



BEAR CREEK LAND DEVELOPMENT FEASIBILITY

FINAL REPORT

OCTOBER 17, 2018



In collaboration with:

Associated Engineering,
Chilkoot Geological Engineers,
Ecofor, & Research Northwest



October 17, 2018

Pierre Marchand, Project Manager

Rural Land Development

Community Services

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Y1A 2N1

Whitehorse, YT

Re: Bear Creek Feasibility Study: Final Report.

Dear Pierre,

Further to our conversation, the following is a final report summarizing the findings from the Bear Creek Feasibility Study.

I would be happy to follow up with you, answer any questions, and elaborate further on any aspect of this study.

Sincerely,

A handwritten signature in black ink, appearing to read "Simon Lapointe".

Simon Lapointe, MCIP, RPP

3PIKAS

PLANNING + DESIGN + TECH



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1 INTRODUCTION

In 2017, Yukon government Rural Lands, approached Kluane First Nation (KFN) to explore the possibility of initiating a technical planning process on an undeveloped site near Bear Creek, Haines Junction. Yukon government hired 3Pikas to look at the development potential of the site and create some options. The site was chosen due to its proximity to nearby KFN settlement land parcel S-39B1, its character, and location. Being situated within proximity of Haines Junction, the site offers recreational, tourism, and residential opportunities. It's a unique area, full of potential.

This report explores the development potential of the site and analyzes the technical elements of the proposed land development concepts. It accounts for economic, technical, social, cultural, and environmental factors. It proposes three concepts and includes a summary of the main elements and features comprised in each concept. The feasibility study has been prepared in collaboration with Associated Engineering, Chilkoot Geological Engineers, Ecofor Consultants, and Research Northwest. More detailed information is available in the Background Report, Geotechnical Evaluation Report, Desktop Heritage Overview Assessment, and Economic Overview Report. The report is organized around nine main sections: Introduction, Site Analysis, Existing Services, Market Conditions, Geotechnical Conditions, Concepts, Servicing, Cost, and Next Steps.

1.1 PLANNING PROCESS

The planning process began in October 2017 with a site visit. Members of the planning team present during the site visit included the Project Manager from Rural Land Development, Land Planner from KFN, engineers from Associated Engineering, and the Planner and Project Manager from 3Pikas. The team toured the study area and undertook an initial site inventory. Through the site inventory, the team was able to characterize the area, and develop a better understanding of the specific constraints and opportunities to be addressed in the conceptual plans.

The planning process unfolded as follow:

- 1 Site visit (October 2017)
- 2 Background information review and analysis (November 2017)
- 3 Geotechnical assessment (December 2017)
- 4 Heritage overview assessment (December 2017)
- 5 Economic overview (December 2017)
- 6 Background report (January 2018)
- 7 Draft concepts and review (April 2018)
- 8 Servicing analysis and costing (August 2018)
- 9 Final concept development (September 2018)
- 10 Final report (October 2018)

1.2 PROJECT LOCATION

The study area identified for this project falls within the Traditional Territories of Kluane and the Champagne Aishihik First Nations, as well as within the asserted Territory of the White River First Nation. It is located within

the Ruby Ranges Ecoregion, which lies in the shadow of the St. Elias Mountains. The site borders Kluane National Park, which protects 21,980 square kilometres of the most spectacular Mountains including Mount Logan (5959 m), Canada's highest peak.

The study area covers 68.82 ha of land along the western side of the Alaska Highway. It is located approximately 7.5 km northwest of the Village of Haines Junction and 1.7 km north of the Dezadeash River. The study area includes KFN's Settlement Land S-39B1 and surrounding Yukon government land. The 24.47 acres settlement land parcel was initially selected by CAFN and traded to KFN. Since then, KFN has identified S-39B1 as a Priority Community Development Area in the Kluane First Nation Phase 2 Nän Land Use Plan. KFN citizens have expressed an interest in designating the area for residential use and providing housing to KFN residents living near Haines Junction.

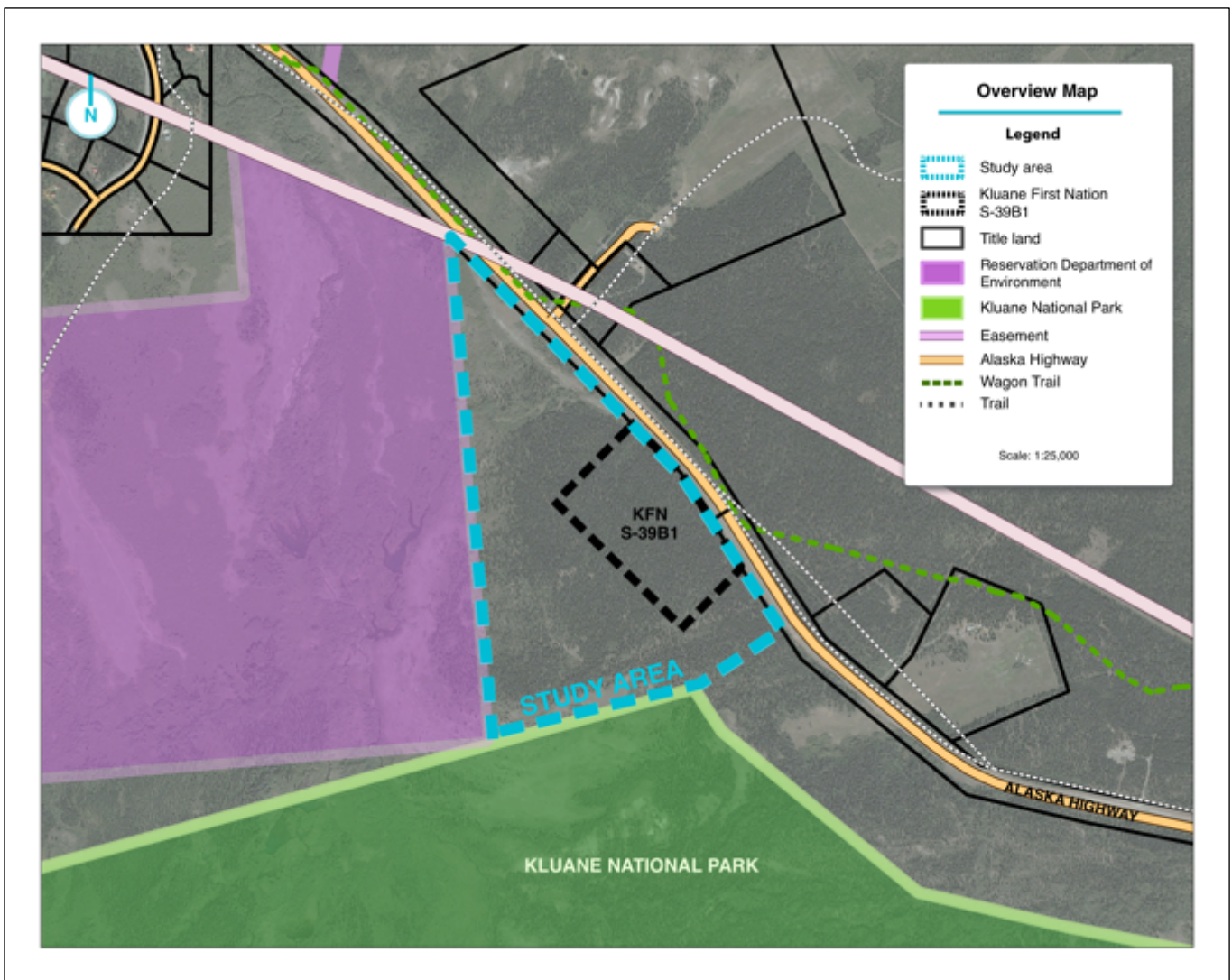


Figure 1. Overview Map.

2 SITE ANALYSIS

Except for a gentle exposed slope in the northern portion of the study area, the site is mostly flat and generally forested. The exposed slope is covered by willows, poplar trees, and shrubs. Informal existing trails run through most of the study area and branches out in all directions. These trails are likely cultural and recreational trails used by locals to move through the area.

2.1 VEGETATION

White spruce dominates the landscape with small pockets of trembling aspen and willow with a moss and ground shrub groundcover. There is a mix of mature and young spruce trees throughout the study area with some spruce beetle kill trees scattered throughout. The northern portion of the site is dominated by less dense and more exposed willows, poplar trees, and shrubs.

2.2 WILDLIFE

The area likely supports a variety and a diversity of wildlife species. The area has been identified as a moose overwintering area in the Key Wildlife Area Mapping from the Department of Environment. Five moose were spotted in the vicinity during a moose survey conducted by the Department of Environment in late winter 2009.

2.3 CLIMATE

The Ruby Ranges Ecoregion lies in the rain shadow of the St. Elias Mountains and is one of the driest in Yukon – precipitation amounts are only 250 to 300 mm annually. Monthly means precipitation is only 10 to 20 mm from January to May and are greatest in June and July with means of 30 to 70 mm (Smith et al. 2004). Winds tend to be moderate but are often strong. Summer tends to bring predominantly southerly winds. Strong northwesterly winds can occur, generally in the winter, associated with outbreaks of Arctic air (Smith et al. 2004).

2.4 SOIL & TERRAIN

The terrain is smooth, rolling, and glaciated. Rising lightly above a fan, the study area provides gentle and flat surfaces with well-drained glaciofluvial gravelly sands, which tend to provide a stable ground that is usually free of ice-rich permafrost. As shown on Figure 2, the study area is composed of two distinct areas. The northern portion of the study area is comprised of a gentle exposed slope covered by willows, poplars, and trees while the southern region is a well-treed terrace bisected by an old trail. Intermittent permafrost is often distributed beneath hillsides, with frozen ground commonly occurring on north facing slopes in the valleys around Haines Junction. Neither groundwater nor bedrock was encountered during the geotechnical assessment. There are no streams located within the study area.

2.4.1 NORTHERN REGION

The northern region is characterized with predominately glaciofluvial materials comprised of silty sands, which contained varying amounts of gravel. Overlying granular fills (potentially associated with the original highway alignment) were encountered in two of the four test pits excavated in this area. As shown on Figure 2, the terrain in the northern portion of the study area gradually descends towards Bear Creek. Flows in the summer and winter runoff is generally low. While the topography is predominately favorable for residential development, the low-lying area located to the northwest of the study area is not be suitable for development (Figure 2). The

Geotechnical Evaluation Report recommends that a 30 metres setback should be applied relative to the low-lying area.

2.4.2 SOUTHERN REGION

A well-treed terrace overlooking a fluvial plain dominates the southern portion of the study area. As shown on Figure 2, the area is partially bisected by an old trail, which trends in a north-south direction. The soils in the southern portion of the study area are comprised of glacial tills, which (in some locations) are overlain with a veneer of glaciofluvial deposits. While the glacial tills are predominately comprised of sands, which contained fluctuating amounts of silt and gravel, fine-grained sandy silts are also present. As is typical with glacial tills, the deposit also contains cobbles and boulders, which are entrained within the soil mass. As shown on Figure 2, permafrost was encountered in the southern portion of the study area.

The topography is predominately favorable for residential development. However, the steep slope located to the southwest of the study area is not be suitable for development (Figure 2). The Geotechnical Evaluation Report recommends that a 30 metres setback should be applied relative to the top of the slope.

2.5 VIEWSCAPE

Surrounded by vast and spectacular wilderness, beautiful and rugged landscape, the Bear Creek area is a gem and offers exceptional outdoor opportunities for visitors and residents alike. The study area is located on a small terrace providing stunning vistas of the Alsek River valley and the Kluane Range. The study area skirts the boundary of the Kluane National Park. Most lots offer vantage points from where the Kluane Range and 2,800 metres peaks are visible.



View from the study area looking west toward the Kluane Range.



Figure 2. Development Potential map.

2.6 HERITAGE

2.6.1 TRAILS

There is evidence of a main trail traversing the study area. The trail bisects KFN Settlement Land parcel S-39B1 in a north-south direction and runs all the way to an area where the Alaska Highway was previously located. The nature and historical use of the trail is unknown. Given its proximity to the Dezadeash River (which acted as the main transportation corridor) and the Kluane Wagon Trail, it is possible that this trail is a branch of the Kluane Wagon Trail.

2.6.2 KLUANE WAGON TRAIL

One significant outcome of the gold discovery on the east side of Kluane Lake is the building of a wagon road between Whitehorse and Silver City. This wagon road provided the route for this segment of the Alaska Highway. The Kluane Wagon Road is located within approximately 100 to 150 metres from to the study area and runs on the east side of the Alaska Highway. The Kluane Wagon Road was in use from 1903-1942, and there is potential for trails associated with the Wagon Road to intersect the study area.

The Kluane Wagon Trail was likely never one trail but rather many interconnected trails heading in the same general location, similar to a braided stream. The use of any particular branches of this trail could have varied over time, by season or by impulse. Climate change over time or any other reasons might have affected which parts of the trail might be more desirable.

Historic Period sites may be frequently encountered along documented travel corridors and settlement sites. There is also the possibility of encountering isolated Historic Period materials associated with early European trapping and prospecting activities. Artifacts of European origin could have been traded to First Nations persons then transported to locations generally considered to be more indicative of Precontact sites.



Trails traversing the study area.

2.6.3 ARCHAEOLOGICAL SITES

There are no previously recorded archaeological sites within the study area, as per the Yukon Historic Sites Inventory and Yukon Archaeological Sites Inventory. However, one site was recorded near the study area, as well as sites in the larger vicinity.

2.6.4 HERITAGE POTENTIAL

Ecofor Natural and Cultural Resource Consultants (Ecofor) conducted a Heritage Resource Overview Assessment (HROA) to identify and assess the heritage resource potential and sensitivity within the study area. Ecofor completed a desktop review and GIS analysis of the physical / environmental and cultural / historical setting of the study area. Based on the analysis performed, Ecofor identified thirty (30) discrete areas of high heritage resource potential. The high potential areas are scattered throughout the study area and total 4.65 ha (14.7 % of the total study area).

The highest potential within the study area for heritage resources is located on elevated knolls and other distinct landforms providing relief from the otherwise sloping and poorly drained study area. These high potential areas are often associated with good access to water, as well as providing views of the surrounding landscape, and have a high potential for temporary habitation sites, lookout points, and lithic scatters.

Based on the nearby Dezadeash River and Kluane Wagon Road, there is a high potential for transportation corridors, trails, sites, and historic period campsites and debris. There is also the potential for the occurrence of permanent habitation sites, temporary habitation sites, culturally modified tree (CMT) sites, and historic sites within the study area. Follow-up fieldwork may refine the areas of potential to smaller, more precise polygons.



Areas providing views of the surrounding landscape tend to have high heritage resources potential.

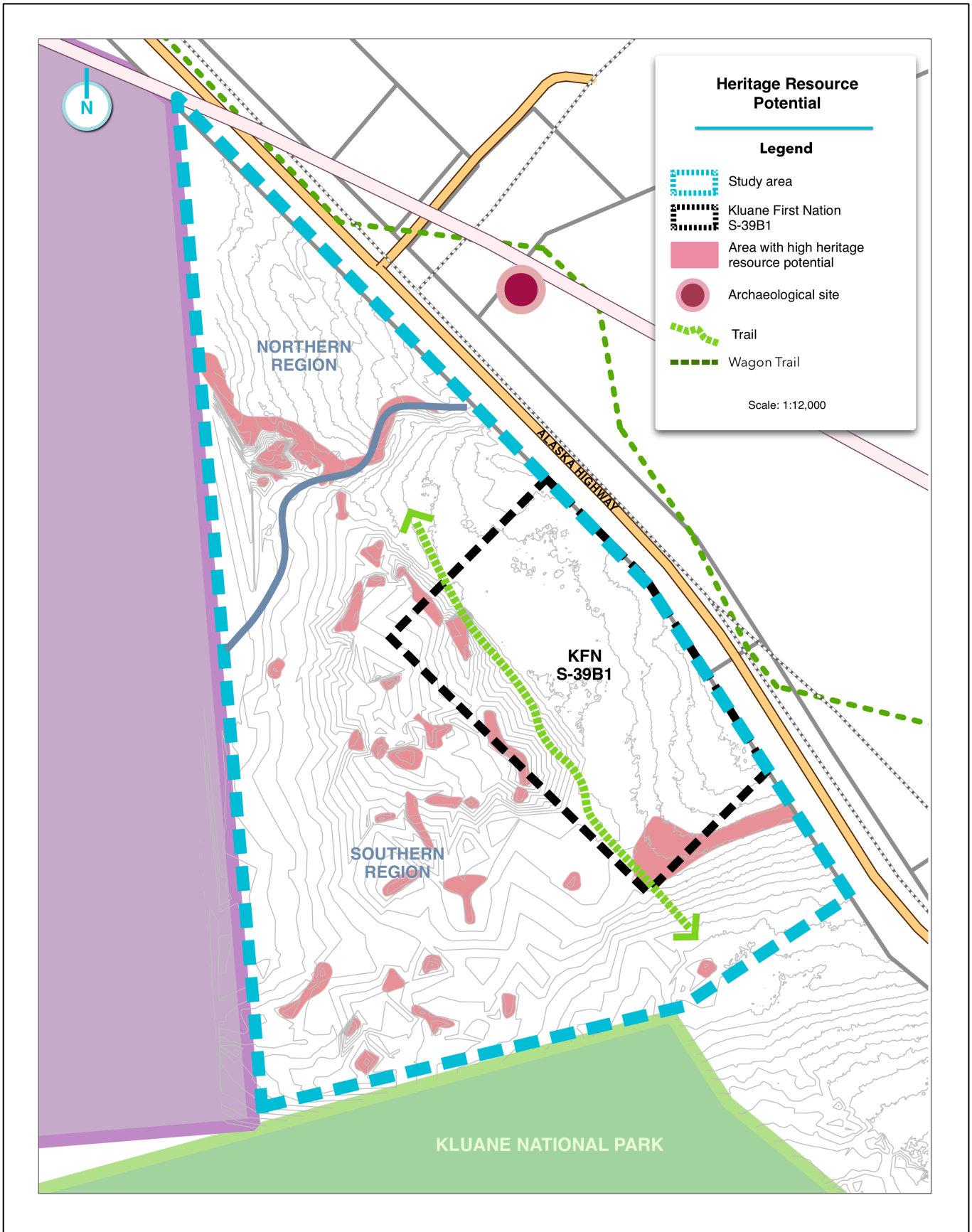


Figure 3. Heritage Resource Potential map.

3 EXISTING SERVICES

NorthwesTel has confirmed the presence of a copper cable communications line in the area and has indicated that service could be provided from the existing line for up to 10 residential customers with a maximum connection speed of 5 MB/s (megabytes per second).

ATCO Electric Yukon has confirmed the presence of their single-phase power line along the Alaska Highway, which could provide electrical service to the project site for residential and light commercial development. If three-phase power is required, significant upgrades would be required similar to that of NorthwesTel. The design for this servicing can be confirmed once a preliminary concept is established.

4 MARKET CONDITIONS

4.1 POPULATION & GROWTH

The population of Haines Junction has been increasing steadily over the past decade. Figure 4 shows a population increased by 13.1% from 804 in 2007 to 909 in June of 2017 with a small decline in population in 2015. This is a slower growth rate than the 19.4% for the Yukon over the same period. The Yukon Bureau of Statistics (YBS) provides low, medium and high projections of population growth for the Yukon out to 2030. Projections are based on variations on births, deaths, and migration patterns. YBS also provides a preferred projection based on weighing the medium demographic projection with another projection based on economic factors. The preferred projection indicates a population of 45,230 for the Yukon by 2030.

Figure 5 shows the projected population growth for Haines Junction. The projections should continue to be 0.6 percentage points lower than the Yukon’s annual average (matching what it has been from 2007 through 2017). The result is a projected population growth of just under 1,000 people by 2030. If the projected population growth is accurate, an additional 29 housing units will be needed in Haines Junction by 2030 based on the Haines Junction average household size of 2.7 people.

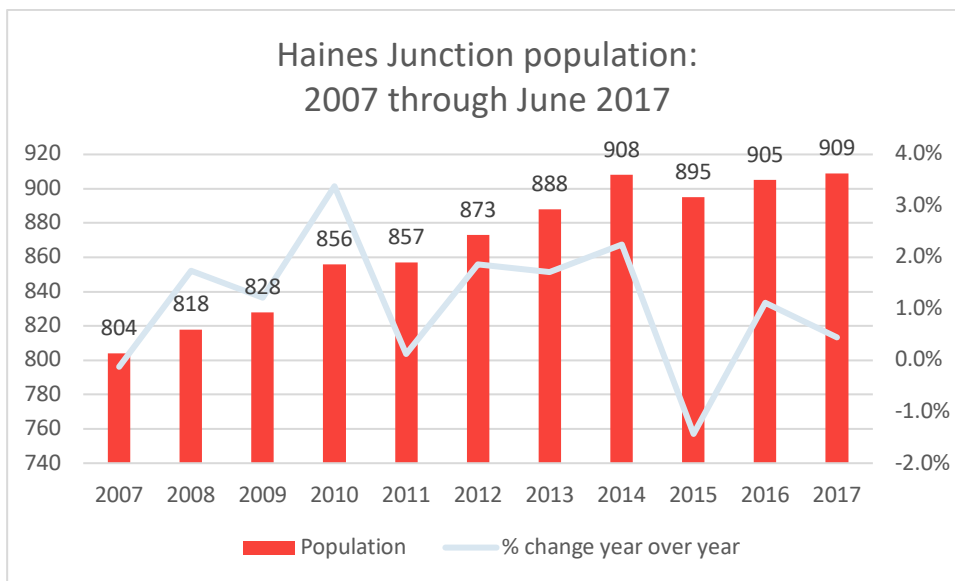


Figure 4. Haines Junction population: 2007 through June 2017 (Yukon Bureau of Statistics)

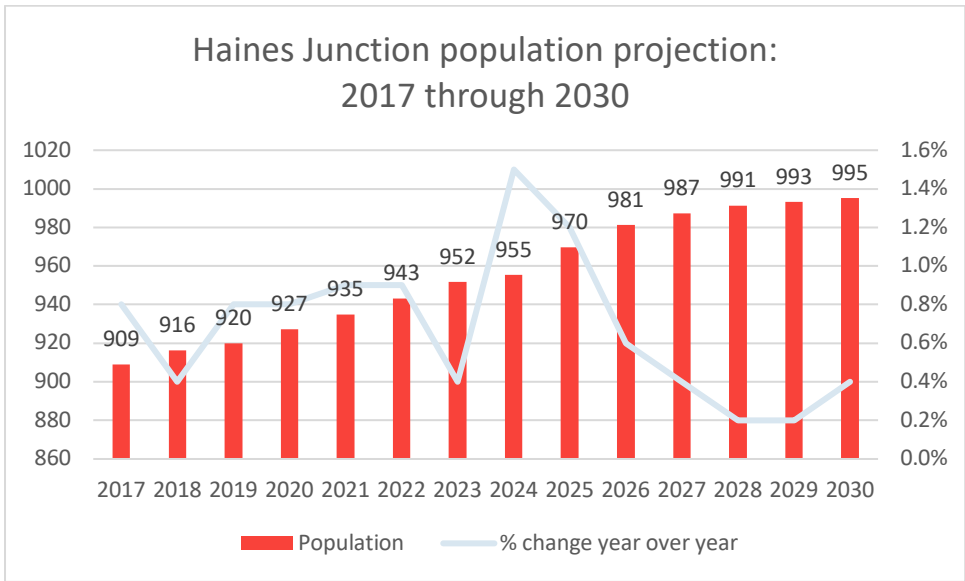


Figure 5. Haines Junction population: 2007 through June 2030 (Yukon Bureau of Statistics)

4.2 MARKET SUPPLY & DEMAND

Based on a Haines Junction average of 2.7 people per household, the population growth from 2007 through 2017 meant that 39 additional housing units were needed in Haines Junction over the past decade. However, 56 more dwellings were counted by the Census in between 2006 and 2016, and residential building permit data indicates, even more, were constructed.

Any new residential land development may be competing with existing residential land available in Haines Junction. The Government of Yukon currently has 44 residential lots in Haines Junction for sale across the counter as shown in the table below.

Type	Number	Price range	Conditions of sale
Country residential	4	\$ 61,538	Build within 5 years
Single-family residential	40	\$38,518 to \$62,708	Build within 5 years
Commercial	1	\$89,517	Build within 5 years

Table 1. Number of lots available as of September 4, 2018
(http://www.emr.gov.yk.ca/landmanagement/lotsale_yukon.html)

The current number of lots available should be sufficient to supply the demand for new housing in Haines Junction for approximately 120 new residents. Given the average household size of 2.7 people, the supply exceeds the projected population increase from 2017 through 2030. The proportion of older people is increasing particularly fast in Haines Junction. Those age 65 and up are not usually the target market for country residential land to build a new single-family house.

The average household size in Haines Junction is dropping. This may be reflecting the Yukon-wide trend to a higher number of single-person households. In 2016 single-person households made up 32.2% of all Yukon households. Other reasons that could explain a lack of interest in those lots include:

- High construction cost and the shortage of builders in Haines Junction.
 - Single people are not the typical target market for country residential land to build a new single-family house.
 - The proximity to the Alaska Highway may have contributed to the lack of interest.
 - Demand for residential lots from residents living outside of Haines Junction is low.
-

4.3 TOURISM & RECREATION

Measuring the role of tourism in an economy is always a challenge because tourism is not treated as a separate economic industry or sector in the Canadian Census. While the economy of Haines Junction has been sluggish in recent years, there may be a sense of renewal in the community. Recreation and tourism industries may be experiencing some growth. YBS has found that the number of businesses and the number of people those firms employ has been increasing in Haines Junction as shown in the figure below. While growth in businesses and the number of people employed is pointing to growth, it may not necessarily be a direct indicator. Many retail businesses — gas stations, restaurants, and stores of all kinds — count both locals and tourists as their customers.

However, tourism appears to be playing a more significant role in Haines Junction than in the rest of Yukon. According to the 2016 Census, the overall proportion of the labour force employed in the accommodation and food services industry reached 10.8% of Haines Junction's labour force compared to 7.2% for the Yukon overall.

5 GEOTECHNICAL ASSESSMENT

Chilkoot Geological Engineers completed a desktop geotechnical assessment as well as a fieldwork program to assess the surface and sub-surface conditions at select locations within the study area. A summary of the geotechnical assessment and design considerations that were carried in this feasibility study are as follows:

5.1 BUILDING STRUCTURES

In general, residential building structures can be built upon conventional footings and monolithic slab-on-grade types of foundation systems following the recommendations provided in the Chilkoot Engineering Geotechnical Report. However, if permafrost is present (which is likely), residential structures will need to be founded upon cribbing, which incorporates ventilated crawlspaces, and the use of insulated (septic) holding tanks still allow for site development. Standard penetration tests (SPT's) should be conducted through drilling methodologies at the locations of proposed buildings to assist in determining the maximum net allowable bearing pressure of the founding soils.

5.2 SURFACE UTILITIES

Construction of roads and ditches utilizing conventional cut / fill construction methodologies is feasible. However, additional consideration may be required to allow for construction in regions where permafrost is encountered.

5.3 SUB-SURFACE UTILITIES

As the density and composition of the glacial till (and glaciofluvial soils) varies across the study area, site-specific assessments should be required at the time of individual lot development to verify the suitability of the soils relative to *Yukon Health and Social Services – Design Specifications for Sewage Disposal Systems*. Holding tanks are required to accommodate sewage disposal in areas where permafrost is present.

Any sub-surface (water / sewer) pipes or tanks should be embedded in bedding sand which conforms to the grain size specifications provided Chilkoot Engineering in the Geotechnical Evaluation Report. Utility pipes and subsurface tanks should be established on a base of bedding sand which measures 300 mm thick. The bedding sand should extend a minimum of 300 mm on all sides of the pipe/tank. The material should be compacted to a minimum of 95% of the materials corresponding to Proctor density at (or near) the materials optimum moisture content.

6 CONCEPTS

The concepts were born as a desire to explore rural residential development options on KFN S-39B1 and investigate development potential on the adjacent Yukon land with the intention of eventually embarking on a joint development initiative. Many of the ideas were derived from the project team and initial investigation of possible options. The concepts are rooted in the greater planning context and the unique character of the Haines Junction and the Bear Creek area. The options were tested and modified in an iterative process and resulted in three concepts.

The concepts created illustrate how the area could be developed – what could be built on the site and where (e.g., roads, proposed residential areas, and green spaces). Each concept includes a summary outlining the intent of the design as well as a brief description of the most notable elements of the proposed design. The concepts prepared are based on the development potential of the land. The development potential was assessed based on existing land uses, policies, environmental conditions, geotechnical conditions, heritage potential, existing services, access and transportation, topography, and other relevant information. The proposed concepts consider the overall development capacity of the existing infrastructure in the vicinity.

The concepts take advantage of a slightly elevated terrace, which overlooks an expansive fluvial plain. The terrace offers excellent sun exposure and spectacular mountain vistas. Lots were designed to maximize the views of the Kluane Range while minimizing views of neighbours. The layout focuses on creating a harmonious relationship between the lots and its surrounding landscape. Each concept retains a large area designated as green space. The green space encompasses an area which includes permafrost. It also establishes community character, ensures connectivity with Kluane National Park, and complements with the surrounding land uses and environment. A protected trail with a 10-metre buffer runs north to south and corresponds to a potential branch of the Wagon Trail. KFN and CAFN requested that every effort should be made to preserve the trail.

Concept 1 and 2 show two very similar residential configurations on KFN land. Given that KFN wished to preserve the trail bisecting the parcel, space is limited, and development options are limited. As a result, both concepts on KFN land are very similar. Except for the lot sizes on KFN land, concept 1 and 2 are nearly identical.

Concept 3 explores the idea of a mixed-use recreational and residential development. It includes a rural residential concept on KFN land and a drive-in recreational concept on Yukon government land. This concept seeks to minimize the visual and physical impact on the site through careful siting and design, which encourage a more seamlessly integrated development with the surrounding landscape. This concept is compatible with adjacent land use and tenure (i.e. Kluane National Park) and aligns with the 2013 Village of Haines Junction's Official Community Plan (OCP), which takes a particular emphasis on encouraging year-round tourism activities and employment opportunities in the municipality.

As this study was prepared for Yukon government, it should be noted that the underlying financial feasibility was a principal underlying driver and underpinned the conceptual design. Marrying the economic necessity of recovering cost with the desire to achieve a collaborative and integrated plan, three creative and achievable concepts emerged.

6.1 CONCEPT 1 & 2: RURAL RESIDENTIAL

Concept 1 and 2 were developed as a way to explore rural residential development on both KFN settlement land and Yukon government land. In these two concepts, the primary access to the subdivision is via two main roads, which run parallel to the northern and southern border of the KFN parcel. The road is distributed equally between KFN and Yukon government. The main access road on the Yukon government portion of the development is approximately 1.4 kilometres in length while the portion of the road on the KFN parcel is approximately 500 metres.

Concept 1 includes 17 large rural residential lots on Yukon government land and 16 small rural residential lots KFN land. Lots on Yukon government land vary from 3.4 to 7.6 acres (1.4 to 3.1 hectares) while lots on KFN land vary from 1.2 to 2.2 acres (0.5 to 0.9 hectares). Concept 2 provides 17 rural residential lots on Yukon government and 8 rural residential lots KFN land. The proposed KFN lots on Concept 2 vary from 1 to 1.6 hectares.

6.2 PROS

Rural and country residential development offers a particular rural residential lifestyle choice that is characterized by larger lots with single detached residences, which is popular in Yukon. The space provided for by the large parcels allows for a variety of residential and rural activities such as the development of secondary suites, large-scale gardening, the limited keeping of horses and other animals, as well as the development of accessory buildings. It can also accommodate the development of small-scale commercial and tourism business activities, based out of the residence, such as home-offices and bed and breakfast establishments.

These types of business activities help key economic sectors; tourism and service while upholding the primary residential role of the area. There is potential to accommodate the formation of commercial services which would supplement existing services in Haines Junction and enable residents to establish a small business within their residence. The Bear Creek area offers convenient access to Kluane National Park and could provide accommodation for travelers and would support Kluane area tourism.

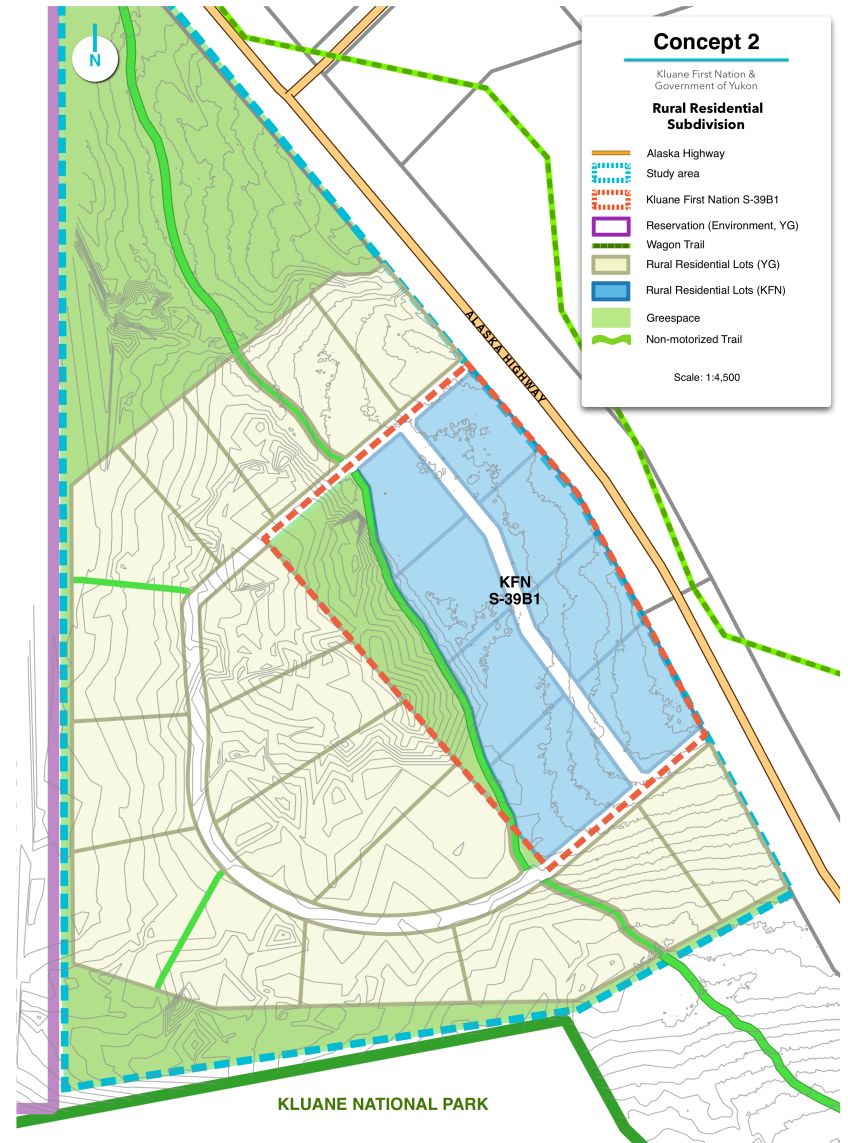
6.3 CONS

Any new residential development outside of Haines Junction could have unintended consequences for the municipality. New residential development located outside of the municipal boundary could take away potential taxpayers, which would impact the municipality's ability to raise more revenue. The population growth projections show that Haines Junction will likely grow by 79 people by the year 2030. Based on average household size in Haines Junction of 2.7 people, the current supply of 44 residential lots should accommodate the demand for approximately 120 new residents. Additional lots put on the market would be competing directly with the existing housing stock.

CONCEPT 1



CONCEPT 2

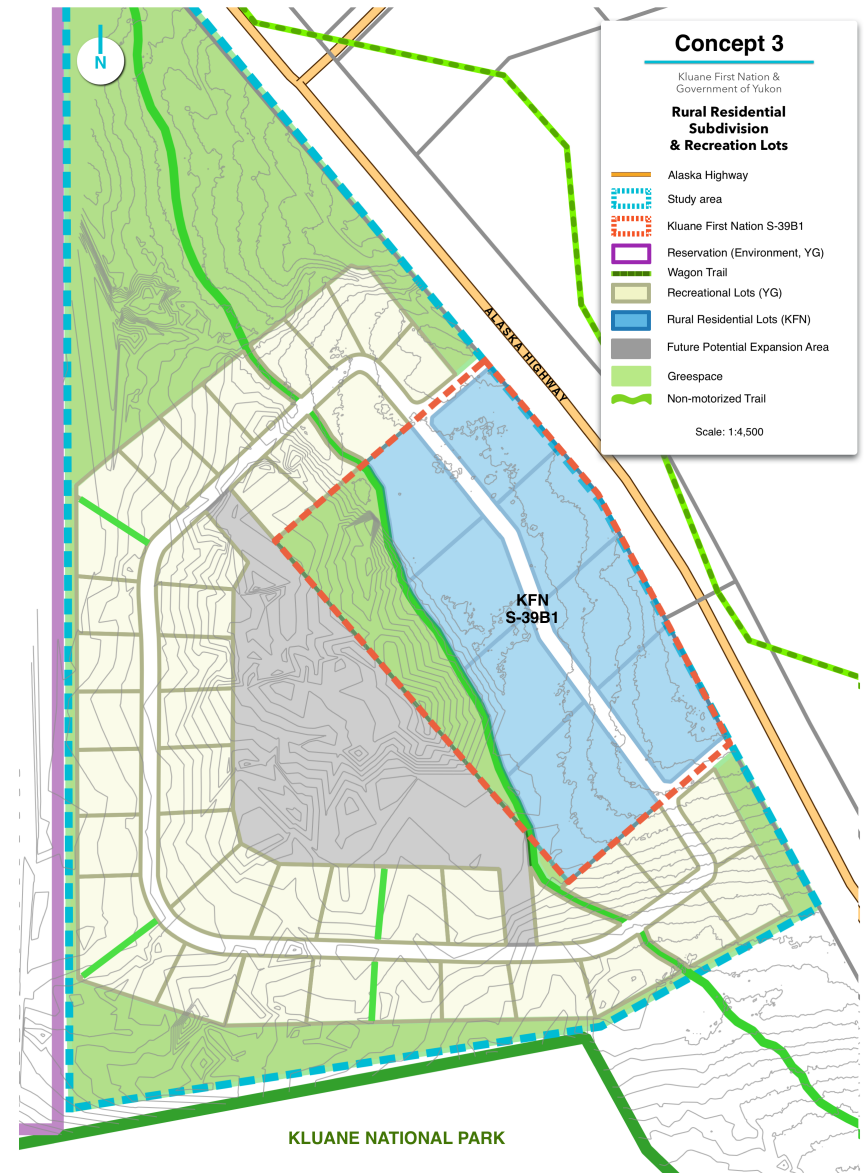


6.4 CONCEPT 3: RURAL RESIDENTIAL & RECREATION

Concept 3 was developed as a way to promote compatible land uses with existing adjacent land interests in the area, including the KFN S-39B1 and Kluane National Park. It was also developed in an attempt to minimize potential adverse effects of introducing additional residential lots outside of the Village of Haines Junction.

This mix-use development offers 8 Rural Residential lots on S-39B1 and 44 Recreational Lots on Yukon government land. Electrical and telephone infrastructure is not included in the Recreational portion of this concept. In this concept, the two main access roads veer in a northwesterly and southwesterly direction creating access for additional recreational lots along the KFN settlement land parcel before turning into a southwesterly direction to provide access to the rest of the lots. This concept retains a generous greenspace buffer around the entire community. This green space provides a buffer to Kluane National Park and provides ample public open space for walking and participating in recreational activities. While a large area was identified as a future expansion area, this area could also be designated as a green space. Recreational lots vary in size from 1 to 1.9 acres (0.4 to 0.8 hectares).

Installation of septic systems will be limited and further discussions with Environmental Health Services may be necessary to determine the feasibility of onsite sewage system.



6.4.1 PROS

The market demand for remote lake-front properties offering spectacular mountain vistas is alive and well. The recreation lots on Bennett Lake near Carcross sold almost immediately. Sixty people applied for 19 remote cottage lots the government sold on Bennett and Tagish Lakes. The waterfront properties fetched between \$45,000 and \$55,000. The properties are reachable by boat in summer or snowmobile in winter. None are accessible by road.

While remote lots are attractive to a number of people, not everyone in Yukon has a motorboat, a truck and a trailer, and the desire to buy one. A drive-in recreational development is a slightly more convenient product and could provide an option to potential buyers looking for a quiet retreat without having to invest into a motorboat or a snowmobile.

This concept has the potential to fulfill a demand for recreational lots in Yukon and provide an alternative to rural residential development outside of the Village of Haines Junction without competing with the existing supply of residential lots in Haines Junction. A cottage industry has the potential to generate year-round economic benefits and spinoffs in Haines Junction. An entire development centered on awe-inspiring mountain vistas could help increase both seasonal and year-round activities. Seasonal residents would be spending time at their second homes, with some eventually choosing to relocate permanently, creating a stream of social and economic benefits for Haines Junction.

6.4.2 CONS

A recreational / cottage development located in an area with no direct lake access is not customary in Yukon and may carry inherent risk. However, this type of development is common in other jurisdictions. For example, Carraig Ridge¹ a recent private development located in the foothills of Alberta, is attracting international attention. The planned development features 43 retreats, each unique in topography and a pristine view of the Rocky Mountains.

Potential human and bear conflicts in recreation areas is an important consideration. The Kluane area is known for its high density of grizzly bears. Guidelines about the proper storage of wildlife attractants would need to be included in the development permit. Enforcement and compliance could be a significant challenge. Yukon government Conservation Officer Services provide conservation and enforcement services for Haines Junction and the surrounding region, including working with problem wildlife. Conservation officers in Haines Junction processes many complaints and the number of calls fluctuates according to conflicts and workload cannot be anticipated year after year.

¹ <https://www.theglobeandmail.com/real-estate/calgary-and-edmonton/in-alberta-foothills-a-plan-to-build-an-enclave-of-world-classarchitecture/article34071267/>

7 SERVICING

7.1 WATER

Water servicing would be provided using truck delivery or using private wells onsite. All costs for the onsite systems are the responsibility of the property homeowner, and therefore the proposed development would not incur any initial water servicing capital costs. Subsequent analysis may need to be undertaken to confirm if additional upgrades to the Haines Junction water treatment plant or water distribution system are required. Water delivery cost varies from one community to another. However, in Teslin the treatment plant charges \$14/m³ plus a \$20 service charge and \$10 delivery charge.

7.2 WASTEWATER INFRASTRUCTURE

Wastewater will be managed by installing onsite septic systems on the portion of the development set aside as rural residential and privies on the portion of the development set aside as recreational lots. Wastewater systems and pit privies should be designed and implemented as per the Yukon government Design Specifications for Sewage Disposal Systems and Sewage Disposal Systems Regulation. All costs for the onsite septic systems and pit privies are the responsibility of the property homeowner, and therefore the proposed development will not incur any initial wastewater septic servicing costs.

7.3 ROAD SERVICING

The road servicing standards used for the purpose of this study are the City of Whitehorse Servicing Standards, which are currently the standard used for developing and constructing roads in Yukon. The proposed road consists of an 8-metre wide BST surface with 1-metre shoulders within a 20-metre right-of-way. The proposed road width is consistent with the City of Whitehorse Design Standards for local roads. The City of Whitehorse recommends right-of-way width for a local road is 25 metres. However, 25 metres is not optimal for this project. The developable land portion of KFN is undersized and accommodating rural or country residential lots is a challenge. However, provisions to accommodate reduced right-of-way width have been made in the past for projects in other Yukon communities.

Associated Engineering has assumed embankment cut / fill on the site will balance out to construct the road with an average of one-metre depth of material to be moved per linear metre of the roadway. Import and export should not be required. For cost estimation purposes Associated Engineering has assumed a road structure of 300 mm of import granular pit-run topped with 150 mm of Gran A crushed gravel. It is assumed that clearing, grubbing, and stripping material can be disposed of in local borrow source for reclamation. A site-specific geotechnical assessment should be conducted to determine the suitability of existing soils for use as embankment fill and to provide a recommendation for road structure. A test pitting program is required for all access roads to confirm the appropriate road structure.

7.4 POWER & PHONE

ATCO Electric Yukon has advised that the power for the proposed development can be routed from the existing single-phase power along the Alaska Highway. Associated Engineering has assumed a standard spacing of one pole required per 80 metres within the proposed subdivision. NorthwesTel does not provide input at the planning and design stage and does not prepare cost estimate for conceptual designs. As such, The NorthwesTel communications infrastructure are assumed to be brought into the proposed subdivision from the Alaska Highway, sharing ATCO's poles.

8 COST

8.1 COST ESTIMATE

A Class D estimate is an estimate based on the initial functional program and broad concept approach. It provides an order of magnitude based on a rough cost. As discussed in this report, the proponent will require additional analysis to confirm field conditions and determine construction techniques, field test pitting program, and detailed survey. The Class D cost estimate, as prepared by Associated Engineering, includes a 45% allowance for engineering and contingency, to service the proposed subdivision.

The Cost estimate is summarized in Table 2. A detailed breakdown of the costs is included in Appendix A.

Concept 1	
Yukon government	\$1,346,000
Kluane First Nation	\$854,000
Total	\$2,200,000
Concept 2	
Yukon government	\$1,346,000
Kluane First Nation	\$854,000
Total	\$2,200,000
Concept 3	
Yukon government	\$1,201,000
Kluane First Nation	\$647,000
Total	\$1,848,000

Table 2. Cost estimate for each concept.

8.2 COST RECOVERY

8.2.1 CONCEPT 1 & 2

The current price of a country residential lot in Haines Junction, about \$60,000, is used as the benchmark for estimating cost recovery for both Concept 1 and 2. The total estimated cost of Concept 1 and 2 at full build-out on the Yukon government portion is approximately \$1,346,000 and the potential revenue is about \$1,020,000. While this shows a loss of \$326,000, some of the shortfall could be further reduced by entering into a cost-sharing agreement with Kluane First Nation on the portion of the shared infrastructure.

8.2.2 CONCEPT 3

For the purpose of estimating the market value of the recreational concept, the lots were valued at \$40,000 per lot. With an estimated cost of \$1,346,000 at full build-out on the Yukon government portion of Concept 3, Yukon government would generate an excess of \$592,000.

8.3 PREFERRED CONCEPT

Concept 3 provides an alternative to rural residential development outside of the Village of Haines Junction. It is compatible with the proposed residential use on S-39B1. It is compatible with the adjacent Kluane National Park and Reserve and does not compete with the existing supply of residential land in Haines Junction.

KFN has not yet confirmed how it intends to dispose of the residential lots on S-39B1. It may approach the development as an economic engine, which would generate a stream of own source revenue through leasehold titles. It may reserve the lots for KFN citizens in order to satisfy the existing demand for land in Haines Junction. Or it may decide to do both: pursue economic development and allocate land for citizens. Historically, lending institutions and buyers did not have confidence in leasehold titles on settlement land making residential and commercial development for the purpose of generating revenue extremely challenging. However, a recent update to the Land Titles Act will eventually give Yukon First Nations access to a system that allows leasehold titles to be issued against settlement lands and, as a result, will facilitate financing and mortgages.

In the interim, KFN is concerned that adjacent residential lots on Yukon government would have an adverse effect on the eventual marketability of residential lots on KFN land consequently limiting its options. As a result, KFN has confirmed that it would endorse Concept 3 (recreational concept) over Concept 1 and 2 (rural residential concept).

9 NEXT STEPS

9.1 NEXT STEPS

There are several steps to be taken before any development of the site could be undertaken, including:

- Discussing the options with KFN, possibly refining the options, and selecting a preferred concept;
- Sharing the preferred concept with Village of Haines Junction, Champagne & Aishihik First Nation for discussion and feedback;
- Undertaking a detail Heritage Resource Impact Assessment;
- Carrying out a hydrogeological study: A hydrogeological study may be conducted if water wells are to be installed within the study area. The intent of the study should be to assess the impacts of the well use upon the underlying aquifer and delineate any liabilities or constraints.
- Preparing an environmental and socio-economic assessment package and submitting an application to YESAB;
- Undertaking detailed geotechnical analysis: While Chilkoat Geological Engineering geotechnical report provides recommendations regarding the anticipated building structures, surface and subsurface utilities, a supplemental geotechnical evaluation utilizing drilling methodologies should be conducted once a conceptual design has been determined to verify the geotechnical design parameters and once the locations of proposed buildings and septic fields have been determined.
- Preparing a preliminary engineering design report;
- Undertaking legal survey; and
- Finalizing detailed engineering design.

REFERENCES

Chilkoot Geological Engineers Ltd. (2018). Geotechnical Evaluation: Proposed Bear Creek Country Residential Subdivision, Haines Junction, Yukon – 2017. Yukon government, Energy Mines & Resources, Land Management Branch.

Ecofor Natural and Cultural Resouce Consultants (2018). Heritage Resource Overview Assessment: Bear Creek Development Initiative. Yukon government, Energy Mines & Resources, Land Management Branch.

Smith, C.A.S., Meikle, J.C., and Roots, C.F. (editors), 2004. Ecoregions of the Yukon Territory; Biophysical Properties of Yukon Landscapes. Agriculture and Agri-Food Canada, PARC Technical Bulletin No. 04-01, Summerland, BC.

2013 Village of Haines Junction Official Community Plan.

APPENDIX A

COST ESTIMATE – CONCEPT 1

<i>Item No.</i>	<i>Description</i>	<i>Estimated Total Quantity</i>	<i>Unit of Measurement</i>	<i>Unit Rate</i>	<i>Extended Total Price</i>
A.	OPTION 1				
1.0	HIGHWAY ACCESS CONSTRUCTION (Includes permitting, culverts, work within right of way to tie-in access road.)	2	ea.	\$ 50,000.00	\$ 100,000.00
2.0	CLEARING, GRUBBING AND STRIPPING	3.9	ha.	\$ 30,000.00	\$ 117,000.00
3.0	SUBGRADE PREPARATION	19,250	m ²	\$ 2.50	\$ 48,125.00
4.0	COMMON EXCAVATION TO EMBANKMENT	19,250	m ³	\$ 10.00	\$ 192,500.00
5.0	PITRUN GRANULAR SUB-BASE (300 mm DEPTH)	5,800	m ³	\$ 35.00	\$ 203,000.00
6.0	20 mm CRUSH GRANULAR BASE (150 mm DEPTH)	19,250	m ²	\$ 16.00	\$ 308,000.00
7.0	BST SURFACING	15,400	m ²	\$ 22.00	\$ 338,800.00
8.0	ATCO Power	1	LS	\$ 130,000.00	\$ 130,000.00
9.0	NWTEL Infrastructure	1	LS	\$ 80,000.00	\$ 80,000.00
SUBTOTAL					\$ 1,517,425.00
CONTINGENCY (35%)					\$ 531,098.75
ENGINEERING (10%)					\$ 151,742.50
TOTAL (Rounded to nearest thousand)					\$ 2,200,000.00

COST ESTIMATE – CONCEPT 2

B.	OPTION 2				
1.0	HIGHWAY ACCESS CONSTRUCTION (Includes permitting, culverts, work within right of way to tie-in access road.)	2	ea.	\$ 50,000.00	\$ 100,000.00
2.0	CLEARING, GRUBBING AND STRIPPING	3.9	ha.	\$ 30,000.00	\$ 117,000.00
3.0	SUBGRADE PREPARATION	19,250	m ²	\$ 2.50	\$ 48,125.00
4.0	COMMON EXCAVATION TO EMBANKMENT	19,250	m ³	\$ 10.00	\$ 192,500.00
5.0	PITRUN GRANULAR SUB-BASE (300 mm DEPTH)	5,800	m ³	\$ 35.00	\$ 203,000.00
6.0	20 mm CRUSH GRANULAR BASE (150 mm DEPTH)	19,250	m ²	\$ 16.00	\$ 308,000.00
7.0	BST SURFACING	15,400	m ²	\$ 22.00	\$ 338,800.00
8.0	ATCO Power	1	LS	\$ 130,000.00	\$ 130,000.00
9.0	NWTeI Infrastructure	1	LS	\$ 80,000.00	\$ 80,000.00
				SUBTOTAL	\$ 1,517,425.00
				CONTINGENCY (35%)	\$ 531,098.75
				ENGINEERING (10%)	\$ 151,742.50
				TOTAL (Rounded to nearest thousand)	\$ 2,200,000.00

COST ESTIMATE – CONCEPT 3

C.	OPTION 3				
1.0	HIGHWAY ACCESS CONSTRUCTION (Includes permitting, culverts, work within right of way to tie-in access road.)	2	ea.	\$ 50,000.00	\$ 100,000.00
2.0	CLEARING, GRUBBING AND STRIPPING	3.4	ha.	\$ 30,000.00	\$ 102,000.00
3.0	SUBGRADE PREPARATION	19,980	m ²	\$ 2.50	\$ 49,950.00
4.0	COMMON EXCAVATION TO EMBANKMENT	14,150	m ³	\$ 10.00	\$ 141,500.00
5.0	PITRUN GRANULAR SUB-BASE (300 mm DEPTH)	4,400	m ³	\$ 35.00	\$ 154,000.00
6.0	20 mm CRUSH GRANULAR BASE (150 mm DEPTH)	19,980	m ²	\$ 16.00	\$ 319,680.00
7.0	BST SURFACING	11,320	m ²	\$ 22.00	\$ 249,040.00
8.0	ATCO Power	1	LS	\$ 88,000.00	\$ 88,000.00
9.0	NWTeI Infrastructure	1	LS	\$ 70,000.00	\$ 70,000.00
				SUBTOTAL	\$ 1,274,170.00
				CONTINGENCY (35%)	\$ 445,959.50
				ENGINEERING (10%)	\$ 127,417.00
				TOTAL (Rounded to nearest thousand)	\$ 1,848,000.00