic rocks
62	TMF12-18	Borehole	304,385	5,706,484	1666	ESSFwc 2	565	Project Site	DEBog	orthogneiss metamorphic rocks
63	hHC12-01	Eco-Risk	304,023	5,709,584	1720	ESSFwc 2	307	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
64	hHC12-02	Eco-Risk	303,620	5,709,312	1740	ESSFwc 2	567	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
65	hHC12-03	Eco-Risk	303,379	5,708,770	1786	ESSFwc 2	567	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
66	hHC12-04	Eco-Risk	303,727	5,708,955	1794	ESSFwc 2	567	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
67	hHC12-05	Eco-Risk	304,236	5,709,281	1790	ESSFwc 2	415	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
68	hHC12-06	Eco-Risk	304,674	5,709,226	1827	ESSFwc 2	415	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
69	hHC12-07	Eco-Risk	305,020	5,709,485	1830	ESSFwc 2	415	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
70	hHC12-08	Eco-Risk	305,373	5,709,276	1830	ESSFwc 2	415	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
71	hHC12-09	Eco-Risk	305,910	5,709,805	1832	ESSFwc 2	135	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
72	hHC12-10	Eco-Risk	305,690	5,710,096	1829	ESSFwc 2	135	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
73	hHC12-11	Eco-Risk	305,723	5,710,504	1817	ESSFwc 2	307	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
74	hHC12-12	Eco-Risk	306,189	5,710,723	1793	ESSFwc 2	416	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
75	hHC12-13	Eco-Risk	306,364	5,711,146	1737	ESSFwc 2	307	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
76	hHC12-14	Eco-Risk	306,907	5,711,420	1696	ESSFwc 2	307	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
77	hHC12-15	Eco-Risk	306,950	5,712,859	1339	ICH mw 3	752	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
78	019	Ground Truthing	306,099	5,717,747	460	IDF mw 2	388	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
79	020	Ground Truthing	305,915	5,715,685	761	ICH dw 3	716	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
80	021	Ground Truthing	305,626	5,714,657	990	ICH dw 3	767	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
81	022	Ground Truthing	305,930	5,714,054	1203	ICH mw 3	40	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
82	023	Ground Truthing	306,458	5,713,280	1281	ICH mw 3	366	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
83	024	Ground Truthing	306,764	5,712,893	1327	ICH mw 3	366	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
84	025	Ground Truthing	305,127	5,711,271	1689	ESSFwc 2	283	Project Site	DEBSk	calc-alkaline volcanic rocks
85	026	Ground Truthing	306,061	5,712,417	1589	ESSFwc 2	278	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
86	027	Ground Truthing	306,348	5,712,465	1552	ESSFwc 2	128	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
87	028	Ground Truthing	305,863	5,710,029	1835	ESSFwc 2	135	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
88	029	Ground Truthing	305,545	5,709,103	1813	ESSFwc 2	568	Project Site	DEBog	orthogneiss metamorphic rocks
89	030	Ground Truthing	304,213	5,706,673	1690	ESSFwc 2	265	Project Site	DEBog	orthogneiss metamorphic rocks
90	031	Ground Truthing	304,563	5,706,277	1660	ESSFwc 2	328	Project Site	DEBog	orthogneiss metamorphic rocks

Table C1-2. Inspection Point Attributes

0	ID	Type	Easting	Northing	Elevation (m)	BEC Zone	Soil Polygon	Location	Strat Unit	Rock Type
91	033	Ground Truthing	304,700	5,706,128	1666	ESSFwc 2	467	Project Site	Kqm	quartz monzonitic intrusive rocks
92	034	Ground Truthing	304,631	5,706,033	1666	ESSFwc 2	705	Project Site	Kqm	quartz monzonitic intrusive rocks
93	036	Ground Truthing	306,356	5,707,708	1748	ESSFwc 2	131	Project Site	DEBog	orthogneiss metamorphic rocks
94	039	Ground Truthing	307,308	5,711,541	1573	ESSFwc 2	343	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
95	040	Ground Truthing	307,283	5,711,550	1588	ESSFwc 2	307	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
96	041	Ground Truthing	307,285	5,711,551	1586	ESSFwc 2	307	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
97	042	Ground Truthing	307,293	5,711,569	1586	ESSFwc 2	307	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
98	043	Ground Truthing	307,277	5,711,522	1592	ESSFwc 2	343	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
99	044	Ground Truthing	302,931	5,706,246	1527	ICH wk 1	220	Local Study Area	Kqm	quartz monzonitic intrusive rocks
100	045	Ground Truthing	302,994	5,706,201	1564	ICH wk 1	220	Local Study Area	Kqm	quartz monzonitic intrusive rocks
101	046	Ground Truthing	302,979	5,706,236	1560	ICH wk 1	220	Local Study Area	Kqm	quartz monzonitic intrusive rocks
102	048	Ground Truthing	303,280	5,706,087	1609	ESSFwc 2	287	Local Study Area	Kqm	quartz monzonitic intrusive rocks
103	049	Ground Truthing	303,481	5,705,895	1624	ESSFwc 2	287	Local Study Area	Kqm	quartz monzonitic intrusive rocks
104	050	Ground Truthing	303,471	5,705,909	1622	ESSFwc 2	237	Local Study Area	Kqm	quartz monzonitic intrusive rocks
105	053	Ground Truthing	304,123	5,704,952	1695	ESSFwc 2	563	Project Site	Kqm	quartz monzonitic intrusive rocks
106	054	Ground Truthing	304,194	5,705,001	1699	ESSFwc 2	563	Project Site	Kqm	quartz monzonitic intrusive rocks
107	055	Ground Truthing	303,441	5,709,111	1759	ESSFwc 2	567	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
108	056	Ground Truthing	307,394	5,710,003	1842	ESSFwc 2	135	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
109	057	Ground Truthing	307,643	5,710,030	1818	ESSFwc 2	266	Project Site	DEBog	orthogneiss metamorphic rocks
110	058	Ground Truthing	308,711	5,709,997	1754	ESSFwc 2	279	Local Study Area	DEBog	orthogneiss metamorphic rocks
111	059	Ground Truthing	309,065	5,710,961	1554	ESSFwc 2	276	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
112	060	Ground Truthing	308,768	5,711,902	1479	ESSFwc 2	44	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
113	063	Ground Truthing	308,765	5,711,902	1479	ESSFwc 2	44	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
114	064	Ground Truthing	308,593	5,712,936	1420	ESSFwc 2	701	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
115	065	Ground Truthing	308,592	5,712,936	1420	ESSFwc 2	701	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
116	066	Ground Truthing	310,261	5,714,659	1218	ICH mw 3	344	Local Study Area	lCmEBJ	greenstone, greenschist metamorphic rocks
117	067	Ground Truthing	313,864	5,715,756	900	ICH dw 3	456	Local Study Area	lCmEBJ	greenstone, greenschist metamorphic rocks
118	068	Ground Truthing	313,920	5,715,928	875	ICH dw 3	456	Local Study Area	lCmEBJ	greenstone, greenschist metamorphic rocks
119	069	Ground Truthing	312,300	5,717,651	593	IDF mw 2	667	Local Study Area	lCmEBlm	limestone, marble, calcareous sedimentary rocks
120	070	Ground Truthing	306,954	5,715,029	848	ICH dw 3	316	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
121	071	Ground Truthing	305,575	5,714,066	1142	ICH mw 3	626	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
122	072	Ground Truthing	305,419	5,713,763	1115	ICH mw 3	474	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
123	073	Ground Truthing	305,411	5,713,738	1117	ICH mw 3	474	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
124	074	Ground Truthing	305,371	5,713,593	1115	ICH mw 3	242	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
125	079	Ground Truthing	306,386	5,717,742	490	IDF mw 2	388	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
126	080	Ground Truthing	306,389	5,717,750	490	IDF mw 2	388	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
127	081	Ground Truthing	306,306	5,717,703	498	IDF mw 2	388	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
128	0622-1	Keystone Plot	306,696	5,717,740	463	IDF mw 2	439	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
129	HC08-01	Keystone Plot	306,930	5,711,426	1691	ESSFwc 2	307	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
130	HC08-02	Keystone Plot	305,954	5,710,658	1802	ESSFwc 2	307	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
131	HC08-03	Keystone Plot	305,797	5,708,789	1780	ESSFwc 2	568	Project Site	DEBog	orthogneiss metamorphic rocks
132	HC08-04	Keystone Plot	302,983	5,706,336	1569	ESSFwc 2	220	Local Study Area	Kqm	quartz monzonitic intrusive rocks
133	HC08-05	Keystone Plot	303,419	5,705,961	1619	ESSFwc 2	287	Local Study Area	Kqm	quartz monzonitic intrusive rocks
134	HC08-06	Keystone Plot	305,642	5,708,975	1800	ESSFwc 2	568	Project Site	DEBog	orthogneiss metamorphic rocks
135	HC08-07	Keystone Plot	303,464	5,708,795	1800	ESSFwc 2	567	Project Site	uPrCmEBpg	paragneiss metamorphic rocks

Table C1-2. Inspection Point Attributes

0	ID	Type	Easting	Northing	Elevation (m)	BEC Zone	Soil Polygon	Location	Strat Unit	Rock Type
136	HC08-08	Keystone Plot	304,694	5,706,201	1663	ESSFwc 2	326	Project Site	DEBog	orthogneiss metamorphic rocks
137	HC08-09	Keystone Plot	305,154	5,705,650	1737	ESSFwc 2	324	Project Site	Kqm	quartz monzonitic intrusive rocks
138	HC08-10	Keystone Plot	305,124	5,705,768	1710	ESSFwc 2	131	Project Site	Kqm	quartz monzonitic intrusive rocks
139	HC08-109	Keystone Plot	304,451	5,705,377	1690	ESSFwc 2	563	Project Site	Kqm	quartz monzonitic intrusive rocks
140	HC08-11	Keystone Plot	305,602	5,706,585	1702	ESSFwc 2	16	Project Site	DEBog	orthogneiss metamorphic rocks
141	HC08-110	Keystone Plot	307,658	5,709,742	1822	ESSFwc 2	331	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
142	HC08-114	Keystone Plot	303,334	5,711,387	1720	ESSFwc 2	779	Project Site	DEBSk	calc-alkaline volcanic rocks
143	HC08-12	Keystone Plot	305,713	5,706,751	1707	ESSFwc 2	327	Project Site	DEBog	orthogneiss metamorphic rocks
144	HC08-13	Keystone Plot	305,663	5,706,771	1705	ESSFwc 2	11	Project Site	DEBog	orthogneiss metamorphic rocks
145	HC08-15	Keystone Plot	304,100	5,707,266	1780	ESSFwc 2	398	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
146	HC08-16	Keystone Plot	304,095	5,707,215	1774	ESSFwc 2	398	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
147	HC08-18	Keystone Plot	305,716	5,708,503	1764	ESSFwc 2	11	Project Site	DEBog	orthogneiss metamorphic rocks
148	HC08-20	Keystone Plot	304,170	5,709,187	1798	ESSFwc 2	415	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
149	HC08-23	Keystone Plot	307,129	5,711,207	1676	ESSFwc 2	699	Project Site	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
150	HC08-24	Keystone Plot	307,445	5,711,165	1646	ESSFwc 2	699	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
151	HC08-25	Keystone Plot	307,705	5,711,108	1606	ESSFwc 2	413	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
152	HC08-28	Keystone Plot	306,805	5,712,384	1514	ESSFwc 2	128	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
153	HC08-29	Keystone Plot	305,651	5,712,042	1603	ESSFwc 2	32	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
154	HC08-31	Keystone Plot	304,887	5,711,263	1670	ESSFwc 2	704	Project Site	DEBSk	calc-alkaline volcanic rocks
155	HC08-32	Keystone Plot	304,881	5,711,231	1665	ESSFwc 2	300	Project Site	DEBSk	calc-alkaline volcanic rocks
156	HC08-33	Keystone Plot	304,793	5,711,259	1655	ESSFwc 2	698	Project Site	DEBSk	calc-alkaline volcanic rocks
157	HC08-36	Keystone Plot	304,190	5,712,369	1642	ESSFwc 2	736	Project Site	DMEBF	andesitic volcanic rocks
158	HC08-38	Keystone Plot	308,694	5,713,665	1340	ICH mw 3	399	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
159	HC08-39	Keystone Plot	308,589	5,713,468	1366	ICH mw 3	399	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
160	HC08-40	Keystone Plot	308,627	5,712,932	1427	ESSFwc 2	701	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
161	HC08-41	Keystone Plot	308,664	5,712,687	1438	ESSFwc 2	756	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
162	HC08-43	Keystone Plot	307,706	5,711,744	1466	ESSFwc 2	169	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
163	HC08-45	Keystone Plot	307,623	5,711,968	1430	ESSFwc 2	318	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
164	HC08-46	Keystone Plot	307,194	5,712,599	1387	ICH mw 3	321	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
165	HC08-48	Keystone Plot	306,970	5,712,808	1348	ICH mw 3	752	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
166	HC08-49	Keystone Plot	306,505	5,713,197	1313	ICH mw 3	366	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
167	HC08-50	Keystone Plot	306,450	5,713,499	1261	ICH mw 3	759	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
168	HC08-53	Keystone Plot	305,562	5,714,037	1147	ICH mw 3	626	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
169	HC08-54	Keystone Plot	305,393	5,713,577	1120	ICH mw 3	145	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
170	HC08-61	Keystone Plot	304,904	5,714,269	1087	ICH mw 3	761	Local Study Area	DMEBF	andesitic volcanic rocks
171	HC08-66	Keystone Plot	307,462	5,713,225	1206	ICH mw 3	717	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
172	HC08-68	Keystone Plot	306,512	5,714,347	1065	ICH dw 3	317	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
173	HC08-69	Keystone Plot	306,131	5,714,616	1034	ICH dw 3	317	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
174	HC08-71	Keystone Plot	305,466	5,714,446	1021	ICH dw 3	751	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
175	HC08-73	Keystone Plot	306,561	5,715,309	840	ICH dw 3	552	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
176	HC08-75	Keystone Plot	306,441	5,715,491	810	ICH dw 3	518	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
177	HC08-77	Keystone Plot	305,808	5,716,113	704	IDF mw 2	523	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
178	HC08-78	Keystone Plot	305,896	5,716,483	654	IDF mw 2	529	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
179	HC08-79	Keystone Plot	305,761	5,716,394	674	IDF mw 2	523	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
180	HC08-80	Keystone Plot	305,948	5,716,616	631	IDF mw 2	538	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks

Table C1-2. Inspection Point Attributes

0	ID	Type	Easting	Northing	Elevation (m)	BEC Zone	Soil Polygon	Location	Strat Unit	Rock Type
181	HC08-81	Keystone Plot	306,124	5,716,737	608	IDF mw 2	514	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
182	HC08-83	Keystone Plot	306,131	5,716,998	580	IDF mw 2	514	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
183	HC08-84	Keystone Plot	306,318	5,717,350	531	IDF mw 2	514	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
184	HC08-85	Keystone Plot	306,465	5,717,340	507	IDF mw 2	539	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
185	HC08-86	Keystone Plot	306,257	5,717,628	510	IDF mw 2	517	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
186	HC08-87	Keystone Plot	306,235	5,717,714	493	IDF mw 2	388	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
187	HC08-92	Keystone Plot	302,114	5,710,623	1348	ICH wk 1	719	Local Study Area	uPrCmEBpg	paragneiss metamorphic rocks
188	HC08-93	Keystone Plot	301,871	5,709,614	1280	ICH wk 1	448	Local Study Area	uPrCmEBpg	paragneiss metamorphic rocks
189	HCV08-112	Keystone Plot	303,155	5,707,032	1776	ESSFwc 2	144	Local Study Area	Kqm	quartz monzonitic intrusive rocks
190	HCV08-14	Keystone Plot	304,318	5,706,799	1698	ESSFwc 2	558	Project Site	DEBog	orthogneiss metamorphic rocks
191	HCV08-17	Keystone Plot	304,911	5,707,562	1720	ESSFwc 2	559	Project Site	DEBog	orthogneiss metamorphic rocks
192	HCV08-19	Keystone Plot	305,396	5,709,337	1831	ESSFwc 2	415	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
193	HCV08-21	Keystone Plot	304,824	5,709,288	1828	ESSFwc 2	415	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
194	HCV08-22	Keystone Plot	305,065	5,709,282	1831	ESSFwc 2	415	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
195	HCV08-26	Keystone Plot	307,341	5,711,497	1573	ESSFwc 2	343	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
196	HCV08-27	Keystone Plot	307,089	5,712,199	1506	ESSFwc 2	128	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
197	HCV08-30	Keystone Plot	304,753	5,711,442	1635	ESSFwc 2	704	Project Site	DEBSk	calc-alkaline volcanic rocks
198	HCV08-34	Keystone Plot	304,219	5,711,449	1615	ESSFwc 2	561	Project Site	DEBSk	calc-alkaline volcanic rocks
199	HCV08-37	Keystone Plot	307,054	5,712,297	1487	ESSFwc 2	129	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
200	HCV08-42	Keystone Plot	308,945	5,712,060	1485	ESSFwc 2	722	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
201	HCV08-44	Keystone Plot	309,643	5,712,145	1680	ESSFwc 2	68	Local Study Area	lCmEBJ	greenstone, greenschist metamorphic rocks
202	HCV08-47	Keystone Plot	307,236	5,712,645	1361	ICH mw 3	366	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
203	HCV08-51	Keystone Plot	306,426	5,713,603	1257	ICH mw 3	759	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
204	HCV08-52	Keystone Plot	306,067	5,713,985	1216	ICH mw 3	40	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
205	HCV08-55	Keystone Plot	305,392	5,713,586	1116	ICH mw 3	145	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
206	HCV08-65	Keystone Plot	306,681	5,713,912	1142	ICH mw 3	317	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
207	HCV08-67	Keystone Plot	307,348	5,713,488	1179	ICH mw 3	717	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
208	HCV08-70	Keystone Plot	305,469	5,714,401	1038	ICH dw 3	751	Local Study Area	lPzEBF	greenstone, greenschist metamorphic rocks
209	HCV08-72	Keystone Plot	305,813	5,714,918	949	ICH dw 3	316	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
210	HCV08-74	Keystone Plot	306,747	5,715,248	844	ICH dw 3	316	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
211	HCV08-76	Keystone Plot	305,913	5,715,605	780	ICH dw 3	716	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
212	HCV08-82	Keystone Plot	306,108	5,716,831	595	IDF mw 2	514	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
213	HCV08-94	Keystone Plot	301,864	5,709,626	1280	ICH wk 1	448	Local Study Area	uPrCmEBpg	paragneiss metamorphic rocks
214	HCV08-95	Keystone Plot	301,922	5,709,334	1260	ICH wk 1	112	Local Study Area	uPrCmEBpg	paragneiss metamorphic rocks
215	HCV111	Keystone Plot	307,649	5,709,818	1825	ESSFwc 2	266	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
216	KS01	Keystone Plot	307,126	5,707,431	1846	ESSFwcw	578	Project Site	DEBog	orthogneiss metamorphic rocks
217	KS04	Keystone Plot	305,414	5,707,905	1722	ESSFwc 2	11	Project Site	DEBog	orthogneiss metamorphic rocks
218	KS05	Keystone Plot	305,471	5,707,888	1720	ESSFwc 2	11	Project Site	DEBog	orthogneiss metamorphic rocks
219	LAF2	Keystone Plot	311,409	5,717,683	505	IDF mw 2	453	Local Study Area	lCmEBJ	greenstone, greenschist metamorphic rocks
220	LAF26	Keystone Plot	313,411	5,715,330	996	ICH mw 3	458	Local Study Area	lCmEBJ	greenstone, greenschist metamorphic rocks
221	LAF3	Keystone Plot	310,608	5,717,556	501	IDF mw 2	479	Local Study Area	lCmEBJ	greenstone, greenschist metamorphic rocks
222	LAF4	Keystone Plot	313,948	5,715,770	887	ICH dw 3	456	Local Study Area	lCmEBJ	greenstone, greenschist metamorphic rocks
223	LAF5	Keystone Plot	309,356	5,717,223	485	IDF mw 2	419	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
224	LAF6	Keystone Plot	305,078	5,716,625	631	IDF mw 2	48	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
225	LAF8	Keystone Plot	309,272	5,719,691	703	IDF mw 2b	643	Local Study Area	lCmEBJ	greenstone, greenschist metamorphic rocks

Table C1-2. Inspection Point Attributes

0	ID	Type	Easting	Northing	Elevation (m)	BEC Zone	Soil Polygon	Location	Strat Unit	Rock Type
226	LAG22	Keystone Plot	313,826	5,716,786	764	ICH dw 3	125	Local Study Area	lCmEBJ	greenstone, greenschist metamorphic rocks
227	LAG23	Keystone Plot	313,888	5,716,811	739	ICH dw 3	50	Local Study Area	lCmEBJ	greenstone, greenschist metamorphic rocks
228	LAG25	Keystone Plot	308,525	5,717,642	440	IDF mw 2	421	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
229	LAG27	Keystone Plot	312,555	5,715,294	1079	ICH mw 3	634	Local Study Area	lCmEBJ	greenstone, greenschist metamorphic rocks
230	LAG28	Keystone Plot	311,449	5,714,578	1160	ICH mw 3	441	Local Study Area	lCmEBlm	limestone, marble, calcareous sedimentary rocks
231	LAG29	Keystone Plot	311,645	5,714,177	1204	ICH mw 3	543	Local Study Area	lCmEBlm	limestone, marble, calcareous sedimentary rocks
232	LAG30	Keystone Plot	311,645	5,714,176	1204	ICH mw 3	543	Local Study Area	lCmEBlm	limestone, marble, calcareous sedimentary rocks
233	LAG7	Keystone Plot	308,303	5,719,902	783	IDF mw 2b	663	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
234	LAG92	Keystone Plot	305,375	5,711,584	1669	ESSFwc 2	283	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
235	LAG93	Keystone Plot	305,754	5,711,852	1651	ESSFwc 2	278	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
236	LAG97	Keystone Plot	307,169	5,711,010	1707	ESSFwc 2	305	Project Site	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
237	LAV1	Keystone Plot	311,468	5,717,786	497	IDF mw 2	340	Local Study Area	lCmEBJ	greenstone, greenschist metamorphic rocks
238	LAV107	Keystone Plot	311,869	5,716,866	934	ICH dw 3	588	Local Study Area	lCmEBJ	greenstone, greenschist metamorphic rocks
239	LAV108	Keystone Plot	312,508	5,716,865	862	ICH dw 3	230	Local Study Area	lCmEBlm	limestone, marble, calcareous sedimentary rocks
240	LAV127	Keystone Plot	305,153	5,716,710	583	IDF mw 2	48	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
241	LAV14	Keystone Plot	310,526	5,718,994	571	IDF mw 2	645	Local Study Area	lCmEBJ	greenstone, greenschist metamorphic rocks
242	LAV15	Keystone Plot	308,769	5,718,252	470	IDF mw 2	17	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
243	LAV16	Keystone Plot	309,149	5,718,312	460	IDF mw 2	476	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
244	LAV17	Keystone Plot	312,332	5,718,289	525	IDF mw 2	127	Local Study Area	lCmEBlm	limestone, marble, calcareous sedimentary rocks
245	LAV18	Keystone Plot	313,016	5,718,432	480	IDF mw 2	342	Local Study Area	lCmEBJ	greenstone, greenschist metamorphic rocks
246	LAV21	Keystone Plot	313,411	5,718,380	536	IDF mw 2	528	Local Study Area	lCmEBJ	greenstone, greenschist metamorphic rocks
247	LAV22	Keystone Plot	313,543	5,718,390	549	IDF mw 2	669	Local Study Area	lCmEBJ	greenstone, greenschist metamorphic rocks
248	LAV46	Keystone Plot	306,106	5,712,515	1578	ESSFwc 2	278	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
249	LAV47	Keystone Plot	307,998	5,711,057	1569	ESSFwc 2	138	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
250	LAV9	Keystone Plot	309,555	5,719,718	768	IDF mw 2b	640	Local Study Area	lCmEBlm	limestone, marble, calcareous sedimentary rocks
251	LAV98	Keystone Plot	308,335	5,710,953	1574	ESSFwc 2	1	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
252	LAV99	Keystone Plot	308,352	5,711,010	1563	ESSFwc 2	277	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
253	PU09072011-01	Keystone Plot	307,205	5,707,377	1857	ESSFwcw	578	Project Site	DEBog	orthogneiss metamorphic rocks
254	PU09072011-02	Keystone Plot	304,581	5,706,294	1660	ESSFwc 2	328	Project Site	DEBog	orthogneiss metamorphic rocks
255	PU09072011-03	Keystone Plot	303,979	5,706,145	1653	ESSFwc 2	264	Project Site	Kqm	quartz monzonitic intrusive rocks
256	PU09072011-04	Keystone Plot	305,368	5,707,997	1730	ESSFwc 2	559	Project Site	DEBog	orthogneiss metamorphic rocks
257	PU09082011-05	Keystone Plot	303,782	5,711,285	1695	ESSFwc 2	296	Project Site	DEBSk	calc-alkaline volcanic rocks
258	PU09082011-06	Keystone Plot	304,521	5,710,689	1689	ESSFwc 2	281	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
259	PU09082011-07	Keystone Plot	308,399	5,710,493	1689	ESSFwc 2	279	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
260	PU09082011-08	Keystone Plot	308,907	5,711,387	1495	ESSFwc 2	557	Local Study Area	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
261	HC11-GT21	ML/ARD	304,580	5,705,787	1677	ESSFwc 2	705	Project Site	Kqm	quartz monzonitic intrusive rocks
262	HC11-GT23	ML/ARD	304,056	5,705,874	1633	ESSFwc 2	264	Project Site	Kqm	quartz monzonitic intrusive rocks
263	OP01	ML/ARD	303,788	5,711,193	1669	ESSFwc 2	289	Project Site	DEBSk	calc-alkaline volcanic rocks
264	OP02	ML/ARD	303,903	5,711,289	1653	ESSFwc 2	289	Project Site	DEBSk	calc-alkaline volcanic rocks
265	OP03	ML/ARD	304,028	5,711,373	1638	ESSFwc 2	561	Project Site	DEBSk	calc-alkaline volcanic rocks
266	OP04	ML/ARD	304,177	5,711,411	1620	ESSFwc 2	561	Project Site	DEBSk	calc-alkaline volcanic rocks
267	OP05	ML/ARD	304,323	5,711,441	1609	ESSFwc 2	561	Project Site	DEBSk	calc-alkaline volcanic rocks
268	OP06	ML/ARD	304,437	5,711,541	1614	ESSFwc 2	561	Project Site	DEBSk	calc-alkaline volcanic rocks
269	OP07	ML/ARD	304,566	5,711,605	1612	ESSFwc 2	736	Project Site	DEBSk	calc-alkaline volcanic rocks
270	OP08	ML/ARD	304,699	5,711,530	1615	ESSFwc 2	704	Project Site	DEBSk	calc-alkaline volcanic rocks

Table C1-2. Inspection Point Attributes

0	ID	Type	Easting	Northing	Elevation (m)	BEC Zone	Soil Polygon	Location	Strat Unit	Rock Type
271	OP09	ML/ARD	304,755	5,711,488	1630	ESSFwc 2	704	Project Site	DEBSk	calc-alkaline volcanic rocks
272	OP10	ML/ARD	304,780	5,711,338	1648	ESSFwc 2	704	Project Site	DEBSk	calc-alkaline volcanic rocks
273	OP11	ML/ARD	304,902	5,711,241	1668	ESSFwc 2	704	Project Site	DEBSk	calc-alkaline volcanic rocks
274	OP12	ML/ARD	305,061	5,711,147	1687	ESSFwc 2	300	Project Site	DEBSk	calc-alkaline volcanic rocks
275	OP12-01	ML/ARD	304,698	5,711,885	1609	ESSFwc 2	736	Project Site	DEBSk	calc-alkaline volcanic rocks
276	OP12-02	ML/ARD	304,524	5,711,510	1607	ESSFwc 2	561	Project Site	DEBSk	calc-alkaline volcanic rocks
277	OP12-03	ML/ARD	304,338	5,711,424	1606	ESSFwc 2	561	Project Site	DEBSk	calc-alkaline volcanic rocks
278	OP12-04	ML/ARD	304,365	5,711,786	1644	ESSFwc 2	736	Project Site	DEBSk	calc-alkaline volcanic rocks
279	OP12-05	ML/ARD	303,977	5,711,765	1694	ESSFwc 2	319	Project Site	DMEBF	andesitic volcanic rocks
280	OP12-06	ML/ARD	303,989	5,711,360	1644	ESSFwc 2	319	Project Site	DEBSk	calc-alkaline volcanic rocks
281	OP12-07	ML/ARD	304,984	5,711,261	1678	ESSFwc 2	704	Project Site	DEBSk	calc-alkaline volcanic rocks
282	OP12-08	ML/ARD	304,782	5,711,265	1654	ESSFwc 2	698	Project Site	DEBSk	calc-alkaline volcanic rocks
283	OP12-09	ML/ARD	305,345	5,710,859	1747	ESSFwc 2	307	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
284	OP12-10	ML/ARD	304,654	5,710,631	1709	ESSFwc 2	281	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
285	OP13	ML/ARD	305,090	5,710,967	1710	ESSFwc 2	307	Project Site	DEBSk	calc-alkaline volcanic rocks
286	OP14	ML/ARD	305,035	5,710,813	1730	ESSFwc 2	307	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
287	OP15	ML/ARD	304,970	5,710,680	1743	ESSFwc 2	281	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
288	OP16	ML/ARD	304,868	5,710,543	1744	ESSFwc 2	307	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
289	TP1	ML/ARD	303,625	5,706,016	1660	ESSFwc 2	558	Project Site	Kqm	quartz monzonitic intrusive rocks
290	TP12	ML/ARD	304,505	5,706,263	1659	ESSFwc 2	466	Project Site	DEBog	orthogneiss metamorphic rocks
291	TP15	ML/ARD	306,234	5,707,519	1737	ESSFwc 2	131	Project Site	DEBog	orthogneiss metamorphic rocks
292	TP2	ML/ARD	303,809	5,705,966	1655	ESSFwc 2	558	Project Site	Kqm	quartz monzonitic intrusive rocks
293	TP26	ML/ARD	304,404	5,706,609	1675	ESSFwc 2	265	Project Site	DEBog	orthogneiss metamorphic rocks
294	TP27	ML/ARD	304,265	5,706,683	1686	ESSFwc 2	265	Project Site	DEBog	orthogneiss metamorphic rocks
295	TP29	ML/ARD	304,424	5,707,111	1721	ESSFwc 2	265	Project Site	DEBog	orthogneiss metamorphic rocks
296	TP30	ML/ARD	304,614	5,707,340	1728	ESSFwc 2	559	Project Site	DEBog	orthogneiss metamorphic rocks
297	TP32	ML/ARD	305,386	5,706,205	1713	ESSFwc 2	131	Project Site	DEBog	orthogneiss metamorphic rocks
298	TP5	ML/ARD	304,920	5,707,672	1729	ESSFwc 2	559	Project Site	DEBog	orthogneiss metamorphic rocks
299	TP51	ML/ARD	306,387	5,710,005	1848	ESSFwc 2	135	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
300	OP01	Open Pit	303,788	5,711,193	1669	ESSFwc 2	289	Project Site	DEBSk	calc-alkaline volcanic rocks
301	OP02	Open Pit	303,903	5,711,289	1653	ESSFwc 2	289	Project Site	DEBSk	calc-alkaline volcanic rocks
302	OP03	Open Pit	304,028	5,711,373	1638	ESSFwc 2	561	Project Site	DEBSk	calc-alkaline volcanic rocks
303	OP04	Open Pit	304,177	5,711,411	1620	ESSFwc 2	561	Project Site	DEBSk	calc-alkaline volcanic rocks
304	OP05	Open Pit	304,323	5,711,441	1609	ESSFwc 2	561	Project Site	DEBSk	calc-alkaline volcanic rocks
305	OP06	Open Pit	304,437	5,711,541	1614	ESSFwc 2	561	Project Site	DEBSk	calc-alkaline volcanic rocks
306	OP07	Open Pit	304,566	5,711,605	1612	ESSFwc 2	736	Project Site	DEBSk	calc-alkaline volcanic rocks
307	OP08	Open Pit	304,699	5,711,530	1615	ESSFwc 2	704	Project Site	DEBSk	calc-alkaline volcanic rocks
308	OP09	Open Pit	304,755	5,711,488	1630	ESSFwc 2	704	Project Site	DEBSk	calc-alkaline volcanic rocks
309	OP10	Open Pit	304,780	5,711,338	1648	ESSFwc 2	704	Project Site	DEBSk	calc-alkaline volcanic rocks
310	OP11	Open Pit	304,902	5,711,241	1668	ESSFwc 2	704	Project Site	DEBSk	calc-alkaline volcanic rocks
311	OP12	Open Pit	305,061	5,711,147	1687	ESSFwc 2	300	Project Site	DEBSk	calc-alkaline volcanic rocks
312	OP13	Open Pit	305,090	5,710,967	1710	ESSFwc 2	307	Project Site	DEBSk	calc-alkaline volcanic rocks
313	OP14	Open Pit	305,035	5,710,813	1730	ESSFwc 2	307	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
314	OP15	Open Pit	304,970	5,710,680	1743	ESSFwc 2	281	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
315	OP16	Open Pit	304,868	5,710,543	1744	ESSFwc 2	307	Project Site	uPrCmEBpg	paragneiss metamorphic rocks

Table C1-2. Inspection Point Attributes

0	ID	Type	Easting	Northing	Elevation (m)	BEC Zone	Soil Polygon	Location	Strat Unit	Rock Type
316	RC01	Road Cut	304,423	5,711,528	1613	ESSFwc 2	561	Project Site	DEBSk	calc-alkaline volcanic rocks
317	RC02	Road Cut	304,189	5,711,409	1617	ESSFwc 2	561	Project Site	DEBSk	calc-alkaline volcanic rocks
318	RC03	Road Cut	303,985	5,711,367	1646	ESSFwc 2	319	Project Site	DEBSk	calc-alkaline volcanic rocks
319	RC04	Road Cut	303,798	5,711,197	1667	ESSFwc 2	289	Project Site	DEBSk	calc-alkaline volcanic rocks
320	RC05	Road Cut	304,806	5,711,314	1652	ESSFwc 2	704	Project Site	DEBSk	calc-alkaline volcanic rocks
321	RC06	Road Cut	304,700	5,711,100	1669	ESSFwc 2	281	Project Site	DEBSk	calc-alkaline volcanic rocks
322	RC07	Road Cut	304,343	5,710,771	1662	ESSFwc 2	281	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
323	RC08	Road Cut	303,995	5,710,550	1625	ESSFwc 2	323	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
324	RC09	Road Cut	303,980	5,711,759	1692	ESSFwc 2	319	Project Site	DMEBF	andesitic volcanic rocks
325	RC10	Road Cut	304,002	5,711,615	1679	ESSFwc 2	319	Project Site	DEBSk	calc-alkaline volcanic rocks
326	RC11	Road Cut	303,797	5,711,304	1690	ESSFwc 2	296	Project Site	DEBSk	calc-alkaline volcanic rocks
327	RC12	Road Cut	304,601	5,710,635	1705	ESSFwc 2	281	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
328	RC13	Road Cut	305,011	5,710,726	1740	ESSFwc 2	281	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
329	RC14	Road Cut	305,629	5,710,730	1779	ESSFwc 2	415	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
330	RC15	Road Cut	305,075	5,711,008	1704	ESSFwc 2	307	Project Site	DEBSk	calc-alkaline volcanic rocks
331	RC16	Road Cut	304,875	5,711,750	1612	ESSFwc 2	283	Project Site	DEBSk	calc-alkaline volcanic rocks
332	RC17	Road Cut	304,695	5,711,884	1609	ESSFwc 2	736	Project Site	DEBSk	calc-alkaline volcanic rocks
333	RC18	Road Cut	304,012	5,707,064	1768	ESSFwc 2	398	Project Site	Kqm	quartz monzonitic intrusive rocks
334	RC19	Road Cut	304,002	5,707,135	1779	ESSFwc 2	398	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
335	RC20	Road Cut	304,035	5,707,169	1778	ESSFwc 2	398	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
336	RC21	Road Cut	304,087	5,707,229	1777	ESSFwc 2	398	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
337	HC1	Soil Inspection	306,943	5,709,063	1785	ESSFwc 2	331	Project Site	DEBog	orthogneiss metamorphic rocks
338	HC10	Soil Inspection	304,103	5,706,531	1689	ESSFwc 2	558	Project Site	Kqm	quartz monzonitic intrusive rocks
339	HC11	Soil Inspection	304,794	5,707,593	1737	ESSFwc 2	559	Project Site	DEBog	orthogneiss metamorphic rocks
340	HC12	Soil Inspection	304,414	5,708,427	1864	ESSFwc 2	415	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
341	HC13	Soil Inspection	303,859	5,708,417	1865	ESSFwc 2	415	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
342	HC15	Soil Inspection	306,058	5,708,742	1765	ESSFwc 2	11	Project Site	DEBog	orthogneiss metamorphic rocks
343	HC16	Soil Inspection	305,845	5,709,333	1810	ESSFwc 2	568	Project Site	DEBog	orthogneiss metamorphic rocks
344	HC17	Soil Inspection	306,107	5,710,134	1837	ESSFwc 2	135	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
345	HC18	Soil Inspection	306,630	5,709,980	1845	ESSFwc 2	135	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
346	HC19	Soil Inspection	307,762	5,709,979	1822	ESSFwc 2	266	Project Site	DEBog	orthogneiss metamorphic rocks
347	HC2	Soil Inspection	307,136	5,708,518	1815	ESSFwc 2	13	Project Site	DEBog	orthogneiss metamorphic rocks
348	HC21	Soil Inspection	305,046	5,709,594	1830	ESSFwc 2	415	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
349	HC23	Soil Inspection	304,869	5,709,223	1830	ESSFwc 2	415	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
350	HC24	Soil Inspection	303,927	5,709,017	1801	ESSFwc 2	415	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
351	HC25	Soil Inspection	303,175	5,708,571	1778	ESSFwc 2	119	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
352	HC27	Soil Inspection	304,194	5,710,418	1645	ESSFwc 2	307	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
353	HC28	Soil Inspection	303,903	5,710,674	1613	ESSFwc 2	19	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
354	HC29	Soil Inspection	304,472	5,710,930	1671	ESSFwc 2	281	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
355	HC31	Soil Inspection	305,384	5,711,446	1689	ESSFwc 2	283	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
356	HC32	Soil Inspection	305,101	5,711,828	1604	ESSFwc 2	283	Project Site	DEBSk	calc-alkaline volcanic rocks
357	HC33	Soil Inspection	304,569	5,711,846	1621	ESSFwc 2	736	Project Site	DEBSk	calc-alkaline volcanic rocks
358	HC34	Soil Inspection	303,839	5,711,915	1722	ESSFwc 2	736	Project Site	DMEBF	andesitic volcanic rocks
359	HC36	Soil Inspection	303,787	5,711,315	1694	ESSFwc 2	296	Project Site	DEBSk	calc-alkaline volcanic rocks
360	HC37	Soil Inspection	306,627	5,711,519	1714	ESSFwc 2	286	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks

Table C1-2. Inspection Point Attributes

0	ID	Type	Easting	Northing	Elevation (m)	BEC Zone	Soil Polygon	Location	Strat Unit	Rock Type
361	HC38	Soil Inspection	306,389	5,711,116	1741	ESSFwc 2	307	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
362	HC39	Soil Inspection	305,630	5,710,795	1770	ESSFwc 2	307	Project Site	lPzEBF	greenstone, greenschist metamorphic rocks
363	HC4	Soil Inspection	306,215	5,706,837	1730	ESSFwc 2	131	Project Site	DEBog	orthogneiss metamorphic rocks
364	HC40	Soil Inspection	305,110	5,710,684	1748	ESSFwc 2	307	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
365	HC5	Soil Inspection	306,885	5,706,776	1806	ESSFwc 2	133	Project Site	DEBog	orthogneiss metamorphic rocks
366	HC6	Soil Inspection	305,374	5,706,686	1690	ESSFwc 2	11	Project Site	DEBog	orthogneiss metamorphic rocks
367	HC7	Soil Inspection	305,165	5,705,881	1706	ESSFwc 2	131	Project Site	Kqm	quartz monzonitic intrusive rocks
368	HC8	Soil Inspection	304,525	5,705,921	1665	ESSFwc 2	705	Project Site	Kqm	quartz monzonitic intrusive rocks
369	HC9	Soil Inspection	304,598	5,706,314	1660	ESSFwc 2	11	Project Site	DEBog	orthogneiss metamorphic rocks
370	TP 1	Test Pit	303,625	5,706,016	1660	ESSFwc 2	558	Project Site	Kqm	quartz monzonitic intrusive rocks
371	TP 10	Test Pit	304,211	5,706,383	1670	ESSFwc 2	558	Project Site	DEBog	orthogneiss metamorphic rocks
372	TP 11	Test Pit	304,334	5,706,313	1665	ESSFwc 2	558	Project Site	DEBog	orthogneiss metamorphic rocks
373	TP 12	Test Pit	304,505	5,706,263	1659	ESSFwc 2	466	Project Site	DEBog	orthogneiss metamorphic rocks
374	TP 13	Test Pit	304,593	5,706,026	1664	ESSFwc 2	705	Project Site	Kqm	quartz monzonitic intrusive rocks
375	TP 15	Test Pit	306,234	5,707,519	1737	ESSFwc 2	131	Project Site	DEBog	orthogneiss metamorphic rocks
376	TP 16	Test Pit	304,523	5,705,618	1681	ESSFwc 2	705	Project Site	Kqm	quartz monzonitic intrusive rocks
377	TP 17	Test Pit	306,719	5,707,113	1777	ESSFwc 2	714	Project Site	DEBog	orthogneiss metamorphic rocks
378	TP 18	Test Pit	304,200	5,705,306	1676	ESSFwc 2	705	Project Site	Kqm	quartz monzonitic intrusive rocks
379	TP 19	Test Pit	304,296	5,705,258	1687	ESSFwc 2	563	Project Site	Kqm	quartz monzonitic intrusive rocks
380	TP 2	Test Pit	303,809	5,705,966	1655	ESSFwc 2	558	Project Site	Kqm	quartz monzonitic intrusive rocks
381	TP 20	Test Pit	304,170	5,705,224	1682	ESSFwc 2	563	Project Site	Kqm	quartz monzonitic intrusive rocks
382	TP 21	Test Pit	304,740	5,705,907	1681	ESSFwc 2	705	Project Site	Kqm	quartz monzonitic intrusive rocks
383	TP 22	Test Pit	305,043	5,705,989	1687	ESSFwc 2	131	Project Site	Kqm	quartz monzonitic intrusive rocks
384	TP 23	Test Pit	304,951	5,706,139	1677	ESSFwc 2	11	Project Site	DEBog	orthogneiss metamorphic rocks
385	TP 25	Test Pit	304,552	5,706,519	1666	ESSFwc 2	265	Project Site	DEBog	orthogneiss metamorphic rocks
386	TP 26	Test Pit	304,404	5,706,609	1675	ESSFwc 2	265	Project Site	DEBog	orthogneiss metamorphic rocks
387	TP 27	Test Pit	304,265	5,706,683	1686	ESSFwc 2	265	Project Site	DEBog	orthogneiss metamorphic rocks
388	TP 28	Test Pit	304,256	5,706,837	1706	ESSFwc 2	558	Project Site	Kqm	quartz monzonitic intrusive rocks
389	TP 29	Test Pit	304,424	5,707,111	1721	ESSFwc 2	265	Project Site	DEBog	orthogneiss metamorphic rocks
390	TP 3	Test Pit	303,763	5,706,070	1662	ESSFwc 2	558	Project Site	Kqm	quartz monzonitic intrusive rocks
391	TP 30	Test Pit	304,614	5,707,340	1728	ESSFwc 2	559	Project Site	DEBog	orthogneiss metamorphic rocks
392	TP 31	Test Pit	305,123	5,705,897	1702	ESSFwc 2	131	Project Site	Kqm	quartz monzonitic intrusive rocks
393	TP 32	Test Pit	305,386	5,706,205	1713	ESSFwc 2	131	Project Site	DEBog	orthogneiss metamorphic rocks
394	TP 33	Test Pit	305,278	5,706,349	1700	ESSFwc 2	131	Project Site	DEBog	orthogneiss metamorphic rocks
395	TP 34	Test Pit	305,317	5,706,352	1703	ESSFwc 2	131	Project Site	DEBog	orthogneiss metamorphic rocks
396	TP 35	Test Pit	305,516	5,706,605	1699	ESSFwc 2	131	Project Site	DEBog	orthogneiss metamorphic rocks
397	TP 36	Test Pit	305,640	5,706,217	1727	ESSFwc 2	706	Project Site	DEBog	orthogneiss metamorphic rocks
398	TP 37	Test Pit	306,004	5,706,600	1722	ESSFwc 2	131	Project Site	DEBog	orthogneiss metamorphic rocks
399	TP 38	Test Pit	306,314	5,706,091	1801	ESSFwc 2	712	Project Site	DEBog	orthogneiss metamorphic rocks
400	TP 39	Test Pit	306,536	5,706,845	1761	ESSFwc 2	130	Project Site	DEBog	orthogneiss metamorphic rocks
401	TP 4	Test Pit	303,857	5,706,211	1671	ESSFwc 2	558	Project Site	Kqm	quartz monzonitic intrusive rocks
402	TP 40	Test Pit	306,247	5,706,411	1747	ESSFwc 2	133	Project Site	DEBog	orthogneiss metamorphic rocks
403	TP 41	Test Pit	304,107	5,705,330	1670	ESSFwc 2	705	Project Site	Kqm	quartz monzonitic intrusive rocks
404	TP 42	Test Pit	304,491	5,705,696	1673	ESSFwc 2	705	Project Site	Kqm	quartz monzonitic intrusive rocks
405	TP 43	Test Pit	304,427	5,705,696	1667	ESSFwc 2	267	Project Site	Kqm	quartz monzonitic intrusive rocks

Table C1-2. Inspection Point Attributes

0	ID	Type	Easting	Northing	Elevation (m)	BEC Zone	Soil Polygon	Location	Strat Unit	Rock Type
406	TP 44	Test Pit	304,193	5,706,170	1650	ESSFwc 2	264	Project Site	Kqm	quartz monzonitic intrusive rocks
407	TP 45	Test Pit	304,608	5,706,196	1659	ESSFwc 2	11	Project Site	Kqm	quartz monzonitic intrusive rocks
408	TP 46	Test Pit	305,560	5,706,323	1718	ESSFwc 2	131	Project Site	DEBog	orthogneiss metamorphic rocks
409	TP 47	Test Pit	304,211	5,707,282	1767	ESSFwc 2	398	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
410	TP 48	Test Pit	304,555	5,707,260	1721	ESSFwc 2	391	Project Site	DEBog	orthogneiss metamorphic rocks
411	TP 49	Test Pit	305,298	5,706,066	1710	ESSFwc 2	131	Project Site	Kqm	quartz monzonitic intrusive rocks
412	TP 5	Test Pit	304,920	5,707,672	1729	ESSFwc 2	559	Project Site	DEBog	orthogneiss metamorphic rocks
413	TP 50	Test Pit	307,463	5,710,001	1838	ESSFwc 2	135	Project Site	DEBog	orthogneiss metamorphic rocks
414	TP 51	Test Pit	306,387	5,710,005	1848	ESSFwc 2	135	Project Site	uPrCmEBpg	paragneiss metamorphic rocks
415	TP 52	Test Pit	304,423	5,705,390	1687	ESSFwc 2	563	Project Site	Kqm	quartz monzonitic intrusive rocks
416	TP 53	Test Pit	304,293	5,705,141	1695	ESSFwc 2	563	Project Site	Kqm	quartz monzonitic intrusive rocks
417	TP 54	Test Pit	304,747	5,705,864	1684	ESSFwc 2	705	Project Site	Kqm	quartz monzonitic intrusive rocks
418	TP 55	Test Pit	304,720	5,706,130	1667	ESSFwc 2	467	Project Site	Kqm	quartz monzonitic intrusive rocks
419	TP 6	Test Pit	304,009	5,706,149	1653	ESSFwc 2	264	Project Site	Kqm	quartz monzonitic intrusive rocks
420	TP 7	Test Pit	304,138	5,706,149	1650	ESSFwc 2	264	Project Site	Kqm	quartz monzonitic intrusive rocks
421	TP 8	Test Pit	305,334	5,708,114	1749	ESSFwc 2	559	Project Site	DEBog	orthogneiss metamorphic rocks
422	TP 9	Test Pit	304,099	5,706,395	1670	ESSFwc 2	558	Project Site	Kqm	quartz monzonitic intrusive rocks
423	TP14	Test Pit	304,577	5,705,952	1669	ESSFwc 2	705	Project Site	Kqm	quartz monzonitic intrusive rocks
424	TP24	Test Pit	304,824	5,706,279	1668	ESSFwc 2	467	Project Site	DEBog	orthogneiss metamorphic rocks
425	HCV08-107	Keystone Plot	304,936	5,702,596	2238	ESSFwcp	na	Outside LSA	Kqm	quartz monzonitic intrusive rocks
426	HCV08-108	Keystone Plot	304,442	5,703,429	1823	ESSFwcw	na	Outside LSA	Kqm	quartz monzonitic intrusive rocks
427	051	Ground Truthing	303,577	5,703,514	1699	ESSFwc 2	na	Outside LSA	Kqm	quartz monzonitic intrusive rocks
428	HC08-104	Keystone Plot	305,599	5,703,606	2187	ESSFwcp	na	Outside LSA	Kqm	quartz monzonitic intrusive rocks
429	HC08-105	Keystone Plot	305,308	5,703,647	2174	ESSFwcp	na	Outside LSA	Kqm	quartz monzonitic intrusive rocks
430	HC08-106	Keystone Plot	305,716	5,704,275	2100	ESSFwcp	na	Outside LSA	Kqm	quartz monzonitic intrusive rocks
431	HCV08-103	Keystone Plot	302,329	5,705,834	1177	ICH wk 1	na	Outside LSA	Kqm	quartz monzonitic intrusive rocks
432	HC08-102	Keystone Plot	302,372	5,706,491	1221	ICH wk 1	na	Outside LSA	Kqm	quartz monzonitic intrusive rocks
433	HC08-101	Keystone Plot	302,567	5,706,556	1292	ICH wk 1	na	Outside LSA	Kqm	quartz monzonitic intrusive rocks
434	HC08-100	Keystone Plot	301,877	5,707,188	1176	ICH wk 1	na	Outside LSA	Kqm	quartz monzonitic intrusive rocks
435	HCV08-99	Keystone Plot	301,978	5,707,847	1229	ICH wk 1	na	Outside LSA	Kqm	quartz monzonitic intrusive rocks
436	HC08-98	Keystone Plot	302,094	5,708,316	1265	ICH wk 1	na	Outside LSA	uPrCmEBpg	paragneiss metamorphic rocks
437	HCV08-97	Keystone Plot	302,055	5,708,551	1258	ICH wk 1	na	Outside LSA	uPrCmEBpg	paragneiss metamorphic rocks
438	HC08-96	Keystone Plot	301,941	5,708,913	1265	ICH wk 1	na	Outside LSA	uPrCmEBpg	paragneiss metamorphic rocks
439	LAV42	Keystone Plot	311,332	5,711,706	1527	ESSFwc 2	na	Outside LSA	DEBog	orthogneiss metamorphic rocks
440	LAV41	Keystone Plot	311,644	5,711,818	1493	ESSFwc 2	na	Outside LSA	DEBog	orthogneiss metamorphic rocks
441	LAV37	Keystone Plot	310,718	5,711,840	1652	ESSFwc 2	na	Outside LSA	lCmEBlm	limestone, marble, calcareous sedimentary rocks
442	LAV39	Keystone Plot	311,065	5,711,886	1539	ESSFwc 2	na	Outside LSA	lCmEBJ	greenstone, greenschist metamorphic rocks
443	LAF43	Keystone Plot	311,899	5,712,012	1466	ESSFwc 2	na	Outside LSA	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
444	LAV44	Keystone Plot	311,913	5,712,136	1471	ESSFwc 2	na	Outside LSA	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
445	LAV38	Keystone Plot	311,066	5,712,278	1500	ESSFwc 2	na	Outside LSA	lCmEBlm	limestone, marble, calcareous sedimentary rocks
446	LAV45	Keystone Plot	311,720	5,712,530	1468	ESSFwc 2	na	Outside LSA	MEBS	mudstone, siltstone, shale fine clastic sedimentary rocks
447	LAV35	Keystone Plot	311,552	5,713,011	1393	ICH mw 3	na	Outside LSA	lCmEBJ	greenstone, greenschist metamorphic rocks
448	LAV31	Keystone Plot	311,817	5,713,546	1353	ICH mw 3	na	Outside LSA	lCmEBlm	limestone, marble, calcareous sedimentary rocks
449	HCV08-64	Keystone Plot	304,921	5,713,630	1172	ICH mw 3	na	Outside LSA	DMEBF	andesitic volcanic rocks
450	078	Ground Truthing	304,885	5,713,657	1178	ICH mw 3	na	Outside LSA	DMEBF	andesitic volcanic rocks

Table C1-2. Inspection Point Attributes

0	ID	Type	Easting	Northing	Elevation (m)	BEC Zone	Soil Polygon	Location	Strat Unit	Rock Type
451	HCV08-59	Keystone Plot	303,671	5,713,938	1417	ESSFwc 2	na	Outside LSA	DMEBF	andesitic volcanic rocks
452	HCV08-60	Keystone Plot	303,606	5,714,002	1412	ESSFwc 2	na	Outside LSA	DMEBF	andesitic volcanic rocks
453	HC08-62	Keystone Plot	304,472	5,714,043	1236	ICH mw 3	na	Outside LSA	DMEBF	andesitic volcanic rocks
454	HC08-56	Keystone Plot	302,580	5,714,060	1517	ESSFwc 2	na	Outside LSA	DMEBF	andesitic volcanic rocks
455	HCV08-63	Keystone Plot	304,596	5,714,066	1202	ICH mw 3	na	Outside LSA	DMEBF	andesitic volcanic rocks
456	HC08-57	Keystone Plot	302,405	5,714,292	1446	ESSFwc 2	na	Outside LSA	DMEBF	andesitic volcanic rocks
457	076	Ground Truthing	303,484	5,714,391	1328	ICH mw 3	na	Outside LSA	DMEBF	andesitic volcanic rocks
458	HCV08-58	Keystone Plot	302,742	5,714,395	1394	ESSFwc 2	na	Outside LSA	DMEBF	andesitic volcanic rocks
459	077	Ground Truthing	300,094	5,714,491	1530	ESSFwc 2	na	Outside LSA	DEBSk	calc-alkaline volcanic rocks
460	LAG123	Keystone Plot	304,141	5,714,958	1080	ICH mw 3	na	Outside LSA	DMEBF	andesitic volcanic rocks
461	LAV125	Keystone Plot	304,438	5,715,303	952	ICH dw 3	na	Outside LSA	DMEBF	andesitic volcanic rocks
462	HCV08-90	Keystone Plot	303,879	5,716,035	930	ICH dw 3	na	Outside LSA	DMEBF	andesitic volcanic rocks
463	HCV08-91	Keystone Plot	303,277	5,716,624	824	ICH dw 3	na	Outside LSA	DMEBF	andesitic volcanic rocks
464	HCV08-89	Keystone Plot	304,571	5,716,625	719	ICH dw 3	na	Outside LSA	DMEBF	andesitic volcanic rocks
465	HCV08-88	Keystone Plot	304,018	5,717,558	479	IDF mw 2	na	Outside LSA	DMEBF	andesitic volcanic rocks
466	082	Ground Truthing	304,634	5,717,571	445	IDF mw 2	na	Outside LSA	DMEBF	andesitic volcanic rocks
467	084	Ground Truthing	313,076	5,718,514	482	IDF mw 2	na	Outside LSA	lCmEBJ	greenstone, greenschist metamorphic rocks
468	LAV20	Keystone Plot	313,239	5,718,790	460	IDF mw 2	na	Outside LSA	lCmEBJ	greenstone, greenschist metamorphic rocks
469	LAV81	Keystone Plot	313,258	5,719,283	460	IDF mw 2	na	Outside LSA	uPrCmEBG	quartzite, quartz arenite sedimentary rocks
470	LAV12	Keystone Plot	310,335	5,719,398	719	IDF mw 2b	na	Outside LSA	lCmEBJ	greenstone, greenschist metamorphic rocks
471	LAV13	Keystone Plot	311,463	5,719,688	562	IDF mw 2	na	Outside LSA	uPrCmEBG	quartzite, quartz arenite sedimentary rocks
472	083	Ground Truthing	298,478	5,720,223	420	IDF mw 2	na	Outside LSA	DEBSk	calc-alkaline volcanic rocks
473	LAV11	Keystone Plot	311,903	5,720,514	-9999	IDF mw 2	na	Outside LSA	uPrCmEBG	quartzite, quartz arenite sedimentary rocks