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**Geotechnical Feasibility Assessment
Proposed Country Residential Development
km 574.5 RHS Robert Campbell Highway #4
Carmacks, Yukon – 2018**



Prepared For: Yukon Government

Date : December 27th, 2018



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Proposed Country Residential Development
km 574.5 RHS Robert Campbell Highway #4
Carmacks, Yukon – 2018**

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1.0 INTRODUCTION

Our firm was retained by *Yukon Government (YG), Department of Community Services – Land Development Branch* under a Standing Offer Agreement (No.2017/2018-2753) to conduct a geotechnical feasibility assessment of an area located in Carmacks, Yukon.

The study area, which measures 14 ha in size, is located at km 574.5 right-hand side (RHS) of Robert Campbell Highway #4 as noted in Figure 1. The *Village of Carmacks* is located ~ 180 km north of Whitehorse along the North Klondike Highway # 2.

Authorization to proceed with the geotechnical assessment was granted by *YG – Community Services - Project Manager, Mr.K.Fisher* on September 24th, 2018. The work was subsequently conducted in accordance with our September 7th, 2018 proposal.

Our findings, which were based upon information retained during a literature review, site reconnaissance and laboratory work program, have been presented herein along with a description of our methodology.

2.0 SCOPE-OF-WORK

The purpose of our feasibility assessment was to characterize the terrain and potential sub-surface conditions of the lot through a literature review, site reconnaissance and laboratory work program such that the development potential of the proposed area could be assessed from a geotechnical perspective relative to country residential lot development.

Specifically, the intent was to delineate regions within the proposed area which may be suitable for development and provide general geotechnical recommendations regarding infrastructure development where development is deemed feasible.

As our assessment was preliminary in nature, it was understood that a more comprehensive geotechnical evaluation would be conducted through drilling/test pit methodologies to verify site-specific geotechnical parameters if the development potential was to be assessed in greater detail.



3.0 METHODOLOGY

Our methodology was comprised of a literature review, field work program and laboratory work program as described below.

3.1 Literature Review

A literature review was conducted to evaluate satellite imagery, a selection of aerial photos, topographical data and other technical resources which were readily available. This information was utilized to evaluate the regional conditions and detail the field work program by establishing GPS waypoints such that geotechnical points of interest could be better assessed during the site reconnaissance.

The following sources of information were reviewed;

Topographical Information

The regional topography was assessed by viewing a 1:50,000 scale topographical map (NTS – 115I01 Carmacks) and information available on the *YG- Water Placer Atlas* and *Yukon Geology* websites.

A selection of the *Yukon Geology* website showing the local contours (in 100 foot intervals) has been presented in Section 4.1, below.

Surficial Geology Map

A 1:100,000 surficial geology map (Map 1879A) entitled Surficial Geology, Tantalus Butte, Yukon Territory compiled by L.E.Jackson - *Geological Survey of Canada* provided a description of the anticipated surficial soil deposits.

A portion of this map and the corresponding limits of the study area has been provided in Section 4.5, below.

Bedrock Geology Map

A bedrock geology map, available through the *Yukon Geological Survey*, identified the regional bedrock types and characteristics within the study area. The map was entitled Yukon Bedrock Geology Map – *Yukon Geological Survey* – Open File 2016-1 - 1:1,000,000 scale compiled by M.Colpron, S.Israel, D.Murphy, L.Pigage, and D.Moynihan.



A more detailed delineation of these contacts was found on the *Yukon Geological Survey* website as noted in Section 4.6, below.

Aerial Photographs

A selection of aerial photographs was obtained from *YG – Energy, Mines and Resources* to allow for a more detailed assessment through airphoto terrain analysis. The following airphotos were available;

<i>Flight Line</i>	<i>Photo No.</i>	<i>Date</i>
A22356	56-58	1971
A22355	73-74	1971

A selection of these aerial photographs has been attached in Appendix A.

Satellite Imagery

A review of satellite imagery from *Google Earth* allowed for an assessment of the site conditions relative to the more recent imagery. The imagery which was available on the website was dated September 24th, 2008.

Village of Carmacks – Official Community Plan (OCP) – 2013

The OCP was partially based upon;

- a 1977 soil study which was conducted by the *Saskatoon Institute of Pedology*,
- a 1989 landscape management plan conducted by *UMA Engineering*, and
- a June 2001 flood-risk assessment conducted by *Norwest Hydraulic Consultants*.

This information was utilized by *Inukshuk Planning & Development Ltd.* to compile a development suitability map of the community which was originally included as part of the 2005 OCP. The Floodplain and Landscape Analysis Map included in Schedule C of the OCP classified the terrain in Carmacks as having either ‘poor, fair or good development capability’. The poor rating was generally given to regions located within the limits of a 1 in 200 year (Yukon River) flood event or else in regions where steep slopes and/or shallow bedrock was likely. The development capability of the study area as classified in Schedule C of the OCP has been denoted in Section 4.7, below.



The OCP indicated that the study area lies within a zone denoted as ‘hinterland’.

Other Resources

The *Yukon Government – Water Placer Atlas* website was reviewed as it denoted the boundaries of various land dispositions, drainage regimes and other similar types of information. The corresponding boundaries of the study area have been illustrated on the *Water Placer Atlas* map attached in Section 4.1, below.

3.2 Field Work Program

The field work program was comprised of a site reconnaissance and hand sampling program. Specifically, our Sr.Soils Technician, Mr.G.Keitel conducted a foot traverse of the site on October 4th, 2018 to note the field conditions and geological features within the study area.

During the course of the traverse, three (3) near surface soil samples were retained by utilizing a hand shovel to allow for subsequent laboratory analysis as described in Section 3.3, below. These samples (#1-#3) were retained from the locations noted in Figure 2.

A supplemental site reconnaissance was conducted on October 8th by a combination of Mr.Keitel and the undersigned to allow for senior engineering assessment.

Fair weather was encountered at the time of the reconnaissance. Although daytime highs were in the order of + 7° C, given the time of season, frozen ground conditions prevailed.

Our observations during the field work program were documented through a combination of field notes, GPS waypoints and photographs. These observations have been summarized in Section 4.0 – Site Conditions.



3.3 Laboratory Work Program

A laboratory work program was conducted on October 8th, 2018 at our Whitehorse laboratory facilities in order to characterize the index properties and conditions of the retained soil samples.

In brief, each of the retained samples underwent moisture content analysis (ASTM D2216-92) and grain size distribution analysis (ASTM D422-633) to determine their natural moisture content and allow for characterization in accordance with the *Unified Soil Classification System*.

The results of the analysis were as follows;

<i>Sample</i>	<i>Moisture (%)</i>	<i>Silt (%)</i>	<i>Sand (%)</i>	<i>Gravel (%)</i>	<i>USCS</i>	<i>Description</i>
1	5.4	18.9	81.1	0.0	SM	Silty Sand
2	12.1	71.6	28.4	0.0	ML	Sandy Silt
3	3.7	12.9	26.6	60.5	GM	Sandy Gravel some Silt

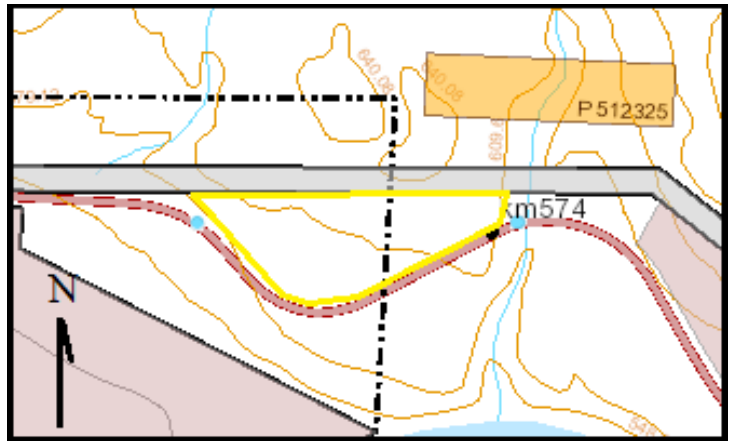


4.0 SITE CONDITIONS

4.1 Study Area

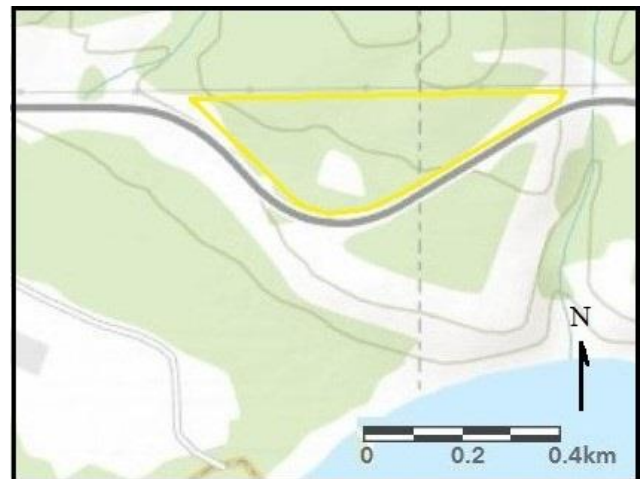
The study area measures 14 ha in size and is located along the Robert Campbell Highway #4, as noted in Figure 1.

The map retained from the *YG - Water Placer Atlas* website noted that the northern periphery of the study area is bound by powerline right-of-way. The eastern edge of the study area borders a drainage gully which directs seasonal drainage to the south. The remainder of the site is bound by the Robert Campbell Highway #4 right-of-way. The eastern portions of the site lies beyond the municipal limits of the *Village of Carmacks*.



While the study area is best described as a gradually sloping terrace, steeper slopes are located within the western and eastern realms of the site. The terrain in the eastern portion is undulating.

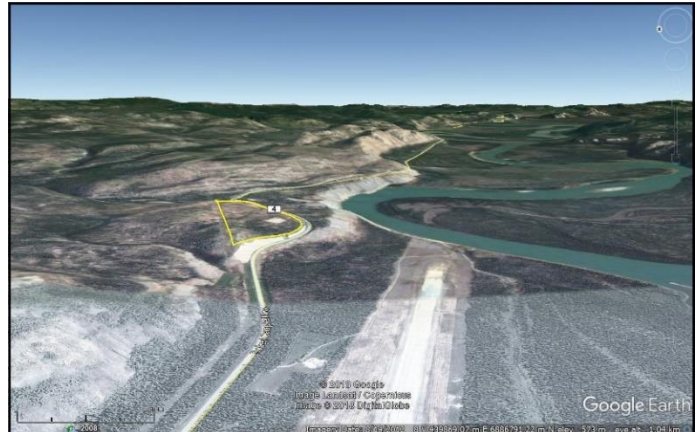
The topography of the study area is best described as a terrace which transitions into a gradual slope which increases in elevation towards the north. The lower (central) elevations of the terrace are in the order of 590 meters (asl). The higher elevations located on the north-eastern portions of the study area approach elevations in the order of 630 meters. As such, the elevation gain across the study area is in the order of 40 meters.



4.2 Physiographic Region

Carmacks is located in the Yukon Plateau-Central Ecoregion at the confluence of the Yukon and Nordenskiöld Rivers. It lies at the southern fringe of the Dawson Range where mountains rise to elevations in the order of 1800 meters.

The prevailing elevations in the region of the study area range between 590 meters to 630 meters. The Yukon River lies at elevations near 517-518 meters. Regionally, elevations between the Yukon River and adjacent valley terraces vary by up to 300 meters.

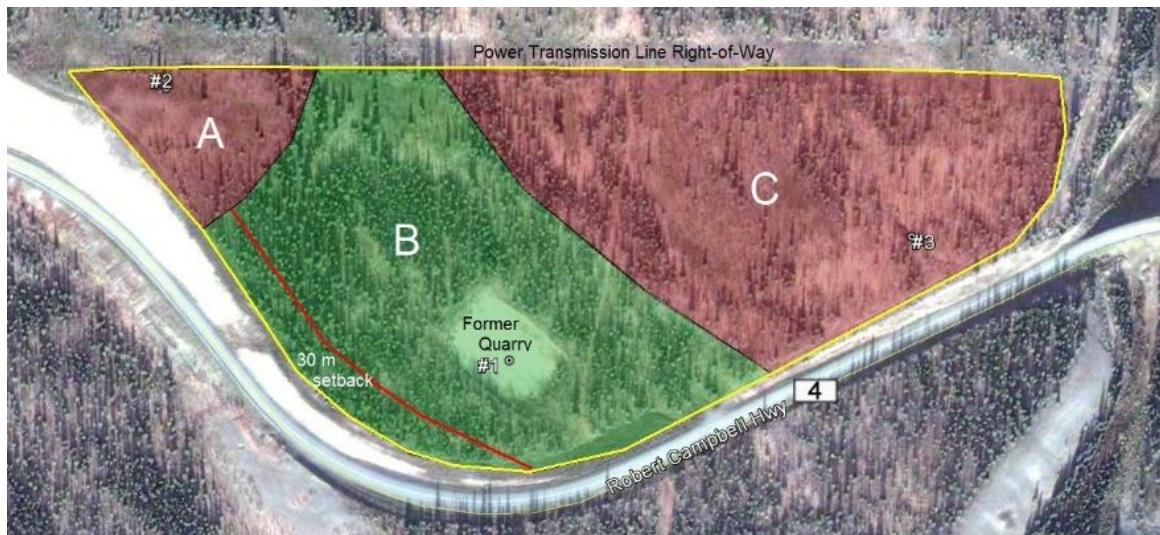


Orthogonal view from Google Earth facing south-east.

The regional terrain can be described as rolling, glaciated terrain, which is incised by broad, U-shaped valleys.

4.3 Site Description

The study area is comprised of three (3) distinct regions as noted below and in Figure 2.



Area A, located in the western realms of the study area, is dominated by glaciofluvial complex deposits. The terrain in this area has moderate to steep slopes and is sparsely treed.

Area B, located in the central region of the study area, is dominated by glaciofluvial terrace deposits which harbors a moderately dense spruce forest with interspersed poplar trees and willow bush understory. The terrain in this area is generally level with increasing gradients towards the north (photo right).



Area C, located in the eastern realms of the study area, is dominated by morainal blanket deposits which overlie shallow bedrock (photos below). The terrain in this region is generally undulating and bedrock outcrops are common. Poplar (and other deciduous) trees dominate this region.



A series of off-road trails provides access to the powerline right-of-way through the central and eastern realms of the site. Some over-grown trails are present in the western areas of the site. A series of shallow bulldozer cuts (indicative of mining exploration operations) were encountered in the eastern realms of the site.

Overhead power transmission lines are located within the powerline right-of-way located along the northern edge of the site.



View of Powerline ROW facing west from central trail.



View of Powerline ROW facing east from central trail.

An abandoned gravel pit is centrally located in the study area (Area B). This granular reserve appears to be predominately comprised of clean sands which contain varying amounts of gravel. The northern and southern working faces of the quarry measured in the order of 5 and 3 meters tall, respectively.



View of quarry facing east.



A moderately steep slope, which was shaped during construction of the Robert Campbell Highway, is located adjacent to the south-western periphery of the study area.



View of south-western slope facing east along the Robert Campbell Highway #4.

4.4 Geomorphology

Glaciation

The terrain in this region of the Yukon was last glaciated during the McConnell Glaciation which occurred approximately 17,000 years ago. The glacial deposits which were deposited during the glacial recession which occurred during this time were subsequently incised by the Yukon River which deposited alluvial soils in predominately floodplain deposits along the adjacent shorelines.

Permafrost

The vegetation did not reveal any signs of permafrost. However, as Carmacks lies in a region of extensive discontinuous to sporadic permafrost, it could be encountered within the limits of the study area depending upon the local conditions.

Watercourses

A seasonal drainage course was noted immediately east of the study area. These surficial waters drain through a CSP culvert located at km 574 of the Robert Campbell Highway #4.

The Yukon River, which flows to the north, is located ~325 meters south-east of the site. Data from a Hydrometric Station (Number 09AH001 YT Yukon River @ Carmacks) maintained by the *Government of Canada – Environment and Natural Resources* noted January 2018 river elevations of ~518 meters.



Surface Drainage

There were no signs of erosion within the study area which would be attributed to surface drainage. In general, surface drainage flows from north-eastern regions of higher elevations towards the south-west.

Groundwater

The presence of shallow groundwater is not likely as the site is located on a terrace which lies in the order of 70 meters above the Yukon River. However, groundwater may be encountered in regions where perched conditions are bedrock

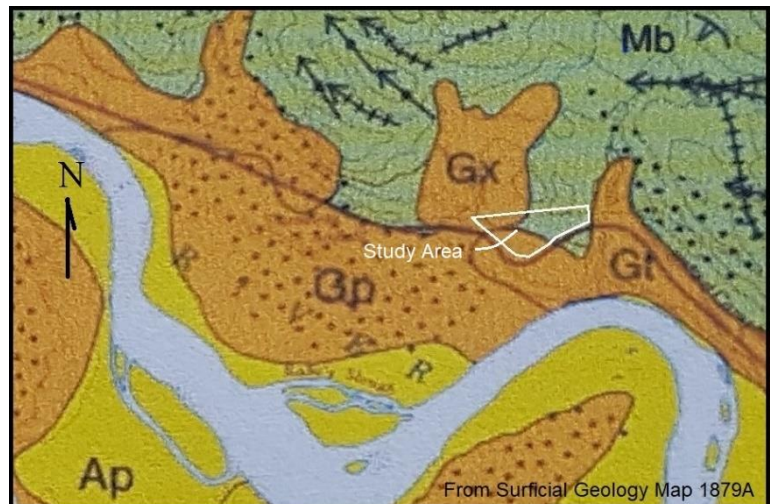
Bedrock

Bedrock outcrops were noted during our site reconnaissance throughout Area C.

4.5 Surficial Geology

The distribution of surficial deposits within the study area has been illustrated in the (1:100,000 scale) surficial geology map Tantalus Butte - Yukon Territory - Map 1879A compiled by L.E.Jackson Jr., 1997. The approximate limits of the study area have been illustrated on a portion of the surficial geology map as noted below.

In brief, the map shows that the surficial deposits which are located within the study area are comprised of a combination of glaciofluvial terrace, glaciofluvial complex and morainal blanket deposits.



The surficial geology map legend describes these deposits as follows;

Glaciofluvial Terrace Deposits (Gt)

These deposits are comprised of pebble to cobble gravel, massive to thick bedded. They are often incised into flights of terraces by glacial streams and measure between 1 meter to greater than 10 meters thick.



Glaciofluvial Ice Stagnation Complex Deposits (Gx)

These deposits are typically comprised of poorly to moderately sorted sand and gravel diamicton, which have been deposited during equilibrium phases of glacial retreat. These deposits can contain cobble to boulder sized materials and minor amounts of silt and clay. They exhibit thick to massive bedding which is commonly folded and faulted from depositional ice melt. The surface expression commonly consists of hummocks, kettles, eskers and crevasse filled ridges with minor elements of glaciofluvial plain, delta and terrace sediments.

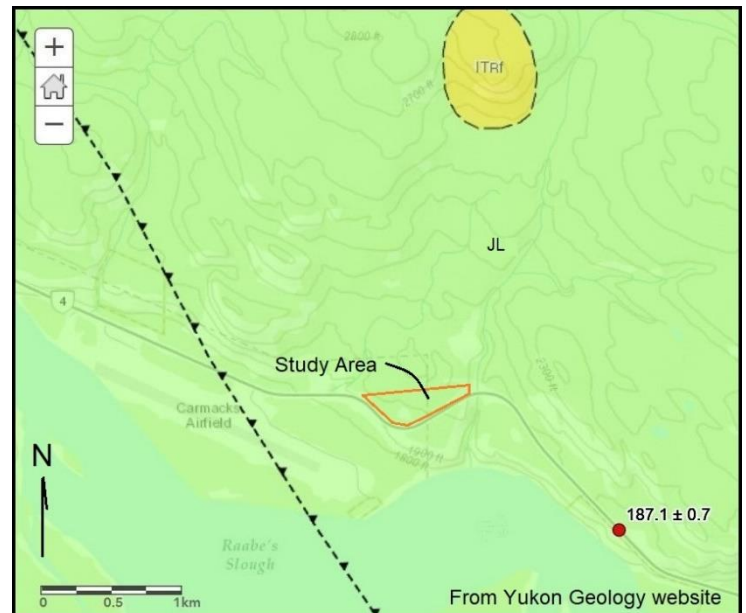
Morainal (Till) Blanket Deposits (Mb)

The sediments in morainal blanket deposits are commonly comprised of a stony diamicton which has a sandy/silty matrix. These deposits are massive to crudely stratified and generally measure between 1 to 5 meters thick. The surface conforms to the underlying topography.

4.6 Bedrock Geology

Bedrock outcrops were encountered during our field work program in the eastern realms (Figure 2 - Area C) of the site.

The geology map noted on the *Yukon Geology* website indicates that the site is underlain by clastic sedimentary rock (JL) of the Tanglefoot Formation. This rock is described as an arkosic sandstone/shale and pebble conglomerate which contains minor coal occurrences.



A thrust fault is located several hundred meters west of the study area.

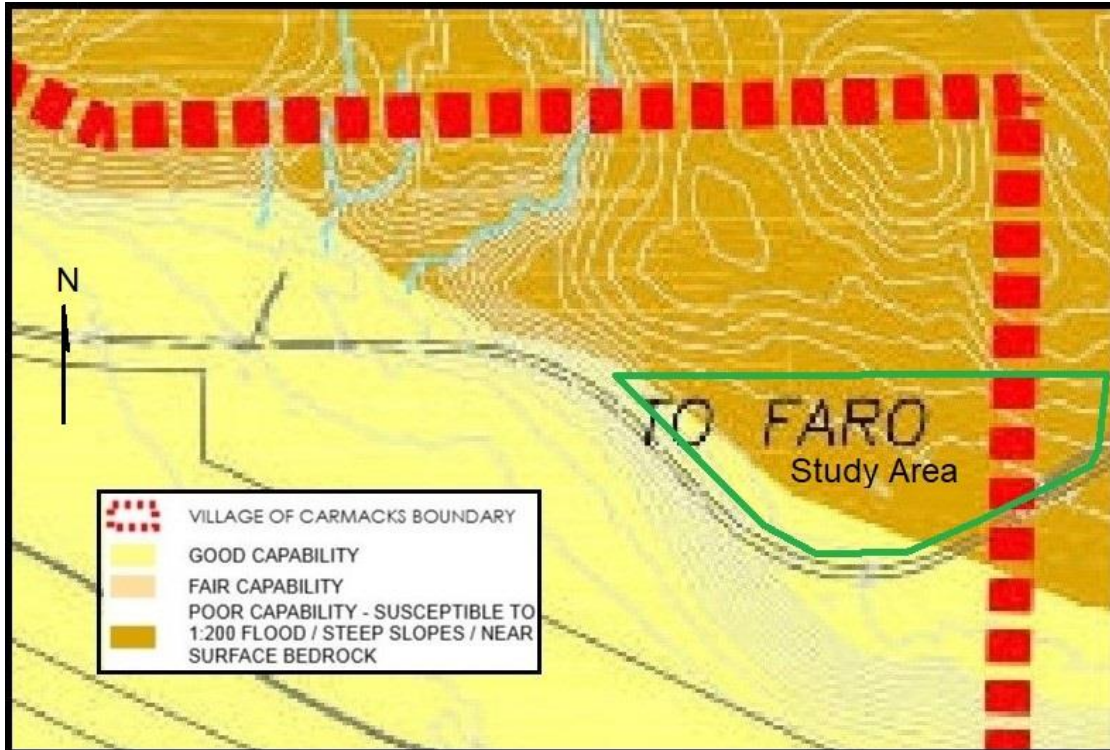
4.7 OCP Floodplain and Landscape Analysis

The study area was identified in Schedule C – Floodplain and Landscape Analysis of the Village of Carmacks - 2013 OCP as having either a good or else poor (development) capability. The good rating was given to the south-western periphery of the site. The



poor rating, which covered the remainder of the site, was likely due to the presence of what they identified as being shallow bedrock.

The approximate limits of the study area have been illustrated on the OCP map (below) for reference.





5.0 DISCUSSIONS

As the geotechnical development potential of the site will vary, we have for discussion purposes classified regions which exhibit similar potentials for development based upon the local types of terrain and anticipated subsurface conditions as illustrated in Figure 2. In general, the figure illustrates the relative development potential within each of the areas as being either ‘Unfavorable, Suitable or Favorable’. A description of each of these levels of classification is as follows;

Unfavorable

Development within these regions is not recommended due to the presence of either poor soil conditions, shallow groundwater/bedrock, steep slopes or combination thereof. If development within these regions is required, it should be limited to supporting infrastructure as building construction would not be recommended.

Suitable

These regions should support building/infrastructure development however, additional site preparation will generally be required relative to regions which have been deemed to be favorable.

Favorable

Development within these regions should allow for unfettered lot development utilizing conventional construction methodologies.

Some variations between these regional boundaries can be expected in the field given the scale of mapping and local geomorphology. Where development is to be conducted, additional consideration will need to be given through a subsurface geotechnical evaluation such that local geotechnical design parameters can be determined relative to the soil and terrain conditions.

Development will require careful planning and design relative to building construction, septic field placement, road alignment and surface drainage management.

5.1 Development Potential

Based upon the information retained during our assessment, the development potential of the site will vary. In general, the anticipated soil and terrain conditions will be



favorable to allow for unrestricted site development in the region denoted as Area B (as noted in Figure 2). This area generally coincides with glaciofluvial terrace deposits.

Although portions of this area were denoted in the Schedule 2 of the OCP as having a poor (development) capability, the classification in the OCP would likely have been restricted given the scale of mapping and scope-of-work which was originally undertaken.

Additional consideration would be required in the unfavorable regions denoted as Areas A & C (Figure 2) if these regions are to be developed. Specifically, the presence of steeper slopes in these areas and shallow bedrock in Area C will likely restrict (and potentially prohibit) development in these areas.

5.2 General Overview

From an overall lot development perspective, construction within the central region of the site (Area B) will be relatively straight-forward although 30-meter building setbacks from the steep slope located to the south-west will need to be observed. Construction difficulties are generally not anticipated until shallow bedrock is encountered at higher elevations located towards the north-eastern realms of this area and Area C.

5.3 Subsurface Considerations

Some adjustments to individual building foundation, road structures and septic field designs may be required to accommodate site-specific conditions as the soil types and subsurface conditions will vary across the study area. Development may be restricted in regions where shallow bedrock is encountered.

The results of the laboratory analysis indicated that the near surface soils at the site are predominately comprised of granular materials although fine-grained soils were also encountered. While the presence of the granular soils will be beneficial in regions where site development is to occur, additional consideration will need to be given where fine-grained soils are present. Specifically, the fine-grained (and any organic) materials will need to be removed from beneath road (and building) load envelopes during construction as these soils are weak and frost susceptible.



5.4 Terrain Considerations

The presence of the steep slope which is located within (or adjacent to) the south-western edge of the study area will require the use of a 30-meter setback to restrict building construction near the crest of the slope. While building construction should not be allowed within the setback limits, if required, this region can be utilized for roadways and/or ancillary use.

5.5 Geotechnical Evaluation

A subsurface geotechnical evaluation should be conducted through test pit/drilling methodologies to verify the local subsurface conditions and outline geotechnical design parameters regarding site development. The evaluation should assess the soils suitability for use as accepting soils relative to *Yukon Health and Social Services – Design Specifications for Sewage Disposal Systems*.

The stability of the slope located in the south-western realm of the study area should be assessed to determine whether or not it may pose a hazard relative to anticipated site development.

A site-specific geotechnical evaluation should be conducted utilizing standard penetration test (SPT) methodologies at any proposed building location such that the maximum net allowable bearing capacity and founding soil conditions can be determined prior to building construction.



6.0 RECOMMENDATIONS

6.1 General

The following recommendations have been provided to outline the envisioned geotechnical requirements for site development in the regions identified in Figure 2. However, as our recommendations are preliminary in nature, additional consideration may be required once the geotechnical parameters have been determined following a subsurface geotechnical evaluation (test pit/drilling and laboratory work programs).

6.2 Building Foundations

Buildings should be constructed utilizing footing and monolithic (slab-on-grade) types of concrete foundation systems. Some adjustments to the individual designs may be required to accommodate site-specific conditions as the soil types, local terrain and subsurface conditions will vary across the study area.

Building construction should be limited to the regions denoted as Area B while observing the setback limits.

Although permafrost is not anticipated, additional consideration could be given if encountered as the use of conventional building foundations should not be allowed in these circumstances.

6.3 Surface Works

The construction of roads and surface utilities should be feasible throughout the study area. While the road structure would need to be determined based upon the subgrade conditions and expected traffic loads, we anticipate the granular components of the road structure would measure in the order of 0.7-1.0 meters thick.

6.4 Subsurface Utilities

The anticipated soils should allow for subsurface utility installation. However, additional consideration may be required during the design and construction phases if groundwater, large boulders and/or bedrock is encountered.

While the soils would need to be assessed during future geotechnical evaluations to determine their suitability for use as accepting soils relative to *Yukon Health and Social*



Services – Design Specifications for Sewage Disposal Systems based upon the information retained during our assessment we anticipate that the soils should prove to be suitable for use.

6.5 Geotechnical Setbacks

Building development should not be allowed within 30 meters of the crest of the steep slope located in the south-western realms of the site. While building construction within this setback area should not be allowed, the construction of access roads and ancillary areas could be considered in this region.

6.6 Additional Assessments & Evaluations

Additional assessments and evaluations should be conducted to verify site-specific design parameters as follows;

Geotechnical Evaluations

A subsurface geotechnical evaluation should be conducted through test pit and/or drilling methodologies to verify the local subsurface conditions and outline geotechnical design parameters regarding site development.

Site-specific geotechnical evaluations should be conducted utilizing standard penetration test (SPT) auger drilling methodologies at all proposed building locations such that the maximum net allowable bearing capacity and founding soil conditions can be determined prior to building design and construction.

A slope stability assessment should be conducted to determine the potential hazards related to the slope located along the south-western side of the study area.

Site Grading, Surface Drainage and Erosion Control Plan

Site grading, surface drainage and erosion control plans should be formulated once conceptual designs have been established to ensure surface waters are adequately controlled.

CSP culverts should be utilized to ensure drainage is unimpeded where access roads/driveways are constructed.

Drainage in steep areas should be controlled utilizing silt fencing, straw bales and/or other similar types of erosion control measures if deemed necessary.



Site Survey

A detailed site survey (minimum 2-meter contour intervals) should be conducted to allow for additional geotechnical evaluation as the scale of mapping available at the time of our assessment was not sufficient to note site-specific variations in the topography.

Environmental Site Assessment(s)

Considering the presence of the highway alignment and abandoned gravel quarry, a Phase I Environmental Site Assessment (ESA) should be conducted to determine whether or not there may be any potential environmental liabilities associated with the study area.

Natural Hazard Assessment

A natural hazard assessment should be conducted by qualified personnel to assess the forest fire potential if development is to proceed.

Hydrogeological Assessment

A hydrogeological study should be conducted if water wells are to be installed within the study area. The intent of the study should be to assess the impacts a well (or wells) would have upon the underlying aquifer and delineate any potential liabilities.



7.0 CONCLUSIONS

Development Potential

Based upon the information retained during our assessment, the anticipated soil and terrain conditions will be favorable to allow for unrestricted site development in the region denoted as Area B (Figure 2). This area generally coincides with glaciofluvial terrace deposits. Additional consideration would be required in the regions denoted as Areas A & C (Figure 2) as steeper slopes and presence of shallow bedrock (located in Area C) will restrict and potentially prohibit development in these areas. Some adjustments to individual building foundation, road structures and septic field designs may be required to accommodate site-specific conditions as the soil types and subsurface conditions will vary across the study area.

From an overall lot development perspective, construction within the central region of the site (Area B) will be relatively straight-forward. Construction difficulties are generally not anticipated until shallow bedrock is encountered at higher elevations located towards the north-eastern realms of this area and Area C.

Additional consideration will be required through a subsurface geotechnical evaluation such that the geotechnical design parameters associated with the study area can be characterized in greater detail.

Setbacks

At this stage, a standard 30-meter setback should be observed for building construction relative to the crest of the steep slope located in the south-western region of the study area (as noted in Figure 2).

Building Foundations

The anticipated glaciofluvial terrace deposits should allow for residential building construction utilizing conventional (footing and monolithic-slab types of) foundation systems.

Surface Utilities

The construction of roads and ditches utilizing conventional cut/fill construction methodologies will be feasible following adequate site preparation. Additional consideration may be required if shallow bedrock is encountered.



Subsurface Utilities

While the soils would need to be assessed during future geotechnical evaluations to determine their suitability for use as accepting soils relative to *Yukon Health and Social Services – Design Specifications for Sewage Disposal Systems* based upon the information retained during our assessment we anticipate that the soils should prove to be suitable for use. Additional consideration may be required during the design and construction phases if groundwater, large boulders and/or bedrock is encountered.

Site Grading, Surface Drainage and Erosion Control Plan

Site grading, surface drainage and erosion control plans should be formulated once conceptual designs have been established to ensure surface waters are adequately controlled.



8.0 LIMITATIONS

This report is intended for the sole use of *Yukon Government*.

No portion of this report may be used as a separate entity; it is intended to be read in its entirety.

Any use of this report by a third party is the responsibility of such third party.

The comments contained herein reflect our best judgment in light of the information available to our firm at the time of our assessment. They are based upon our collation of available literature, observations made during our site reconnaissance, recognition of geomorphic features and generally accepted engineering practices.

Given the nature of our assessment and scale of mapping, the information contained herein will not be sufficient to assess all factors that may have an effect upon design and construction and so this should be considered from a project management perspective. As such our findings should be supplemented through subsequent geotechnical evaluations and other technical studies as may be required.

Due to the geomorphological nature of the deposits encountered, interpolations of subsurface conditions have not been made or implied other than for discussion purposes. The anticipated conditions have also been discussed, but only to the extent that they may influence design decisions. Suggestions of construction methods contained herein express our opinion and are not intended to direct contractors on how to carry out construction. Any reference to structures, roads or overall use of the study area have been made for discussion purposes only. The actual use will need to be determined during the planning and design processes.

Should unexpected subsurface conditions be encountered during future evaluations of the study area, our firm should be notified immediately in order to confirm the suitability of our recommendations and conclusions. If required, our firm may alter or modify our recommendations and conclusions at such time.



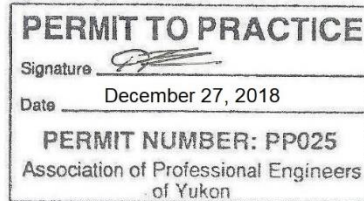
9.0 CLOSURE

Thank you for providing our firm with the opportunity to conduct this geotechnical feasibility assessment.

We trust that the information we have provided will be suitable for your purposes at this time, however, if you should have any questions or concerns, please feel free to contact the undersigned at your convenience.

Respectfully Submitted,

CHILKOOT GEOLOGICAL ENGINEERS LTD.

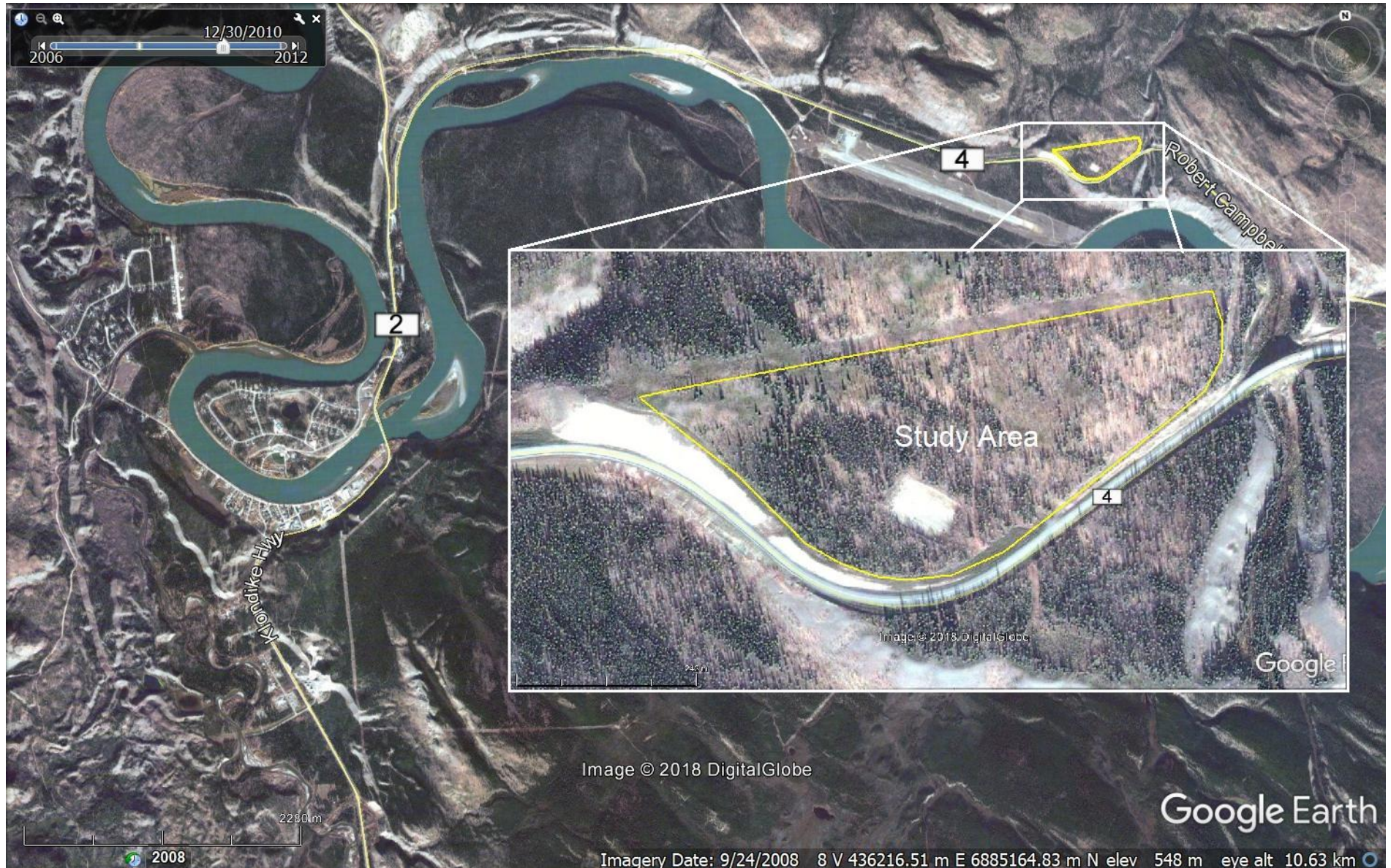


Tares Dhara, P.Eng.
Senior Geotechnical Engineer

TD/td

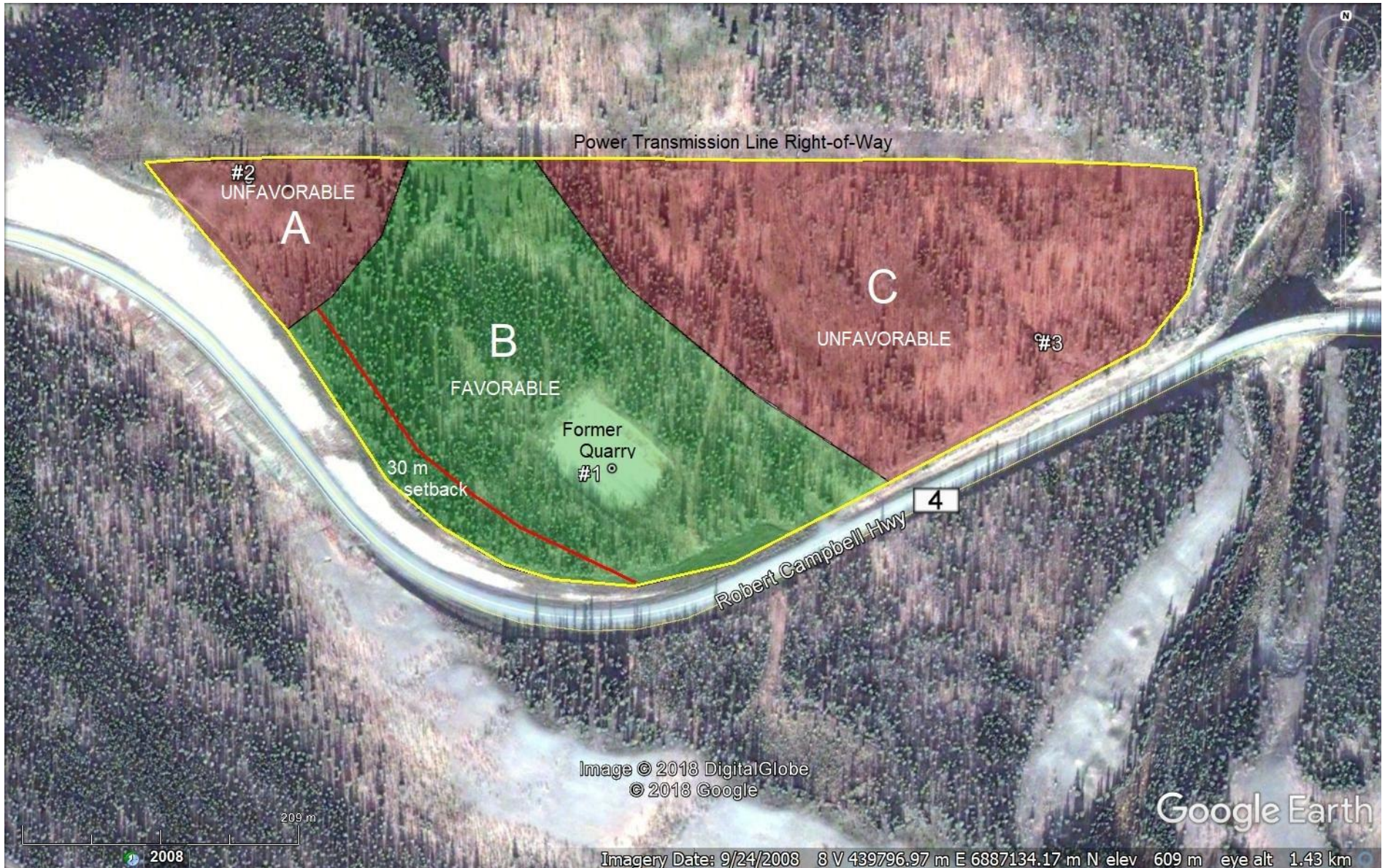


Geotechnical Feasibility Assessment
Proposed Country Residential Development – Carmacks, Yukon – 2018
Figure 1 – Location of Study Area





Geotechnical Feasibility Assessment
Proposed Country Residential Development – Carmacks, Yukon – 2018
Figure 2 – Development Potential





Geotechnical Feasibility Assessment
Proposed Country Residential Development – Carmacks, Yukon – 2018
Appendix A – Airphoto A22355 #73 (July 27th, 1971)

