



TETRA TECH EBA

## July 2016 Vegetation and Wildlife Baseline Surveys Prairie Creek All Season Road



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AUGUST 17, 2016  
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## **LIMITATIONS OF REPORT**

This report and its contents are intended for the sole use of Canadian Zinc Corporation and their agents. Tetra Tech EBA Inc. (Tetra Tech EBA) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Canadian Zinc Corporation, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in Tetra Tech EBA's Services Agreement. Tetra Tech EBA's General Conditions are provided in Appendix A of this report.

## 1.0 INTRODUCTION

Canadian Zinc Corporation (CZN) submitted a Developers Assessment Report (DAR) to the Mackenzie Valley Review Board for the proposed upgrade of the Prairie Creek Mine's existing winter road to all-season quality (the Project; CZN 2015). As part of the continuing environmental assessment review, Tetra Tech EBA Inc. (Tetra Tech EBA) was retained by CZN to conduct additional baseline vegetation and wildlife surveys in July 2016, and to consider whether modifications to the existing DAR effects assessment and mitigation measures are required as a result of the additional new baseline information.

On July 7, Parks Canada provided recommendations to CZN regarding baseline studies; these included:

### Vegetation:

1. Ground-truth a vegetation classification along the proposed all-season road to describe the current vegetation and assemblages;
2. Assess the presence of rare plant species and rare assemblages that could potentially occur along the all-season road corridor;
3. Survey areas of high rare plant potential and high rare vegetation assemblage potential.

### Wildlife:

4. Assess population characteristics and habitat use of the Project area by resident and migratory birds, with emphasis on forest bird communities, waterfowl, and avian species at risk;
5. Evaluate habitat suitability for Black Bears (*Ursus americanus*) in the Project area including foraging, denning, and travel considerations; and
6. Evaluate the presence of Collared Pika.

CZN committed to undertaking the resident and migratory bird surveys before construction begins and during the appropriate timing window (i.e., June). Consequently, resident and migratory bird surveys were not part of the July 2016 field program scope. In addition to the baseline studies outlined by Parks Canada, other baseline wildlife studies were carried out opportunistically. These included surveys for Peregrine Falcon scrapes and presence of Trumpeter Swan/waterfowl, Harlequin Duck, and beaver.

## 2.0 METHODS

### 2.1 Vegetation

The vegetation studies consisted of two primary components: ecosystem characterization and a rare plant survey. Efforts were made to time the field survey to maximize the presence of plant diagnostic features. Field survey locations focused on areas of proposed new disturbance (e.g., borrow pits and road realignment areas) in order to maximize field survey efficiency.

#### 2.1.1 Ecosystem Classification

The most current mapping available for the Project area for preparation of the DAR in 2014 was Earth Observation for Sustainable Development of Forests (EOSD) mapping (Wulder et al. 2004) which was used to verify Beak's (1981) earlier baseline vegetation work and ecotyping and which formed the basis of the effects assessment.

Parks Canada produced an ecological land classification for the expanded NNPR in 2015, but this ecotyping was unavailable at the time the DAR was prepared.

Both classification systems have their merits and shortcomings. Any ecotype mapping can be outdated soon after it is published, particularly in light of changes resulting from fire and human disturbance. Since the Beak mapping was produced in 1981, there have been very few anthropogenic changes to the landscape; however, fire has influenced areas of the Project, and no one set of ecotype mapping, including the most recent mapping developed by Parks Canada, accurately captures this information.

The level of detail of the EOSD mapping for wetlands is useful. Most of the sensitive wildlife species that may be in the Project area prefer wetland habitats. The EOSD mapping provides better wetland habitat correlation in this respect. However, the Parks Canada ecotype mapping is better at depicting variation between boreal and alpine/subalpine vegetation assemblages. Both mapping datasets can be used to complement each other.

As requested by Parks Canada, Tetra Tech EBA based the field data collection on the Parks Canada ecotype system but also assigned each plot an EOSD land cover class since the EOSD data formed the basis of the effects assessment. In an effort to correlate the two different systems and to simplify the discussion of ecotypes, general ecosystems were developed that combine similar ecotypes/land cover classes between the two approaches.

Terminology to describe ecotypes varies by mapping systems. For clarity, below is a summary of classification terminology:

- Parks Canada – Ecotypes
- EOSD – Land cover classes
- Tetra Tech EBA – Ecosystems and ecosites

General ecosystem types were assigned based on the various ecotypes described in the field and by Parks Canada's ecotype mapping and the EOSD land cover classes. Ecotypes/land cover classes with similar characteristics (e.g., relative moisture status, vegetation type) were grouped into the same general ecosystem type (e.g., ecotypes characterized as upland forest with a conifer-dominated overstory were grouped into the "conifer forest" general ecosystem type).

The shrub ecosystem varied substantially, requiring further revision into ecosites; three distinct categories were apparent:

- Alluvial – shrub communities near watercourses that may be influenced from time to time by flooding;
- Fire regeneration – a historic fire approximately 15 years ago burnt through mature forest. Trees in this ecosite are still in the shrub layer (approximately two metres in height) and are developing into a young forest; and
- Subalpine – shrub communities in the subalpine zone.

## 2.1.2 Ecosystem Description

Baseline ecotyping was generally conducted in areas of proposed new disturbance, such as borrow pits and road realignment areas. As a guide, plot data collected for ecotype verification followed the field data collection approach identified in the *BC MOE/MOF 2010 Field manual for describing terrestrial ecosystems – 2nd ed.* Plots measured 400 m<sup>2</sup> and data collected included percent cover by species as well as site characteristics (e.g., slope, aspect, elevation, geographic location in UTM).

Ground-based survey locations were selected based on a combination of factors including a review of the available imagery for the area, changes in topography, changes in vegetation cover, site access, and general distribution along the proposed all-season road. Generally, ecotypes with the greatest amount of anticipated disturbance were targeted.

Tetra Tech EBA collected data for nine attributes at each ground-based sampling location (Table 1). Additional attributes were collected opportunistically (soil in particular due to shallow soil over rock) where feasible.

Ecosystems were developed to describe the common vegetation assemblages. Prominence values were calculated to determine the most common species for each ecosystem.

$$prominence\ value = \sqrt{\% frequency \times \%cover}$$

Species with a prominence of less than 5 were excluded, so only characteristic species are shown.

**Table 1: Vegetation Attribute Collection**

Required Attributes	Optional Attributes
Plot number	Aspect (°)
Date	Slope (%)
Plot type (Ground Inspection [G] vs. Visual [V], to identify level of detail being recorded)	Relative slope position (e.g., crest, mid-slope, toe, etc.)
	Estimate of soil drainage (e.g., rapid, well, poor, etc.)
Geographic location (in UTM format)	Soil type (e.g., mineral, organic)
Site photographs	Soil texture (e.g., sandy, clay, fibric, etc.)
Ecosite	Surface organic horizon thickness (cm)
Vegetation structure	Soil coarse fragment content (%)
Elevation	Relative Soil Moisture Regime (1-7)
List of indicator plant species	Relative Nutrient Regime (A-E)
	Estimate of % cover by vegetation layer (tree, shrub, herb, moss/lichen)

Plants that were documented at each ground inspection location were identified to species, where possible. Plants that could not be readily identified in the field were collected for further inspection and subsequent genus or species confirmation. In cases where the plant could have been listed as rare, specimens were only collected if collection did not appear to threaten the immediate population (as per the guidelines presented by the Alberta Native Plant Council [ANPC] 2012).

### 2.1.3 Rare Plants

Lists of rare plant species potentially occurring within the Project area were compiled from various sources, including databases maintained by the Government of the Northwest Territories (GNWT), the federal *Species at Risk Act* (SARA), and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Species that are designated by COSEWIC may qualify for legal protection under SARA; however, SARA only applies to species on the SARA legal list. Tetra Tech EBA obtained a list of rare plant species that are known to occur within the Taiga Plain. Vascular plants ranked as either “At Risk”, “May Be At Risk”, or “Sensitive” from the GNWT General Status database were compiled (217 in total).

The habitat of listed plant species is often linked to fine-scale and uncommon landscape features (ANPC 2012). As such, efforts were made to identify unusual substrates and vegetation patterns during the review of high

resolution imagery available for the study area and during the reconnaissance flight on the first day of the field study. These unusual landscape features were subsequently targeted for later field inspections where feasible. Features such as wetlands, alluvial areas, and subalpine/alpine areas were of particular interest.

Rare plant surveys were generally conducted in areas of proposed new disturbance, such as borrow pits and road realignment areas and in areas supporting unusual landscape features. Rare plant surveys were also conducted while ground-truthing ecotypes. Rare plant surveys followed the ANPC *Guidelines for Rare Vascular Plant Surveys in Alberta – 2012 Update*. Due to the large size of the overall study area, a meander survey was conducted. At each survey location, a species list (irrespective of status) was compiled by ecosystem; common, identifiable bryoids were recorded, but the survey focused on vascular plants. Plants were identified to species in the field whenever possible. Voucher specimens of suspected rare plants were almost always collected, provided the collection did not appear to threaten the immediate population (as per the guidelines presented by ANPC [2012]). Specimens were also collected (under the same restrictions) if a definitive identification to species in the field was not possible.

Following methods for rare plant surveys as identified by the ANPC, the species list compiled by ecotype is presented in Appendix D.

#### 2.1.4 Areas of Rare Plant Potential and Rare Vegetation Assemblage Potential

Rare ecosystems often provide unique ecological functions, such as critical habitat for species at risk, linkages or corridors for wildlife, or they support high levels of biological diversity. Neither the GNWT nor Parks Canada have a tracking list and/or status for rare vegetation assemblages. In the absence of this information, rare plant assemblages or ecosystems that may have high rare plant potential within the Project area have been identified as follows:

**Alluvial Assemblages** – during the field survey, plots with the highest species richness were found along alluvial flood plains. These habitats are subjected to occasional flooding (disturbance) which bring nutrients and seed sources to the site and maintain adequate moisture due to the presence of a high water table. Due to these conditions, plant assemblages in alluvial areas may be rare; these areas also have high potential for rare plants. Alluvial areas are best depicted as ecotypes that are adjacent to Parks Canada’s Alluvial Non-vegetated ecotype but have not been specifically mapped. Alluvial areas appear to be relatively uncommon within the Project area according to the mapping data available. Further details are presented in Section 3.4 below.

**Wetlands** – wetland ecosystems are frequently biologically diverse areas that provide important habitats for various plants and plant assemblages. Disturbances that affect the features that define wetlands (such as alterations to local hydrology, in particular, water levels throughout the season or nutrient availability) can change the characteristics of the wetland itself, along with those species assemblages that wetlands support. Within the Project area, wetlands appear to be relatively uncommon according to the mapping data available. Further details are presented in Section 3.4 below.

**Alpine** – alpine ecotypes can be harsh environments full of tiny microhabitats for specialized plant species. Vegetation which grows in alpine and subalpine environments must be adaptable to harsh climate conditions such as extreme temperatures, desiccation, and limited soil development. These ecotypes are relatively uncommon according to the mapping data available. Further details are presented in Section 3.4 below.

## 2.2 Wildlife

### 2.2.1 Black Bear Habitat Potential

Habitat modelling was conducted with the objective of identifying areas of high habitat potential for Black Bears and with this understanding, determine areas of possible Project-Black Bear interaction (e.g., temporary construction

camps). For land management decision making, a Habitat Capability and Suitability (CAPSU) model is considered adequate to identify Black Bear habitat (RIC 1999b). Field surveys were completed to inform the model.

### 2.2.1.1 Field Survey

The objectives of the Black Bear survey were to ground-truth the land cover mapping in the context of Black Bear habitat potential, record evidence of Black Bear use in various habitat types, and to guide the habitat model with data collected from the field surveys. During the field survey, land cover types with the greatest amount of anticipated disturbance were targeted, with consideration of collecting representative ecotypes from across the landscape.

Evidence of Black Bear use (e.g., tracks/trails, feeding sign, scat), plant forage availability and percent cover, and a general field ranking of Black Bear habitat was recorded across multiple habitat types using 100 m length fixed width transects (total 4 m wide) or 20 m radius visual plots. Visual plots were completed for efficiency and or within small habitat patches (or believed to be based on field observations), and involved walking concentric circles from a station centre. In large and moderately sized habitat patches, fixed width transects were employed. One to three transects, comprising a combined total of 100 m, were surveyed in each habitat station. The length of each individual transect was dependent upon a habitat edge (transect ended if approaching a habitat edge) and relative proximity to the safety (bear) monitor (also shared with the vegetation surveyor).

Transects and visual plots were slowly walked, and Black Bear habitat characteristics and sign were recorded on datasheets. Evidence of other species was also recorded. Survey data included the transect(s) start and end locations, composition and cover of woody debris, key Black Bear forage species presence and cover, and species sign.

### 2.2.1.2 Model Development

Modelled habitat capability and/or suitability ratings provide an indication of habitat value along the proposed all-season road in its current condition. As a guide, the modelling approach followed the Resources Inventory Committee (RIC; 1999b) British Columbia Wildlife Habitat Ratings Standards, and an existing Black Bear habitat suitability model from west-central Alberta was consulted and incorporated, where appropriate for the Project area (Zapisocki et al. 1998).

Based on available literature, a Black Bear species account was prepared. This species account identified important Black Bear life requisites, habitat requirements, and seasons of use, and formed the basis from which the model's habitat ratings and assumptions were derived. Food, security, and hibernating Black Bear life requisites were identified from the literature review and were divided into 1) growing and 2) winter seasons of use.

For the purposes of the Black Bear habitat model, a 6 km study area around the proposed all-season access road and its facilities (within Black Bear range) was considered appropriate for the selected life requisites. This represents the average home range size of male Black Bears in Alberta (average female home range size smaller) (refer to Appendix B).

Ecological attributes that illustrate Black Bear habitat for each selected life requisite and season of use were then identified. For instance, vegetation land cover types, which express a site's soils, aspect, and topography, were mapped using the EOSD Land Cover data at a pixel size of 25 x 25 m. Additional habitat attributes considered appropriate to predict Black Bear habitat potential included slope, elevation, and aspect determined from CanVec 1:50,000 topographic base mapping within a Geographic Information System (GIS) and field verified ecosite descriptions.

Based on the species account and the July 2016 Black Bear habitat field survey results, habitat ratings were then assigned to the ecological attributes (i.e., landcover type, slope, aspect) across the study area. Habitat ratings included High, Moderate, Low, and Nil; a 4-class rating system owing to a moderate understanding of Black Bear habitat requirements in the NWT. These ratings express the ability of each ecological attribute to meet specific Black Bear life requisites for the selected seasons of use. Appendix B includes a more complete description of the ecological attributes and how they were used to predict Black Bear habitat.

### **2.2.2 Collared Pika**

A Collared Pika field survey was completed with the objective of determining their presence at proposed borrow sources, within Collared Pika range, that included appropriate talus habitat. As a guide, the Collared Pika present/not detected surveys followed RISC methods for Pika and Sciurids (RIC 1998a).

Collared Pika surveys comprised 1) an observation station (or point count) and 2) talus transects. The observation station involved passively surveying and recording the presence of vocalizing Collared Pikas for a ten minute interval at a single station. Each individual pika heard vocalizing and/or sighted was recorded, along with their approximate distance and direction from the observation station. A single observation station was selected for each proposed borrow source, and was located at the foot of the talus at the meadows edge.

Each observation station was followed by a transect survey primarily within the first 20 m of the talus edge. A single fixed width transect (total 4 m wide) was walked slowly for the length of the talus habitat and/or area within the proposed borrow source. Overhanging rocks and openings within the rock matrix were specifically searched for signs of pika occupancy (i.e. haypiles and urine/pellets). Features with high probability of use (e.g., under large overhanging rocks) located outside the transect width were also searched opportunistically. Any vocalizing individuals detected during the transect survey were also recorded.

Occupied or active sites were determined if at least one calling individual and/or fresh haypiles and pellets were detected. In the absence of calling individuals and fresh haypiles, possible inactive sites were determined if old haypiles were detected. Survey data were documented on datasheets and included species, observation, observation location(s), talus and nearby meadow characteristics, survey start and stop times, and weather.

### **2.2.3 Peregrine Falcon**

A Peregrine Falcon scrape survey was completed with the objective of determining the presence of scrapes within appropriate habitat near the proposed all-season road. This survey was completed opportunistically, but followed the Resources Inventory Committee (RIC) (2001) inventory methods for raptors using aerial surveys as a guide.

Prior to the field survey, an area of Sundog Creek was identified as potentially suitable Peregrine Falcon nesting habitat, within 1.5 km of the proposed all-season road, based on 1:50,000 topographic maps and Google Earth (Information Request Response dated April 28, 2016). This area was targeted for the aerial helicopter survey.

Potential habitat was searched for nests/scrapes by slowly passing at least 40 m from the cliff face and approaching in view of nesting raptors. The aerial survey included an observer/navigator positioned in the front left helicopter seat and an observer in the rear left seat. The pilot and a third observer in the right helicopter seats watched for birds potentially flushing from the cliff face. Occupied nests/scrapes were determined if at least one adult bird was at the nesting site, two adults were together, finding a nest/scrape containing eggs or young, or an adult was flushed from a nest (RIC 2001). Nests/scrapes with no adult bird, eggs, or young detected were considered unoccupied. Observations were recorded on datasheets and included raptor species detected, Global Positioning System (GPS) location, nests/scrape characteristics, eggs/young, survey elevation, survey start and stop times, and weather.

The aerial survey was repeated at high and medium elevations along tall cliff-faces that were difficult to survey with a single flight pass. A single flight pass was performed each survey day.

#### **2.2.4 Harlequin Duck**

A Harlequin Duck field survey was conducted with the objective of determining their presence along the Sundog, Fast/Funeral, and Prairie creeks. As a guide, the survey methods followed the RIC (1998b) methods for riverine birds including Harlequin Ducks.

The Harlequin Duck survey included an observer positioned in the front left helicopter seat, a pilot, as well as two observers in the rear seats. The aerial survey involved flying each creek 30 m above water level and at approximately 60 kilometres/hour (km/hr). RIC (1998b) survey methods suggest appropriate flying heights at 15-20 m as tree cover permits; however, in a critique of survey methods, Paton (2000) indicated 30-40 m survey heights were more suitable. At these survey heights, Harlequin Ducks are reported to move to the middle of the stream and dive into the water, rather than fly away (Paton 2000).

The helicopter flew directly over each creek (where appropriately narrow) or closer to the pilots bankside to allow the observer greater views. In the Sundog Creek's wide floodplain with braided channels, the survey was conducted over the primary channel. Survey data were documented on datasheets and included observation location(s), survey start and stop times and location, and weather.

#### **2.2.5 Trumpeter Swan Reconnaissance**

The objective of the Trumpeter Swan/waterfowl field surveys was to determine presence in relation to the proposed all-season road. Surveys included both an aerial survey of waterbodies/wetland complexes in the Fishtrap Creek and east of Silent Hills, and shoreline observation station surveys at isolated ponds.

The aerial survey methods followed the RIC (1999b) inventory presence/not detected methods for waterfowl and allied species (e.g., Trumpeter Swans). The aerial survey included an observer/navigator positioned in the front left seat and a pilot. The survey was flown at approximately 60 m above ground level and 50 km/hr. Waterbodies were selected randomly; however, selection targeted those within 1 km of the proposed all-season road. Larger waterbodies were circled, whereas, one side of smaller waterbodies were largely flown. Trumpeter Swans (e.g., pairs, singles) and their GPS locations were recorded. Ducks were also recorded incidentally.

A surveyor using binoculars also surveyed from a shoreline observation station to document waterfowl/waterbirds. Ponds were selected randomly as the opportunity arose. From each observation station, all waterfowl/waterbirds, including breeding pairs, family groups, and molting rafts were documented over a ten minute period.

During the observation station based surveys, all birds seen on the water and taking flight were recorded. Birds flying over at the time of the survey were recorded as incidentals, as well as all other incidental wildlife observations. Survey data were documented on datasheets including the species, group composition (e.g., single male/female, paired, mixed), start and end times, habitat characteristics and drawing, and percent survey coverage of the waterbody.

#### **2.2.6 Beaver Reconnaissance**

The objective of the beaver reconnaissance survey was to determine areas of beaver presence in relation to the proposed all-season road. Beaver dams and lodges detected along and near the proposed all-season access road were recorded during an aerial survey of the road, as well as during the aerial Trumpeter Swan survey. Survey data documented included the observation (i.e., lodge, dam) and GPS location.

### 3.0 VEGETATION RESULTS

#### 3.1 Regional Context

The study area is located within the Taiga Plains Ecozones of the NWT and is characterized by several notable topographic features: the Mackenzie Mountains, the Nahanni Ranges, and the Liard floodplain. These features provide an array of growing conditions, and consequently, numerous vegetation species assemblages (Ecosystem Classification Group 2007). Wild fires occasionally occur in the region and have influenced forested ecosystems throughout much of the landscape.

#### 3.2 Ecosystem Classification

Ten ecosystems and three ecosites were developed to describe the common vegetation assemblages (Table 2). Ecosystem descriptions are presented in Appendix C.

**Table 2: Land Cover and Ecotype Concordance**

Ecosystem Type	EOSD	Parks Canada
Deciduous	Broadleaf – Dense Broadleaf – Open	Deciduous Forest/Tall Shrub
Coniferous	Coniferous – Dense Coniferous – Open Coniferous – Sparse	Coniferous Forest Subalpine Coniferous Woodland Spruce – Lichen – Moss Woodland Spruce – Lichen Woodland
Mixedwood	Mixedwood – Dense Mixedwood – Open	Mixed Predominantly Coniferous Forest Mixed Predominantly Deciduous Forest
Shrub – Alluvial Shrub – Fire Regen Shrub – Subalpine	Shrub – Tall Shrub – Low	Subalpine Tall Shrub Low Sparse Shrub Medium – Low Shrub Subalpine Shrub – Sparse Trees
Herb	Herbs	Alpine Herb Tundra and Meadow
Bryoids	Bryoids	Rock – Lichen
Wetland	Wetland – Treed Wetland – Shrub Wetland – Herb	Wetland
Water	Water	Permanent Water Intermittent Water Water/Terrain Shadow
Non-Vegetated	Rock/Rubble Exposed/Barren Land	Rock Rock/Water Terrain or Cloud Shadow/Water Ice/Snow Alluvial – Non-Vegetated
Disturbance	Exposed/Barren Land	Recently Burnt

A total of 24.7 km were surveyed by two biologists. Thirty-three plots were completed across various ecotypes (Table 3; Figure 1). The majority of plots were surveyed in the shrub and mixedwood ecosystem types. This is consistent with the distribution of these ecosystem types within the Project Area overall (Tables 4 and 5). The Project Area is approximately 2,101.2 ha in size and the shrub and mixedwood ecosystem types each cover 493.8 ha and 315.5 ha, respectively.

**Table 3: Ecotype Plot Summary**

Plot Number	Ecosystem Type	EOSD	Parks Canada	Comments
V01	Herb	Herbs	Alpine Herb Tundra and Meadow	
V02	Herb	Herbs	Alpine Herb Tundra and Meadow	
V03	Coniferous	Coniferous - Open	Coniferous Forest	
V04	Shrub	Shrub – Low	Medium – Low Shrub	Flood plain
V05	Shrub	Shrub – Tall	Medium – Low Shrub	Fire regen (15 years)
V06	Mixedwood	Mixedwood – Open	Mixed Predominantly Coniferous Forest	
V07	Mixedwood	Mixedwood – Open	Mixed Predominantly Coniferous Forest	
V08	Mixedwood	Mixedwood – Open	Mixed Predominantly Coniferous Forest	
V09	Mixedwood	Mixedwood – Open	Mixed Predominantly Deciduous Forest	
V10	Coniferous	Coniferous - Open	Coniferous Forest	
V11	Mixedwood	Mixedwood – Open	Mixed Predominantly Coniferous Forest	Visual plot
V12	Mixedwood	Mixedwood – Open	Mixed Predominantly Coniferous Forest	
V13	Mixedwood	Mixedwood – Dense	Mixed Predominantly Coniferous Forest	Visual plot
V14	Shrub	Shrub – Low	Medium – Low Shrub	Outside park boundary
V15	Wetland	Wetland – Shrub	Wetland	Suspected permafrost degradation area
V16	Mixedwood	Mixedwood – Dense	Mixed Predominantly Deciduous Forest	
V17	Coniferous	Coniferous – Open	Coniferous Forest	
V18	Shrub	Shrub – Low	Medium – Low Shrub	Fire regen (15 years)
V19	Shrub	Shrub – Tall	Medium – Low Shrub	Fire regen (15 years)
V20	Shrub	Shrub – Low	Medium – Low Shrub	Flood plain
V21	Coniferous	Coniferous - Open	Spruce – Lichen – Moss	
V22	Coniferous	Coniferous –Dense	Coniferous Forest	
V23	Mixedwood	Mixedwood – Open	Mixed Predominantly Coniferous Forest	
V24	Non-Vegetated	Exposed Land	Alluvial – Non-Vegetated	Sundog Creek bed
V25	Mixedwood	Mixedwood – Dense	Mixed Predominantly Coniferous Forest	

Plot Number	Ecosystem Type	EOSD	Parks Canada	Comments
V26	Coniferous	Coniferous – Sparse	Spruce – Lichen – Moss	
V27	Shrub	Shrub – Low	Low Sparse Shrub	
V28	Shrub	Shrub – Low	Subalpine Shrub Sparse Tree	
V29	Shrub	Shrub – Tall	Subalpine Tall Shrub	
V30	Shrub	Shrub – Low	Low Sparse Shrub	
V31	Shrub	Shrub – Low	Low Sparse Shrub	
V32	Shrub	Shrub – Tall	Subalpine Tall Shrub	
V33	Bryoids	Bryoids	Spruce – Lichen – Woodland	

Table 4 shows the plot distribution within Parks Canada Ecotypes. The majority of plots (8) were assessed in Mixed Predominantly Coniferous Forest, the second most dominant ecotype (362.22 ha). Several plots were also completed in the Medium-Low Shrub ecotype (6) due to the variability of the ecotype. Four plots were completed in Coniferous Forest, the most dominant ecotype.

**Table 4: Ecotyping Results Based on Parks Canada Mapping**

Ecotype	Project Area (ha)	Number of Plots	Plot Type
Alpine Herb Tundra and Meadow	23.32	2	GIF*
Terrain or Cloud Shadow/Water	75.67	0	
Subalpine Tall Shrub	1.52	2	GIF
Spruce-Lichen-Moss Woodland	271.28	2	GIF
Low Sparse Shrub	132.34	3	GIF
Rock Lichen	205.09	0	
Rock	52.26	0	
Mixed Predominantly Coniferous Forest	362.22	8	6 GIFs, 2 Visuals
Medium-Low Shrub**	165.24	6	GIF
Coniferous Forest	398.94	4	GIF
Subalpine Shrub – Sparse Trees	16.43	1	GIF
Spruce-Lichen Woodland	27.79	1	GIF
Wetland	22.63	1	GIF
Alluvial non-vegetated	4.55	1	GIF
Water/Terrain Shadow	0.39	0	
Deciduous Forest/Tall Shrub	96.42	0	
Mixed Predominantly Deciduous Forest/Tall Shrub	131.61	2	GIF
Recently Burnt	41.32	0	
Ice/Snow	14.82	0	
Permanent Water	12.18	0	
Intermittent Water	42.76	0	
<b>Total</b>	<b>2,101.2</b>		

\* Ground Inspection Form

\*\* One plot was located outside the Park boundary and was mapped as “Shrub-Tall” according to the EOSD mapping.

Table 5 shows the plot distribution within EOSD land cover classes. The majority of plots (9) were assessed in the Shrub – Low class (221.74 ha) which is the second most dominant vegetated class (excluding the Exposed/Barren Land class). Several plots (7) were completed in the Mixedwood – Open class (13.59 ha); the area of this class appears to be somewhat misrepresented, likely area of Coniferous and Deciduous land cover classes should be added to the Mixedwood class. Four plots were completed in Coniferous – Open, the most dominant land cover class (415.66 ha).

**Table 5: Ecotyping Results Based on the EOSD Mapping**

Ecotype	Project Area (ha)	# of Plots	Plot Type
Shadow	29.42	0	
Water	17.57	0	
Rock/Rubble	160.76	0	
Exposed/Barren Land	434.12	1	GIF
Bryoids	9.50	1	GIF
Shrub – Tall	25.69	3	GIF
Shrub – Low	221.74	9	GIF
Wetland – Treed	32.04	0	
Wetland – Shrub	3.73	1	GIF
Wetland – Herb	0	0	
Herbs	1.52	2	GIF
Coniferous – Dense	273.47	1	GIF
Coniferous – Open	415.66	4	GIF
Coniferous – Sparse	82.52	1	
Broadleaf – Dense	164.17	0	
Broadleaf – Open	24.60	0	
Mixedwood – Dense	191.00	3	2 GIF; 1 visual
Mixedwood – Open	13.59	7	6 GIF; 1 visual
<b>Total</b>	<b>2,101.2</b>		

### 3.3 Rare Plants

One species protected under SARA, *Symphyotrichum nahanniense* (Nahanni aster), has the potential to occur in the vicinity of the Project Area; however, its habitat type is dependent on hot springs which are not present within the Project Area.

The Government of the Northwest Territories (GNWT) ranks 217 vascular plants as either “At Risk”, “May Be At Risk”, or “Sensitive.” Of these species identified, *Salix raupii* (Raup’s willow) is of special interest to the GNWT (discussed on the GNWT Species at Risk website) and has potential to be found within the Project Area.

No SARA or GNWT-listed species were detected during the field surveys. Tetra Tech EBA conducted a specific survey for Raup’s willow along Sundog Creek between kilometre Point (KP) 36 and 38. Tetra Tech EBA detected 187 plant species during the survey efforts (Appendix D), none of which were listed.

### **3.4 Rare Vegetation Assemblages**

Neither the GNWT nor Parks Canada have a tracking list and/or status for rare vegetation assemblages. In the absence of this information, rare plant assemblages or ecosystems that may have high rare plant potential within the Project area were defined (according to Section 2.1.4 above) specifically for the Project area.

The Alluvial Non-Vegetated ecotype accounts for approximately 4.55 ha of the Project area (Table 4). While it has a restricted distribution within the Project Area, it has been mapped within the broader area covered by the Parks Canada data. Alluvial areas were generally avoided during road alignment selection due to fish and fish habitat considerations.

Wetlands are depicted by both the Parks Canada (22.63 ha) and EOSD land cover mapping (35.77 ha) (Tables 4 and 5, respectively). While wetlands have restricted distribution within the Project area, they have a broader distribution within the Parks Canada and EOSD mapping. Wetlands were generally avoided during road alignment selection due to their environmentally sensitive nature.

Alpine Areas are depicted by the Alpine Herb Tundra and Meadow Parks Canada ecotype (23.32 ha). Shrub ecotypes may be present within alpine areas, represented by ecotypes such as the Low Sparse Shrub and Medium – Low Shrub, however, these ecotypes are found at other elevations as well, and thus include areas in the subalpine and the boreal zones. Alpine zones have not been depicted specifically by EOSD land cover classes, however they could be captured by the Rock/Rubble and Exposed/Barren land cover classes. While alpine herb, tundra, and meadow areas have a restricted distribution within the Project Area, they have a broader distribution within the EOSD and Parks Canada mapping. New disturbance to alpine areas was generally avoided during road design by following the old winter road alignment.

## **4.0 WILDLIFE RESULTS**

### **4.1 Black Bear Habitat Potential**

#### **4.1.1 Field Survey Results**

Within Black Bear range, 21 detailed 100 m transects and three 20 m radius visual plots were surveyed (Figures 2a-2f). These transects/visual plots were conducted in eight different ecosites, including three transects specifically along riparian habitat (WT02, WT16, and WT20) (Table 6). An additional six 100 m transects were surveyed in four ecosites in the Nahanni Range (assumed Grizzly Bear range).

Of those transects/visual plots within Black Bear range, 16 were situated within or immediately adjacent to a proposed Project-footprint (e.g., borrow source) and eight were located well outside (Figures 2a-2f). In particular, transects were completed at two of the six proposed camp locations within Black Bear range (and at two camp locations within Grizzly Bear range).

A total of 38 observations of bear sign were recorded on transects within Black Bear range (Table 6). Twenty additional incidental observations of bear sign were recorded off transects. During transect surveys, Black Bear sign were recorded at 11 of the 21 survey plots; representing Mixedwood Dense, Mixedwood Open, Shrub – Low (including floodplain), Shrub – Tall, and Wetland Shrub ecosites.

Feeding sign was most commonly observed throughout the survey transects/visual plots. Evidence of feeding on ants/insects (i.e., torn logs, ant hills; Photo 1) was observed in four different ecosites: Shrub – Tall, Shrub – Low, Wetland Shrub, and Mixedwood Open. Bark stripping on mature white spruce and jack pine (Photo 2) was documented only in Mixedwood Open and Mixedwood Dense ecosites.

**Table 6: Summary of Black Bear Habitat and Sign Field Survey Results**

<b>Ecosite</b>	<b>Plot (WT) Number</b>	<b>Total Black Bear Obs. on Transect (Total incidental obs. off transect)</b>	<b>Black Bear Habitat Comments<sup>1</sup></b>
Coniferous – Dense	WT18	0 (0)	Overall poor Black Bear feeding habitat. Understory of trace quantities of bearberry, prickly rose, and <i>ribes</i> species. Standing and downed woody debris was moderate.
Coniferous - Open	WT01, WT09, WT13, WT17	0 (0)	Moderate fruit-bearing shrub cover for spring (i.e., overwintered common bearberry) and summer/fall (i.e., alpine bilberry, red bearberry, rock cranberry). Also patches of horsetail species for spring forage. Overall low woody debris cover, but isolated patches of downed debris reaching 15% cover.
Coniferous – Sparse	WT22*	0 (1)**	Low cover of fruit-bearing shrubs (i.e., alpine bilberry, red bearberry). Low cover of woody debris.
Mixedwood - Dense	WT12, WT21, WS03	11 (5)	Moderate cover of spring horsetail cover and summer/fall fruit-bearing shrubs (i.e., buffaloberry, low-bush cranberry, prickly rose, saskatoon). Overall moderate woody debris cover (both standing and downed).
Mixedwood – Open	WT05, WT06, WT08, WT07, WT19, WS01, WS02	13 (2)	High evidence of bark stripping on white spruce at WT07; represents spring feeding. Overall, low to moderate fruit-bearing shrub cover depending on the topographic position (mid-slope units appear to have higher cover than lower-slope units). Large mature white spruce trees for denning. Downy woody debris ranges from 1-10%.
Broadleaf – Dense	–	–	EOSD description: Greater than 60% crown closure; broadleaf trees are 75% or more of total basal area
Broadleaf – Open	–	–	EOSD description: 26-60% crown closure; broadleaf trees are 75% or more of total basal area
Shrub – Tall	WT03, WT04, WT15	7 (5)	Regenerating burn area. Pockets of high fruit-bearing shrub cover noted principally within 100 m of creek; however, overall generally low fruit-bearing shrub availability (i.e., alpine bilberry, <i>ribes</i> species, buffaloberry). Relatively high abundance of ants. Standing woody debris cover ranged from 3-10% and downed woody debris ranged from 5-40%.
Shrub – Low (includes riparian floodplain)	WT02, WT10, WT14, WT16	6 (8)	WT02 and WT16 within riparian floodplains. Low cover of fruit-bearing shrubs and graminoids, but relatively high abundance of ants. Low overall cover of woody debris.
Wetland – Treed	–	–	EOSD description: Land with a water table near/at/above the soil surface for enough time to promote wetland or aquatic processes; the majority of vegetation is coniferous, broadleaf or mixedwood trees
Wetland – Shrub	T11	1 (0)	High cover of bearberry and sedge cover, and low buffaloberry, alpine bilberry, and woody debris. Wet organic substrate material.

**Table 6: Summary of Black Bear Habitat and Sign Field Survey Results**

Ecosite	Plot (WT) Number	Total Black Bear Obs. on Transect (Total incidental obs. off transect)	Black Bear Habitat Comments <sup>1</sup>
Wetland – Herb	–	–	EOSD description: Land with a water table near/at/above the soil surface for enough time to promote wetland or aquatic processes; the majority of vegetation is herb
Herb	–	–	Refer to the ecotype description in Section 3.1
Bryoids	WT27*	0 (0)	Low cover of fruit-bearing shrubs, and low cover of woody debris.
Exposed/Barren Land (alluvial floodplain)	WT20	0 (0)	No available Black Bear food, security, or hibernating habitat
Water	-	-	-

<sup>1</sup> Refer to the ecosite descriptions in Section 3.1 for full characterization. The EOSD land cover description adapted from Wulder et al. (2003).

\* transects completed outside Black Bear range (assumed from KP 40 to the Liard Highway); ecosite characteristics assumed similar for the purposes of the Black Bear model

\*\* Bear species

- No Black Bear transects completed. Refer to the ecosite description in Section 3.1 or the EOSD land cover description.

### 4.1.2 Black Bear Habitat Model Predictions

Black Bear distributions generally match the quality of habitats that satisfy their life requisites for food, security, and hibernating. Patches of higher habitat quality, for these life requisites, are more likely to be frequented by Black Bears.

Habitat ratings were based on the literature review and field survey results. Tetra Tech EBA’s habitat model suggests that high quality Black Bear food, security, and hibernating habitat is common throughout the Black Bear habitat study area, including near the proposed all-season access road, borrow sources, bridge locations, and camps (Table 7).

**Table 7: Area of Predicted Black Bear Habitat Near the Proposed All-Season Road**

Life Requisite	Ranking	Within Black Bear Study Area (6 km buffer from road) (ha)	Within 500 m of road (ha)
Food	High	48,837	5,824
	Moderate	60,933	6,022
	Low	36,620	3,060
	Nil	17,373	1,095
Security	High	76,228	8,477
	Moderate	24,271	2,517
	Low	30,283	2,573
	Nil	32,982	2,434
Hibernating	High	95,490	9,844
	Moderate	17,798	2,242
	Low	44,802	3,576
	Nil	5,673	338

Habitats predicted to provide high quality Black Bear food principally extend east from the Tetcela River area to the Liard Highway (Figure 3). Predicted high quality food habitat also exists at or adjacent to four of the six proposed camps within Black Bear range: Tetcela (Figure 3c), Wolverine (Figure 3d), Grainger (Figure 3e), and Liard (Figure 3h). Similarly, all proposed bridge locations exist within or near high predicted food habitat (i.e., riparian areas; Appendix B).

Overall, habitats predicted to provide high security cover (Figure 4) are located primarily east of the burn areas (east of KP 60) (Figure 4b).

In the winter, security (and thermal) cover governs suitable denning locations. Within the Black Bear study area, predicted high quality hibernating habitat is considered common along the length of the proposed all-season road (Figure 5). Potential hibernating habitat is low within the burn regenerating area (Figures 5a and 5b) and in the large lowland complexes in Fishtrap Creek and east of the Silent Hills (Figures 5d and 5f), but overall moderate and high potential exists along the remaining road length.

## 4.2 Collared Pika

Surveys were completed in borrow sources in the Sundog Creek realignment (all talus borrows or those immediately adjacent to talus from KP 32 to KP 38.5) and Borrow Sources 14 (near KP 14) and 16 (near KP 16) (Figure 6). Suitable talus habitat was not observed near the proposed all-season road and borrows from KP 0-16. Borrow Sources 14 and 16 (Photos 3 and 4, respectively) do not include talus habitat; however, talus habitat is located approximately 40 m from Borrow 16.

Evidence of both active and possibly inactive pika sites was observed during the July 2016 survey. Active sites were found at Borrow Sources 33 and 34 (Table 8), as indicated by calling individuals and/or fresh haypiles and pellets. Two possible inactive sites, as determined from the presence of old haypiles (and lack of calling individuals and fresh haypiles) were found at Borrow Source 38, and at the talus site located approximately 40 m from Borrow Source 16 (Table 8).

**Table 8: Summary of Collared Pika Survey Results**

Station (nearest road KP)	Transect Length (m)	Collared Pika Observations	Talus Description	Meadow Description
WP01 (16)	140*	<ul style="list-style-type: none"> <li>2 haypiles and pellets (old)</li> </ul>	<ul style="list-style-type: none"> <li>North and northwest aspect</li> <li>Boulders average size &gt;150 cm diameter</li> </ul>	<ul style="list-style-type: none"> <li>Available at toe and sides of talus</li> <li>Alpine herb/graminoid tundra, no shrubs or trees present</li> </ul>
WP02 (14)	75	None	<ul style="list-style-type: none"> <li>North aspect</li> <li>Cobble, small rock, and shale shards. Not appropriate talus habitat</li> </ul>	<ul style="list-style-type: none"> <li>Available at toe, sides, and isolated pockets in talus</li> <li>Alpine herb tundra</li> </ul>
WP03 (33) (Photo 3)	100	<ul style="list-style-type: none"> <li>2 individuals calling (possibly 3)</li> <li>11 haypiles, pellets, and urine (fresh and old) (Photo 4)</li> </ul>	<ul style="list-style-type: none"> <li>North aspect</li> <li>Talus rock ranges in size from 10-150 cm diameter. Average size 60 cm</li> </ul>	<ul style="list-style-type: none"> <li>Available at toe, talus sides, and isolated pockets in talus</li> <li>Tree and shrub dominated with graminoids and forbs</li> </ul>

**Table 8: Summary of Collared Pika Survey Results**

Station (nearest road KP)	Transect Length (m)	Collared Pika Observations	Talus Description	Meadow Description
WP04 (34) (Photo 5)	20	<ul style="list-style-type: none"> <li>▪ 2 individuals calling</li> <li>▪ 3 haypiles (old)</li> </ul>	<ul style="list-style-type: none"> <li>▪ North aspect</li> <li>▪ Talus rock ranges in size from 15-150 cm diameter. Average size 80 cm</li> </ul>	<ul style="list-style-type: none"> <li>▪ Available at toe of talus</li> <li>▪ Tree and shrub dominated with trace cover graminoids and forbs</li> </ul>
WP05 (37) (Photo 6)	150	None	<ul style="list-style-type: none"> <li>▪ North aspect</li> <li>▪ Talus in four small areas along Sundog Creek</li> <li>▪ Talus rock ranges in size from 10 - &gt;150 cm diameter. Average size 20 cm</li> <li>▪ Talus extends approx. 10 m upslope and 200 m along toe</li> </ul>	<ul style="list-style-type: none"> <li>▪ Available at toe and isolated pockets in talus</li> <li>▪ Tree and shrub dominated with trace cover graminoids and forbs</li> </ul>
WP06 (35) (Photo 7)	118**	None	<ul style="list-style-type: none"> <li>▪ North aspect</li> <li>▪ Talus rock ranges in size from 30 - &gt;150 cm diameter. Average size 60 cm</li> <li>▪ Talus extends approx. 25 m upslope and 120 m along toe</li> </ul>	<ul style="list-style-type: none"> <li>▪ Available at toe and isolated pockets in talus</li> <li>▪ Tree and shrub dominated with trace cover graminoids and forbs</li> </ul>
WP07 (38) (Photo 8)	230	<ul style="list-style-type: none"> <li>▪ 2 haypiles and pellets (old) (Photo 9)</li> </ul>	<ul style="list-style-type: none"> <li>▪ North aspect</li> <li>▪ Talus rock in narrow strips interspersed by tree/shrub dominated meadow</li> <li>▪ Average rock size ranges from 20-80 cm diameter</li> <li>▪ Talus extends approx. 20 m upslope and 100 m along toe</li> </ul>	<ul style="list-style-type: none"> <li>▪ Available at toe and talus sides</li> <li>▪ Tree and shrub dominated with trace cover of graminoids and forbs</li> </ul>

\* No available talus at proposed borrow pit. Pika surveys completed at a talus site located approx. 40 m from proposed borrow disturbance. Survey includes two separate transects; near toe meadow and approximately 20 m upslope of toe meadow.

\*\* Approximate length of available boulder talus

A single Collared Pika was incidentally recorded vocalizing from the north side of Sundog Creek (south aspect talus) near KP 33.

### 4.3 Peregrine Falcon

One large inactive stick nest (likely once occupied by a Golden Eagle) was observed during the aerial Peregrine Falcon nest survey along the cliffs of Sundog Creek (south aspect) from KP 34 to 37.8. A Peregrine Falcon was incidentally detected (visual and vocalization) along Sundog Creek near KP 37.5. Although no Peregrine Falcon scrapes were detected, the presence of a Peregrine Falcon in July may indicate an active nest site in the area. A perching site, as indicated by whitewash, was observed approximately 150 to 200 m above ground level (agl) and 50 m from the cliff top.

Another possible falcon scrape was detected near KP 23 (approximately 400 m from the proposed all-season road). Although the site was unoccupied at the time of the July 2016 survey, signs suggestive of its past use (i.e., orange lichen, moss campion growing) were observed. This scrape was approximately 12 m agl on an east-facing creek bank.

### 4.4 Harlequin Duck

Sundog, Fast/Funeral, and Prairie creeks were surveyed during the designated aerial survey (Figure 7). In addition, these watercourses were regularly flown throughout the field program, outside the specified Harlequin Duck survey, and Funeral/Fast Creek was also slowly driven with an ATV. No Harlequin Ducks were observed during the designated surveys or incidentally.

The pilot had reported an observation of an unknown duck species diving into Sundog Creek near KP 28.5 several days prior to the aerial survey.

### 4.5 Trumpeter Swan Reconnaissance

The aerial reconnaissance targeted the wetlands in Fishtrap Creek (Photo 10) and the wetlands east of Silent Hills within 1 km of the proposed all-season road (Figure 8). High winds and wind gusts necessitated flying faster (60-80 km/hr) and at a higher altitude (sometimes reaching approximately 80-100 m agl) than suggested by RIC protocols.

A total of 14 Trumpeter Swans (including 8 adults and 6 cygnets) were observed during the designated aerial survey (Photo 11), and 17 were incidentally recorded. Some incidentally recorded Trumpeter Swans likely represent multiple records of the same individual(s) that were observed over multiple days. In particular near KP 96, three separate records of Trumpeter Swans from the same lake were reported on three different days. This likely represents a single breeding pair at this location.

Most observations of Trumpeter Swans were located in the wetland complexes of Fishtrap Creek and east of Silent Hills (Figure 8). The lone exception was a pair of Trumpeter Swans incidentally observed on a pond near KP 143. In addition to Trumpeter Swans, 85 ducks (Mallards, Green-winged Teals, Ring-necked Ducks; but most not identified to species) were observed during the aerial survey including, females with ducklings, ducklings with no adult, and a molting raft. A total of six broods were recorded.

A single shoreline observation station survey was conducted near KP 94. One Pacific Loon was observed occupying this pond. The pond characteristics included open water with a narrow sedge marsh perimeter. Approximately 5% of the pond was not visible with binoculars from the observation station.

## 4.6 Beaver Reconnaissance

A total of 37 Beaver observations (e.g., dams, lodges) were recorded along the proposed all-season access road (Photo 12); primarily within and near the wetland complexes of Fishtrap Creek and east of Silent Hills (Figure 9). These aerial survey results are due to survey effort in the wetland complexes, but also poor available habitat along the remaining portions of the all-season road.

Two observations of Beaver harvested trees were also observed incidentally in upland forests near KP 94, and at the perimeter of the Fishtrap wetland complex. Based on these surveys, Beavers occur in the lower elevation boreal forest zone, and occur in higher densities in the Fishtrap Creek and the wetland complexes east of Silent Hills

## 4.7 Incidental Wildlife

A total of 678 non-targeted species observations were incidentally recorded during the July 2016 field survey (Table 9). Moose and Snowshoe Hare were the most common species observed (including sign). Grizzly Bear and Caribou sign were primarily observed along the existing winter road; Grizzly Bear sign was observed from KP 1 to 12.5 and Caribou sign from KP 10 to 13.5.

Nearly all the Dall's Sheep were observed at the Prairie Creek Mine on various days, with the exception of five ewes with four lambs observed nearest to KP 8.5 and 16. A lone sheep was also recorded 2.7 km south of KP 18.

**Table 9: Summary Incidental Wildlife Observations**

Species	Total # Incidental Obs.	Species	Total # Incidental Obs.
<b>Birds</b>			
American Wigeon	2 x visual	Northern Flicker	1 x sign 2 x visuals
Green-winged Teal	4 x visual	Pileated Woodpecker	2 x sign
Ring-necked Duck	1 x visual	Woodpecker species	32 x sign
Scaup species	6 x visuals	Say's Phoebe	2 x visual
Bufflehead	3 x visual	Common Raven	6 x visual
Spruce Grouse	1 x sign 4 x visuals	Boreal Chickadee	5 x vocalizations
Willow Ptarmigan	1 x visual	Varied Thrush	1 x vocalization
Grouse/ptarmigan species	19 x sign	Hermit Thrush	11 x vocalizations
Bald Eagle	1 x visual	Thrush species	2 x visual
Northern Harrier	6 x visuals	Yellow-rumped Warbler	1 x vocalization
Red-tailed Hawk	1 x visual	Blackpoll Warbler	1 x vocalization
Golden Eagle	1 x visual	Chipping Sparrow	1 x vocalization
American Kestrel	1 x visual	Fox Sparrow	1 x vocalization
Hawk species	2 x visuals	Lincoln's Sparrow	4 x vocalizations
Lesser Yellowlegs	1 x vocalization	White-throated Sparrow	4 x vocalizations
Gull species	1 x visual	White-crowned Sparrow	3 x vocalizations
Belted Kingfisher	1 x visual	Dark-eyed Junco	1 x vocalization
Hairy Woodpecker	2 x visual	Pine Siskin	2 x vocalizations 1 x visual
Yellow-bellied Sapsucker	13 x sign		

**Table 9: Summary Incidental Wildlife Observations**

Species	Total # Incidental Obs.	Species	Total # Incidental Obs.
<b>Mammals</b>			
Wildlife trail	17 x visual	Caribou, Northern Mountain*	8 x sign 1 x visual**
Arctic-Ground Squirrel	29 x visual, sign, vocalization	Moose	11 x visual 134 x sign
Red Squirrel	43 x visual, sign, vocalization	Dall's Sheep	52 x visual 6 x sign
Porcupine	5 x sign	Wolf	1 x visual 5 x sign
Vole/Lemming species	12 x sign	Grizzly Bear*	31 x sign
Snowshoe Hare	166 x sign		
<b>Amphibians</b>			
Wood Frog	3 x visuals		

\* Based on species ranges

\*\* Caribou observed on July 16 appeared to have a collar (observation location: Latitude 61.585580; Longitude 124.548350).

Rusty Blackbirds, Yellow Rails, and Horned Grebes were not incidentally observed during the July 2016 field surveys.

Several well-worn wildlife trails were incidentally observed on or crossing the all-season road alignment:

- Along particular lengths of the old winter road;
- Near KP 6 the trail crosses the existing access road at two nearby locations; and
- Near KP 71.5 the trail crosses the former winter road and follows a ridgeline within the new burn area.

The Prairie Creek Mine's Wildlife Casual Observation Log was received at the time of the July visit. Mine staff arrived at the Prairie Creek Mine on July 7 for the first time in 2016. The observation log included reports of wildlife seen by staff from July 8 to 16, prior to Tetra Tech EBA's departure from camp. During this nine day period, three observations of a female grizzly bear with two cubs were reported along the south side of Prairie Creek, at the confluence of Harrison and Prairie creeks, and at the airstrip. A single porcupine was also observed at the airstrip.

## 5.0 DISCUSSION

### 5.1 Vegetation

#### 5.1.1 Ecosystem Classification

Ecosystem classification comments and recommendations are as follows:

- Ground-truthing of the EOSD and Parks Canada mapping was undertaken. Data collection was restricted in the Silent Hills area (KP 96-102) by access limitations (landing locations for the helicopter), however, the ecotypes defined for this area by the EOSD mapping are predominantly mixedwood, deciduous, and shrub ecotypes, and these were partially confirmed by aerial survey.

- A recent forest fire (1-2 years ago) has burnt a portion of the route from approximately KP 60 to 72.5. All existing ecotyping is no longer valid. An older burn (12-15 years ago) is also not accurately depicted on Parks Canada ecotype mapping (KP 48.5 to 60). No mapping dataset accurately depicts current burned conditions; however, each dataset can be updated to reflect these changes based on the information gathered in the field. Pre-fire, common ecotypes were coniferous, mixedwood and wetland; post-fire, each ecotype has been reset to a shrub community.
- Should Parks Canada wish to confirm their mapping, the following ecotypes would benefit from further evaluation:
  - Terrain or Cloud Shadow/Water – This ecotype occurs where imagery is poor and the land cover could not be properly classified. Due to the size of this ecotype (75.67 ha) further ground-truthing would be required to determine which ecotypes are actually present.
  - Rock/Lichen – No plot data were collected in this ecotype.
  - Wetland – This ecotype is likely more prevalent than depicted by the Parks Canada mapping, although it is somewhat more accurately depicted by the EOSD mapping due to a larger number of wetland categories. More wetland ecotype data would need to be collected.
  - Deciduous Forest/Tall Shrub – This ecotype is more prevalent in the Silent Hills area.

Both the Parks Canada and EOSD ecotyping could be smoothed out somewhat to create polygon features for each ecotype. The mapping is somewhat pixilated in areas, reducing its usability.

Vegetation assemblages were classified using three ecotype classification systems and generally document the dominant ecotypes. This new information does not alter the effects assessment in the DAR, but enhances the baseline database.

### 5.1.2 Rare Plants

The timing of the rare plant survey was too late for the flowering periods of plant families such as Ranunculaceae (buttercups) and Rosaceae (rose). An early season rare plant survey is recommended prior to construction. If rare plants are found, measures such as avoidance or mitigation may be implemented.

### 5.1.3 Areas of Rare Plant Potential and Rare Vegetation Assemblage Potential

As per Section 2.1.3, rare plant surveys were driven, in part, by the identification of areas thought to have a higher potential of supporting the habitat of listed plant species. These areas are often linked to fine-scale and uncommon landscape features and areas with unusual substrates and vegetation patterns. Surveys of these areas did not result in the identification of listed species.

The GNWT does not have a tracking list or information regarding rare vegetation assemblages. The restricted distribution of certain vegetation assemblages within the Project Area (e.g., the Alluvial Non-Vegetated ecotype, wetlands, and alpine areas) is not an indicator of rarity in this case, particularly as these assemblages have been mapped in areas that extend beyond the Project Area boundary.

## 5.2 Black Bear Habitat Potential

It is assumed that patches of higher habitat quality are more likely to be frequented by Black Bears than moderate or lower quality habitats, thereby leading to increased interactions with the proposed all-season road activities in areas of high quality habitat. However, habitat quality is not the only determinant of Black Bear occurrence as

individuals can travel extensively through all types of land cover in search of food. In particular, Black Bears have a demonstrated willingness to persist in poor quality habitats if sufficient anthropogenic sources of food are available (e.g., poorly maintained camps).

Potential Project-related interactions with Black Bear life requisites and seasons of use exist for all phases of construction and operation (Table 10). Based on the Project schedule, most construction activities (including bridge construction) occur during Black Bear's winter hibernating period. The operation of five temporary construction camps and possibly two permanent camps, two transfer facilities, borrow source development, and road operations will overlap with Black Bear active seasons.

Winter bridge construction occurs in riparian areas identified as high Black Bear feeding habitat; however, there is no seasonal overlap between construction activities and Black Bear food requisites.

Yukon Environment (2008) recommends that camps should be located a minimum of 30 m from the high water mark of waterbodies (including creek riparian areas) and avoid areas of common bear food (e.g., berry patches; setback distance not provided to food sources) to reduce the likelihood of human-bear encounters. All proposed temporary and permanent camp locations in Black Bear habitat are at least 30 m from high water marks. There is the potential to move the Liard Camp to Borrow Source BP159a (KP 158), which is located in an area predicted to be low Black Bear feeding habitat.

**Table 10: Project-Related Interactions with Black Bear Key Life Requisites and Seasons**

Project-Activity	Black Bear Life Requisites/Seasons	Period of Interaction
<b>Clearing:</b> winter activity	<ul style="list-style-type: none"> <li>▪ Winter hibernating</li> </ul>	2 years
<b>Temporary Construction Camps:</b> Six camps are proposed within Black Bear range. All camps are proposed for winter operations, with five camps potentially extending operations through the spring, summer, and fall.	<ul style="list-style-type: none"> <li>▪ All Camps = Winter hibernating</li> <li>▪ 5 Camps = Spring, Summer, Fall food and security</li> </ul>	2 years
<b>Permanent Camps and Transfer Facilities:</b> Two camps are likely to continue operations beyond the construction period (Liard and Tetcela), and an additional two have a possibility. Two transfer facilities are proposed.	<ul style="list-style-type: none"> <li>▪ Winter hibernating</li> <li>▪ Spring, summer, and fall food and security</li> </ul>	Infrequent to the end of the Project life. Note: permanent camp at the Tetcela location infrequently used for the purposes of road maintenance.
<b>Bridge Construction:</b> all bridges proposed during winter construction.	<ul style="list-style-type: none"> <li>▪ Winter hibernating</li> </ul>	Continuous at individual bridge locations for a few weeks to 2 months.
<b>Borrow Source Development:</b> most temporary for the purposes of construction; however, some may remain open for road maintenance.	<ul style="list-style-type: none"> <li>▪ Winter hibernating</li> <li>▪ Spring, summer, and fall food and security</li> </ul>	Continuous at individual borrow sources for a period ranging from a few months to the end of the Project life.
<b>Road Operations:</b> year-round operations.	<ul style="list-style-type: none"> <li>▪ Winter hibernating</li> <li>▪ Spring, summer, and fall food and security</li> </ul>	Infrequent but daily from approximately January 1 to March 31 and again from June 15 to November 4.

### **5.3 Collared Pika**

As referenced in the DAR, Environment and Natural Resources' (ENR's) Wildlife Management Information System (WMIS) includes reports of Collared Pikas seen and/or heard in talus between KP 15 to 22. The July 2016 field results demonstrate that pikas are present in or have once occupied talus habitat as far east as KP 38.

Due to the presence of active and possibly inactive pika sites, CZN has directed Allnorth to move the proposed all-season road alignment, to the extent possible, off of available talus habitat in the Sundog Creek area.

Collared Pika surveys should be undertaken in the future at Borrow Sources 35, 38, and 16 if these borrows are intended to be developed, and surveys for additional active Collared Pika talus at and near realignment areas should be conducted prior to disturbance. Alternative borrows to sources 33 and 34 should be selected to avoid active Collared Pika sites.

No modifications to the impact assessment and or mitigations are recommended, as avoidance measures will be undertaken.

### **5.4 Peregrine Falcon**

No modifications to the impact assessment and/or mitigations are recommended based on the July 2016 field results. The presence of nesting Peregrine Falcons within 1.5 km of construction works should continue to be monitored prior to earthworks.

### **5.5 Harlequin Duck**

Harlequin Ducks were assessed in the Information Response (dated April 28, 2016), which assumed the presence of Harlequin Ducks along this watercourse. No modifications to the impact assessment and or mitigations are recommended based on the July 2016 field results.

The unconfirmed observation of a duck in Sundog Creek, near KP 28.5 should be considered for further survey(s) during the next planned summer field program(s).

### **5.6 Trumpeter Swan Reconnaissance**

No modifications to the impact assessment and or mitigations are recommended based on the July 2016 field results. Additional baseline surveys for forest and wetland birds are planned for the May to June window, at which time additional waterfowl surveys may be conducted concurrently.

### **5.7 Beaver Reconnaissance**

No modifications to the impact assessment and or mitigations are recommended based on the July 2016 field results.

### **5.8 Incidental Wildlife**

Several existing wildlife trails were incidentally observed crossing the access road alignment. Wildlife crossing the road at these locations pose a collision hazard with Project-related traffic. Wildlife crossing signs that warn drivers of the potential hazard should be erected near known trails intersecting with the proposed all-season access road.

## 6.0 CLOSURE

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

Respectfully submitted,  
Tetra Tech EBA Inc.



Prepared by:  
Karla Langlois, B.Sc., P.Biol.  
Biologist  
Environment Practice  
Direct Line: 867.920.2287x223  
Karla.Langlois@tetrattech.com



Prepared by:  
Amy McLenaghan, B.Sc., P.Biol., L.A.T.  
Biologist  
Environment Practice  
Direct Line: 780.451.2130 x630  
Amy.McLenaghan@tetrattech.com



Reviewed by:  
Richard A.W. Hoos, R.P.Bio.  
Principal Consultant  
Mining Practice  
Direct Line: 604.608.8914  
Rick.Hoos@tetrattech.com



Reviewed by:  
Jason Jones, Ph.D., R.P.Bio.  
Senior Ecologist  
Manager – Pacific & Yukon Region  
Direct Line: 778.945-5840  
Jason.Jones@tetrattech.com



Reviewed by:  
Tania Perzoff  
Senior Regulatory Specialist  
Mining Practice  
Direct Line: 778.945.5717  
Tania.Perzoff@tetrattech.com

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## REFERENCES

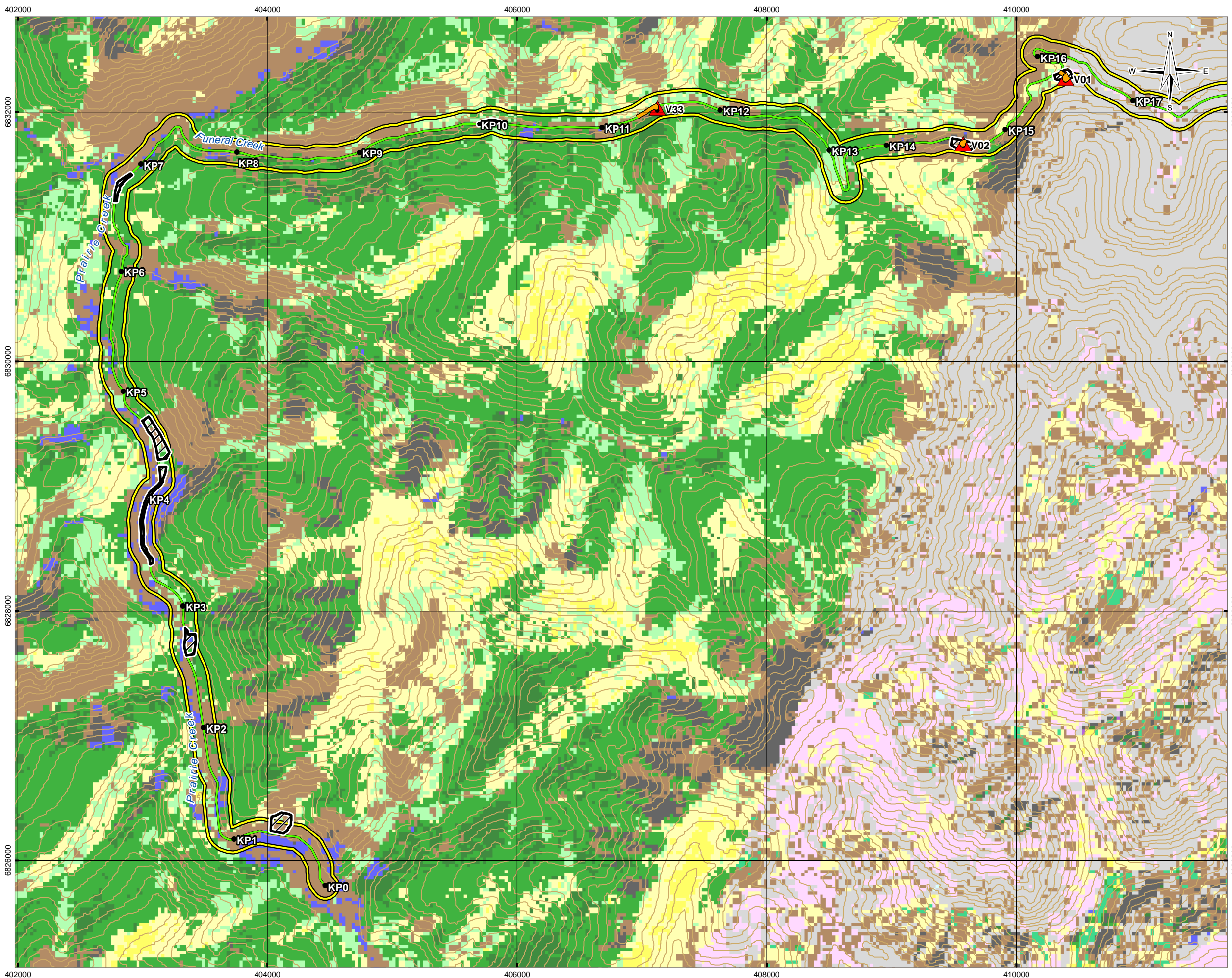
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# FIGURES

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Figures 2a-2f	Black Bear Habitat Survey Locations
Figures 3a-3j	Black Bear Food Habitat Potential
Figures 4a-4j	Black Bear Security Habitat Potential
Figures 5a-5j	Black Bear Hibernating Habitat Potential
Figure 6	Collared Pika Survey Locations
Figure 7	Harlequin Duck Survey Locations
Figure 8	Trumpeter Swan Locations
Figure 9	Beaver Locations

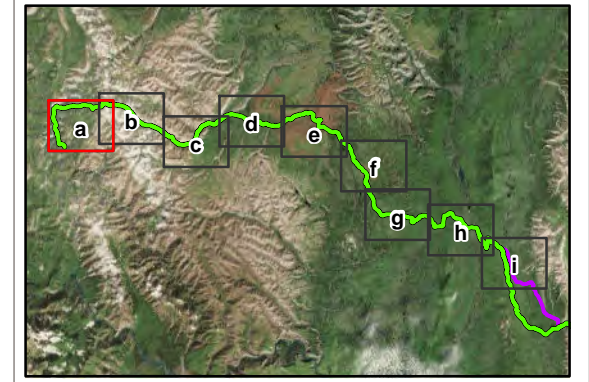


**LEGEND**

- Vegetation Plot
- Rare Plant Transect
- 100 m Buffer
- Prairie Creek Access Road (Apr 5, 2016)
- Borrow Pit
- Contour (40 m)

**Land Classification**

- Shadow
- Water
- Snow / Ice
- Rock / Rubble
- Exposed / Barren Land
- Bryoids
- Shrub - Tall
- Shrub - Low
- Wetland - Treed
- Herbs
- Coniferous - Dense
- Coniferous - Open
- Coniferous - Sparse
- Broadleaf - Open



**NOTES**  
 Base data source: EOSD Data  
 Alignment, Borrow Sources and camps provided by AllNorth

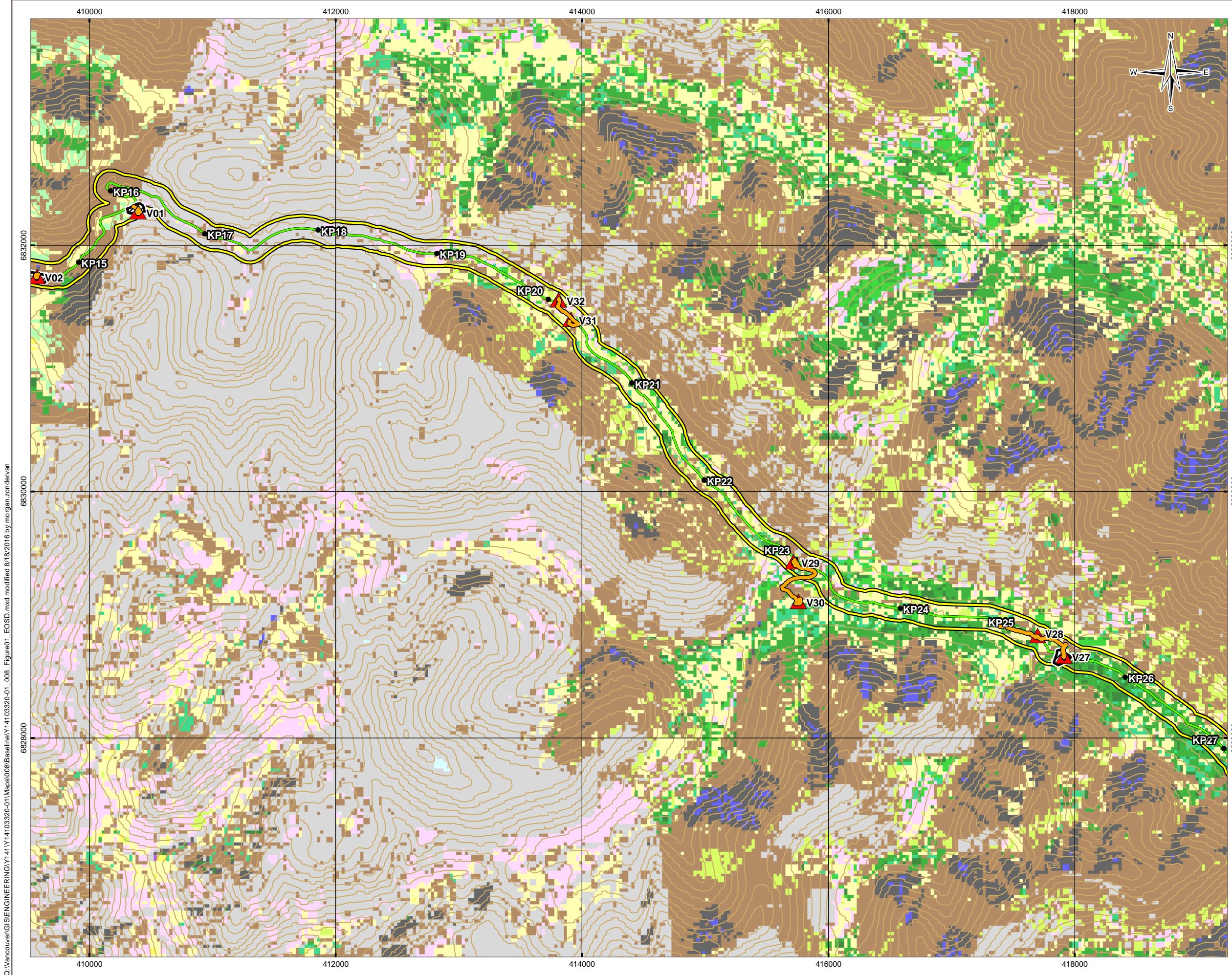
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**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Vegetation Plots and  
 Rare Plant Transects**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:30,000 		<b>TETRA TECH EBA</b>
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<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>APVD</b> AM	<b>REV</b> 0	<b>Figure 1a</b>
<b>OFFICE</b> T EBA-VANC	<b>DATE</b> August 18, 2016	

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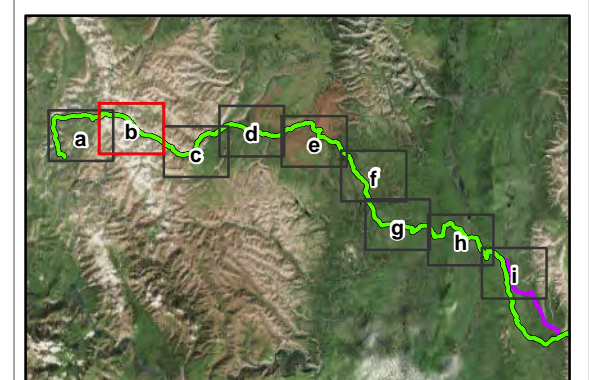


**LEGEND**

- Vegetation Plot
- Rare Plant Transect
- 100 m Buffer
- Prairie Creek Access Road (Apr 5, 2016)
- Borrow Pit
- Contour (40 m)

**Land Classification**

- Shadow
- Water
- Snow / Ice
- Rock / Rubble
- Exposed / Barren Land
- Bryoids
- Shrub - Tall
- Shrub - Low
- Wetland - Treed
- Herbs
- Coniferous - Dense
- Coniferous - Open
- Coniferous - Sparse
- Broadleaf - Dense
- Broadleaf - Open



**NOTES**  
 Base data source: EOSD Data  
 Alignment, Borrow Sources and camps provided by AllNorth

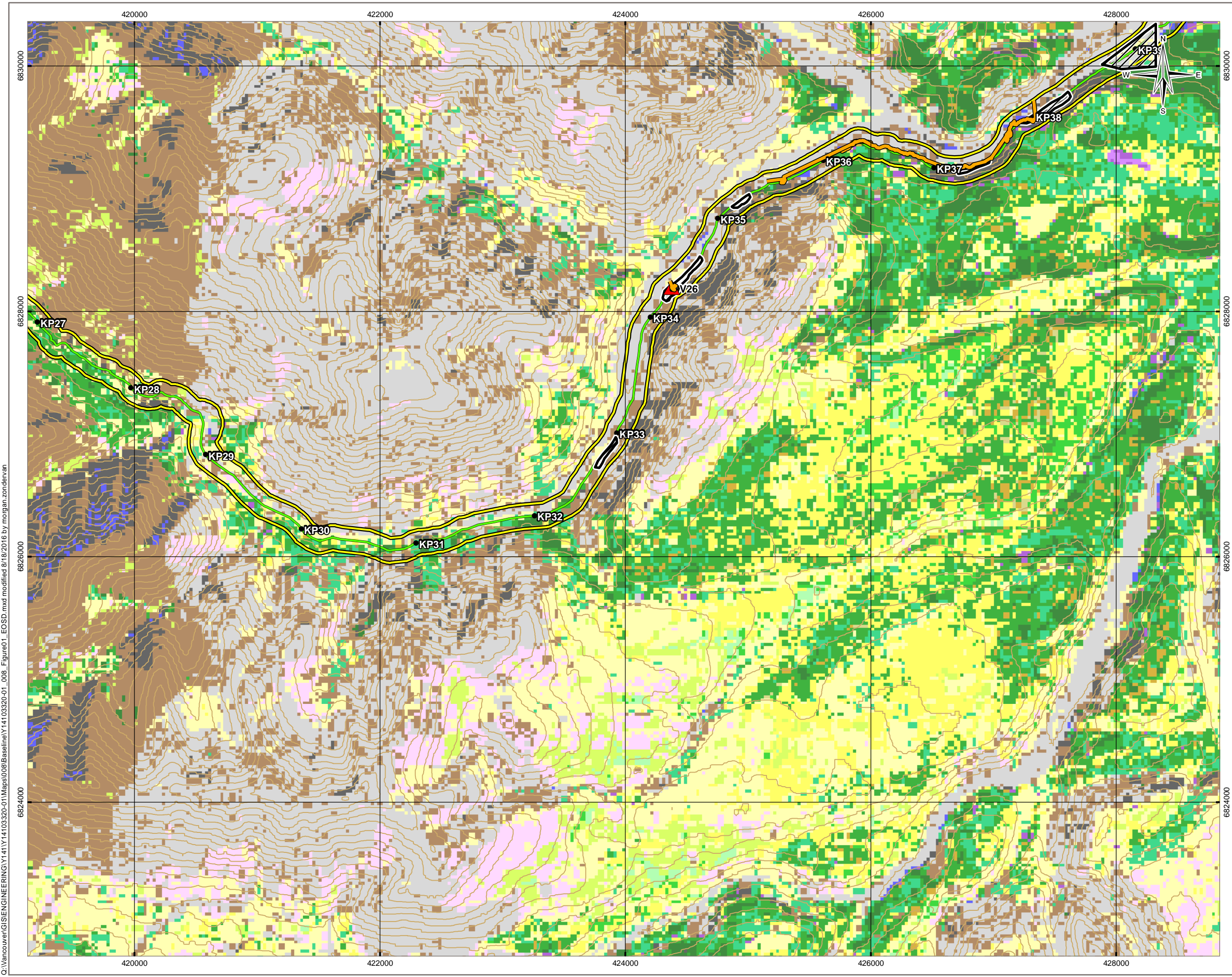
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**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Vegetation Plots and  
 Rare Plant Transects**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:30,000 		<b>TETRA TECH EBA</b>
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<b>APVD</b> AM	<b>REV</b> 0	<b>Figure 1b</b>
<b>OFFICE</b> T EBA-VANC	<b>DATE</b> August 18, 2016	

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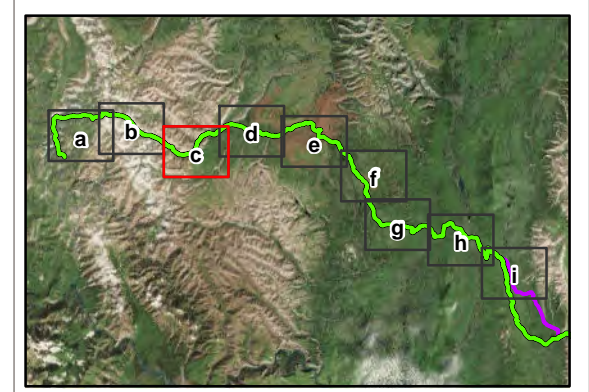


**LEGEND**

- Vegetation Plot
- Rare Plant Transect
- 100 m Buffer
- Prairie Creek Access Road (Apr 5, 2016)
- Borrow Pit
- Contour (40 m)

**Land Classification**

- Shadow
- Water
- Snow / Ice
- Rock / Rubble
- Exposed / Barren Land
- Bryoids
- Shrub - Tall
- Shrub - Low
- Wetland - Treed
- Wetland - Shrub
- Herbs
- Coniferous - Dense
- Coniferous - Open
- Coniferous - Sparse
- Broadleaf - Dense
- Broadleaf - Open
- Mixedwood - Dense
- Mixedwood - Open



**NOTES**  
 Base data source: EOSD Data  
 Alignment, Borrow Sources and camps provided by AllNorth

**STATUS**  
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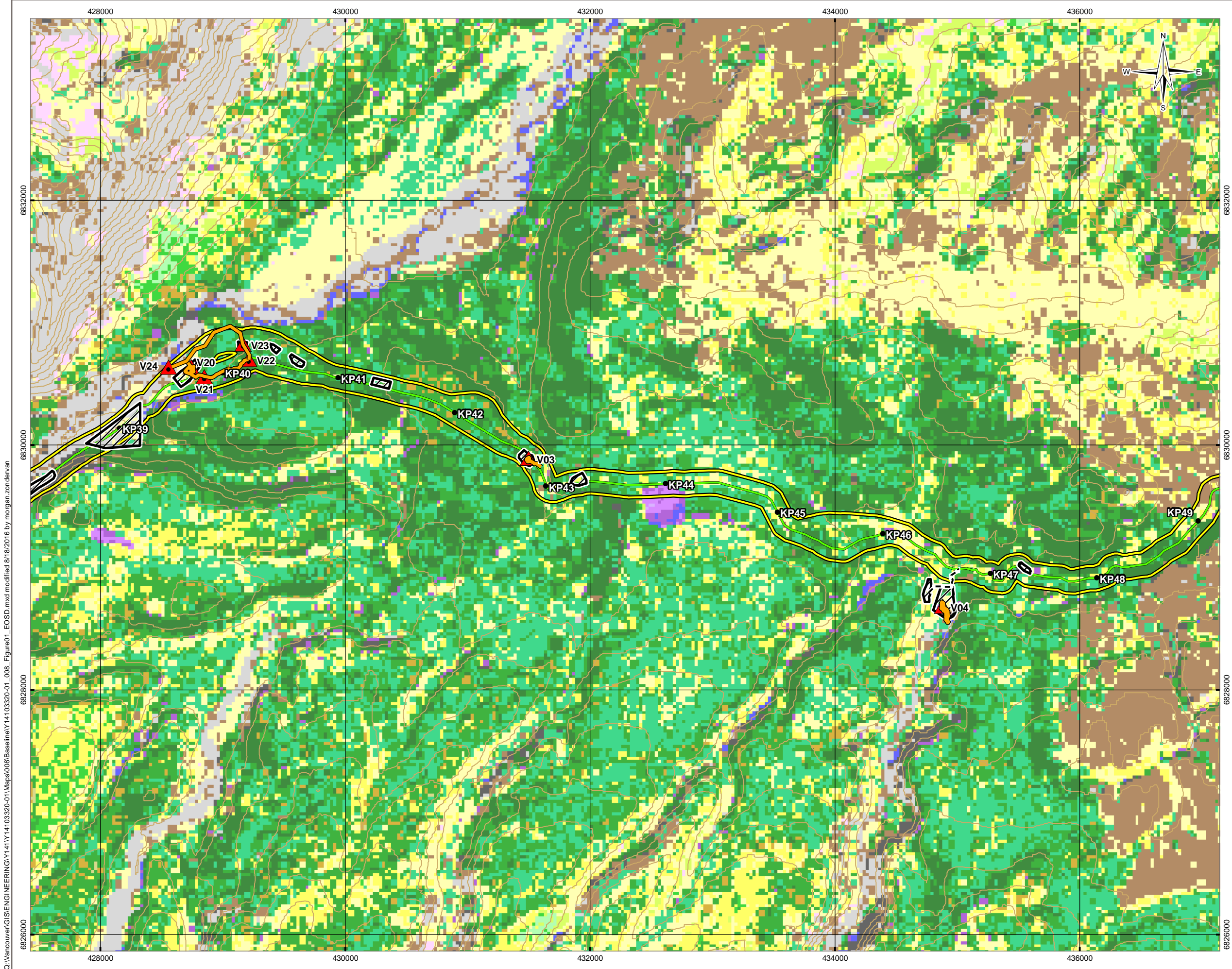
**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Vegetation Plots and  
 Rare Plant Transects**

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Scale: 1:30,000 		<b>TETRA TECH EBA</b>
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<b>OFFICE</b> TlEBA-VANC	<b>DATE</b> August 18, 2016	

**Figure 1c**

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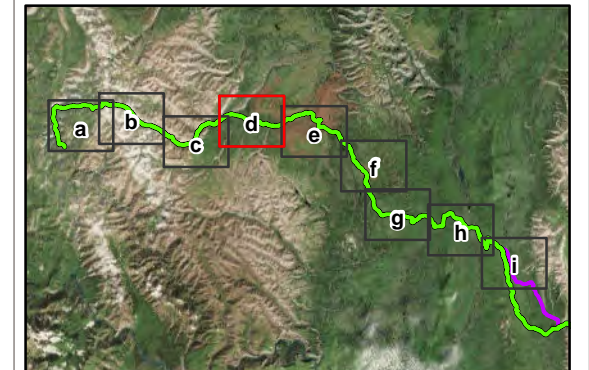


**LEGEND**

- Vegetation Plot
- Rare Plant Transect
- 100 m Buffer
- Prairie Creek Access Road (Apr 5, 2016)
- Borrow Pit
- Borrow Pit Access Road
- Contour (40 m)

**Land Classification**

- Shadow
- Water
- Rock / Rubble
- Exposed / Barren Land
- Bryoids
- Shrub - Tall
- Shrub - Low
- Wetland - Treed
- Wetland - Shrub
- Wetland - Herb
- Herbs
- Coniferous - Dense
- Coniferous - Open
- Coniferous - Sparse
- Broadleaf - Dense
- Broadleaf - Open
- Mixedwood - Dense
- Mixedwood - Open



**NOTES**  
 Base data source: EOSD Data  
 Alignment, Borrow Sources and camps provided by AllNorth

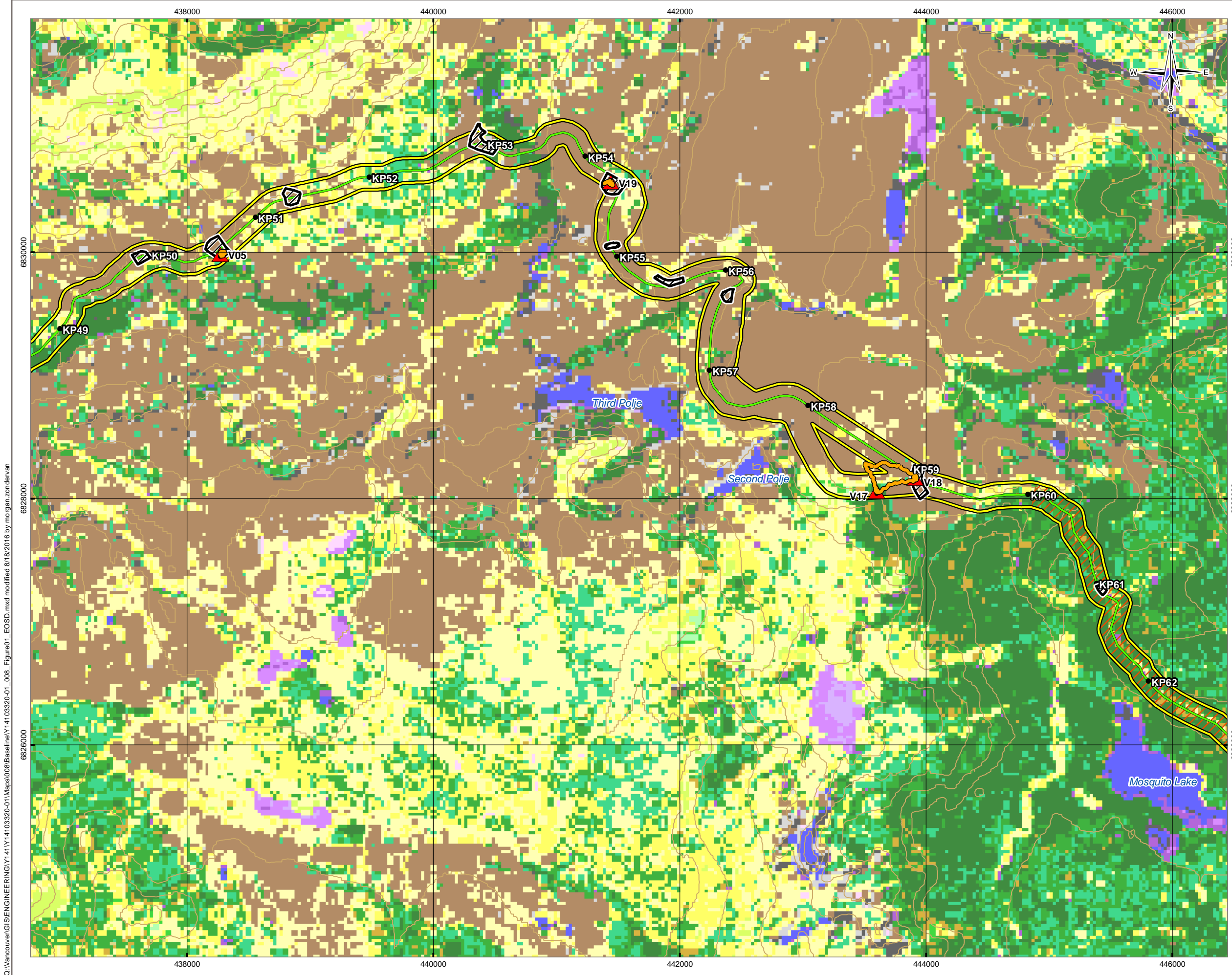
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**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Vegetation Plots and  
 Rare Plant Transects**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:30,000 		<b>TETRA TECH EBA</b>
<b>FILE NO.</b> Y14103320-01_008_Figure01_EOSD.mxd		
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<b>OFFICE</b> T: EBA-VANC	<b>APVD</b> AM	<b>REV</b> 0
<b>DATE</b> August 18, 2016		<b>Figure 1d</b>

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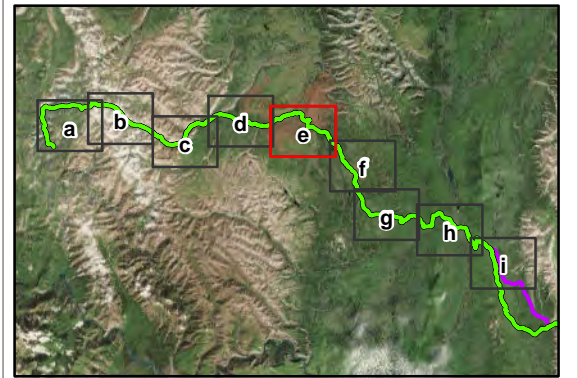


**LEGEND**

- Vegetation Plot
- Rare Plant Transect
- 100 m Buffer
- Prairie Creek Access Road (Apr 5, 2016)
- Borrow Pit
- Recent Burn Area
- Contour (40 m)

**Land Classification**

- Shadow
- Water
- Rock / Rubble
- Exposed / Barren Land
- Bryoids
- Shrub - Tall
- Shrub - Low
- Wetland - Treed
- Wetland - Shrub
- Wetland - Herb
- Herbs
- Coniferous - Dense
- Coniferous - Open
- Coniferous - Sparse
- Broadleaf - Dense
- Broadleaf - Open
- Mixedwood - Dense
- Mixedwood - Open



**NOTES**  
 Base data source: EOSD Data  
 Alignment, Borrow Sources and camps provided by AllNorth

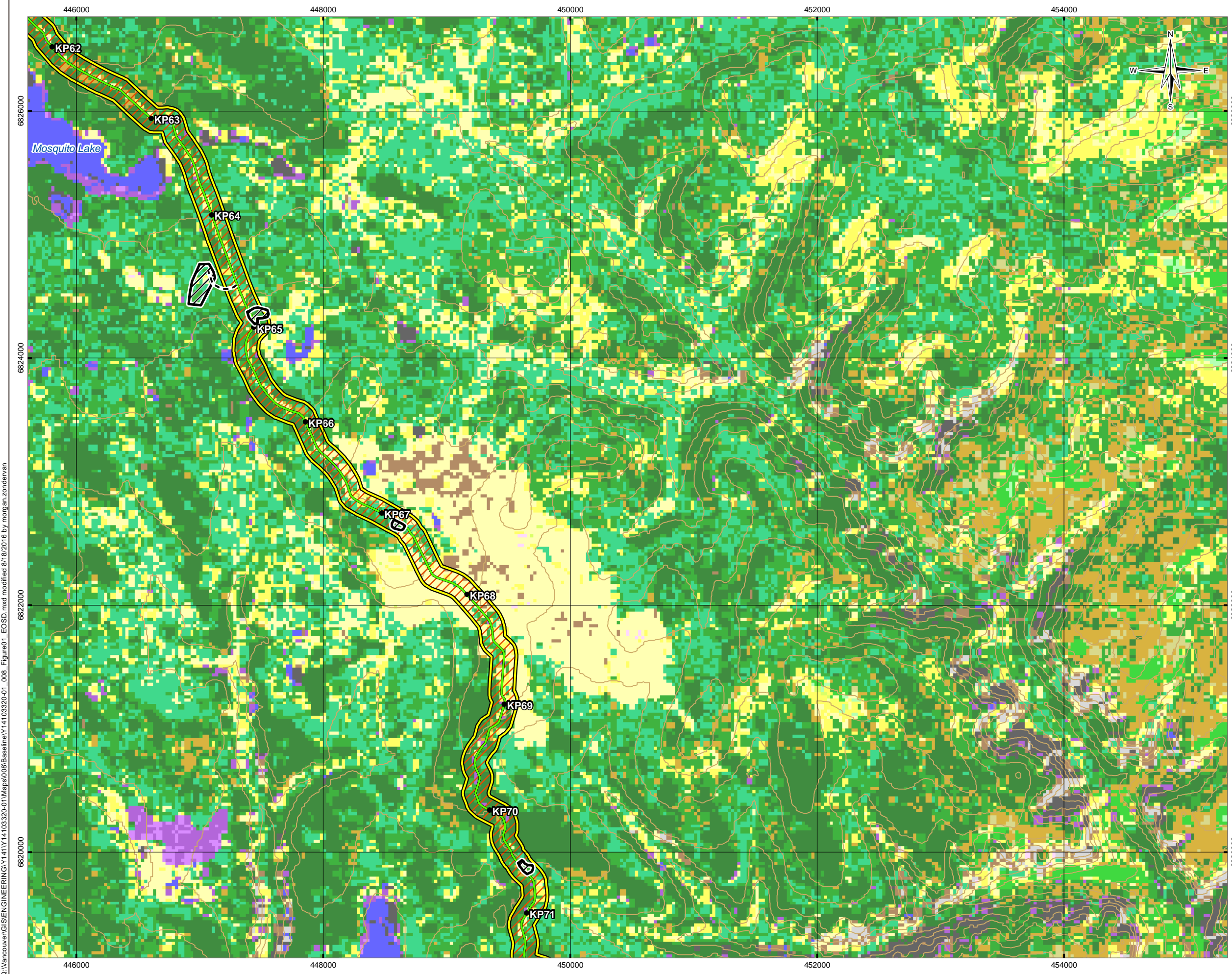
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**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Vegetation Plots and  
 Rare Plant Transects**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
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<b>OFFICE</b> TlEBA-VANC	<b>DATE</b> August 18, 2016	

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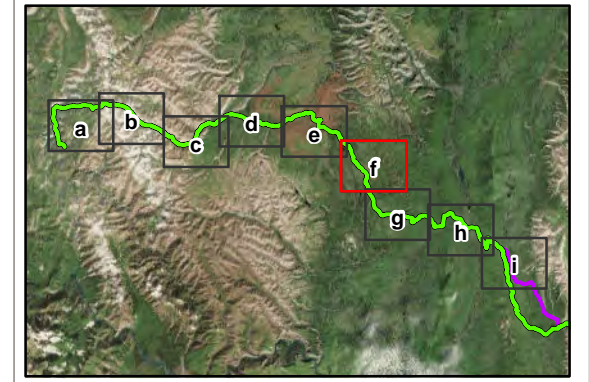


**LEGEND**

- 100 m Buffer
- Prairie Creek Access Road (Apr 5, 2016)
- Borrow Pit
- Borrow Pit Access Road
- Recent Burn Area
- Contour (40 m)

**Land Classification**

- Shadow
- Water
- Rock / Rubble
- Exposed / Barren Land
- Bryoids
- Shrub - Tall
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- Wetland - Treed
- Wetland - Shrub
- Herbs
- Coniferous - Dense
- Coniferous - Open
- Coniferous - Sparse
- Broadleaf - Dense
- Broadleaf - Open
- Mixedwood - Dense
- Mixedwood - Open



**NOTES**  
 Base data source: EOSD Data  
 Alignment, Borrow Sources and camps provided by AllNorth

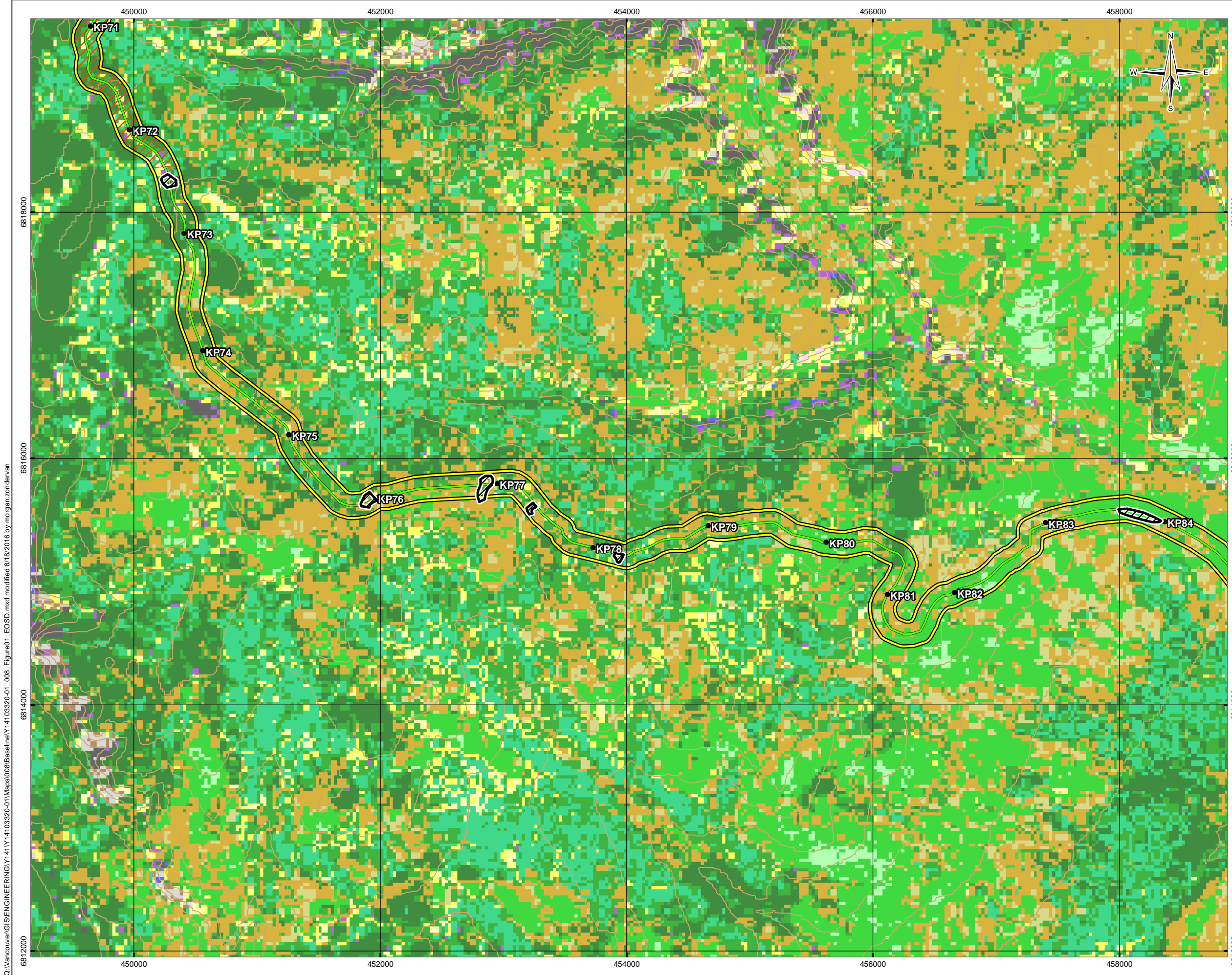
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**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Vegetation Plots and  
 Rare Plant Transects**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:30,000 		<b>TETRA TECH EBA</b>
<b>FILE NO.</b> Y14103320-01_008_Figure01_EOSD.mxd		
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<b>OFFICE</b> TlEBA-VANC	<b>DATE</b> August 18, 2016	

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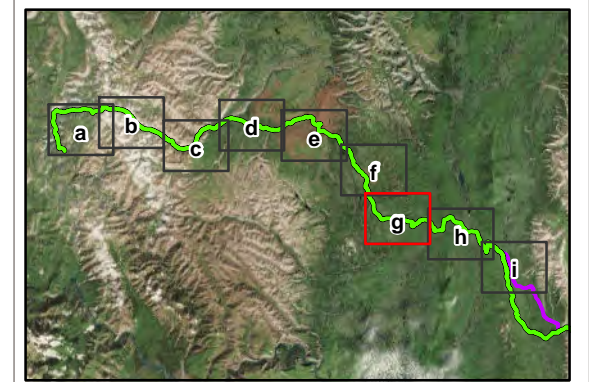


**LEGEND**

- 100 m Buffer
- Prairie Creek Access Road (Apr 5, 2016)
- Borrow Pit
- Recent Burn Area
- Contour (40 m)

**Land Classification**

- Shadow
- Water
- Rock / Rubble
- Exposed / Barren Land
- Bryoids
- Shrub - Tall
- Shrub - Low
- Wetland - Treed
- Herbs
- Coniferous - Dense
- Coniferous - Open
- Coniferous - Sparse
- Broadleaf - Dense
- Broadleaf - Open
- Mixedwood - Dense
- Mixedwood - Open



**NOTES**  
 Base data source: EOSD Data  
 Alignment, Borrow Sources and camps provided by AllNorth

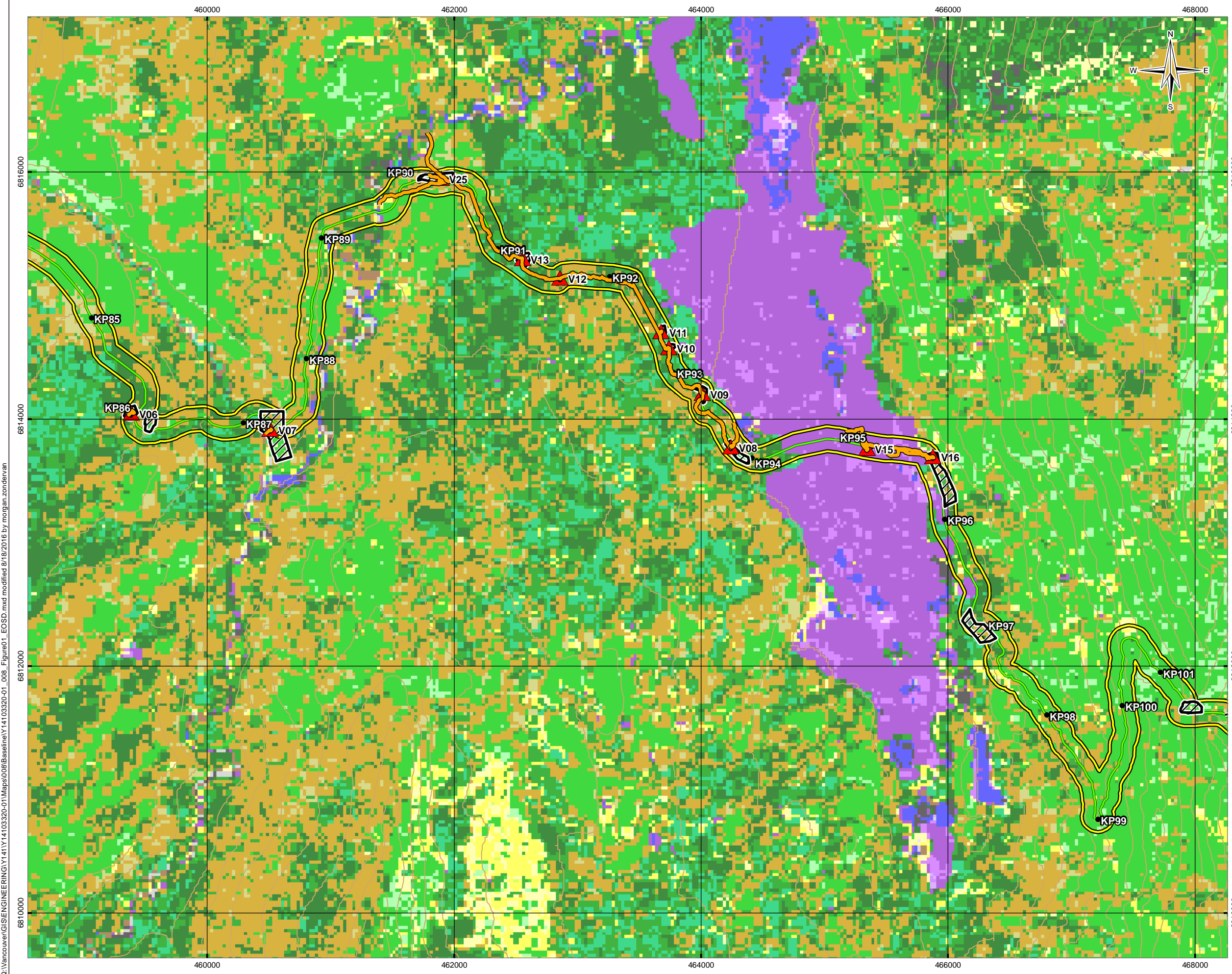
**STATUS**  
 ISSUED FOR USE

**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Vegetation Plots and  
 Rare Plant Transects**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:30,000 		<b>TETRA TECH EBA</b>
<b>FILE NO.</b> Y14103320-01_008_Figure01_EOSD.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>APVD</b> AM	<b>REV</b> 0	<b>Figure 1g</b>
<b>OFFICE</b> Tl:EBA-VANC	<b>DATE</b> August 18, 2016	

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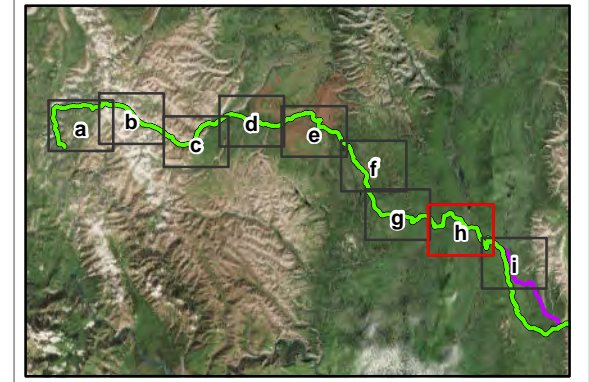


**LEGEND**

- Vegetation Plot
- Rare Plant Transect
- 100 m Buffer
- Prairie Creek Access Road (Apr 5, 2016)
- Borrow Pit
- Borrow Pit Access Road
- Contour (40 m)

**Land Classification**

- Shadow
- Water
- Rock / Rubble
- Exposed / Barren Land
- Bryoids
- Shrub - Tall
- Shrub - Low
- Wetland - Treed
- Wetland - Shrub
- Wetland - Herb
- Herbs
- Coniferous - Dense
- Coniferous - Open
- Coniferous - Sparse
- Broadleaf - Dense
- Broadleaf - Open
- Mixedwood - Dense
- Mixedwood - Open



**NOTES**  
 Base data source: EOSD Data  
 Alignment, Borrow Sources and camps provided by AllNorth

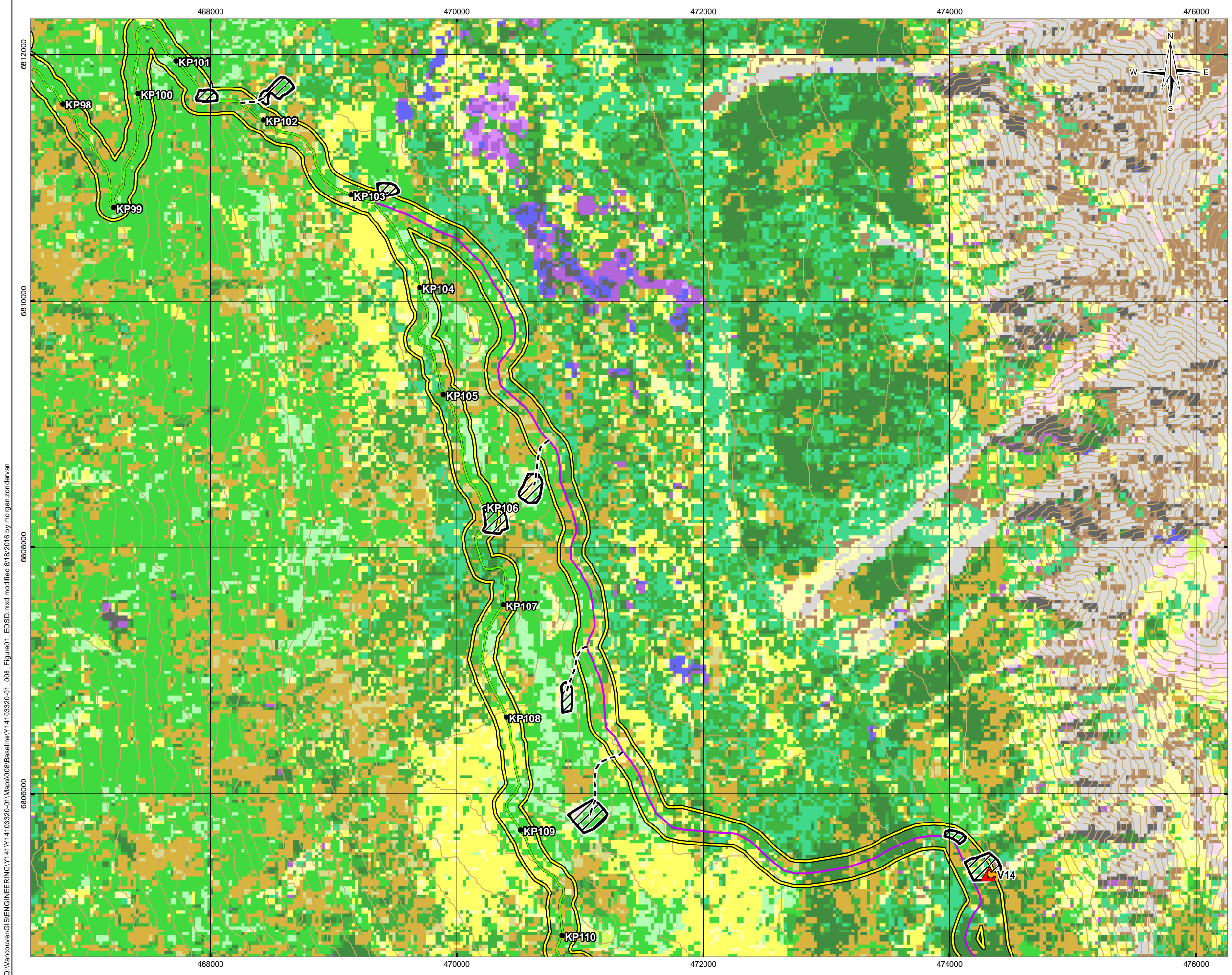
**STATUS**  
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**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Vegetation Plots and  
 Rare Plant Transects**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:30,000 		<b>TETRA TECH EBA</b>
<b>FILE NO.</b> Y14103320-01_008_Figure01_EOSD.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>APVD</b> AM	<b>REV</b> 0	<b>Figure 1h</b>
<b>OFFICE</b> TlEBA-VANC	<b>DATE</b> August 18, 2016	

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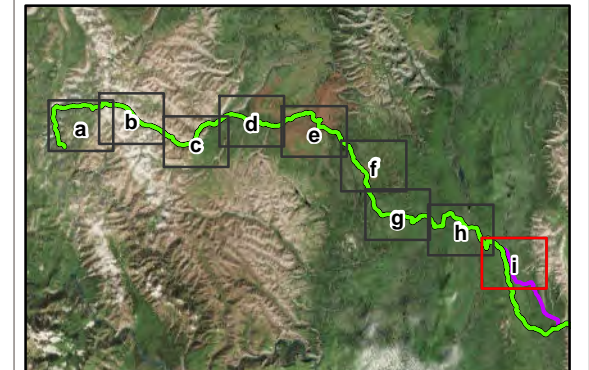


**LEGEND**

- Vegetation Plot
- Rare Plant Transect
- 100 m Buffer
- Prairie Creek Access Road (Apr 5, 2016)
- Alternative Alignment (Apr 5, 2016)
- Borrow Pit
- Borrow Pit Access Road
- Contour (40 m)

**Land Classification**

- Shadow
- Water
- Rock / Rubble
- Exposed / Barren Land
- Bryoids
- Shrub - Tall
- Shrub - Low
- Wetland - Treed
- Wetland - Shrub
- Wetland - Herb
- Herbs
- Coniferous - Dense
- Coniferous - Open
- Coniferous - Sparse
- Broadleaf - Dense
- Broadleaf - Open
- Mixedwood - Dense
- Mixedwood - Open



**NOTES**  
 Base data source: EOSD Data  
 Alignment, Borrow Sources and camps provided by AllNorth

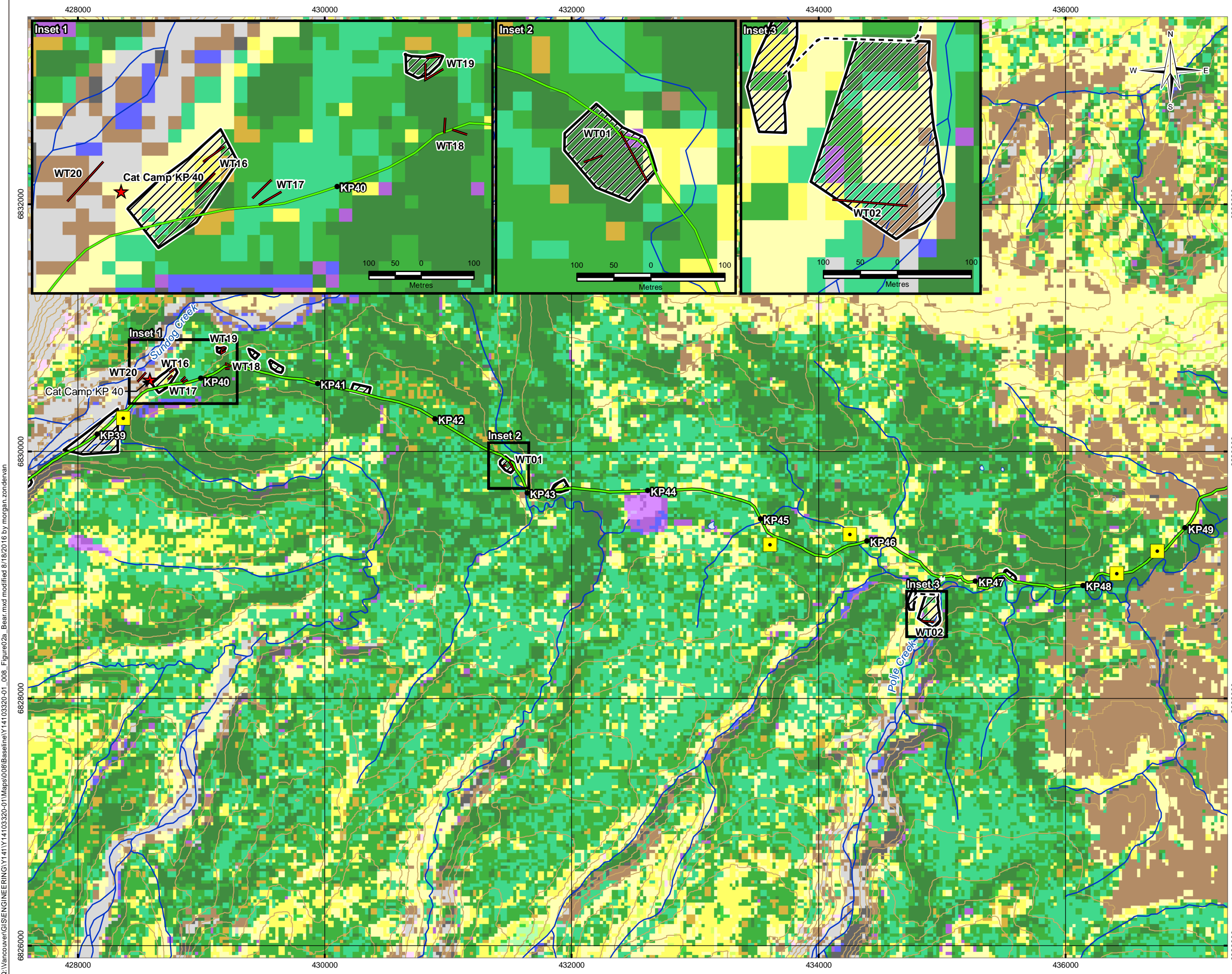
**STATUS**  
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**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Vegetation Plots and  
 Rare Plant Transects**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:30,000  Metres		<b>TETRA TECH EBA</b>
<b>FILE NO.</b> Y14103320-01_008_Figure01_EOSD.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>APVD</b> AM	<b>REV</b> 0	<b>Figure 1i</b>
<b>OFFICE</b> TlEBA-VANC	<b>DATE</b> August 18, 2016	

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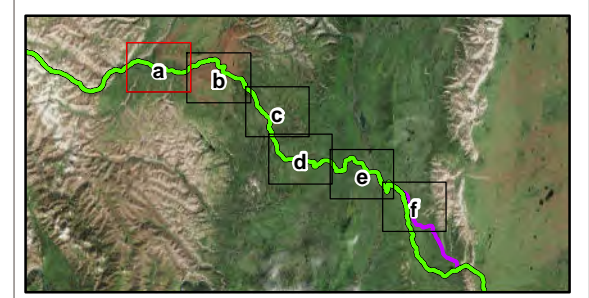


### LEGEND

- Visual Plot
- Wildlife Transect
- Bridge
- Camp (existing and proposed)
- Prairie Creek Access Road (Apr 5, 2016)
- Proposed Borrow Pit (preferred and alternate)
- Proposed Borrow Pit Access Road
- Contour (40 m)
- Watercourse
- Waterbody

### Land Classification

- Shadow
- Water
- Rock / Rubble
- Exposed / Barren Land
- Bryoids
- Shrub - Tall
- Shrub - Low
- Wetland - Treed
- Wetland - Shrub
- Wetland - Herb
- Herbs
- Coniferous - Dense
- Coniferous - Open
- Coniferous - Sparse
- Broadleaf - Dense
- Broadleaf - Open
- Mixedwood - Dense
- Mixedwood - Open



**NOTES**  
 Base data source: EOSD Data  
 Alignment, Borrow Sources and camps provided by AllNorth

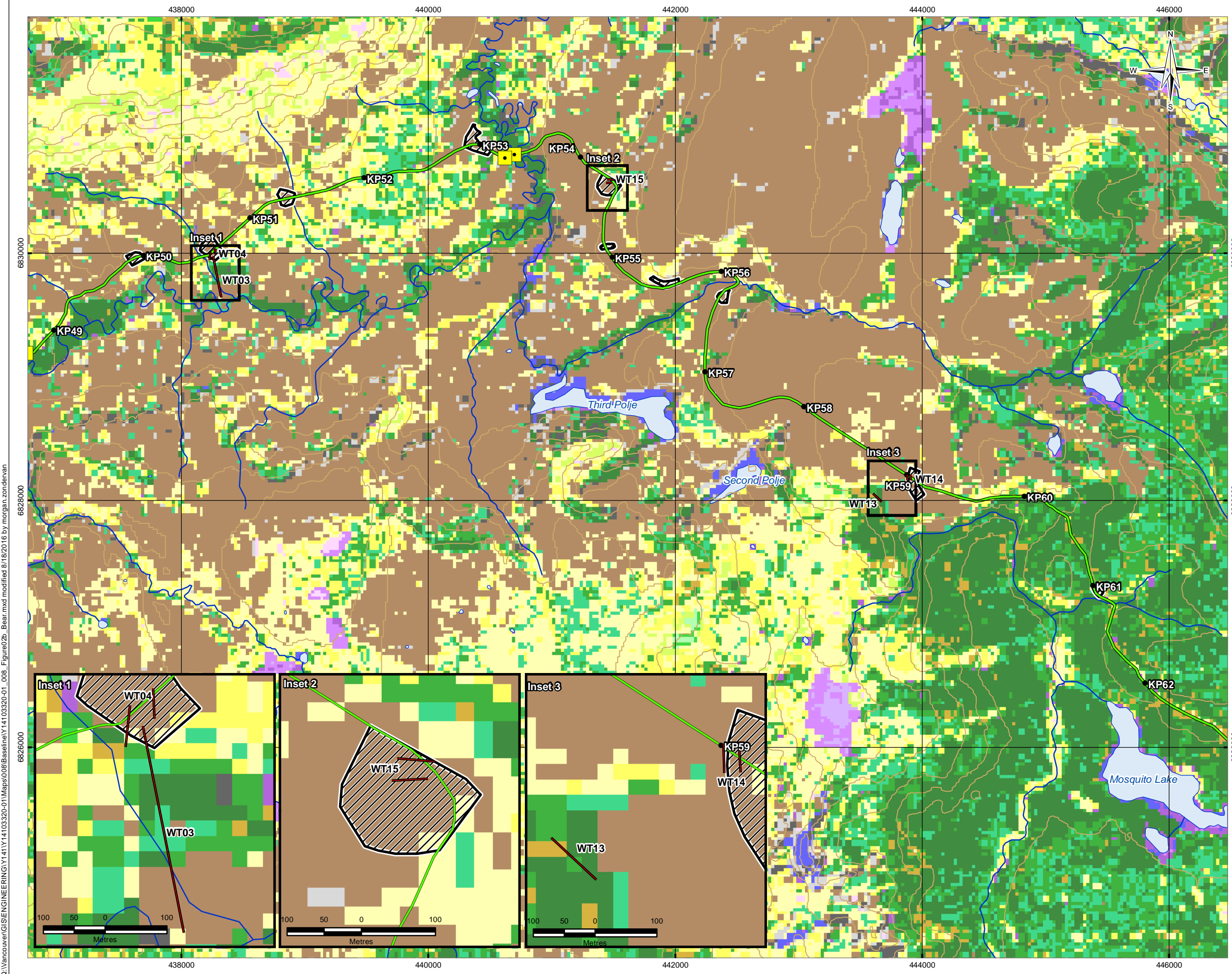
**STATUS**  
 ISSUED FOR USE

## PRAIRIE CREEK ALL-SEASON ROAD 2016 VEGETATION AND WILDLIFE BASELINE SURVEYS

### Black Bear Habitat Survey Locations

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:30,000  Metres		<b>TETRA TECH EBA</b>
<b>FILE NO.</b> Y14103320-01_008_Figure02a_Bear.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>OFFICE</b> T/EBA-VANC	<b>APVD</b> KL	<b>REV</b> 0
<b>DATE</b> August 18, 2016		<b>Figure 2a</b>

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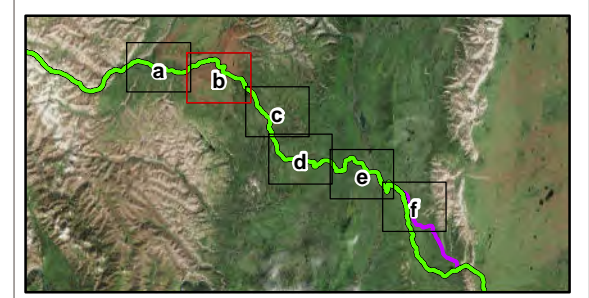


### LEGEND

- Wildlife Transect
- Bridge
- Prairie Creek Access Road (Apr 5, 2016)
- Proposed Borrow Pit (preferred and alternate)
- Contour (40 m)
- Watercourse
- Waterbody

### Land Classification

- Shadow
- Water
- Rock / Rubble
- Exposed / Barren Land
- Bryoids
- Shrub - Tall
- Shrub - Low
- Wetland - Treed
- Wetland - Shrub
- Wetland - Herb
- Herbs
- Coniferous - Dense
- Coniferous - Open
- Coniferous - Sparse
- Broadleaf - Dense
- Broadleaf - Open
- Mixedwood - Dense
- Mixedwood - Open



**NOTES**  
 Base data source: EOSD Data  
 Alignment, Borrow Sources and camps provided by AllNorth

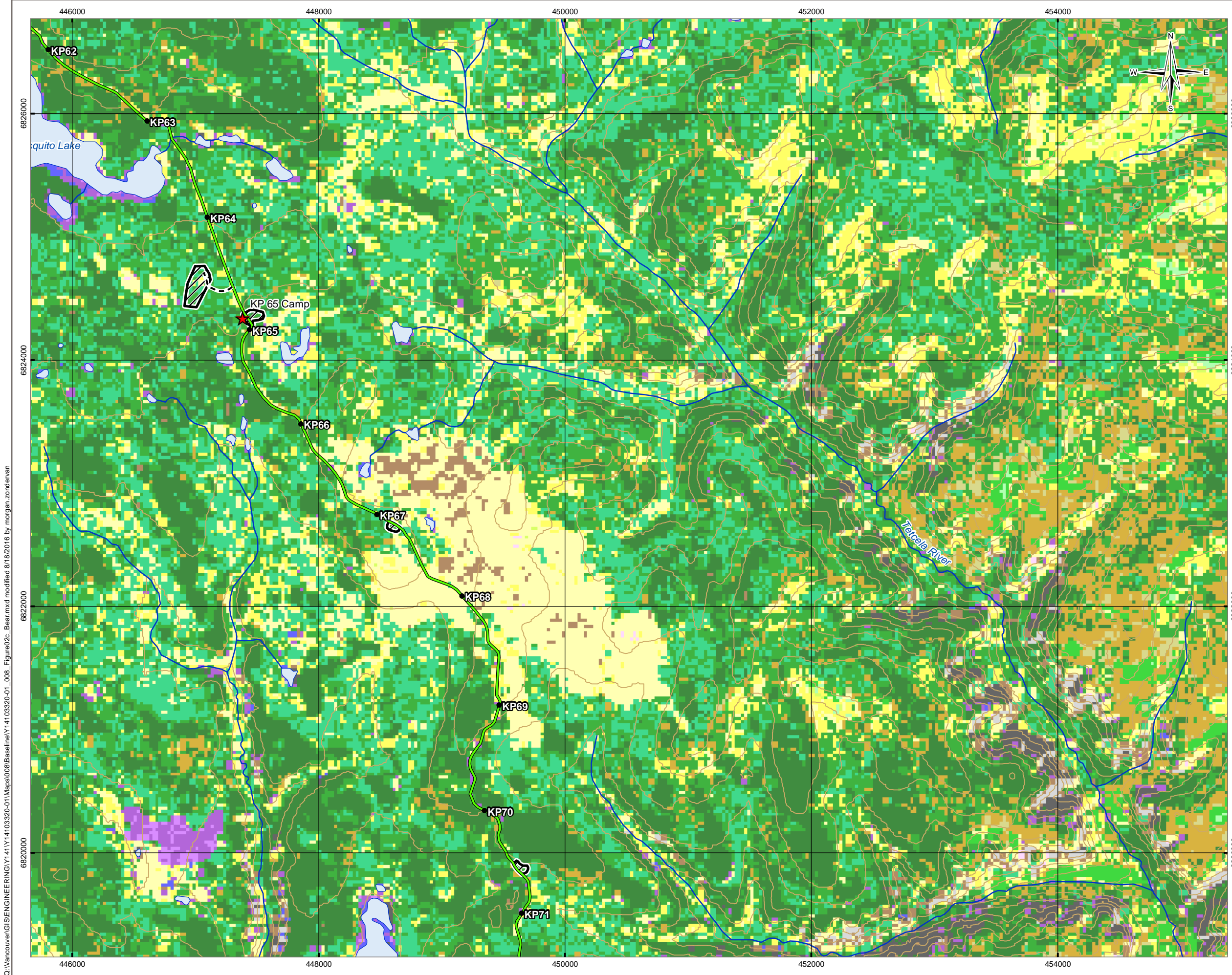
**STATUS**  
 ISSUED FOR USE

## PRAIRIE CREEK ALL-SEASON ROAD 2016 VEGETATION AND WILDLIFE BASELINE SURVEYS

### Black Bear Habitat Survey Locations

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> CANADIAN ZINC CORPORATION
Scale: 1:30,000 		<b>FILE NO.</b> Y14103320-01_008_Figure02b_Bear.mxd
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>OFFICE</b> T EBA-VANC	<b>APVD</b> KL	<b>REV</b> 0
<b>DATE</b> August 18, 2016		<b>Figure 2b</b>

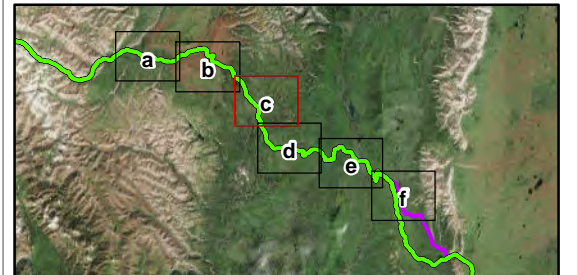
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**LEGEND**

- ★ Camp (existing and proposed)
- Prairie Creek Access Road (Apr 5, 2016)
- Proposed Borrow Pit (preferred and alternate)
- - - Proposed Borrow Pit Access Road
- Contour (40 m)
- Watercourse
- Waterbody

- Land Classification**
- Shadow
  - Water
  - Rock / Rubble
  - Exposed / Barren Land
  - Bryoids
  - Shrub - Tall
  - Shrub - Low
  - Wetland - Treed
  - Wetland - Shrub
  - Herbs
  - Coniferous - Dense
  - Coniferous - Open
  - Coniferous - Sparse
  - Broadleaf - Dense
  - Broadleaf - Open
  - Mixedwood - Dense
  - Mixedwood - Open



**NOTES**  
 Base data source: EOSD Data  
 Alignment, Borrow Sources and camps provided by AllNorth

**STATUS**  
 ISSUED FOR USE

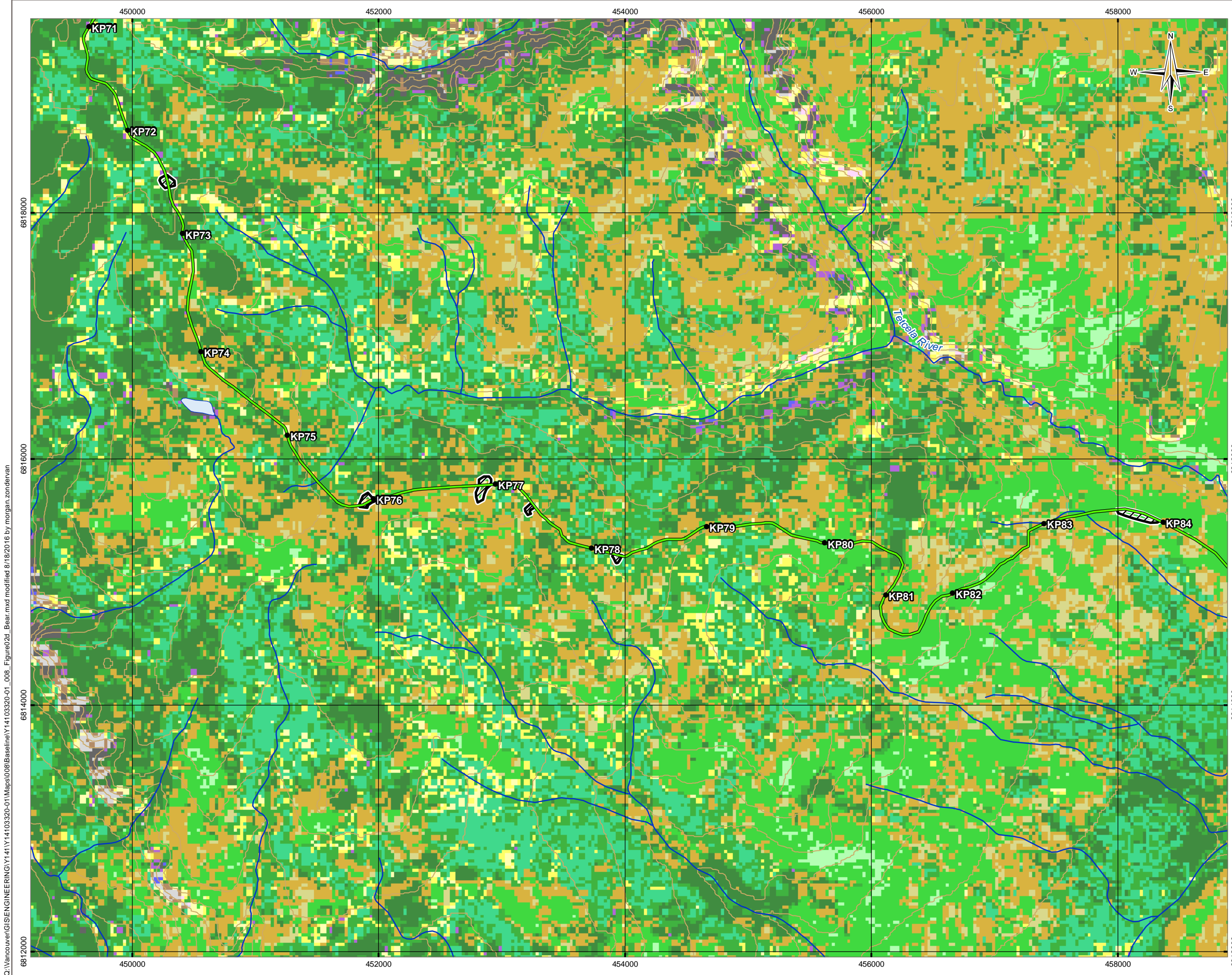
**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Habitat  
 Survey Locations**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:30,000 		<b>TETRA TECH EBA</b>
<b>FILE NO.</b> Y14103320-01_008_Figure02c_Bear.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
	<b>APVD</b> KL	<b>REV</b> 0
<b>OFFICE</b> T/EBA-VANC	<b>DATE</b> August 18, 2016	

**Figure 2c**

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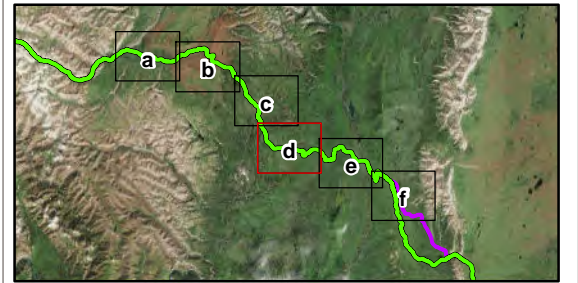


**LEGEND**

- Prairie Creek Access Road (Apr 5, 2016)
- Proposed Borrow Pit (preferred and alternate)
- Contour (40 m)
- Watercourse
- Waterbody

**Land Classification**

- Shadow
- Water
- Rock / Rubble
- Exposed / Barren Land
- Bryoids
- Shrub - Tall
- Shrub - Low
- Wetland - Treed
- Herbs
- Coniferous - Dense
- Coniferous - Open
- Coniferous - Sparse
- Broadleaf - Dense
- Broadleaf - Open
- Mixedwood - Dense
- Mixedwood - Open



**NOTES**  
 Base data source: EOSD Data  
 Alignment, Borrow Sources and camps provided by AllNorth

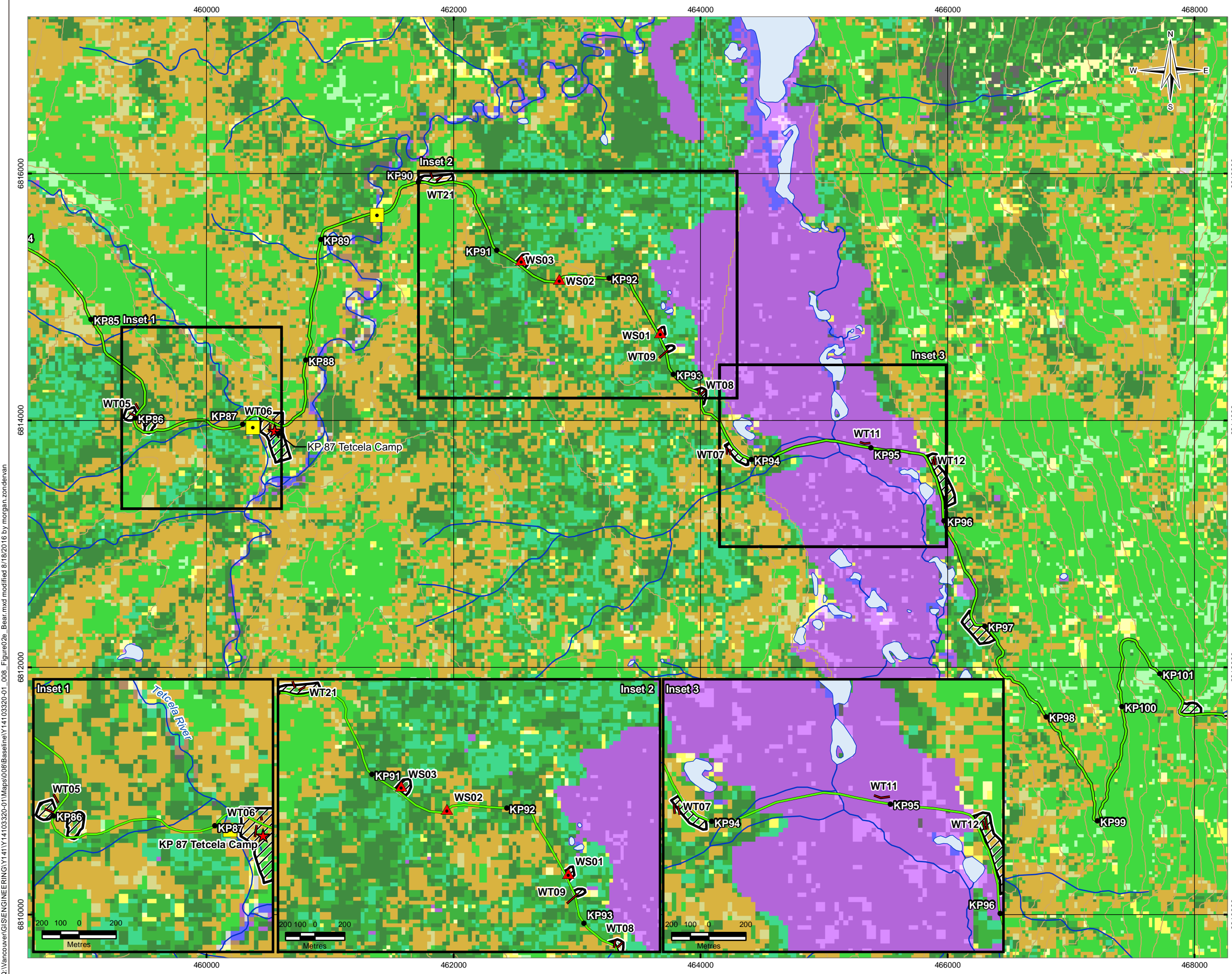
**STATUS**  
 ISSUED FOR USE

**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Habitat  
 Survey Locations**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:30,000 		<b>TETRA TECH EBA</b>
<b>FILE NO.</b> Y14103320-01_008_Figure02d_Bear.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>APVD</b> KL	<b>REV</b> 0	<b>Figure 2d</b>
<b>OFFICE</b> T: EBA-VANC	<b>DATE</b> August 18, 2016	

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**LEGEND**

- Visual Plot
- Wildlife Transect
- Bridge
- Camp (existing and proposed)
- Prairie Creek Access Road (Apr 5, 2016)
- Proposed Borrow Pit (preferred and alternate)
- Proposed Borrow Pit Access Road
- Contour (40 m)
- Watercourse
- Waterbody

**Land Classification**

- Shadow
- Water
- Rock / Rubble
- Exposed / Barren Land
- Bryoids
- Shrub - Tall
- Shrub - Low
- Wetland - Treed
- Wetland - Shrub
- Wetland - Herb
- Herbs
- Coniferous - Dense
- Coniferous - Open
- Coniferous - Sparse
- Broadleaf - Dense
- Broadleaf - Open
- Mixedwood - Dense
- Mixedwood - Open

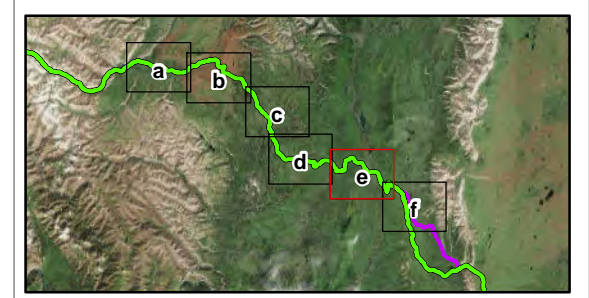
**NOTES**

Base data source: EOSD Data  
 Alignment, Borrow Sources and camps provided by AllNorth

**STATUS**  
 ISSUED FOR USE

**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Habitat  
 Survey Locations**



**PROJECTION**  
 UTM Zone 10

**DATUM**  
 NAD83

**CLIENT**  
 CANADIAN ZINC CORPORATION

**FILE NO.**  
 Y14103320-01\_008\_Figure02e\_Bear.mxd

**PROJECT NO.**  
 Y14103320-01.008

**OFFICE**  
 T|EBA-VANC

**Scale:** 1:30,000

**Scale bar:** 0 to 500 Metres

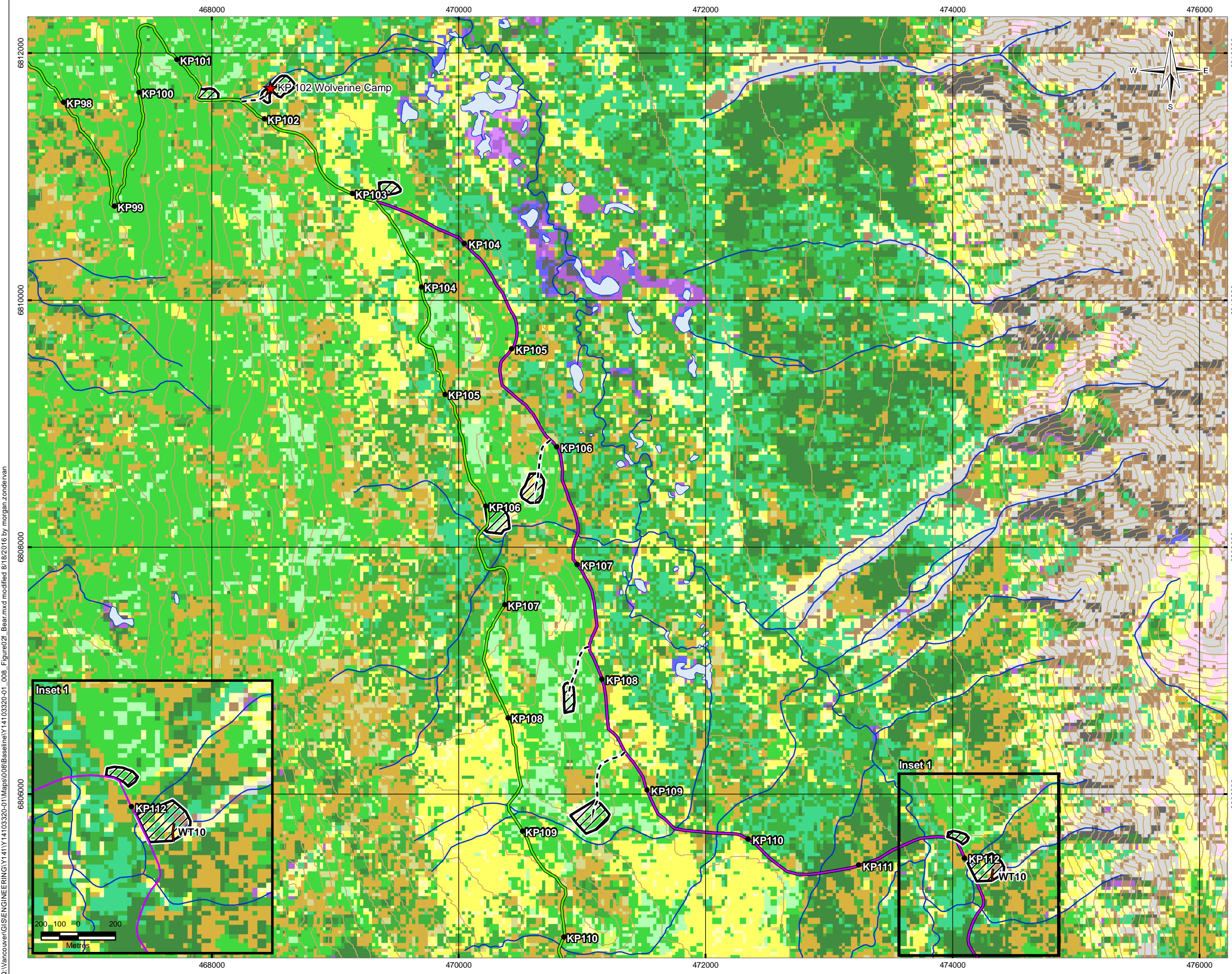
**CLIENT:** TETRA TECH EBA

**PROJECT NO.:** MEZ, **DWN:** YL, **CKD:** YL, **APVD:** KL, **REV:** 0

**DATE:** August 18, 2016

**Figure 2e**

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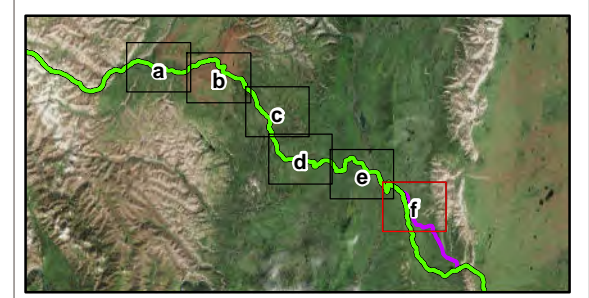


### LEGEND

- Wildlife Transect
- Camp (existing and proposed)
- Prairie Creek Access Road (Apr 5, 2016)
- Alternative Alignment (Apr 5, 2016)
- Proposed Borrow Pit (preferred and alternate)
- Proposed Borrow Pit Access Road
- Contour (40 m)
- Watercourse
- Waterbody

### Land Classification

- Shadow
- Water
- Rock / Rubble
- Exposed / Barren Land
- Bryoids
- Shrub - Tall
- Shrub - Low
- Wetland - Treed
- Wetland - Shrub
- Wetland - Herb
- Herbs
- Coniferous - Dense
- Coniferous - Open
- Coniferous - Sparse
- Broadleaf - Dense
- Broadleaf - Open
- Mixedwood - Dense
- Mixedwood - Open



**NOTES**  
 Base data source: EOSD Data  
 Alignment, Borrow Sources and camps provided by AllNorth

**STATUS**  
 ISSUED FOR USE

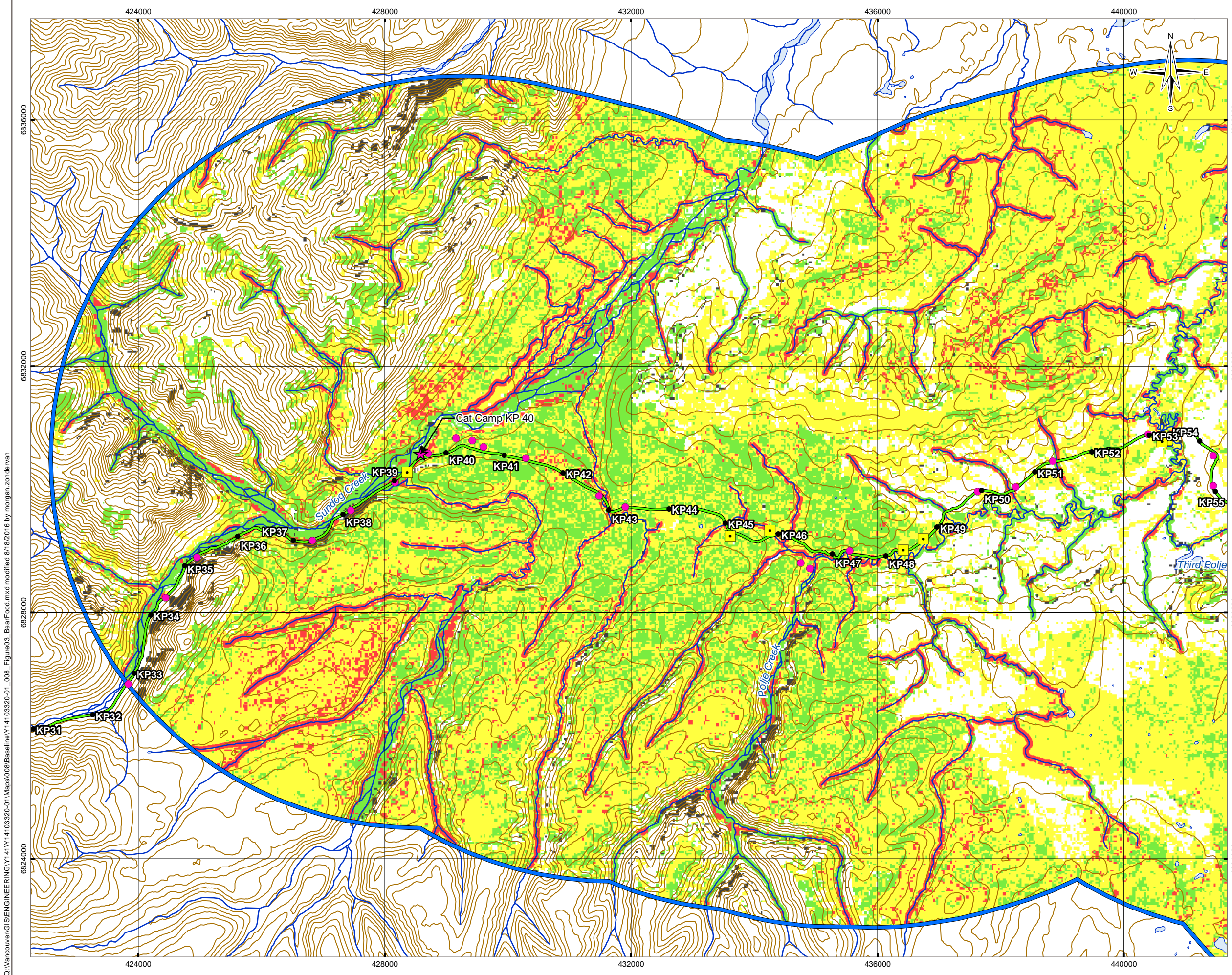
## PRAIRIE CREEK ALL-SEASON ROAD 2016 VEGETATION AND WILDLIFE BASELINE SURVEYS

### Black Bear Habitat Survey Locations

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:30,000 		<b>TETRA TECH EBA</b>
<b>FILE NO.</b> Y14103320-01_008_Figure02f_Bear.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
	<b>APVD</b> KL	<b>REV</b> 0
<b>OFFICE</b> T: EBA-VANC	<b>DATE</b> August 18, 2016	

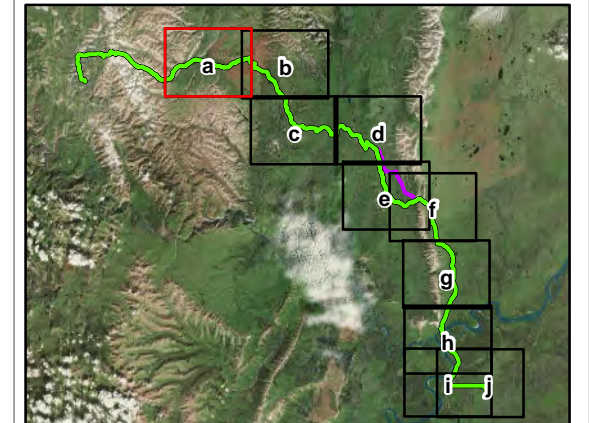
**Figure 2f**

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**LEGEND**

- Food Potential
  - Nil
  - Low
  - Moderate
  - High
  - Unknown
- Bear Habitat Model Boundary
- Proposed Borrow Pit (preferred and alternate)
- Camp (existing and proposed)
- Bridge
- Prairie Creek Access Road (Apr 5, 2016)
- Contour (40 m)
- Watercourse
- Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

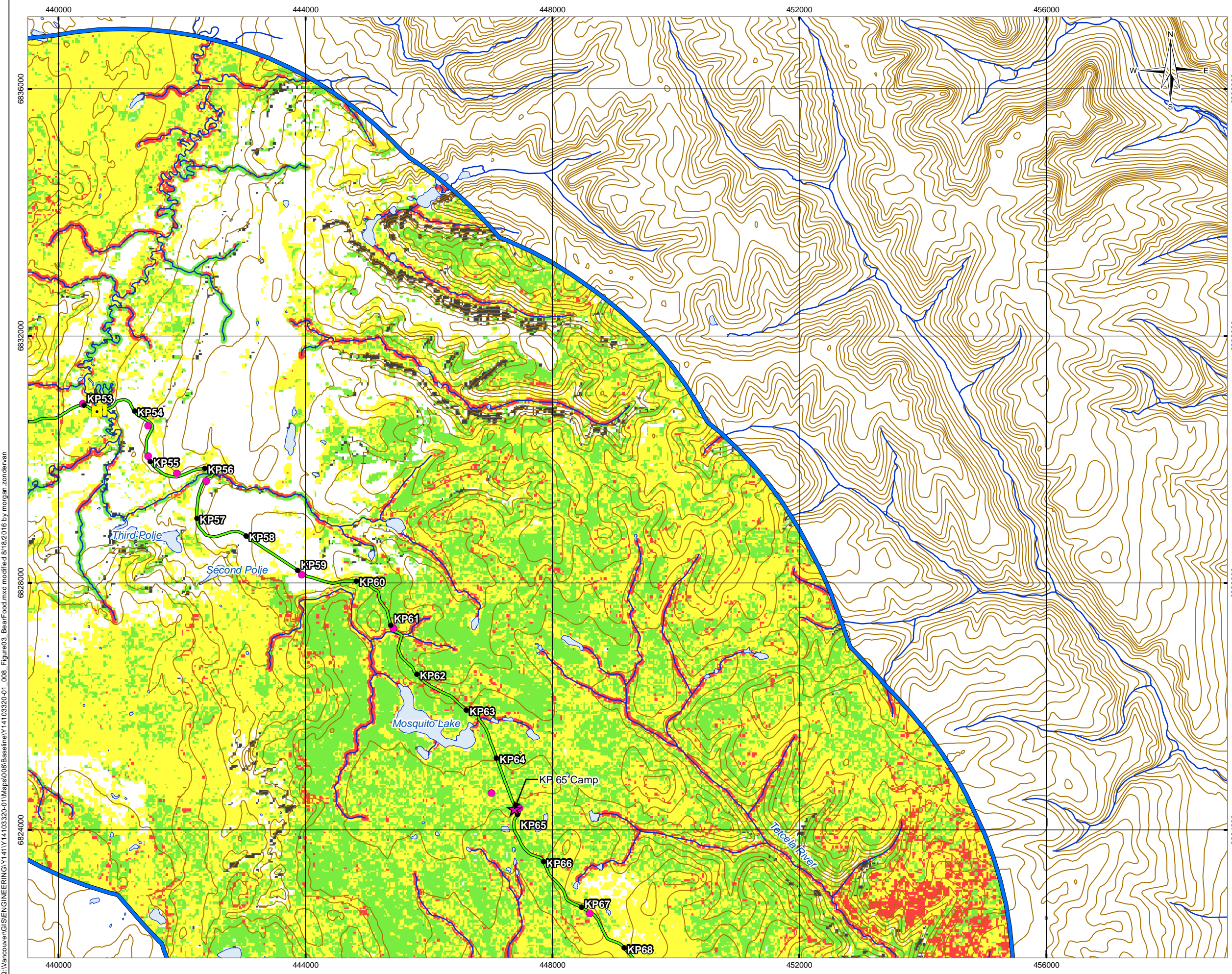
**STATUS**  
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**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Food  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:60,000 1 0.5 0 1 Kilometres		
<b>FILE NO.</b> Y14103320-01_008_Figure03_BearFood.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>APVD</b> KL	<b>REV</b> 0	<b>Figure 3a</b>
<b>OFFICE</b> TlEBA-VANC	<b>DATE</b> August 18, 2016	

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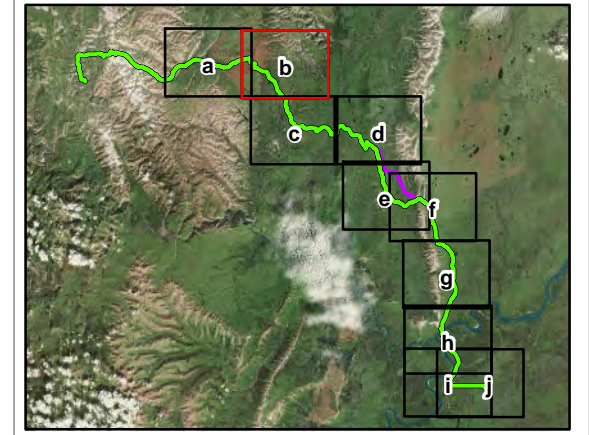
### LEGEND

**Food Potential**

- Nil
- Low
- Moderate
- High
- Unknown

**Other Features**

- Bear Habitat Model Boundary
- Proposed Borrow Pit (preferred and alternate)
- Camp (existing and proposed)
- Bridge
- Prairie Creek Access Road (Apr 5, 2016)
- Contour (40 m)
- Watercourse
- Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

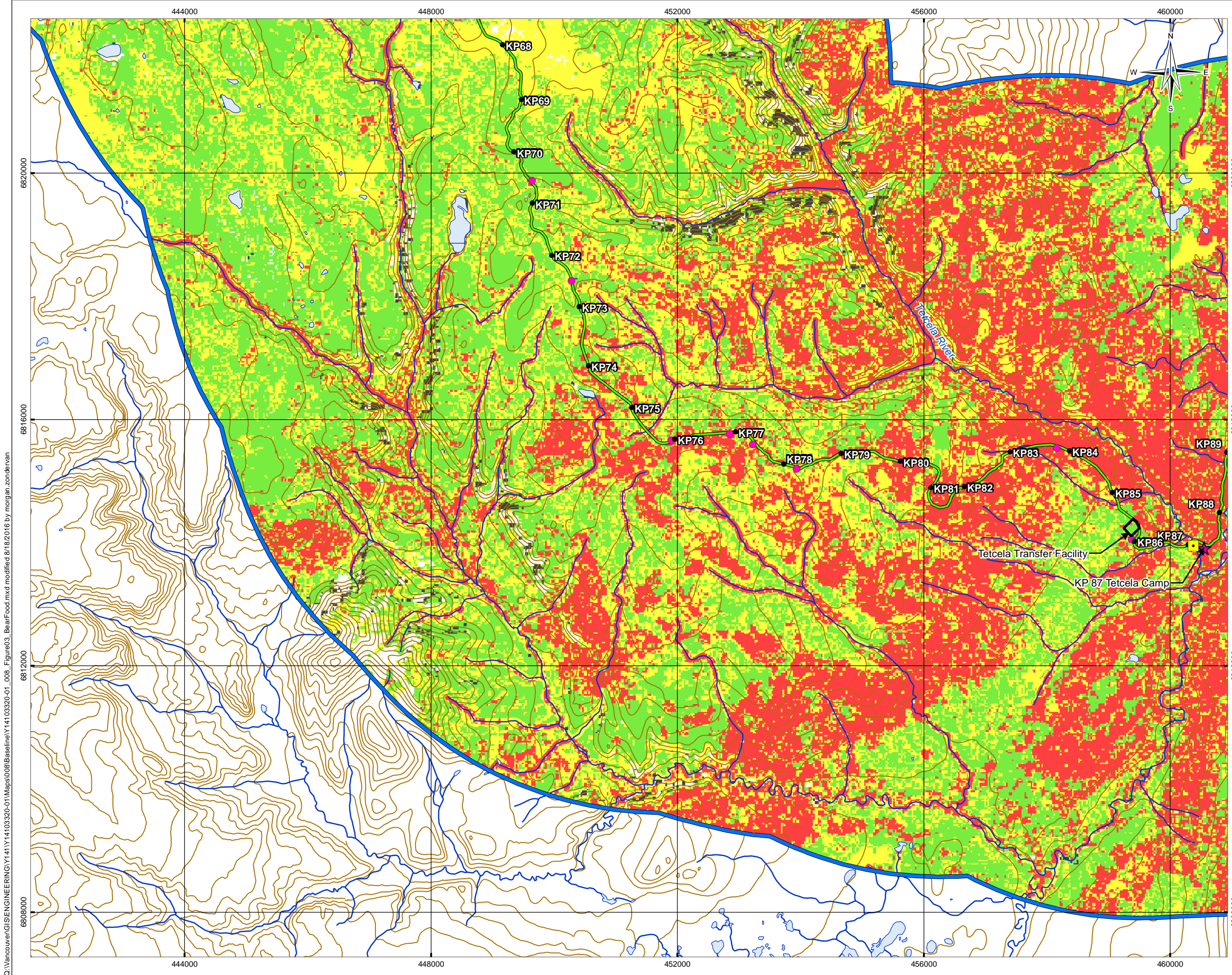
**STATUS**  
 ISSUED FOR USE

## PRAIRIE CREEK ALL-SEASON ROAD 2016 VEGETATION AND WILDLIFE BASELINE SURVEYS

### Black Bear Food Habitat Potential

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> CANADIAN ZINC CORPORATION
Scale: 1:60,000 1 0.5 0 1 Kilometres		TETRA TECH EBA
<b>FILE NO.</b> Y14103320-01_008_Figure03_BearFood.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>APVD</b> KL	<b>REV</b> 0	<b>Figure 3b</b>
<b>OFFICE</b> TlEBA-VANC	<b>DATE</b> August 18, 2016	

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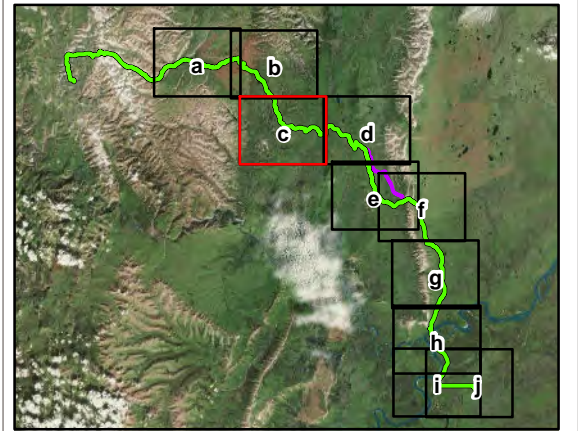
### LEGEND

**Food Potential**

- Nil
- Low
- Moderate
- High
- Unknown

**Other Features:**

- Bear Habitat Model Boundary
- Proposed Borrow Pit (preferred and alternate)
- Camp (existing and proposed)
- Bridge
- Prairie Creek Access Road (Apr 5, 2016)
- Contour (40 m)
- Watercourse
- Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

**STATUS**  
 ISSUED FOR USE

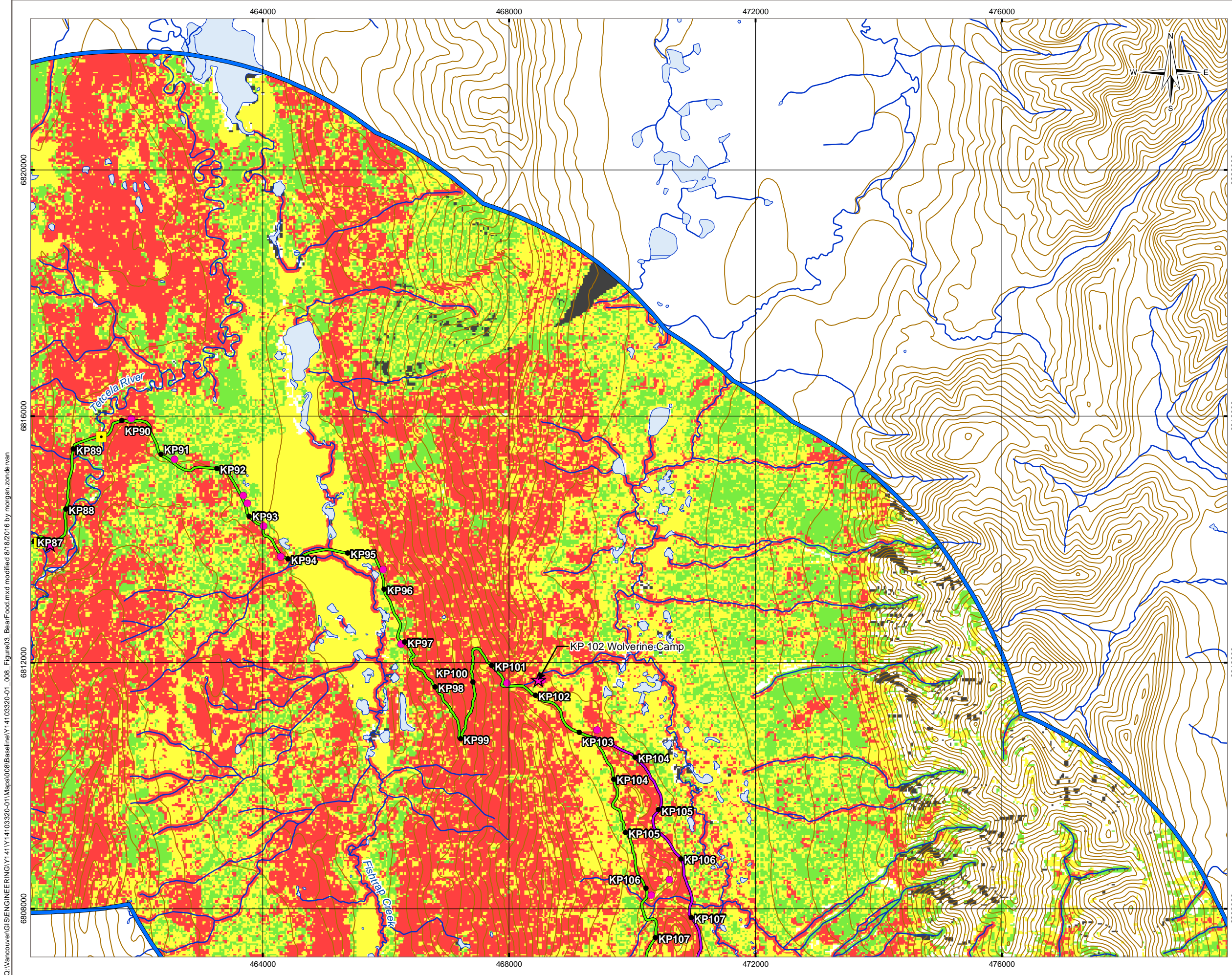
**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Food  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:60,000 1 0.5 0 1 Kilometres		<b>TETRA TECH EBA</b>
<b>FILE NO.</b> Y14103320-01_008_Figure03_BearFood.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
	<b>APVD</b> KL	<b>REV</b> 0
<b>OFFICE</b> TlEBA-VANC	<b>DATE</b> August 18, 2016	

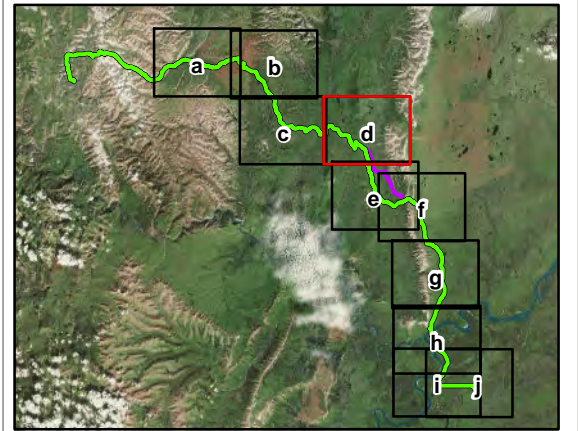
**Figure 3c**

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**LEGEND**

- Food Potential
  - Nil
  - Low
  - Moderate
  - High
  - Unknown
- Bear Habitat Model Boundary
- Proposed Borrow Pit (preferred and alternate)
- Camp (existing and proposed)
- Bridge
- Prairie Creek Access Road (Apr 5, 2016)
- Alternative Alignment (Apr 5, 2016)
- Contour (40 m)
- Watercourse
- Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

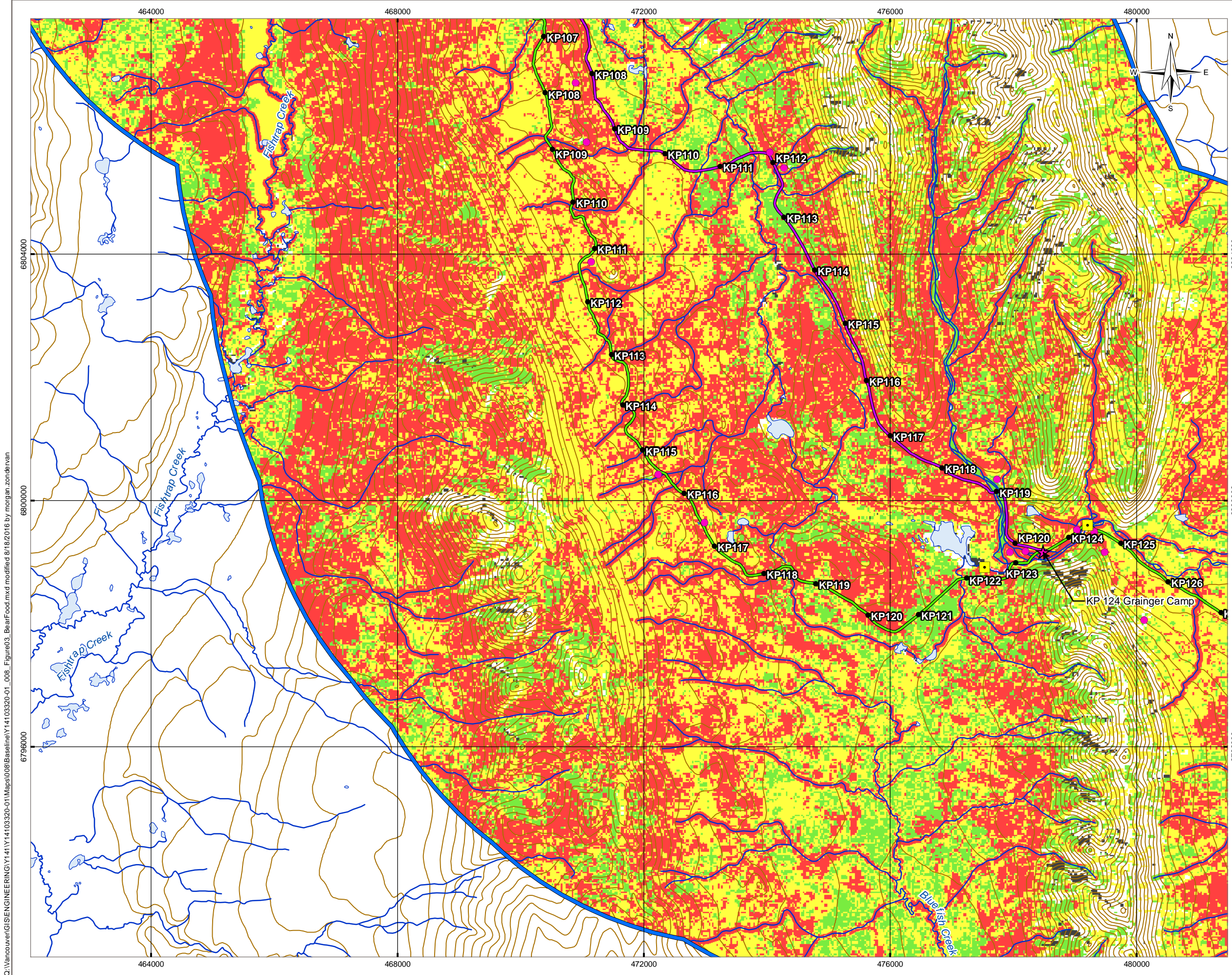
**STATUS**  
 ISSUED FOR USE

**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Food  
 Habitat Potential**

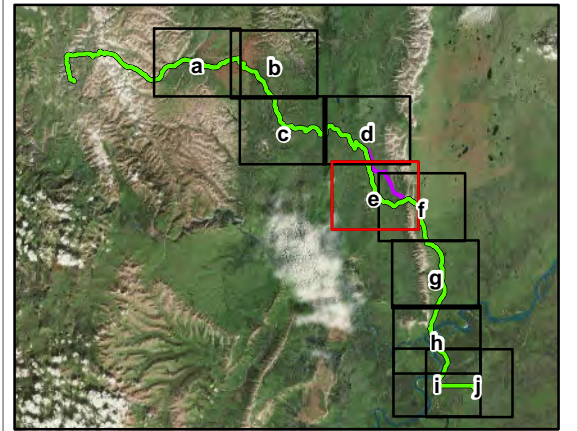
<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:60,000 		
<b>FILE NO.</b> Y14103320-01_008_Figure03_BearFood.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>OFFICE</b> T EBA-VANC	<b>APVD</b> KL	<b>REV</b> 0
<b>DATE</b> August 18, 2016		<b>Figure 3d</b>

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**LEGEND**

- Null
- Low
- Moderate
- High
- Unknown
- ⬭ Bear Habitat Model Boundary
- Proposed Borrow Pit (preferred and alternate)
- ★ Camp (existing and proposed)
- Bridge
- Prairie Creek Access Road (Apr 5, 2016)
- Alternative Alignment (Apr 5, 2016)
- Contour (40 m)
- Watercourse
- Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

**STATUS**  
 ISSUED FOR USE

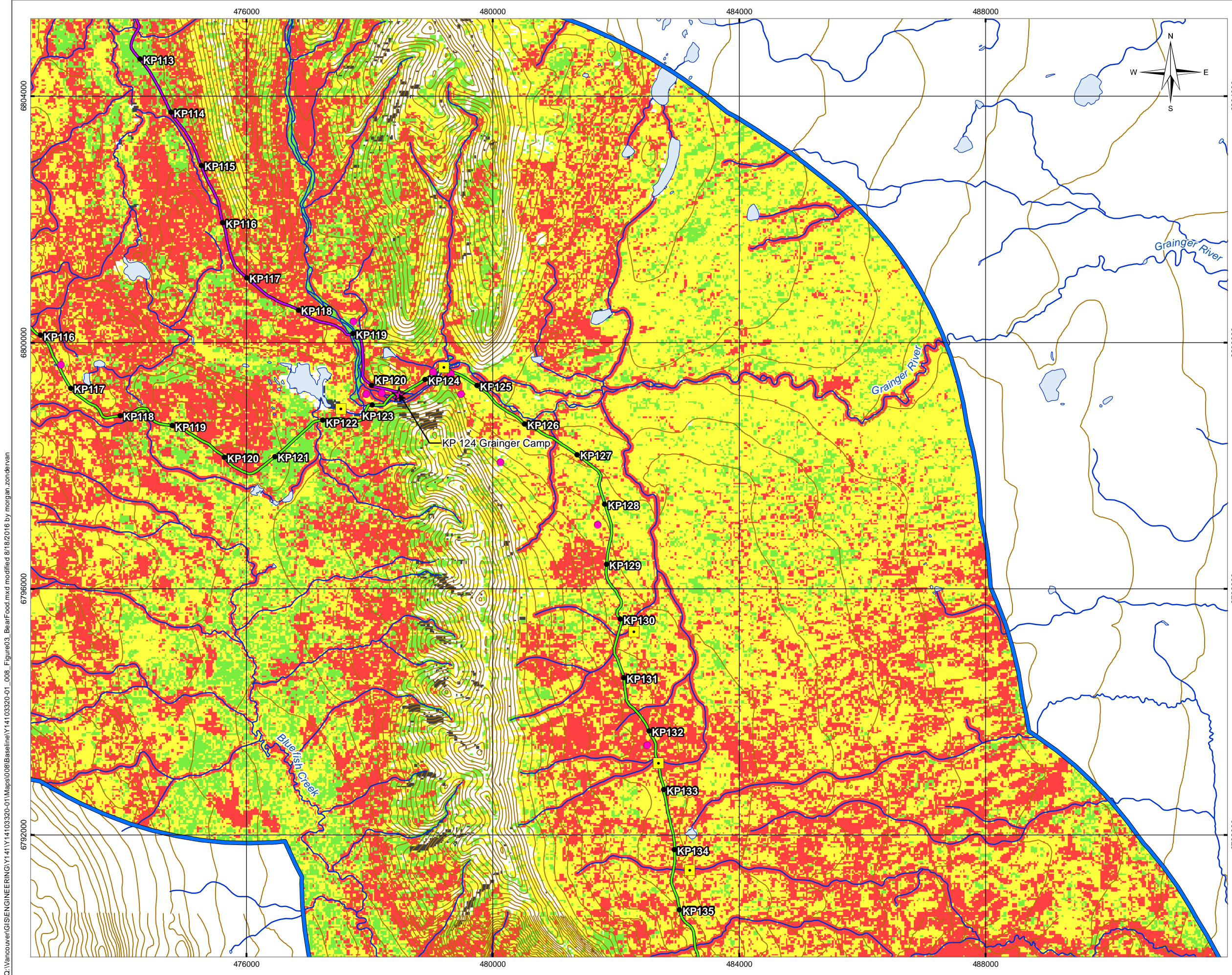
**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Food  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> CANADIAN ZINC CORPORATION
Scale: 1:60,000 1 0.5 0 1 Kilometres		TETRA TECH EBA
<b>FILE NO.</b> Y14103320-01_008_Figure03_BearFood.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
	<b>APVD</b> KL	<b>REV</b> 0
<b>OFFICE</b> TlEBA-VANC	<b>DATE</b> August 18, 2016	

**Figure 3e**

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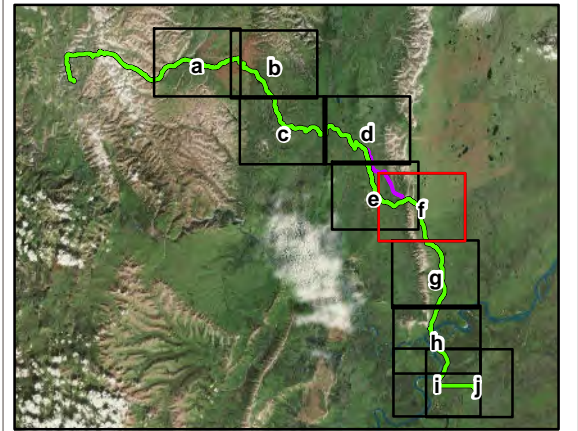


**LEGEND**

**Food Potential**

- Null
- Low
- Moderate
- High
- Unknown

Bear Habitat Model Boundary  
 Proposed Borrow Pit (preferred and alternate)  
 Camp (existing and proposed)  
 Bridge  
 Prairie Creek Access Road (Apr 5, 2016)  
 Alternative Alignment (Apr 5, 2016)  
 Contour (40 m)  
 Watercourse  
 Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

**STATUS**  
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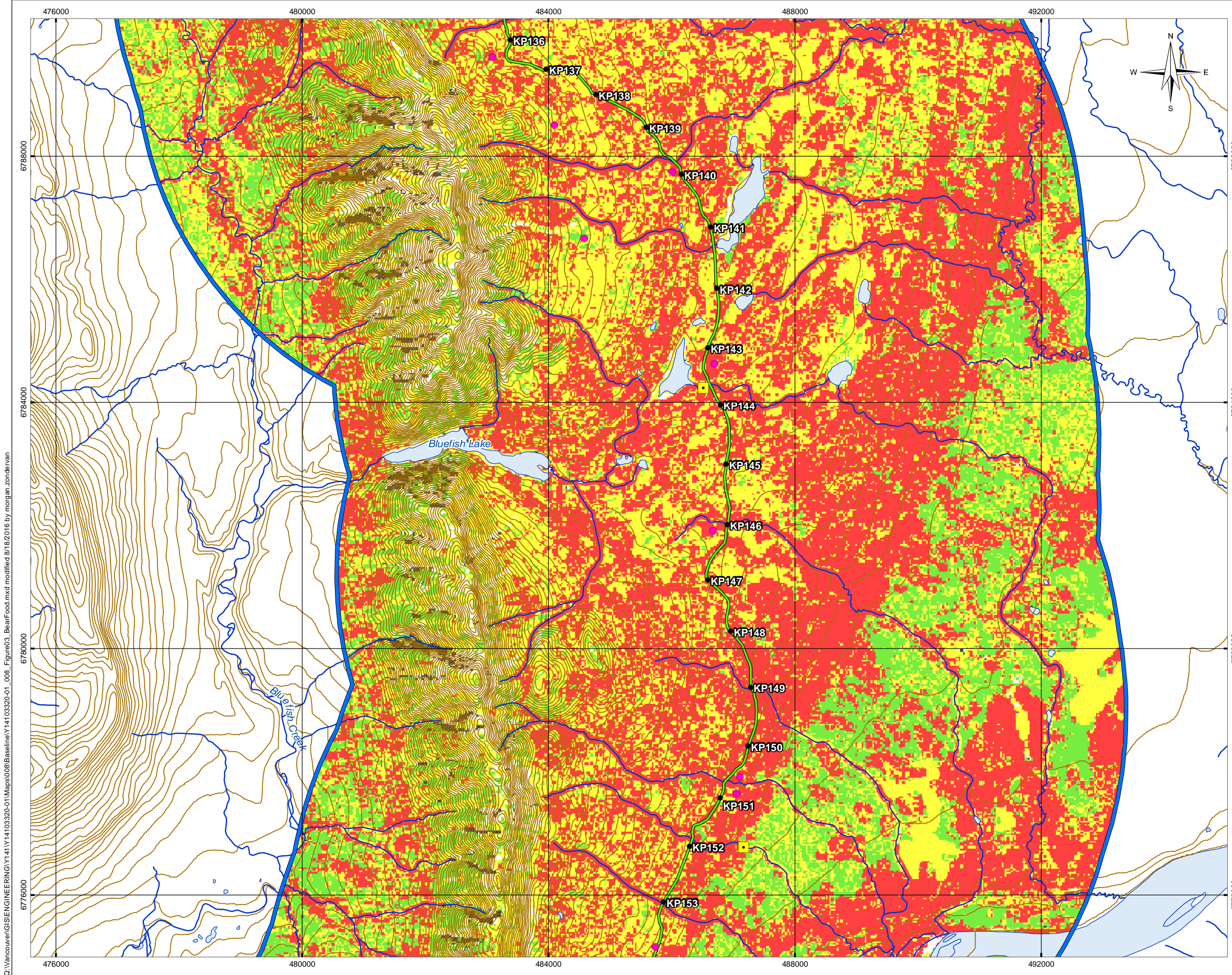
**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Food  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> CANADIAN ZINC CORPORATION
Scale: 1:60,000 1 0.5 0 1 Kilometres		TETRA TECH EBA
<b>FILE NO.</b> Y14103320-01_008_Figure03_BearFood.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
	<b>APVD</b> KL	<b>REV</b> 0
<b>OFFICE</b> T: EBA-VANC	<b>DATE</b> August 18, 2016	

**Figure 3f**

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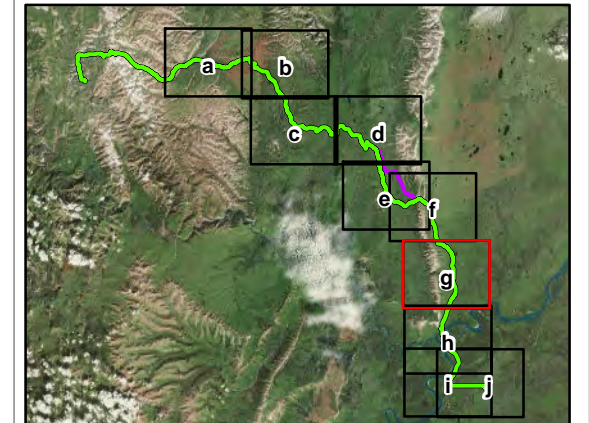
### LEGEND

**Food Potential**

- Nil
- Low
- Moderate
- High
- Unknown

**Other Features:**

- Bear Habitat Model Boundary
- Proposed Borrow Pit (preferred and alternate)
- Bridge
- Prairie Creek Access Road (Apr 5, 2016)
- Contour (40 m)
- Watercourse
- Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

**STATUS**  
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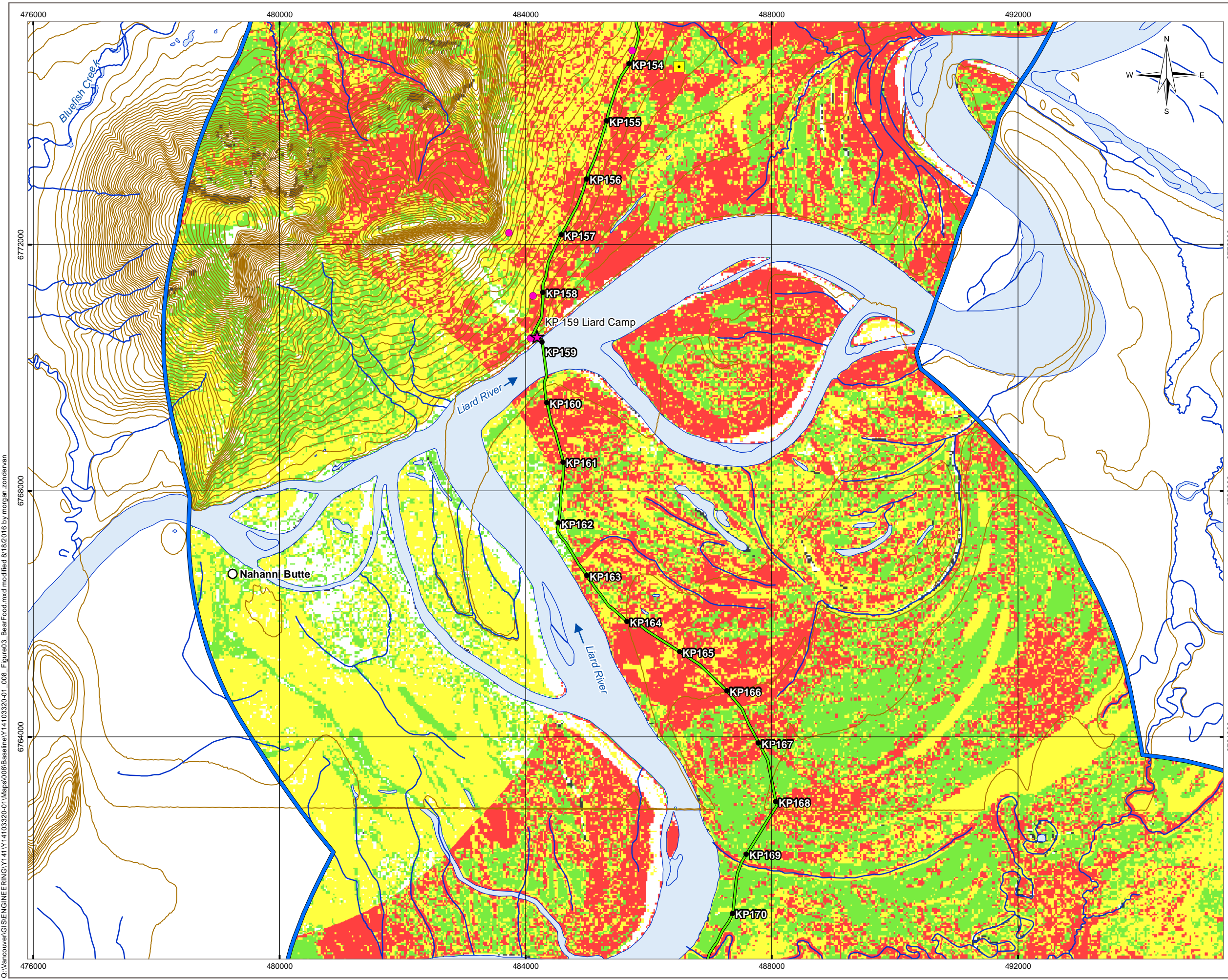
## PRAIRIE CREEK ALL-SEASON ROAD 2016 VEGETATION AND WILDLIFE BASELINE SURVEYS

### Black Bear Food Habitat Potential

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:60,000 1 0.5 0 1 Kilometres		<b>CLIENT</b> 
<b>FILE NO.</b> Y14103320-01_008_Figure03_BearFood.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>APVD</b> KL	<b>REV</b> 0	
<b>OFFICE</b> T: EBA-VANC	<b>DATE</b> August 18, 2016	

**Figure 3g**

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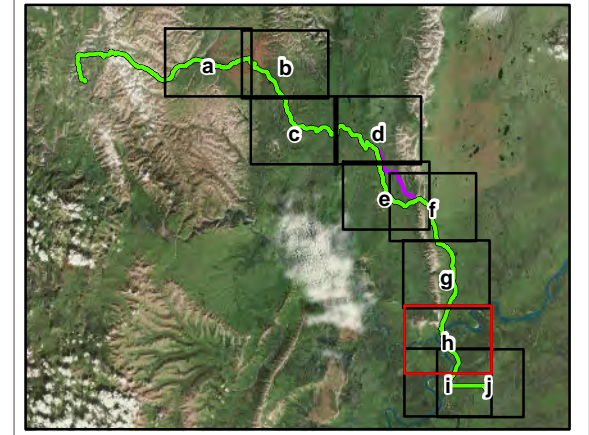


**LEGEND**

**Food Potential**

- Null
- Low
- Moderate
- High
- Unknown

Bear Habitat Model Boundary  
 Proposed Borrow Pit (preferred and alternate)  
 Camp (existing and proposed)  
 Bridge  
 Prairie Creek Access Road (Apr 5, 2016)  
 Contour (40 m)  
 Watercourse  
 Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

**STATUS**  
 ISSUED FOR USE

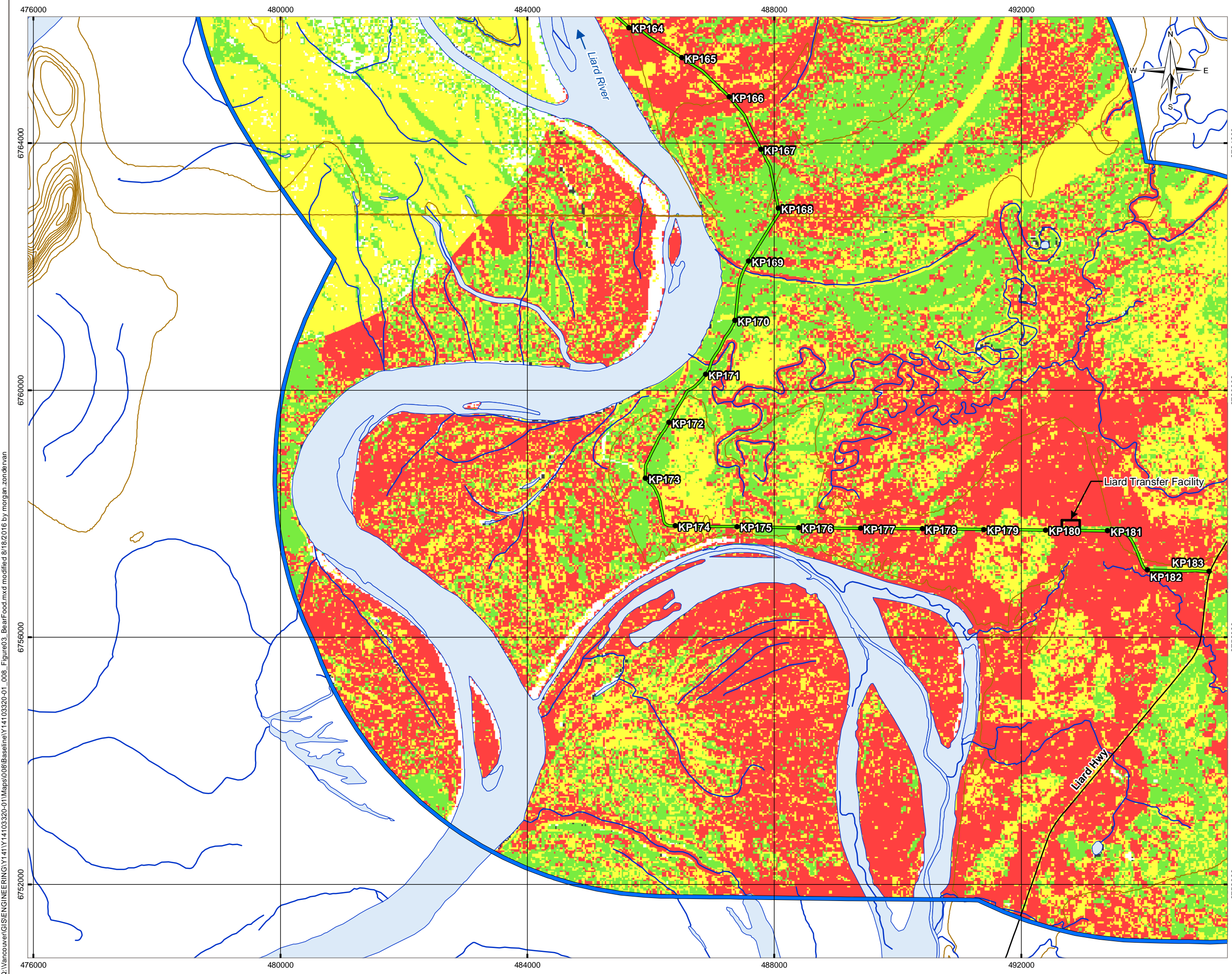
**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Food  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> CANADIAN ZINC CORPORATION
Scale: 1:60,000 		<b>FILE NO.</b> Y14103320-01_008_Figure03_BearFood.mxd
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>OFFICE</b> TlEBA-VANC	<b>APVD</b> KL	<b>REV</b> 0
<b>DATE</b> August 18, 2016		<b>TETRA TECH EBA</b>

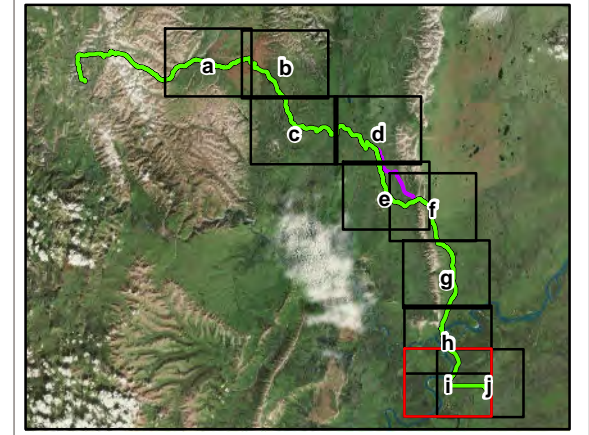
**Figure 3h**

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**LEGEND**

- Food Potential
  - Nil
  - Low
  - Moderate
  - High
  - Unknown
- Bear Habitat Model Boundary
- Transfer Facility
- Prairie Creek Access Road (Apr 5, 2016)
- Liard Highway
- Contour (40 m)
- Watercourse
- Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

**STATUS**  
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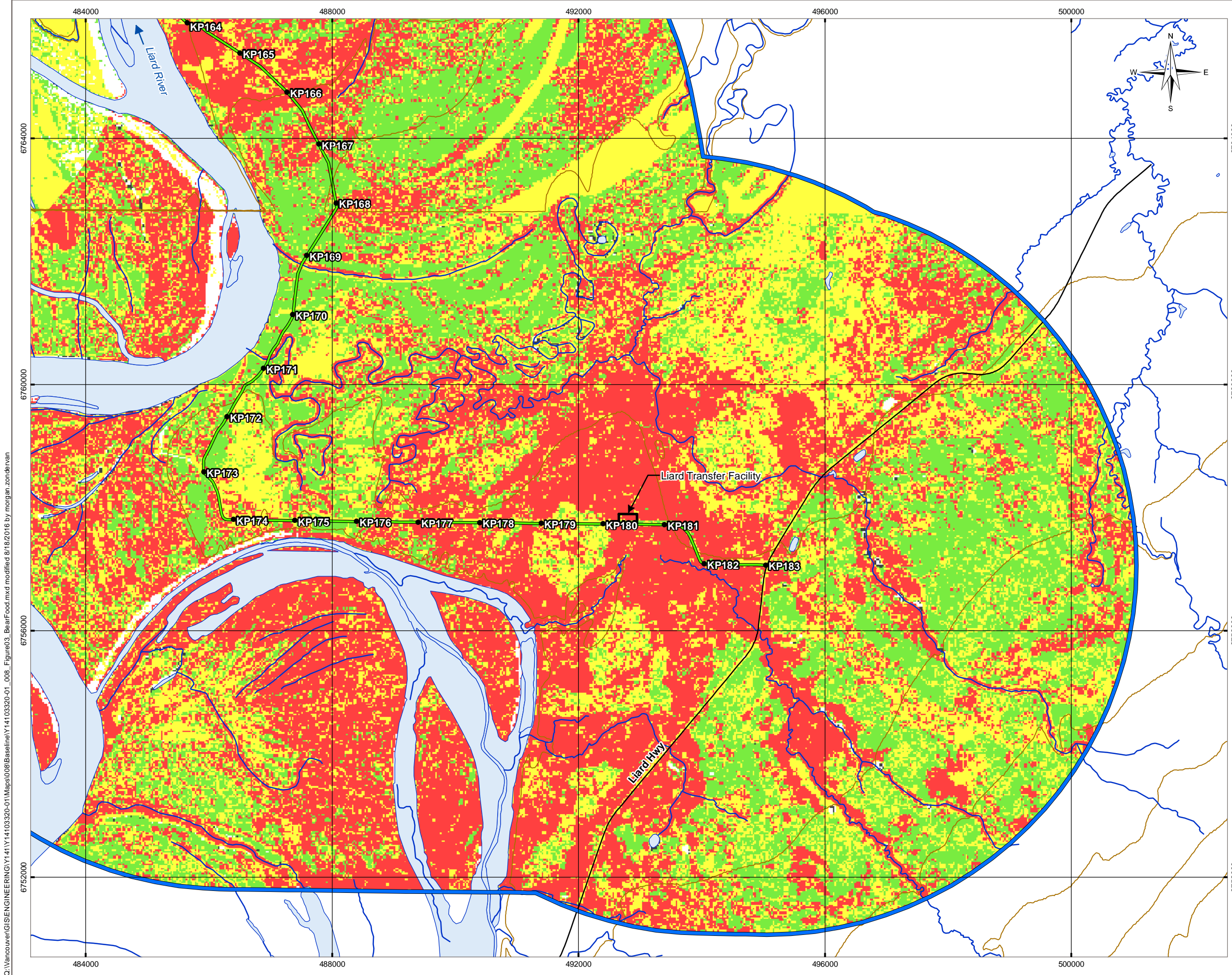
**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Food  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:60,000 1 0.5 0 1 Kilometres		<b>TETRA TECH EBA</b>
<b>FILE NO.</b> Y14103320-01_008_Figure03_BearFood.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
	<b>APVD</b> KL	<b>REV</b> 0
<b>OFFICE</b> Tl:EBA-VANC	<b>DATE</b> August 18, 2016	

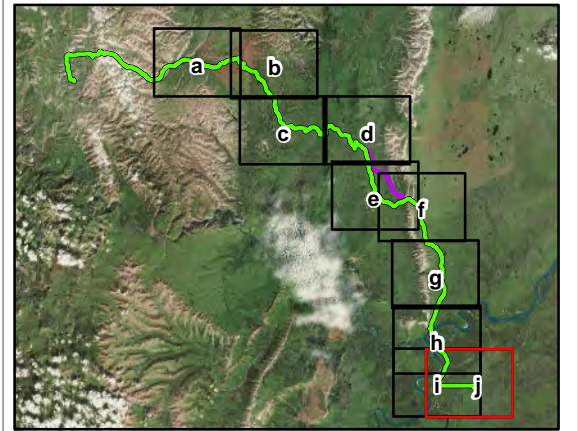
**Figure 3i**

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**LEGEND**

- Food Potential
  - Nil
  - Low
  - Moderate
  - High
  - Unknown
- Bear Habitat Model Boundary
- Transfer Facility
- Prairie Creek Access Road (Apr 5, 2016)
- Liard Highway
- Contour (40 m)
- Watercourse
- Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

**STATUS**  
 ISSUED FOR USE

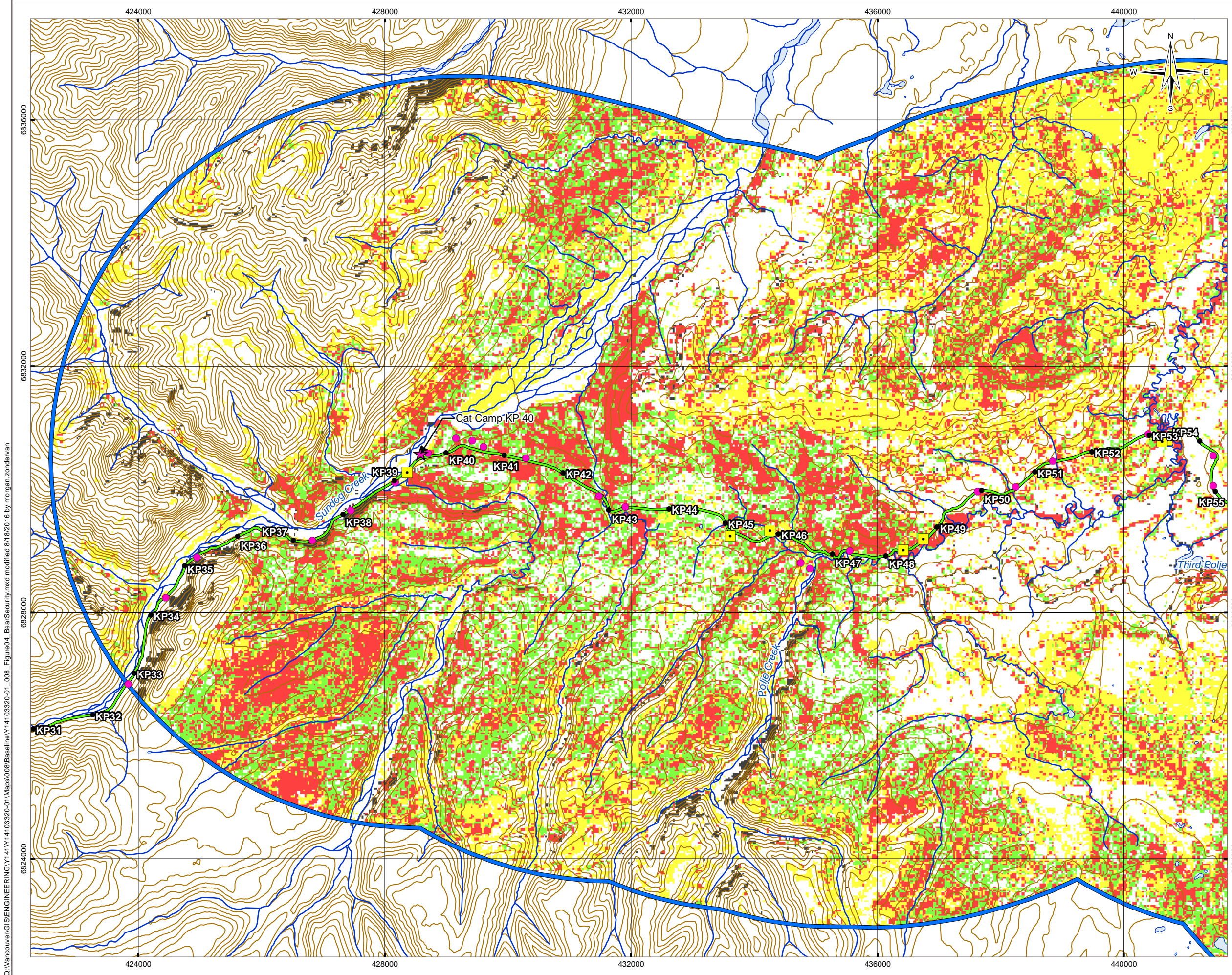
**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Food  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:60,000 1 0.5 0 1 Kilometres		
<b>FILE NO.</b> Y14103320-01_008_Figure03_BearFood.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>APVD</b> KL	<b>REV</b> 0	
<b>OFFICE</b> Tl:EBA-VANC	<b>DATE</b> August 18, 2016	

**Figure 3j**

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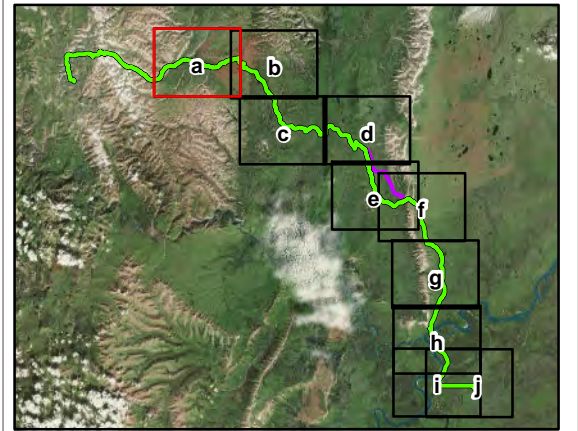


**LEGEND**

**Security Potential**

- Null
- Low
- Moderate
- High
- Unknown

Bear Habitat Model Boundary  
 Proposed Borrow Pit (preferred and alternate)  
 Camp (existing and proposed)  
 Bridge  
 Prairie Creek Access Road (Apr 5, 2016)  
 Contour (40 m)  
 Watercourse  
 Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

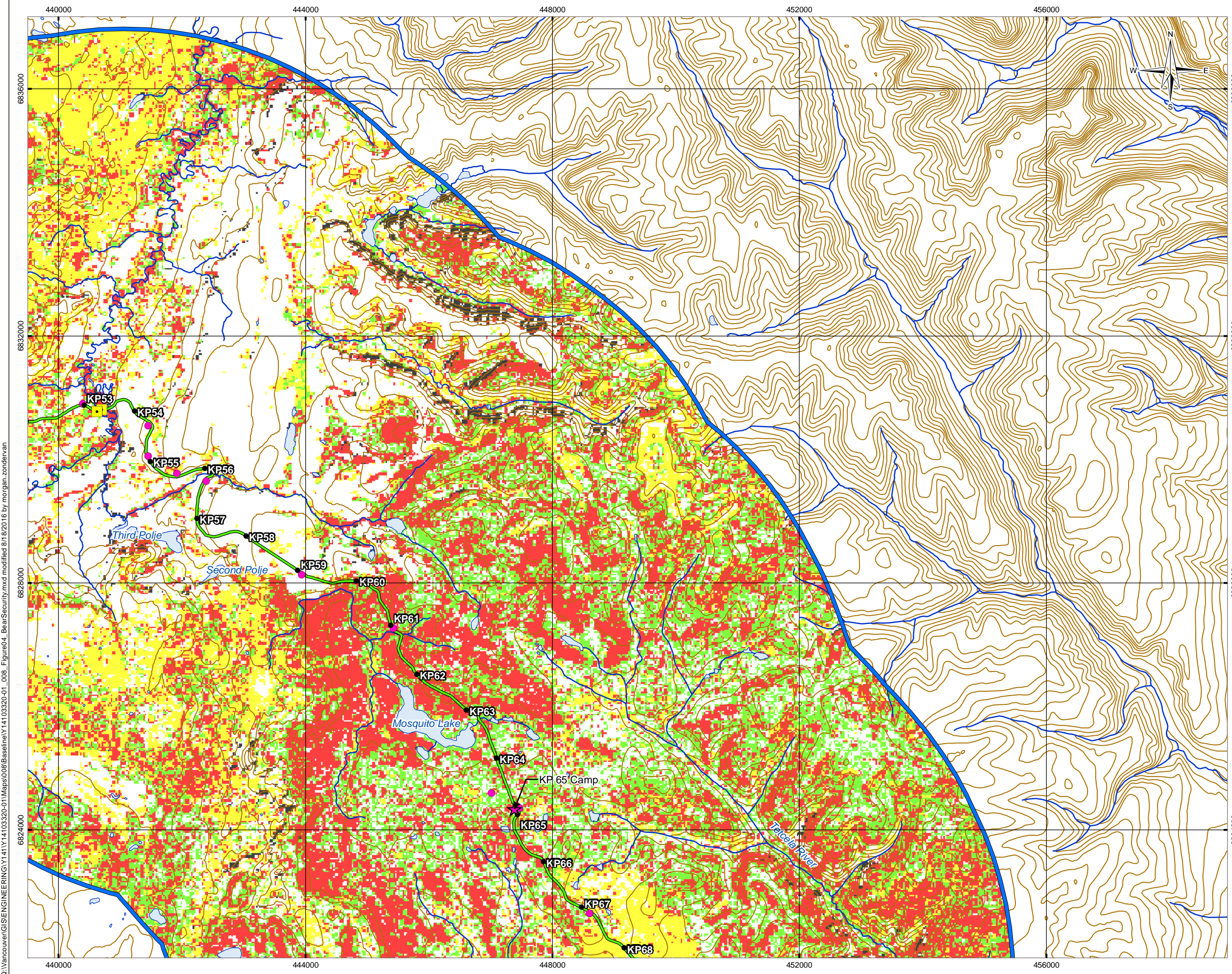
**STATUS**  
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**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Security  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> CANADIAN ZINC CORPORATION
Scale: 1:60,000 1 0.5 0 1 Kilometres		TETRA TECH EBA
<b>FILE NO.</b> Y14103320-01_008_Figure04_BearSecurity.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>OFFICE</b> TlEBA-VANC	<b>APVD</b> KL	<b>REV</b> 0
<b>DATE</b> August 18, 2016		<b>Figure 4a</b>

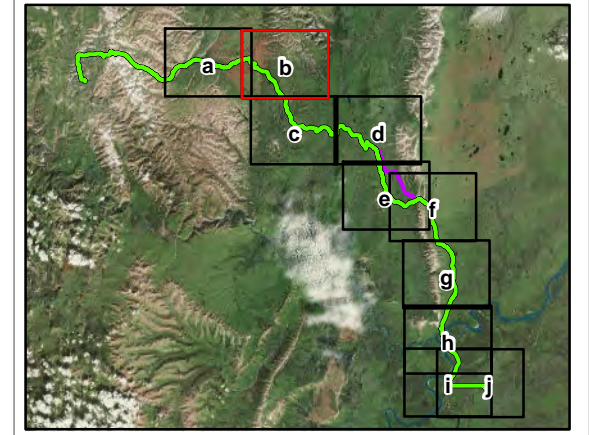
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**LEGEND**

**Security Potential**

- Null
- Low
- Moderate
- High
- Unknown
- Bear Habitat Model Boundary
- Proposed Borrow Pit (preferred and alternate)
- Camp (existing and proposed)
- Bridge
- Prairie Creek Access Road (Apr 5, 2016)
- Contour (40 m)
- Watercourse
- Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

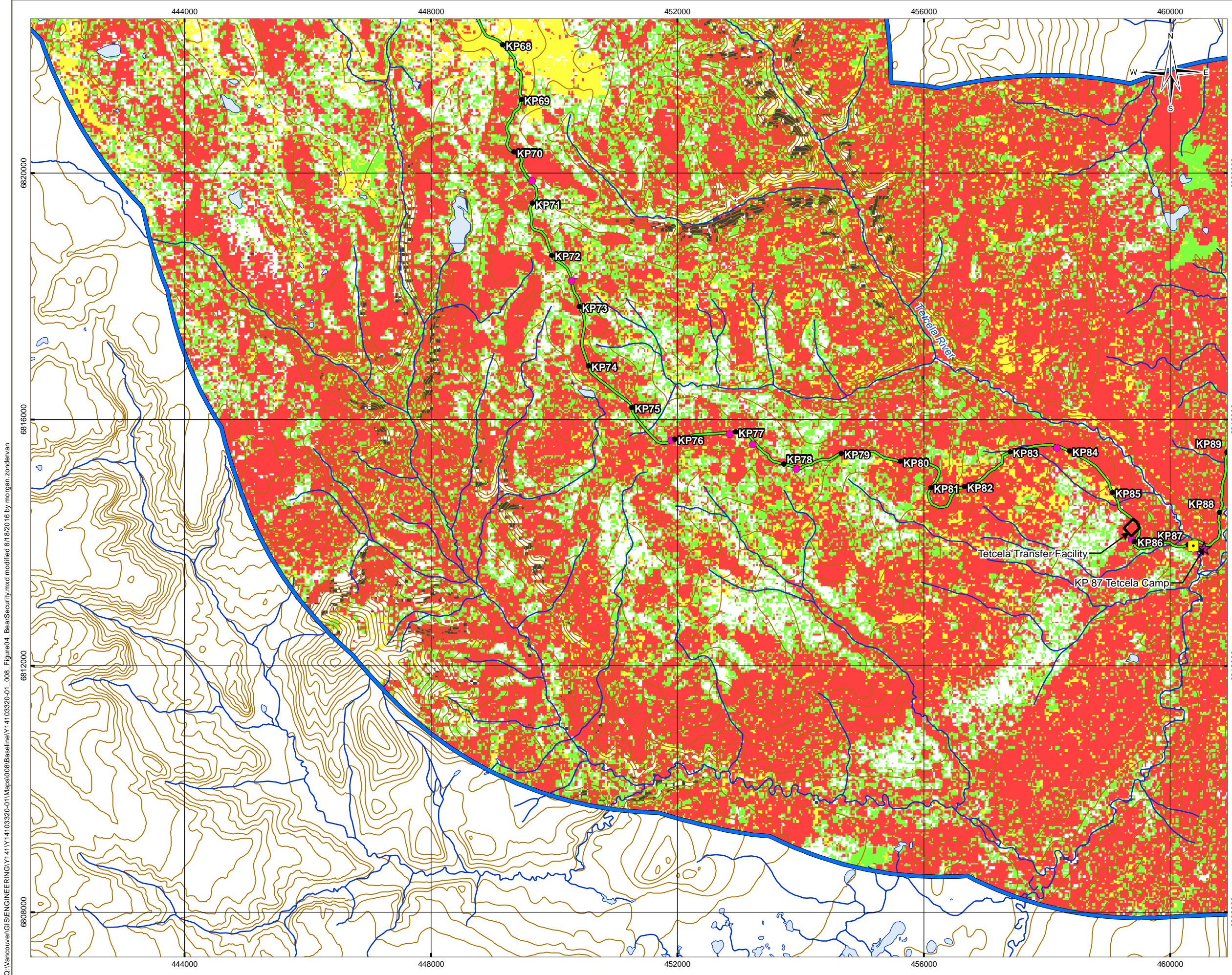
**STATUS**  
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**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Security  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:60,000 1 0.5 0 1 Kilometres		
<b>FILE NO.</b> Y14103320-01_008_Figure04_BearSecurity.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>APVD</b> KL	<b>REV</b> 0	<b>Figure 4b</b>
<b>OFFICE</b> T/EBA-VANC	<b>DATE</b> August 18, 2016	

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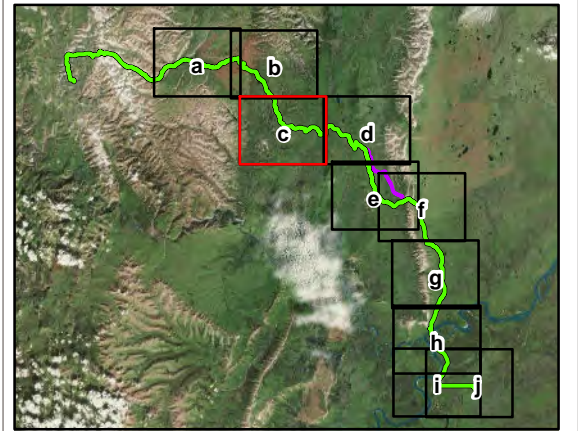


### LEGEND

**Security Potential**

- Null
- Low
- Moderate
- High
- Unknown

Bear Habitat Model Boundary  
 Proposed Borrow Pit (preferred and alternate)  
 Camp (existing and proposed)  
 Bridge  
 Prairie Creek Access Road (Apr 5, 2016)  
 Contour (40 m)  
 Watercourse  
 Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

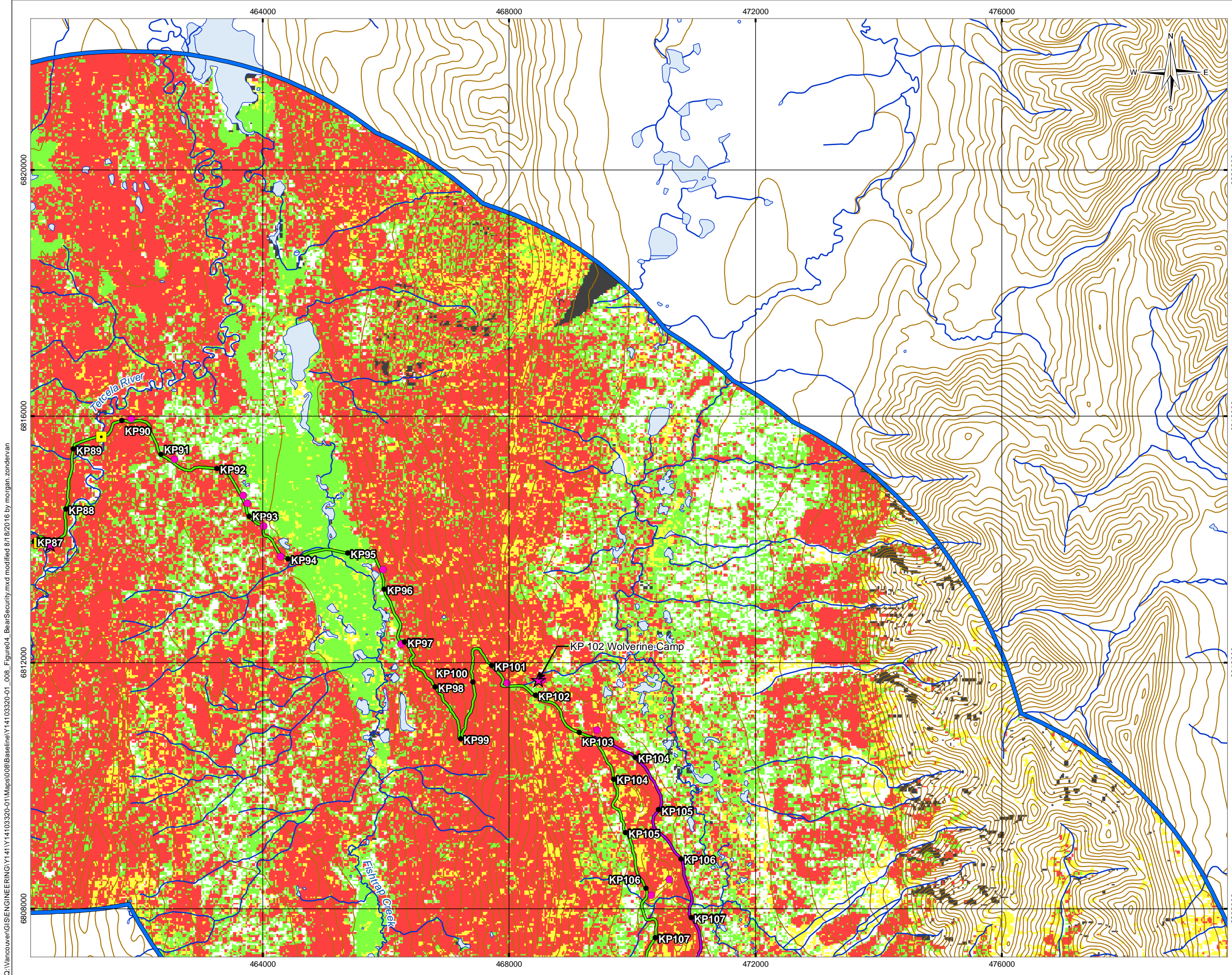
**STATUS**  
 ISSUED FOR USE

**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Security  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:60,000 		
<b>FILE NO.</b> Y14103320-01_008_Figure04_BearSecurity.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>OFFICE</b> TlEBA-VANC	<b>APVD</b> KL	<b>REV</b> 0
<b>DATE</b> August 18, 2016		<b>Figure 4c</b>

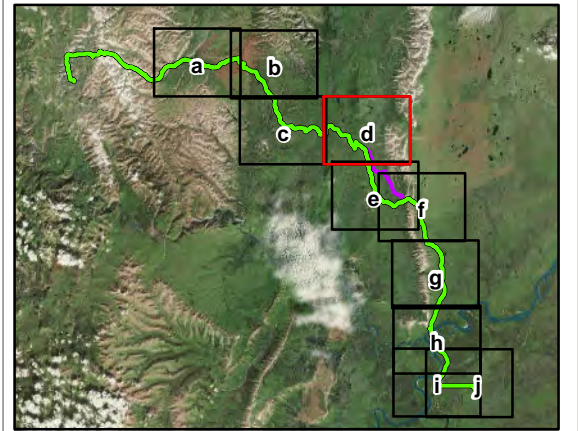
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**LEGEND**

**Security Potential**

- Null
- Low
- Moderate
- High
- Unknown
- ⬮ Bear Habitat Model Boundary
- Proposed Borrow Pit (preferred and alternate)
- ★ Camp (existing and proposed)
- Bridge
- Prairie Creek Access Road (Apr 5, 2016)
- Alternative Alignment (Apr 5, 2016)
- Contour (40 m)
- Watercourse
- Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

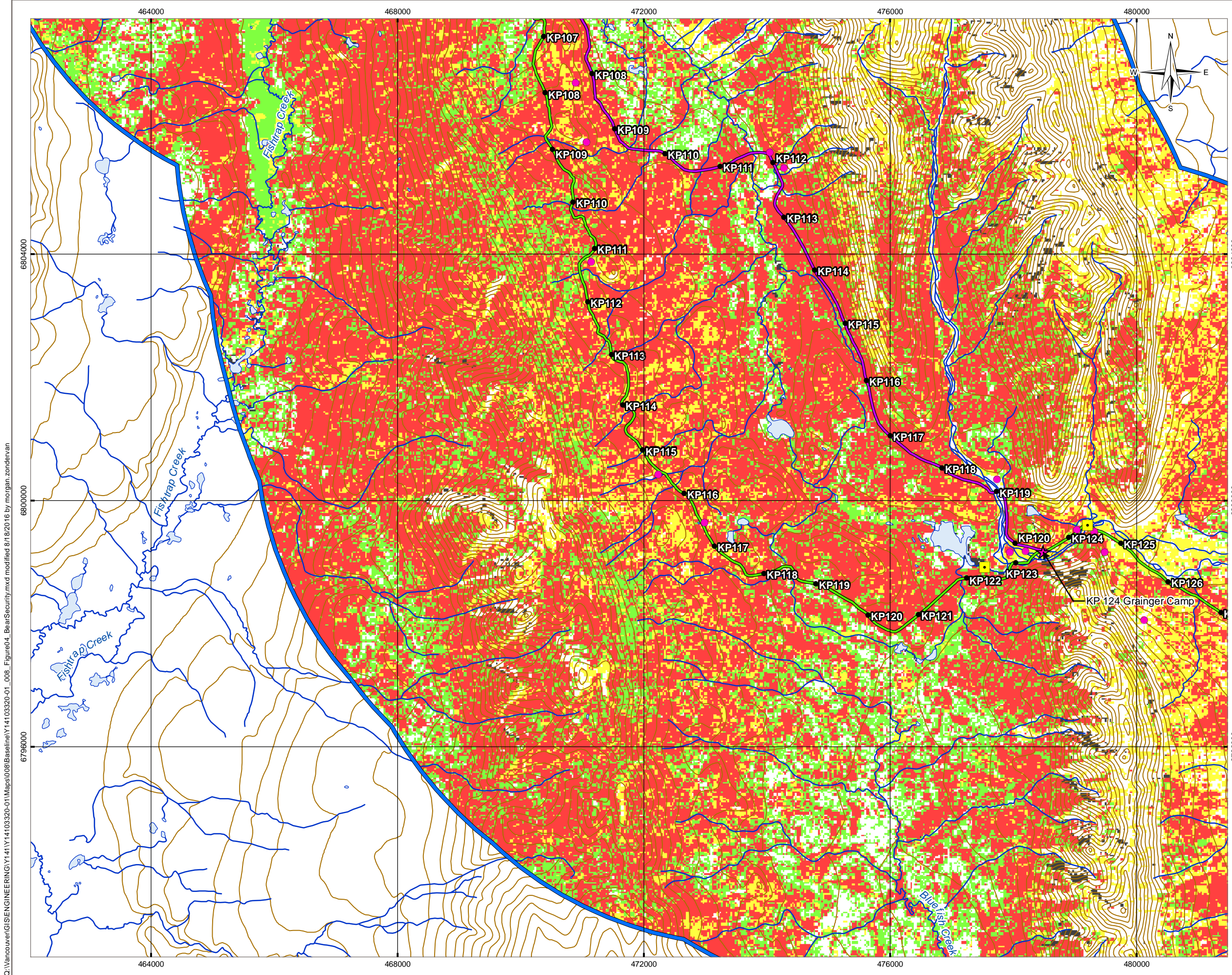
**STATUS**  
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**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Security  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> CANADIAN ZINC CORPORATION
Scale: 1:60,000 		<b>FILE NO.</b> Y14103320-01_008_Figure04_BearSecurity.mxd
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>OFFICE</b> TlEBA-VANC	<b>APVD</b> KL	<b>REV</b> 0
<b>DATE</b> August 18, 2016		<b>Figure 4d</b>

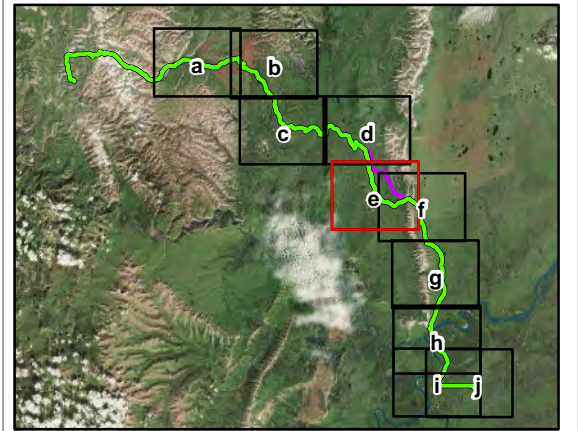
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**LEGEND**

**Security Potential**

- Nil
- Low
- Moderate
- High
- Unknown
- ⬮ Bear Habitat Model Boundary
- Proposed Borrow Pit (preferred and alternate)
- ★ Camp (existing and proposed)
- Bridge
- Prairie Creek Access Road (Apr 5, 2016)
- Alternative Alignment (Apr 5, 2016)
- Contour (40 m)
- Watercourse
- Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

**STATUS**  
 ISSUED FOR USE

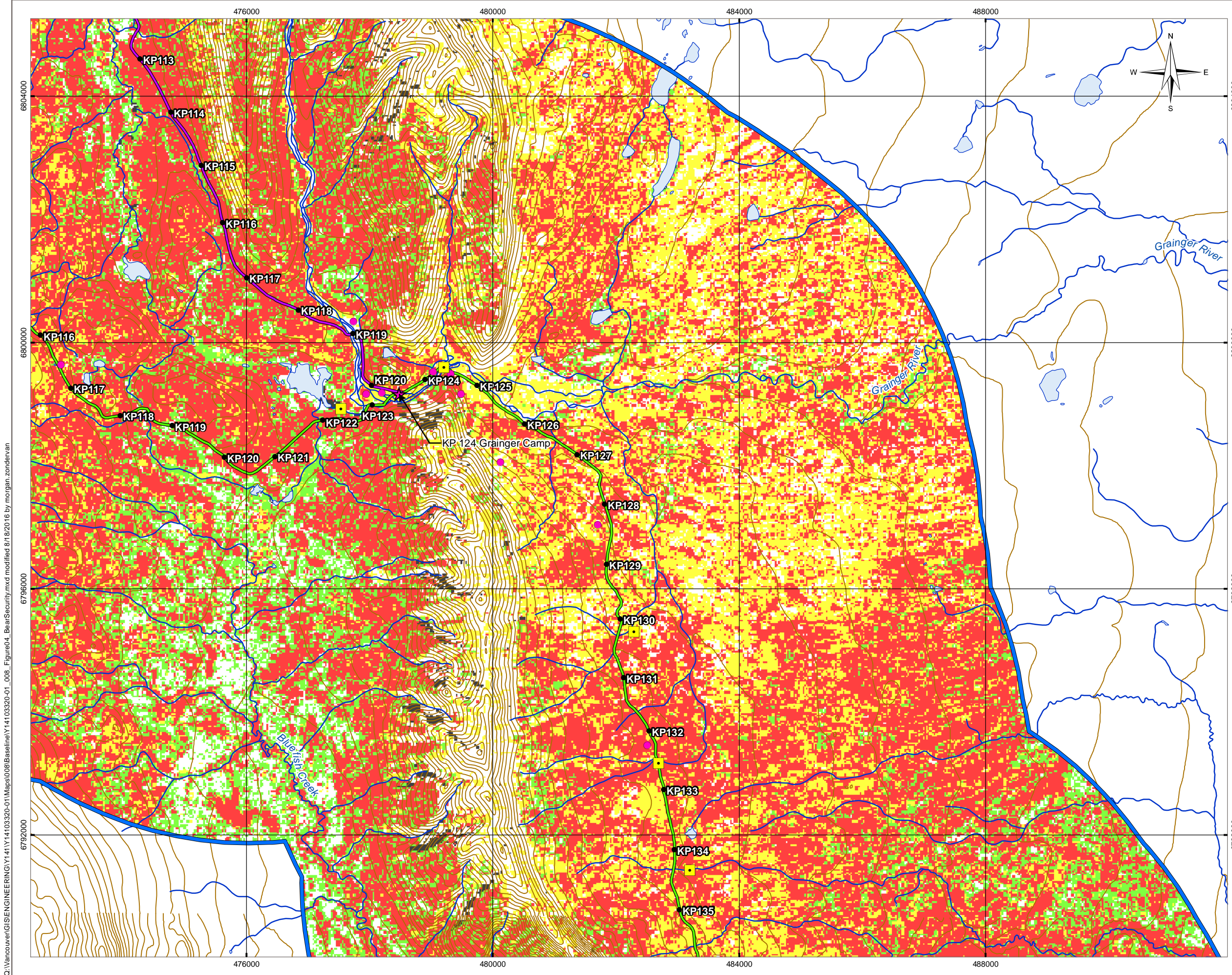
**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Security  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:60,000 1 0.5 0 1 Kilometres		
<b>FILE NO.</b> Y14103320-01_008_Figure04_BearSecurity.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
	<b>APVD</b> KL	<b>REV</b> 0
<b>OFFICE</b> TlEBA-VANC	<b>DATE</b> August 18, 2016	

**Figure 4e**

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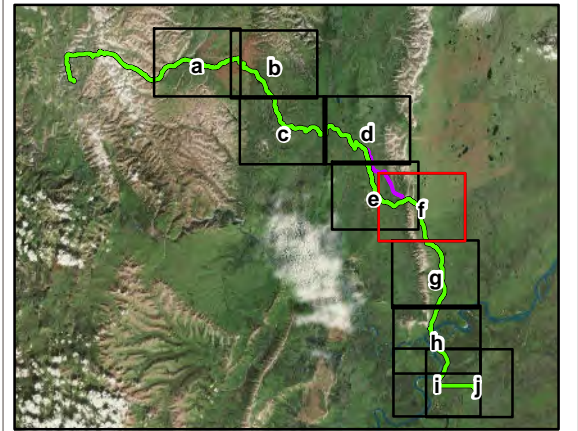


**LEGEND**

**Security Potential**

- Nil
- Low
- Moderate
- High
- Unknown

Bear Habitat Model Boundary  
 Proposed Borrow Pit (preferred and alternate)  
 Camp (existing and proposed)  
 Bridge  
 Prairie Creek Access Road (Apr 5, 2016)  
 Alternative Alignment (Apr 5, 2016)  
 Contour (40 m)  
 Watercourse  
 Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

**STATUS**  
 ISSUED FOR USE

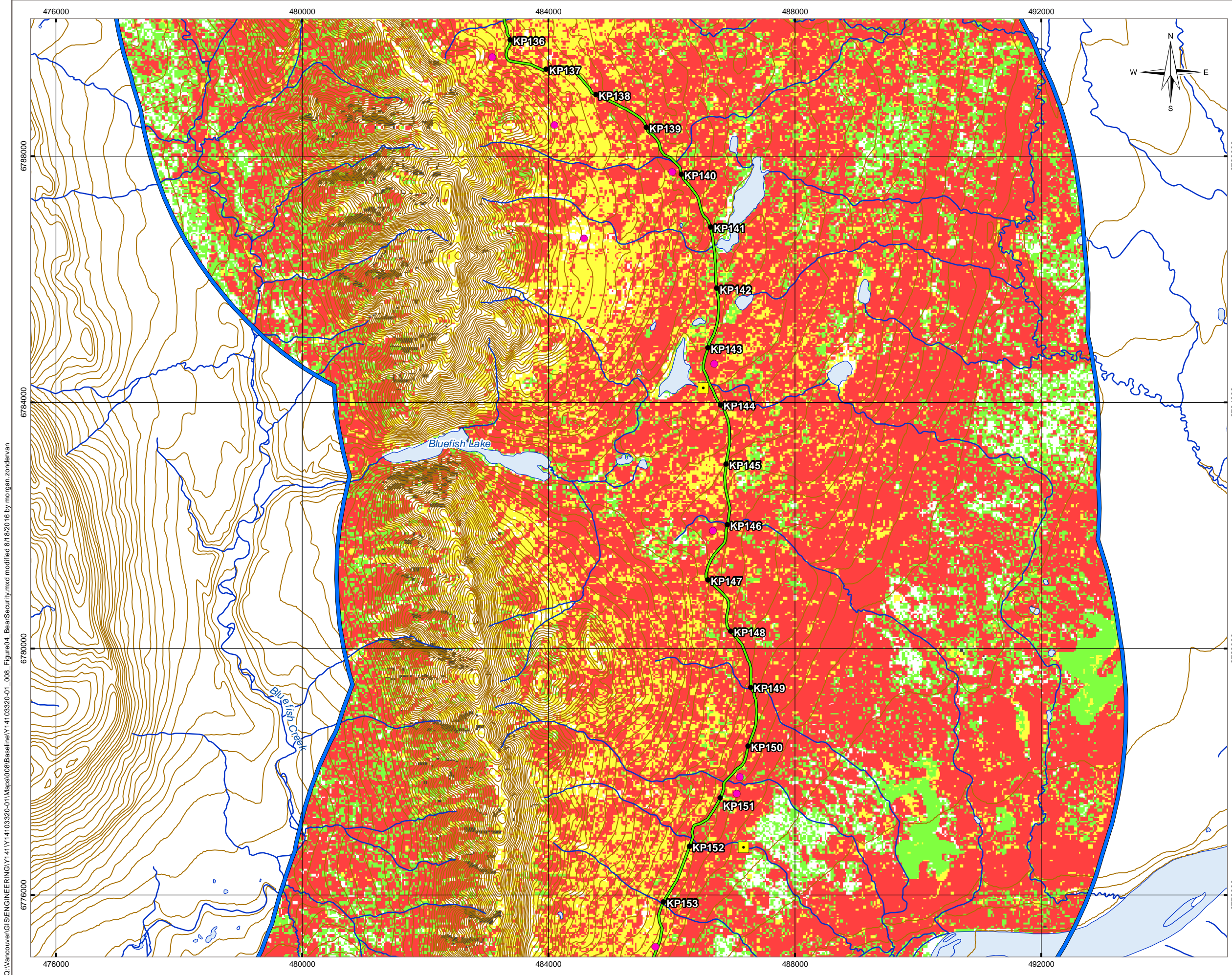
**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Security  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:60,000 1 0.5 0 1 Kilometres		
<b>FILE NO.</b> Y14103320-01_008_Figure04_BearSecurity.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
	<b>APVD</b> KL	<b>REV</b> 0
<b>OFFICE</b> T: EBA-VANC	<b>DATE</b> August 18, 2016	

**Figure 4f**

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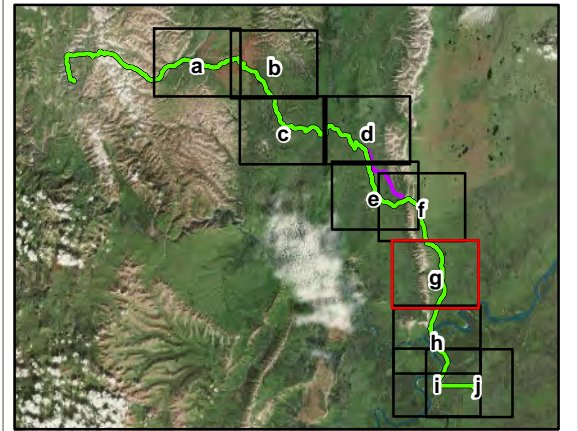
### LEGEND

**Security Potential**

- White: Null
- Light Green: Low
- Yellow: Moderate
- Red: High
- Black: Unknown

**Other Features:**

- Blue outline: Bear Habitat Model Boundary
- Pink dot: Proposed Borrow Pit (preferred and alternate)
- Yellow square: Bridge
- Green line: Prairie Creek Access Road (Apr 5, 2016)
- Brown line: Contour (40 m)
- Blue line: Watercourse
- Blue shape: Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

**STATUS**  
 ISSUED FOR USE

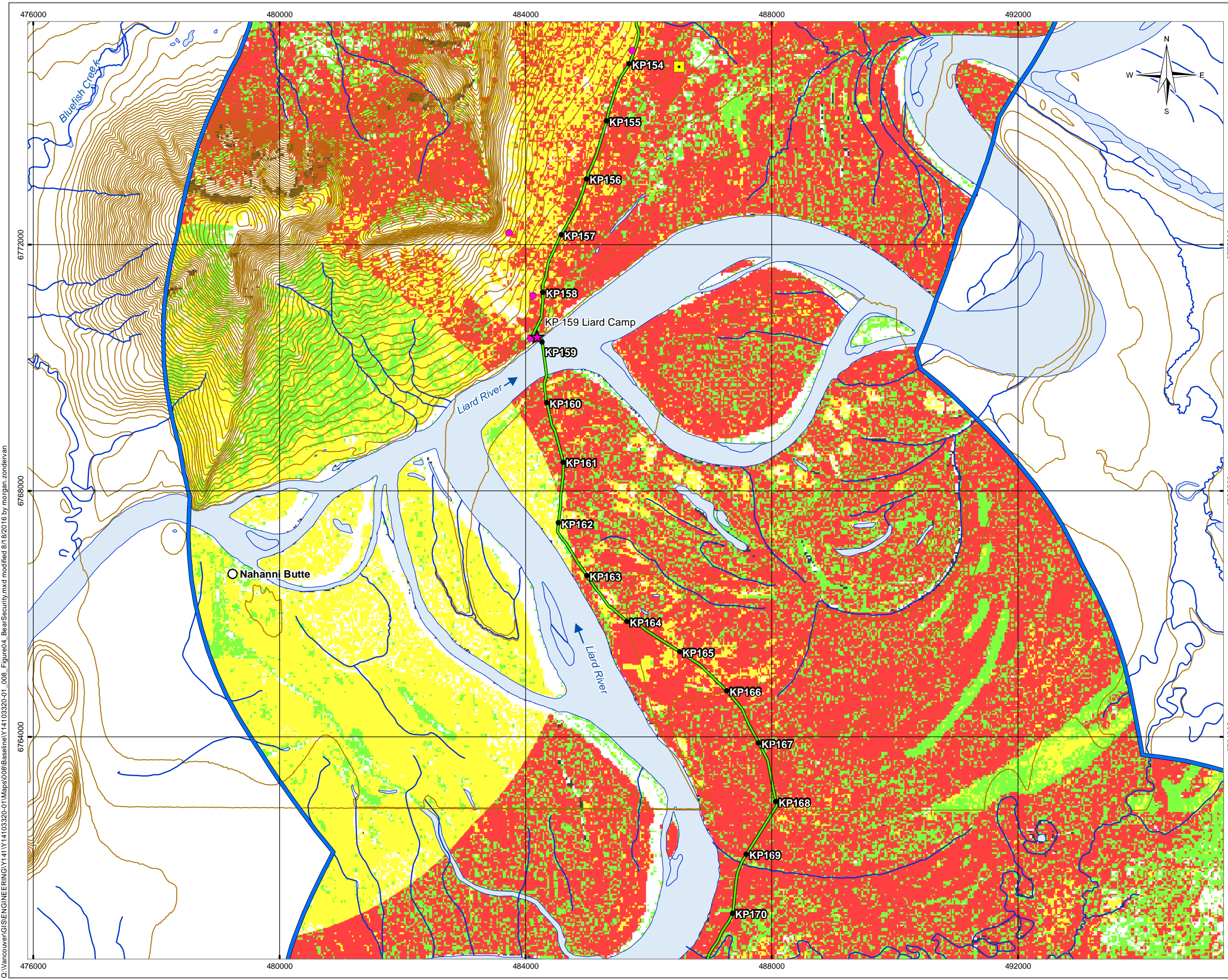
## PRAIRIE CREEK ALL-SEASON ROAD 2016 VEGETATION AND WILDLIFE BASELINE SURVEYS

### Black Bear Security Habitat Potential

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:60,000 1 0.5 0 1 Kilometres		<b>CLIENT</b> 
<b>FILE NO.</b> Y14103320-01_008_Figure04_BearSecurity.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
	<b>APVD</b> KL	<b>REV</b> 0
<b>OFFICE</b> T: EBA-VANC	<b>DATE</b> August 18, 2016	

**Figure 4g**

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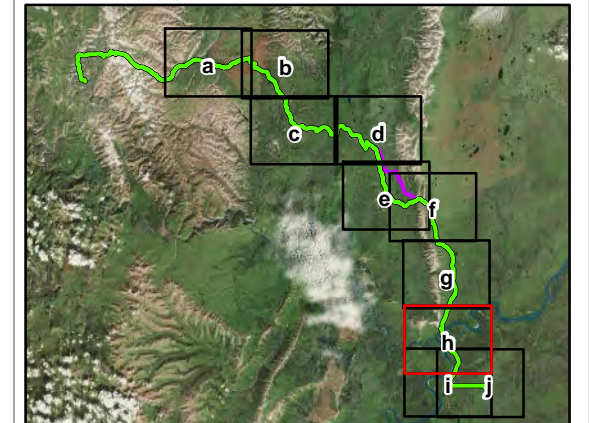
### LEGEND

**Security Potential**

- Nil
- Low
- Moderate
- High
- Unknown

**Other Features:**

- Bear Habitat Model Boundary
- Proposed Borrow Pit (preferred and alternate)
- Camp (existing and proposed)
- Bridge
- Prairie Creek Access Road (Apr 5, 2016)
- Contour (40 m)
- Watercourse
- Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

**STATUS**  
 ISSUED FOR USE

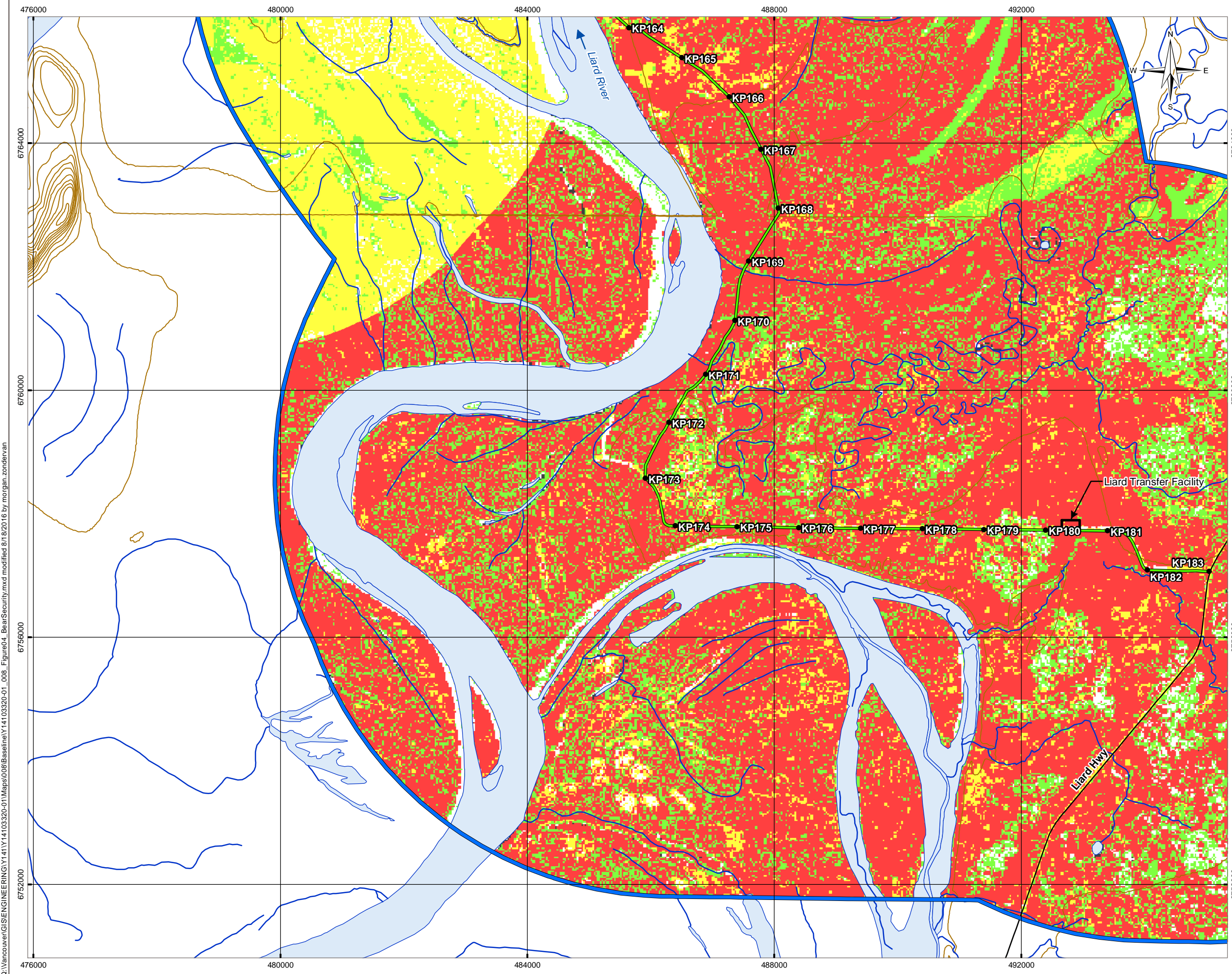
## PRAIRIE CREEK ALL-SEASON ROAD 2016 VEGETATION AND WILDLIFE BASELINE SURVEYS

### Black Bear Security Habitat Potential

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:60,000 1 0.5 0 1 Kilometres		
<b>FILE NO.</b> Y14103320-01_008_Figure04_BearSecurity.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
	<b>APVD</b> KL	<b>REV</b> 0
<b>OFFICE</b> T/EBA-VANC	<b>DATE</b> August 18, 2016	

**Figure 4h**

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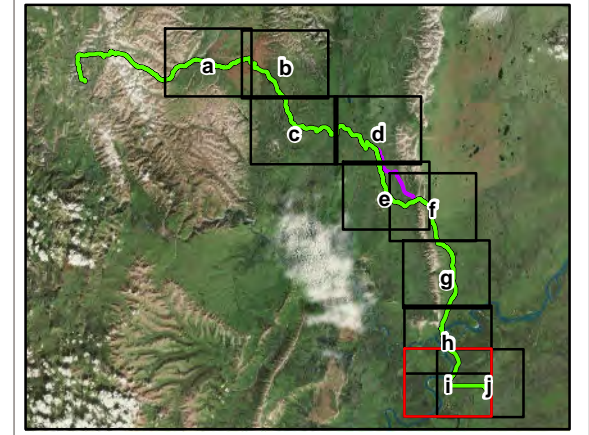


**LEGEND**

**Security Potential**

- Nil
- Low
- Moderate
- High
- Unknown

- Bear Habitat Model Boundary
- Transfer Facility
- Prairie Creek Access Road (Apr 5, 2016)
- Liard Highway
- Contour (40 m)
- Watercourse
- Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

**STATUS**  
 ISSUED FOR USE

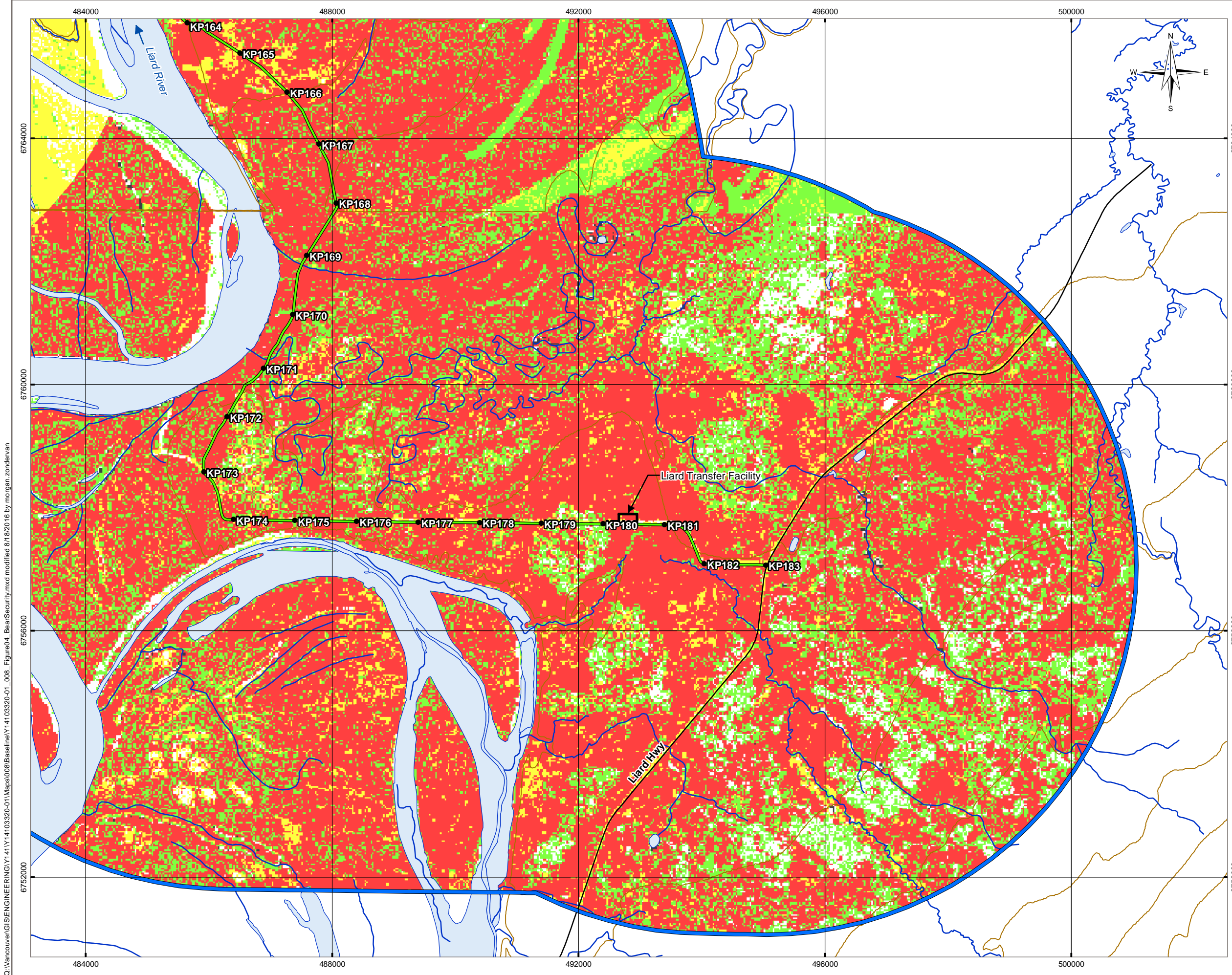
**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Security  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:60,000 1 0.5 0 1 Kilometres		<b>TETRA TECH EBA</b>
<b>FILE NO.</b> Y14103320-01_008_Figure04_BearSecurity.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
	<b>APVD</b> KL	<b>REV</b> 0
<b>OFFICE</b> Tl:EBA-VANC	<b>DATE</b> August 18, 2016	

**Figure 4i**

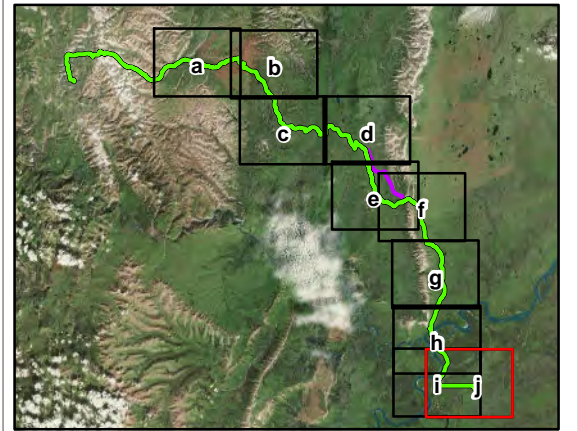
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**LEGEND**

**Security Potential**

- Nil
- Low
- Moderate
- High
- Unknown
- ⬭ Bear Habitat Model Boundary
- ▭ Transfer Facility
- Prairie Creek Access Road (Apr 5, 2016)
- Liard Highway
- Contour (40 m)
- Watercourse
- Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

**STATUS**  
 ISSUED FOR USE

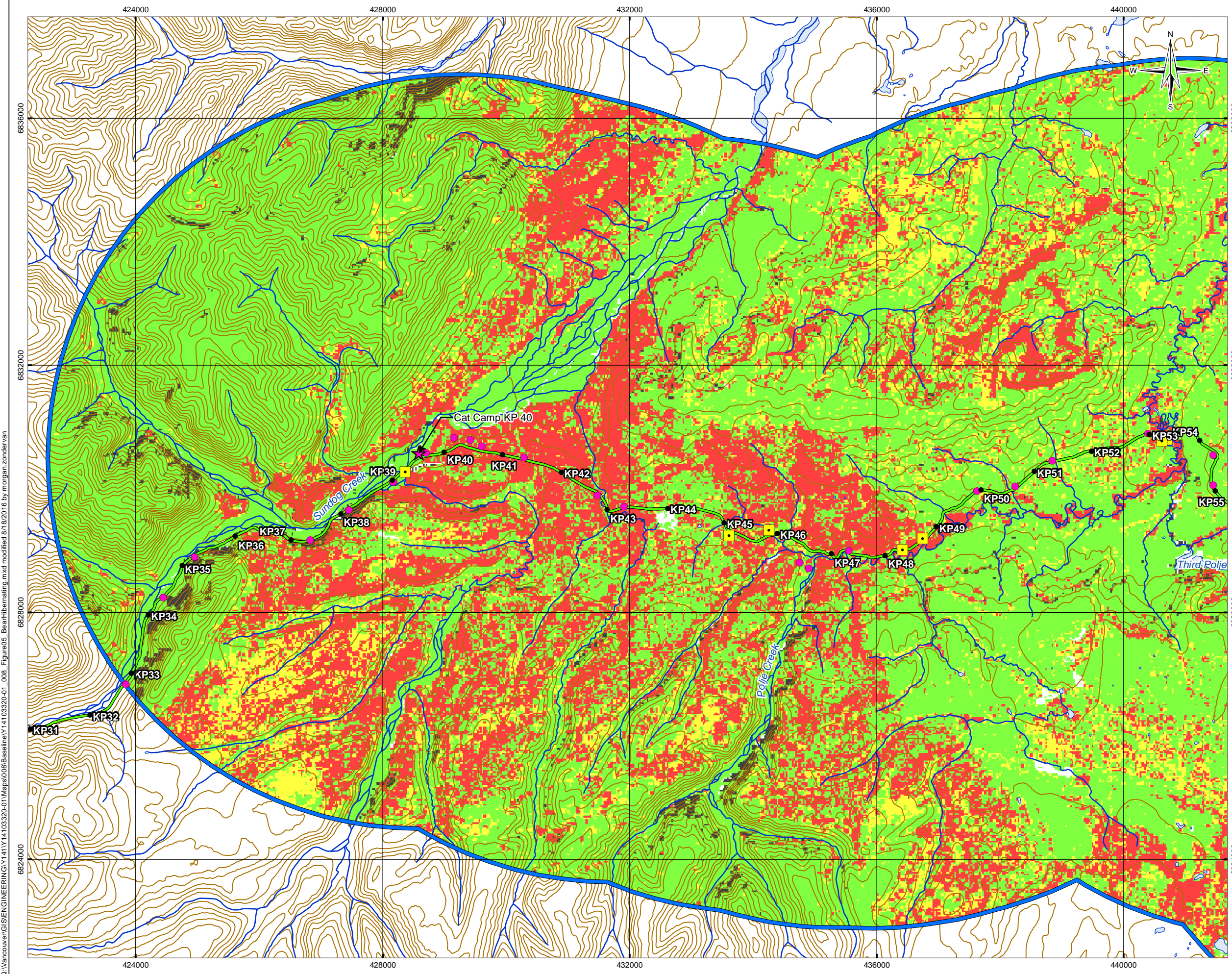
**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Security  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> CANADIAN ZINC CORPORATION
Scale: 1:60,000 1 0.5 0 1 Kilometres		TETRA TECH EBA
<b>FILE NO.</b> Y14103320-01_008_Figure04_BearSecurity.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
	<b>APVD</b> KL	<b>REV</b> 0
<b>OFFICE</b> Tl:EBA-VANC	<b>DATE</b> August 18, 2016	

**Figure 4j**

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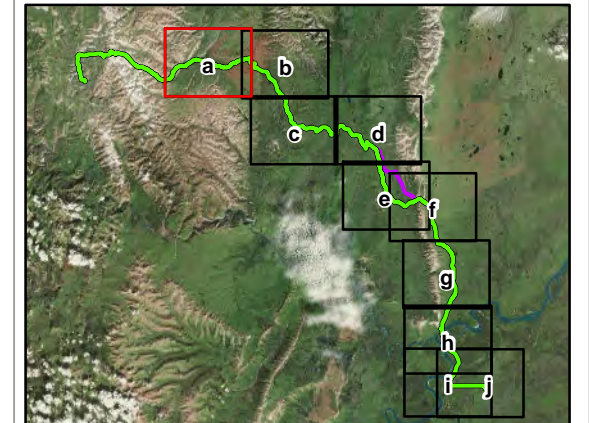


**LEGEND**

**Hibernating Potential**

- Null
- Low
- Moderate
- High
- Unknown

Bear Habitat Model Boundary  
 Proposed Borrow Pit (preferred and alternate)  
 Camp (existing and proposed)  
 Bridge  
 Prairie Creek Access Road (Apr 5, 2016)  
 Contour (40 m)  
 Watercourse  
 Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

**STATUS**  
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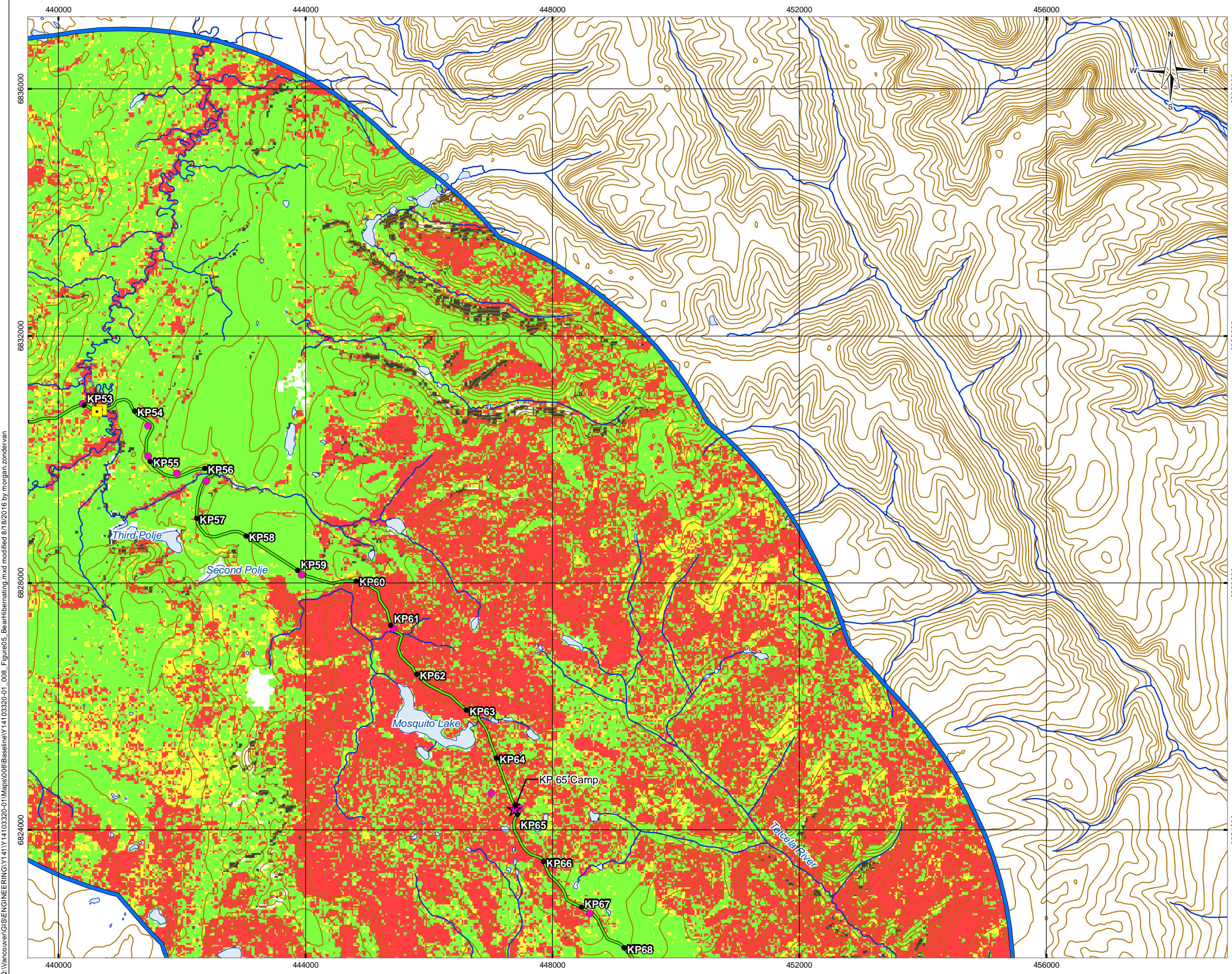
**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Hibernating  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> CANADIAN ZINC CORPORATION
Scale: 1:60,000 		<b>TETRA TECH EBA</b>
<b>FILE NO.</b> Y14103320-01_008_Figure05_BearHibernating.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>APVD</b> KL	<b>REV</b> 0	
<b>OFFICE</b> Tl:EBA-VANC	<b>DATE</b> August 18, 2016	

**Figure 5a**

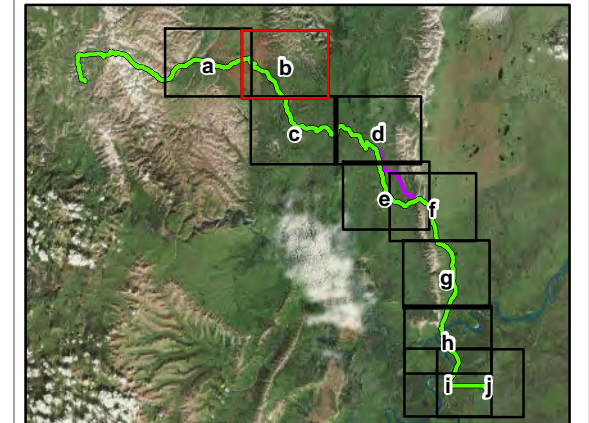
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**LEGEND**

**Hibernating Potential**

- Nil
- Low
- Moderate
- High
- Unknown
- Bear Habitat Model Boundary
- Proposed Borrow Pit (preferred and alternate)
- ★ Camp (existing and proposed)
- Bridge
- Prairie Creek Access Road (Apr 5, 2016)
- Contour (40 m)
- Watercourse
- Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

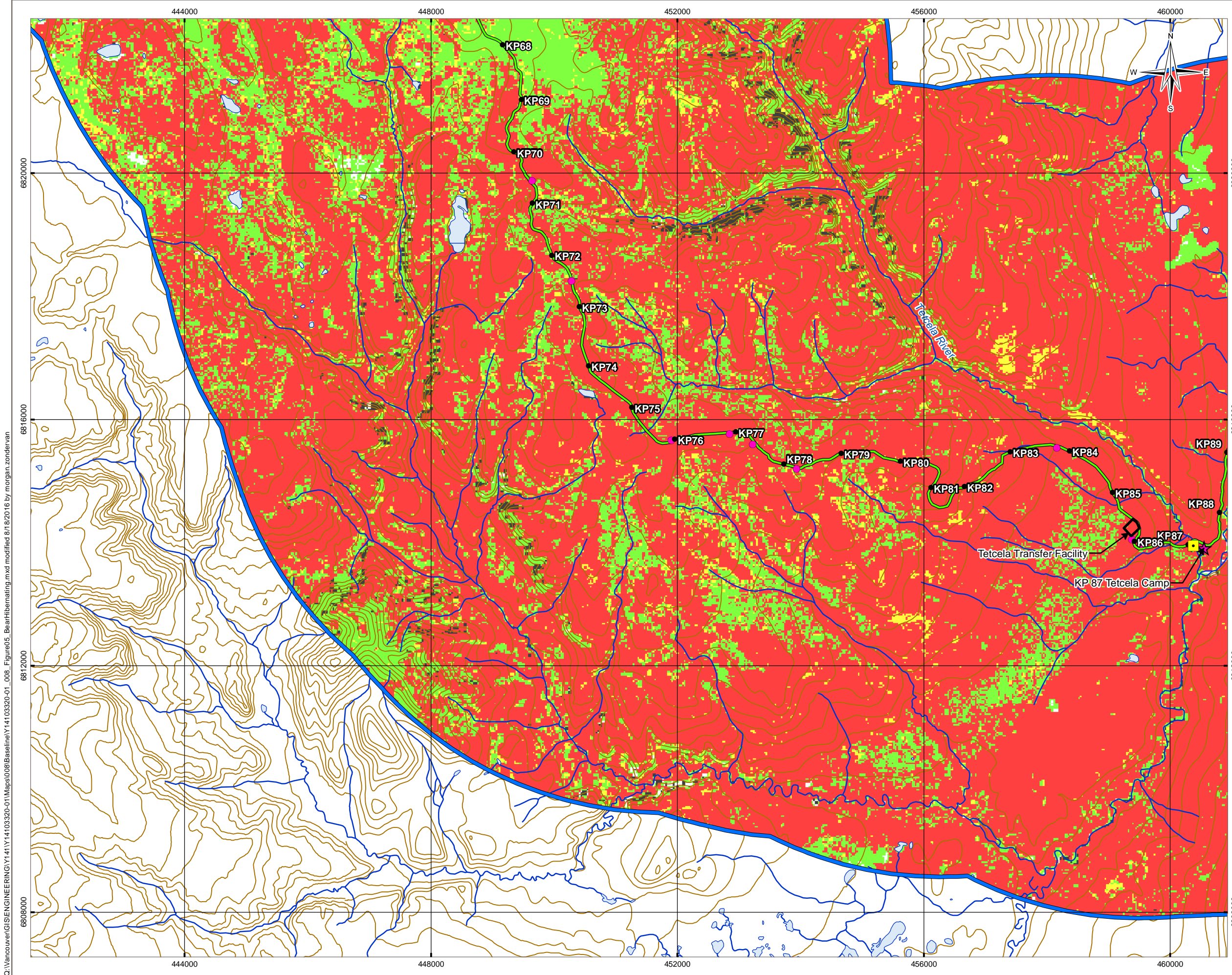
**STATUS**  
 ISSUED FOR USE

**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Hibernating  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> CANADIAN ZINC CORPORATION
Scale: 1:60,000 1 0.5 0 1 Kilometres		TETRA TECH EBA
<b>FILE NO.</b> Y14103320-01_008_Figure05_BearHibernating.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>OFFICE</b> TlEBA-VANC	<b>APVD</b> KL	<b>REV</b> 0
<b>DATE</b> August 18, 2016		<b>Figure 5b</b>

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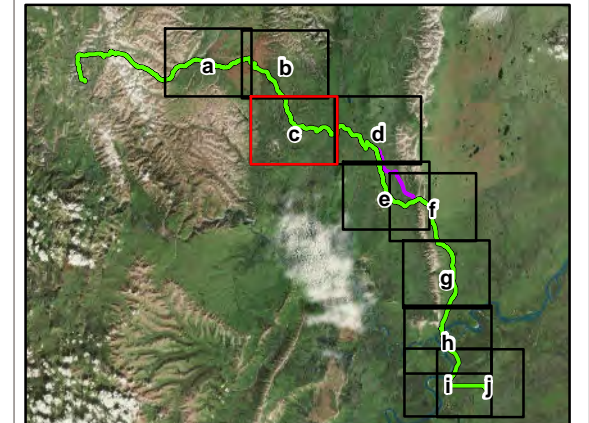


**LEGEND**

**Hibernating Potential**

- Nil
- Low
- Moderate
- High
- Unknown

- Bear Habitat Model Boundary
- Proposed Borrow Pit (preferred and alternate)
- Camp (existing and proposed)
- Bridge
- Prairie Creek Access Road (Apr 5, 2016)
- Contour (40 m)
- Watercourse
- Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

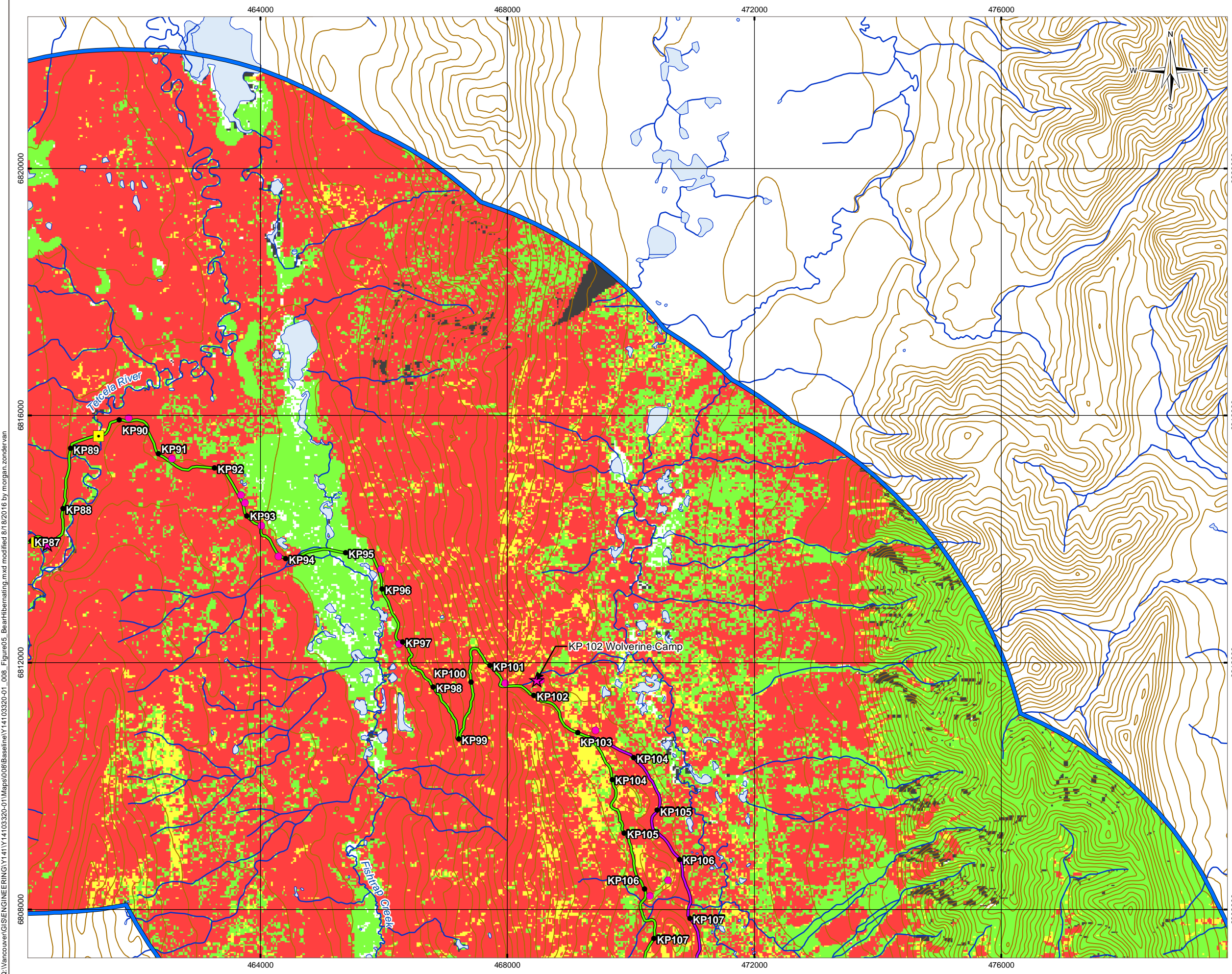
**STATUS**  
 ISSUED FOR USE

**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Hibernating  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:60,000 1 0.5 0 1 Kilometres		
<b>FILE NO.</b> Y14103320-01_008_Figure05_BearHibernating.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>APVD</b> KL	<b>REV</b> 0	<b>Figure 5c</b>
<b>OFFICE</b> TlEBA-VANC	<b>DATE</b> August 18, 2016	

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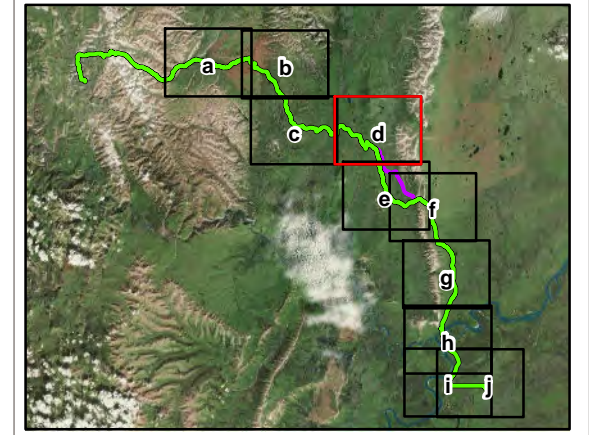


### LEGEND

**Hibernating Potential**

- Nil
- Low
- Moderate
- High
- Unknown

- Bear Habitat Model Boundary
- Proposed Borrow Pit (preferred and alternate)
- Camp (existing and proposed)
- Bridge
- Prairie Creek Access Road (Apr 5, 2016)
- Alternative Alignment (Apr 5, 2016)
- Contour (40 m)
- Watercourse
- Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

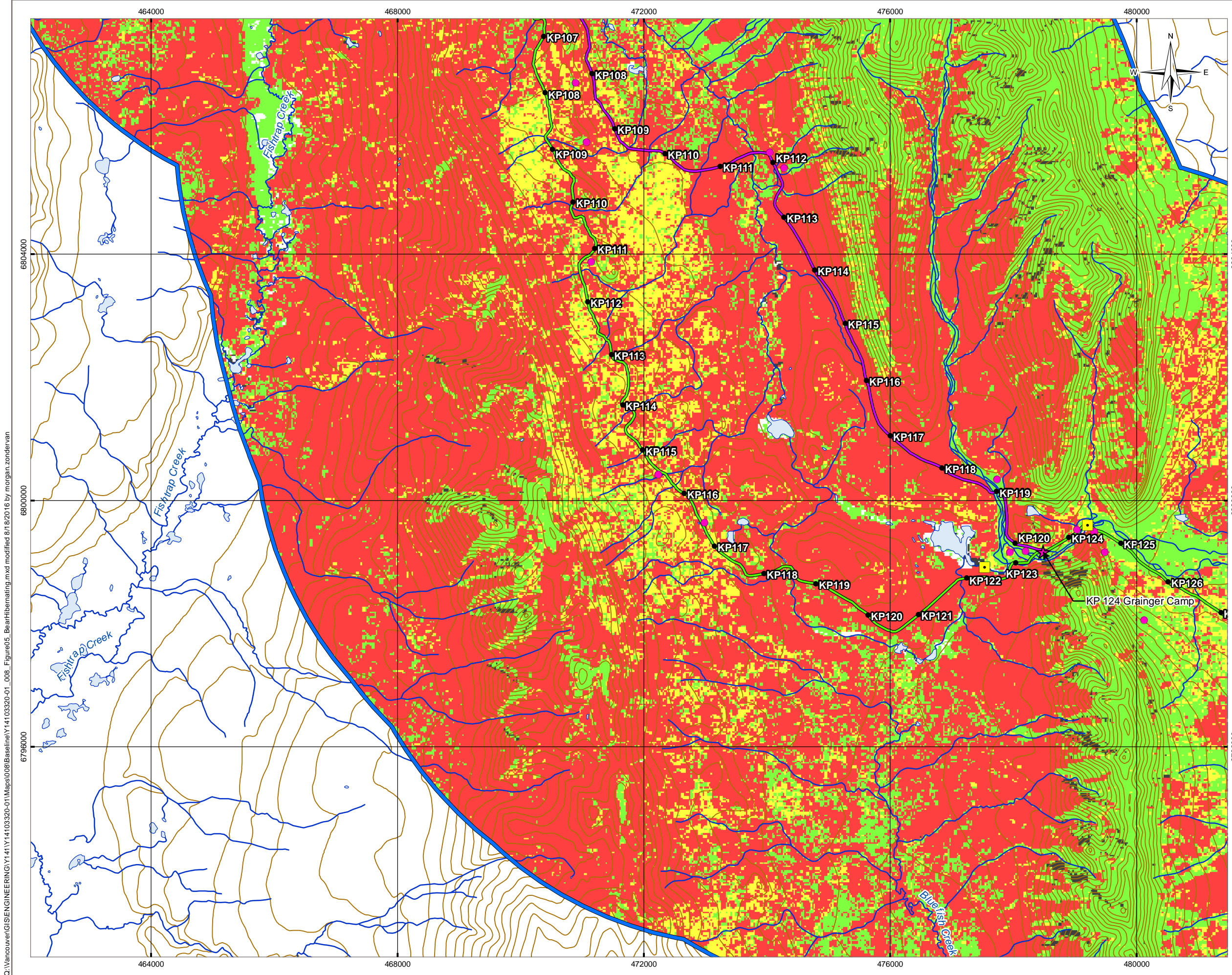
**STATUS**  
 ISSUED FOR USE

## PRAIRIE CREEK ALL-SEASON ROAD 2016 VEGETATION AND WILDLIFE BASELINE SURVEYS

### Black Bear Hibernating Habitat Potential

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> CANADIAN ZINC CORPORATION
Scale: 1:60,000 		TETRA TECH EBA
<b>FILE NO.</b> Y14103320-01_008_Figure05_BearHibernating.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>OFFICE</b> T/EBA-VANC	<b>APVD</b> KL	<b>REV</b> 0
<b>DATE</b> August 18, 2016		<b>Figure 5d</b>

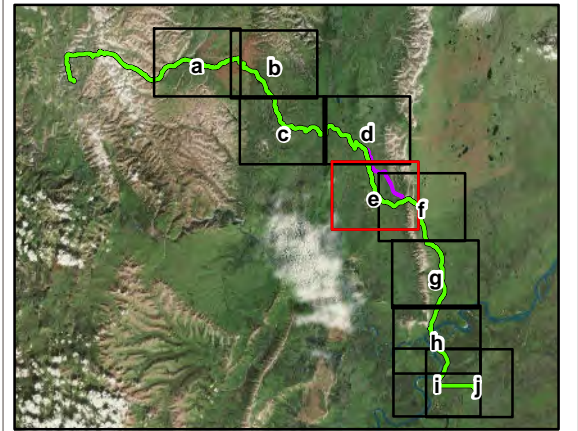
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**LEGEND**

**Hibernating Potential**

- Null
- Low
- Moderate
- High
- Unknown
- ⬮ Bear Habitat Model Boundary
- Proposed Borrow Pit (preferred and alternate)
- ★ Camp (existing and proposed)
- Bridge
- Prairie Creek Access Road (Apr 5, 2016)
- Alternative Alignment (Apr 5, 2016)
- Contour (40 m)
- Watercourse
- Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

**STATUS**  
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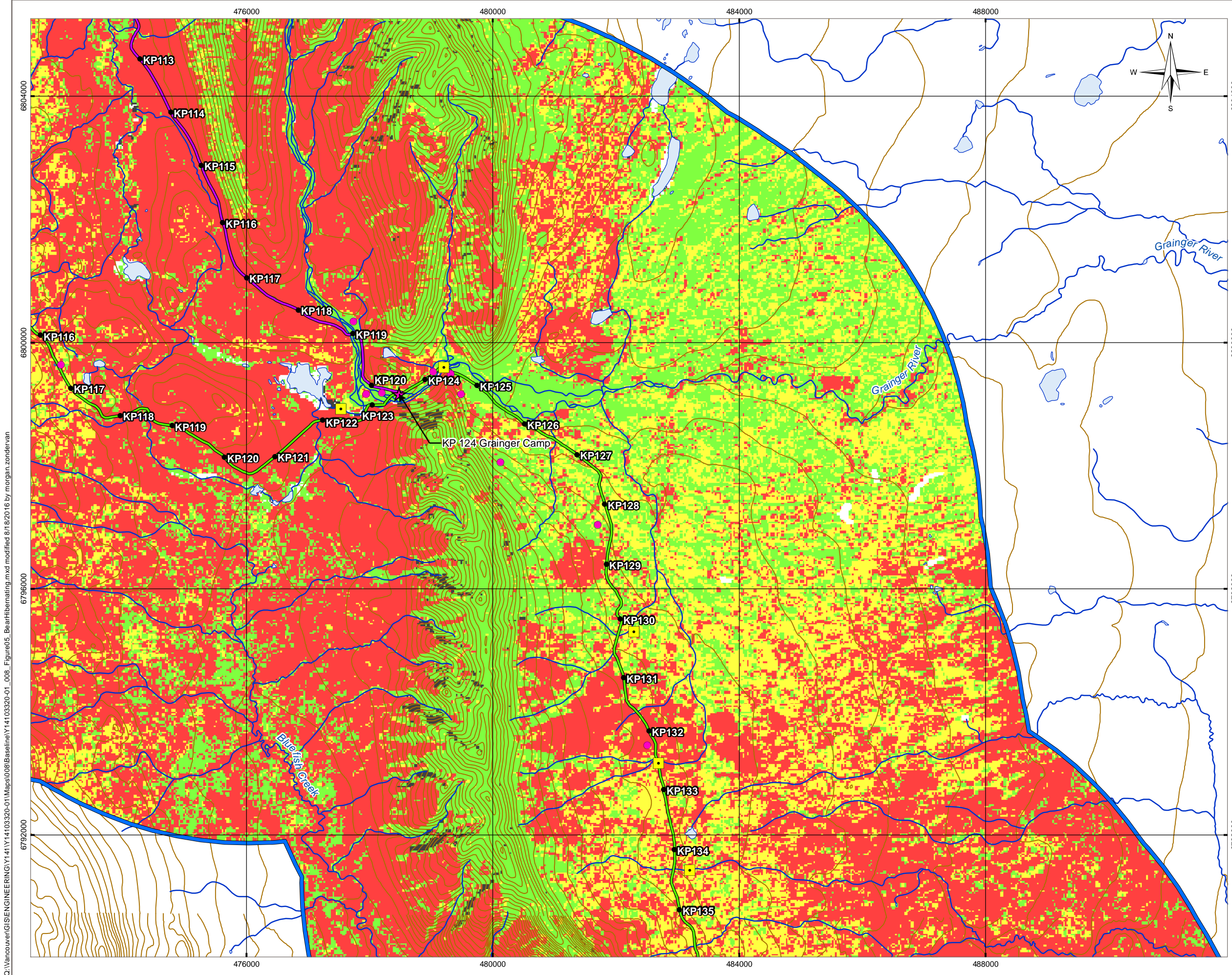
**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Hibernating  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> CANADIAN ZINC CORPORATION
Scale: 1:60,000 1 0.5 0 1 Kilometres		TETRA TECH EBA
<b>FILE NO.</b> Y14103320-01_008_Figure05_BearHibernating.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
	<b>APVD</b> KL	<b>REV</b> 0
<b>OFFICE</b> TlEBA-VANC	<b>DATE</b> August 18, 2016	

**Figure 5e**

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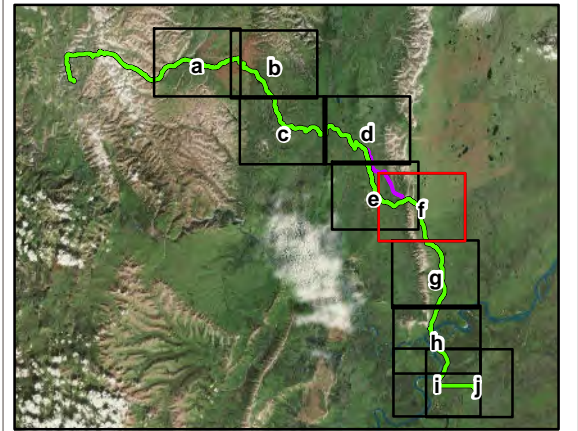


**LEGEND**

**Hibernating Potential**

- Null
- Low
- Moderate
- High
- Unknown

Bear Habitat Model Boundary  
 Proposed Borrow Pit (preferred and alternate)  
 Camp (existing and proposed)  
 Bridge  
 Prairie Creek Access Road (Apr 5, 2016)  
 Alternative Alignment (Apr 5, 2016)  
 Contour (40 m)  
 Watercourse  
 Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

**STATUS**  
 ISSUED FOR USE

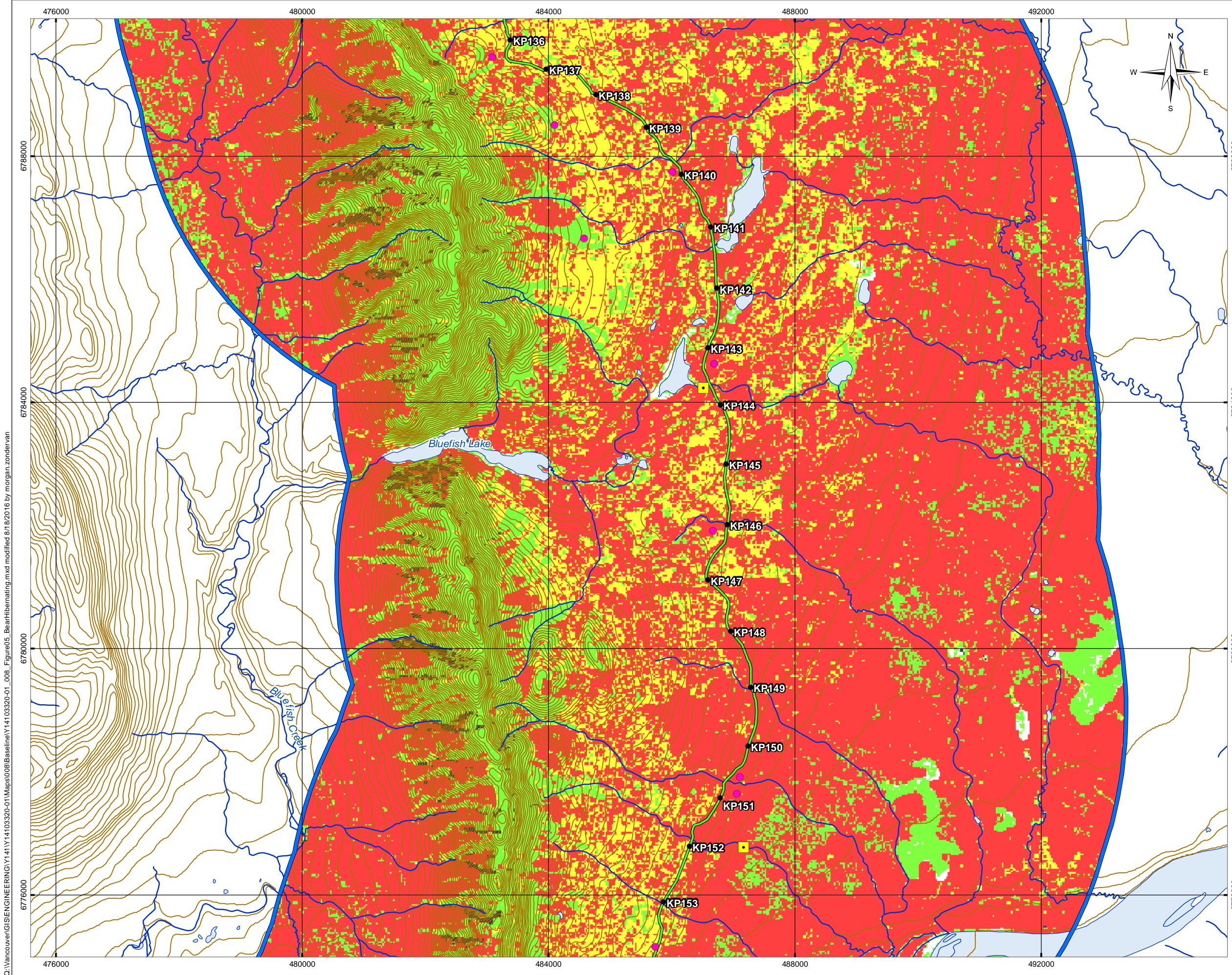
**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Hibernating  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> CANADIAN ZINC CORPORATION
Scale: 1:60,000 1 0.5 0 1 Kilometres		TETRA TECH EBA
<b>FILE NO.</b> Y14103320-01_008_Figure05_BearHibernating.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
	<b>APVD</b> KL	<b>REV</b> 0
<b>OFFICE</b> T: EBA-VANC	<b>DATE</b> August 18, 2016	

**Figure 5f**

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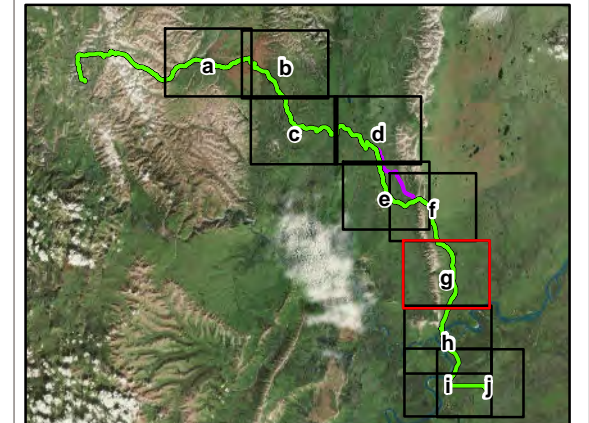


**LEGEND**

**Hibernating Potential**

- Null
- Low
- Moderate
- High
- Unknown

Bear Habitat Model Boundary  
 Proposed Borrow Pit (preferred and alternate)  
 Bridge  
 Prairie Creek Access Road (Apr 5, 2016)  
 Contour (40 m)  
 Watercourse  
 Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

**STATUS**  
 ISSUED FOR USE

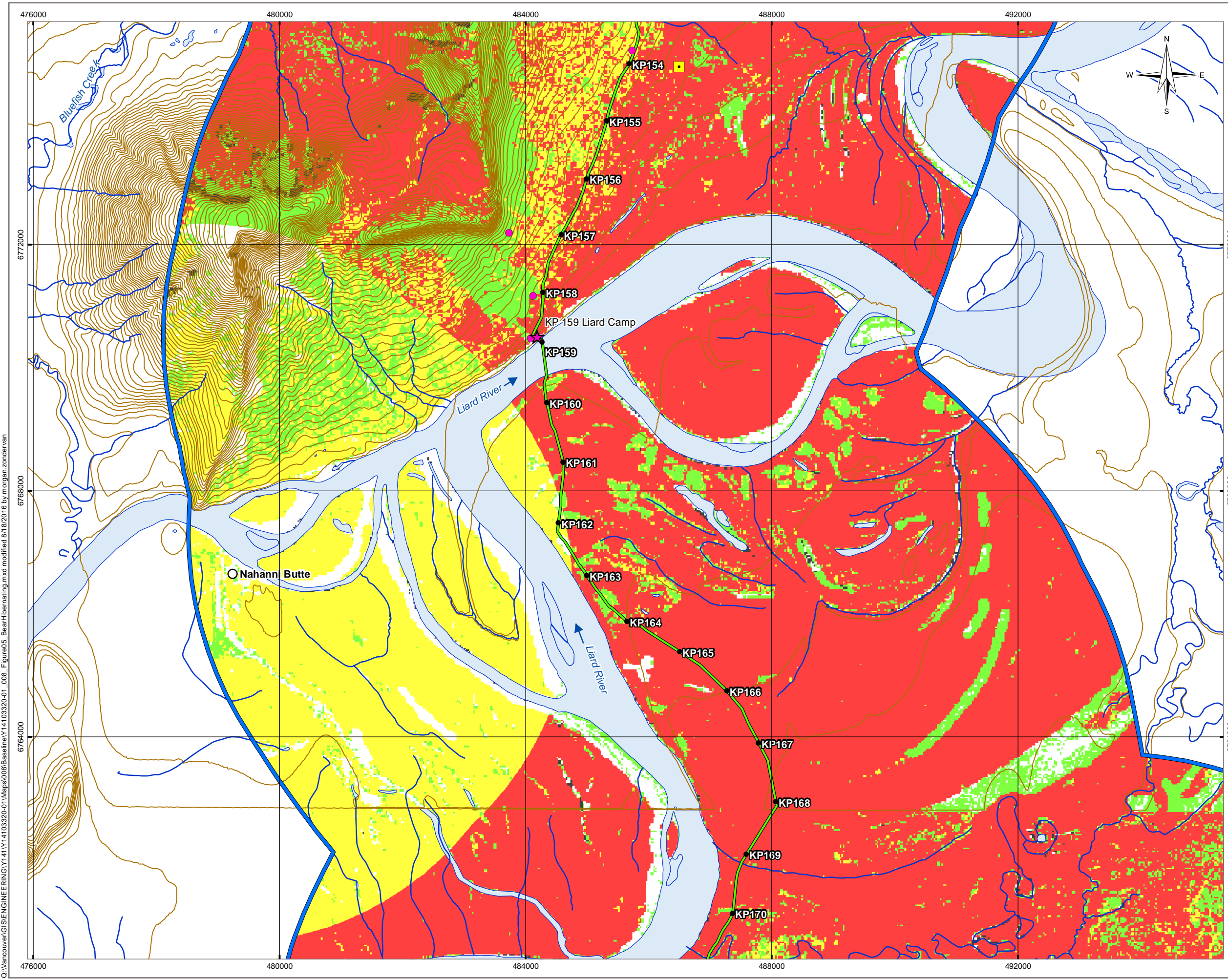
**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Hibernating  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:60,000 1 0.5 0 1 Kilometres		<b>CLIENT</b> 
<b>FILE NO.</b> Y14103320-01_008_Figure05_BearHibernating.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
	<b>APVD</b> KL	<b>REV</b> 0
<b>OFFICE</b> T EBA-VANC	<b>DATE</b> August 18, 2016	

**Figure 5g**

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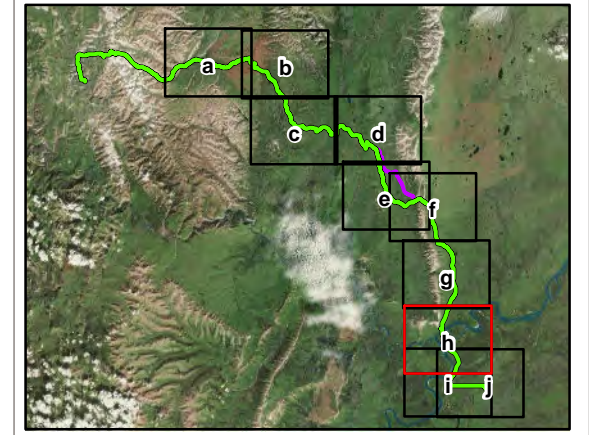


**LEGEND**

**Hibernating Potential**

- Null
- Low
- Moderate
- High
- Unknown

Bear Habitat Model Boundary  
 Proposed Borrow Pit (preferred and alternate)  
 Camp (existing and proposed)  
 Bridge  
 Prairie Creek Access Road (Apr 5, 2016)  
 Contour (40 m)  
 Watercourse  
 Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

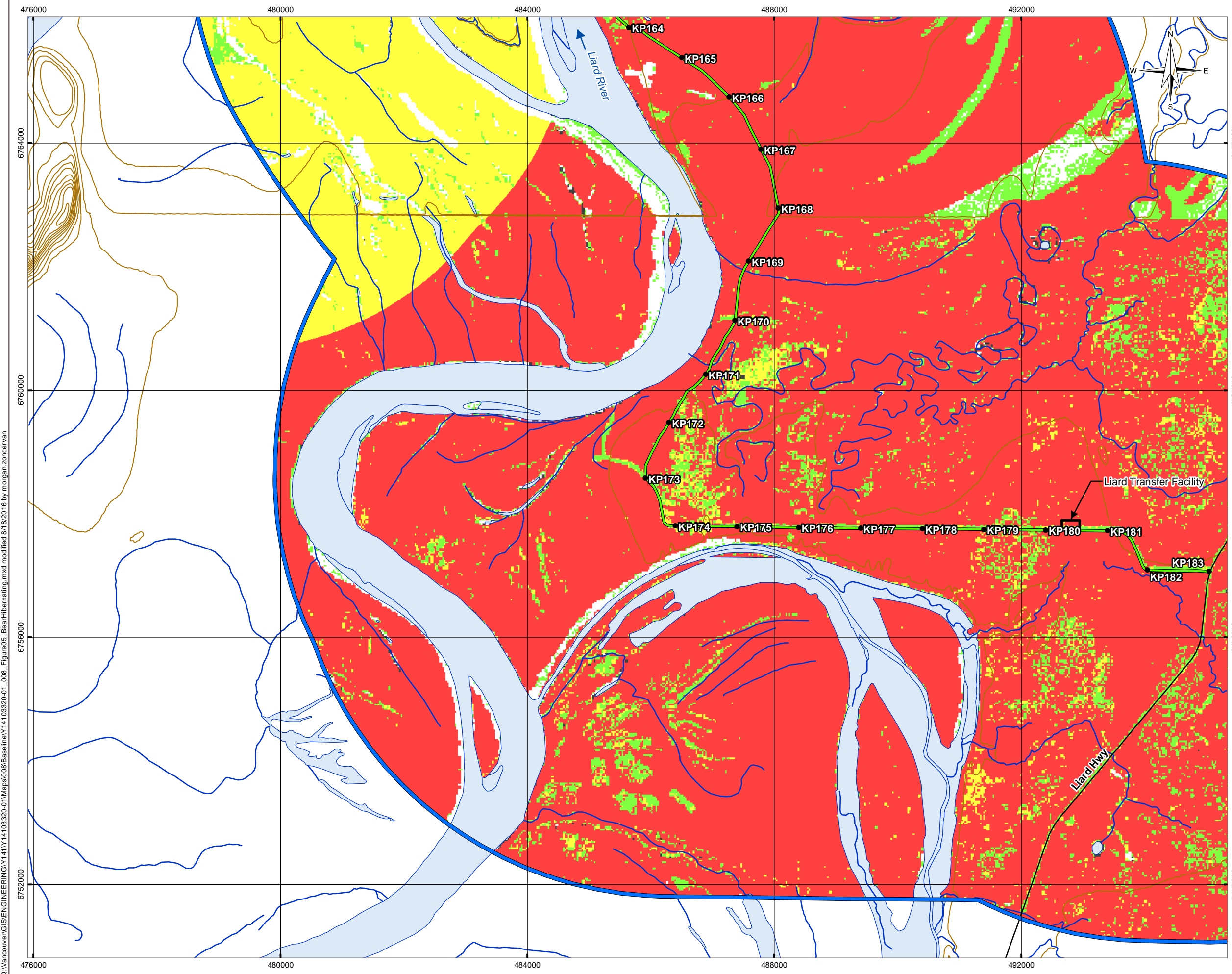
**STATUS**  
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**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Hibernating  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> CANADIAN ZINC CORPORATION
Scale: 1:60,000 1 0.5 0 1 Kilometres		TETRA TECH EBA
<b>FILE NO.</b> Y14103320-01_008_Figure05_BearHibernating.mxd	<b>Figure 5h</b>	
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>OFFICE</b> TlEBA-VANC	<b>APVD</b> KL	<b>REV</b> 0
<b>DATE</b> August 18, 2016		

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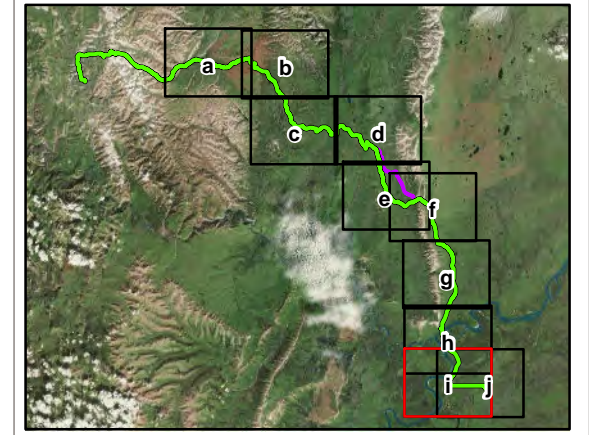
**LEGEND**

**Hibernating Potential**

- White: Null
- Green: Low
- Yellow: Moderate
- Red: High
- Black: Unknown

**Other Features:**

- Blue outline: Bear Habitat Model Boundary
- Black rectangle: Transfer Facility
- Green line: Prairie Creek Access Road (Apr 5, 2016)
- Black line: Liard Highway
- Brown line: Contour (40 m)
- Blue line: Watercourse
- Blue area: Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

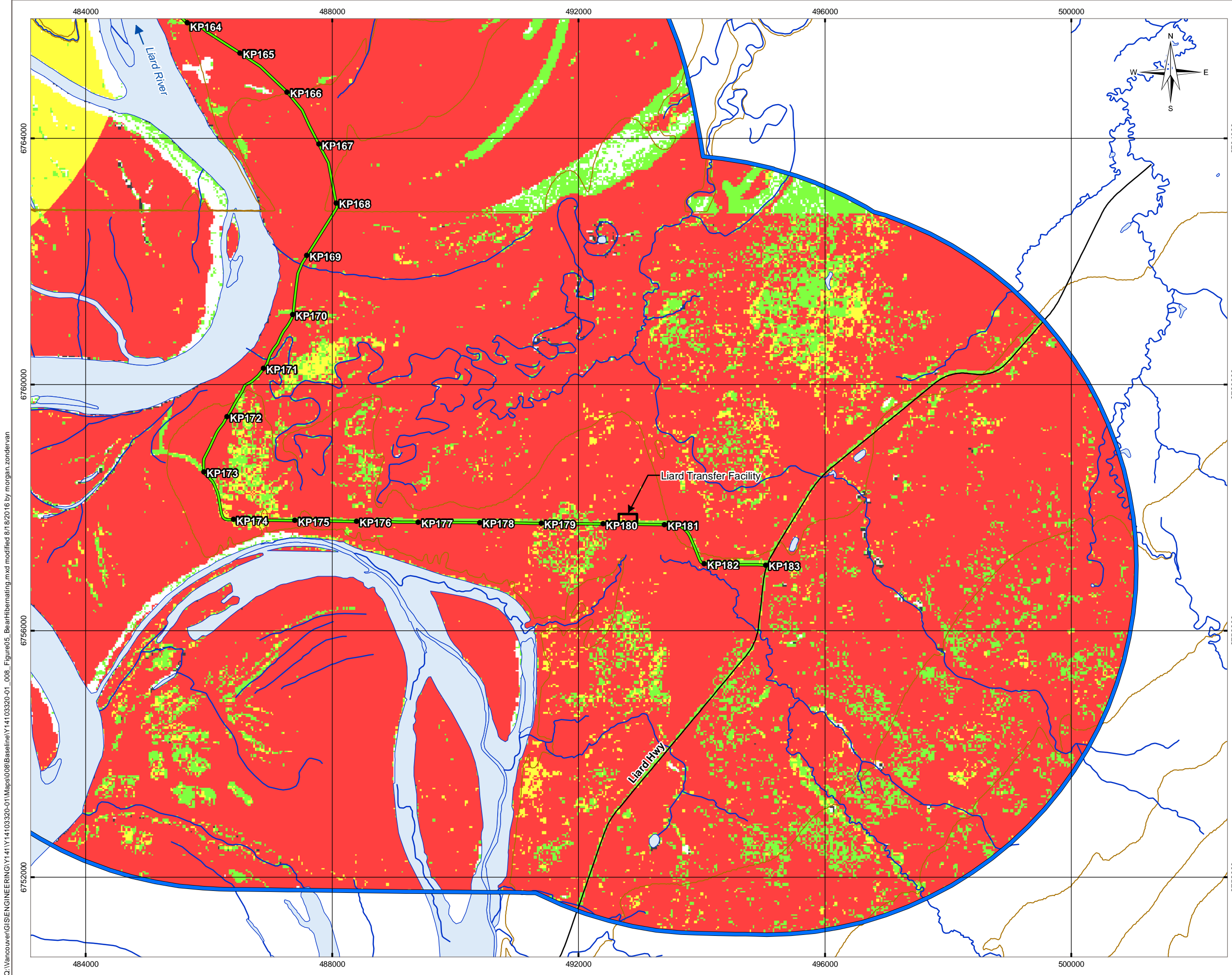
**STATUS**  
 ISSUED FOR USE

**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Hibernating  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> CANADIAN ZINC CORPORATION
Scale: 1:60,000 1 0.5 0 1 Kilometres		TETRA TECH EBA
<b>FILE NO.</b> Y14103320-01_008_Figure05_BearHibernating.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>APVD</b> KL	<b>REV</b> 0	<b>Figure 5i</b>
<b>OFFICE</b> Tl:EBA-VANC	<b>DATE</b> August 18, 2016	

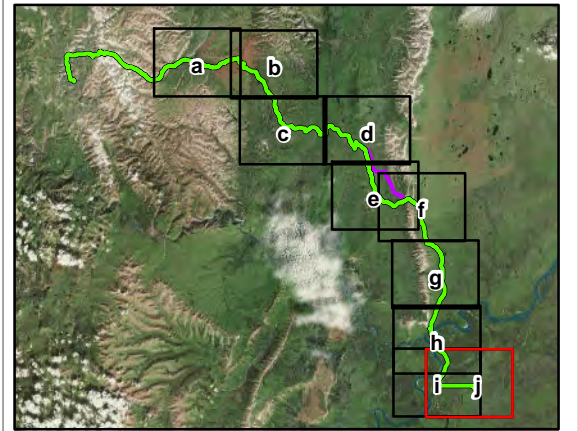
Q:\Vancouver\GIS\ENGINEERING\Y141Y14103320-01\Maps\008\Baseline\Y14103320-01\_008\_Figure05\_BearHibernating.mxd modified 8/18/2016 by morgn.zondervan



**LEGEND**

**Hibernating Potential**

- Null
- Low
- Moderate
- High
- Unknown
- Bear Habitat Model Boundary
- Transfer Facility
- Prairie Creek Access Road (Apr 5, 2016)
- Liard Highway
- Contour (40 m)
- Watercourse
- Waterbody



**NOTES**  
 Base data source: EOSD Data  
 Alignment, borrow sources, bridges and camps provided by AllNorth

**STATUS**  
 ISSUED FOR USE

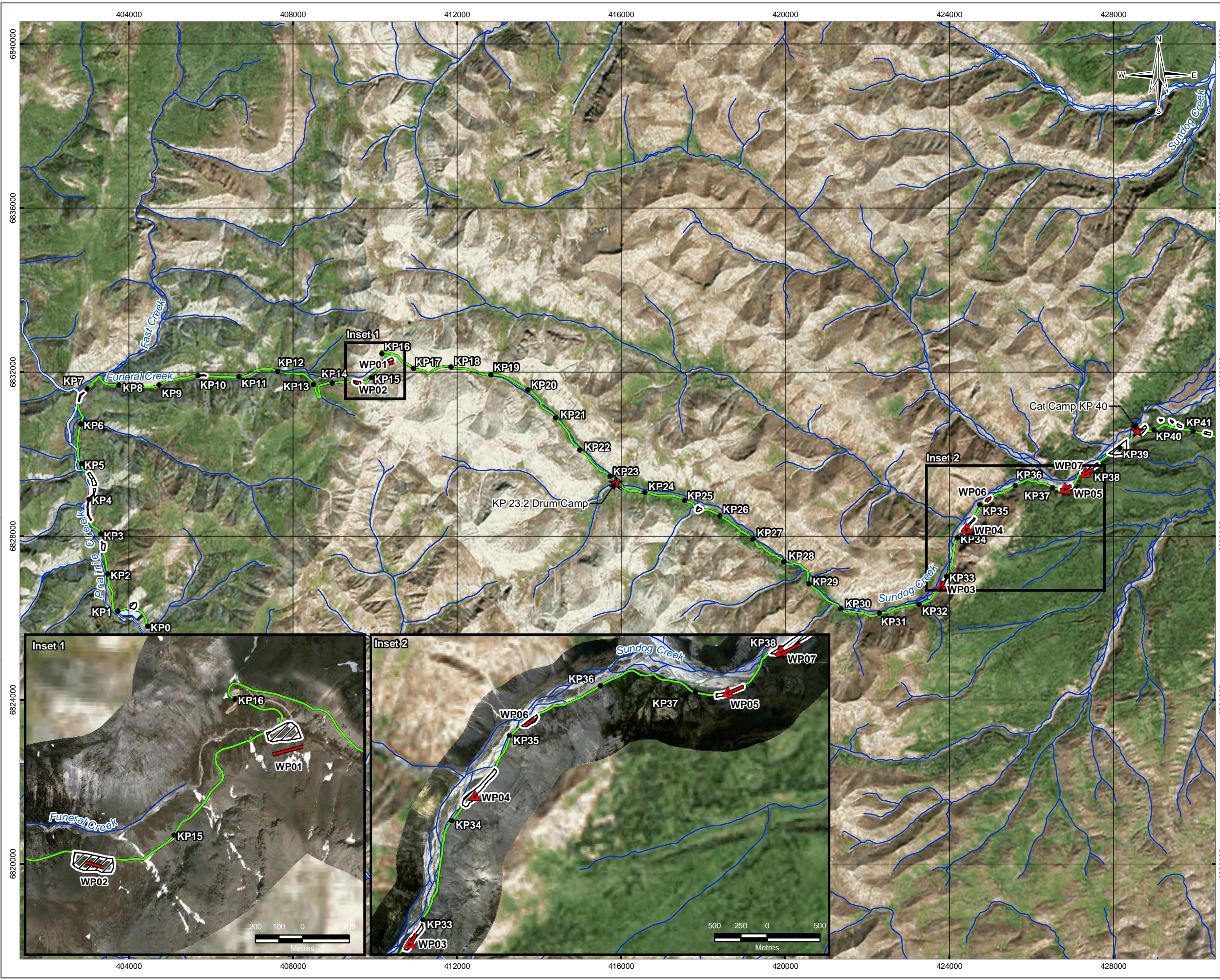
**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Black Bear Hibernating  
 Habitat Potential**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:60,000 1 0.5 0 1 Kilometres		
<b>FILE NO.</b> Y14103320-01_008_Figure05_BearHibernating.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
	<b>APVD</b> KL	<b>REV</b> 0
<b>OFFICE</b> Tl:EBA-VANC	<b>DATE</b> August 18, 2016	

**Figure 5j**

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**LEGEND**

- Visual Plot
- Pika Survey Transect
- Camp (existing and proposed)
- Prairie Creek Access Road (Apr 5, 2016)
- Proposed Borrow Pit (preferred and alternate)
- Watercourse
- Waterbody

**NOTES**  
 Base data source:  
 Imagery, alignment and camps provided by AllNorth  
 Additional Imagery from ESRI; Earthstar Geographics (1999)

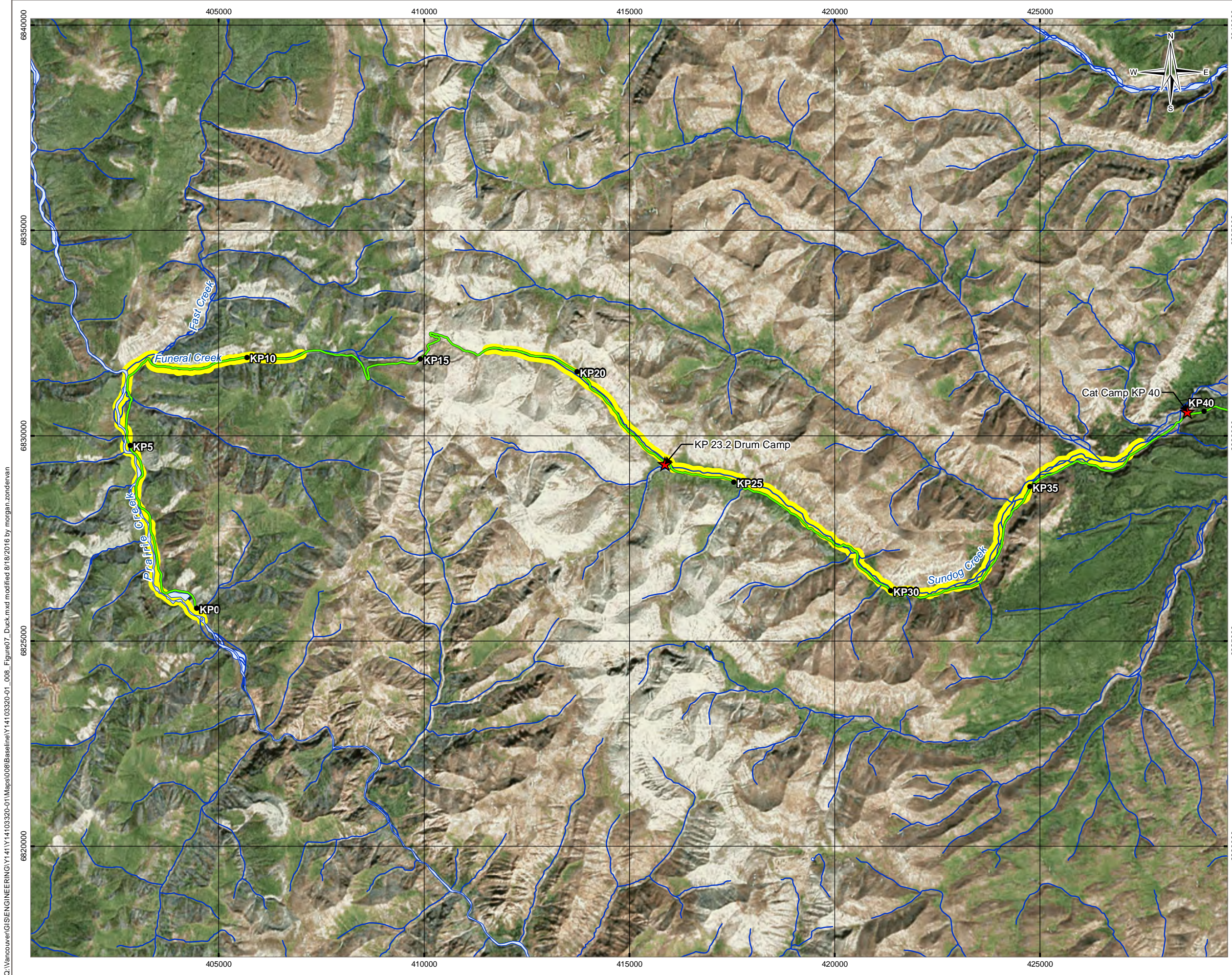
**STATUS**  
 ISSUED FOR USE

**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Collared Pika Survey Locations**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:90,000 2 1 0 2 Kilometres		<b>FILE NO.</b> Y14103320-01_008_Figure06_Pika.mxd
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
<b>OFFICE</b> Tl:EBA-VANC	<b>APVD</b> KL	<b>REV</b> 0
<b>DATE</b> August 18, 2016		<b>Figure 6</b>

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**LEGEND**

- Harlequin Duck Survey
- Camp (existing and proposed)
- Prairie Creek Access Road (Apr 5, 2016)
- Watercourse
- Waterbody

**NOTES**  
 Base data source:  
 Imagery, alignment and camps provided by AllNorth  
 Additional Imagery from ESRI; Earthstar Geographics (1999)

**STATUS**  
 ISSUED FOR USE

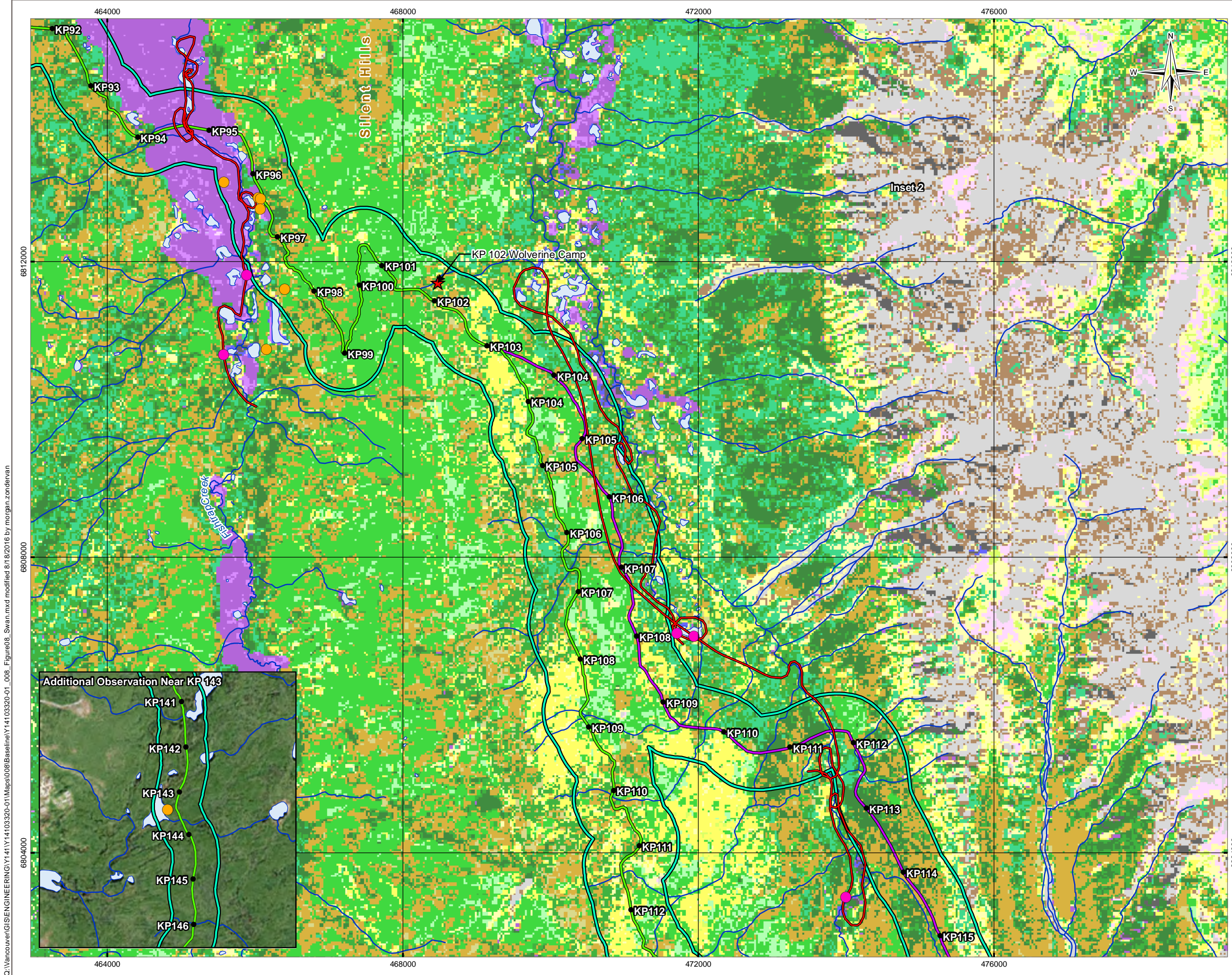
**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Harlequin Duck Survey Locations**

<b>PROJECTION</b> UTM Zone 10		<b>DATUM</b> NAD83		<b>CLIENT</b> 	
Scale: 1:90,000					
<b>FILE NO.</b> Y14103320-01_008_Figure07_Duck.mxd					
<b>PROJECT NO.</b> Y14103320-01.008		<b>DWN</b> MEZ	<b>CKD</b> YL	<b>APVD</b> KL	<b>REV</b> 0
<b>OFFICE</b> T/EBA-VANC		<b>DATE</b> August 18, 2016			

**Figure 7**

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### LEGEND

**Swan Observation**

- Incidental (Yellow circle)
- On Survey (Pink circle)
- Survey Track (Red line)
- Camp (existing and proposed) (Red star)
- Prairie Creek Access Road (Apr 5, 2016) (Green line)
- Alternative Alignment (Apr 5, 2016) (Purple line)
- 1 km Buffer (Green outline)
- Watercourse (Blue line)
- Waterbody (Blue area)

**Land Classification**

- Shadow (Grey)
- Water (Blue)
- Snow / Ice (Light Blue)
- Rock / Rubble (Light Grey)
- Exposed / Barren Land (Brown)
- Bryoids (Light Purple)
- Shrub - Tall (Yellow)
- Shrub - Low (Light Yellow)
- Wetland - Treed (Dark Purple)
- Wetland - Shrub (Medium Purple)
- Wetland - Herb (Light Purple)
- Herbs (Light Green)
- Coniferous - Dense (Dark Green)
- Coniferous - Open (Medium Green)
- Coniferous - Sparse (Light Green)
- Broadleaf - Dense (Dark Green)
- Broadleaf - Open (Medium Green)
- Mixedwood - Dense (Brownish Green)
- Mixedwood - Open (Light Brown)

**NOTES**  
 Base data source:  
 Alignment and camps provided by AllNorth  
 Imagery from ESRI: Earthstar Geographics (1999)

**STATUS**  
 ISSUED FOR USE

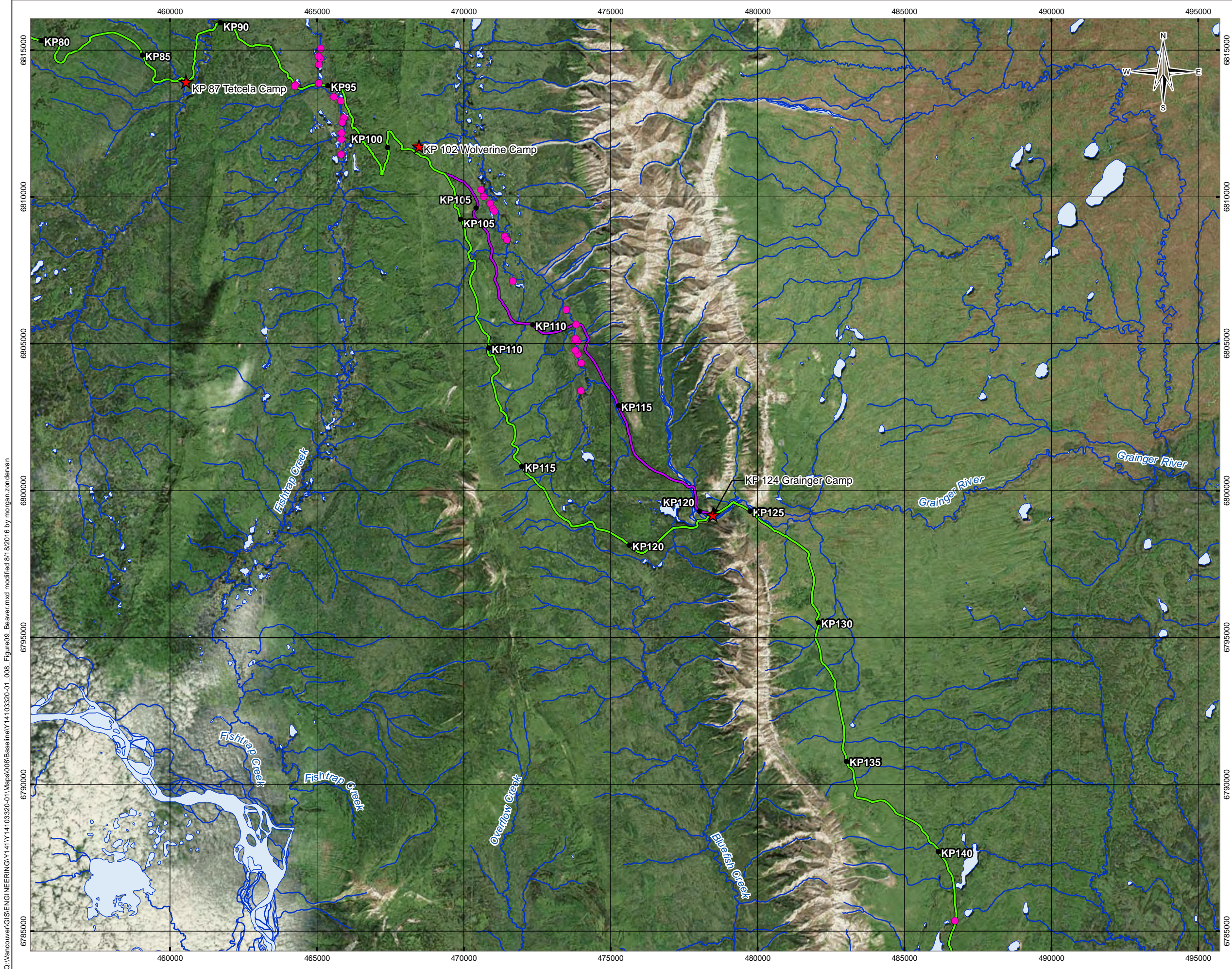
## PRAIRIE CREEK ALL-SEASON ROAD 2016 VEGETATION AND WILDLIFE BASELINE SURVEYS

### Trumpeter Swan Locations

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:50,000 1 0.5 0 1 Kilometres		<b>TETRA TECH EBA</b>
<b>FILE NO.</b> Y14103320-01_008_Figure08_Swan.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
	<b>APVD</b> KL	<b>REV</b> 0
<b>OFFICE</b> T/EBA-VANC	<b>DATE</b> August 18, 2016	

Figure 8

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**LEGEND**

- Beaver Observation
- ★ Camp (existing and proposed)
- Prairie Creek Access Road (Apr 5, 2016)
- Alternative Alignment (Apr 5, 2016)
- Watercourse
- Waterbody

**NOTES**  
 Base data source:  
 Alignment and camps provided by AllNorth  
 Imagery from ESRI: Earthstar Geographics (1999)

**STATUS**  
 ISSUED FOR USE

**PRAIRIE CREEK ALL-SEASON ROAD  
 2016 VEGETATION AND WILDLIFE  
 BASELINE SURVEYS**

**Beaver Locations**

<b>PROJECTION</b> UTM Zone 10	<b>DATUM</b> NAD83	<b>CLIENT</b> CANADIAN ZINC CORPORATION
Scale: 1:125,000 Kilometres		<b>TETRA TECH EBA</b>
<b>FILE NO.</b> Y14103320-01_008_Figure09_Beaver.mxd		
<b>PROJECT NO.</b> Y14103320-01.008	<b>DWN</b> MEZ	<b>CKD</b> YL
	<b>APVD</b> KL	<b>REV</b> 0
<b>OFFICE</b> T/EBA-VANC	<b>DATE</b> August 18, 2016	

**Figure 9**

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# PHOTOGRAPHS

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- Photo 1 Evidence of Black Bear feeding on ants was documented in a variety of habitat types, including near the Tetcela River.
- Photo 2 Black Bear stripping the bark of white spruce and jack pine was documented in Mixedwood Dense and Mixedwood Open ecotypes.
- Photo 3 Looking East on Borrow Source14 (survey station WP02). Note the absence of talus habitat available for Collared Pikas.
- Photo 4 On Borrow Source 16 (survey station WP01), looking west along the existing road. Note the absence of talus habitat available for Collared Pikas on the borrow
- Photo 5 Looking East across Borrow Source 33 (survey station WP03) where Collared Pikas were heard.
- Photo 6 Collared Pika latrine observed at Borrow Source 33.
- Photo 7 Aerial view of Borrow Source 34 (survey station WP04) looking East.
- Photo 8 Looking West across Borrow Source 37 (survey station WP05).
- Photo 9 Looking East across Borrow Source 35 and the Collared Pika observation station WP06.
- Photo 10 Looking West across Borrow Source 38 (survey station WP07).
- Photo 11 Old Collared Pika haypiles, as seen here, were observed at Borrow Source 38 (survey station WP07).
- Photo 12 At proposed all-season road crossing at Fishtrap Creek looking North to a series of wetlands.
- Photo 13 Trumpeter Swans, as seen here, were primarily observed in the Fishtrap Creek and wetland complex east of the Silent Hills.
- Photo 14 Evidence of Beaver was noted in Fishtrap Creek.



**Photo 1:** Evidence of Black Bear feeding on ants was documented in a variety of habitat types, including near the Tetcela River.



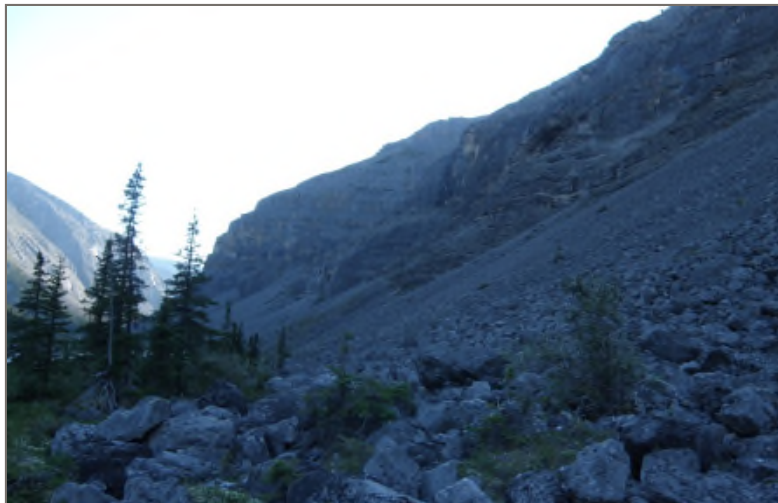
**Photo 2:** Black Bear stripping the bark of white spruce and jack pine was documented in Mixedwood Dense and Mixedwood Open ecotypes.



**Photo 3:** Looking East on Borrow Source 14 (survey station WP02). Note the absence of talus habitat available for Collared Pikas.



**Photo 4:** On Borrow Source 16 (survey station WP01), looking west along the existing road. Note the absence of talus habitat available for Collared Pikas on the borrow.



**Photo 5:** Looking East across Borrow Source 33 (survey station WP03) where Collared Pikas were heard.



**Photo 6:** Collared Pika latrine observed at Borrow Source 33.



**Photo 7:** Aerial view of Borrow Source 34 (survey station WP04) looking East.



**Photo 8:** Looking West across Borrow Source 37 (survey station WP05).



**Photo 9:** Looking East across Borrow Source 35 and the Collared Pika observation station WP06.



**Photo 10:** Looking West across Borrow Source 38 (survey station WP07).



**Photo 11:** Old Collared Pika haypiles, as seen here, were observed at Borrow Source 38 (survey station WP07).



**Photo 12:** At proposed all-season road crossing at Fishtrap Creek looking North to a series of wetlands.



**Photo 13:** Trumpeter Swans, as seen here, were primarily observed in the Fishtrap Creek and wetland complex east of the Silent Hills.



**Photo 14:** Evidence of Beaver was noted in Fishtrap Creek.

# APPENDIX A

## TETRA TECH EBA'S GENERAL CONDITIONS

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# GENERAL CONDITIONS

## NATURAL SCIENCES

This report incorporates and is subject to these "General Conditions".

### 1.0 USE OF REPORTS AND OWNERSHIP

This report pertains to a specific site, a specific development or activity, and/or a specific scope of work. The report may include plans, drawings, profiles and other supporting documents that collectively constitute the report (the "Report").

The Report is intended for the sole use of Tetra Tech EBA's Client (the "Client") as specifically identified in the Tetra Tech EBA Services Agreement or other Contract entered into with the Client (either of which is termed the "Services Agreement" herein). Tetra Tech EBA does not accept any responsibility for the accuracy of any of the data, analyses, recommendations or other contents of the Report when it is used or relied upon by any party other than the Client, unless authorized in writing by Tetra Tech EBA.

Any unauthorized use of the Report is at the sole risk of the user. Tetra Tech EBA accepts no responsibility whatsoever for any loss or damage where such loss or damage is alleged to be or, is in fact, caused by the unauthorized use of the Report.

Where Tetra Tech EBA has expressly authorized the use of the Report by a third party (an "Authorized Party"), consideration for such authorization is the Authorized Party's acceptance of these General Conditions as well as any limitations on liability contained in the Services Agreement with the Client (all of which is collectively termed the "Limitations on Liability"). The Authorized Party should carefully review both these General Conditions and the Services Agreement prior to making any use of the Report. Any use made of the Report by an Authorized Party constitutes the Authorized Party's express acceptance of, and agreement to, the Limitations on Liability.

The Report and any other form or type of data or documents generated by Tetra Tech EBA during the performance of the work are Tetra Tech EBA's professional work product and shall remain the copyright property of Tetra Tech EBA.

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

### 2.0 ALTERNATIVE REPORT FORMAT

Where Tetra Tech EBA submits both electronic file and hard copy versions of the Report or any drawings or other project-related documents and deliverables (collectively termed Tetra Tech EBA's "Instruments of Professional Service"), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed version archived by Tetra Tech EBA shall be deemed to be the original. Tetra Tech EBA will archive the original signed and/or sealed version for a maximum period of 10 years.

Both electronic file and hard copy versions of Tetra Tech EBA's Instruments of Professional Service shall not, under any circumstances, be altered by any party except Tetra Tech EBA. Tetra Tech EBA's Instruments of Professional Service will be used only and exactly as submitted by Tetra Tech EBA.

Electronic files submitted by Tetra Tech EBA have been prepared and submitted using specific software and hardware systems.

Tetra Tech EBA makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

### 3.0 STANDARD OF CARE

Services performed by Tetra Tech EBA for the Report have been conducted in accordance with the Services Agreement, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Report. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Report.

Tetra Tech EBA professionals are bound by their ethical commitments to act within the bounds of all pertinent regulations. In certain instances, observations by Tetra Tech EBA of regulatory contravention may require that regulatory agencies and other persons be informed. The client agrees that notification to such bodies or persons as required may be done by Tetra Tech EBA in its reasonably exercised discretion.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of Tetra Tech EBA.

### 4.0 ENVIRONMENTAL ISSUES

The ability to rely upon and generalize from environmental baseline data is dependent on data collection activities occurring within biologically relevant survey windows.

### 5.0 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with Tetra Tech EBA with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for Tetra Tech EBA to properly provide the services contracted for in the Services Agreement, Tetra Tech EBA has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

### 6.0 INFORMATION PROVIDED TO TETRA TECH EBA BY OTHERS

During the performance of the work and the preparation of this Report, Tetra Tech EBA may have relied on information provided by persons other than the Client.

While Tetra Tech EBA endeavours to verify the accuracy of such information, Tetra Tech EBA accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

## 7.0 GENERAL LIMITATIONS OF REPORT

This Report is based solely on the conditions present and the data available to Tetra Tech EBA at the time the data were collected in the field or gathered from publically available databases.

The Client, and any Authorized Party, acknowledges that the Report is based on limited data and that the conclusions, opinions, and recommendations contained in the Report are the result of the application of professional judgment to such limited data.

The Report is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present at or the development proposed as of the date of the Report requires a supplementary investigation and assessment.

It is incumbent upon the Client and any Authorized Party, to be knowledgeable of the level of risk that has been incorporated into the project design or scope, in consideration of the level of the environmental baseline information that was reasonably acquired to facilitate completion of the scope.

The Client acknowledges that Tetra Tech EBA is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of property, the decisions on which are the sole responsibility of the Client.

## 8.0 JOB SITE SAFETY

Tetra Tech EBA is only responsible for the activities of its employees on the job site and was not and will not be responsible for the supervision of any other persons whatsoever. The presence of Tetra Tech EBA personnel on site shall not be construed in any way to relieve the Client or any other persons on site from their responsibility for job site safety.

# APPENDIX B

## BLACK BEAR SPECIES ACCOUNT

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## APPENDIX B: BLACK BEAR SPECIES ACCOUNT

### 1.0 INTRODUCTION

The proposed all-season road is located primarily within the Taiga Cordillera and Taiga Plains Ecozones of the Northwest Territories (NWT) and is characterized by several significant topographic features including the Mackenzie Mountains and the Nahanni Ranges. Black Bears are common throughout the boreal forests of the NWT (including the Taiga Cordillera and Taiga Plains ecozones), and could occur primarily in the boreal forests along the proposed all-season road from KP 40 to the Liard Highway (Table 1).

**Table 1: Black Bear at a Glance**

<b>Black Bear (<i>Ursus americanus</i>)</b>	
<b><i>NWT Population Summary</i></b>	
Conservation Status	Assessed as Not At Risk by COSEWIC (1999) and ranked as Secure in the NWT
Trend	Stable in distribution, but unknown population trend (ENR 2012).
Size	Conservative estimate of 10,000 bears (ENR 2012).
Density	Estimated at 10 bears/100 km <sup>2</sup> (ENR 2012).
Sensitivities and Threats	Human developments and activities and defense of life kills
<b><i>Relationship with the Prairie Creek All Season Road</i></b>	
Possible Presence	Predominantly in the boreal forest zone from KP 40 to the Liard Highway
Seasons of Use	Year round
Key Habitats	Coniferous and deciduous forests, swamps, and berry patches (ENR 2012).

Black Bears have been studied across their North American range, including many aspects of their biology including habitat associations, denning and forage requirements, and population dynamics. NWT specific studies were reviewed, where publically available (i.e., Clarkson 1993, MacDougall 1997) to supplement this species account.

### 2.0 ECOLOGY AND KEY HABITAT REQUIREMENTS

#### 2.1 General

Black Bears are omnivores. Their diet is primarily composed of vegetation, but animal matter is taken opportunistically, especially winter-killed ungulates, moose and caribou calves, insects, small mammals, birds/eggs, and possibly fish. In general, Black Bears select new vegetative growth and over-wintered carcasses in the spring, vegetative material (i.e., grass, sedge, forb, fruit) and insects in the summer, and berries in the fall (Larivière 2001; MacDougall 1997). During the growing season, the presence of food is the primary factor influencing Black Bear habitat selection, and they may travel extensively within their home ranges as seasonal foods become available (Larivière 2001; Unsworth 1984). In Alberta, the average male home range size is estimated at 119 km<sup>2</sup>, and the female home range size at 20 km<sup>2</sup> (Larivière 2001). Although home ranges vary in shape, this represents an assumed circular radius of 6.156 to 2.524 km.

Black Bears prefer forests and shrublands, but are known to occupy burned areas, wetlands, riparian areas, and alpine meadow (Larivière 2001; Unsworth 1984). Unsworth (1984) determined Black Bears select forests in all growing seasons, and open forests with shrub understories, riparian, and aspen forests in the summer/fall for foraging. Meadows were important feeding habitats in the spring, and rock/talus were avoided throughout the growing season (Unsworth 1984). In northeastern Alberta, Black Bears chiefly forage in upland mixedwoods, with only a few foraging in bogs and fens (Latham et al. 2011). In general during the growing season, Black Bears select lower topographic slopes and stream bottoms, avoid ridgetops and upper slopes, and use all other topographic slope types in proportion to their availability across the landscape (Unsworth 1984).

Disturbed habitats, including fire-influenced habitats, are also known to provide good Black Bear habitat. Black Bears benefit from regenerating burns, which commonly provide summer and fall forage resources, such as berries and ants in downed and burned trees (Larivière 2001).

Black Bears may occur at all elevations, including alpine tundra; however, they favour forests and shrublands that provide suitable forage and security cover. In particular, they are vulnerable to Grizzly Bear predation, and may avoid areas, such as alpine tundra, that are commonly occupied by Grizzly Bears (Clarkson 1993). In northwestern Montana, Aune (ND) determined that Black Bears selected closed canopied forest habitat more than Grizzly Bears, and occupied rock, talus, grasslands, riparian shrub, and riparian complex habitats less often than Grizzly Bears.

In the winter, Black Bears require security and thermal cover, in the form of dens, for hibernating, parturition, and early maternal care. Parturition occurs in mid-January or early February while in the den. Litter size ranges from 1 to 4, which is positively correlated to the early winter condition of the mother (Larivière 2001). Cubs remain with the mother for approximately 16 months, and will den with the sow over the winter until the following spring/summer (Larivière 2001; Zapisocki et al. 1998). In the week(s) before entering and after emerging from the den, Black Bears (males and females) concentrate their activity near the den site, particularly sows emerging with cubs (Clarkson 1993; Kolenosky and Strathearn ND).

In the non-denning period, Black Bears will seek security cover primarily in mature forests and shrublands. Micro-habitats providing cool shady areas for relief from hot weather, and shelter from precipitation, provide thermal cover. Black Bears will bed in shade provided by micro-habitats, north and east aspects, and in lower slopes, and avoid bedding in south and west aspects and upper slopes/ridge tops (Unsworth 1984).

Unsworth (1984) indicated that forests adjacent to drainages and densely vegetated riparian habitats provide important travel habitat. To reduce the likelihood of Black Bear-human encounters at camps, Yukon Environment (2008) recommends a minimum 30 m setback distance from the high water mark of waterbodies, including the riparian area.

## **2.2 Habitat Use (Life Requisites and Seasons)**

Food availability is the primary factor that influences Black Bear habitat selection during the growing season (Larivière 2001; Unsworth 1984; Zapisocki et al. 1998). Habitats that provide adequate thermal and security cover influence winter denning sites and spring, summer, fall bedding. Life requisites evaluated include food, security, and hibernating.

Food, security, and hibernating life requisites are divided into: 1) growing, and 2) winter seasons of use. The growing season includes habitats with available food and security cover from early June to late

September. The winter season encompasses specific security and thermal requirements necessary for hibernating from early October to late May (Table 2).

**Table 2: Growing and Winter Season Classification for Black Bear Habitat**

Season	Month(s)	Comments
<b>Growing Season (early June to late September)</b>		
Spring	June	Den emergence dates vary; however, Clarkson (1993) indicated bears begin to emerge in late April.
Summer	July and August	-
Fall	September	-
<b>Winter Season (early October to late May)</b>		
Winter	October to May	Den entrance dates vary depending on the physical condition of the individual (including pregnancy), food availability, and cub dependents.

### 2.2.1 Food – Growing Season

Black Bear habitat quality is based primarily on the abundance of seasonally important food items. In the spring, bears gravitate towards areas with early-emerging vegetation and over-wintered berries and carcasses (Zapisocki et al. 1998). In summer, bears typically consume a variety of species of forbs, horsetails, grasses/sedges, and insects. By fall time, their diet shifts as the nutritional quality of many plants decline and berries become ripe (Zapisocki et al. 1998).

MacDougall (1997) analyzed bear scat (not identified to species) in and around the Rabbitkettle Lake area. Results indicated that overwintered common bearberry (*Arctostaphylos uva-ursi*), common horsetail (*Equisetum arvense*), ants, and mammals comprised the greatest proportion of spring diets (MacDougall 1997). By summer, bears shifted their diets to primarily include buffaloberry (*Shepherdia canadensis*), horsetail, other fleshy fruits, ants, and small mammals/birds (MacDougall 1997). Buffaloberry, other fleshy fruit (especially alpine bilberry *Vaccinium uliginosum*), and horsetail continue to be most important into the fall (MacDougall 1997). Grasses and shrubs, as well as red bearberry (*Arctostaphylos rubra*), red-osier dogwood (*Cornus stonoifera*), crowberry (*Empetrum nigrum*), saskatoon (*Amelachier alnifolia*), fireweed (*Epilobium angustifolium*), prickly rose (*Rosa acicularis*), and rock cranberry (*Vaccinium vitis-idaea*) were considered minor components of their diet.

In northwestern Montana, Aune (ND) reported generally similar diets. Overall, grass, forbs, fruiting shrubs, and insects were considered important Black Bear food. Graminoids (e.g., *Carex* and *Poa*) and insects were important throughout the growing season, but other forage items varied over time (Aune ND). Forbs, particularly moist-site species such as dandelion (*Taraxacum* spp.), pea-vine (*Lathyrus* spp.), sweet cicely (*Osmorhiza* spp.), and cow parsnip (*Heraclium lanatum*) were most important in the summer and fall. Fruit-bearing shrubs, such as bearberry, buffaloberry, chokecherry (*Prunus virginiana*), and saskatoon continued their importance into the fall.

### 2.2.2 Security – Growing Season

In the non-winter period, security cover is primarily in the form of large diameter trees for escape and thick forests/shrublands to hide from predators (i.e., large male bears and timber wolves; Kolenosky and

Strathearn ND). Mature forests with poorly developed understories on steep slopes provide secure bedding habitat, which allow visibility of approaching danger and escape trees (Unsworth 1984).

Zapisocki et al. (1998) indicate Black Bears generally remain within 180 to 200 m of forest cover. In west-central Idaho, feeding Black Bears selected habitats in proportion of availability independent of the presence of roads; however, females avoid roads by at least 50 m when bedding (Unsworth 1984). In west-central Alberta, habitat suitability models predicted that Black Bear food and security habitat are adversely affected at least 250 m from active roads and within 5 km of a community (Zapisocki et al. 1998).

### 2.2.3 Hibernating – Winter Season

Denning is initiated when food becomes limiting, adequate snow cover for insulation is available, and a negative energy balance occurs (Larivière 2001; Gaines 2003). Yearlings, pregnant females, and females with cubs generally den earlier than adults and subadults (Kolenosky and Strathearn ND; Larivière (2001). No evidence of den site fidelity was reported in east-central Ontario; however, Larivière (2001) indicates dens may be reused in subsequent years by either the same or a different individual. In the interior of Alaska, reuse of dens was low (18%) (Smith et al. 1994).

Forty-one radio-collared Black Bears in and around Norman Wells were monitored from 1985 to 1987. During this time, Black Bears entered their dens from early to mid-October, and emerged from late April to late May (Clarkson 1993). Seven den sites were later visited to record site characteristics. Although den locations and site characteristics varied, sandy soils, mixed spruce forests, and south facing slopes were the most consistent feature among the den sites (Clarkson 1993). Dens were found at a variety of elevations, ranging from lowlands to rock outcrops (Clarkson 1993). A single den located in a spruce-alder lowland with organic soils was described to be in a characteristically poor, wet swampy habitat and the den was partially collapsed (Clarkson 1993). Den fidelity was not reported during this study, but the bears continued to den in the same area in consecutive years (Clarkson 1993).

In northeastern Alberta, Tietje and Ruff (1980) found Black Bears selected mixedwood and coniferous mature forests, and avoided wetlands for denning. In east-central Ontario, Black Bears selected mature mixedwood and deciduous (white birch and poplar) forests on moderate to well-drained upland sites; however, 3% denned in lowland poorly drained areas consisting of black spruce-cedar-larch (Kolenosky and Strathearn ND). In the interior of Alaska, Black Bears selected willow/alder shrublands and black spruce forests more often than these habitats were available, but also denned in white spruce and birch/aspen forests (Smith et al. 1994). In general, Black Bears were also found to avoid wet heath meadow bogs, but a few dens were recorded in drier micro-habitats (Smith et al. 1994).

Although specific denning habitat can vary by region (Larivière 2001), several researchers indicate that there is a correlation with the presence of roads. Davis (1996) reported some female Black Bears using dens within 50 m of roads (forestry roads and highways), including 50 m from bridge construction. Immell et. al (2013) reported the average distance of dens from roads (paved and gravel) to be 167 m (n = 69); however, this study did not incorporate any assessment of habitat availability. Tietje and Ruff (1980) and Goodrich and Berger (1994) indicated Black Bears used dens beyond 300 m and 800 m from a road, respectively, even though suitable habitat existed at shorter distances.

Black Bears typically excavate dens; however, hollow logs/trees, rock caves, and piles of human-made debris are used (Kolenosky and Strathearn ND; Clarkson 1993; Larivière 2001). Excavations are commonly under the base of standing trees or stumps, under fallen logs, or directly into the soil (Kolenosky and Strathearn ND).

## 3.0 HABITAT SUITABILITY MODEL

### 3.1 Ecological Attributes

Table 3 outlines how Black Bear life requisites (food, security, and hibernating) are associated with the specific ecological attributes (e.g., land cover type, canopy closure) for use in a habitat suitability model.

**Table 3: Ecological Attributes for Black Bear Food, Security, and Hibernating Life Requisites**

Life Requisite	Ecological Attributes
Food	<ul style="list-style-type: none"> <li>▪ <b>Site:</b> land cover type*, watercourses</li> <li>▪ <b>Vegetation:</b> land cover type, canopy closure</li> </ul>
Security	<ul style="list-style-type: none"> <li>▪ <b>Site:</b> land cover type*</li> <li>▪ <b>Vegetation:</b> land cover type, canopy closure</li> </ul> <p>Note: micro-habitat features that provide non-winter thermal habitat are generally too small to map, and are therefore not represented by these ecological attributes.</p>
Hibernating	<ul style="list-style-type: none"> <li>▪ <b>Site:</b> land cover type*</li> <li>▪ <b>Vegetation:</b> land cover type, canopy closure</li> </ul>

\* Includes topographic position, aspect, drainage, and Black Bear forage cover collected during the July 2016 field survey

### 3.2 Model Ratings

As recommended in the British Columbia Wildlife Habitat Ratings Standards (RIC 1999b), a 4-class rating scheme that includes: high (1), moderate (2), low (3), and nil (4) was used since there is a moderate level of knowledge on Black Bear habitat requirements in the NWT. These ratings express the ability of the ecological units to fulfill the habitat requirements for Black Bear feeding (growing season), security (growing season), and hibernating (winter season).

Table 4 outlines the assumptions considered in rating an ecosystem unit's ability to support Black Bear feeding, security, and hibernating life requisites. Table 5 provides the habitat ratings used for model development.

For the purposes of this habitat model, buffer distances from the approved winter road and transfer facilities, existing Nahanni Butte winter access road, or the Liard Highway were not included. The mine-related developments are approved for winter construction and operations, and road-related activities would commence at a time when Black Bears are already hibernating. Year-round disturbances from the community of Nahanni Butte are included, and follow a Black Bear setback distance used in west-central Alberta (Zapisocki et al. 1998).

In addition, a modifier was used to rate riparian areas for the feeding and security (growing season) life requisites. A 50 m buffer distance from any watercourse was selected to represent a higher food (and movement) habitat potential. This buffer distance was selected arbitrarily, but based on the Yukon Environment's (2008) recommendation for camps to be located at least 30 m from the high water mark.

**Table 4: Habitat Rating Assumptions for Black Bear**

Rated Life Requisite and Season	Ratings Assumptions
Feeding – Growing Season	<p><b>Site:</b></p> <ul style="list-style-type: none"> <li>▪ Disturbance modifier: habitats within 5 km of Nahanni Butte are rated 1 value lower than the same habitats &gt;5 km away.</li> <li>▪ Riparian modifier: habitats within 50 m of a watercourse are rated 1 value higher.</li> <li>▪ Mid- and upper slopes and regenerating burn areas are assumed to support higher density of ants than compared to lower slopes. These habitats rated higher than lower slopes and unburnt areas.</li> </ul> <p><b>Vegetation:</b></p> <ul style="list-style-type: none"> <li>▪ Habitats characterized by sedges/graminoids rated lower than fruit-bearing habitats.</li> <li>▪ Habitats with high coarse woody debris cover (both standing and downed debris) rated as high feeding habitat.</li> <li>▪ Habitats that support a high cover of buffaloberry, bearberry, rock cranberry, and horsetails are rated higher than units with trace cover of these species. Assumes berry production dependent on cover (Zapisocki et al. 1998).</li> <li>▪ Habitat types dominant in lower topographic position and stream bottoms rated highest, followed by mid- and upper-slopes. Upper slopes and ridgetops rated the lowest.</li> </ul>
Security – Growing Season	<p><b>Site:</b></p> <ul style="list-style-type: none"> <li>▪ Disturbance modifier: habitats within 5 km of Nahanni Butte are rated 1 value lower than the same habitats &gt;5 km away.</li> </ul> <p><b>Vegetation:</b></p> <ul style="list-style-type: none"> <li>▪ Mature upland forests assumed to support large-diameter trees and rated higher than lowland forest types.</li> <li>▪ Habitats with thick shrub cover rated higher than open understory habitats.</li> <li>▪ Forests with open canopies assume to support higher shrub understory cover. Forests with open canopies rated higher than dense forests.</li> </ul>
Hibernating – Winter Season	<p><b>Site:</b></p> <ul style="list-style-type: none"> <li>▪ Southern aspects provide suitable thermal requirements, and are rated highest. Western and eastern aspects rated moderately, and northern aspects rated the lowest.</li> <li>▪ Disturbance modifier: habitats within 5 km of Nahanni Butte are rated 1 value lower than the same habitats &gt;5 km away.</li> </ul> <p><b>Vegetation:</b></p> <ul style="list-style-type: none"> <li>▪ Densely canopied forests provide suitable thermal cover. Thus densely canopied coniferous and mixedwood forest types ranked the highest denning value, followed by open coniferous and mixedwood, and dense broadleaf forest.</li> <li>▪ Coniferous forests and shrublands (tall and low shrub) provide appropriate security cover, and thus provide higher denning value.</li> <li>▪ Forests with a higher percent of standing and downed woody debris provide more suitable denning sites.</li> </ul>

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Rated Life Requisite and Season	Ratings Assumptions
	<ul style="list-style-type: none"><li>▪ Mature forests provide suitable denning sites and are rated higher than young forests; and young forests are rated higher than regenerating forests (pole/sapling). It is assumed that regenerating burn areas (pole/sapling stage) provide little security and thermal cover, and are given a rating of nil (assumes no mature legacy forest patches).</li><li>▪ A few Black Bears were reported denning in rock habitat and in organic soils near Norman Wells. Rock/Rubble habitats and peat wetlands rated as low.</li><li>▪ Wetland vegetation community types have organic soils and rated lower than upland vegetation community types with mineral soils.</li><li>▪ Dry upland habitats rated higher than poorly drained lowland habitats.</li></ul>

**Table 5: Black Bear Feeding, Security, and Hibernating Model Ratings**

ZONE	ECOZONE	Site Modifier	Stand Structure	Stand Composition	Tree Crown Closure	Topographic Position	Aspect	Moisture Regime	Disturbance Code	Unit Description	Feeding (Growing)	Security (Growing)	Hibernating (Winter)
Boreal	Taiga Plains		6	C	D	MS-US	225-360	M		Boreal-Coniferous Dense	L	H	H
Boreal	Taiga Plains	w	6	C	D	MS-US	225-360	M		Boreal-Coniferous Dense near watercourse	M	H	H
Boreal	Taiga Plains		6	C	D	MS-US	225-360	M	dC	Boreal-Coniferous Dense near Nahanni Butte	N	M	M
Boreal	Taiga Plains		6	C	O	MS-US	225-360	M		Boreal-Coniferous Open	M	L	H
Boreal	Taiga Plains	w	6	C	O	MS-US	225-360	M		Boreal-Coniferous Open near watercourse	H	L	H
Boreal	Taiga Plains		6	C	O	MS-US	225-360	M	dC	Boreal-Coniferous Open near Nahanni Butte	L	N	M
Boreal	Taiga Plains		6	C	S	MS-US	225-360	M		Boreal-Coniferous Sparse	L	N	L
Boreal	Taiga Plains	w	6	C	S	MS-US	225-360	M		Boreal-Coniferous Sparse near watercourse	M	N	L
Boreal	Taiga Plains		6	C	S	MS-US	225-360	M	dC	Boreal-Coniferous Sparse near Nahanni Butte	N	N	N
Boreal	Taiga Plains		6	B	D					Boreal-Broadleaf Dense	H	H	H
Boreal	Taiga Plains	w	6	B	D					Boreal-Broadleaf Dense near watercourse	H	H	H
Boreal	Taiga Plains		6	B	D				dC	Boreal-Broadleaf Dense near Nahanni Butte	M	M	M
Boreal	Taiga Plains		6	B	O					Boreal-Broadleaf Open	M	M	M
Boreal	Taiga Plains	w	6	B	O					Boreal-Broadleaf Open near watercourse	H	M	M
Boreal	Taiga Plains		6	B	O				dC	Boreal-Broadleaf Open near Nahanni Butte	L	L	L
Boreal	Taiga Plains		6	M	D	Lv-US	90-330	D-M		Boreal-Mixedwood Dense	H	H	H
Boreal	Taiga Plains	w	6	M	D	Lv-US	90-330	D-M		Boreal-Mixedwood Dense near watercourse	H	H	H
Boreal	Taiga Plains		6	M	D	Lv-US	90-330	D-M	dC	Boreal-Mixedwood Dense near Nahanni Butte	M	M	M
Boreal	Taiga Plains		6	M	O	Lv-US	90-330	D-M		Boreal-Mixedwood Open	M	M	H
Boreal	Taiga Plains	w	6	M	O	Lv-US	90-330	D-M		Boreal-Mixedwood Open near watercourse	M	M	H
Boreal	Taiga Plains		6	M	O	Lv-US	90-330	D-M	dC	Boreal-Mixedwood Open near Nahanni Butte	N	L	M
Boreal	Taiga Plains					MS-US	Crest-20	D		Herb	L	N	L

ZONE	ECOZONE	Site Modifier	Stand Structure	Stand Composition	Tree Crown Closure	Topographic Position	Aspect	Moisture Regime	Disturbance Code	Unit Description	Feeding (Growing)	Security (Growing)	Hibernating (Winter)
Boreal	Taiga Plains	w				MS-US	Crest-20	D		Herb near watercourse	M	N	L
Boreal	Taiga Plains					MS-US	Crest-20	D	dC	Herb near Nahanni Butte	N	N	N
Boreal	Taiga Plains		6	C						Wetland Treed	M	L	L
Boreal	Taiga Plains	w	6	C						Wetland Treed near watercourse	H	L	L
Boreal	Taiga Plains		6	C					dC	Wetland Treed near Nahanni Butte	L	N	N
Boreal	Taiga Plains					Lv	Flat	W		Wetland Shrub	M	M	N
Boreal	Taiga Plains	w				Lv	Flat	W		Wetland Shrub near watercourse	H	M	N
Boreal	Taiga Plains					Lv	Flat	W	dC	Wetland Shrub near Nahanni Butte	L	L	N
Boreal	Taiga Plains									Wetland Herb	L	N	N
Boreal	Taiga Plains	w								Wetland Herb near watercourse	M	N	N
Boreal	Taiga Plains								dC	Wetland Herb near Nahanni Butte	N	N	N
Boreal	Taiga Plains					Lv-US	330-Flat	D-M		Shrub Tall	M	H	M
Boreal	Taiga Plains	w				Lv-US	330-Flat	D-M		Shrub Tall near watercourse	H	H	M
Boreal	Taiga Plains					Lv-US	330-Flat	D-M	dC	Shrub Tall near Nahanni Butte	L	M	L
Boreal	Taiga Plains					Lv-US	330-Flat	D-M		Shrub Low	M	M	L
Boreal	Taiga Plains	w				Lv-US	330-Flat	D-M		Shrub Low near watercourse	H	M	L
Boreal	Taiga Plains					Lv-US	330-Flat	D-M	dC	Shrub Low near Nahanni Butte	L	L	N
Boreal	Taiga Plains					LS	80	M		Byroids	L	N	L
Boreal	Taiga Plains	w				LS	80	M		Byroids near watercourse	M	N	L
Boreal	Taiga Plains					LS	80	M	dC	Byroids near Nahanni Butte	N	N	N
Boreal	Taiga Plains					Lv	Flat	D		Exposed/Barren Land	N	N	L
Boreal	Taiga Plains	w				Lv	Flat	D		Exposed/Barren Land near watercourse	L	N	L
Boreal	Taiga Plains					Lv	Flat	D	dC	Exposed/Barren Land near Nahanni Butte	N	N	N
Boreal	Taiga Plains									Rock/Rubble	N	N	L

ZONE	ECOZONE	Site Modifier	Stand Structure	Stand Composition	Tree Crown Closure	Topographic Position	Aspect	Moisture Regime	Disturbance Code	Unit Description	Feeding (Growing)	Security (Growing)	Hibernating (Winter)
Boreal	Taiga Plains	w								Rock/Rubble near watercourse	L	N	L
Boreal	Taiga Plains								dC	Rock/Rubble near Nahanni Butte	N	N	N
Boreal	Taiga Plains					Lv	Flat	W		Water	N	N	N
Boreal	Taiga Plains	w				Lv	Flat	W		Water near watercourse	N	N	N
Boreal	Taiga Plains					Lv	Flat	W	dC	Water near Nahanni Butte	N	N	N

Site Modifier: Within 50 m of a watercourse (w)

Stand Structure: Mature forest (6)

Stand Composition: Dominant tree cover (≥75% total basal area); Coniferous (C), Deciduous (D), Mixedwood (M)

Tree Crown Closure: percent units; Dense (D; >60% closure), Open (O; 26-60% closure), and Sparse (S; 1-25% closure)

Topographic Position: Level (Lv), Lower Slope/Toe (LS), Mid-Slope (MS), Upper Slope/Crest (US)

Aspect: degree units

Moisture Regime: Dry (D; xeric to submesic), Moist (M; mesic to subhygric), Wet (W; hygric to hydric)

Disturbance Code: Within 5 km of a community (dC)

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# APPENDIX C

## VEGETATION PLOT DATA

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**ECOSITE:** Mixedwood **PLOT NUMBERS:** V06, V07, V08, V09, V11, V12, V13, V16, V23, V25



General Site



Ground Cover

## ECOSITE FEATURES

### Parks Canada Ecotype:

Mixed Predominantly Coniferous Forest  
Mixed Predominantly Deciduous Forest

### EOSD Land Cover Types:

Mixedwood – Dense  
Mixedwood – Open

**Site Position:** Lower - Upper

**Aspect (°):** 90-330

**Moisture Regime:** Mesic - Subxeric

**Coarse Fragments (%):** <20%

**Texture:** Loam, Silt, Clay

**Slope (%):** 1-10

**Elevation (m):** 263-790

**Nutrient Regime:** Poor - Rich

**Drainage:** Imperfectly - Well

**ECOSITE:** Mixedwood **PLOT NUMBERS:** V06, V07, V08, V09, V11, V12, V13, V16, V23, V25

## VEGETATION

Scientific Name	Common Name	Layer	Prominence
<b>TREE</b>			
<i>Picea glauca</i>	White Spruce	A2	43
<i>Picea mariana</i>	Black Spruce	A2	28
<i>Betula papyrifera</i>	Paper Birch	A2	26
<i>Pinus banksiana</i>	Jack Pine	A2	25
<i>Populus balsamifera</i>	Balsam Poplar	A2	21
<i>Populus tremuloides</i>	Trembling Aspen	A2	16
<b>SHRUB</b>			
<i>Ledum groenlandicum</i>	Common Labrador Tea	B2	23
<i>Rosa acicularis</i>	Prickly Rose	B2	23
<i>Vaccinium vitis-idaea</i>	Rock Cranberry	B2	19
<i>Salix myrtilifolia</i>	Blueberry Willow	B2	16
<i>Viburnum edule</i>	Squashberry	B2	14
<i>Alnus incana</i>	Speckled Alder	B1	12
<i>Cornus sericea</i>	Red Osier Dogwood	B2	12
<i>Alnus incana</i>	Speckled Alder	B2	11
<i>Shepherdia canadensis</i>	Buffalo-berry	B2	11
<i>Vaccinium uliginosum</i>	Alpine Bilberry	B2	7
<i>Salix bebbiana</i>	Bebb Willow	B2	6
<i>Betula glandulosa</i>	Dwarf Birch	B2	5
<i>Betula occidentalis</i>	Water Birch	B1	5
<i>Salix arbusculoides</i>	Littletree Willow	B2	5
<b>FORB</b>			
<i>Cornus canadensis</i>	Dwarf Dogwood	C	23
<i>Equisetum arvense</i>	Field Horsetail	C	20
<i>Geocaulon lividum</i>	Northern Comandra spp	C	11
<i>Linnaea borealis</i>	Twinflower	C	11
<i>Equisetum scirpoides</i>	Dwarf Scouring-rush	C	10
<i>Chamerion angustifolium</i>	Fireweed	C	7
<i>Mitella nuda</i>	Bare-stem Bishop's Cap	C	7
<i>Orthilia secunda</i>	One-sided Wintergreen	C	7
<i>Vaccinium vitis-idaea</i>	Rock Cranberry	C	7
<i>Pyrola asarifolia</i>	Pink Pyrola	C	6
<b>NON-VASCULAR</b>			
<i>Hylocomium splendens</i>	stair-step moss	D	51
<i>Pleurozium schreberi</i>	Big red stem	D	42
<i>Ptilium crista-castrensis</i>	Knight's plume"	D	35

**ECOSITE:** Coniferous **PLOT NUMBERS:** V03, V10, V17, V21, V22, V26



General Site



Ground Cover

## ECOSITE FEATURES

### Parks Canada Ecotype:

Coniferous Forest, Subalpine Coniferous Woodland  
 Spruce – Lichen – Moss Woodland  
 Spruce – Lichen Woodland

### EOSD Land Cover Types:

Coniferous – Dense  
 Coniferous – Open  
 Coniferous – Sparse

**Site Position:** Mid to Crest

**Aspect (°):** Crest and 225-360

**Moisture Regime:** Poorly to Rapidly

**Coarse Fragments (%):** <20% - 35%

**Texture:** Loam, Silt, Clay, Sand

**Slope (%):** 3-7

**Elevation (m):** 275-897

**Nutrient Regime:** Poor - Moderate

**Drainage:** Poorly to Rapidly

**ECOSITE: Coniferous PLOT NUMBERS: V03, V10, V17, V21, V22, V26**
**VEGETATION**

Scientific Name	Common Name	Layer	Prominence
<b>TREE</b>			
<i>Picea glauca</i>	White Spruce	A2	55
<i>Pinus banksiana</i>	Jack Pine	A2	19
<i>Picea mariana</i>	Black Spruce	A2	13
<i>Pinus contorta</i>	Lodgepole Pine	A2	9
<b>SHRUB</b>			
<i>Betula glandulosa</i>	Dwarf Birch	B2	34
<i>Vaccinium vitis-idaea</i>	Rock Cranberry	B2	31
<i>Ledum groenlandicum</i>	Common Labrador Tea	B2	28
<i>Vaccinium uliginosum</i>	Alpine Bilberry	B2	23
<i>Alnus incana</i>	Speckled Alder	B2	16
<i>Arctostaphylos rubra</i>	Red Bearberry	B2	15
<i>Salix glauca</i>	Gray willow	B2	13
<i>Salix myrtilifolia</i>	Blueberry Willow	B2	13
<i>Rosa acicularis</i>	Prickly Rose	B2	12
<i>Betula occidentalis</i>	Water Birch	B1	9
<i>Shepherdia canadensis</i>	Buffalo-berry	B2	9
<i>Dasiphora fruticosa</i>	Shrubby Cinquefoil	B2	8
<i>Salix scouleriana</i>	Scouler Willow	B2	8
<i>Arctostaphylos uva-ursi</i>	Common Bearberry	B2	7
<i>Betula papyrifera</i>	Paper Birch	B1	7
<i>Picea glauca</i>	White Spruce	B1	7
<i>Ribes triste</i>	Swamp Red Currant	B2	7
<i>Salix reticulata</i>	Net-veined Willow	B2	7
<i>Alnus viridis</i>	Green Alder	B2	6
<i>Andromeda polifolia</i>	Bog Rosemary	B2	6
<i>Cassiope tetragona</i>	Arctic White Heather	B2	6
<b>FORB</b>			
<i>Cornus canadensis</i>	Dwarf Dogwood	C	14
<i>Geocaulon lividum</i>	Northern Comandra spp	C	13
<i>Equisetum sylvaticum</i>	-- Woodland Horsetail	C	7
<i>Mertensia paniculata</i>	Northern Bluebell	C	7
<i>Anemone richardsonii</i>	Yellow Anemone	C	6
<i>Equisetum arvense</i>	Field Horsetail	C	6
<i>Equisetum scirpoides</i>	Dwarf Scouring-rush	C	6
<i>Linnaea borealis</i>	Twinflower	C	6
<i>Rubus chamaemorus</i>	Cloudberry	C	6
<b>NON-VASCULAR</b>			
<i>Hylocomium splendens</i>	Stair-step moss	D	53
<i>Pleurozium schreberi</i>	Big red stem	D	50
<i>Ptilium crista-castrensis</i>	Knight's plume	D	34
<i>Cladonia rangiferina</i>	Gray reindeer lichen	D	24
<i>Tomenthypnum nitens</i>	Golden fuzzy fen moss	D	22
<i>Cladonia</i>	Lichen	D	18
<i>Dicranum scoparium</i>	Broom moss	D	13
<i>Peltigera aphthosa</i>	Silver-edged Freckle Pelt Lichen	D	8

**ECOSITE:** Shrub - Alluvial **PLOT NUMBERS:** V04, V20



General Site



Ground Cover

## ECOSITE FEATURES

### Parks Canada Ecotype:

Medium – Low Shrub

### EOSD Land Cover Types:

Shrub - Low

**Site Position:** Level

**Aspect (°):** 330 - Flat

**Moisture Regime:** Subhygric - Submesic

**Coarse Fragments (%):** <20%

**Texture:** Silt, Loam

**Slope (%):** 0-1

**Elevation (m):** 787-788

**Nutrient Regime:** Rich

**Drainage:** Imperfectly - Well

**ECOSITE: Shrub - Alluvial PLOT NUMBERS: V04, V20**

**VEGETATION**

Scientific Name	Common Name	Layer	Prominence
<b>TREE</b>			
<i>Picea glauca</i>	White Spruce	A2	27
<i>Pinus banksiana</i>	Jack Pine	A3	7
<b>SHRUB</b>			
<i>Betula glandulosa</i>	Dwarf Birch	B2	32
<i>Dasiphora fruticosa</i>	Shrubby Cinquefoil	B2	32
<i>Arctostaphylos uva-ursi</i>	Common Bearberry	B2	19
<i>Salix myrtillofolia</i>	Blueberry Willow	B2	19
<i>Salix glauca</i>	Gray willow	B2	17
<i>Arctostaphylos rubra</i>	Red Bearberry	B2	16
<i>Juniperus horizontalis</i>	Creeping Juniper	B2	14
<i>Juniperus communis</i>	Common Juniper	B2	12
<i>Salix arbusculoides</i>	Littletree Willow	B2	12
<i>Salix barrattiana</i>	Barratt Willow	B2	10
<i>Shepherdia canadensis</i>	Buffalo-berry	B2	10
<i>Vaccinium vitis-idaea</i>	Rock	B2	10
<i>Salix alaxensis</i>	-- Cranberry	B2	7
<i>Salix bebbiana</i>	Alaska Willow	B2	7
<i>Salix brachycarpa</i>	Bebb Willow	B2	7
<i>Salix pseudomonticola</i>	Short-fruit Willow	B2	7
<i>Salix reticulata</i>	False Mountain Willow	B2	7
<i>Vaccinium uliginosum</i>	Net-veined Willow	B2	7
<b>GRAMINOID</b>			
<i>Carex scirpoidea</i>	Bulrush Sedge	C	19
<i>Leymus innovatus</i>	Downy Lyme Grass	C	19
<i>Arctagrostis arundinacea</i>	Broad-leaf Arctic-bent	C	12
<i>Bromus pumpehianus</i>	Pumpelly Brome	C	12
<b>FORB</b>			
<i>Erigeron hyssopifolius</i>	Hyssop-leaved Fleabane	C	17
<i>Tofieldia pusilla</i>	Scotch False Asphodel	C	16
<i>Dryas integrifolia</i>	Entire-leaved Mountain Avens	C	14
<i>Lycopodium annotinum</i>	Bristly Clubmoss	C	12
<i>Parnassia palustris</i>	Marsh Grass-of-parnassus	C	12
<i>Senecio lugens</i>	Black-tip Ragwort	C	12
<i>Aquilegia brevistyla</i>	Blue Columbine	C	10
<i>Dryas drummondii</i>	Yellow Mountain Avens	C	10
<i>Equisetum arvense</i>	Field Horsetail	C	10
<i>Gallium boreale</i>	Northern Bedstraw	C	10
<i>Rubus acaulis</i>	Raspberry spp	C	10
<i>Astragalus americanus</i>	American Milk-vetch	C	7
<i>Delphinium glaucum</i>	Pale Larkspur	C	7
<i>Hedysarum alpinum</i>	Alpine Sweet-vetch	C	7
<i>Hedysarum boreale</i>	Boreal Sweet- vetch	C	7
<i>Linnaea borealis</i>	Twinflower	C	7
<i>Pedicularis labradorica</i>	Labrador Lousewort	C	7
<i>Pinguicula vulgaris</i>	Common Butterwort	C	7
<i>Platanthera aquilonis</i>	Tall Northern Green Orchid	C	7
<i>Solidago multiradiata</i>	Alpine Multiray Goldenrod	C	7
<i>Thalictrum alpinum</i>	Alpine Meadow Rue	C	7
<i>Triantha glutinosa</i>	Sticky False Asphodel	C	7
<b>NON-VASCULAR</b>			
<i>Hylocomium splendens</i>	Stair-step moss	D	22
<i>Cladonia rangiferina</i>	Gray reindeer lichen	D	19

**ECOSITE:** Shrub - Fire Regen    **PLOT NUMBERS:** V05, V18, V19



General Site



Ground Cover

## ECOSITE FEATURES

### Parks Canada Ecotype:

Medium – Low Shrub

### EOSD Land Cover Types:

Shrub - Low, Shrub - Tall

**Site Position:** Lower - Upper

**Aspect (°):** 60-180

**Moisture Regime:** Subhygric - Subxeric

**Coarse Fragments (%):** <20% - 35%

**Texture:** Sand, Clay

**Slope (%):** 2-3

**Elevation (m):** 757-900

**Nutrient Regime:** Poor - Rich

**Drainage:** Imperfectly - Well

**ECOSITE:** Shrub - Fire Regen **PLOT NUMBERS:** V05, V18, V19

**VEGETATION**

Scientific Name	Common Name	Layer	Prominence
<b>TREE</b>			
Pinus banksiana	Jack Pine	A2	6
<b>SHRUB</b>			
Betula glandulosa	Dwarf Birch	B2	42
Pinus banksiana	Jack Pine	B1	29
Salix glauca	Gray willow	B1	29
Ledum groenlandicum	Common Labrador Tea	B2	24
Vaccinium uliginosum	Alpine Bilberry	B2	23
Vaccinium vitis-idaea	Rock Cranberry	B2	22
Salix myrtillofolia	Blueberry Willow	B2	18
Salix scouleriana	Scouler Willow	B2	18
Picea glauca	White Spruce	B2	14
Salix arbusculoides	Littletree Willow	B2	14
Rosa acicularis	Prickly Rose	B2	10
Actaea rubra	Red Baneberry	B2	8
Pinus banksiana	Jack Pine	B2	8
Dasiphora fruticosa	Shrubby Cinquefoil	B2	6
<b>GRAMINOID</b>			
Bromus pumpellianus	Pumpelly Brome	C	6
Carex membranacea	Fragile-seed Sedge	C	6
Carex vaginata	Sheathed Sedge	C	6
<b>FORB</b>			
Cornus canadensis	Dwarf Dogwood	C	26
Equisetum sylvaticum	Woodland Horsetail	C	22
Diphasiastrum complanatum	Trailing Clubmoss	C	13
Equisetum arvense	Field Horsetail	C	12
Mertensia paniculata	Northern Bluebell	C	12
Linnaea borealis	Twinflower	C	10
Pedicularis labradorica	Labrador Lousewort	C	10
Chamerion angustifolium	Fireweed	C	9
Geocaulon lividum	Northern Comandra spp	C	8
Lycopodium clavatum	Running Clubmoss	C	6
Petasites sagittatus	Arrow-Leaved Sweet-Coltsfoot	C	6
Rubus acaulis	Raspberry spp	C	6
Senecio lugens	Black-tip Ragwort	C	6
<b>NON-VASCULAR</b>			
Cladonia	Lichen	D	18
Polytrichum	Hair-cap	D	18
Cladonia rangiferina	Gray reindeer lichen	D	13

**ECOSITE:** Shrub - Subalpine **PLOT NUMBERS:** V14, V27, V28, V29, V30, V31, V32



General Site



Ground Cover

## ECOSITE FEATURES

### Parks Canada Ecotype:

Medium - Low Shrub, Low Sparse Shrub  
 Subalpine Shrub - Sparse Trees  
 Subalpine Tall Shrub

### EOSD Land Cover Types:

Shrub - Low, Shrub - Tall

**Site Position:** Mid to Crest

**Aspect (°):** 120-360

**Moisture Regime:** Subhygric - Subxeric

**Coarse Fragments (%):** <20 % - >70%

**Texture:** Silt, Loam, Sand

**Slope (%):** 3-12

**Elevation (m):** 512-1332

**Nutrient Regime:** Poor - Rich

**Drainage:** Imperfectly - Very Rapidly

**ECOSITE:** Shrub - Subalpine **PLOT NUMBERS:** V14, V27, V28, V29, V30, V31, V32

## VEGETATION

Scientific Name	Common Name	Layer	Prominence
<b>TREE</b>			
<i>Picea glauca</i>	White Spruce	A2	10
<b>SHRUB</b>			
<i>Betula glandulosa</i>	Dwarf Birch	B2	66
<i>Ledum groenlandicum</i>	Common Labrador Tea	B2	18
<i>Arctostaphylos rubra</i>	Red Bearberry	B2	16
<i>Empetrum nigrum</i>	Black Crowberry	B2	15
<i>Salix glauca</i>	Gray willow	B2	15
<i>Salix planifolia</i>	Diamond-leaved Willow	B2	15
<i>Dasiphora fruticosa</i>	Shrubby Cinquefoil	B2	14
<i>Vaccinium uliginosum</i>	Alpine Bilberry	B2	13
<i>Juniperus communis</i>	Common Juniper	B2	11
<i>Cassiope tetragona</i>	Arctic White Heather	B2	10
<i>Rhododendron lapponicum</i>	Lapland Rosebay	B2	10
<i>Salix reticulata</i>	Net-veined Willow	B2	9
<i>Vaccinium vitis-idaea</i>	Rock Cranberry	B2	9
<i>Arctostaphylos alpina</i>	Alpine Bearberry	B2	8
<i>Arctostaphylos uva-ursi</i>	Common Bearberry	B2	8
<i>Picea glauca</i>	White Spruce	B1	8
<i>Pinus banksiana</i>	Jack Pine	B1	8
<i>Rosa acicularis</i>	Prickly Rose	B2	8
<i>Salix myrtilifolia</i>	Blueberry Willow	B2	8
<i>Shepherdia canadensis</i>	Buffalo-berry	B2	8
<i>Andromeda polifolia</i>	Bog Rosemary	B2	5
<i>Juniperus horizontalis</i>	Creeping Juniper	B2	5
<b>GRAMINOID</b>			
<i>Carex scirpoidea</i>	Bulrush Sedge	C	8
<i>Carex siccata</i>	Dry-spike Sedge	C	7
<i>Bromus pumpellianus</i>	Pumpelly Brome	C	5
<b>FORB</b>			
<i>Dryas integrifolia</i>	Entire-leaved Mountain Avens	C	17
<i>Hedysarum boreale</i>	Boreal Sweet- vetch	C	8
<i>Cornus canadensis</i>	Dwarf Dogwood	C	7
<i>Silene acaulis</i>	Moss Champion	C	7
<i>Thalictrum alpinum</i>	Alpine Meadow Rue	C	6
<i>Delphinium glaucum</i>	Pale Larkspur	C	5
<i>Hedysarum alpinum</i>	Alpine Sweet-vetch	C	5
<i>Zigadenus elegans</i>	Mountain Death Camas	C	5
<b>NON-VASCULAR</b>			
<i>Cladonia</i>	Lichen	D	50
<i>Pleurozium schreberi</i>	Big red stem	D	24
<i>Hylocomium splendens</i>	Stair-step moss	D	21

ECOSITE: Wetland PLOT NUMBERS: V15



## ECOSITE FEATURES

### Parks Canada Ecotype:

Wetland

### EOSD Land Cover Types:

Wetland - Shrub

Site Position: Level

Aspect (°): Level

Moisture Regime: Hydric

Coarse Fragments (%): <20%

Texture:

Slope (%): 0

Elevation (m): 250

Nutrient Regime: Rich

Drainage: Very Poorly

**ECOSITE: Wetland PLOT NUMBERS: V15**

**VEGETATION**

Scientific Name	Common Name	Layer	Prominence
<b>TREE</b>			
Larix laricina	Tamarack	A2	22
<b>SHRUB</b>			
Betula glandulosa	Dwarf Birch	B2	45
Dasiphora fruticosa	Shrubby Cinquefoil	B2	32
Andromeda polifolia	Bog Rosemary	B2	22
Ledum groenlandicum	Common Labrador Tea	B2	22
Salix pedicellaris	Bog Willow	B2	22
Salix pseudomonticola	False Mountain Willow	B2	22
Chamaedaphne calyculata	Leatherleaf	B2	17
Arctostaphylos rubra	Red Bearberry	B2	14
<b>GRAMINOID</b>			
Carex aquatilis	Water Sedge	C	63
Carex utriculata	Northwest Territory Sedge	C	17
Calamagrostis neglecta	Reed Bentgrass	C	10
<b>FORB</b>			
Rubus acaulis	Raspberry spp	C	22

ECOSITE: Herb PLOT NUMBERS: V01, V02



## ECOSITE FEATURES

### Parks Canada Ecotype:

Alpine Herb Tundra and Meadow

### EOSD Land Cover Types:

Herbs

**Site Position:** Mid to Crest

**Aspect (°):** Crest and 20

**Moisture Regime:** Submesic

**Coarse Fragments (%):** >70%

**Texture:**

**Slope (%):** 5-20

**Elevation (m):** 1351-1455

**Nutrient Regime:** Moderate

**Drainage:** Rapidly

**ECOSITE:** Herb **PLOT NUMBERS:** V01, V02

## VEGETATION

Scientific Name	Common Name	Layer	Prominence
<b>SHRUB</b>			
Rhododendron lapponicum	Lapland Rosebay	B2	27
Salix reticulata	Net-veined Willow	B2	23
Cassiope tetragona	Arctic White Heather	B2	19
Betula glandulosa	Dwarf Birch	B2	14
Arctostaphylos alpina	Alpine Bearberry	B2	7
Salix myrtilifolia	Blueberry Willow	B2	7
Salix scouleriana	Scouler Willow	B2	7
<b>GRAMINOID</b>			
Carex rupestris	Rock Sedge	C	59
Carex capillaris	Hairlike Sedge	C	14
Carex scirpoidea	Bulrush Sedge	C	14
<b>FORB</b>			
Dryas integrifolia	Entire-leaved Mountain Avens	C	57
Silene acaulis	Moss Campion	C	21
Potentilla biflora	Two-flowered Cinquefoil	C	10
Tofieldia pusilla	Scotch False Asphodel	C	10
Bistorta vivipara	Alpine Knotweed	C	7
Parrya nudicaulis	Naked-stemmed Wallflower	C	7
Saxifraga oppositifolia	Purple Mountain Saxifrage	C	7

ECOSITE: Bryoids PLOT NUMBERS: V33



## ECOSITE FEATURES

### Parks Canada Ecotype:

Bryoids and Lichens

### EOSD Land Cover Types:

Bryoids

Site Position: Lower

Aspect (°): 80

Moisture Regime: Mesic

Coarse Fragments (%): >70%

Texture:

Slope (%): 15

Elevation (m): 1103

Nutrient Regime: Moderate

Drainage: Very Rapidly

**ECOSITE:** Bryoids **PLOT NUMBERS:** V33

## VEGETATION

Scientific Name	Common Name	Layer	Prominence
<b>TREE</b>			
<i>Picea glauca</i>	White Spruce	A2	22
<b>SHRUB</b>			
<i>Cassiope tetragona</i>	Arctic White Heather	B2	59
<i>Betula glandulosa</i>	Dwarf Birch	B2	22
<i>Salix alaxensis</i>	Alaska Willow	B2	17
<i>Larix laricina</i>	Tamarack	B2	14
<i>Arctostaphylos rubra</i>	Red Bearberry	B2	10
<i>Ledum groenlandicum</i>	Common Labrador Tea	B2	10
<i>Salix glauca</i>	Gray willow	B2	10
<i>Vaccinium vitis-idaea</i>	Rock Cranberry	B2	10
<b>GRAMINOID</b>			
<i>Carex scirpoidea</i>	Bulrush Sedge	C	10
<b>FORB</b>			
<i>Hedysarum alpinum</i>	Alpine Sweet-vetch	C	10
<b>NON-VASCULAR</b>			
<i>Cladonia stellaris</i>	Star-Nosed Reindeer Lichen	D	63
<i>Cladonia rangiferina</i>	Gray reindeer lichen	D	45
<i>Flavocetraria cucullata</i>	Curled snow lichen	D	32

**ECOSITE:** Non-Vegetated **PLOT NUMBERS:** V24



General Site



Ground Cover

## ECOSITE FEATURES

### Parks Canada Ecotype:

Alluvial – Non-Vegetated

### EOSD Land Cover Types:

Exposed Land

**Site Position:** Level

**Aspect (°):** Level

**Moisture Regime:** Subxeric

**Coarse Fragments (%):** >70%

**Texture:**

**Slope (%):** 0

**Elevation (m):** 788

**Nutrient Regime:** Poor

**Drainage:** Very Rapidly

**ECOSITE:** Non-Vegetated **PLOT NUMBERS:** V24

## VEGETATION

Scientific Name	Common Name	Layer	Prominence
<b>SHRUB</b>			
Populus balsamifera	Balsam Poplar	B2	10
Salix alaxensis	Alaska Willow	B2	10
<b>GRAMINOID</b>			
Trisetum spicatum	Narrow False Oat	C	17
Leymus innovatus	Downy Lyme Grass	C	10
<b>FORB</b>			
Dryas drummondii	Yellow Mountain Avens	C	22
Saxifraga aizoides	Yellow Mountain Saxifrage	C	10

# APPENDIX D

## PLANT LISTS

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Herb Species List

Layer	Scientific Name	Common Name	Provincial General Status
Trees and Shrubs	<i>Arctostaphylos alpina</i>	Alpine Bearberry	Secure
	<i>Betula glandulosa</i>	Dwarf Birch	Secure
	<i>Cassiope tetragona</i>	Arctic White Heather	Secure
	<i>Dasiphora fruticosa</i>	Shrubby Cinquefoil	Secure
	<i>Larix laricina</i>	Tamarack	Secure
	<i>Picea glauca</i>	White Spruce	Secure
	<i>Rhododendron lapponicum</i>	Lapland Rosebay	Secure
	<i>Salix arctica</i>	Arctic Willow	Secure
	<i>Salix herbacea</i>	Snowbed Willow	Secure
	<i>Salix myrtilifolia</i>	Blueberry Willow	Secure
	<i>Salix reticulata</i>	Net-veined Willow	Secure
	<i>Salix scouleriana</i>	Scouler Willow	Secure
	<i>Vaccinium uliginosum</i>	Alpine Bilberry	Secure
	<i>Vaccinium vitis-idaea</i>	Rock Cranberry	Secure
Graminoids and Forbs	<i>Androsace chamaejasme</i>	Sweet-flower Rock-jasmine	Secure
	<i>Anemone richardsonii</i>	Yellow Anemone	Secure
	<i>Antennaria alpina</i>	Alpine Pussytoes	Secure
	<i>Astragalus americanus</i>	American Milk-vetch	Secure
	<i>Bistorta vivipara</i>	Alpine Knotweed	Secure
	<i>Campanula aurita</i>	Yukon Bellflower	Secure
	<i>Campanula uniflora</i>	Arctic Harebell	Secure
	<i>Carex capillaris</i>	Hairlike Sedge	Secure
	<i>Carex gynocrates</i>	Northern Bog Sedge	Secure
	<i>Carex rupestris</i>	Rock Sedge	Secure
	<i>Carex scirpoidea</i>	Bulrush Sedge	Secure
	<i>Cystopteris fragilis</i>	Fragile Fern	Secure
	<i>Draba lactea</i>	Milky Whitlow-grass	Secure
	<i>Draba nivalis</i>	Yellow Arctic Whitlow-grass	Secure
	<i>Dryas integrifolia</i>	Entire-leaved Mountain Avens	Secure
	<i>Hulteniella integrifolia</i>	Entire-leaf Daisy	Secure
	<i>Huperzia selago</i>	Fir Clubmoss	Secure
	<i>Packera paupercula</i>	Balsam Groundsel	Secure
	<i>Parrya nudicaulis</i>	Naked-stemmed Wallflower	Secure
	<i>Pedicularis lanata</i>	Woolly Lousewort	Secure
	<i>Pinguicula vulgaris</i>	Common Butterwort	Secure
	<i>Potentilla biflora</i>	Two-flowered Cinquefoil	Secure
	<i>Potentilla nivea</i>	Snow Cinquefoil	Secure
	<i>Pyrola grandiflora</i>	Arctic Pyrola	Secure
	<i>Saxifraga aizoides</i>	Yellow Mountain Saxifrage	Secure
	<i>Saxifraga oppositifolia</i>	Purple Mountain Saxifrage	Secure
<i>Silene acaulis</i>	Moss Champion	Secure	
<i>Tofieldia pusilla</i>	Scotch False Asphodel	Secure	

**Wetland Species List**

Layer	Scientific Name	Common Name	Provincial General Status
Trees and Shrubs	<i>Larix laricina</i>	Tamarack	Secure
	<i>Andromeda polifolia</i>	Bog Rosemary	Secure
	<i>Arctostaphylos rubra</i>	Red Bearberry	Secure
	<i>Betula glandulosa</i>	Dwarf Birch	Secure
	<i>Chamaedaphne calyculata</i>	Leatherleaf	Secure
	<i>Dasiphora fruticosa</i>	Shrubby Cinquefoil	Secure
	<i>Ledum groenlandicum</i>	Common Labrador Tea	Secure
	<i>Picea mariana</i>	Black Spruce	Secure
	<i>Salix myrtillofolia</i>	Blueberry Willow	Secure
	<i>Salix pedicellaris</i>	Bog Willow	Secure
	<i>Salix pseudomonticola</i>	False Mountain Willow	Secure
	<i>Vaccinium oxycoccos</i>	Small Cranberry	Secure
	<i>Vaccinium uliginosum</i>	Alpine Bilberry	Secure
	<i>Vaccinium vitis-idaea</i>	Rock Cranberry	Secure
Graminoids and Forbs	<i>Antennaria angustata</i>	Pussytoes spp	Not Assessed
	<i>Calamagrostis neglecta</i>	Reed Bentgrass spp	Not Assessed
	<i>Carex aquatilis</i>	Water Sedge	Secure
	<i>Carex utriculata</i>	Northwest Territory Sedge	Secure
	<i>Carex vaginata</i>	Sheathed Sedge	Secure
	<i>Cypripedium parviflorum</i>	Yellow Lady's-slipper	Secure
	<i>Drosera rotundifolia</i>	Round-leaved Sundew	Secure
	<i>Equisetum fluviatile</i>	Water Horsetail	Secure
	<i>Equisetum scirpoides</i>	Dwarf Scouring-rush	Secure
	<i>Erigeron acris</i>	Bitter Fleabane	Secure
	<i>Eriophorum vaginatum</i>	Tussock Cotton-grass	Secure
	<i>Geocaulon lividum</i>	Northern Comandra spp	Secure
	<i>Linnaea borealis</i>	Twinflower	Secure
	<i>Parnassia palustris</i>	Marsh Grass-of-parnassus	Secure
	<i>Pedicularis capitata</i>	Capitate Lousewort	Secure
	<i>Petasites sagittatus</i>	Arrow-Leaved Sweet-Coltsfoot	Not Assessed
	<i>Petasites vitifolius</i>	Sweet Coltsfoot spp	Not Assessed
	<i>Platanthera obtusata</i>	Blunt-leaved Bog Orchid	Secure
	<i>Ranunculus lapponicus</i>	Lapland Buttercup	Secure
	<i>Rubus acaulis</i>	Raspberry spp	Not Assessed
<i>Senecio lugens</i>	Black-tip Ragwort	Secure	
<i>Spiranthes romanzoffiana</i>	Hooded Ladies' -tresses	Secure	
<i>Tofieldia pusilla</i>	Scotch False Asphodel	Secure	

**Bryoid Species List**

Layer	Scientific Name	Common Name	Provincial General Status
Trees and Shrubs	<i>Arctostaphylos rubra</i>	Red Bearberry	Secure
	<i>Betula glandulosa</i>	Dwarf Birch	Secure
	<i>Cassiope tetragona</i>	Arctic White Heather	Secure
	<i>Larix laricina</i>	Tamarack	Secure
	<i>Ledum groenlandicum</i>	Common Labrador Tea	Secure
	<i>Picea glauca</i>	White Spruce	Secure
	<i>Salix alaxensis</i>	Alaska Willow	Secure
	<i>Salix glauca</i>	Gray willow	Secure
Graminoids and Forbs	<i>Vaccinium vitis-idaea</i>	Rock Cranberry	Secure
	<i>Astragalus umbellatus</i>	Tundra Milk-vetch	Secure
	<i>Carex scirpoidea</i>	Bulrush Sedge	Secure
	<i>Hedysarum alpinum</i>	Alpine Sweet-vetch	Secure
Bryoids	<i>Cladonia rangiferina</i>	Gray reindeer lichen	Secure
	<i>Cladonia stellaris</i>	Star-Nosed Reindeer Lichen	Secure
	<i>Flavocetraria cucullata</i>	Curled snow lichen	Secure

**Non-Vegetated Species List**

Layer	Scientific Name	Common Name	Provincial General Status
Trees and Shrubs	<i>Salix alaxensis</i>	Alaska Willow	Secure
	<i>Populus balsamifera</i>	Balsam Poplar	Secure
	<i>Dasiphora fruticosa</i>	Shrubby Cinquefoil	Secure
Graminoids and Forbs	<i>Dryas drummondii</i>	Yellow Mountain Avens	Secure
	<i>Trisetum spicatum</i>	Narrow False Oat	Secure
	<i>Leymus innovatus</i>	Downy Lyme Grass	Secure
	<i>Saxifraga aizoides</i>	Yellow Mountain Saxifrage	Secure
	<i>Anemone richardsonii</i>	Yellow Anemone	Secure

Coniferous Species List

Layer	Scientific Name	Common Name	Provincial General Status
Trees and Shrus	<i>Betula occidentalis</i>	Water Birch	Secure
	<i>Betula papyrifera</i>	Paper Birch	Secure
	<i>Salix bebbiana</i>	Bebb Willow	Secure
	<i>Alnus incana</i>	Speckled Alder	Secure
	<i>Alnus viridis</i>	Green Alder	Secure
	<i>Andromeda polifolia</i>	Bog Rosemary	Secure
	<i>Arctostaphylos rubra</i>	Red Bearberry	Secure
	<i>Arctostaphylos uva-ursi</i>	Common Bearberry	Secure
	<i>Betula glandulosa</i>	Dwarf Birch	Secure
	<i>Cassiope tetragona</i>	Arctic White Heather	Secure
	<i>Dasiphora fruticosa</i>	Shrubby Cinquefoil	Secure
	<i>Empetrum nigrum</i>	Black Crowberry	Secure
	<i>Juniperus communis</i>	Common Juniper	Secure
	<i>Ledum groenlandicum</i>	Common Labrador Tea	Secure
	<i>Picea glauca</i>	White Spruce	Secure
	<i>Picea mariana</i>	Black Spruce	Secure
	<i>Pinus banksiana</i>	Jack Pine	Secure
	<i>Rhododendron lapponicum</i>	Lapland Rosebay	Secure
	<i>Ribes triste</i>	Swamp Red Currant	Secure
	<i>Rosa acicularis</i>	Prickly Rose	Secure
	<i>Salix arbusculoides</i>	Littletree Willow	Secure
	<i>Salix glauca</i>	Gray willow	Secure
	<i>Salix myrtillifolia</i>	Blueberry Willow	Secure
	<i>Salix reticulata</i>	Net-veined Willow	Secure
	<i>Salix scouleriana</i>	Scouler Willow	Secure
	<i>Shepherdia canadensis</i>	Buffalo-berry	Secure
	<i>Symphoricarpos occidentalis</i>	Northern Snowberry	Secure
	<i>Vaccinium oxycoccos</i>	Small Cranberry	Secure
	<i>Vaccinium uliginosum</i>	Alpine Bilberry	Secure
	<i>Vaccinium vitis-idaea</i>	Rock Cranberry	Secure
<i>Viburnum edule</i>	Squashberry	Secure	
Graminoids and Forbs	<i>Anemone richardsonii</i>	Yellow Anemone	Secure
	<i>Arctagrostis arundinacea</i>	Broad-leaf Arctic-bent	Not Assessed
	<i>Astragalus americanus</i>	American Milk-vetch	Secure
	<i>Bistorta vivipara</i>	Alpine Knotweed	Secure
	<i>Bromus pumpellianus</i>	Pumpelly Brome	Secure
	<i>Carex membranacea</i>	Fragile-seed Sedge	Secure
	<i>Carex scirpoidea</i>	Bulrush Sedge	Secure
	<i>Chamerion angustifolium</i>	Fireweed	Secure
	<i>Cornus canadensis</i>	Dwarf Dogwood	Secure
	<i>Cypripedium parviflorum</i>	Yellow Lady's-slipper	Secure
	<i>Diphasiastrum complanatum</i>	Trailing Clubmoss	Secure
	<i>Draba alpina</i>	Alpine Whitlow-grass	Secure
	<i>Dryas integrifolia</i>	Entire-leaved Mountain Avens	Secure
	<i>Equisetum arvense</i>	Field Horsetail	Secure
	<i>Equisetum scirpoides</i>	Dwarf Scouring-rush	Secure
	<i>Equisetum sylvaticum</i>	Woodland Horsetail	Secure
	<i>Galium boreale</i>	Northern Bedstraw	Secure
	<i>Geocaulon lividum</i>	Northern Comandra spp	Secure
	<i>Goodyera repens</i>	Lesser Rattlesnake Plantain	Secure
	<i>Leymus innovatus</i>	Downy Lyme Grass	Secure
	<i>Linnaea borealis</i>	Twinflower	Secure
	<i>Maianthemum canadense</i>	Wild Lily-of-the-Valley	Undetermined
	<i>Mertensia paniculata</i>	Northern Bluebell	Secure
	<i>Mitella nuda</i>	Bare-stem Bishop's Cap	Secure
	<i>Moneses uniflora</i>	One-flowered Wintergreen	Secure
	<i>Orthilia secunda</i>	One-sided Wintergreen	Secure
	<i>Parnassia palustris</i>	Marsh Grass-of-parnassus	Secure
	<i>Pedicularis labradorica</i>	Labrador Lousewort	Secure
	<i>Petasites palmatus</i>	Sweet Coltsfoot spp	Not Assessed
	<i>Petasites sagittatus</i>	Arrow-Leaved Sweet-Coltsfoot	Not Assessed
	<i>Pinguicula vulgaris</i>	Common Butterwort	Secure
	<i>Pyrola asarifolia</i>	Pink Pyrola	Secure
	<i>Rubus chamaemorus</i>	Cloudberry	Secure
	<i>Rubus pubescens var. pubescens</i>	Dwarf Red Raspberry	Secure
	<i>Senecio lugens</i>	Black-tip Ragwort	Secure
	<i>Silene acaulis</i>	Moss Champion	Secure
	<i>Spiranthes romanzoffiana</i>	Hooded Ladies' -tresses	Secure
	<i>Tofieldia pusilla</i>	Scotch False Asphodel	Secure
	<i>Vicia americana</i>	American Purple Vetch	Secure
	<i>Zigadenus elegans</i>	Mountain Death Camas	Secure
Bryoids	<i>Cladonia</i>	Lichen	
	<i>Cladonia rangiferina</i>	Gray reindeer lichen	Secure
	<i>Cladonia stellaris</i>	Star-Nosed Reindeer Lichen	Secure
	<i>Dicranum scoparium</i>	Broom moss	
	<i>Hylocomium splendens</i>	stair-step moss	Secure
	<i>Nephroma arcticum</i>	Arctic kidney lichen, green light	Secure
	<i>Peltigera aphthosa</i>	Silver-edged Freckle Pelt Lichen	Secure
	<i>Pleurozium schreberi</i>	Big red stem	Secure
	<i>Ptilium crista-castrensis</i>	Knight's plume	Secure
	<i>Tomenthypnum nitens</i>	Golden fuzzy fen moss	

Mixedwood Species List

Layer	Scientific Name	Common Name	Provincial General Status
Trees and Shrubs	<i>Alnus incana</i>	Speckled Alder	Secure
	<i>Alnus viridis</i>	Green Alder	Secure
	<i>Amelanchier alnifolia</i>	Saskatoon Berry, Serviceberry	Secure
	<i>Arctostaphylos rubra</i>	Red Bearberry	Secure
	<i>Betula glandulosa</i>	Dwarf Birch	Secure
	<i>Betula occidentalis</i>	Water Birch	Secure
	<i>Betula papyrifera</i>	Paper Birch	Secure
	<i>Cornus sericea</i>	Red Osier Dogwood	Secure
	<i>Dasiphora fruticosa</i>	Shrubby Cinquefoil	Secure
	<i>Juniperus communis</i>	Common Juniper	Secure
	<i>Ledum groenlandicum</i>	Common Labrador Tea	Secure
	<i>Lonicera dioica</i>	Mountain Honeysuckle	Secure
	<i>Picea glauca</i>	White Spruce	Secure
	<i>Picea mariana</i>	Black Spruce	Secure
	<i>Pinus banksiana</i>	Jack Pine	Secure
	<i>Populus balsamifera</i>	Balsam Poplar	Secure
	<i>Populus tremuloides</i>	Trembling Aspen	Secure
	<i>Ribes lacustre</i>	Bristly Black Currant	Secure
	<i>Rosa acicularis</i>	Prickly Rose	Secure
	<i>Salix arbusculoides</i>	Littletree Willow	Secure
	<i>Salix bebbiana</i>	Bebb Willow	Secure
	<i>Salix glauca</i>	Gray willow	Secure
	<i>Salix myrtilifolia</i>	Blueberry Willow	Secure
	<i>Salix scouleriana</i>	Scouler Willow	Secure
	<i>Shepherdia canadensis</i>	Buffalo-berry	Secure
<i>Vaccinium uliginosum</i>	Alpine Bilberry	Secure	
<i>Vaccinium vitis-idaea</i>	Rock Cranberry	Secure	
<i>Viburnum edule</i>	Squashberry	Secure	
Graminoids and Forbs	<i>Actaea rubra</i>	Red Baneberry	Secure
	<i>Anemone richardsonii</i>	Yellow Anemone	Secure
	<i>Aquilegia brevistyla</i>	Blue Columbine	Secure
	<i>Arctagrostis arundinacea</i>	Broad-leaf Arctic-bent	Not Assessed
	<i>Astragalus americanus</i>	American Milk-vetch	Secure
	<i>Chamerion angustifolium</i>	Fireweed	Secure
	<i>Cornus canadensis</i>	Dwarf Dogwood	Secure
	<i>Delphinium glaucum</i>	Pale Larkspur	Secure
	<i>Diphasiastrum complanatum</i>	Trailing Clubmoss	Secure
	<i>Equisetum arvense</i>	Field Horsetail	Secure
	<i>Equisetum scirpoides</i>	Dwarf Scouring-rush	Secure
	<i>Equisetum sylvaticum</i>	Woodland Horsetail	Secure
	<i>Fragaria virginiana</i>	Virginia Strawberry	Secure
	<i>Fragaria virginiana</i>	Virginia Strawberry	Secure
	<i>Galium boreale</i>	Northern Bedstraw	Secure
	<i>Geocaulon lividum</i>	Northern Comandra spp	Secure
	<i>Goodyera repens</i>	Lesser Rattlesnake Plantain	Secure
	<i>Hedysarum boreale</i>	Boreal Sweet- vetch	Secure
	<i>Lathyrus ochroleucus</i>	Cream Vetchling	Secure
	<i>Leymus innovatus</i>	Downy Lyme Grass	Secure
	<i>Linnaea borealis</i>	Twinflower	Secure
	<i>Maianthemum canadense</i>	Wild Lily-of-the-Valley	Undetermined
	<i>Mertensia paniculata</i>	Northern Bluebell	Secure
	<i>Mitella nuda</i>	Bare-stem Bishop's Cap	Secure
	<i>Moneses uniflora</i>	One-flowered Wintergreen	Secure
	<i>Orthilia secunda</i>	One-sided Wintergreen	Secure
	<i>Pedicularis labradorica</i>	Labrador Lousewort	Secure
	<i>Petasites palmatus</i>	Sweet Coltsfoot spp	Not Assessed
	<i>Petasites vitifolius</i>	Sweet Coltsfoot spp	Not Assessed
	<i>Platanthera obtusata</i>	Blunt-leaved Bog Orchid	Secure
	<i>Pyrola asarifolia</i>	Pink Pyrola	Secure
	<i>Pyrola chlorantha</i>	Greenish-flowered Pyrola	Secure
	<i>Pyrola grandiflora</i>	Arctic Pyrola	Secure
<i>Rubus pubescens var. pubescens</i>	Dwarf Red Raspberry	Secure	
<i>Vicia americana</i>	American Purple Vetch	Secure	
<i>Viola renifolia</i>	Kidney-leaf White Violet	Secure	
Bryoids	<i>Dicranum scoparium</i>	Broom moss	
	<i>Hylocomium splendens</i>	stair-step moss	Secure
	<i>Hylocomium splendens</i>	stair-step moss	Secure
	<i>Peltigera aphthosa</i>	Silver-edged Freckle Pelt Lichen	Secure
	<i>Pleurozium schreberi</i>	Big red stem	Secure
	<i>Ptilium crista-castrensis</i>	Knight's plume	Secure

**Shrub - Fire Regen Species List**

Layer	Scientific Name	Common Name	Provincial General Status
Trees and Shrubs	<i>Actaea rubra</i>	Red Baneberry	Secure
	<i>Betula glandulosa</i>	Dwarf Birch	Secure
	<i>Dasiphora fruticosa</i>	Shrubby Cinquefoil	Secure
	<i>Ledum groenlandicum</i>	Common Labrador Tea	Secure
	<i>Picea glauca</i>	White Spruce	Secure
	<i>Pinus banksiana</i>	Jack Pine	Secure
	<i>Populus balsamifera</i>	Balsam Poplar	Secure
	<i>Rosa acicularis</i>	Prickly Rose	Secure
	<i>Salix arbusculoides</i>	Littletree Willow	Secure
	<i>Salix glauca</i>	Gray willow	Secure
	<i>Salix myrtillifolia</i>	Blueberry Willow	Secure
	<i>Salix scouleriana</i>	Scouler Willow	Secure
	<i>Vaccinium oxycoccos</i>	Small Cranberry	Secure
	<i>Vaccinium uliginosum</i>	Alpine Bilberry	Secure
<i>Vaccinium vitis-idaea</i>	Rock Cranberry	Secure	
Graminoids and Forbs	<i>Bromus pumpellianus</i>	Pumpelly Brome	Secure
	<i>Carex membranacea</i>	Fragile-seed Sedge	Secure
	<i>Carex vaginata</i>	Sheathed Sedge	Secure
	<i>Chamerion angustifolium</i>	Fireweed	Secure
	<i>Cornus canadensis</i>	Dwarf Dogwood	Secure
	<i>Diphasiastrum complanatum</i>	Trailing Clubmoss	Secure
	<i>Equisetum arvense</i>	Field Horsetail	Secure
	<i>Equisetum sylvaticum</i>	Woodland Horsetail	Secure
	<i>Geocaulon lividum</i>	Northern Comandra spp	Secure
	<i>Linnaea borealis</i>	Twinflower	Secure
	<i>Lycopodium annotinum</i>	Bristly Clubmoss	Secure
	<i>Lycopodium clavatum</i>	Running Clubmoss	Undetermined
	<i>Mertensia paniculata</i>	Northern Bluebell	Secure
	<i>Pedicularis labradorica</i>	Labrador Lousewort	Secure
	<i>Petasites sagittatus</i>	Arrow-Leaved Sweet-Coltsfoot	Not Assessed
	<i>Rubus acaulis</i>	Raspberry spp	Not Assessed
	<i>Senecio lugens</i>	Black-tip Ragwort	Secure
<i>Zigadenus elegans</i>	Mountain Death Camas	Secure	
Bryoids	<i>Cladonia</i>	Lichen	
	<i>Cladonia rangiferina</i>	Gray reindeer lichen	Secure
	<i>Polytrichum</i>	Hair-cap	

Shrub - Alluvial Species List

Layer	Scientific Name	Common Name	Provincial General Status
Trees and Shrubs	<i>Arctostaphylos rubra</i>	Red Bearberry	Secure
	<i>Arctostaphylos rubra</i>	Red Bearberry	Secure
	<i>Arctostaphylos uva-ursi</i>	Common Bearberry	Secure
	<i>Betula glandulosa</i>	Dwarf Birch	Secure
	<i>Cassiope tetragona</i>	Arctic White Heather	Secure
	<i>Dasiphora fruticosa</i>	Shrubby Cinquefoil	Secure
	<i>Dasiphora fruticosa</i>	Shrubby Cinquefoil	Secure
	<i>Juniperus communis</i>	Common Juniper	Secure
	<i>Juniperus horizontalis</i>	Creeping Juniper	Secure
	<i>Ledum groenlandicum</i>	Common Labrador Tea	Secure
	<i>Picea glauca</i>	White Spruce	Secure
	<i>Pinus banksiana</i>	Jack Pine	Secure
	<i>Populus balsamifera</i>	Balsam Poplar	Secure
	<i>Rhododendron lapponicum</i>	Lapland Rosebay	Secure
	<i>Salix alaxensis</i>	Alaska Willow	Secure
	<i>Salix arbusculoides</i>	Littletree Willow	Secure
	<i>Salix barclayi</i>	Barclay Willow	Secure
	<i>Salix barrattiana</i>	Barratt Willow	Secure
	<i>Salix bebbiana</i>	Bebb Willow	Secure
	<i>Salix brachycarpa</i>	Short-fruit Willow	Secure
	<i>Salix glauca</i>	Gray willow	Secure
	<i>Salix myrtillofolia</i>	Blueberry Willow	Secure
	<i>Salix planifolia</i>	Diamond-leaved Willow	Secure
	<i>Salix pseudomonticola</i>	False Mountain Willow	Secure
	<i>Salix reticulata</i>	Net-veined Willow	Secure
	<i>Salix scouleriana</i>	Scouler Willow	Secure
	<i>Shepherdia canadensis</i>	Buffalo-berry	Secure
	<i>Vaccinium uliginosum</i>	Alpine Bilberry	Secure
<i>Vaccinium vitis-idaea</i>	Rock Cranberry	Secure	
Graminoids and Forbs	<i>Achillea millefolium</i>	Common Yarrow	Secure
	<i>Agoseris aurantiaca</i>	Orange False Dandelion	Undetermined
	<i>Agoseris aurantiaca</i>	Orange False Dandelion	Undetermined
	<i>Anemone patens</i>	Prairie Crocus	Secure
	<i>Anemone richardsonii</i>	Yellow Anemone	Secure
	<i>Antennaria angustata</i>	Pussytoes spp	Not Assessed
	<i>Antennaria densifolia</i>	Dense-leaved Pussytoes	Secure
	<i>Antennaria pulcherrima</i>	Showy Pussytoes	Secure
	<i>Anthoxanthum hirtum</i>	Vanilla Sweet Grass	Secure
	<i>Aquilegia brevistyla</i>	Blue Columbine	Secure
	<i>Arctagrostis arundinacea</i>	Broad-leaf Arctic-bent	Not Assessed
	<i>Arenaria humifusa</i>	Creeping Sandwort	Secure
	<i>Artemisia norvegica</i>	Arctic Sagebrush	Secure
	<i>Astragalus americanus</i>	American Milk-vetch	Secure
	<i>Bistorta vivipara</i>	Alpine Knotweed	Secure
	<i>Bromus pumpellianus</i>	Pumpelly Brome	Secure
	<i>Calamagrostis purpurascens</i>	Purple Reed Grass	Secure
	<i>Campanula aurita</i>	Yukon Bellflower	Secure
	<i>Carex aurea</i>	Golden Fruit Sedge	Secure
	<i>Carex buxbaumii</i>	Buxbaum's Sedge	Secure
	<i>Carex buxbaumii</i>	Buxbaum's Sedge	Secure
	<i>Carex capillaris</i>	Hairlike Sedge	Secure
	<i>Carex podocarpa</i>	Short-stalk Sedge	Secure
	<i>Carex rupestris</i>	Rock Sedge	Secure
	<i>Carex scirpoidea</i>	Bulrush Sedge	Secure
	<i>Carex vaginata</i>	Sheathed Sedge	Secure
	<i>Castilleja caudata</i>	Pale Indian Paintbrush / Painted Cup	Secure
	<i>Castilleja raupii</i>	Ruap Indian Paintbrush	Secure
	<i>Chamerion angustifolium</i>	Fireweed	Secure
	<i>Cypripedium parviflorum</i>	Yellow Lady's-slipper	Secure
	<i>Delphinium glaucum</i>	Pale Larkspur	Secure
	<i>Draba lactea</i>	Milky Whitlow-grass	Secure
	<i>Dryas drummondii</i>	Yellow Mountain Avens	Secure
	<i>Dryas integrifolia</i>	Entire-leaved Mountain Avens	Secure
	<i>Equisetum arvense</i>	Field Horsetail	Secure
	<i>Erigeron hyssopifolius</i>	Hyssop-leaved Fleabane	Secure
	<i>Eurybia sibirica</i>	Siberian Aster	Secure
	<i>Galium boreale</i>	Northern Bedstraw	Secure
	<i>Gentianopsis detonsa ssp. Raupii</i>	Sheared Gentian	Not Assessed
	<i>Geocaulon lividum</i>	Northern Comandra spp	Secure
	<i>Hedysarum alpinum</i>	Alpine Sweet-vetch	Secure
	<i>Hedysarum boreale</i>	Boreal Sweet- vetch	Secure
	<i>Hieracium umbellatum</i>	Umbellate Hawkweed	Secure
	<i>Juncus alpinoarticulatus</i>	Northern Green Rush	Secure
	<i>Juncus castaneus</i>	Chestnut Rush	Secure
	<i>Juncus triglumis</i>	Northern White Rush	Secure
	<i>Leymus innovatus</i>	Downy Lyme Grass	Secure
	<i>Linnaea borealis</i>	Twinflower	Secure
	<i>Luzula spicata</i>	Spiked Wood Rush	Secure
	<i>Lycopodium annotinum</i>	Bristly Clubmoss	Secure
	<i>Mertensia paniculata</i>	Northern Bluebell	Secure
	<i>Orthilia secunda</i>	One-sided Wintergreen	Secure
	<i>Oxytropis splendens</i>	Showy Locoweed	Secure
	<i>Packera paupercula</i>	Balsam Groundsel	Secure
	<i>Parnassia palustris</i>	Marsh Grass-of-parnassus	Secure
	<i>Pedicularis labradorica</i>	Labrador Lousewort	Secure
	<i>Pinguicula vulgaris</i>	Common Butterwort	Secure
	<i>Platanthera aquilonis</i>	Tall Northern Green Orchid	Secure
	<i>Polemonium acutiflorum</i>	Tall Jacob's Ladder	Secure
	<i>Pyrola asarifolia</i>	Pink Pyrola	Secure
	<i>Ranunculus lapponicus</i>	Lapland Buttercup	Secure
	<i>Rubus acaulis</i>	Raspberry spp	Not Assessed
	<i>Saxifraga oppositifolia</i>	Purple Mountain Saxifrage	Secure
<i>Saxifraga tricuspidata</i>	Prickly Saxifrage	Secure	
<i>Senecio lugens</i>	Black-tip Ragwort	Secure	
<i>Solidago multiradiata</i>	Alpine Multiray Goldenrod	Secure	
<i>Symphotrichum ciliolatum</i>	Lindley's Aster	Secure	
<i>Thalictrum alpinum</i>	Alpine Meadow Rue	Secure	
<i>Tofieldia coccinea</i>	Northern False Asphodel	Secure	
<i>Tofieldia pusilla</i>	Scotch False Asphodel	Secure	
<i>Triantha glutinosa</i>	Sticky False Asphodel	Secure	
<i>Zigadenus elegans</i>	Mountain Death Camas	Secure	
Bryoids	<i>Cladonia rangiferina</i>	Gray reindeer lichen	Secure
	<i>Hylocomium splendens</i>	stair-step moss	Secure

Shrub - Subalpine Species List

Layer	Scientific Name	Common Name	Provincial General Status
Trees and Shrubs	<i>Actaea rubra</i>	Red Baneberry	Secure
	<i>Andromeda polifolia</i>	Bog Rosemary	Secure
	<i>Arctostaphylos alpina</i>	Alpine Bearberry	Secure
	<i>Arctostaphylos rubra</i>	Red Bearberry	Secure
	<i>Arctostaphylos uva-ursi</i>	Common Bearberry	Secure
	<i>Betula glandulosa</i>	Dwarf Birch	Secure
	<i>Cassiope tetragona</i>	Arctic White Heather	Secure
	<i>Dasiphora fruticosa</i>	Shrubby Cinquefoil	Secure
	<i>Empetrum nigrum</i>	Black Crowberry	Secure
	<i>Juniperus communis</i>	Common Juniper	Secure
	<i>Juniperus horizontalis</i>	Creeping Juniper	Secure
	<i>Ledum groenlandicum</i>	Common Labrador Tea	Secure
	<i>Lonicera dioica</i>	Mountain Honeysuckle	Secure
	<i>Picea glauca</i>	White Spruce	Secure
	<i>Pinus banksiana</i>	Jack Pine	Secure
	<i>Rhododendron lapponicum</i>	Lapland Rosebay	Secure
	<i>Rosa acicularis</i>	Prickly Rose	Secure
	<i>Salix alaxensis</i>	Alaska Willow	Secure
	<i>Salix arbusculoides</i>	Littletree Willow	Secure
	<i>Salix barrattiana</i>	Barratt Willow	Secure
	<i>Salix glauca</i>	Gray willow	Secure
	<i>Salix myrtilifolia</i>	Blueberry Willow	Secure
	<i>Salix planifolia</i>	Diamond-leaved Willow	Secure
	<i>Salix reticulata</i>	Net-veined Willow	Secure
<i>Shepherdia canadensis</i>	Buffalo-berry	Secure	
<i>Vaccinium uliginosum</i>	Alpine Bilberry	Secure	
<i>Vaccinium vitis-idaea</i>	Rock Cranberry	Secure	
<i>Viburnum edule</i>	Squashberry	Secure	
Graminoids and Forbs	<i>Aconitum delphinifolium</i>	Mountain Monkshood	Secure
	<i>Anemone richardsonii</i>	Yellow Anemone	Secure
	<i>Antennaria pulcherrima</i>	Showy Pussytoes	Secure
	<i>Arctagrostis arundinacea</i>	Broad-leaf Arctic-bent	Not Assessed
	<i>Arnica angustifolia</i>	Narrowleaf Arnica	Secure
	<i>Artemisia norvegica</i>	Arctic Sagebrush	Secure
	<i>Aster alpinus</i>	Alpine Aster	Secure
	<i>Bistorta vivipara</i>	Alpine Knotweed	Secure
	<i>Botrychium lunaria</i>	Common Moonwort	Secure
	<i>Bromus pumpellianus</i>	Pumpelly Brome	Secure
	<i>Campanula aurita</i>	Yukon Bellflower	Secure
	<i>Carex capillaris</i>	Hairlike Sedge	Secure
	<i>Carex membranacea</i>	Fragile-seed Sedge	Secure
	<i>Carex rupestris</i>	Rock Sedge	Secure
	<i>Carex scirpoidea</i>	Bulrush Sedge	Secure
	<i>Castilleja raupii</i>	Ruap Indian Paintbrush	Secure
	<i>Chamerion angustifolium</i>	Fireweed	Secure
	<i>Cornus canadensis</i>	Dwarf Dogwood	Secure
	<i>Cypripedium parviflorum</i>	Yellow Lady's-slipper	Secure
	<i>Delphinium glaucum</i>	Pale Larkspur	Secure
	<i>Draba alpina</i>	Alpine Whitlow-grass	Secure
	<i>Dryas integrifolia</i>	Entire-leaved Mountain Avens	Secure
	<i>Equisetum scirpoides</i>	Dwarf Scouring-rush	Secure
	<i>Erigeron hyssopifolius</i>	Hyssop-leaved Fleabane	Secure
	<i>Fragaria virginiana</i>	Virginia Strawberry	Secure
	<i>Galium boreale</i>	Northern Bedstraw	Secure
	<i>Geocaulon lividum</i>	Northern Comandra spp	Secure
	<i>Hedysarum alpinum</i>	Alpine Sweet-vetch	Secure
	<i>Hedysarum boreale</i>	Boreal Sweet- vetch	Secure
	<i>Leymus innovatus</i>	Downy Lyme Grass	Secure
	<i>Linnaea borealis</i>	Twinflower	Secure
	<i>Lycopodium annotinum</i>	Bristly Clubmoss	Secure
	<i>Parnassia palustris</i>	Marsh Grass-of-parnassus	Secure
	<i>Parrya nudicaulis</i>	Naked-stemmed Wallflower	Secure
	<i>Pedicularis labradorica</i>	Labrador Lousewort	Secure
	<i>Pedicularis lanata</i>	Woolly Lousewort	Secure
	<i>Pinguicula vulgaris</i>	Common Butterwort	Secure
	<i>Pyrola asarifolia</i>	Pink Pyrola	Secure
	<i>Pyrola chlorantha</i>	Greenish-flowered Pyrola	Secure
	<i>Saxifraga aizoides</i>	Yellow Mountain Saxifrage	Secure
	<i>Saxifraga oppositifolia</i>	Purple Mountain Saxifrage	Secure
	<i>Senecio lugens</i>	Black-tip Ragwort	Secure
	<i>Silene acaulis</i>	Moss Champion	Secure
	<i>Solidago multiradiata</i>	Alpine Multiray Goldenrod	Secure
<i>Thalictrum alpinum</i>	Alpine Meadow Rue	Secure	
<i>Tofieldia coccinea</i>	Northern False Asphodel	Secure	
<i>Tofieldia pusilla</i>	Scotch False Asphodel	Secure	
<i>Triantha glutinosa</i>	Sticky False Asphodel	Secure	
<i>Zigadenus elegans</i>	Mountain Death Camas	Secure	
Bryoids	<i>Cladonia</i>	Lichen	
	<i>Hylocomium splendens</i>	stair-step moss	Secure
	<i>Oxytropis nigrescens</i>	Blackish Locoweed	Secure
	<i>Pleurozium schreberi</i>	Big red stem	Secure