ALASKA-CANADA RAIL LINK
STRATEGIC ENVIRONMENTAL ASSESSMENT:

DECISION SUPPORT DOCUMENT

Submitted to:

Alaska Canada Rail Link Project

210 – 212 MAIN ST. WHITEHORSE, YK, Y1A 2A9

PHONE: 867.456.3915

Submitted by:

MACLEOD INSTITUTE

1835 – 20 Avenue NW, Calgary, AB T2M 1H4

Phone: 403.220.5271; Fax: 403.282.1287

Email: macleod@macleodinstitute.com

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1.0 CONTEXT

1.1 Strategic Environmental Assessment

The ultimate goal for this *Strategic Environmental Assessment* is an issues scoping / pre-feasibility assessment, from which to distil a Decision Support Document that will assist US and Canadian public sector decision-makers in assessing the merits, risks and impacts associated with public sector support and investment in the Alaska Canada Rail Link (ACRL).

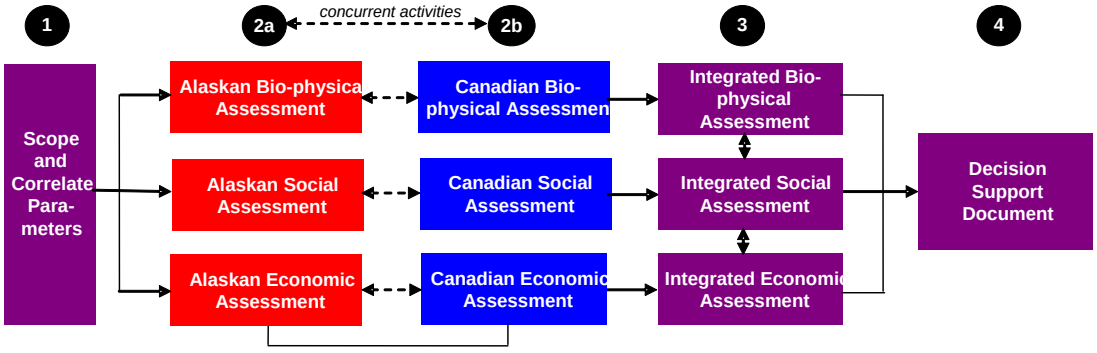
1.2 Objectives

As described in the Statement of Work, the objective of this SEA is to provide ***an early warning, long range assessment of likely construction and operations impacts and benefits to both the natural and human environment*** from investment in the ACRL.

1.3 Methodology

The project has been carried out according to the original four-stage framework set out in the proposal; there are deliverable reports available for each of the six tasks in Stage 2 and the three tasks in Stage 3. This document forms the Decision Support Document envisioned for Stage 4; it represents the culmination of all previous work in the D1 Work Package: the (see Figure 1 below).

Figure 1: A Four Step Approach



The reader will note that the content relating to the six task areas of this decision support document varies to a degree, in format, terminology and emphasis. This is a reflection of the respective regulatory regimes and 'terms of art' in environmental management practice, economic and socio-cultural study that exist on either side of the international border.

2.0 FINDINGS

The following section briefly outlines the findings of the Strategic Environmental Assessment.

2.1 Integrated Findings

The project will improve the basic economics of many mines in Alaska, Yukon, and northern BC. This potential, if developed appropriately, could provide steady, high-paying jobs, grow regional economic output, and increase revenues for governments.

The construction phase of the railroad will place strains on local labour markets and infrastructure. Once built, however, it will reduce freight costs, improve disaster response capability and reduce reconstruction costs for highways in Yukon and Alaska. Due to its scope, the ACRL will be classified as a mega-project, requiring special management and resources to be brought in from other parts of the country, or indeed, the world.

With the ACRL in place, costs of basic goods will be reduced in Alaska, Yukon, and northern BC. These savings will be offset to some degree by increased housing prices in the region, especially during construction phases. Imported business inputs will become less expensive, and transportation costs of exports reduced.

As opposed to road transport, a rail link offers increased energy efficiency, reduced emissions and a reduced ecological footprint. In comparison to road and particularly port access, it offers greater security of access in the event of cataclysmic natural disaster.

At this level of investigation, a specific biophysical bar to rail construction or operation in any of the sub-corridors identified and considered has not been identified. There are specific areas of concern, however, designated as “hot spots”, and described more fully in the body of this document. Similarly, no such socio-cultural bar has been identified; again, concerns are identified.

The capital expenditure for ACRL construction will be a sunk cost. However, significant economic return (primarily from induced development in the mining sector) suggests that a rail link will offer broad economic benefit in the long term.

Notwithstanding the foregoing, there remain significant biophysical, socio-cultural and economic issues to be considered should this initiative proceed, in whole, in part or in phases, that are further described below and in more detail in supporting study documentation.

Due to time and budget constraints, the SEA was conducted without broad public consultation. Public input, therefore, is an information gap of the first order that must be addressed should a decision lead to a furtherance of this initiative; consultation must include indigenous (Aboriginal and Alaska Native) and local, non-Aboriginal knowledge and community participation. This suggests a series of community visioning opportunities could function as a useful tool for consulting with affected communities while developing strategic plans for building governance capacity and impact resiliency. Additional information gaps, not the least of which are traditional environmental knowledge (TEK) and climate change adaptation studies, are identified below and in further detail in supporting subject documentation. In this regard, the ACRL presents an opportunity for inter-disciplinary learning about climate change adaptation.

This document identifies top-level biophysical, socio-cultural and economic impacts and benefits to the construction and operation of an ACRL. Supporting documentation speaks to processes to plan for and implement measures and procedures to manage and mitigate impacts and to maximize benefits. Underlying these proposals is the need for greater specificity and depth of sub-corridor data and information, biophysically, socio-culturally and economically. A decision to go forward, in whole, in part, or in phases will trigger regulatory imperatives for in-depth environmental assessment inclusive of socio-economic consideration and broad public consultation. It will also need to address the cumulative effects of induced development. This process will include impacts mitigation and management planning and benefits enhancement planning.

By working with affected communities during the consultation process, strategic plans for building governance capacity can be developed to realize benefits and investment in institutional infrastructure (a significant step in mitigating socio-cultural and socio-economic impacts).

2.2 Specified Route Assessment

During the course of this SEA the ACRL Project Manager requested a comparative analysis be performed on a specified route. As currently envisaged, this route follows from Delta Junction to Hazelton via Carmacks and Watson Lake (Segments[1] A, B, H and L/L1) with a spur to the port of Skagway/Haines from Carmacks via Whitehorse (following Segments F and G). Note that Segment L runs further than the intended destination (Eaglesnest Creek to Minaret sub-segment) but is the only segment that examines Watson Lake to Eaglesnest Creek.

The following table presents a comparative analysis of directly-affected interests and constituencies encountered along the specified route[2].

[1] Route segments are described in maps and tables beginning on page 8 below.
[2] By contrast, Table 6 on pages 21-22 presents *regional* issues (within a 200 km buffer).

Table 1: Analysis of Specified Route

Route Segment	Pros	Cons	Hot Spots & Key Issues**
A: Delta Jn. to Tanacross	• Achieves connectivity to Alaska rail system • No alternate route (common to all routes) • Estimated USD $250-300 million in highway reconstruction savings to Gov't of Alaska if built before AHGP development	• State Forest, ANCSA Land, 4 Game Management Units • Federally threatened species: Lynx, 7 species of special concern • Steeper slopes than southern route (to Beaver Creek)	• Tanana River (navigable stream) • Land use conflicts: State Forest, State Parks, Scenic Byway, State Range, Military Reservation • Habitat fragmentation (tundra and forest), fish habitat
B: Tanacross to Carmacks (Beaver Creek to Carmacks via Nisling River is alternate)	• Avoids Kluane National Park • 55% as opposed to 72% of route requires heavy construction • Avoids potential Special Management designation for Nisling River alternate • Significant wetlands avoided • 20 as opposed to 34 water crossings • Low gradient but 35% curves • 2 as opposed to 3 SARA Schedule 1 species affected • Potential induced mining development but not in near term • 100% of route in settled land claim areas (Tr'ondek Hwech'in, Selkirk and Little Salmon/Carmacks) • Avoids unsettled White River land claim	• Affects Nordenskiold Wetlands/Habitat Protection Area • 90% as opposed to 40% of route within 1 km of water body (increased spill risk) • Alternate route steep gradient but 21% curves	• Aesthetic impacts • Land use conflicts with proposed power line • Tantalus Bluff raptor habitat
H: Carmacks to Watson Lake (Whitehorse to Watson Lake via Alaska Highway is alternate)	• Avoids Blue/Dease Rivers Ecological Reserve, Nasutlin R. National Wildlife Area • 63% as opposed to 80% of route requires heavy construction • 28% as opposed to 34% curves • Wolverine and Howards Pass mines assisted; Fyre, Kudz Ze Kaya, Grum, Ice, Swim all dependent	• Affects Nordenskiold Habitat Protection Area • 41 as opposed to 31 significant water crossings • 3 as opposed to 2 SARA Schedule 1 species affected • Majority of route in unsettled YK Kaska Dena land claim (represented by Liard FN and Ross River Dena Council)	• Routing at Carmacks • Aesthetic impacts • Yukon River crossing • Raptors • Little Salmon Lake • Migratory flyway • Routing at Watson Lake • Induced development increases cumulative effect
L: Watson Lake to Minaret via Eaglesnest Creek* (Ft. Nelson route is alternate)	• Achieves half of northern BC link • Avoids Dune Za Keyih and Denetiah Provincial Parks • 1 as opposed to 3 SARA Schedule 1 species affected • Potential induced mining development but not in near term	• Multiple protected areas affected: Spatsizi Headwaters, Spatsizi Plateau & Stikine Provincial Park • Approx 69% as opposed to 37% of route requires heavy or very heavy construction (however much on Minaret spur) • Similar proportion of curves but very steep gradient as opposed to low-moderate gradient • Much of route in unsettled BC land claims (Kaska Dena Council, Liard First Nation, Ross River Dena Council)	• Dease Lake • Aesthetic impacts • Stikine & Klappan Rivers • Skeena River headwaters • Proximity to Spatsizi Wilderness Park • Multiple wildlife concerns
L1: Eaglesnest Creek to Hazelton (Minaret spur, Mackenzie or Ft. St. John alternates)	• Achieves half of northern BC link • Kerness North and South mines assisted; Lost Fox, Hobbit Boatch, Summit, Ground Hog and Coalfield all dependent	• Multiple protected areas affected: Spatsizi Headwaters & Spatsizi Plateau Provincial Parks • Skeena, Klappan, Nass & Kispiox River valleys affected (wildlife corridors) • Part of route in unsettled land claim (Gitxsan Hereditary Chiefs)	• Fisheries and recreation impacts to Kispiox, Nass and Skeena Rivers • Encroachment into roadless valleys with high wilderness values vs. Highway 37 route • Duplication of existing rail bed in Segment L from Dease Lake to Minaret • Induced development increases cumulative effect

Route Segment	Pros	Cons	Hot Spots & Key Issues**
F:Carmacks to Whitehorse	• Only route from Carmacks to Whitehorse (alternate is from Beaver Creek via Kluane NP or Nisling R., not serving Carmacks) • Division Mtn. and Minto mines assisted • 100% of route in settled land claim areas (Little Salmon/Carmacks, Ta'an Kwach'an and Kwanlin Dun First Nations)	• Data gaps in biophysical effects • Woodland Caribou (SARA Schedule 1 species) affected • 64% of route within 1 km of water body	• Nordenskiold wetlands • Braeburn elk • Fox Lake (land use conflicts) • Induced development increases cumulative effect
G: Whitehorse to Skagway/Haines	• Achieves northern port access for AHGP freight • Follows existing corridor with summer use • Minimal surface disturbance if existing corridor is followed • Potential induced mining but not in near term • Canadian portion of route in settled land claim areas (Ta'an Kwach'an, Kwanlin Dun and Carcross/Tagish First Nations)	• Affects Chilkoot Pass National Historic Site • 2 SARA Schedule 1 species affected (Perigrine Falcon and Woodland Caribou) • 67% of route within 1 km of water body	• Routing at Whitehorse • Yukon River crossing • Southern Lakes Caribou • Lewes Lake • Migratory flyway

* The analyzed route does not run from Eaglesnest Creek to Minaret; route segment L is the only segment that covers Watson Lake to Eaglesnest Creek
** Insufficient data to include socio-cultural hot spots without broad public consultation process

2.3 Biophysical Impacts

A major infrastructure project such as the ACRL has the potential to influence an extended landscape beyond the immediate vicinity of its route. Analysis of the overall corridor within which the ACRL would lie is therefore relevant to the SEA.

A key consideration for the ACRL will be whether the corridor selected has an existing transportation route (road or rail), thus mitigating the effects of creating access into an otherwise “wilderness” area. Even though such a choice is consistent with established environmental management practice for minimizing the biophysical impacts of linear developments, science-based risk analysis may reveal that the impacts of using a corridor without existing access are less than those with existing access.

An example may be an ACRL option paralleling the Alaska Highway through Kluane National Park where, despite the presence of the Highway, the railway may place at risk a number of federally protected ecologically sensitive areas, thus suggesting a “wilderness” alternative as being preferable. Conversely, the suggested sub-corridor routing from Eaglesnest Creek to Hazelton deviates from the course of Highway 37, suggested a “wilderness” routing as opposed to that through an existing transportation route. These potential situations underscore the need for detailed biophysical information collection and analysis during the planning and design stage such that the comparative trade-offs can be appreciated in decision-making.

The following tables identify the links that make up all possible combinations for joining the existing Alaskan and Canadian rail systems. Figure 2 (below) illustrates the ACRL segments and scenarios being considered. Table 2 (page 6) groups these links by ‘Scenario’ and Table 3 (page 6) identifies end points and link sequence.

Figure 2: ACRL Segments in Alaska, Yukon and British Columbia

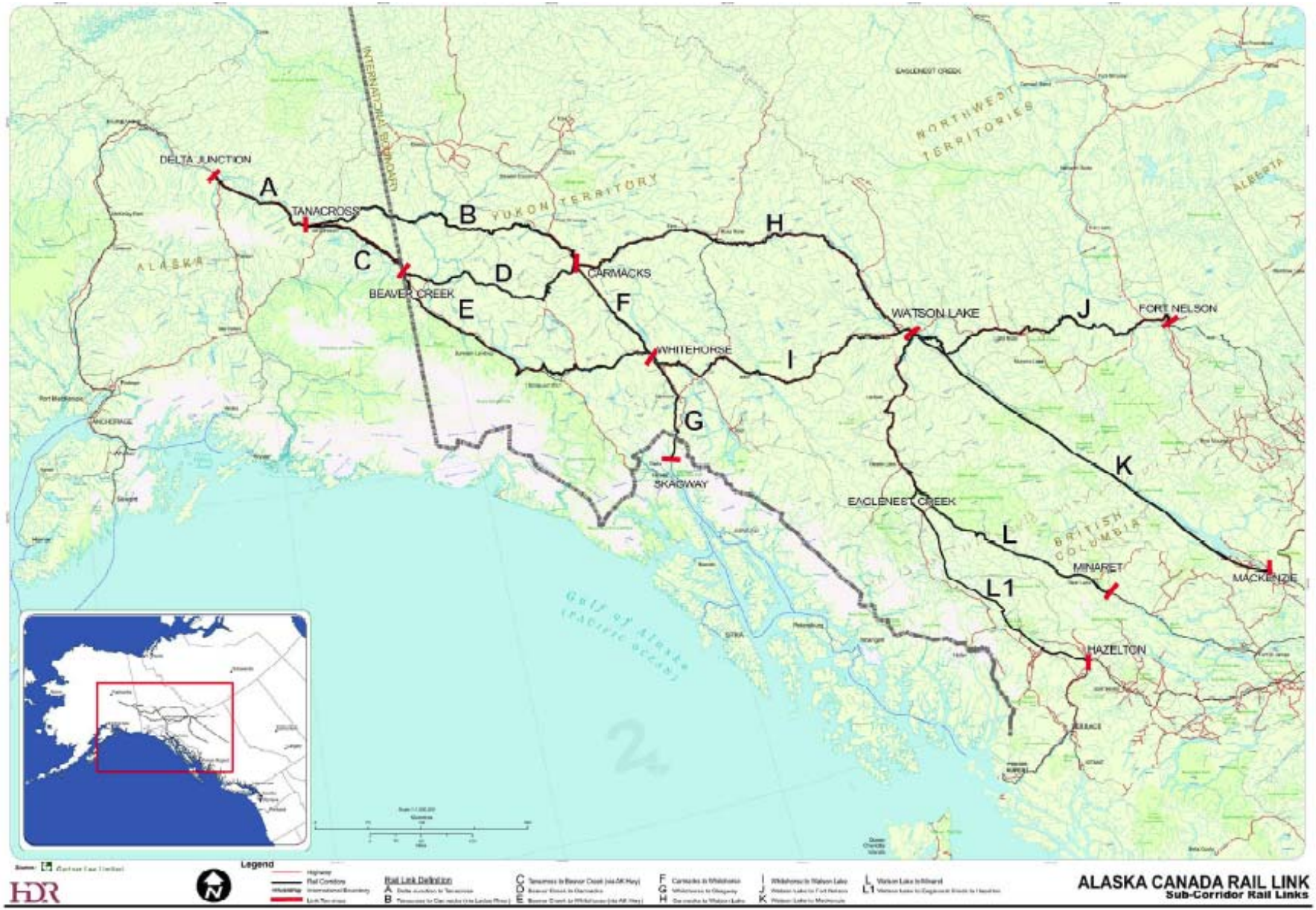


Table 2: ACRL Links by Scenario

Link Designation	Description	Scenario #
A	Delta Junction to Tanacross	1
B	Tanacross to Carmacks (via Ladue River)	1
C	Tanacross to Beaver Creek (via Alaska Highway)	1
D	Beaver Creek to Carmacks	1
E	Beaver Creek to Whitehorse (via Alaska Highway)	1
F	Carmacks to Whitehorse	2
G	Whitehorse to Skagway	2
H	Carmacks to Watson Lake	3
I	Whitehorse to Watson Lake	3
J	Watson Lake to Fort Nelson	4
K	Watson Lake to Mackenzie	4
L	Watson Lake to Minaret	4
L1	Watson Lake to Eaglenest Creek to Hazelton	4

Table 3: ACRL Potential Link Combinations

Endpoints		Link Sequence
Delta Junction	Carmacks	A-B
		A-C-D
Carmacks	Whitehorse	F
Delta Junction	Whitehorse	A-B-F
		A-C-D-F
		A-C-E
Carmacks	Skagway	F-G
Delta Junction	Skagway	A-B-F-G
		A-C-D-F-G
		A-B-E-G
Carmacks	Watson Lake	H
		F-I
Whitehorse	Watson Lake	I
Delta Junction	Watson Lake	A-B-H
		A-C-D-H
		A-B-F-I
		A-C-D-F-I
		A-C-E-I
Watson Lake	Fort Nelson	J
Delta Junction	Fort Nelson	A-B-H-J
		A-C-D-H-J
		A-B-F-I-J
		A-C-D-F-I-J
		A-C-E-I-J
Watson Lake	Mackenzie	K
Delta Junction	Mackenzie	A-B-H-K
		A-C-D-H-K
		A-B-F-I-K
		A-C-D-F-I-K
		A-C-E-I-K
Watson Lake	Minaret	L
Delta Junction	Minaret	A-B-H-L
		A-C-D-H-L
		A-B-F-I-L
		A-C-D-F-I-L
		A-C-E-I-L
Watson Lake	Hazelton	L1
Delta Junction	Hazelton	A-B-H-L1
		A-C-D-H-L1
		A-B-F-I-L1
		A-C-D-F-I-L1
		A-C-E-I-L1

A summary of the four scenarios from a biophysical perspective provides the reader an overview that can be used to refine the scope of subsequent work that will be required at the next level of route definition and planning. As would be expected with a project of this magnitude and potential cost, planning and route selection will be an iterative process.

There are key biophysical data gaps and they are large enough to merit significant additional investigation. Furthermore, the information gaps along each sub-corridor are large enough to suggest proceeding with caution from a biophysical perspective. The biophysical data for each sub-corridor needs to be brought up to a common base standard to effectively contribute to the selection of a preferred routing. A number of issues raised in this assessment could have substantial time and cost implications that would affect project economics. Further, the development, costing and implementation of effective management and mitigation efforts will require such biophysical data.

The biophysical analyses performed in Stage 2 identify *net biophysical effects* and *data gaps* for each scenario. Highlights of those analyses are provided in Table 4: Summary of SEA Level Biophysical Hotspots by Scenario, below.

Scenario 1 – Links A through F. Possible effects of ACRL development include: impacts on state land (Forest, Parks, Game Management, Controlled Use Areas, Military); Aboriginal land; Species of Concern (caribou, fish, fisheries, migratory bird areas, other wildlife habitat); sensitive vegetation, waste sites, aquatic areas (farms, wetlands and floodplains); and corridor proximity to water bodies which could be impacted by potential construction, spill hazards and derailment. The gaps include: air quality modeling, noise and vibration elevations, wetland and floodplain delineations, consultation to determine aboriginal concerns (sensitive areas and issues), hydrologic/hydraulic surveys, mapping and modeling, hazard identification (earthquake and volcano), permafrost/geologic features, waste sites and climate change adaptation.

Scenario 2 – Links F and G. The effects include: close proximity to water bodies (Nordenskolid wetlands, Fox Lake, Yukon River, southern Lakes, Lewes Lake and Bennet Lake). The gaps include: wildlife corridor identification, surface disturbance, spill/derailment hazards, traditional environmental knowledge and climate change adaptation.

Scenario 3 – Links H and I. Anticipated effects include: land use conflicts with existing transportation and pipeline corridors, proximity to water bodies, surface disturbance and spill/derailment hazards and wildlife impacts (birds and mammals). The gaps include: identification of induced development of assisted mine, wildlife corridors, traditional environmental knowledge and climate change adaptation.

Scenario 4 – Links J, K, L and L1. The effects include: direct impact on protected areas, close proximity to water bodies, significant river crossings, surface disturbance, spill/derailment hazards, wildlife conflicts, bird and plant diversity provincial park impacts and duplication of an existing unfinished rail bed. The gaps include: wildlife corridors, climate change adaptation, potential induced development and traditional environmental knowledge.

Finally, the following table offers further qualitative commentary on “hot spots” in the study area, designed to flag significant issues for consideration at this level of strategic consideration. The Annexes referred to in this table can be found in the Stage 3 biophysical report.

Table 4: Summary of SEA Level Biophysical Hotspots by Scenario

SCENARIOS	CORRIDOR HOTSPOTS
Scenario One	
Delta Junction to Tanacross (standalone, common to remaining sub-corridors)	See Annex 1, following for discussion on Alaskan sub-corridor.
Tanacross to North of Beaver Creek to Carmacks (via Ladue River)	See Annex 1, following, for discussion on Alaskan sub-corridor. In Yukon: Aesthetics, land use conflicts Minto to Carmacks with proposed power line routing east side of Klondike Highway, Tantalus Bluff
Tanacross to Beaver Creek to Carmacks (via Nisling River)	See Annex 1, following, forf discussion on Alaskan sub-corridor. In Yulon: Permafrost, migratory birds (wetlands), lack of biophysical information on Nisling River drainage, candidate SMA, potential for rare plants, roadless wilderness area
Tanacross to Beaver Creek to Whitehorse along the Alaska Highway	See Annex I, following, for discussion on Alaskan sub-corridor. In Yukon: Permafrost, seismic, migratory birds (Pickhandle Lakes), Chisana caribou, major land use conflicts Kluane National Park at Slims River, Spruce beetle at Haines Junction, Bison & Elk, rare plants Takhini Valley, routing at Whitehorse
Scenario Two	
Carmacks to Whitehorse	Nordenskiold wetlands, Braeburn elk, Fox Lake (land use conflicts, aesthetics, soils and grades, routing at Whitehorse and Yukon River crossing
Whitehorse to Skagway via Carcross	Routing at Whitehorse, Yukon River crossing, Southern lakes caribou, Lewes Lake, Carcross, Bennett Lake
Scenario Three	
Whitehorse to Watson Lake (via the Alaska Highway)	Yukon River crossing & wetlands, Marsh Lake land use conflicts, Squanga Lake whitefish, Johnson Crossing Teslin River crossing), Teslin Lake Nisutlin Bay (waterfowl, grades, routing) Rancheria (aesthetics, bull trout, caribou), Liard River crossing
Carmacks to Watson Lake	Routing at Carmacks, aesthetics, Yukon River crossing, raptors, Little Salmon Lake, migratory flyway, routing at Watson Lake
Scenario Four	
Watson Lake to Fort Nelson	Liard River Crossing, Liard River Hotsprings & Corridor Park, aesthetics and multiple wildlife conflicts, unusual boreal forest bird/plant diversity
Watson Lake to Mackenzie	Roadless wilderness, important wildlife migration corridor, Kechika River drainage & Rocky Mountain trench have multiple wildlife habitat interests including Denetiah and Dune Za Keyih provincial parks,
Watson Lake – Minaret via BCR Extension rail bed	Aesthetics, Dease Lake, Stikine & Klappan Rivers, Skeena River headwaters, proximity to Spatzizi Wilderness park, multiple wildlife concerns
Eagle nest Creek – Hazelton	Kispiox, Nass, Skeena rivers have high fisheries and recreation values, encroachment into roadless valleys with high wilderness values, duplication of existing unfinished rail bed

2.4 Economic Impacts

The Alaska-Canada Rail Link will have positive economic impacts along its route and elsewhere during construction and operations. Rail is a cheaper and more energy efficient method of moving heavy loads over long distances than trucking. This productivity or efficiency gain will be reflected in lower prices and increased options for consumers and businesses. The rail link will spur new economic activity in the region by lowering development and operating costs for new enterprises. Governments will benefit from lower resupply costs and reduced highway maintenance.

The large workforce required during construction and in some mining operations may create some negative social and economic impacts that will need to be mitigated as much as possible through careful planning that includes the participation of affected communities.

Key Economic Impacts for Rail Operations and Stimulated Mining activity include the following:

- Additional economic output totalling $1.6 billion/year in Canada
- Resupply cost reduction of 32% in Yukon and 25% in Alaska
- New railway employment peaking at over 500 jobs in Canada and Alaska
- Stimulated mining employment peaking at almost 8,000 jobs in Yukon and BC
- Additional $1.3 billion in revenues to all three levels of government in Canada
- Alaska Pipeline Benefits exceeding $250million highway reconstruction savings

The following table reflects the total length of track if the route for the ACRL extends from the Delta Junction to Ladue (Alaska Segment) to Carmacks to Watson Lake (Yukon Segment) to Hazelton (B.C. Segment). Using the terminology from Table 2, this route includes Links A, B, H and L1. A spur connects from Carmacks to Whitehorse to Skagway/Haines (same as Specified Route in Section 2.2 above). The table details the total expenditure in US dollars by jurisdiction.

Table 5: Economic Impact of Suggested Study Area

	Total Project	Alaska	Canada	Yukon	British Columbia
Miles of Track	1,530	190	1,340	843	497
Investment (USD)	$11 Billion	$1 Billion	$10 Billion	$6 Billion	$4 Bilion

The construction phase of the project will generate about 209,000 person-years of employment, with 17,000 in Alaska and over 190,000 in Canada. Direct construction employment will be 68,500 person-years, with over 10,500 in Alaska and about 58,000 in Canada (33,000 in Yukon and 25,000 in BC). The balance of jobs results from *indirect* employment generated by suppliers to the project and the employment *induced* by workers spending their paychecks from construction and supplier firms on goods and services in the broader economy. Many of the indirect and induced jobs occur in other parts of Canada and the US.

Economic analysis of the ACRL project includes several potential impacts:

- ACRL Construction Impacts
- ACRL Operations Impacts
- Indirect ACRL Impacts - Mining impacts, long-haul trucking and marine freight impacts, port impacts, wage and price impacts, gas pipeline impacts, other oil and gas industry impacts, tourism impacts, civil defense and emergency management impacts, highway maintenance savings and emission impacts.

Construction Impacts. The standard-gauge rail line proposed to cover 1,530 miles in length, carries a capital cost of approximately CD$ 13.9 billion (US$11billion) in current dollars. The route chosen for the impact study runs from Delta Junction to Ladue (Alaska Segment) to Carmacks to Watson Lake (Yukon Segment) to Hazelton (B.C. Segment) with a spur from Carmacks to Whitehorse to Skagway/Haines. The route plays a large role in determining both total expenditure and annual capital outlay.

This study estimates capital costs for the Canadian segment to be CD$12.4 billion (US$10 billion), approximately 90 per cent of the entire project – 1,340 miles. The Canadian economic output generated by this spending will be approximately CD$27 billion. The remaining mainline construction will take place in Alaska (190 miles, US$1 billion).[3] An estimated additional US$30 million would be required for construction of the Alaska segment of the Skagway/Haines–Whitehorse–Carmacks spur line.

Construction costs average about US$7.7 million per mile (CD$9.1 million). In Construction costs in easier Alaska terrain are lower (about US$5.6 million per mile) while in Canada they average about US$8.0 million per mile (Yukon - US$8.3 million per mile and BC US$7.5 million per mile).

[3] [3] To convert to US dollars multiply Canadian dollar value by 0.85.

Construction employment in Canada will extend from 2010 to 2014. Construction labour income will exceed CD$2.8 billion over the same period while indirect and induced employment will provide an estimated CD$11 billion in labour income, from 2010 to 2020. If ACRL construction is completed before AHGP initiation, it is estimated that the Alaska government would save on the order of USD $250-300 million in avoided highway reconstruction costs.

Operations Impacts. The rail link requires resources for right-of-way and equipment maintenance, transport of goods, and administration of operating activities (billing, payroll, etc.). Annual ACRL employment for operations would be about 530 full-time equivalents (FTEs) with about 90 in Alaska, 260 in Yukon, and 180 in BC. ACRL operations will have a direct impact of CD$290 million per year on the economic output of the Canadian economy. Gross Domestic Product (GDP) for rail link operations should cover the wage bill, net interest paid, capital consumption allowances, and a regulated rate of return for invested capital. However, the capital expenditure will be a sunk cost. There is an implicit assumption that the capital cost will be covered by the US and Alaska governments, with minor contributions from Canada. Alternatively, the governments could operate the roadbed/right-of-way with an annual charge tied to the use of the line by railroad companies. Any losses would show up as losses by a Crown corporation. Depending on the method of covering these costs, GDP might be affected.

Relatively larger impacts of the ACRL arise from induced activity in mining in Yukon and BC, along with induced employment elsewhere in Canada. The railway would also help meet commodity demands south of the study area and elsewhere in the world and may improve security of supply for some minerals.

The introduction of rail transportation as an option is expected to result in the development of a number of new mines in Yukon and northern BC. The rail line operation and mine activity together result in a direct and indirect impact on the economic output of CD$1.2 billion per year. Total economic output generated specifically by the operation of the rail line and mine activity is approximately CD$1.6 billion per year (induced effects of CD$400 million per year).

Indirect ACRL Impacts. 'Yukon and BC resupply' refers to the flow of goods and commodities into the region. Approximately 147,000 tonnes of goods per year enter into Yukon (54,700 tonnes of goods per year by truck on the Alaska Highway and 93,000 tonnes of petroleum products from the pipeline from Skagway/Haines, Alaska). Only 23,800 tonnes could be competitively transported by the ACRL from existing truck transportation services. This would result in 32 per cent reduction in total transportation costs (excluding pipeline services) amounting to CD$30 per tonne or CD$150 per capita.

The reduction in demand for truck services for resupply will be somewhat offset by the increased demand for trucking from other sources, which include new mine development and other short hauls to and from the rail line to nearby locations. Resupply modal shifts for northern British Columbia would have similar characteristics to the Yukon resupply picture, but to a lesser extent. The gains from resupply in Yukon are quite small relative to those in Alaska; the ACRL would serve about 30,000 people in Yukon and over 600,000 in Alaska.

Consumer Price Index (CPI) impacts of the ACRL include a drop in transportation costs (reducing the CPI by approximately 0.2 to 0.3 per cent, in the first four years, followed by a fairly stable average impact of 0.1 per cent), which may soften nominal wage rate demands and spur consumer demand and business investment. As demand increases there is an increase in employment demand. This lowers the unemployment rate, placing upward pressure on wage rate demands and nominal wage income increases with an impact of more than twice that of real demand. Consequently, there is an increase in unit labour costs that puts upward pressure on prices.

Anticipated disposable income increases on average by 0.4 per cent, and peaks in the fourth year with an impact of 0.5 per cent. Improvements in the first three years derive mainly from the CPI drop, while the remaining years are dominated by improved nominal income gains.

In Alaska, the average savings resulting from the diversion of up to two million tons of highway and marine freight could total over $100 million per year or about 25 percent of annual resupply transportation costs. We expect that some of this savings would be passed on to Alaska households, businesses and government purchasers. Annual savings on general merchandise entering Alaska would average $52 per ton or $162 per capita.

Alaska Highway Gas Pipeline impacts include mobilization of significant tonnage of pipe, fuel and equipment as well as intensive construction over a relatively short period of time. The use of a rail system for transporting construction materials should reduce the costs of construction. If the switch from truck to rail results in a halving of the freight rate then there is an opportunity for a CD$22.9 million saving on pipeline construction. This saving would lead to a lower pipeline tariff (regulated return based on capital expenditure) and therefore a larger netback for the natural gas producers in Prudhoe Bay and the Alaskan government.

Other oil and gas industry impacts include exploration and development of oil and gas activities in the Yukon and northern British Columbia. These would benefit from reduced transportation costs of material inputs.

Upgrades to the Port of Skagway/Haines and the White Pass and Yukon Railway could create an additional 1,450 construction jobs and 1,050 jobs in other economic sectors, with a combined labour income of US$127 million. New capital investments of US$110 million in the port and US$74 million in the Alaska segment of the existing rail line would generate US$294 million in economic output in the state.

Highway maintenance savings include reduced resupply truck traffic along some of the major roads in Yukon, primarily Alaska Highway, Campbell Highway and the Klondike Highway. Average recent spending on these highways is approximately CD$7.7 million per year, which accounts for approximately 17 per cent of total annual spending on highways, and 5 per cent of total capital expenditure by the Yukon Government.

Reductions of emissions occur because of the relative energy efficiency of rail compared to truck. However, total energy in the Canadian economy may be increased because a large portion of Canadian rail transportation comes from displacing US transportation services; the US will require less energy because they are moving goods to the Canada-US border whereas without ACRL they would have to get them to Seattle or Tacoma and move them to Anchorage. Additional development of mines will also increase energy use, although with a rail transportation system in place, energy consumption would be less than if trucks were the primary mode of transportation.

Mining impacts include the development of mines in the Yukon and northern British Columbia with production in excess of one billion tonnes of metal and coal ore over the first 40 years of operation. There are some mines that are likely to proceed in Yukon and BC even if the railroad is not built. This study anticipates that mid- to long-term mineral development in Alaska will play a similar role.

With the ACRL, these mines become potential customers. Most of these projects are expected to come into operation after 2020, accounting for almost 11.1 million tons of concentrate or coal to be railed via ACRL, bringing in around $114 million of average revenue for the railway annually. Annual investment of $339 million will be needed to support the operations of these mines.

The total impact of these mines amounts to an average of $917 million on national output, of which, $460 million accrues to Yukon and $195 million to British Columbia. The mines also account for an average of 7,800 full-time equivalent jobs annually from 2020 onwards, of which 4 thousand will be located in the Yukon and more than two thousand in British Columbia.

A preliminary assessment of potential for new Alaska minerals development associated with an ACRL project predicts at the low end 8.8 billion tonnes of mineral concentrates could be developed in the rail corridor over a 30-year period, with a gross metal value totaling US$16.9 billion[4] based on a statistical analysis by University of Alaska Fairbanks researchers. The high-end of the predicted range is US$69 billion. These numbers are not directly comparable to estimates of mineral development and mining impacts in Canada because the analysts used different data sets, different methodologies and different assumptions.

Significant security and emergency management benefits to Alaska from the ACRL that cannot be quantified would provide a critical transportation link – invaluable in the event that a major natural disaster or breech of security shuts down other transportation arteries connecting Alaska to the rest of the world.

Expenditures and revenues of local, provincial and federal governments at the national level in Canada will affect all three levels of government combined with US$1.3 billion additional revenue from ACRL during the years 2010 to 2025. US federal, state and local revenues are more modest. The U.S. treasury will benefit from taxes on income to ACRL construction and operations workers, corporate income tax on Alaska-based corporations whose expenses are reduced, and royalties from oil and gas revenues derived from leases on U.S. government lands. Displacement of trucking freight will reduce federal fuel tax revenues by approximately US$100,000 annually.

2.5 Socio-Cultural Impacts

This section summarizes social and cultural impacts of a proposed railway. It provides a scoping of issues for policy-makers and affected communities in order to inform the decision of whether to proceed with a full slate of technical, economic, social and ecological assessments for the ACRL.

A key finding of this study is that a complete Strategic Environmental Assessment cannot be achieved without comprehensive and meaningful consultation with affected individuals and communities – a process that must begin as part of determining feasibility of the Alaska Canada Rail Link.

To maintain a strategic level of analysis—one that may provide information about potential cumulative effects, or that takes into account the socio-political reality of regional social interests in land, economic development, etc.—a 200 km radius catchment area was used in the social assessment. This value was chosen so as to be within an order of magnitude of geographical extent of First Nations' land claims, and to avoid undue focus on specific communities within the Strategic Environmental Assessment.

In Canada, impact of the ACRL at the socio-cultural level is high. This study assesses overall effects of rail development as having the potential magnitude and significance of the Mackenzie Valley Pipeline proposal of the 1970s, and notes parallels between pipeline development and the ACRL:

- First, the sheer number of communities in the jurisdiction of the Yukon Territory and the Province of British Columbia is sufficient to warrant a meaningful and effective consultation process.
- Second, there is a significant First Nations presence in the region whose participation and consultation are protected by Canada's laws, including the Constitution Act, the Canadian Environmental Assessment Act and in Yukon by the Yukon Environmental and Socio-Economic Assessment Act (YESAA).
- Third, the status of land claims negotiations is not uniform throughout the proposed ACRL corridor.

This combination of factors creates a complex and potentially volatile environment for the proposed rail link project because significant portions of northern British Columbia do not have settled claims. Yukon Territory has largely settled its land claims, guided by the Umbrella Final Agreement, although there are still three First Nations with unsettled claims in southern Yukon within the corridor that could have considerable bearing on project sites, partnerships, cost and feasibility.

While the non-Aboriginal population constitutes the majority of residents overall, key communities along the corridor have a predominately Aboriginal population. Aboriginal and non-Aboriginal residents in the ACRL corridor have significant connections to the land based on traditional use, subsistence and other "bush economy" activities, and recreation. Therefore, the human ecological and biophysical implications of the ACRL are significant.

First Nations' participation and consultation are required by Canada's laws and regulations including the Constitution Act and the Canadian Environmental Assessment Act (and in Yukon by YESAA), and have been reaffirmed through case law in the Supreme Court. Depending on the circumstances, this consultation may range from public notification to landowner consultation to quazi-intergovernmental consultation (especially in areas of BC); the extent of a proponent's duty to consult varies with the strength of Aboriginal interests or claims, and a proponent must substantively address Aboriginal concerns.

It should be noted that the status of land claims negotiations is not uniform throughout the ACRL corridor (most are settled in Yukon but only the Nisga'a have a settled comprehensive land claim in the study area in BC[5]—the remainder of the BC study area is under active land claim).

Consideration of the project in phases may enable and encourage settlement of First Nation land claims in Canadian segments of the ACRL. Therefore, scenarios that favour development in Yukon may be favoured over those in northern British Columbia. Corridors within the Yukon where the claims are settled may likewise be favoured over those where they are still under negotiation. However, land claims, are but a starting place in developing local capacity; as in the Alaska Highway Pipeline and the Mackenzie Valley Pipeline cases, the establishment of local institutional capacity to participate in and benefit from ACRL construction could be seen as a prerequisite for meaningful participation in northern development, especially within the interpretation of the Yukon Umbrella Final Agreement and the YESAA.

Table 6 provides a summary of affected communities, using routes designated in Figure 2. The table includes Alaska information in segments 1 and 3.

[5] An exception is the easternmost route to Ft. Nelson, part of which passes through Treaty 8 lands.

Table 6: Summary of ACRL Communities

Railway Corridor (See Fig. 2: Routes)	• Communities and Reserves		Organizational Capacity	• Status of Land Claims*		Presence of Subsistence Lifestyle (Seasonal Round)			Canadian Income and Unemployment Ranges (See note for Alaska ranges)	
	Number	Data Missing or Insufficient		Yukon: Settled Claims	BC: Stages	Alaska	Yukon	BC	Income	Unemployment
Whitehorse – Skagway/Haines (Route G)	FN: 14 MC: 18	FN: 7 MC: 7	FN: Moderate – High MC: Moderate - High	7 of 9	St. 4: 4	No	Yes TLUOS: 1	Yes TLUOS: 1	$17,472 (Carmacks)~ $30,348 (Whitehorse)	10%(Whitehorse) ~ 50% (Reserve: Carcross 4)
Whitehorse - Carmacks (Route F)	FN: 11 MC: 21	FN: 4 MC: 7	FN: Moderate – High MC: Low – Moderate	9 of 11	St. 4: 4		Yes TLUOS: 1	Yes TLUOS: 1	$16,277 (Pelly Crossing)~ $30,348 (Whitehorse)	9.3% (Mayo)~ 50% (Stewart Crossing)
Delta Junction – Whitehorse (ABCDE)	FN: 14 MC: 33	FN: 4 MC: 9	FN: Moderate – High MC: Moderate	9 of 11	St. 4: 4	Yes, in 9 of 11 communities	Yes TLUOS: 1	Yes TLUOS: 1	$16,277 (Pelly Crossing) ~ $30,348 (Whitehorse)	9.3%(Mayo) ~ 30% (Pelly Crossing)
Watson Lake - Fort Nelson (Route J)	FN: 36 MC: 12	FN: 28 MC: 5	FN: Moderate MC: Low - Moderate	1 of 2	St. 4: 3 St. 2: 3 Treaty 8: 2		Yes TLUOS: 1	Yes TLUOS: 3	$22,251 (Watson Lake) ~ $36,992 (Reserve: Iskut)	5.6% (Fort Nelson) ~ 50% (Reserve: Dease Lake 9)
Watson Lake – Mackenzie (Route K)	FN: 123 MC: 30	FN: 102 MC: 20	FN: Moderate - High MC: Low - Moderate	1 of 2	St. 5: 2 St. 4: 7 St. 2: 3 Treaty 8: 3		Yes TLUOS: 1	Yes TLUOS: 7	$9,168 (Reserve: Woyenne 27) ~ $27,785 (Fort St. James)	7.2% (Fort St. James) ~ 75% (Reserve: Blueberry River 205)
Watson Lake – Halzelton (Route L1)	FN: 121 MC: 25	FN: 94 MC: 12	FN: Moderate - High MC: Moderate	1 of 2	St. 5: 1 St. 4: 10 St. 3: 1 St. 2: 3 Settled: 1		Yes TLUOS: 1	Yes TLUOS: 3	$2,952 (Reserve: Kitwanga) ~ $36,992 (Reserve: Iskut)	8.3% (Reserve: Telkwa) ~ 59.4% (Reserve: Gitsegulka 1)

Railway Corridor, Cont'd.	• Communities and Reserves		Organizational Capacity	• Status of Land Claims		Presence of Subsistence Lifestyle (Seasonal Round)			Canadian Income and Unemployment Ranges (See note for Alaska ranges)	
	Number	Data Missing or Insufficient		Yukon: Settled Claims	BC: Stages	Alaska	Yukon	BC	Income	Unemployment
Watson Lake – Carmacks (Route H)	FN: 9 MC: 27	FN: 3 MC: 7	FN: Moderate MC: Moderate	9 of 11	St. 4: 3 St. 2: 3		Yes TLUOS: 1	Yes TLUOS: 3	$13,600 (Ross River) ~ $30,348 (Whitehorse)	9.3% (Mayo) ~ 50% (Stewart Crossing)
Watson Lake - Whitehorse (Route I)	FN: 9 MC: 20	FN: 3 MC: 6	FN: Moderate MC: Moderate	9 of 11	St. 4: 5 St. 2: 3		Yes TLUOS: 1	Yes TLUOS: 2	$17,472 (Carmacks) ~ $30,348 (Whitehorse)	10% (Whitehorse) ~ 50% (Reserve: Carcross 4)

* Land claims referenced in this table are those within 200 km radius buffer of railway. For this reason, a route passing within 200 km of neighbouring jurisdiction may include land claims from that jurisdiction. Directly intersected land claims are mentioned in body text.

Legend:
- FN = In Canada, First Nation communities (Indian Reserves)
  In Alaska, communities with 80% or more Alaska Native population
- MC = Mixed Communities
- TLUOS = Traditional Land Use and Occupancy Study
- Stages: (BC Claims)
  - Stage 1 = Statement of Intent to Negotiate
  - Stage 2 = Readiness to Negotiate
  - Stage 3 = Negotiation of a Framework Agreement
  - Stage 4 = Negotiation of an Agreement in Principle
  - Stage 5 = Negotiation to Finalize a Treaty
  - Stage 6 = Implementation of the Treaty

Note: Alaska Income Range = $67,500 (Northway Junction) ~ $6,875 (Eagle Village)
Alaska Unemployment Range = 3.2% (Fort Greely) ~ 46.9% (Tetlin)

The socio-cultural analysis presents several key findings important to the overall context of the SEA. The ACRL will impact residents in several ways: population movements; pressures on community infrastructure; family pressures; workforce changes; changing community character; pressures on subsistence activity (bush economy); and cultural pressures. Regardless of the routing, efforts should be undertaken to ameliorate or mitigate these impacts so as not to adversely affect local communities.

Steps to ameliorate or mitigate the potential impacts would include:

- meaningful consultation including both Aboriginal and non-Aboriginal communities;
- a comprehensive impact assessment must include indigenous (Canadian Aboriginal and Alaska Native) knowledge, local non-Aboriginal knowledge, and community participation;
- consideration of a phased implementation in order to enable and encourage settlement of First Nation land claims in Canadian segments of the ACRL (i.e., scenarios that favour development in Yukon could occur before northern British Columbia; and corridors within the Yukon where the claims are settled could proceed before those where they are still under negotiation); and
- working with affected communities, developing strategic plans for building governance capacity to realize benefits and investment in institutional infrastructure to mitigate and manage adverse effects of ACRL (a series of community visioning opportunities could be a significant tool).

Regardless of national, state, provincial or territorial jurisdiction, meaningful community participation is key to successful ACRL development. Poor communication can create gaps and stifle channels for mitigating shared problems between First Nations and developers. By taking part in baseline and socio-economic impact studies, community members can become informed about the project and empowered to give input.

Participation by First Nations can help build community institutional capacity to voice concerns and make recommendations. Incorporating Traditional Ecological Knowledge (TEK) helps developers to understand First Nations' issues and concerns, and helps First Nations communicate the need for protection of key areas and sacred sites. This knowledge may enhance understanding of bio-physical impacts.

Given adequate investment of time and resources in community involvement at the front end, the ACRL project has the potential to realize benefits both in terms of economic efficiency and socio-cultural effectiveness.

3.0 TOWARD A DECISION

The following section draws out some of the key issues from the background research completed in Stages 2 and 3 that can be seen as 'red flags', or potential barriers to the ACRL. These issues may be considered 'deal-breakers' to the extent that they are not addressed.

3.1 Support for the Decision-Making Process

3.1.1 Railway Feasibility

From a technical point of view, the challenges to building this railway are not insurmountable. Several issues exist in relation to changing permafrost conditions (related to seasonal variation and climate change), and in avoidance of parks and protected areas and sensitive species populations. Careful consideration in route selection and construction methods should be adequate to address the major technical and biophysical challenges.

The ACRL would reduce the costs of consumer items in the Study Area, and would reduce costs for mining freight and shipping for pipeline materials if it were built prior to Alaska Highway Gas Pipeline development. However, the labour requirements of construction activities are large in proportion to the small population in the Study Area, and would likely cause considerable challenges in terms of wage inflation, housing shortages and availability of basic goods and services, including basic government services. These challenges are confronted by every mega-project. Indeed, that is how we define mega projects. The ACRL should draw from analogous experience on how to cope with these challenges.

3.1.2 Boom and Bust Cycles

The social effects of the ACRL are likely to be large. The sheer volume of itinerant workers required for construction activities will dwarf small local communities in a boom and bust cycle familiar within the region in association with resource extraction and infrastructure development activities. However, the management of mega projects has come a long way since the Trans-Alaska Pipeline experience. Construction camps, coordinated movement of people in and out from the sites, and modern computer support systems may help to mitigate the social impact on local towns. Experience from other linear mega-projects should be examined to identify Best Practices in mitigating social, cultural and gender impacts before moving forward with ACRL development.

3.1.3 Direct and Induced Effects

A body of work developed for the ACRL project through the University of Alaska and Yukon Economic Development identified several mines and other economic activities that would benefit from the ACRL. Six mines are likely to be built regardless of the existence of the ACRL, whereas a further nine mines would become feasible only if the ACRL were built. There is an expectation of about 124 mines in the longer term, reflecting the richness of ore bodies in the Study Area and the expectations about costs if a rail line is available.

Projections for industrial activity contingent on construction of the ACRL yields projected ecological footprints that are directly attributable to the ACRL, or contingent upon the ACRL, therefore providing substantial data for direct and induced cumulative effects. A reliable analysis of cumulative effects would be required as part of the environmental assessment and permitting phase.

3.1.4 ACRL Segments

Each segment of the proposed ACRL poses greatly varying economic performance, strategic purposes and technical/biophysical/social challenges depending on local circumstances. In this light, it may be constructive to examine each segment of the larger ACRL for its economic merits, strategic function and prospects for successful development / absence of obstacles.

The Project Team recognizes that 'the ACRL' as an integrated railway connection is a different concept than 'parts of an eventual ACRL' in political and practical terms. There may be ramifications of considering the railway incrementally versus in complete form. However, depending on the drivers for initiating ACRL development, there may be opportunities for early successes and strategic benefits for other regional activities, such as pipeline or mining developments.

3.1.5 Strategic Issues by Segment

The impacts and challenges of each segment of the ACRL are covered in detail in the nine accompanying deliverables for Stages 2 and 3 of this project. The following section briefly describes the ACRL in four overall areas and is intended to provide an executive summary level recap of ACRL sub-corridors.

Alaska to Yukon Border. This section of railway poses among the least challenge in terms of technical, biophysical, social or political challenges. However, it contains cultural properties, a wildlife refuge, communities and Alaska Native groups whose interests should be included through an appropriate consultation process. This section is a required link between the existing Alaska Railroad system and the Canadian system, and therefore is essential to connect Alaska rails to the lower 48 US States.

There are several potential routes through the Yukon connecting Delta Junction in Alaska to Whitehorse and Watson Lake en route south to a northerly spur of the Canadian railway system. The most southerly routing through Beaver Creek, Burwash Landing and Haines Junction en route to Whitehorse would run through Kluane National Park and would pass very close to Kluane Lake, requiring massive cut & fill and would therefore cause significant visual impact to the National Park and Game Sanctuary and attendant wildlife corridor issues. In addition, there are significant land use conflicts in the vicinity of the Slims River. Such concerns suggest major hurdles to overcome within an Environmental Assessment process.

The two more northern routes to Carmacks (via Pelly Crossing and directly from Beaver Creek to Carmacks) would necessitate a connection from Whitehorse to Carmacks (Link F), and would run closer to a range of mineral resources. Major river crossings and sensitive wetlands pose challenges. Link B (from the border to Carmacks via the Ladue River) closely follows waterways and suggests some land use conflicts. Link D (from Beaver Creek to Carmacks via the Nisling River) offers similar challenges; in addition, there is little specific biophysical information of the Nisling River drainage which is a candidate for a Special Management Zone.

The route from Carmacks to Watson Lake via Ross River (Link H) would likewise open access to mining activities but poses a relatively higher number of significant water crossings and surface disturbance. The Whitehorse to Watson lake option (Link I) suggests land use conflicts along existing Alaska Highway and proposed pipeline corridors and numerous further biophysical challenges.

British Columbia (Four Sub-Sections):

The four sub-corridors through northern British Columbia pose a variety of biophysical and technical challenges owing to the length and variety of landscape through which the railway would pass. The routes through BC also pose socio-cultural challenges because land claims are not settled, and therefore the frameworks are not defined for First Nations to negotiate Impact Benefit Agreements to compensate for livelihood impacts.

Except for the route to Ft. Nelson, all of northern BC is subject to comprehensive land claims from First Nations, creating a planning environment in which the Constitution Act and the Canadian Environmental Assessment Act require meaningful consultation with each First Nation to degrees 'corresponding to the seriousness and strength of each claim'.

The route to Hazelton may be favoured for its direct connection to the port of Prince Rupert. In addition, this is the only route in the Study Area that passes through a modern settled land claim: the Nisga'a (by comparison the Dene Tha region of north eastern BC and southern NWT is part of the historical Treaty 8). The entitlement of the Nisga'a for consultation, participation, and benefit from development within settled lands is therefore more established, providing certainty in terms of rights and obligations. The rest of the Study Area with BC (excluding Treaty 8 lands) is under active land claim and therefore a condition of uncertainty in terms of specific rights and obligations; the requirement for consultation continues to be valid in these areas.

3.1.6 Community Consultation

A project of this scale triggers the requirement for community involvement. Following the precedents of the Mackenzie Valley Pipeline Inquiry and the Alaska Highway Gas Pipeline Inquiry, a full community consultation process is warranted before any construction activities are undertaken in support of the ACRL. A staggered, phase by phase, approach can both support meaningful consultation and reduce the extensive cost of a massive consultation process.

Whereas the model of the Mackenzie Valley Pipeline Inquiry may seem excessive for the construction of a railway, parallels exist between this development and proposed pipeline developments. For example, the community impacts of railway construction will be considerable. The development is a linear disturbance with wildlife, fisheries and social impacts.

The economic benefit resulting from the construction of the ACRL will neither be consistent from community to community nor will it be uniformly positive. And Canadian precedent exists for assessing the community benefits and impacts of massive capital projects of similar scope.

In Canada, the Constitution Act and Environmental Assessment Act require meaningful consultation with Aboriginal groups in ways that are over and above the normal requirements for public consultation. Where land claims are unsettled, the requirement for consultation varies with the severity and strength of the claim, ranging from normal community consultation to full landowner status negotiations.

In the United States, the National Environmental Policy Act contains a series of action-forcing procedures to be evaluated through the preparation of an Environmental Impact Statement (EIS) and provides for public involvement during scoping and for public review of the draft EIS. Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA) requires study of and a plan for avoidance or mitigation of effects on subsistence use. ANILCA Section 106 requires inventory and evaluation of cultural and historic sites and development of a mitigation plan.

3.2 Risks and Merits Summary

The following table summarizes the findings of the Strategic Environmental Assessment. The table reflects the similarity of issues and impacts across the ACRL corridor and highlights challenges according to jurisdiction.

Table 1: Summary of ACRL Strategic Environmental Assessment Findings

	Biophysical	Socio-Cultural	Economic
Scenario 1 Alaska to Yukon border	**Merits** * possible reduction in truck emissions * increased energy efficiency in freight * opportunity to increase climate change adaptation knowledge and experience * reduced ecological footprint compared to (potential) increase in road construction	**Merits** * job creation * increased economic activity * small reduction in cost of goods * faster disaster response (easy to reubuild)	**Merits** * reduced cost of construction materials * direct and induced mining expansion * rail connectivity with lower 48 US States * savings to AK road rebuilding budget * increased State revenues * savings for pipeline construction
	Risks * impacts on State land * impacts on Native land * impacts on water bodies * impacts on fish and habitat * impacts on wildlife * air, noise and vibration effects * climate change (especially permafrost) * cumulative impacts (including roads, pipelines, oil and gas, mines, etc.)	**Risks** * labour shortage * influx of migrant workers * impacts on sacred sites * boom and bust cycle * increased alcoholism * increased domestic abuse * housing shortages and cost increase * community consultation required	**Risks** * capital cost of railway a sunk cost * major capital expenditure * stakeholder interests may take time to resolve
Scenario 2 Alaska Border to Watson Lake via southern route	**Merits** * possible reduction in truck emissions * increased energy efficiency in freight * opportunity to increase climate change adaptation knowledge and experience * reduced ecological footprint compared to (potential) increase in road construction	**Merits** * job creation * increased economic activity * small reduction in cost of goods * faster disaster response (easy to reubuild)	**Merits** * reduced cost of construction materials * direct and induced mining expansion * rail connectivity with lower 48 US States * savings to AK road rebuilding budget * increased Territorial revenues * savings for pipeline construction
	Risks * impacts on National Park and Game Sanctuary * impacts on Native land * impacts on water bodies * impacts on fish and habitat * impacts on wildlife * air, noise and vibration effects * climate change (especially permafrost) * cumulative impacts (including roads, pipelines, oil and gas, mines, forestry, etc.)	**Risks** * labour shortage * influx of migrant workers * impacts on sacred sites * boom and bust cycle * increased alcoholism * increased domestic abuse * housing shortages and cost increase * some unsettled land claims * community consultation required	**Risks** * capital cost of railway a sunk cost * major capital expenditure * stakeholder interests may take time to resolve
Scenario 3 Alaska border to Watson Lake via northern route	**Merits** * possible reduction in truck emissions * increased energy efficiency in freight * opportunity to increase climate change adaptation knowledge and experience * reduced ecological footprint compared to (potential) increase in road construction	**Merits** * job creation * increased economic activity * small reduction in cost of goods * faster disaster response (easy to reubuild)	**Merits** * reduced cost of construction materials * direct and induced mining expansion * rail connectivity with lower 48 US States * savings to AK road rebuilding budget * increased State tax revenue * savings for pipeline construction
	Risks * impacts on Native land * impacts on water bodies * impacts on fish and habitat * impacts on wildlife * air, noise and vibration effects * climate change (especially permafrost) * cumulative impacts (including roads, pipelines, oil and gas, mines, forestry, etc.)	**Risks** * labour shortage * influx of migrant workers * impacts on sacred sites * boom and bust cycle * increased alcoholism * increased domestic abuse * housing shortages and cost increase * some unsettled land claims * community consultation required	**Risks** * capital cost of railway a sunk cost * major capital expenditure * stakeholder interests may take time to resolve
Scenario 4 British Columbia all routes	**Merits** * possible reduction in truck emissions * increased energy efficiency in freight * opportunity to increase climate change adaptation knowledge and experience * reduced ecological footprint compared to (potential) increase in road construction	**Merits** * job creation * increased economic activity * small reduction in cost of goods * faster disaster response (easy to reubuild)	**Merits** * reduced cost of construction materials * direct and induced mining expansion * rail connectivity with lower 48 US States * savings to AK road rebuilding budget * increased Provincial revenues * savings for pipeline construction
	Risks * impacts on Provincial Parks * impacts on Native land * impacts on water bodies * impacts on fish and habitat * impacts on wildlife * air, noise and vibration effects * climate change (especially permafrost) * cumulative impacts (including roads, pipelines, oil and gas, mines, forestry, etc.)	**Risks** * labour shortage * influx of migrant workers * impacts on sacred sites * boom and bust cycle * increased alcoholism * increased domestic abuse * housing shortages and cost increase * many unsettled land claims * community consultation required	**Risks** * capital cost of railway a sunk cost * major capital expenditure * stakeholder interests may take time to resolve
Scenario 5 Whitehorse to Skagway / Haines	**Merits** * possible reduction in truck emissions * increased energy efficiency in freight * opportunity to increase climate change adaptation knowledge and experience * reduced ecological footprint compared to (potential) increase in road construction * potential to use existing rail bed	**Merits** * job creation * increased economic activity * small reduction in cost of goods * faster disaster response (easy to reubuild)	**Merits** * port access for AHGP rail-bound freight * direct and induced mining expansion * rail connectivity with lower 48 US States * savings to AK road rebuilding budget * increased State and Territorial revenues * savings for pipeline construction * reduced cost of construction materials
	Risks * impacts on US National Historic Site * impacts on Native land * impacts on water bodies * impacts on fish and habitat * impacts on wildlife * air, noise and vibration effects * climate change (especially permafrost)	**Risks** * labour shortage * influx of migrant workers * impacts on sacred sites * boom and bust cycle * increased alcoholism * increased domestic abuse * housing shortages and cost increase * many unsettled land claims * community consultation required	**Risks** * capital cost of railway a sunk cost * major capital expenditure * stakeholder interests may take time to resolve

4.0 CONCLUSION

This Strategic Environmental Assessment illuminates the suite of issues related to ACRL development; its purpose is to examine the concept of an ACRL from a strategic level, illustrating the issues, hot spots, data gaps, merits and risks of proceeding. It does not recommend for or against ACRL development but spells out for all of the constituencies affected *what an ACRL would mean* from biophysical, socio-cultural and economic perspectives. The choice of whether to develop the ACRL is one that rests with local, state/provincial and federal governments, and with the human and biophysical constituencies within the region. This SEA informs the debate of 'net societal impact' from the ACRL and provides decision makers with early warning of 'red flags', or barriers to development.