KPMG

Yukon Ports Access Strategy for Yukon Economic Development

KPMG LLP

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Acknowledgements

This report is produced under the cover of KPMG LLP ("KPMG"), but represents the efforts of a number of parties. KPMG would like to acknowledge the input of Collings Johnston Inc, Lauga & Associates Consulting Ltd. and Robert G. Friend Consultants Inc.

Restrictions

In completing this engagement KPMG has relied on information and material provided by the Yukon Government and third parties. KPMG has not audited nor independently verified any of the information contained herein. The financial estimates presented in this report are based on assumptions developed with, and agreed upon by the Yukon Government for the purposes of completing the financial analysis. Estimates and analyses presented in this report are also based on economic trends and market assumptions regarding future events, which are subject to variation and change between now and future dates. Therefore, actual results will vary from the information presented. Even if the planned activities occur as projected in this report, the variations may be material. Accordingly, KPMG expresses no opinion as to whether these projections will be achieved.

This report has been prepared for the Yukon Government to assist in their development of a Port Access Strategy. This report is not to be used for any purpose other than that indicated above without our prior written permission. We will not assume any responsibility or liability for damages or losses incurred by the Yukon Government or any other parties as a result of the circulation, publication, reproduction, use of or reliance on this report.

EXECUTIVE SUMMARY

The Executive Summary has been published separately and covers both the development of the port strategy (Contract A – KPMG) and the discussion of land use, regulatory and environmental considerations associated with the strategy (Contract B – Gartner Lee).

CONTENTS

GLOSSARY OF TERMS AND ACRONYMS

AAC	Annual Allowable Cut
AADT	Annual Average Daily Traffic
ABP	Associated British Ports
ACRLS	Alaska Canada Rail Link Study
AEA	Alaska Energy Authority
AIDEA	Alaska Industrial Development and Export Authority
AMH	Alaska Marine Highway
AVS	Annual Verification Statements
BST	Bituminous Surface Treatment
Capesize	150,000 + Deadweight tonnes cargo ship too large to traverse either the Suez Canal or Panama Canal, including VLCC and ULCC supertankers and bulk carriers transporting coal, ore, and other commodity raw materials.
CIF	Cost Insurance and Freights
CMA	Canada Marine Act
CN	Canadian National Railway
CPA	Canada Port Authorities
COE	US Army Corps of Engineers
DMTS	DeLong Mountain Transportation System
ESAL	Equivalent Standard Axle Load
FBM	Foot Board Measure (12” x 12” x 1” = 1 FBM)
GO	General Obligation
GRC	Gross Revenue Charge
Handymax	Bulk carrier 30,001 - 50,000 DWT, length 150-200 meters

JIT	Just-in-Time logistics and manufacturing
MARAD	US Maritime Administration
NYK	Nippon Yusen Kaisha
OOCL	Orient Overseas Container Line Ltd.
Panamax	Vessel of maximum dimensions that will fit through the locks of the Panama Canal; displacement of approx. 65,000 tons.
PCE	Passenger car Equivalence
PDF	Port Divestiture Fund
PILT	Payment In Lieu of Taxes
SADT	Summer Average Daily Traffic
SAFETEA	Safe, Accountable, Flexible and Efficient Transportation Equity Act
TEU	Twenty-Foot Equivalent Units- Containers
YED	Yukon Economic Development
YTG	Yukon Territorial Government

1. INTRODUCTION

The number and complexity of issues influencing Canadian transportation requirements are as varied – and as quickly changing – as at any time in the recent past. The continued deepening of North-South trade flows, the expanding markets in emerging economies such as China and India, and measurable changes in security requirements at Canadian borders, all point to the complexity of policy requirements necessary to develop an efficient, effective and sustainable transportation infrastructure in Canada.

In northern Canada, the focus for this study, the challenges are even greater. Inadequate surface transportation linkages to the ports, significant distances between ports and inland sources of export products and markets for imported goods, lack of interest/understanding by potential port developers and financial markets, uncertainty about resource and project developments and low population and tax bases all combine to challenge the development of a viable ports access strategy.

1.1 The Purpose of this Report

The Yukon Ports Access Strategy Study (the "Study") has been undertaken in two broad phases: one aimed at understanding potential markets as well as an assessment of the current infrastructure, and the second focused on assessing identified feasible alternatives for infrastructure improvement along a number of dimensions (financial, economic, public interest, governance, etc.).

The objective of this Study is to understand and analyze the link among the following:

- Global demand and supply for products (i.e., trade levels and forecasts).
- The flows of trade through the transportation infrastructure (accounting for modes of transportation, commercial trade corridors and geographical gateways).
- The current and future ability of the identified gateways to respond to trade pressures (including future sustainability).
- The strategic decisions that can be taken by various stakeholders in response to the opportunities.

1.2 Methodology

The methodology employed in the development of the Ports Strategy entailed:

- Developing potential scenarios for economic development (and associated port traffic).
- Assessing the current capacity and future capability of port and associated infrastructure.
- Identifying potential elements of a practical ports strategy.

- Assessing the elements of the ports strategy in terms of financial feasibility, socio-economic considerations, governance and implementation.

1.2.1 Scenarios for Economic Development

Due to the high degree of uncertainty associated with future events and economic development opportunities, this study finds its roots in a high level description of the economic potential of the Yukon. The resulting analysis relies on a framework of assumption-based scenarios which outline what can happen, rather than what will happen. The interrelated assumptions in each scenario capture the different levels of future economic development that could occur in the Yukon. Each economic development scenario corresponds to a particular outlook on the demand and supply of commodities in the Yukon. Due to the fact that minerals will likely make up the main part of commodity movements, the perspectives are similar to Gartner Lee's recently developed mineral scenario forecasts for the Alaska Canada Rail Link Study. Although the specifics of these scenarios are uncertain at this point, the perspectives roughly correspond to a certain volume and can somewhat be ascribed to a timeframe. Exhibit 1-1 illustrates this conceptual framework.

Exhibit 1-1
Conceptual Framework for Economic Development

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Commodity Potential Perspective	Pessimistic	Conservative	Optimistic	Optimistic + Crest Iron Ore Development
Potential Commodity Volume	Low	Medium	High	Very High
Indicative Timeframe	Short-term (0-5 years)	Medium-term (5-10 years)	Long-term (10+ years)	Long-term (10+ years)

This conceptual framework allows for an analysis of the potential traffic impact on the options for port development. This Study does not include traditional traffic forecasts due to the high level of uncertainty about mineral development and the timing/feasibility of the proposed major projects in the Yukon (e.g., Alaska Highway Gas Pipeline).

1.2.2 Infrastructure Assessment

The assessment of the current infrastructure and its future potential entailed:

- Site visits and discussions with users, owners and operators of existing infrastructure.
- Identification of capacity and potential uses through an examination of infrastructure condition, current and historical levels of traffic and identification of potential constraints or opportunities for infrastructure development.
- A high level screening analysis of port development options on basis of capital costs, operating costs, environmental/community considerations, capacity and consistency with local/regional plans.

The result of this process was a short list of options for further consideration as to inclusion in the ports strategy.

1.2.3 Elements of a Port Strategy

Each of the conceptual options was examined in more detail in terms of the potential capital costs, operating costs and revenues. This information was used to develop a financial model to test the financial feasibility of implementation.

This assessment also looked at a number of other factors including:

- Trigger points for infrastructure development (e.g., traffic volumes)
- Socio-community considerations (e.g., traffic)
- Environmental, regulatory and land use considerations (based largely on the work of Gartner Lee on Contract B).

1.2.4 Implementation Plan

The implementation plan is based on an assessment of the actions required to remove barriers and take advantage of enablers for the successful implementation of the ports strategy. While the implementation plan is time-based in the short term, many of the actions required for future infrastructure development are trigger-based (i.e., based on the occurrence of certain events such as the opening of a particular mine or the construction of a pipeline).

The implementation plan identifies the major tasks for implementation and the decisions that need to be made by key stakeholders.

1.3 Outline of the Report

This report is structured as follows:

- **Chapter 2** outlines the Yukon's economic background with a focus on the economic potential and corresponding traffic volumes for mineral products, forest products, project resources, re-supply of the region and tourism.
- **Chapter 3** frames the current state of surface and water infrastructure in Alaska and Yukon associated with the ports.
- **Chapter 4** examines the potential for future infrastructure development.
- **Chapter 5** presents the high level analysis of each of the port/infrastructure options.
- The preferred options are described in greater detail in **Chapter 6** in terms of the development concept, infrastructure elements, phasing and critical success factors.
- **Chapter 7** contains a summary of the potential economic and socio-community impacts of port development.
- **Chapter 8** presents the financial analysis of the options, including an assessment of options to include financial viability and key financial risks.
- **Chapter 9** examines options for port governance and presents a potential model for implementation of the port strategy.
- **Chapter 10** presents the implementation plan.

2. YUKON ECONOMIC BACKGROUND

In order to create a fitting strategy for development/expansion of the ports that provide access to the Yukon, it is necessary to understand the economic potential of the Yukon and the corresponding traffic flows in and out of the Yukon. This chapter provides a discussion of the types, quantities and direction (inbound / outbound) of potential Yukon port traffic.

The following commodities are considered in these economic potential projections:

1. Mineral concentrates:
    a. *Coal*
    b. *Iron ore*
    c. *Copper*
    d. *Lead*
    e. *Zinc*
    f. *Molybdenum*
    g. *Gold*
    h. *Tungsten*
    i. *Silver*
2. Forest products
3. Project commodities
4. Re-supply commodities
5. Agriculture / aquaculture
6. Tourism

Most commodity projections pertain to Yukon originated or destined traffic. Projections for foreign province/state commodities and traffic are only considered if these can potentially impede or facilitate future port access to the Yukon.

Due to uncertainties about the future development of mineral resources, forest resources and major projects such as the planned pipelines, this study uses a scenario-based approach to assess future demand. This is consistent with the approach that has been taken in much of the background work for the Alaska Canada Rail Link Study.

2.1 Minerals

The complex and varied geological terrain underlying the Yukon is host to a number of past-producing mines of gold, copper, lead, zinc, tungsten, silver and cadmium[1]. Showings of various minerals, including coal, barite, iron ore, molybdenum, nickel and platinum group elements, attest to the untapped mineral richness of the territory. Some of the world's largest known, undeveloped lead-zinc, tungsten and sulphide deposits can be found in districts of the Yukon. Recent developments and refinements to mineral deposit models have created a new perspective for mineral deposit exploration in the Yukon.

The deposits that are most likely to go into production ("priority deposits") in pessimistic, conservative and optimistic scenarios, are described in the following paragraphs, ordered by mineral concentrate type. For each deposit that is likely to go into production, the volume, location and traffic specifications are indicated.

All data presented in this section relies on information and analyses conducted by Gartner Lee for the Alaska Canada Rail Link Project. Shippable volume represents the probability weighted potential shipment from a particular mineral deposit. This may be less than the volume available to ship due to the analytical methodology employed by Gartner Lee[2].

2.1.1 Iron Ore

Iron ore represents the most significant commodity for potential outbound traffic in the Yukon.

The **Crest** deposit in the north-eastern Yukon is owned by Chevron Resources Canada[5] and contains at least 3 billion tonnes of mineable resources. Approximately 1.2 billion tonnes of that are considered shippable, spread over a project life of more than 30 years, with an annual average shipment of approximately 23 million tonnes[3] iron ore, as illustrated in Exhibit 2-1. The site is located between the Wernecke and Mackenzie Mountain ranges on the Yukon / Northwest Territories border. Despite its remote location, the site is considered feasible for exploitation, due to the strategic global importance of the deposit. No access to the site currently exists.

This development is so significant in terms of volume that if it proves to be viable, it could trigger the development of other significant mineral resources, particularly coal in nearby areas.

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[1] Yukon Government, *Discover Yukon's Mineral Wealth*, August 2005
[2] Gartner Lee Ltd, WPA2a – *Outbound Traffic Data Development for Mineral Resources – Overview of Assessment Methodology*, 27 January 2006.
[3] Gartner Lee Ltd, Forest Pearson, *Memorandum on Yukon Priority Deposit Potentially Shippable Commodity Inventory - DRAFT*, 23 December 2005

Exhibit 2-1
Iron Ore Deposits in Yukon Territory

Property Name	Commodity	Total Reported In-ground Resource (tonnes)	Mineable Resources, if known or reported (tonnes)	Total Shippable Commodity (tonnes)	Projected Project Life
Crest	**Iron Ore**	**3,175,147,000**	**3,016,389,650**	**1,219,500,000**	**>30**

2.1.2 Coal

There are many coal deposits in the Yukon, with project lives between 8 and 22 years. Exhibit 2-2 presents a summary of these properties.[4]

Exhibit 2-2
Coal Deposits in Yukon Territory

Property Name		Commodity	Total reported In-ground Resource (tonnes)	Mineable Resources, if known or reported (tonnes)	Total Shippable Commodity (tonnes)	Projected Project Life
Bonnet Plume Coal Field	**Illtyd Creek**	**Coal**	**194,325,447**	**11,904,762**	**10,119,048**	**12**
	Spaceship	Coal	157,950,000	23,692,500	20,138,625	14
	Pole	Coal	133,580,000	20,037,000	17,031,450	14
	Deslaurier	Coal	104,630,000	15,694,500	13,340,325	13
	Marathon	Coal	18,400,000	2,760,000	2,346,000	8
	Pan Ocean	Coal	47,560,000	7,134,000	6,063,900	11
	Garlic Ring	Coal	14,150,000	2,122,500	1,804,125	8
Rock River Coal - Sulpetro		Sub-bituminous to Lignite Coal	67,000,000	56,000,000	33,600,000	18
Division Mt.		**Bituminous B Coal**	**51,595,000**	**45,826,000**	**27,500,000**	**22**

Of these 9 coal deposits, only 2 sites are projected to be viable within the foreseeable future. The following sections describe these potential mines in more detail. Given the remote location of the

[4] Gartner Lee, Table 2C, 2E, BC & Yukon Mineral Resource Shippable Commodity Summary.

other sites and the historical / cultural value of the areas they are in, the other 7 Yukon coal deposits are not considered feasible for development.

Aggregate coal shipped from the two feasible deposits would be around 2 million tonnes per annum if both these mines are in production simultaneously. Although potentially unrealistic, this assumption helps create a picture of the magnitude of potential shipments of this mineral out of the Yukon.

Illtyd Creek

Development of the Illtyd Creek deposit at the Bonnet Plume Coal Field is considered feasible in light of power requirements if the Crest property (iron ore) is developed in the future. The site is currently owned by Anderson Mining Company Limited[5]. Total shippable commodity in this deposit is just over 10 million tonnes. With a discounted average annual shipment of approximately 337,000 tonnes in an optimistic scenario, this mine is estimated to have a life-span of about 12 years. The location of this deposit is very remote: above the Wernecke Mountain range in the north-eastern Yukon, approximately 200 kilometers north to north-east of Mayo[5]. No access roads or ports currently exist for this property.

Division Mountain

Division Mountain has development potential in recognition of the deposit's global significance. The deposit is owned by Cash Minerals[5] and contains more than 51 million tonnes of bituminous B coal, at least half of which is considered shippable. At approximately 917,000 tonnes per year in a conservative or optimistic scenario, the site will have a project life of about 22 years. The deposit is located in the south-western Yukon, directly adjacent to the principal highway between Whitehorse and Carmacks, approximately 85 kilometers[5] south of Carmacks. If the Alaska-Canada rail project goes ahead, it will be accessible by the proposed rail link.

2.1.3 Base Metals

Base metals represent another portion of the potentially shippable mineral commodities in the Yukon. The most important ones are lead, zinc, silver and copper. Project lives range from 4 to 25 years. Exhibit 2-3 provides a summary.[6]

[5] Yukon Geological Survey, *Yukon Mineral Deposits 2005*, Whitehorse, 2005

[6] Gartner Lee, Table 2C, 2E, BC & Yukon Mineral Resource Shippable Commodity Summary.

Exhibit 2-3
Base Metal Deposits in Yukon Territory

Property Name		Commodity	Total reported In-ground Resource (tonnes)	Mineable Resources, if known or reported (tonnes)	Likely Shippable Commodity	
					Total Shippable Commodity (tonnes)	Project Life
Howard's Pass		**Lead, Zinc**	**491,500,000**	**115,500,000**	**14,009,249**	**21**
Faro Camp	**Grizzly / Dy**	**Lead, Zinc**	**17,240,000**	**14,860,000**	**2,330,889**	**11.5**
	Grum	**Lead, Zinc**	**18,649,000**	**19,630,000**	**1,837,500**	**5**
	Swim	**Lead, Zinc**	**4,300,000**	**4,300,000**	**490,773**	**9**
Finlayson Lake District	**Wolverine**	**Polymetallic**	**4,989,000**	**6,400,000**	**1,400,000**	**12**
	Kudz Ze Kayah	**Polymetallic**	**11,300,000**	**9,400,000**	**1,492,650**	**9**
	Fyre (Kona)	**Polymetallic**	**8,200,000**	**8,200,000**	**711,600**	**4**
	Ice	Copper	4,561,863	3,400,000	152,740	8
Tom & Jason		**Lead, Zinc**	**19,835,900**	**18,366,627**	**3,289,635**	**14**
Dawson Range	Casino	Copper, Gold, Molybdenum	964,000,000	178,200,000	2,421,004	25
	Cash	Copper, Molybdenum	36,290,000	34,475,500	201,772	16
	Minto	**Copper**	**8,340,000**	**7,500,000**	**322,800**	**12**

These minerals have been located in several polymetalic deposits in the Yukon. The deposits indicated in bold font in Exhibit 2-3 are the ones considered most likely to go into production in the foreseeable future. These potential mines are further described in the following sections.

Howard's Pass

Howard's Pass is a lead, zinc and silver deposit, currently owned by Placer Dome. It is considered feasible for mining due to its global significance. Combined in-ground quantity is over 490 million tonnes, of which 14 million tonnes is shippable. With a projected life-span of 21 years, this mine will generate approximately 467,000 tonnes on average per year in all scenarios (pessimistic, optimistic and conservative). The site is located about 175 kilometers[5] east to north-east of Ross River on the border of the Yukon and the Northwest Territories. No access roads exist.

Tom and Jason

Tom and Jason are both lead, zinc and silver deposits. Tom is currently owned by Hudson Bay Exploration and Development Company Limited; Jason is owned by Mac Pass Resources Limited. According to Yukon Energy & Mines officials, both deposits are considered feasible for mining,

however, the socio-environmental values and remoteness associated with the locations continue to pose question marks at this stage. For the purpose of this study, it is assumed that exploration of this mine will only go ahead in an optimistic scenario

Combined in-ground quantity of the Tom and Jason deposits is almost 20 million tonnes, of which 3.3 million tonnes is shippable. With a projected life-span of 14 years, this mine will generate approximately 235,000 tonnes on average per year. The sites are in close proximity to one another, located about 170 kilometers north-east of Ross River on the border of the Yukon and the Northwest Territories. The sites are adjacent to the North Canol Road.

Grizzly (Dy)

Grizzly, or Dy, is a deposit containing lead, zinc, silver and gold. It has been appointed by the court to Deloitte & Touche as the interim receiver. It holds almost 17.3 million tonnes of in-ground minerals, generating 2.3 million tonnes of total shippable future resources. Over a project life of 11.5 years, the discounted average annual amount of shippable minerals is estimated at 78,000 tonnes in an optimistic scenario. The site is located approximately 10 kilometers[5] north-east of Faro, close to the Campbell Highway.

Grum

Grum is a deposit containing lead, zinc, silver and gold. It has been appointed by the court to Deloitte & Touche as the interim receiver. It holds almost 18.7 million tonnes of in-ground minerals, generating 1.8 million tonnes of total shippable future resources. Over a project life of 5 years, the discounted average annual amount of shippable minerals is estimated at 367,500 tonnes in an optimistic scenario. The site is located approximately 9 kilometers[5] north-east of Faro, close to the Campbell Highway.

Swim

Swim is a deposit containing lead, zinc, and silver. It has been appointed by the court to Deloitte & Touche as the interim receiver. It holds 4.3 million tonnes of in-ground minerals, generating almost half a million tonnes of total shippable future resources. Over a project life of 9 years, the discounted average annual amount of shippable minerals is estimated at 53,000 tonnes in an optimistic scenario. The site is located approximately 17 kilometers[5] east of Faro, close to the Campbell Highway.

Kudz Ze Kayah

Kudz Ze Kayah is a lead, zinc, copper and gold deposit, currently owned by Teck Cominco Limited. It is considered feasible for mining given its current status permissions. Combined in-ground quantity is 11.3 million tonnes, of which almost 1.5 million tonnes is considered shippable. With a projected life-span of 9 years, this mine is estimated to generate approximately 50,000 tonnes on average per year in a conservative or optimistic scenario. The site is located about 110 kilometers[5] south-east of Ross River in the Finlayson Lake District. Although no access roads exist, it is close to the Campbell Highway.

Wolverine

Wolverine is a volcanic sediment site containing lead, zinc, copper, silver and gold. It is currently owned by Yukon Zinc Corporation and contains 4.9 million tonnes of in-ground minerals. It is estimated that 1.4 million tonnes of total shippable resources can be mined from this deposit in the future. Over a project life of 12 years, this results in 47,000 tonnes average annual shippable commodity in a conservative or optimistic scenario. The site is located in the Finlayson Lake District, approximately 135 kilometers[5] south-east of Ross River. Although no access roads exist, it is close to the Campbell Highway.

Fyre (Kona)

Fyre, or Kona, is a copper, gold and cobalt deposit, currently owned by Pacific Ridge Exploration Limited. It is considered feasible for mining assuming neighbor mine development in the Finlayson Lake District. Combined in-ground quantity is 8.2 million tonnes, of which only about 712,000 tonnes is considered shippable. With a projected life-span of 4 years, this mine is estimated to generate approximately 24,000 tonnes on average per year in a conservative or optimistic scenario. The site is located approximately 130 kilometers[5] south-east of Ross River in the Finlayson Lake District. Although no access roads exist, it is close to the Campbell Highway. Although route selection has not yet been completed, if the Alaska-Canada railway project proceeds, this deposit will be in close proximity to rail access.

Minto

Minto is a copper, silver and gold deposit. It is currently owned by Sherwood Copper Corporation and contains 8.3 million tonnes of in-ground minerals, generating approximately 320,000 tonnes of total shippable resources for future shipment. Over a planned project life of 12 years, this results in a discounted 11,000 tonnes of annual shippable commodity on average in an optimistic scenario. The site is located approximately 75 kilometers[5] north-west of Carmacks near the Klondike

Highway. Sherwood Copper has proposed development of this mine within the next year and the first shipment of concentrate from this mine is expected by the middle of 2007.

2.1.4 Other Minerals

Other minerals, including tungsten, molybdenum, barite, nickel, uranium, selenium and asbestos account for only a very small portion of potential future shippable minerals. One molybdenum deposit and two tungsten deposits are likely to go into production in the near future. These are described below. Project lives range from 4 to 21 years. Exhibit 2-4 presents a summary.[7]

The deposits indicated in bold font in Exhibit 2-4, are the most significant and most likely to go into production in the foreseeable future. These potential mines are further described in the following sections.

Aggregate shipments from these potential mines would be around 16,000 tonnes per annum if they are all in production at the same time. Although unrealistic, this assumption helps create a picture of the magnitude of potential shipments of these minerals out of the Yukon.

Exhibit 2-4
Other Mineral Deposits in Yukon Territory

Property Name	Commodity	Total Reported In-ground Resource (tonnes)	Mineable Resources, if known or reported (tonnes)	Likely Shippable Commodity	
				Total Shippable Commodity (tonnes)	Project Life
Wellgreen	Ni-Cu	46,700,000	36,500,000	500,000	10
Logtung	Tungsten, Mo	162,000,000	162,000,000	293,700	30
Red Mountain	Molybdenum	187,270,000	46,000,000	102,098	17
Mactung	Tungsten	13,699,000	12,985,550	140,986	30

Logtung

Logtung is a tungsten and molybdenum deposit, currently owned by Strategic Metals Limited. It contains approximately 162 million tonnes of in-ground minerals, generating almost 294,000 tonnes of total shippable resources. Over a planned project life of 30 years, this results in almost 10,000 tonnes of annual shippable commodity on average in an optimistic scenario. The site is

[7] Gartner Lee, Table 2C, 2E, BC & Yukon Mineral Resource Shippable Commodity Summary.

located approximately 65 kilometers[5] south-east of Teslin, on the Yukon, British Columbia border, in proximity of the Alaska Highway.

Red Mountain

Red Mountain is a molybdenum deposit, currently owned by Tintina Mines Limited. It contains more than 187 million tonnes of in-ground minerals, generating approximately 102,000 tonnes of total shippable resources. Over a planned project life of 17 years, this results in a discounted 3,000 tonnes of annual shippable commodity in an optimistic scenario. The site is located approximately 75 kilometers[5] north-east of Whitehorse.

Mactung

Mactung is a tungsten deposit, currently owned by North American Tungsten Corporation Limited. It contains approximately 13.7 million tonnes of in-ground minerals, generating almost 141,000 tonnes of total shippable resources. Over a planned project life of 30 years, the discounted amount of annual shippable resources has been estimated at 5,000 tonnes on average in an optimistic scenario. The site is located approximately 187 kilometers[5] north-east of Ross River on the Yukon, Northwest Territory border, in proximity of the Upper Canol Highway.

2.1.5 Summary of Shippable Volumes of Yukon Minerals

Aggregate future potential shipments from the mineral deposits as described in the previous sections is estimated at a total of about 1.3 billion tonnes. Exhibit 2-5 presents an overview of all potential mineral deposits and the corresponding total and annual shipments expected. “O” indicates the mine might be developed in an optimistic scenario only, “C” stands for development under conservative circumstances and “P” indicates the mine will likely be developed even under pessimistic circumstances.

Exhibit 2-5
Summary of Shippable Volumes of Minerals

Commodity	Property Name	Likely Shippable Commodity (in tonnes)			
		Project Life	Scenario	Total Shippable Commodity	Annual Shipment [8]
Iron	Crest	30+	O	1,219,500,000	23,076,923
Coal	Illtyd Creek	12	O	10,119,048	337,000
	Division Mt.	22	C,O	27,500,000	917,000
Base Metals	Howard's Pass	21	P, C, O	14,009,249	467,000
	Grizzly / Dy	11.5	O	2,330,889	78,000
	Grum	5	O	1,837,500	367,500
	Swim	9	O	491,000	53,000
	Tom & Jason	14	O	3,289,635	234,974
	Wolverine	12	C, O	1,400,000	47,000
	Kudz Ze Kayah	9	C, O	1,492,650	50,000
	Fyre (Kona)	4	C, O	711,600	24,000
	Minto	12	P, C, O	322,800	11,000
Other Minerals	Logtung	30	O	293,700	10,000
	Red Mountain	17	O	102,098	3,000
	Mactung	30	O	140,986	5,000
ALL MINERALS	**TOTAL**	**-**	**-**	**1,283,541,155**	**25,681,397**

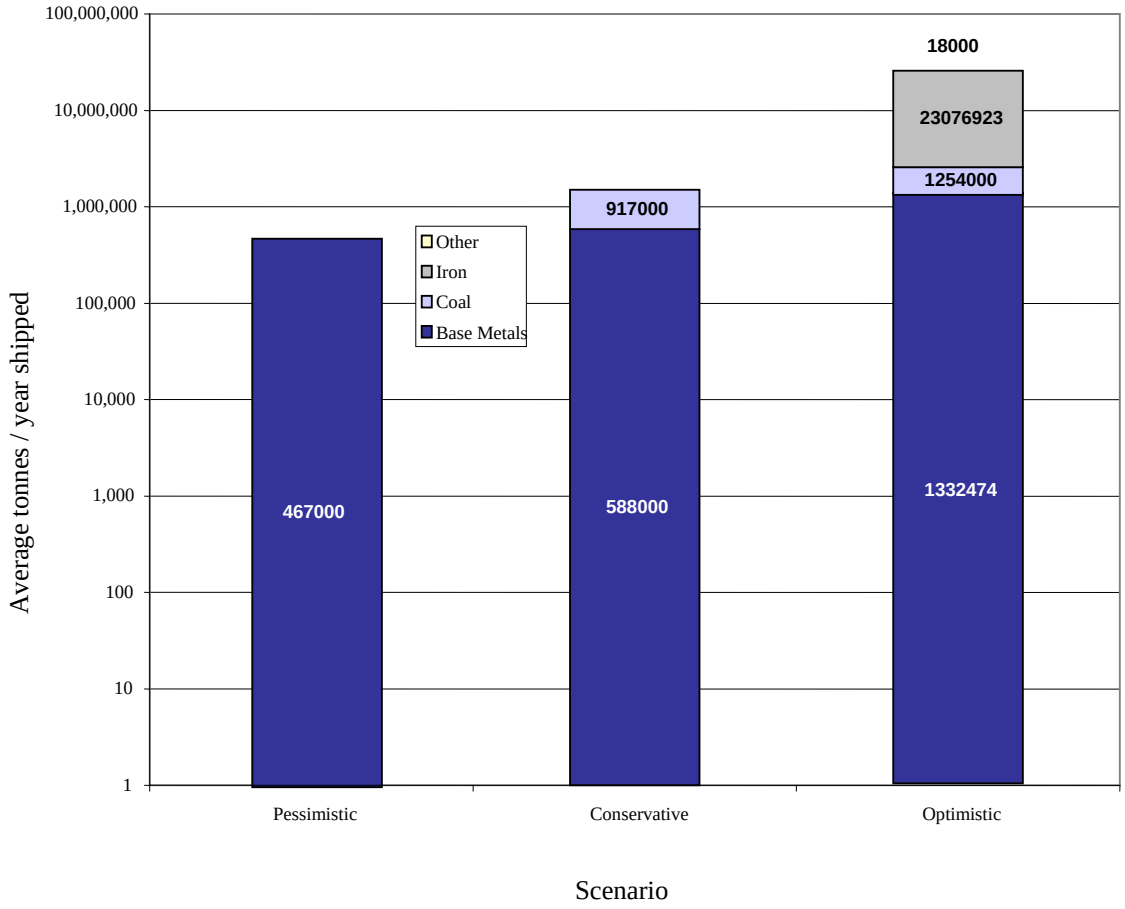
"O" indicates the mine might be developed in an optimistic scenario only,
"C" stands for development under conservative circumstances, and
"P" indicates the mine will likely be developed even under pessimistic circumstances.

2.2 Transportation Impact of Yukon Minerals

These totals lead to the following volumes of shippable mineral commodities for the pessimistic, conservative and optimistic scenarios. Exhibit 2-6 indicates the average annual expected volume of shippable mineral commodities over a 30 year period, as determined by Gartner Lee for each of the mineral development scenarios.

[8] Annual shipment numbers have been discounted by varying factors to account for undisclosed reasons by Gartner Lee (Table 4-4 BC & Yukon Mineral Resource Shippable Commodity Summary.)

Exhibit 2-6
Annual Average Shippable Volumes



2.3 Forest Products

The commercial forests of the Yukon are predominantly situated in the south-eastern areas of the territory, in proximity of the Watson Lake community[9]. Although there is support for a viable forest industry in the Yukon, these forest areas remain relatively undeveloped due to a number of challenges.

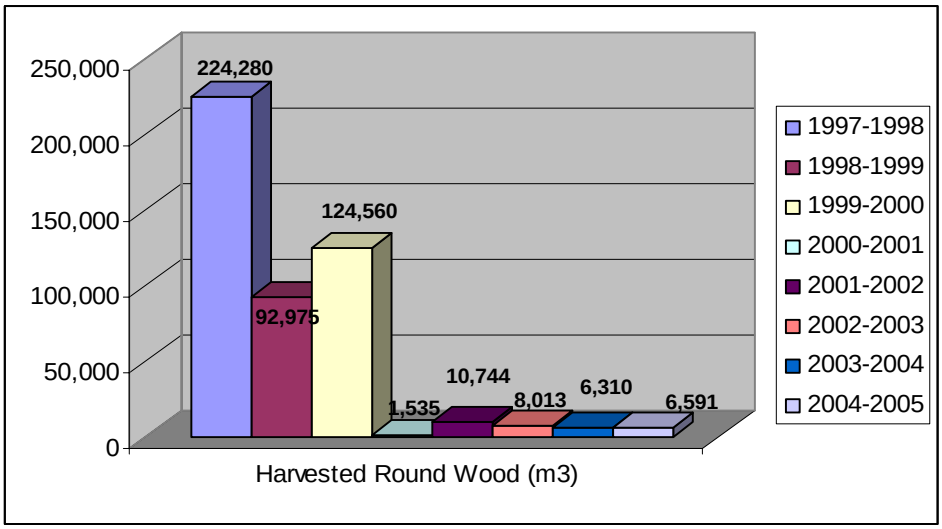
The total annual volume of forest products that could be transported in the Yukon in the future depends on the territory's ability to overcome these challenges. Sound economic and policy instruments must be put in place to encourage and sustain investment and build a successful forest industry.

[9] PricewaterhouseCoopers, *Economic Assessment of Forest Industry in Southeast Yukon*, August 2005

2.3.1 Current Harvest Volumes

In recent years, forest harvesting activities have decreased significantly in the Yukon. As can be seen in the table in Exhibit 2-7, only about 6,500 m3 of timber was produced in the 2004–2005 financial year. Most of the current harvest is from the Watson Lake area and is transported by truck.

Exhibit 2-7
Historical Yukon Timber Harvest[10] - Cubic Metres



The sharp drop in harvest in 2000-2001 can be attributed to low lumber prices and a soft timber market. Nationally, the Canadian wood products market has been dramatically affected by the softwood lumber dispute. This led to very little of the Yukon's wood supply being harvested[11].

2.3.2 Challenges to Future Development

One of the main challenges is the ongoing debate over the amount of timber that can be harvested annually without jeopardizing the current and future forest industry in the Yukon. Furthermore, the remote location of the Yukon forests poses transport and labour availability challenges. In addition, a recent study by PricewaterhouseCoopers[9] showed that the breakeven point for lumber under current working environment and cost structures is at least 40 percent higher in the Yukon than in the rest of Canada[12]. As excess transportation costs only account for 10 percent of this total

[10] Source: Government of the Yukon, department of Energy Mines & Resources, 2006
[11] Yukon Finance, Yukon Economic Outlook 2001, Whitehorse, February 2001
[12] Yukon: $544 fbm/m3 compared to average rest of Canada: ($390 BC + $376 Alberta + $419 Prairies + $383 Eastern Canada) / 4 = $392 fbm/m3 (Information from: PricewaterhouseCoopers, *Economic Assessment of Forest Industry in Southeast Yukon,* August 2005)

40 percent, improved access to the area alone will not resolve this financial disadvantage. Many other aspects, including the high costs of energy and manufacturing, and labour shortages must be addressed to create a successful forest industry in the Yukon Territories.

An analysis of cost differentials between the Yukon and BC is presented in Exhibits 2-8 and 2-9. These exhibits demonstrates clearly that the largest differentials occur in manufacturing costs (more than double in the Yukon) and transportation costs (about 30 percent more in the Yukon). When combined, the cost of fibre and the costs of manufacturing and transportation are more than 35 percent higher in the Yukon than in British Columbia.

Exhibit 2-8
Quantitative Analysis of Cost Differentials – Fibre Costs

Cost Element	Southeast Yukon	British Columbia
Logging and Roadside	24	17
Loading	1.5	1.5
Hauling	10	9.5
Roads	4	4
Silviculture and Reforestation	8	3.5
Stumpage	4	16
Overhead and Other	7	5
Total Delivered Fibre ($/m^3)	58.5	56.5
[13]Total Delivered Fibre ($/Mfbm)	**229**	**222**

Exhibit 2-9
Quantitative Analysis of Cost Differentials – Manufacturing, Transportation and Total Costs

Cost Element	Southeast Yukon	British Columbia
Labor & Benefits	90	55
Energy	30	11
Other Direct Manufacturing Costs	105	40
Total Direct Manufacturing ($/Mfbm)	**225**	**106**
Transportation Costs ($/ Mfbm)	**90**	**62**
BREAKEVEN POINT ($/ Mfbm)	**544**	**390**

[13] Total delivered fiber is converted from 4/m3 to $/Mfbm using an average prairies lumber recover factor of 255. This provides a better understanding of the entire cost structure.

2.3.3 Potential Harvest Volumes

According to the Yukon Conservation Society, the maximum annual allowable cut (AAC) in the Yukon[14] is approximately 350,000 m3 – 400,000 m3. It is however not likely that this amount will be realized in the near future. The following assumptions have been made:

- For the purpose of this estimation, we will assume that the timber industry will produce 10 percent more per year over the next 5 years (short-term scenario) as it has during the recent past. This volume will be exported from the Yukon as logs.

- During the medium-term scenario (5-10 years) the Yukon's forestry production is assumed to be 128,000 m3 per annum, based on increased demand from China, a resolving of environmental hurdles and a reduction in manufacturing and transportation costs. This amount reflects the annual allowable cut ("AAC") that was preliminarily determined for the southeast Yukon recently[15]. This volume will be converted to lumber at a sawmill that is likely to be located near Watson Lake.

- In the long-run (10+ years), the timber harvest in the southeast Yukon is assumed to double that of the medium term to 256,000 m3 per annum. Again, increased demand from China and more favorable conditions in the Yukon will be responsible for this; as well as a potential decline in BC forest activity due to environmental factors. Add to this the AAC of 25,000 m3 per annum in the Teslin area, for a total long-term round wood projection of 281,000 m3 per annum. The expected timber harvest is not expected to increase further in the longer term.

- These volumes of round wood can be converted into board feet of processed timber using the following conversion rate:

  1 cubic meter (m3) round wood = 270 board feet (fbm) of timber = 0.215 tonnes

Exhibit 2-10 presents the projected amounts of harvested round wood and processed timber from the Yukon territories in the short, medium and long-term.

[14] Yukon Conservation Society, *YCS Forestry Goals*, www.yukonconservation.org/library/pdf/forestry.pdf
[15] PricewaterhouseCoopers, *Economic Assessment of Forest Industry in Southeast Yukon*, August 2005

Exhibit 2-10
Timber Projections Short, Medium and Long-Term[16]

	Year	Harvested Round Wood (m3)	Processed Timber (fbm)
Short-Term	2006	7,250	0
	2007	7,975	0
	2008	8,770	0
	2009	9,650	0
	2010	10,615	0
Medium-Term	2011	128,000	34,560,000
	2012	128,000	34,560,000
	2013	128,000	34,560,000
	2014	128,000	34,560,000
	2015	128,000	34,560,000
Long-Term	2016+	281,000	75,870,000

2.3.4 Transportation Impact of Future Harvest

Exhibit 2-10 shows that the projected total for board feet of timber to the Yukon will be 0 (zero) in the short run. This is because it is not financially viable to bring a sawmill into production for the small amounts of harvested round wood in the short-term.

In the medium-term, harvested round wood could rise to 128,000 m3 per year, generating approximately 34.6 million fbm. This translates into about 28,000 tonnes, which can be shipped via 350 rail carloads, or 700 truckloads.

In the long-term, harvested round wood will be 281,000 m3 per annum, generating about 75.9 million fbm, or 61,000 tonnes of lumber. This could be shipped via 760 railcars or 1520 truckloads.

In an extreme case it is imaginable that the ports of Skagway and Haines might be used, however, it is most likely that these volumes will travel south down the Alaska Highway to Fort Nelson for delivery within North America. The volumes of trucks or rail cars required to move this lumber is relatively small, and hence is expected to have minimal impact on the economics of any infrastructure decisions.

[16] Source: Government of the Yukon, department of Energy Mines & Resources, 2006

2.4 Project Commodities

Freight traffic associated with large resource and infrastructure projects in the Yukon will be largely inbound. The following projects should be considered in estimating the inbound freight volumes:

- Mackenzie Gas Pipeline (Alberta)
- Alaska Highway Natural Gas Pipeline
- Alaska-Canada Rail Link Project
- Mining Development Projects

These projects will cause a large amount of construction materials (machinery and equipment, fuel, tractor services, timber, iron, pipes, steel and camp buildings, consumables, parts and supplies) to be transported into and throughout the Yukon. The following sections provide an overview of the projected commodity volumes.

2.4.1 Mackenzie Gas Pipeline

Freight volumes associated with the construction of the Mackenzie Gas Pipeline in Alberta have been estimated by QGI Consulting and Gartner Lee for the Alaska Canada Rail Link Study.

The major pipeline materials will need to be transported into Alberta; in Alberta they will move between the NGTL Interconnect Facility in the south and Niglintgak in the north. The BC ports of Stewart and Prince Rupert and the Alaskan ports Skagway and Haines could be involved in the logistics of the gas pipeline development, mainly for the pipes that will be used. Railway and highway infrastructure in the Yukon will also be used for carrying supplies to this project. The following volumes are estimated to be required throughout the implementation of this project.

This report does not attempt to forecast the timing of the construction of this pipeline, rather it indicates the potential volume of products to be shipped during the construction period, when it happens. It is also not clear if all of the volume shown in Exhibit 2-11 will actually move through Alaskan ports.

Exhibit 2-11
MGP Inbound Commodity Volumes – in tonnes[17]

Commodity	Year 1	Year 2	Total In
Pipe	240,780	189,700	430,480
Fuel	65,680	126,140	191,820
Equipment[18]	61,100	16,000	77,100
Total Volume	**367,560**	**331,840**	**699,400**

2.4.2 Alaska Highway Natural Gas Pipeline

Freight volumes associated with the construction of the Alaska Highway Natural Gas Pipeline have been estimated by QGI Consulting and Gartner Lee for the Alaska Canada Rail Link Study. Total tonnage of approximately 1.1 million tonnes is expected to be shipped into the territory over a period of 2 years for this project. The timing of the construction of the pipeline is dependent on energy prices, financing and the environmental approval processes. This report does not attempt to forecast the timing of the construction of this pipeline, rather it indicates the potential volume of products to be shipped during the construction period, when it happens.

This amount includes pipes, equipment and fuel. Equipment of approximately 48,000 tonnes will have to be shipped out of the territory again upon completion of the project.

[17] Gartner Lee, Mackenzie pipeline data, 2006
[18] The 77,100 tonnes of equipment needed for this pipeline development will be shipped out of the territory after completion of the project

Exhibit 2-12
Alaska Highway Gas Pipeline - Inbound Commodity Volume (tonnes)[19]

Required Delivery By:	Winter 1	Winter 1	Total	Summer 1	Summer 1	Total	Winter 2	Summer 2	Project - Total
To: Spread	AW 1	BW 1	Winter 1	AS 1	BS 1	Summer 1	AW 2	BS 2	
Km. Post Location	KP0-109	KP555-687		KP226-375	KP375-555		KP109-226	KP687-832	
Camp	Koidern	Morley R.		Canyon Cr.	Marsh L.		Burwash	Rancharia	
Facility		CS No. 3		& K.Lk. X'ing	CS No. 2		CS No. 1		
Facility Location		KP 651			KP 455		KP 213		
Destination Volumes									
LINE PIPE (1)	118,772	143,113	261,885	170,888	196,359	367,247	119,098	156,805	**905,035**
EQUIPMENT									
Pipeline Constr.	18,800	18,800	37,600	Repositioned	Repos.		Repos.	Repos.	
CS/Facility Constr.		3,500	3,500		3,500	3,500	3,500		
Total	18,800	22,300	41,100		3,500	3,500	3,500		**48,100**
FUEL									
P/L Construction	11,200	11,200	22,400	11,500	9,500	21,000	11,200	9,500	
CS/MS Constr.		1,700	1,700		1,700	1,700	1,700		
Camp Fuel	6,900	6,900	13,800	8,400	6,400	14,800	6,900	6,400	
Total	18,100	19,800	37,900	19,900	17,600	37,500	19,800	15,900	**111,100**
TOTALS	**155,672**	**185,213**	**340,885**	**190,788**	**217,459**	**408,247**	**142,398**	**172,705**	**1,064,235**

[19] Gartner Lee, Alaska Highway Natural Gas Pipeline Traffic Flows, Yukon Segment

2.4.3 Mineral Resource Development Projects

According to Gartner Lee data, freight volumes associated with the construction and operation of mining activities in the Yukon can be divided into two categories:

1. Mine construction
2. Mine operation

Mine Construction Freight Volumes

The analytical model used by Gartner Lee indicates that a total of 1.594 million tonnes of construction freight will be moved to and from the Yukon if all priority mineral deposits (1,292 shippable tonnes of resources) in BC and the Yukon go into production. This translates to 0.00123 tonnes of construction freight per 1 tonne of shippable mineral resources. Apart from the equipment, most of this traffic will be inbound into the Yukon.

The following breakdown of materials can be expected as illustrated in Exhibit 2-13.

Exhibit 2-13
Mine Construction Freight Volume Composition[20]

Commodity	Allocation
Fuel	23%
Pit & Surface Equipment	23%
Cement	18%
Civil/Mechanical Equipment and Supplies	12%
Structural Steel	12%
Tankage	6%
Camp/Office	4%
Cladding	2%

Mine Operation Freight Volumes

Mine operation support freight will include diesel fuel, crusher liners, mill liners, grinding balls, lime, fluxes, lubricants, mill and lab supplies, food and other consumables. Diesel fuel will take up more than half of the freight.

[20] Gartner Lee, Alaska Highway Natural Gas Pipeline Traffic Flows, Yukon Segment

Following Gartner Lee data, the ratio of inbound freight volume to mining operations support is approximately 1,292 million tonnes (total shippable mineral volume) to 4.5 million tonnes (mining support freight). This means mining support freight makes up approximately 0.35 percent[21] of total shippable volume.

2.5 Re-Supply Commodities

In terms of the commodities for re-supply, northern British Columbia, Alaska and Yukon bound traffic are all of interest, as the southern ports of Alaska (Haines, Skagway, Seward, Whittier) and the northern ports of BC (Stewart, Prince Rupert) currently service these areas.

Inbound community re-supply commodities include agricultural products, household goods, livestock, mobile homes, construction materials, timber, petroleum products, vehicles and general merchandise.

2.5.1 Freight Flows

Research by Gartner Lee for the Alaska Rail Link project (2006)[22] produced the following freight volume estimates for re-supply commodities to the Yukon and Alaska via the highways and the Inside Passage. Gartner Lee based these estimates on highway freight flows using the Weigh Scale Database provided by the Yukon Department of Highways and Public Works, Transportation Planning Branch.

Aggregating these averages for the Yukon and Alaska gives an annual freight flow of **241,173 tonnes** into the Yukon (see Exhibit 2-14 for details). Most of these commodity freight volumes, whether intended to re-supply Alaska or the Yukon, are *not* likely to be moved through a port (other than the small volumes that currently move through Haines and Skagway).

[21] Gartner Lee calculates 4.56 million mining support freight for all 42 mines (representing 1,292 shippable tonnes) This leads to 4.56/1,292=0.00353 support freight volume per tonne of shippable resources.
[22] Gartner Lee, Alaska Canada Rail Link Project Feasibility Study Report, WPA1a-4

Exhibit 2-14
Community Re-Supply[23]

Yukon & Alaska Community Re-Supply	
Alaska Highway NORTHBOUND	Over the 2000 to 2003 period, commodity volumes delivered to Whitehorse originating south of 60 averaged **47,232 tonnes** per year
	Over the 2000 to 2003 period, commodity volumes delivered to Alaska originating south of 60 averaged **92,008 tonnes** per year.
	Over the 2000 to 2003 period, commodity volumes delivered to Alaska originating in Yukon averaged **3,868 tonnes** per year
Alaska Highway SOUTHBOUND	Over the 2000 to 2003 period, commodity volumes delivered to Whitehorse originating in Alaska averaged **7,460 tonnes** per year
	Over the 2000 to 2003 period, commodity volumes delivered to south of 60 originating in Alaska averaged **44,656 tonnes** per year
	Over the 2000 to 2003 period, commodity volumes delivered to south of 60 originating in Yukon averaged **15,097 tonnes** per year
Inside Passage (via Haines and Skagway)	Over the 2000 to 2004 period, commodity volumes delivered to Whitehorse via the Inside Passage averaged **29,450 tonnes** per year
	Over the 2000 to 2004 period, commodity volumes delivered to Skagway via Whitehorse averaged **1,402 tonnes** per year; vehicles, machinery and equipment accounted for 35% of total volumes traveling south over the White Pass with petroleum products accounting for an additional 28% of average tonnages
Total	**241,173 tonnes per year**

For the purpose of the Ports Access Strategy, only the volumes associated with Haines and Skagway are considered further, as the other volumes are unlikely to change their routings in response to improvements to ports serving the Yukon.

2.5.2 Other Infrastructure Freight Volumes

A study by QGI Consulting for the Alaska Canada Rail Link Study (2006)[24] produced the following freight volume estimates for re-supply commodities via other modes of transportation to Alaska. Exhibit 2-15 displays the different types of transportation, for which the overall total is **4,033,000**. It is important to note that these commodity freight volumes move directly to Alaska and will at no point move through Skagway or Haines, hence these are not considered further in the study.

[23] Gartner Lee, Alaska Highway Natural Gas Pipeline Traffic Flows, Yukon Segment
[24] Gartner Lee, Alaska Canada Rail Link Project Feasibility Study Report, WPA1a-4

Exhibit 2-15
Community Re-Supply – Other Modes

Transportation Mode	Annual Tonnage
Railcar Barge	309,000
Container / Trailer Vessel / Barge	1,947,000
Other	1,660,000
TOTAL	**4,033,000**

2.5.3 Aggregate Future Projections

There is no change in transportation mode foreseen for re-supply commodities. Based on the current total of 29,240 tonnes of re-supply freight moving through Skagway and Haines during 2004, the following projections have be made, based on a growth rate of 1.5 percent[25] per annum.

Exhibit 2-16
Community Re-Supply – Projection

	Year	Re-Supply through Skagway/Haines
Short-Term	2006	30,500
	2007	30,900
	2008	31,400
	2009	31,800
	2010	32,300
Medium-Term	2011	32,800
	2012	33,300
	2013	33,800
	2014	34,300
	2015	34,800
Long-Term	2016+	35,300

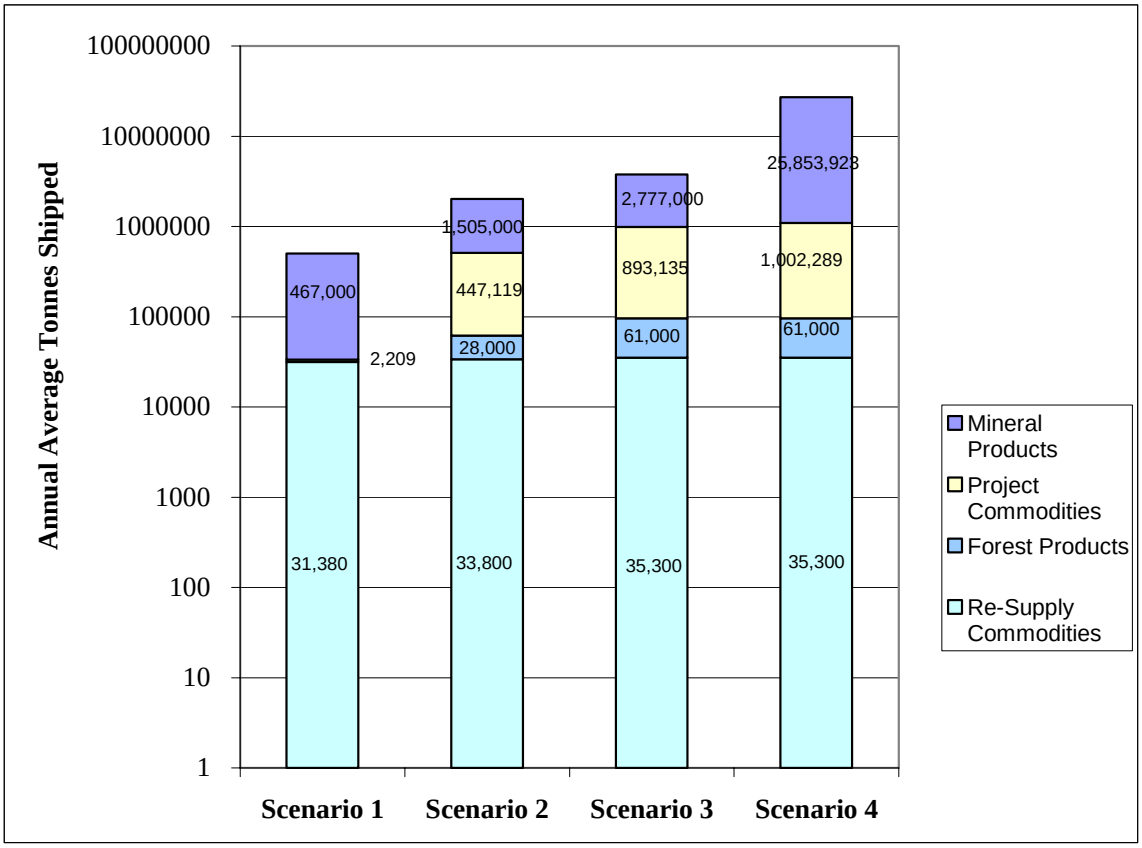
In the short-term, an average of 31,380 tonnes of re-supply commodities could be shipped through Skagway or Haines on an annual basis. In the medium-term, this could be as much as 33,800 tonnes per annum and in the long-term it could be 35,300 and up.

[25] The number 1.5% was based on the average growth of the Yukon population over the last 4 years.

2.6 Summary of Projected Commodity Movements

The following total freight volumes for re-supply commodities, minerals, forest products and project commodities is expected, based on the four scenarios as set out in earlier in this chapter: the short-term (Scenario 1), the medium-term (Scenario 2), the long-term without iron ore (Scenario 3) and the long-term with iron ore mining (Scenario 4).

Exhibit 2-17
Annual Volumes for Mineral Products, Project Commodities, Forest Products and Re-Supply Commodities



The key conclusions to be drawn from the analyses of potential shipping volumes are twofold:

1. The volumes of annual shippable commodities (excluding the one-time effects of pipeline construction) are quite small in three of the scenarios, ranging from about 500,000 to 3,000,000 tonnes per year. In terms of port throughput, these are generally considered to be

within the capacity of a typical terminal that could be developed in any of the ports under consideration.

2. The only significantly different scenario involves development of the Crest iron ore deposit and increases the shipment volumes by a factor of about 10. This volume will require its own supply chain, distinct from that considered in 1 above.

There is no intermediate volume scenario in practical terms. As a result, in the balance of this report, the focus is on the smaller repetitive volumes (up to 3 million tonnes) and the larger volumes associated with Crest iron ore. As a result, the discussion involves collapsing Scenarios 1 through 3 into a low volume scenario and Scenario 4 becomes the high volume scenario.

3. EXISTING INFRASTRUCTURE ASSESSMENT

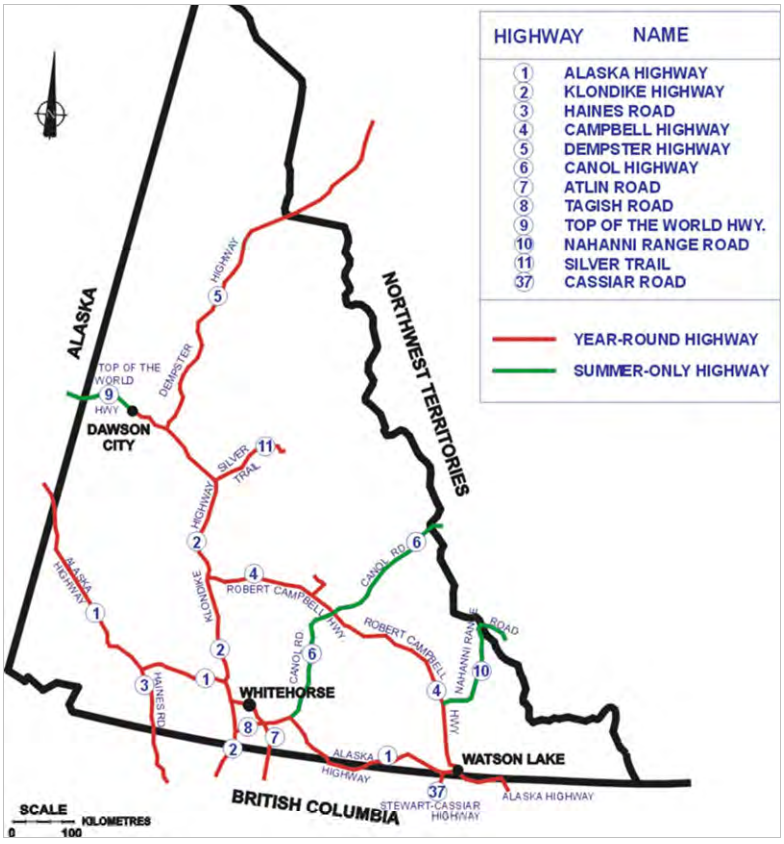
To obtain an overview of the current infrastructure in the Yukon, both surface (rail and road) and ports infrastructure must be assessed.

3.1 Current Road Infrastructure

3.1.1 Highways

The Yukon is well served with surfaced roads traversing the populated south-western part of the Territory and providing access to various ports in Southeast Alaska. Appendix 1 provides an overview of the current road and rail infrastructure, including distances and traffic volumes. Exhibit 3-1 illustrates the major highways in the Yukon.

Exhibit 3-1
Yukon Highways



The main highway across the Yukon is the Alaska Highway. It originates in Dawson Creek, BC and runs for 909 km through the Yukon from the BC border east of Watson Lake to the to the Interior Alaska border at Beaver Creek. The Alaska Highway and the Haines Highway were built in 1943 as military pioneer roads. They were improved during the 1950s and substantially upgraded in the 1980s. These two principal highways are well-paved and well-maintained. Other Yukon highways include the Klondike Highway from Skagway through Whitehorse to Dawson City and the Dempster Highway from east of Dawson City to Inuvik. The Klondike Highway parallels the old White Pass trail between Skagway and Log Cabin.

Whitehorse is the centre of travel in the Yukon. Exhibit 3-2 summarizes distances to the nearest ports and centers from Whitehorse, indicating the remote nature of the Yukon.

Exhibit 3-2
Distances from Whitehorse

To Principal Ports or Other Northern Centers	Distance (km)
Skagway, AK	177
Haines, AK	396
Stewart, BC	1,050
Prince Rupert, BC	1,438
Seward, AK	1,234
Fairbanks, AK	951
Beaver Creek, Alaska Border	456
Haines Junction	156
Dawson City	536
Carmacks	176
Watson Lake	453
Dawson Creek	1,426
Prince George	1,622
Inuvik	1,222

3.1.2 Current Road Traffic Levels

The Alaska Highway and the Haines Highway carry a small amount of traffic compared with provincial highways in BC and Alberta. The highest vehicle movements are within the Whitehorse area, between Whitehorse and Skagway and between Whitehorse and Haines Junction.

In 2005 the annual average daily traffic (AADT) on the Alaska Highway was approximately 500 vehicles per day, rising to 800 during summer months (SADT). This compares with AADT of 1,350 and an SADT of 1,820 on BC Highway 16 at the Highway 37 junction. The point of this

comparison is to note that the traffic volumes on the Alaska Highway are significantly smaller than those on a comparable highway in northern B.C. These volumes are also documented in Appendix 1.

The capacity of this rural highway, with a design speed of 110 km/h has a capacity of approximately 8,000 to 10,000 vehicles per day for a Level of Service C. Level of Service C indicates that the volume to capacity ratio is about 70 percent and that traffic is still generally free flow. This also indicates the consistent presence of short convoys of vehicles at any given point and the continuous need for overtaking. Level of Service C is used by many highway planners as the lower end of the acceptable range for highway operations.

The Klondike Highway carried an average of between 200 and 400 vehicles per day in 2005, with 400 to 600 per day during summer months. The Dempster Highway, a gravel highway of over 1,000 km, carries only 100 vehicles per day on average, and 180 vehicles per day during summer months.

Other roads, such as the Campbell Highway and the Canol Road are gravel surfaced. The Yukon government plans to improve the surface of the Campbell Highway from Watson Lake to Carmacks by upgrading the gravel with bituminous surface treatment (BST). The Canol Road is only open in the summer and fall seasons and carries very little traffic

The highway from Haines to the interior of Alaska is the main connection from Fairbanks to Juneau and Seattle by way of the Alaska ferry service (the Alaska Marine Highway). Relatively few vehicles use this highway: in 2005 an average of 188 vehicles per day was recorded during the summer and 112 vehicles on average per day during the rest of the year.

3.1.3 Pavement Strength

All principal roads in the Yukon have been designed to withstand standard highway loading based on approximately 2,000 standard truck movements per day. A standard highway truck is a semi-trailer with six axles and gross vehicle weight of 50 tonnes with a wheel base of 22.7m.

A high level assessment of a typical pavement structure was carried out to establish the theoretical service life status. A representative pavement structure was selected on the Haines Highway using data provided by Public Works Canada “Status of Reconstruction” documents dated March 1992.

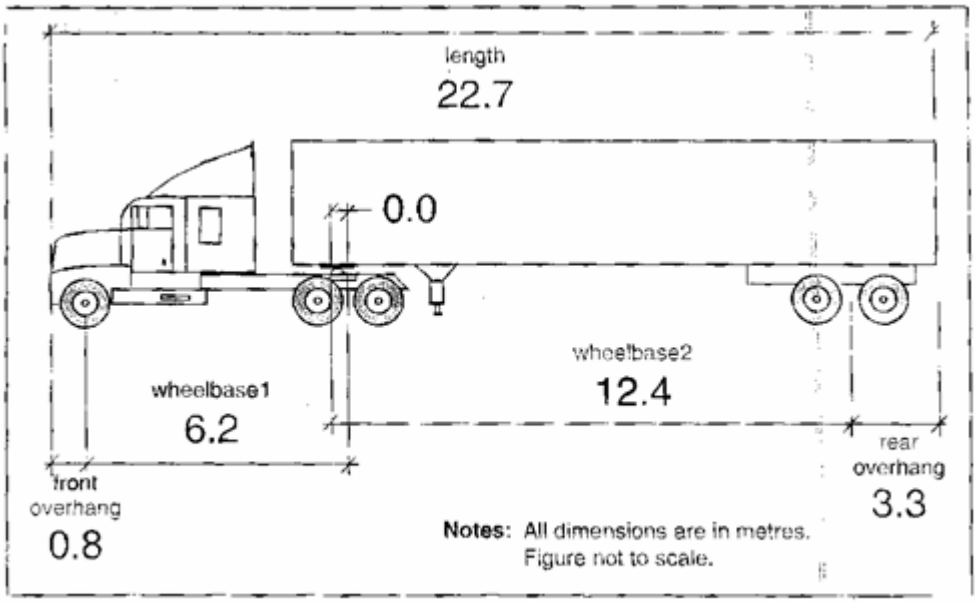
The representative pavement location is on Segment 4B and consists of:

- Bituminous surface treatment
- 150mm base course
- 250mm sub-case

The recent reconstruction in 1989/1990 was assumed the start of the current design life. The assessment compared the design life number of Equivalent Standard Axle Loads (ESALs) with the assumed actual loading to date The conclusion is that the pavement has a likely remaining service life of 5-10 years under the probable increased traffic loadings resulting from new mining developments. The Government of the Yukon is planning to repave both the Alaska and the Haines Highway in the next 5-10 years.

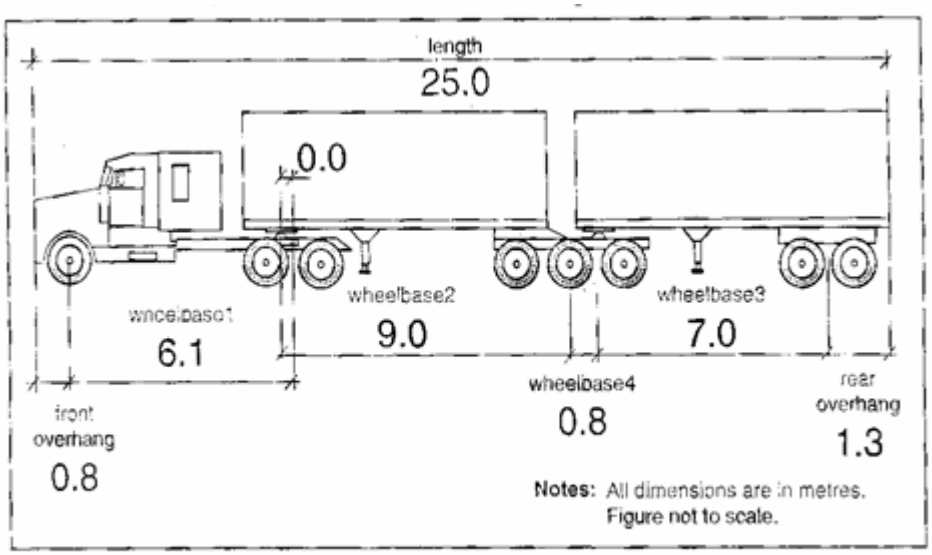
For reference, Exhibits 3-3 and 3-4 are diagrams of standard highway trucks that have been taken from the Geometric Design Guide of Canadian Roads by the Transportation Association of Canada[12]. The maximum axle loading is 80 kN (18,000 lbs).

Exhibit 3-3
Tractor – Semi-trailer Dimensions



Note: Fifth wheel offset set to zero to yield the maximum swept path in a turn.

Exhibit 3-4
B Train Double (BTD) Dimensions



Note: Fifth wheel offset set to zero to yield the maximum swept path in a turn.

Appendix 1 documents existing traffic volumes. Traffic on most highways in Canada has been growing at 2 percent per annum over the last 20 years (Ref TAC 2005). In the Yukon, traffic has been declining in the last five years due to decreased economic activity and decreased tourism. Traffic in 2005 was between 5 and 10 percent less than in the year 2002. Existing traffic is usually less than 10 percent of the capacity of the highways in question; hence any growth is unlikely to cause significant congestion on the highways.

There appears to be sufficient capacity on Yukon highways to accommodate approximately five times more vehicles than the current traffic levels. If the number of trucks using these highways will increase substantially, or if this load class of truck will increase, the pavements will have to be strengthened and climbing lanes will need to be added on the steeper gradients.

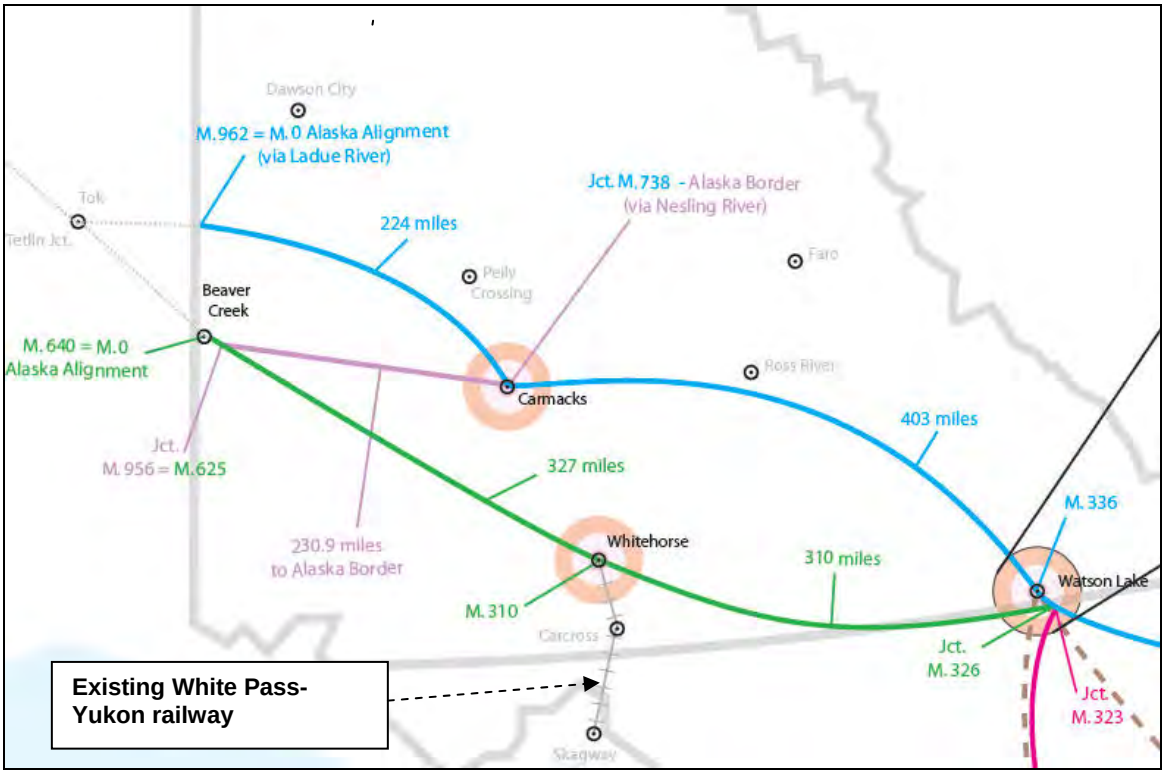
3.2 Current Rail Infrastructure

One existing rail line currently operates in the Yukon. The White Pass & Yukon Route (WPYR) is a narrow gauge railway running from Skagway to Whitehorse over a distance of approximately 180 km. The only section of this rail link currently in operation is the section from Skagway to Lake Bennett, though the railway can be operated as far as Carcross. WPYR has been improving the existing rail line through replacing older ties with newer, full-length ties and upgrading the rail. Current plans involve upgrading the railway as far as Carcross with future plans calling for reactivating and upgrading the

balance of the line to Whitehorse. While it is possible to move freight over this line, the WPYR does not have any rail freight equipment and does not have any current plans to institute freight service. Discussions with WPYR have indicated an interest in potential re-institution of freight service if the traffic becomes available and can be moved profitably.

A study into the benefits of additional rail links is currently underway: the Alaska Canada Rail Link Study (ACRLS) was initiated in 2005 to undertake market analyses, develop traffic data and investigate rail routes from Delta Junction, the terminus of the Alaska Railroad System, to the North American Rail Network in Northern BC. The study is due for completion in the summer of 2006. Exhibits 3-5 and 3-6 illustrate the Yukon and northern BC segments of the proposed rail link. The economic feasibility of this rail link has not yet been established. The study focuses on regional re-supply, mineral exports and pipeline material as the main sources of revenue for the rail link. The study's context is Alaska, Yukon and northern British Columbia.

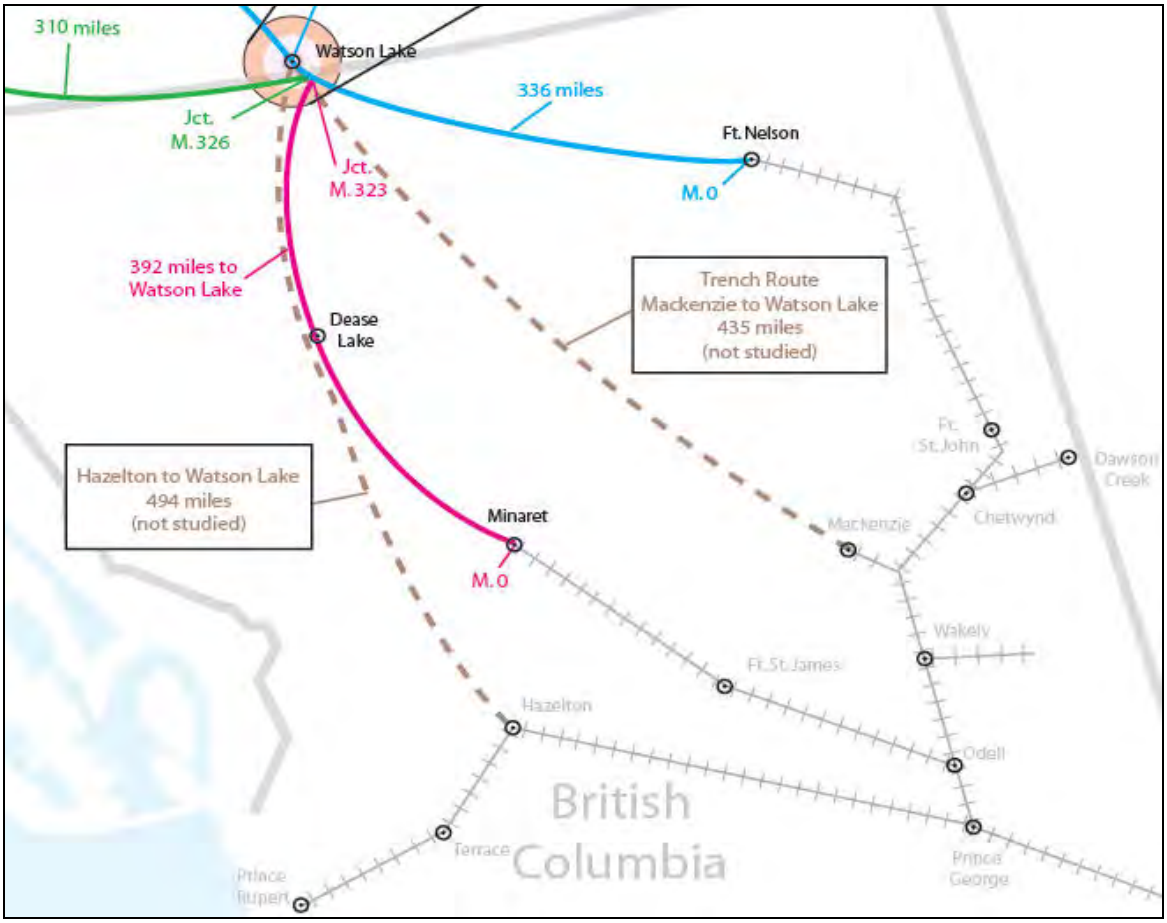
Exhibit 3-5
Yukon Segment of Proposed Alaska Canada Rail Link Corridors[26]



[26] Alaska Canada Rail Study – UMA – AECOM

In the Yukon the two principal corridors that are being investigated are along the Alaska Highway and through the Tintina Trench. In Northern British Columbia, corridors connect to existing CN rail termini at Fort Nelson, Mackenzie, Minaret and Hazelton.

Exhibit 3-6
Northern BC Segments of Proposed Alaska Canada Rail Link Corridors[27]



3.3 Current Barge Systems

Barges towed by modern tugs are an effective means of transportation across seaways and on shallow rivers. The cost of operating a barge service is less than the cost of a rail service and substantially less than a road truck service. Barges provide an economical means of transportation on European and Asian rivers, on major rivers in the United States and along the West Coast of North America. There are no barge systems operational in the Yukon at present.

[27] Alaska Canada Rail Study – UMA – AECOM

3.4 Current Port Infrastructure

Exhibit 3-7 illustrates the logical hinterlands of the Yukon, Alaska and BC port areas. Depending on type and volume of the transportable commodities however, the Yukon is presently serviced by several ports in Alaska and BC.

Over the past 100 years the southern Alaskan ports in Skagway (since the gold rush) and Haines (more recently) have been the Yukon's main port outlets. The port of Skagway has a demonstrated capacity to handle hundreds of thousands of tonnes of concentrates and similar quantities of general cargoes. The existing narrow gauge White Pass Railway formerly delivered mineral concentrates from the Yukon's Faro Mine to Skagway's bulk concentrate terminal. Skagway's mostly containerized general cargoes arrive by barge to a floating barge ramp which leads to an inter-modal yard. The general cargoes are then carried by truck to the Yukon and Alaska.

In western Alaska, the ports of Whittier, Port Mackenzie and Seward could be connected with the Yukon. In southern Alaska the Bradfield Inlet is also available for Yukon commodities and in northern British Columbia, Stewart, Kitimat and Prince Rupert are potential outlets for volumes of the Yukon's bulk exports that are beyond the limited capacities available at Skagway. No ports are currently available in the northern Yukon to serve potential development.

Exhibit 3-7
Hinterland and Focal Ports[28]

[28] Gartner Lee Environmental Strategies & Solutions

4. REQUIRED FUTURE INFRASTRUCTURE ASSESSMENT

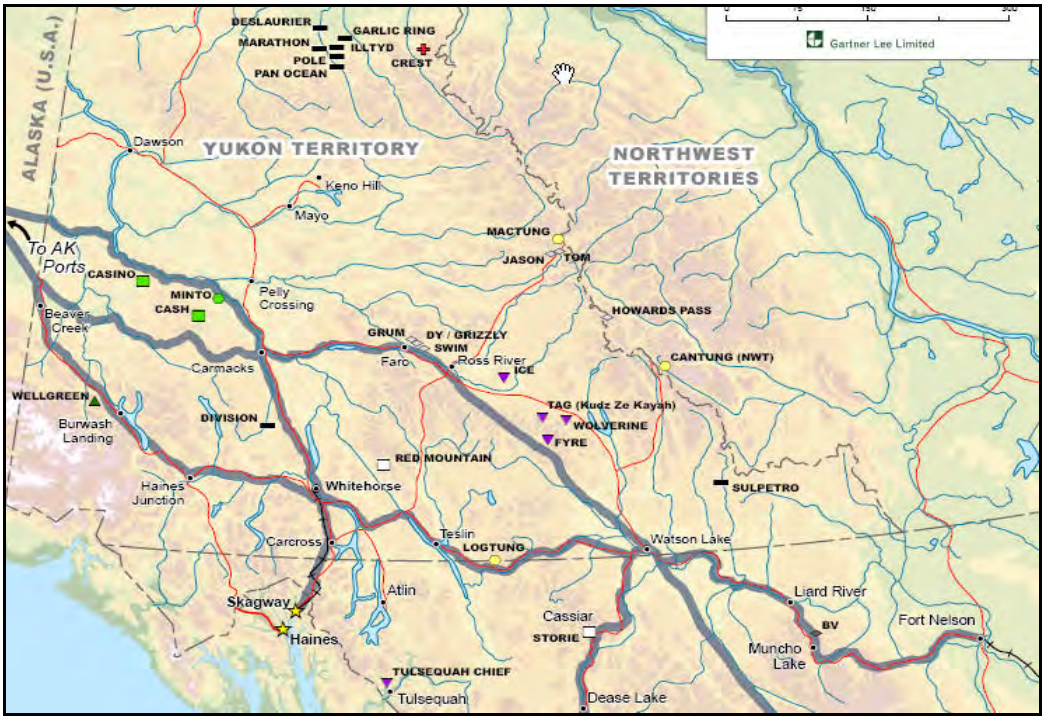
To obtain an idea of the required infrastructure in the Yukon in the short-, medium- and long-term, the existing road, rail, barge and ports systems need to be assessed in the light of the potential economic development of the territory. As illustrated in Section 2 of this report, the corresponding potential increase in traffic volumes will mostly depend on mining activities and pipeline projects. Although re-supply commodities and timber products are also likely to grow over the next decades, the shippable volumes for these purposes are not considered significant enough to develop existing infrastructure beyond its current state.

4.1 Required Surface Infrastructure

4.1.1 Short-term

In the short-term, a number of smaller mines are likely to be developed. Recent announcements by Yukon Zinc and Sherwood Copper highlight the potential for mine development in the short term as well as the difficulties in assessing the potential timing of mine development. The mine properties proposed for development – Minto and Wolverine – are shown in Exhibit 4-1.

Exhibit 4-1
Priority Mineral Deposits in the Bonnet Plume Range and the Tintina Trench



Source: Gartner Lee Traffic Data Development for Mineral Resources, March 2006

A further possibility is the Howard's Pass property of Yukon Zinc, which could ship close to 500,000 tonnes per year, significantly more than the other two properties. The work undertaken by Gartner Lee indicates that this may be a medium term opportunity. As a result, the mineral development projections discussed earlier in this report should be considered indicative of potential development and not specific about which developments will proceed at a particular point in time.

The volume associated with the development, operation and export commodities of these mines is relatively small. Minerals could be shipped directly to Skagway or to Haines.

It is assumed that this projected volume of mineral concentrates will be moved in a standard "B-Train Double" truck/trailer combination with a gross vehicle weight of 65 tonnes and payload of 50 tonnes. The Klondike Highway through Alaska allows for the permitted movement of vehicles of up to 170,000 lbs (77.3 tonnes). While Yukon and British Columbia have allowed for the movement of these vehicles over their portions of the Klondike Highway in the past, this is not guaranteed in the future and it is not clear that motor carriers would use the larger equipment if they also had to run it on other highways. Accordingly, our analysis is based on the smaller vehicles.

If one-half million tonnes of mineral ore or concentrate is shipped per annum using standard B-Train highway truck combinations carrying 45 net tonnes per load, 35 one-way (and 70 two-way) truck movements will be required over a 300-day year. 40 one-way movements (80 two-way) would be required over a 250-day year (5 days per week and a two-week Christmas break).

The passenger car equivalence (PCE) (the number of passenger cars displaced in the traffic flow by a truck under prevailing highway conditions) for an ore-bearing truck is likely to be 3.0. Recent research on Canadian Roads[29] have shown the PCE on 2-lane highways is 2.54 to 2.42 for semi-trailer-type trucks. This will likely rise to 3.0 for a 65 tonne B-Train Double truck combination used in moving ore. If one truck is equivalent to three passenger vehicles, 80 two-way truck movements would be equivalent to adding 240 vehicles to the highway system.

Any of the Yukon highways can accommodate this volume. As a result, the short-term impact on the Yukon road system will not be significant as a result of the additional movements of trucks. Two-lane rural highways have a capacity of about 10,000 vehicles per day and projected additional short-term traffic can be handled by the existing highways. The number of trucks could be reduced if B-Train bulk carriers carrying larger loads were to be used. Pavements may have to be further strengthened to carry these heavier loads.

[29] Buliung, R.N. Kanaroglou, P.S., *Using an Integrated Urban Model to Estimate the Contribution of Commercial Vehicle Movements to Mobile Emission in Urban Areas*, Center for Spatial Analysis at McMaster University, December 2005.

4.1.2 Medium-term

In the medium-term, several mineral deposits, as well as one of the pipeline projects are likely to go into development and operation. The following mines may go into production:

- Howard's Pass
- Division Mountain
- Wolverine
- Kudz ze Kayah
- Fyre

Exhibit 4-1 shows the location of these mines in the Tintina Trench.

The volume associated with the development, operation and export commodities of these mines is in the range of 1.5 million tonnes per year. If all of this volume is moved by truck, the number of two-way truck movements would be in the order of 210 to 240 trucks per day. With a passenger car equivalence of 3.0 this equates to about 600-700 passenger car equivalents per day – still well below the capacity of existing highways.

4.1.3 Long-term without Crest

In the long-term scenario, without development of the Crest iron ore deposit, all other ore deposits previously identified by Gartner Lee, as well as both pipeline projects are likely to go into development and operation.

The volume associated with the development, operation and export commodities of these mines is about 2.5 million tonnes per year. If all of this volume is moved by truck, the number of two-way truck movements would be in the order of 350 to 400 trucks per day. With a passenger car equivalence of 3.0 this equates to about 1,050 to 1,200 passenger car equivalents per day.

The presence of 350 two-way truck movements per day on a highway represents approximately one truck passing a given point every three minutes. This number of trucks could tend to form convoys that will inhibit the movement of other road users. If this number of trucks were to use a public highway, considerable investment will have to be made in widening curves and providing climbing and passing lanes.

- Projected daily traffic from 2.5 million tonnes of mineral export:
    - 350 standard 45-tonne trucks
    - 1,050 passenger car equivalence

- Projected daily traffic from construction of two pipelines simultaneously:
    - 140 standard 45-tonne trucks
    - 420 passenger car equivalence
- Maximum likely daily traffic from 2.5 million tonnes mineral export and pipeline construction:
    - 1,470 vehicles per day

If existing summer general traffic increases at 7 percent per annum due to increased economic activity, baseline traffic on Yukon highways will double in 10 years to the volumes indicated in Exhibit 4-2. If the mineral and project traffic is added to this mix, the total traffic will increase significantly, but all highways will still be well below capacity. Consideration may need to be given to the construction of more passing lanes to eliminate vehicle platooning (convoys).

Exhibit 4-2
Projected Mid-term Traffic Volumes Assuming Truck Transportation for Mineral Export & Pipeline Construction

Highway	General Traffic in 2016 (vehicles/ day)	Traffic from Mineral Export & Pipeline Construction if all Moves to/from One Port (vehicles/day)	Maximum Likely Volume (vehicles/day)	Volume: Capacity Ratio for Capacity at 8000 vehicles/day
Haines Hwy	400	1,570	1,970	0.25
Alaska Hwy from Haines Jct to Whitehorse	3,000	1,570	4,570	0.57
Klondike Hwy from Skagway to Whitehorse	1,700	1,570	3,270	0.41
Klondike Hwy from Carmacks to Dawson City	1,000	1,570	2,570	0.32
Dempster Hwy	300	1,570	1,870	0.23

4.1.4 Long-term with Crest Development (Scenario 4)

In the long-term scenario with development of the Crest deposit, all mineral deposits, as well as both pipeline projects are likely to go into development and operation. Exhibit 4-1 shows the locations of these mines in the Tintina Trench and Bonnet Plume areas.

Development of the Crest deposit means a significant amount of iron ore would have to be transported to tidewater. The minerals could be transported to southern ports (Skagway, Haines, Stewart or Prince Rupert) or a new port could be developed on the Arctic Ocean. A port at King Point on the Arctic Ocean has been investigated in the past. The road distance from the Crest

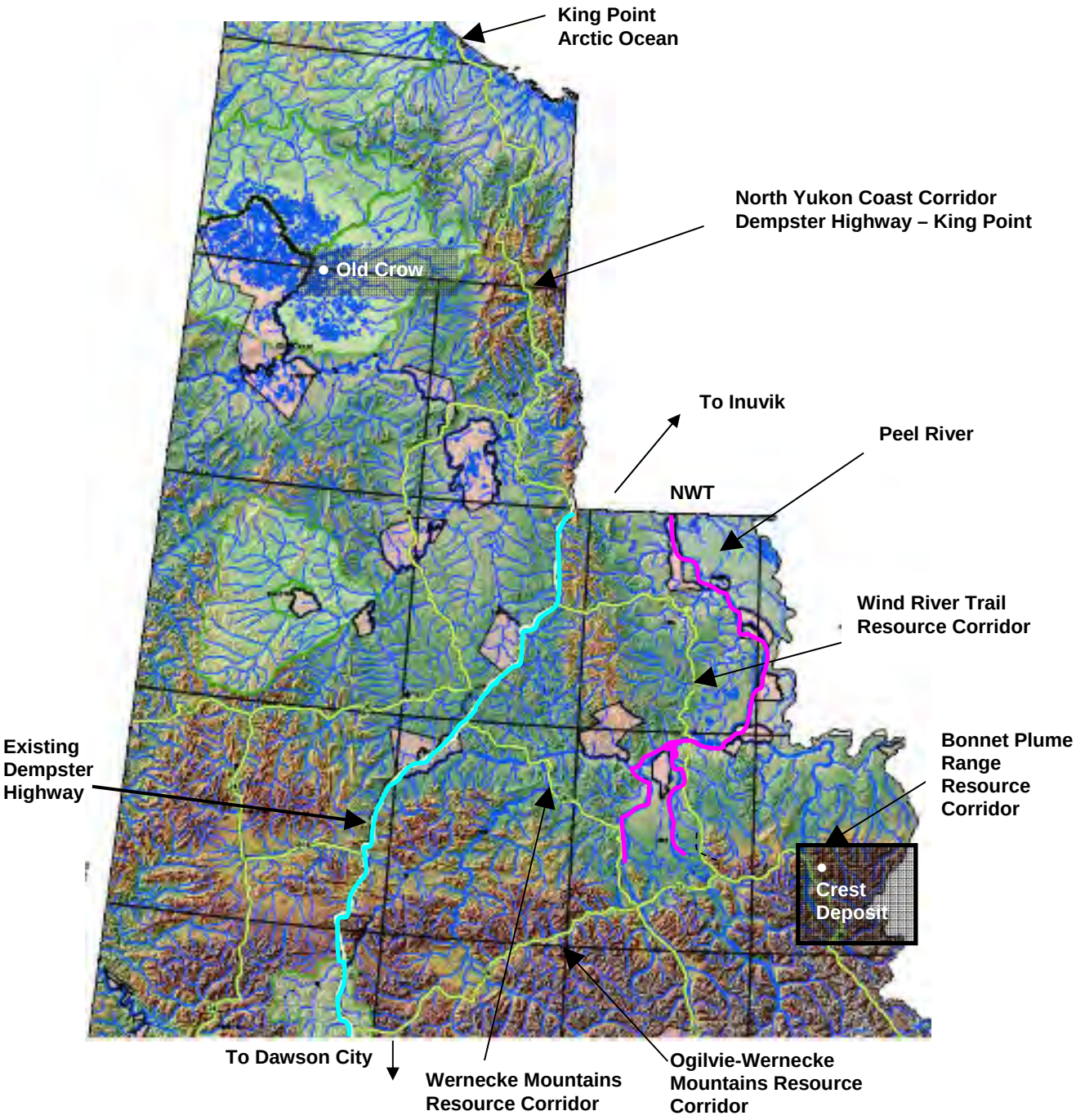
Deposit to tidewater at Haines is 1,230 km and a link to King Point would be 730 km. Distances are approximate and conform to the alignments of corridors shown in Exhibits 4-3 and 4-4, which have been taken from the Conceptual Study Report to Identify Potential Natural Resource Infrastructure Access Corridors. It is noted that the purpose of this study was not to undertake an engineering assessment of alignments, but to identify potential corridors for future use.

The volume of potential production of coal and iron ore in this region would comprise the majority of any traffic on a road or rail link servicing this area. Insofar as this area currently does not have road or rail access, construction of new transportation infrastructure is a prerequisite to development of the mineral resources and must be considered part of the overall development strategy.

Road

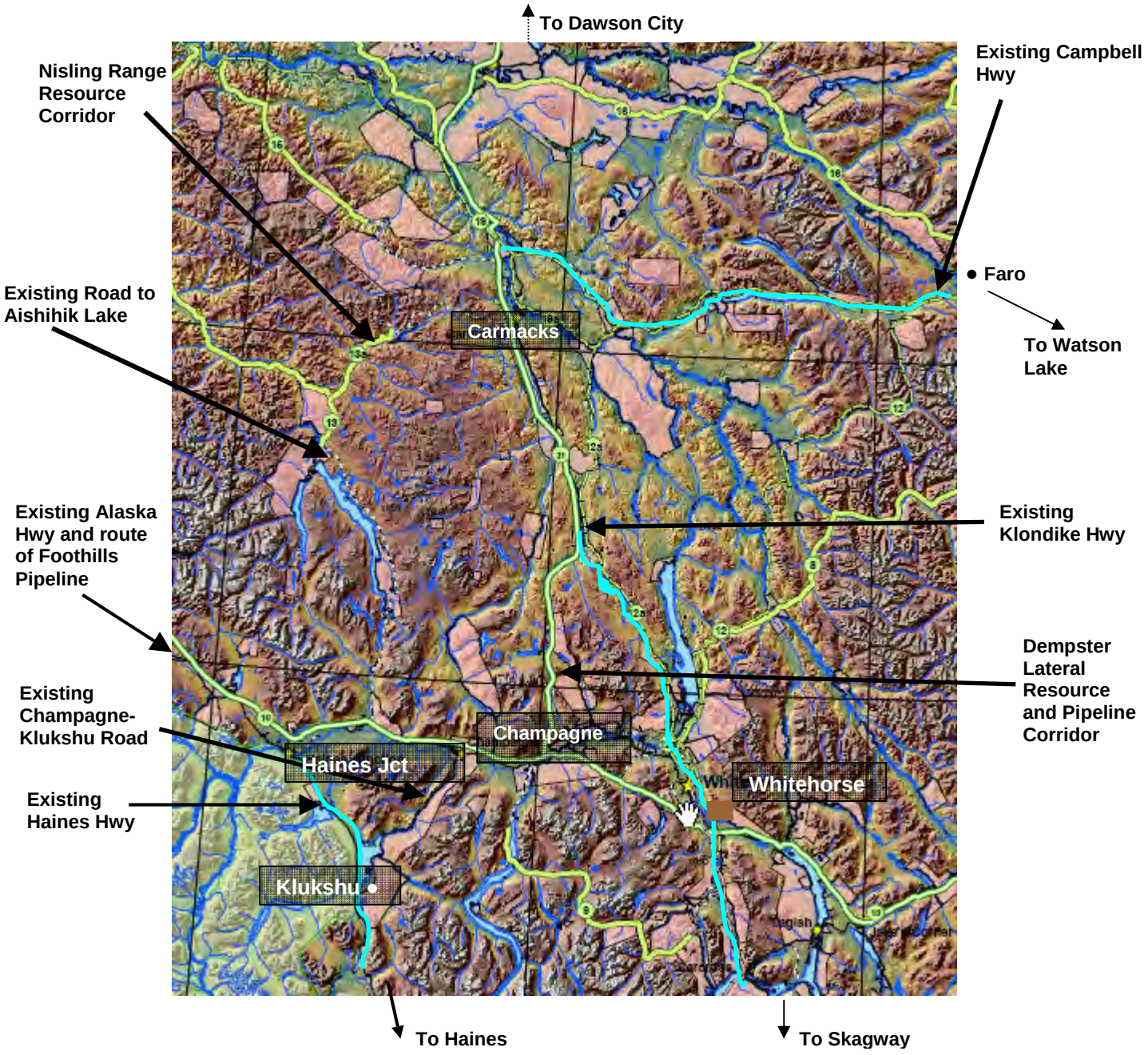
Mining production of approximately 27 million tonnes per year would require over 1,800 one-way (3,600 two-way) truck movements; equivalent to 11,000 passenger car units per day, assuming 300 working days per year. Exhibit 4-5 summarizes the distances of new roads and road upgrades that would be required to accommodate heavy trucks between the Crest deposit and ports on the Arctic and Pacific Oceans. The cost of this road building is summarized in Appendix 1.

Exhibit 4-3
Identified Resource Road Corridors from Bonnet Plume Range to the Arctic Ocean[30]



[30] Access Consulting Group, 2003

Exhibit 4-4
Identified Resource Corridors from Carmacks to Desdeash Lake Area[31]



[31] Access Consulting Group, 2003

Exhibit 4-5
Summary of Road Construction and Upgrading – From Crest Deposit

	Construction	Distance		Construction	Distance
To the Northern Port at King Point	Build road from Crest Deposit to Crest Jct on Dempster Hwy	250 km	**To the Southern Port at Haines**	Build road from Crest Deposit to Crest Jct on Dempster Hwy	250 km
	Upgrade Dempster Hwy from Crest Jct to King Pt Junction	200 km		Upgrade Dempster Hwy from Crest Jct to Dawson City	220 km
	Build a road from King Pt Jct on Dempster Hwy to Port at King Pt	280 km		Upgrade Klondike Hwy from Dawson City to Carmacks	360 km
				Build new hwy from Carmacks to Desdeash Lake	220 km
				Upgrade Haines Hwy from Desdeash Lake to Haines	180 km
	Total Distance	**730 km**		**Total Distance**	**1230 km**

In summary, it would require the construction and reconstruction of roads to very high standards, and the logistics of loading, hauling and unloading this many trucks would not be economical. Mineral developments of this size are typically serviced by rail, due to the significantly lower costs.

Rail

Consideration would have to be given to a rail spur that would follow the Dempster Highway and connect the Crest Deposit to Haines at a distance of 970 km. An alternative rail spur to the Bonnet Plume deposits could run north to a port at King Point. Rail costs about 5 times more to build than a highway but is significantly less costly to operate. The construction of about 1,000 km of potential rail spurs from the Bonnet Plume Range will be expensive and will likely cost in excess of $5 billion.

If a train can carry 10,000 net tonnes (assuming 100 cars, each carrying 100 tonnes) a total of 10 trains would use a rail line per day (300 days per year) to move this quantity of mineral from the area around the Crest deposit. The number of trains could be reduced if the number of cars per train was to be increased but this would have to be investigated as part of a more detailed study.

Pipeline

Concentrate pipelines are used widely in other parts of the world but are reported to be problematic in cold climates. There are a significant number of reports on the potential use of slurry pipelines for the movement of iron ore and coal to port facilities, however, most of these have not been built nor have they been proven to be economic and practical to operate, particularly over long distances in northern climates.

A detailed study of the suitability of a slurry pipeline would be required given the severe weather and geographic conditions as well as the distance involved.

Barge

A barge system could be explored as an alternative to a road or rail system to connect the Bonnet Plume Deposits to an export port. The Peel River, which is a tributary to the Mackenzie River, could be explored for this purpose. The Peel River is known to be shallow and its location north of the Arctic Circle would only allow service for possibly four months a year. If the Peel River could be dredged, a viable barge system could be operated to transport minerals from north of the Arctic Circle.

4.2 Potential Port Infrastructure

4.2.1 Arctic Ports – King Point

The rationale for an Arctic port is the offer of relatively short land transport connections. The Yukon's existing roads and its short narrow-gauge rail line do not have an existing or potential capacity to handle the tens of millions of tonnes of iron ore and coal exports. It is questionable if the Yukon's traditional existing port outlet at Skagway has the required existing or potential capacity for large scale bulk exports or whether the community would accept such a large port operation. Hence regardless of which land routing is selected for large scale bulk exports from northern Yukon, land transport distances are significant, and substantial new rail construction and new port terminal construction will be required. The Arctic port option would have the shortest rail line.

A deep sea port at King Point on the Arctic Ocean coast has been proposed in the past. However, the issue of the short shipping season is a significant barrier to development. Currently, the operating season for traffic around Point Barrow to reach the Beaufort Sea at King Point is from about the third week of July to the end of September. Most years, the length of the shipping season is about 100 days. The typical variation is plus or minus one to two weeks.

As a result, terminal facilities would have to ship the whole year's output in a short season. While some climatologists and others believe that the shipping season could be extended as a result of

global warming (resulting in a less severe ice conditions), it is not clear when or if this will happen. Even if the standard seasons were to increase to 140 days, the port and land logistics would remain a high cost.

Allowing for variations in the length of the shipping season, product reclaiming and shiploading systems with an average capacity of four times the annual throughput would be required in order to load products into ships during the short season. For example, to ship 25 million tonnes per year of bulk products in the season, the reclaim and shiploading system would have to be sized for a normal annual throughput of about 100 million tonnes per year. To meet annual shipping requirements, it will be necessary to store ten to twenty million tonnes of bulk material over the winter at the port or, alternatively, all operations will have to be scaled up by a factor of four. Such mining, transport and bulk terminal capacities have never been attempted in Arctic regions.

Logistics Chain Options

Two options are considered to be possible for accessing a terminal at King Point.

- **All Rail Option** – The all rail route would traverse about 800 km of sub-arctic and arctic terrain to reach King Point. The all rail route may have the advantage of being able to function year round. Assuming mining and materials handling equipment can operate year round, an optimistic assumption would be for limited mine site product storage. Ideally, the materials handling system would be designed with sufficient live storage surge capacity to allow a continuous flow of material from mine production into carefully scheduled unit trains. With a continuous mining and transport system, a very large and costly bulk terminal will have to buffer the difference between seasonal deep sea shipping and the continuous land delivery system.

- **Rail/Barge Option** – The rationale for a rail to barge to ship system using the Mackenzie River would be to reduce the length of the costliest part of the logistics chain, the rail segment. Since the variable cost of rail transport is typically several times that of barge transport, the rail/barge system would be based on the offer of lower variable costs than the all rail option. However, the rail/barge option also has the disadvantages of a short shipping season for barges and the additional cost of a rail-to-barge transshipment terminal on the Mackenzie River. As for the rail-to-deep sea Arctic port system, the rail-to-barge-to-ship transhipment terminal will have to have an effective shipping capacity that is about four times the annual throughput of the whole system. Two high capacity bulk terminals will be required, one for the rail to barge interface on the Mackenzie River, and one for the barge to ship interface, probably located in the Beaufort Sea as close as possible to the Mackenzie

River delta. For the barge to ship interface, a floating and removable transfer terminal may solve some of the problems associated with the harsh arctic marine conditions.

In the short to medium term a northern port is not likely to be economically viable due to the short shipping season and the resulting high capital and operating costs for the major elements in the supply chain. In the longer term, as more information regarding climate change becomes available, the economics might change. Other issues such as the need to demonstrate sovereignty over the Canadian Arctic may also become a factor. Nevertheless, this area contains a highly unique ecosystem and detailed environmental studies and discussion with affected First Nations peoples would be required before moving forward with such a plan.

4.2.2 Alaska Mainland Ports

These ports (Whittier, Seward and Port Mackenzie) offer: ice free operations, use of existing Alaska rail for part of the required land distance, shorter land transport distances than for British Columbia ports and shorter ocean distances to the Orient than the other ports being considered. Nevertheless, using Alaska mainland ports will require land transport distances in the range of 1,400-1,600 km for the Bonnet Plume coal fields and the Crest iron ore deposits. For southern Yukon mineral mining deposits, the distances are 1,600-2,000 km. These compare to be between 800 to 1,000 km for King Point and Haines. For such distances, shippers normally select rail transport for all but the most high value and time sensitive cargoes.

As a result, high standard rail access is a necessary condition for the use of these ports.

Whittier

Whittier offers: good sea conditions, existing rail access and an established port. The key concerns are an apparent lack of developable port land and the probable high cost to upgrade the rail link to standard required for large scale bulk exports. Whittier is too far from shipment points in the Yukon to be a practical for terminal location for general cargoes and smaller volumes bulk products such as mineral concentrates.

Exhibit 4-6
Whittier Alaska from the Air

The photograph in Exhibit 4-6 shows that this port's flat open space is limited by mountainous terrain. Deep waters probably preclude significant land reclamation. (See the solid line ellipse.) Environmental sensitivities likely preclude development of the river estuary and mud flats at the end of the inlet. (See dashed box.)

Port Mackenzie

Port Mackenzie has an existing bulk and all purpose terminal and ample backup lands for expansion (see Exhibit 4-7). Sea conditions are likely to be favourable. A 70 km rail line would have to be built to link the port to the existing Alaska Railroad. A preliminary design for such a link has recently been prepared. The design report for the proposed rail link contains an estimated cost of $193 million or about $2.7 million per km. Grades and curves do not appear to be onerous. Since Port Mackenzie is located a short distance across Cook Inlet from Anchorage, there is relatively good access to various services. A car ferry linking Port Mackenzie to Anchorage directly has been proposed.

Exhibit 4-7
Port Mackenzie

Seward

In terms of transportation linkages and port development potential, Seward is the most well endowed of the Alaska mainland ports. Seward has: an existing bulk coal terminal, land for port expansion, and existing road and rail connections on relatively favourable terrain. To expand the bulk terminal and its storage yard, the main rail exchange yard and other industrial facilities would have to be moved. Apart from the long land transport distance to the Yukon, there are no obvious major obstacles to port development at this location.

Exhibit 4-8 indicates the location of the existing coal terminal and the area where expansion might be possible.

Exhibit 4-8
Port of Seward

4.2.3 Alaska Panhandle Ports

These ports offer: ice free operations, shorter land transport distances than for British Columbia or Alaska mainland ports and shorter ocean distances to the Orient than British Columbia ports. Using Alaska Panhandle ports will require land transport distances that are in the range of 700 to 900 km. For such distances, some shippers will consider truck transport for mineral concentrates and general cargoes. The ports of Skagway, Haines and a proposed port at Bradfield Inlet have been put forward as options.

Port Bradfield

Port Bradfield is on the Alaska panhandle, about 60 km south of Wrangell and about 100 north of Ketchikan. The proposal to build a port at Bradfield Inlet and a new highway to join with British Columbia Highway 37 near Bob Quinn, creates a potential port connection for the Yukon. If built, the port and highway would offer a slightly shorter road route to tidewater than is available at Stewart. However, the port and its linking highway to the hinterland will have to be built in a pristine wilderness area and through the Coast Mountain Range. Environmental concerns may preclude development altogether. The proposed highway link to Highway 37 will require a long tunnel and steep grades. Because of the steep terrain, rail construction may not be feasible at reasonable cost.

This option has been studied as part of the Juneau highway access study conducted by the Alaska Department of Transportation. It is not the preferred option, and is unlikely to be built.

Exhibit 4-9
Port Bradfield

Skagway

For more than 100 years, Skagway has been the Yukon's main port outlet. The port has a demonstrated capacity to handle hundreds of thousands of tonnes of concentrates and similar quantities of general cargoes. The existing narrow gauge White Pass Railway formerly delivered mineral concentrates from the Yukon's Faro Mine to Skagway's nearly operational bulk concentrate terminal. Skagway's mostly containerized general cargoes arrive by barge to a floating barge ramp which leads to an inter-modal yard. The general cargoes are then carried by truck to the Yukon and Alaska.

The main issue at Skagway is opportunity to expand. The potential for expansion is very limited.

- **Ship Berths** – All of the existing and potential ship berthing positions are taken up by cruise ships. The concentrate berth is also used for cruise ships. To free the concentrate berth for bulk handling, it would be necessary to move cruise operations to another area in the port. At most, the concentrate facility would be able to handle a handymax bulk carrier or a bulk barge. It may also be possible construct a separate dedicated bulk barge loading facility at the seaward end of the concentrate deep sea berth. The Railway Dock, while dedicated for cruise ships in the summer, could be used to load/unload products such as pipe for the pipelines during other times of the year.

  It should be noted that the issue of cruise ship conflicts is only present for five months of the year; the other seven months do not present any problems. Even during the cruise ship

season, cruise ship use of the docks is heaviest Tuesday through Friday, hence there are windows for using the ore dock to load freight even during the summer.

- **Anchorages** – There are no deep sea vessel anchorages at Skagway. The nearest anchorages are at Haines, about 24 km to the south. At higher throughput levels, the distant anchorages will add to the overall cost of shipping through Skagway.

- **Cargo Storage Areas** – The concentrate terminal and vacant lands near the existing ore dock provide a potential maximum storage area of 4 acres. More area could be available if the existing helicopter terminal were re-located. However, finding a suitable new location near the helicopter terminal's cruise ship customers will be difficult in the confined port areas of Skagway. Finding space for bulk storage for concentrates is also complicated by the need to have separate stockpiles for each mineral and shipper. In terms of annual throughput, it is estimated that Skagway's potential to ship concentrates and/or coal is about two to three million tonnes per year, but this level of capacity may be sufficient depending on how many of the Yukon's identified mineral properties are actually developed.

Exhibit 4-10
Port of Skagway

For a deep sea coal or iron terminal, space for storing hundreds of thousands of tonnes of cargo is necessary. This is a significant issue on the waterfront in Skagway, given the lack of available space for such a facility and the potential reaction of the community to the location of such a facility. The most suitable and capable bulk storage site in Skagway is in an area known as the "Russell Metals" site. This site is located about 4 kilometres inland from the Ore Dock but could be linked with a high capacity conveyor to the port area to move modest amounts of bulk products.

Options for Increased Shipping Capacity at Skagway

One way to overcome Skagway's limitations for cargo storage and ship berthing capacity is to use a barge-to-ship or a barge-to-terminal lightering system. Barges loaded at Skagway could travel to a coal terminal at Haines. A similar system is being used for shipping the Quinsam coal deposit (Hillsborough Resources) near Campbell River on Vancouver Island. In the Quinsam system, trucks deliver coal to a covered storage dome at Middle Point. Covered conveyors from the dome convey coal to barges which travel to Texada Island some 50 km away. At Texada Island, the coal is off-loaded and then re-loaded onto deep sea vessels. As with Skagway, the Quinsam system overcomes the lack of deep sea berthing facilities by means of a lightering and re-loading system. See Exhibits 4-11 and 4-12 for pictures of the Quinsam facility.

Exhibit 4-11
Quinsam Coal Barge Loading Facility

Figure 4-12
Quinsam Coal Storage Dome and Enclosed Barge Loading Conveyor

Other optional configurations of such a system could be arranged as follows:

- A permanently moored or anchored vessel at Haines could act as a floating coal storage area. Self-discharging barges from Skagway would discharge to the coal storage vessel. In turn, the coal storage vessel would be able load deep sea coal ships at high speed.
- Self-discharging barges could travel to Prince Rupert where they would unload at the Ridley Island coal terminal. The Ridley island coal terminal has ample spare capacity and could load deep sea vessels at high speed.

In the midst of Skagway, using a concise and covered materials handling system similar to the Quinsam system may be the only socially acceptable way to export significant volumes of coal. Cash Minerals Ltd. proposes to export about one million tonnes per year of coal through Skagway. If significant tonnages of mineral concentrates are being shipped as well, the coal will have to be handled in a separate facility.

In approximate terms, coal and concentrate shipments with a combined volume of up to about two to three million tonnes per would probably represent the upper limit of bulk throughput capacity at Skagway, without imposing significantly upon the community in terms of the scale of facilities and the level of traffic. If truck transport were being used, such volumes would require approximately 40,000 to 60,000 one-way truck movements per year or about 130 to 200 one-way movements per day. Truck traffic volumes at this level passing through the town would not likely be acceptable.

Consideration could be given to use the White Pass and Yukon Railway to move at least a portion of this tonnage, similar to the movement of mineral concentrates in the past. One million tonnes of product could be moved in 2 to 3 trains per day (five days a week) along the existing rail route. The major issues would be finding the appropriate rolling stock, constructing a transshipment facility near Whitehorse, upgrading the line from Carcross to Whitehorse, funding the upgrade and purchase of new equipment, and scheduling the freight service around the summer season passenger service.

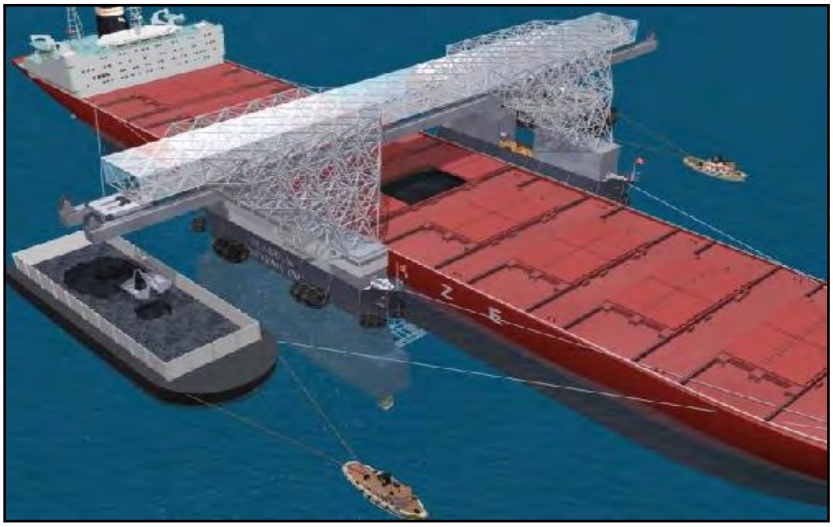
Haines

Haines offers anchorage, favourable sea conditions, modest amounts of port lands available at low development costs, relatively short land transport distances to the Yukon and road access. The port's main shortcoming is the lack of rail connections to the Yukon. Haines has three port sites about 50 metres wide by 300 metres long bordering a quiet bay that offers anchorage for deep sea vessels. Increasing the size of these sites is possible with cuts into the hillsides. The port sites are away from the town and options for by-pass road and rail alignments are feasible. The favourable sea conditions will also allow the use of floating bulk barge-to-ship transfer terminals. Expansion of port lands beyond what is currently available is possible at the site of the old Army Fuel Storage Depot.

Exhibit 4-13
Municipal Dock – Haines

One option for overcoming the limited amount of low cost port lands at Haines would be to use a floating bulk transfer terminal as shown in Exhibit 4-14.

Exhibit 4-14
Floating Bulk Transfer Terminal



4.2.4 British Columbia Port Options

In northern British Columbia, Stewart, Kitimat and Prince Rupert are potential outlets for some of the Yukon's bulk exports.

Stewart

Stewart is the closest Canadian port option for Yukon exports. The rail transport distance from the Bonnet Plume coal fields and Crest iron ore deposits to Stewart would be approximately 1,800 km. From the south Yukon mining areas, the distance to Stewart is about 1,000 km. For comparison, coal from the Rocky Mountain region is currently transported by unit train from Sparwood to Westshore Terminals near Vancouver over a distance of about 1,130 km.

Stewart offers road access, an ice free port, anchorage and favourable marine conditions. While there is very limited developable cargo storage land available near to the shore, extensive industrial sites are available about 4 km inland from the waterfront. For large volume bulk exports, the variable cost of conveying over such distances is comparable to rail transport. Bulk ship loading facilities can probably be built at the end of an existing causeway, known as the "Arrow Dock".

Figure 4-15
Stewart, British Columbia

Stewart's main shortcoming is a lack of rail service. Should the Alaska-Canada rail link pass near to Stewart along the Dease Lake alignment, a link to Stewart may be justifiable. Yukon cargoes could be combined with other cargoes such as anthracite coal from the Mount Klappan deposit to recover the investment required for a rail link to Stewart. The most costly portion of such a line is

likely to be a segment of about 20 kilometres near to Stewart. This segment contains a canyon and a slide area through which tunnels and snow sheds would probably be required.

Overflow concentrate cargoes that cannot be handled at Skagway could go to an existing bulk concentrate loading facility operated by Stewart Bulk Terminals Ltd (see Exhibit 4-16). From the southern Yukon, truck delivery over distances of about 900 km would be required. The photograph records the loading of a test shipment of Mount Klappan anthracite coal. The expansion potential of this terminal is modest. Increased volumes of concentrates could be handled with minimal changes, but shipping high volumes of coal or iron ore would not be feasible at this terminal.

Figure 4-16
Stewart Bulk Terminals' concentrate loading terminal at Stewart

Kitimat

Kitimat has most of the requirements for a bulk terminal. It has favourable marine conditions, road and rail access, developable port lands near to the water, and existing marine support infrastructure.

Although Kitimat's rail line is capable of carrying full weight rail cars, CN limits the length of train that can be handled. The existing limitation is about 5,000 feet. CN reports that, with some modifications, trains up to 7,000 ft might be handled. Lengths up to 7,000 feet correspond to typical Canadian unit train lengths. Nevertheless, CN contends that standard length unit trains

would have to be broken into two parts at Terrace before being sent to Kitimat. While Kitimat is about 70 km closer to the sea than Prince Rupert, its distance advantage would probably be negated by the additional cost to split unit trains at Terrace.

Exhibit 4-17
Port of Kitimat – Potential Terminal Site

Prince Rupert

Prince Rupert is well equipped to handle large scale volumes of coal exports and has the space to accommodate a large iron ore export terminal.

Prince Rupert has an efficient coal terminal at Ridley Island that is under utilized. In its current configuration, the capacity of the terminal is about 13 million tonnes per year. Expected future coal shipments from British Columbia mines are expected to consume half or more the terminal's existing capacity. However, the coal terminal is designed to be expanded to about 25 million tonnes per year should demand warrant it (see dotted box in Exhibit 4-18).

The Port of Prince Rupert has space on Ridley Island for two additional major terminals. Expansion of the existing coal terminal and/or the grain terminal would not significantly affect the capacity of the remaining two terminal sites. One of the two remaining sites is being reserved for a proposed LNG export terminal. The remaining site could potentially be the location of an iron ore export terminal (indicated by the ellipse in Exhibit 4-18). Marine conditions are adequate for large bulk carriers. Rail access is excellent. The chief disadvantage, from the perspective of the Yukon, would be the very long rail distances from the Bonnet Plume coal fields and the Crest iron ore deposit. The distances are approximately 2,100 km.

Exhibit 4-18
Ridley Island – Port of Prince Rupert

5. TRANSPORTATION COST AND FEASIBILITY ANALYSIS

This chapter describes the process used to assess the full range of potential options for port and infrastructure development and identify the preferred options for further consideration as elements of the ports access strategy.

5.1 Financial/Economic Assessment of Options

Ports and their linking transport logistics chains for the Yukon's major export products were assessed from the perspective of estimates of total transport cost in relation to probable selling prices.

The transport modes being considered are: trucking, rail, barging and deep sea shipping. All are demonstrably feasible in the Yukon, Alaska and British Columbia. Slurry pipelines have not been considered due to the high level of uncertainty about their use in the north.

The longest coal slurry pipeline is the 440 km Black Mesa line in the U.S.A. and the longest iron ore slurry pipeline is the 396 km Sanmarco line in Brazil. At this point, the feasibility of slurry pipelines of the length required for the Yukon has not been demonstrated; neither has the feasibility of slurry pipeline operations in sub-arctic conditions. A review of the literature suggests that construction costs are slightly cheaper for a slurry pipeline than a railway, particularly if the system can rely on gravity instead of significant mechanical pumping. For a slurry pipeline across relatively level ground, pumping is an issue. The operating costs of a slurry pipeline approach those of a high capacity railway if dewatering at a terminal is a practical and environmental option. If the water has to be returned to the origin for reuse via a parallel pipeline, the costs will be significantly higher.

A number of port options were considered for the feasibility assessment, as follows:

- **Whittier** – This port does not appear to have enough developable port lands to support the large scale bulk exports that would be required of it.
- **Port Mackenzie** – There are no obvious obstacles to the further development of this port. The long run variable cost of rail transport is expected to be high.
- **Seward** – At the port itself, there are no obvious obstacles. The feasibility of upgrading the rail line to meet the requirements for large scale bulk exports is unknown at this time. The long run variable cost of rail transport is expected to be high.
- **Port Bradfield** – This proposed port and linking road system is probably infeasible. The environmental sensitivities are considerable. The cost of transportation is almost certainly too high because only road transport is available to this distant port.

- **Skagway** – Modest volumes of concentrates shipments and small volumes of coal shipments are probably feasible. In the past, significant volumes of concentrates from the Faro mine were trucked through Skagway and loaded into deep sea vessels at Skagway's bulk terminal. However, lack of space and socio-economic and environmental considerations limit bulk throughput at Skagway to a maximum of about two to three million tonnes per year. Both the road system and narrow gauge railway at Skagway are unsuited to large scale bulk exports. Hence, large scale bulk exports through Skagway are considered infeasible.

  Modest volumes of containerized and general cargoes, delivered by barge and trucked out, have been handled at Skagway for many years. The quantities required for pipeline construction are about one million tonnes per year for about two years. In this preliminary document, the consultants have not yet analyzed the logistics of pipeline construction materials and their implications to Skagway and other ports. However, if the pipeline volumes were spread over both Haines and Skagway, it is quite likely that these volumes could be handled through existing or modestly upgraded facilities.

- **Haines** – There are no obvious physical obstacles to further development of this port. Nevertheless, the cost of implementing large scale bulk terminal facilities will be somewhat higher than at conventional ports that have large land areas in favourable marine settings. That said, few of the port options save the distant ports of Prince Rupert and Port Mackenzie, have large port areas in favourable marine settings. There may be some environmental and social issues associated with access to the port, particularly if a new rail line is required.

- **Stewart** – There are no obvious obstacles for this port save the expected high cost of rail construction for the land approaches to this port. The long run variable cost of rail and road transport is also expected to be high.

- **Kitimat** – There are no obvious obstacles for the use of this port save the expected high cost of rail transport.

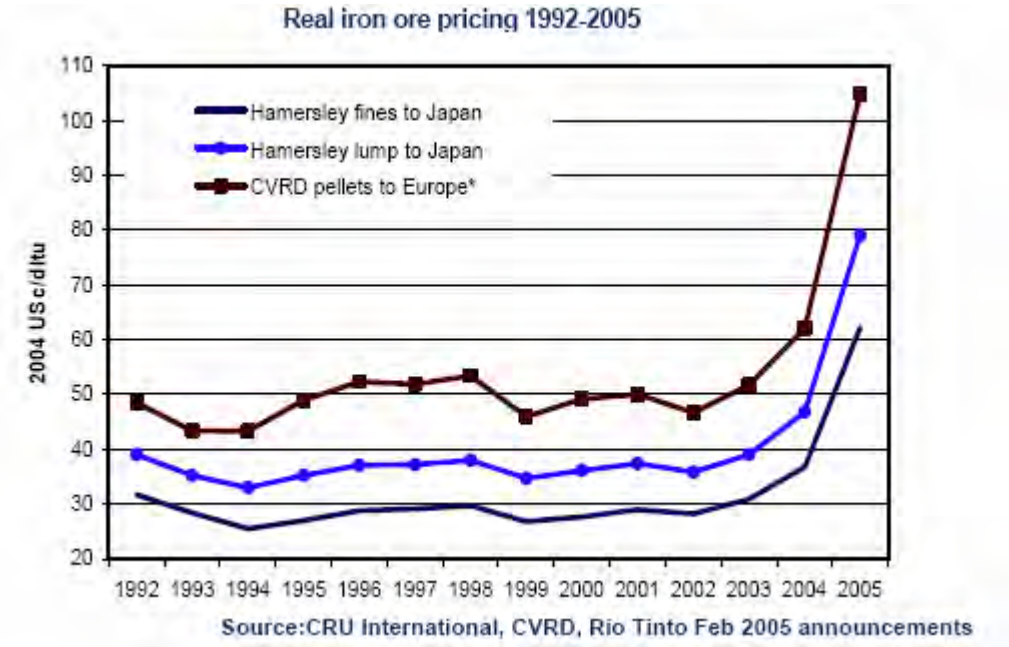
- **Prince Rupert** – There are no obvious obstacles for the use of this port save the expected high cost of rail transport.

5.1.1 Basis of Financial Analysis

The financial analysis was based on either an assessment of the economic costs of transportation versus the probable selling price of mineral commodities in world markets or, where world prices were not practically available, identifying the lowest cost option.

The analysis comprised the following components:

- **Mining Cost** – For iron ore and coal, the estimated mining cost covers the variable cost of mining plus the recovery of original mine development costs. For other products, the mineral concentrates, the mining cost is the variable cost of mining and processing the ore and does not include the cost of developing the mine. The loading costs for trucks and/or trains are assumed to be included in the variable mining cost.
- **Trucking Cost** – The estimated trucking cost is based on full recovery plus profit. It includes the capital and operating cost of trucking plus a 5 percent allowance for profit.
- **Rail Transport Cost** – The rail transport cost is based on average reported rail tariffs per tonne km. Such tariffs probably recover the cost of maintaining and renewing the rail track and the full recovery of capital and operating costs of rail equipment. As a result, it is assumed to recover the long run variable cost of rail transport. This cost is only used for the assessment of transporting product on a new standard gauge railway. The costs of moving product on a narrow gauge railway such as the White Pass & Yukon Route are likely closer to the cost of trucking.
- **Terminal Costs** – Terminal costs are based on prevailing tariffs in similar facilities. The tariffs being used are an estimate of full recovery of capital, operating costs and profit.
- **Ship Costs** – Ship costs include full recovery of the capital cost of owning and operating ships. Ship costs vary according to the distance from loading port to the assumed common destination of Shanghai. For iron ore, Capesize ships were assumed; for coal, Panamax ships were assumed; for concentrates, Handymax sized ships were assumed. Ship port time varied according to loading rate norms for the commodities being loaded. The ship costs include an allowance for port charges at both the loading port and the receiving port. Port charges vary according to the characteristics of the ship and the characteristics of the waterway approach to the terminal. Port charges in the calculations are in the range of $1 to $2 per tonne. To simplify the preliminary analysis, the port charges for vessels calling at Ridley Island were used as a surrogate for all ports.
- **Total Transport Cost** – This figure is a representation of the minimum acceptable CIF price of the product at the final seaport destination. This minimum price is intended to represent the minimum CIF price by which producers, shippers and carriers can be satisfied.
- **Market Price** – The CIF market price for the various mine products was estimated for the common destination of Shanghai. For iron ore the Shanghai CIF (Cost, Insurance and Freight) price is an estimate of the long run market price for iron ore. Current CIF market prices for iron ore are extremely high and are not considered sustainable.



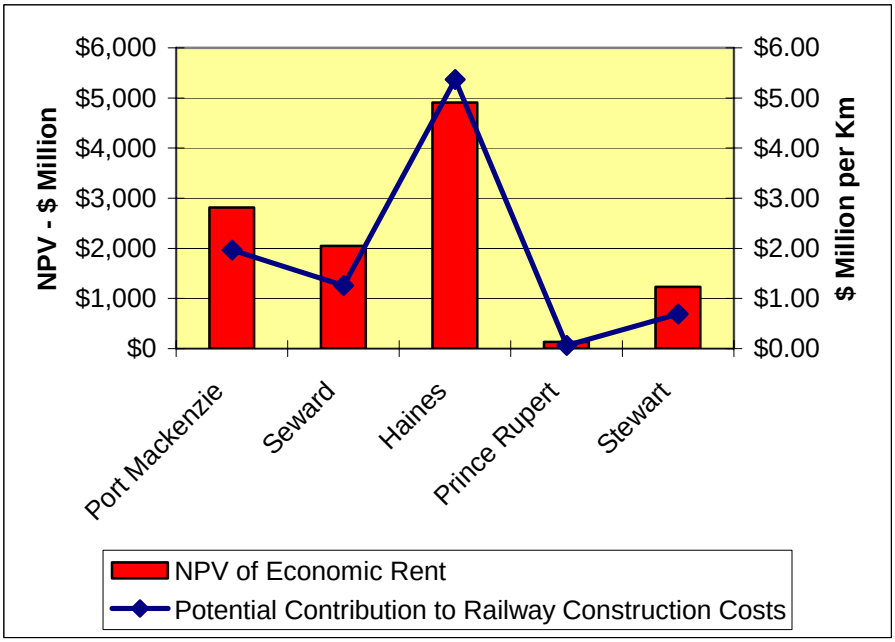
The CIF price for coal is the market price as of March 10, 2006. Coal prices have not shown the extreme variances that have been observed for iron ore. Market prices for concentrates were not assessed due to the variability in concentrate quality and content.

- **Economic Rent** – The definition of economic rent is the difference between the actual selling price and the minimum price that would be satisfactory to the seller after he has paid for transportation to the receiving port. For the purposes of the analysis, it was assumed the economic rent would be available to recover the capital investment for new rail lines.
- **Maximum Rail Construction Cost** – This represents the maximum amount of funds available from the economic rent divided by the length of the potential rail line. The maximum rail construction cost per kilometre is an indication of the economic feasibility of new rail construction to serve the products being carried. For example, if the maximum rail construction cost were calculated as $100,000 per kilometer, it would be an indication the economic justification for new rail construction was doubtful. Obviously, rail construction costs are much higher than $100,000 per kilometre. Such a result would discourage further investigation into the economic feasibility of the line in question. Other the other hand, a calculated maximum rail construction cost of, say, $8 million dollars per kilometre might encourage further investigations into the economic feasibility of the line in question. The results of the Alaska Canada Rail Link Study suggest that a construction cost of $5 to $6 million per kilometer may be achievable for a new standard gauge railway in Alaska/Yukon.

5.1.2 Results of the Feasibility Assessment

Exhibits 5-1 and 5-2 present the results of the feasibility assessment for high volumes of coal and iron ore, and lower volumes of concentrates respectively. The detailed results of the feasibility assessment are contained in Appendix 2.

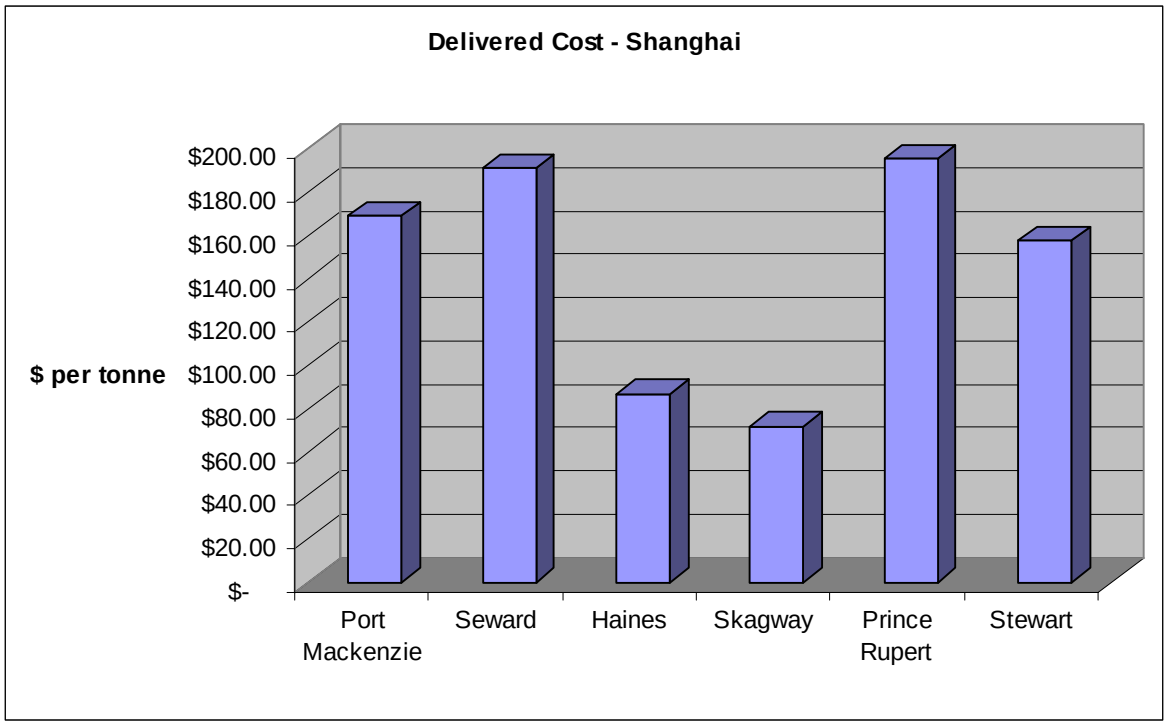
Exhibit 5-1
Potential Contribution of Traffic to Rail Construction Costs



As indicated in Exhibit 5-1, Haines and its associated logistics chain appear to offer the most favorable combination of costs for the longer term high volumes of mineral products. Based on the estimated economic rent available from iron ore and coal shipments, the cost of new rail construction to Haines can be funded up to a cost of about $5.4 million per kilometer. No estimate of additional economic rent contributions available from shipments of mineral concentrates was added or attempted. These mines are typically small in terms of volume and will likely develop well in advance of a rail line.

The Division Mountain coal deposit (Cash Minerals) has the potential to develop well in advance of the iron ore and coal deposits in the Bonnet Plume area of the Yukon. In this case, the rail line would not yet be developed and the coal would have to be moved by truck at least part of the way to a port. Exhibit 5-2 indicates that the port of Skagway has an advantage over Haines of about $15 per tonne and a significant advantage over all other ports for the movement of coal from Division Mountain.

Exhibit 5-2
Comparison of Delivered Cost of Division Mountain Coal

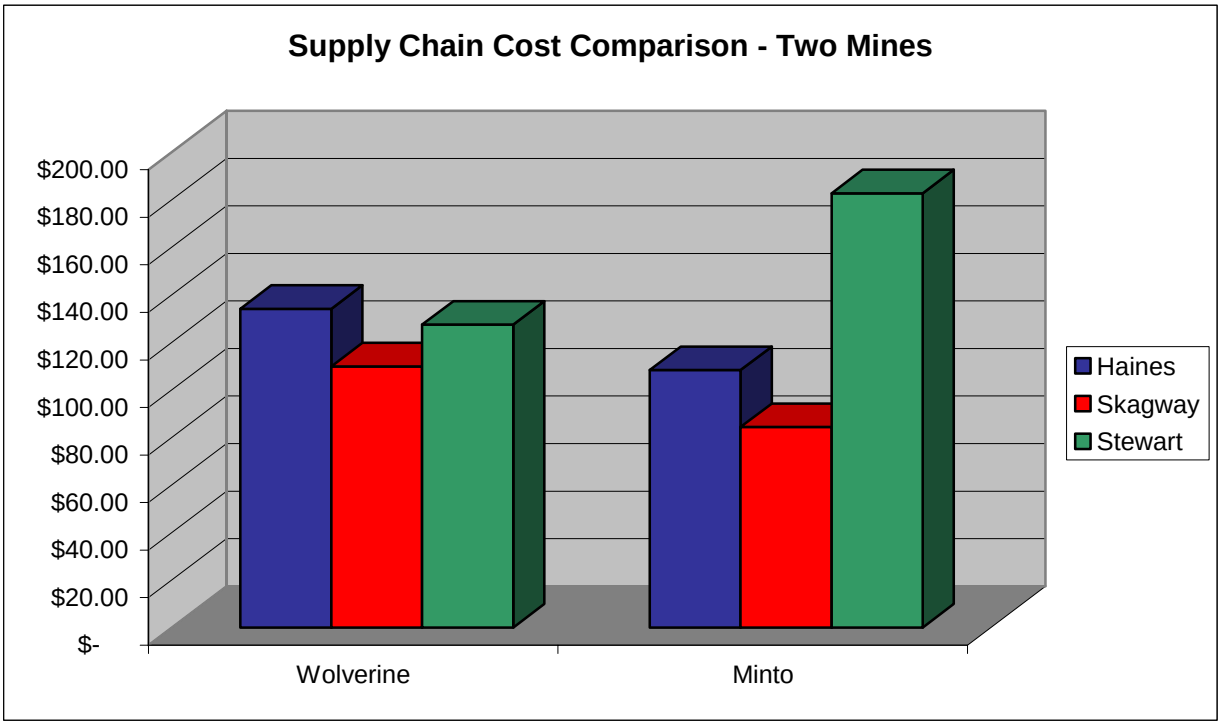


With a delivered CIF (cost, insurance and freight) cost of about $72 per tonne, this deposit may not be economic to develop, as coal prices were in the vicinity of $70 per tonne in March 2006. In the case of Skagway, this analysis assumed that coal would be barged to Haines for transshipment to a deep sea vessel. Direct loading to deep sea vessel could also be considered, but as illustrated later in this report, the costs are very similar.

For concentrates, Skagway is the preferred point of export, as the cost advantage ranges from $5 to $75 per tonne compared to either Haines or Stewart. Other ports are too distant for consideration of movement of the relatively small volumes by truck.

Exhibit 5-3 presents a comparison of the three ports for two of the potential mines. As indicated in this exhibit, Skagway has a significant cost advantage over Haines and Stewart for the movement of concentrates out of the Yukon.

Exhibit 5-3
Comparison of Delivered Cost – Concentrates



These analyses suggest that Haines is the preferred option for larger quantities of products such as coal and iron ore, which are likely to be developed in the longer term, while Skagway is the preferred option for concentrates and smaller quantities of coal, which are likely to be developed in the shorter term.

5.2 Overall Assessment of Options

The description and ultimate assessment of options for port access is being developed along a number of dimensions, as follows:

- **Temporal** – short (1-5 years), medium (5-10 years) and long (10+ years) term
- **Volume** – three scenarios have been developed that link, to a certain extent, with the temporal dimension above. Inbound cargoes (re-supply and project) can be overlaid on top of each of the following.
    - Less than 1 million tonnes of outbound product
    - Between 1 and 5 million tonnes of outbound product
    - Over 5 million tonnes of outbound product

- **Spatial** – By specific port or combination of ports
    - Skagway
    - Haines
    - Stewart
    - Kitimat
    - Prince Rupert
    - Whittier/Seward/Port Mackenzie
    - North Slope (King Point or other)
- **Access** – By mode or combination of modes for port access
    - Road – existing or new links
    - Rail – narrow gauge
    - Rail – standard gauge (upgrade or new)
    - Slurry Pipeline
- **Material handling solution** – The particular solution that may be employed at a particular port to deal with storage, transfer or other issues. Potential solutions include:
    - On dock storage and material handling systems
    - Off dock storage with a transfer system (truck or conveyor)
    - Cross-dock system such as is used by Red Dog Mine or Hillsborough Resources for Quinsam River Coal (i.e., lightering system such as developed by Sea Bulk Systems)

5.2.1 Temporal Dimension

The strategy will include a temporal dimension with implicit links to both the volume dimension and the surface infrastructure dimension. For example:

- The short term scenario are primarily focused on pre-existing movement of commodities – primarily inbound re-supply, but could handle limited volumes of concentrate and forest products. Pipeline construction requirements (especially the Alaska Highway Gas Pipeline) could be overlaid on this scenario.
- The medium term scenario is focused on the continuation of the short term scenario with the inclusion of further mine development and the resultant increased movement of concentrates and the development of a property such as Cash coal.
- The long term scenario is focused on the continuation of both the short and long term scenario volumes and includes the development of other major projects such as the Crest iron ore project. It also includes the development of the Alaska Canada Rail Link for many of the surface infrastructure options.

5.2.2 Volume Dimension

The three volumes scenarios are based on the following considerations:

- **Up to 1 million tonnes –** Includes the development of several mining properties that will ship concentrate and the potential development of a sawmill in the economic hinterland of one of the ports (initial thinking is for 100 million FBM production). These volumes are the maximum that can realistically be handled by truck, given the urban context of ports such as Skagway. Assuming an average payload of 45 tonnes per vehicle, this is equivalent to about 180 trucks per day (90 in each direction) five days per week. Assuming these trucks move only in the period of 7:00 am to 11:00 pm, this is the equivalent to a truck every five minutes. There is some potential to move a portion of this product to Skagway on the existing rail line, assuming it is upgraded from Carcross to Whitehorse.
- **1 to 5 million tonnes** – Includes the development of further mining properties and the potential development of the Division Mountain coal project. At this point, trucking is not generally a realistic option given the constrained spaces in most of the ports being considered. Discussion with White Pass and Yukon have indicated that they could reinstitute rail service as in the past (each train could carry 2,000 to 3,000 tonnes of product). Assuming a 250 day per year rail operation, one train-set could handle 500,000 to 750,000 tonnes per year. This would result in somewhere in the range of 5 to 8 trains per day in each direction. This could be handled so long as they can be scheduled around the passenger trains during the summer and quick unloading capabilities are present in the port.
- **Over 5 million tonnes** – This scenario contemplates the development of the major mineral projects such as the Crest iron ore deposit. While the limit is 5 million tonnes, each major project could be significantly higher. If these products are to move south or east, they will most likely have to move by rail, hence it is implied that the Alaska Canada Rail Link is constructed. The volumes are too high for truck unless a high capacity, short haul system can be developed in conjunction with rail. This scenario may also warrant the consideration of a slurry pipeline.

5.2.3 Spatial Dimension

The spatial dimension focuses on the particular ports that may be in the economic hinterland of the cargoes being contemplated. Some of the particular considerations and preliminary thoughts on these ports are as follows:

- **Skagway** – Best located of all of the ports with respect to distance and available surface infrastructure (road and rail). Limited by available waterfront land. Consideration could be given to the use of a new industrial port access road or conveyance system for larger volumes, as this would reduce local impacts on residents and streets. The major issues are

the cruiseship business, traffic through town and the capacity of narrow gauge White Pass and Yukon to handle freight again.

- **Haines** – Most viable nearby port due to availability of land and underutilized marine facilities. The most significant issue is the longer distance to any mineral developments (though this could be partially dealt with if a new road could be built along the Dalton Trail route). Industrial development and increased traffic along the Shakwak Highway may be an issue due to environmental interests/concerns and the clash with outdoor activities.
- **Stewart** – Well located to serve projects in the southern Yukon that can access Highway 37 or if the Alaska Canada Rail Link project is completed (though would need a spur line to Stewart). Has an existing concentrate facility that could be expanded to a point. Options for port expansion also exist in Hyder and along the opposite side of the Portland Canal. Significant issues are uncertainty about the rail link, the distance from the Yukon and environmental considerations (particularly in Hyder).
- **Prince Rupert** – Excellent facilities that could be used for coal and ore shipments. Only makes sense if the Alaska Canada Rail Link project is completed, and probably the western alignment only.
- **Kitimat** – Recent investigations show that there is land and excess capacity that could be utilized. Again, this only makes sense if the Alaska Canada Rail Link project is completed, and probably the western alignment only. Some problems with access to the facilities by road and rail.
- **Seward/Whittier/Port Mackenzie** – Existing ports that could play a role in the movement of larger quantities of mineral products. The use of these ports is dependent on the development of the Alaska Canada Rail Link. Potential issues include capacity/interference with other activities, environment and distance.

5.2.4 Surface Transport Dimension

Access to the ports can be via a number of surface transport options as follows:

- **Road** – Either via existing road or new road. Examples of new roads could include the construction of a new route along the Dalton Trail to reduce the distance by road to Haines. The cost of mine or resource access roads are not included in this analysis as they are project specific costs.
- **Rail – Narrow Gauge** – This assumes using the existing White Pass and Yukon line for freight purposes. This requires an estimated $30 to $50 million upgrade to the line (based on estimates by White Pass & Yukon Route) and additional capital for new rolling stock and locomotives.

- **Rail – Standard Gauge** – This is possible for new lines to Haines, Stewart, or to the North Slope. This does not include the Alaska Canada Rail Link. It also includes the potential to upgrade the White Pass and Yukon to standard gauge at a minimum cost of $115 million plus the cost of rolling stock.
- **Slurry Pipeline** – This is possible for some movements of ore, coal and concentrates. Costs are hard to determine at the moment and there are potentially significant environmental impacts or costs to minimize impacts. As a result, this option is not considered feasible at the present time.

5.2.5 Material Handling Dimension

Specific material handling solutions will depend on the circumstances, but could include:

- **On dock storage and material handling systems** – Would use existing available space on marine facilities. In some cases this may be limited (e.g. Skagway) and/or may be incompatible with other activities.
- **Off dock storage with a transfer system (truck or conveyor)** – could be applicable in Skagway by making use of the Russell Metals property as either a staging area for project traffic (e.g. Alaska Highway Gas Pipeline) or for storage of larger volumes of ores, coal or concentrates. The major issues will be double handling and the need for a transport mechanism between the site and the dock.
- **Cross-dock system** such as is used by Red Dog Mine or Hillsborough Resources for Quinsam River Coal (i.e., lightering system). Contact was made with Sea Bulk Systems and Hillsborough Resources to obtain information on costs, operating parameters and issues. Potential issues could include dust from transfer operations (dust suppression technology has been used at other similar facilities and may mitigate this issue). May work well for the medium volume scenario in Skagway where lightering by barge to a deepsea vessel moored in Haines could be viable.

5.3 Summary of Analysis

The options described by these dimensions have been assessed throughout the previous chapters. A matrix of the options that have been considered is provided in Exhibit 5-4. Depending on the ultimate development scenario, the strategy may incorporate several options at the same time or a staged evolution from one option to another. Options that do not appear to be relevant for further consideration are shaded out in red in this exhibit. Feasible options are shown in green.

The criteria used in the preliminary screening of options include:

1. **Capacity** – does the option have the capacity to handle the projected tonnage?
2. **Transportation costs** – based on rules of thumb for road, rail, barge and pipeline costs
3. **Capital intensity** – can the traffic support the infrastructure required?
4. **Consistency with local plans** – is the option consistent with municipal/regional plans?
5. **Environmental considerations** – are there significant environmental issues?
6. **Community acceptability** – is the option acceptable to local residents and businesses (this may be an offshoot of the environmental considerations criteria)?
7. **Proven technology** – is the technology proven to be practical for the goods movements being contemplated?

Exhibit 5-4 provides a summary of the analysis, but this time provides an indication of which criteria significantly affected the decision to note an option as being feasible or infeasible or for which further study is required or underway. Those options for which further study is required or underway are noted as "potential" options.

Exhibit 5-4
Summary of Options Considered

	Less Than 1 Million Tonnes				1 -5 Million Tonnes				Over 5 Million Tonnes			
Port	Truck	Rail - Narrow Gauge	Rail Standard Gauge	Slurry Pipeline	Truck	Rail - Narrow Gauge	Rail Standard Gauge	Slurry Pipeline	Truck	Rail - Narrow Gauge	Rail Standard Gauge	Slurry Pipeline
Skagway												
Haines												
Stewart												
Prince Rupert												
Kitimat												
Seward												
Whittier												
Port Bradfield												
Port Mackenzie												
King Point												
Other North												

Key

Infeasible Option

Feasible Option

Potential Option

Exhibit 5-5
Summary of Key Criteria Affecting Assessment of Options

	Less Than 1 Million Tonnes				1 -5 Million Tonnes				Over 5 Million Tonnes			
Port	Truck	Rail - Narrow Gauge	Rail Standard Gauge	Slurry Pipeline	Truck	Rail - Narrow Gauge	Rail Standard Gauge	Slurry Pipeline	Truck	Rail - Narrow Gauge	Rail Standard Gauge	Slurry Pipeline
Skagway	1 - 2	1 - 2	1 - 3 - 6	2 - 5 - 7	1 - 2	1 - 2	1	2 - 5 - 7	1 - 2 - 4 - 6	1	6	2 - 5 - 7
Haines	1 - 2	N/A	1 - 3 - 5	2 - 5 - 7	1 - 2	N/A	2 - 3	2 - 5 - 7	1 - 2 - 6	N/A	1 - 2	2 - 5 - 7
Stewart	1 - 2	N/A	1 - 3 - 5	2 - 5 - 7	1 - 2	N/A	2 - 3 - 5	2 - 5 - 7	1 - 2 - 6	N/A	2 - 3	2 - 5 - 7
Prince Rupert	2	N/A	1 - 2 - 3	2 - 5 - 7	2	N/A	2	2 - 5 - 7	1 - 2 - 6	N/A	2 - 3	2 - 5 - 7
Kitimat	2	N/A	1 - 2 - 3	2 - 5 - 7	2	N/A	2	2 - 5 - 7	1 - 2 - 6	N/A	2 - 3	2 - 5 - 7
Seward	2	N/A	1 - 2 - 3	2 - 5 - 7	2	N/A	2	2 - 5 - 7	1 - 2 - 6	N/A	2 - 3	2 - 5 - 7
Whittier	2	N/A	1 - 2 - 3	2 - 5 - 7	2	N/A	2	2 - 5 - 7	1 - 2 - 6	N/A	2 - 3	2 - 5 - 7
Port Bradfield	2	N/A	1 - 2 - 3	2 - 5 - 7	2	N/A	2	2 - 5 - 7	1 - 2 - 6	N/A	2 - 3	2 - 5 - 7
Port Mackenzie	2	N/A	1 - 2 - 3	2 - 5 - 7	2	N/A	2	2 - 5 - 7	1 - 2 - 6	N/A	2 - 3	2 - 5 - 7
King Point	2	N/A	1 - 2 - 3	2 - 5 - 7	2	N/A	2 - 3	2 - 5 - 7	1 - 2 - 6	N/A	4 - 5 - 6	2 - 5 - 7
Other North	2	N/A	N/A	2 - 5 - 7	2	N/A	N/A	2 - 5 - 7	1 - 2 - 6	N/A	N/A	2 - 5 - 7

Key

- Infeasible Option
- Feasible Option
- Potential Option

Assessment Criteria	
1 - Capacity	5 - Environmental Considerations
2 - Transportation Costs	6 - Community Acceptability
3 - Capital Intensity	7 - Proven Technology
4 - Consistency with Local Plans	N/A - Not Available

As indicated in Exhibits 5-4 and 5-5, the following options appear to hold the most option for further consideration.

- **Short Term** – Truck shipment of inbound and outbound goods through Haines, Skagway and Stewart, depending on the relative advantage of each port for each potential movement. Some consideration could also be given to utilizing the White Pass and Yukon Railway for outbound mineral concentrate movements.
- **Medium Term** – Further truck shipment of inbound and outbound goods through Haines, Skagway and Stewart as well as utilizing the White Pass and Yukon Railway for outbound mineral concentrate and potentially small volume coal movements.
- **Long Term** – Standard Gauge Rail to Haines.

It should be noted that these options build on each other, i.e., small volumes of mineral concentrate would continue to move by truck to Skagway, Haines or Stewart, while larger volumes of iron ore and coal could move to Haines by rail. These options are described and evaluated in more detail in the following chapters of this report.

Further work is expected to be completed on the Alaska Canada Rail Link Study that may provide further information on the viability of standard gauge rail service along the existing White Pass & Yukon Route. As this option is still under review, it is not considered further in this report.

6. DESCRIPTION OF PREFERRED OPTIONS

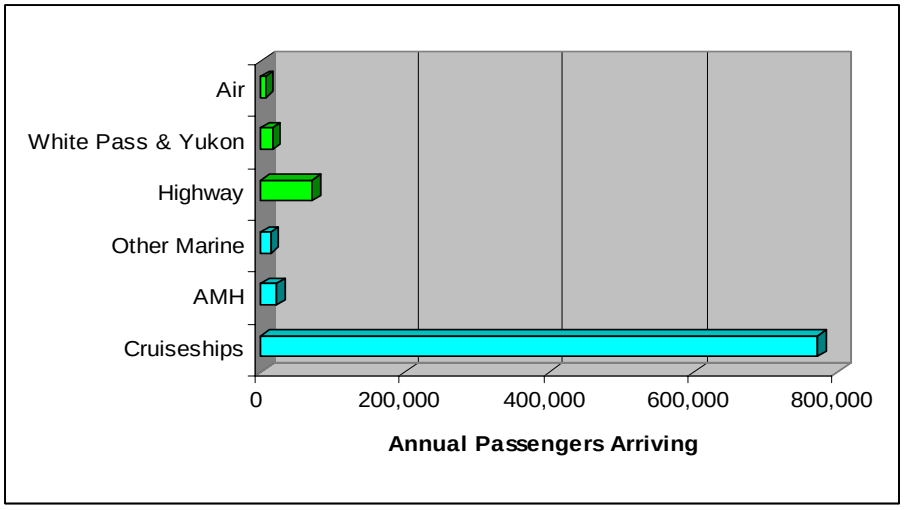
This chapter provides details of the preferred (feasible) port options (Skagway, Haines and Stewart) that were identified in Chapter 5 of this report. Each option is described in terms of infrastructure requirements, capital and operating costs and a high level indication of some of the key issues. These issues are dealt with in greater detail in later chapters of this report or in the companion report on the environmental, regulatory and land use implications of the Yukon Ports Access Strategy.

6.1 Skagway

The Port of Skagway offers the opportunity to utilize a pre-existing network of roads, rail line and port facilities that are sufficient to handle export volumes of up to about 3 million tonnes of mineral concentrates and coal. The port can also handle ongoing volumes of re-supply traffic and project traffic, particularly related to pipeline construction programs. In this respect Skagway can be characterized as the low to moderate volume option, and can be developed very quickly.

A key consideration is that the necessary infrastructure for the industrial traffic can't significantly impact on the tourism and cruise ship activities that are important to the economic vitality of the City. The importance of this consideration is evident in the volume of tourist traffic through the port, as indicated in Exhibit 6-1.

Exhibit 6-1
Passengers Arriving in Skagway - 2004



As indicated in this exhibit, cruise ship passengers volumes are very significant, and also contribute to volumes on some of the other modes, though this latter effect is not included in the exhibit.

Exhibit 6-2 below and the following text provide an indication of the constraints to port development posed by this cruise ship traffic.

Exhibit 6-2
Marine Facilities in Port of Skagway

The existing marine facilities are currently utilized as follows:

- **Railway Dock** – Dedicated to cruise ship activities and capable of berthing two of the largest cruise ships operating to Alaska could also be sued for other traffic during the off-season (e.g. pipeline construction materials).
- **Broadway Dock** – Contains one cruise ship berth and the Alaska Marine Highway ferry dock. Occasionally used for other traffic as well.
- **Ore Dock –** Currently used by Alaska Marine Lines for intermodal cargo, for fuel products re-supply and as a cruise ship berth. The footprint of the old concentrate shed and the ship loader are currently on site, though not currently used.

The current marine facilities in Skagway are not conducive to the movement of significant volumes of bulk traffic:

- The Ore Dock is currently used as a cruise ship berth during the five month cruise ship season and this traffic has the priority on its use during that period.
- The old concentrate shed has been demolished and it is not clear that the existing ship loader is suitable for future operations.
- The use of the Ore Dock for future concentrate and coal shipments could cause conflicts between pedestrian and vehicle traffic associated with the cruise ships, and truck and/or rail traffic associated with the movement of bulk commodities.
- It may be difficult to handle concentrates and coal within the footprint of the old concentrates facility and associated leased area.
- It is not clear that AMH fully utilizes the space at the existing vehicle holding facility for the ferry.

Existing facilities, including the Ore Dock (north end) and the Railway Dock are expected to be sufficient for future re-supply traffic as well as project-related traffic (e.g., Alaska Highway Gas Pipeline).

6.1.1 Long Term Port Development Concept

For a variety of reasons, including the desirability of separating industrial and tourism traffic, making better utilization of existing space and consolidating industrial traffic away from the waterfront adjacent to the commercial area of Skagway, a long term port development concept has been defined, the key elements of which include:

- Creation of a dedicated concentrate and coal shipment facility on the existing ore dock.
- Potential development of a truck dump near the Skagway River Bridge and a conveyor to move coal and/or concentrate along either the east or west side of the airport to the Ore Dock. Alternatively, a rail dump facility for coal shipments and a closed storage shed could be located further north in the Skagway Valley, potentially on the old “Russell Metals” site.
- Movement of the Alaska Marine Highway ferry operation to the south-east corner of the Ore Dock.
- Redevelopment of the Broadway Dock with an additional cruise ship berth, a dedicated marshalling area for buses for both berths and other associated facilities.

Under this scenario, the waterfront would look like the conceptual layout in Exhibit 6-3. This layout shows the largest cruiseship currently in service at the new cruise ship dock.

Exhibit 6-3
Port of Skagway – Long Term Conceptual Layout

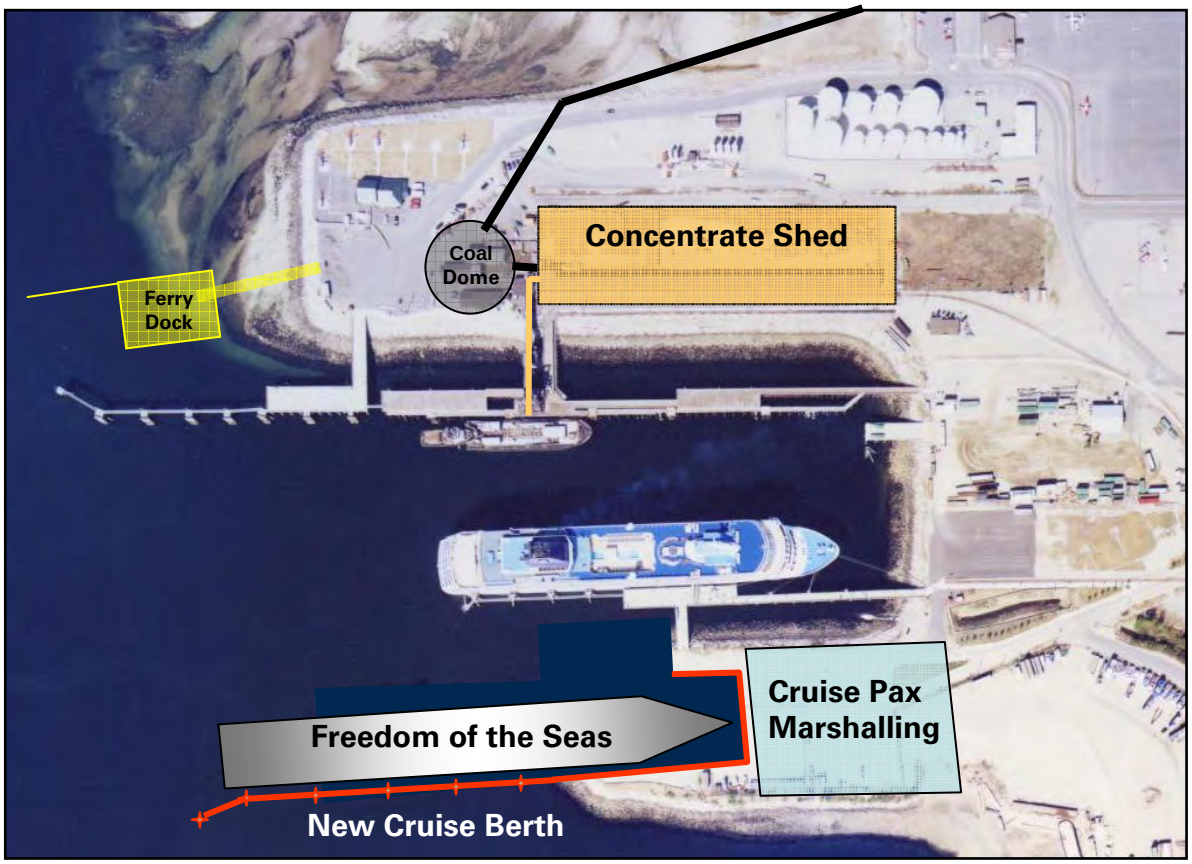
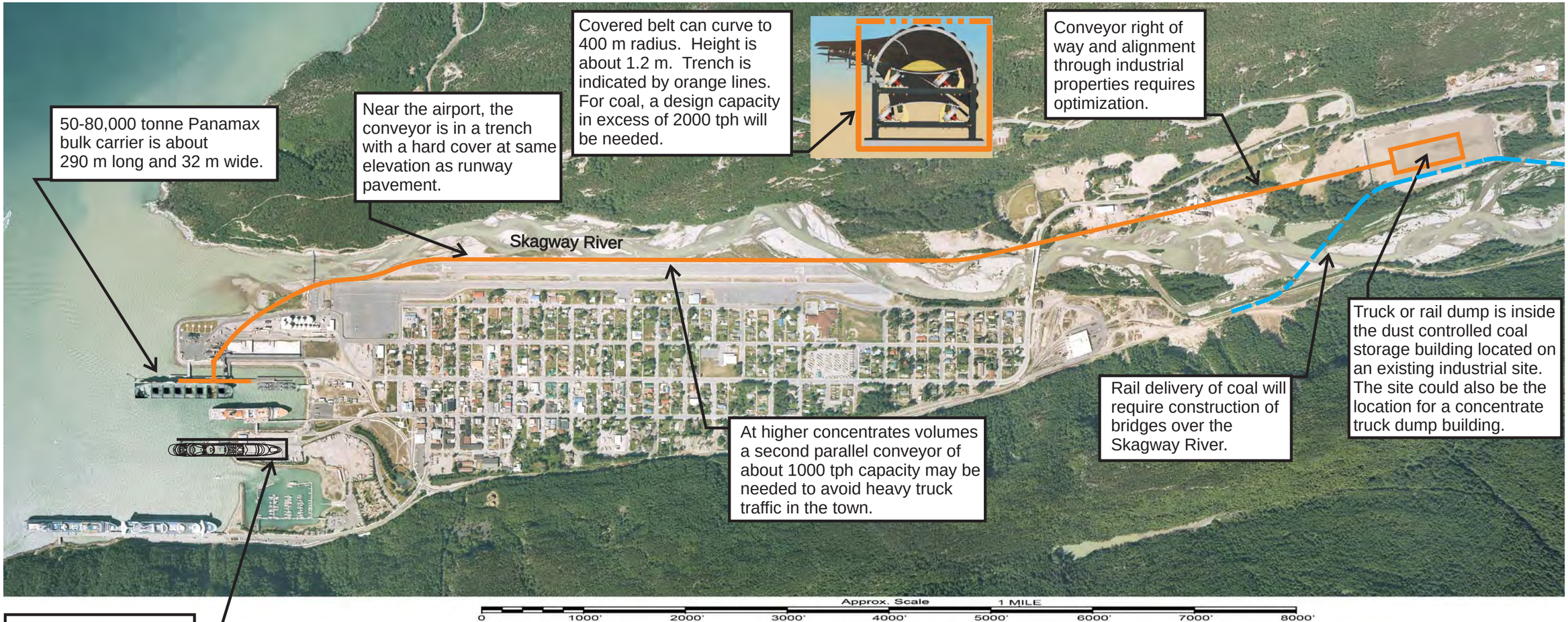


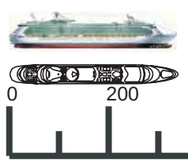
Exhibit 6-4 on the following page contains a more detailed presentation of this concept. Exhibit 6-5 illustrates that the same level of detail can alternate arrangement of coal. The two options for the movement of coal are discussed in more detail in Section 6.1.3 of this report.

WPYR has also given consideration to an additional option that would involve construction of a new cruise ship berth at the south end of the Railway Dock on their property. This option has not been reviewed in this report, however it would mitigate the need to move the Ferry Dock. The impact on the two scenarios shown in Exhibits 6-4 and 6-5 would only be on the ferry and cruise operations, not on the concentrate or coal operations - the principal focus of this report.

Exhibit 6-4: Port of Skagway - Detailed Long Term Conceptual Layout



339 m
Freedom of the Seas loa 339 m, beam 38 m
Ship is shown to scale at new cruise wharf. Alaska ferry terminal is removed.



Project: Yukon Port Access Study			Deep Sea Bulk Shipping Concept for Coal via Deep Sea Vessel
Scale: 1 :: 12,000	Date: 27/06/06	Dwg # 2	Client: Yukon Economic Development

Notes:
Coal can be delivered to the coal storage building by truck or rail. Coal is conveyed from the coal storage building to a travelling shiploader at the concentrate berth. Concentrates trucks can deliver directly to the concentrate terminal or to a truck dump near the coal storage building. Cruise ships no longer use the concentrate berth. They use a new dedicated cruise berth.

Prepared by:

Lauga & Associates Consulting Ltd.
www.port-plan.com

Yukon Government

Exhibit 6-5: Port of Skagway - Alternative Arrangement for Coal

Ferry Columbia at new terminal
loa 127 m
beam 26 m
(Not required if Juneau to Skagway highway is built.)

Covered 1000 tph conveyor in trench with hard cover at same elevation as runway pavement. (Optional 2nd conveyor for concentrates shown by dashed line.)

Skagway River

Covered belt can curve to 400 m radius. Height is about 1.2 m. Trench is indicated by orange lines.

Underground "beltavator" conveyor facilitates vehicle traffic.

Covered 15,000 tonne coal storage dome about 41 m diameter

Coal truck dump is inside dust control building located upstream or downstream from highway bridge.

10,000 tonne self-unloading coal barge links to coal terminal in Haines.
loa 138 m, beam 32 m

Truck dump building with cladding to suit historic styles. Exact location to be determined; location options are shown.

339 m
Freedom of the Seas
loa 339 m, beam 38 m
Ship is shown to scale at new cruise wharf. Alaska ferry terminal is removed.

0 200 400 600 800 1000 metres

Project: Yukon Port Access Study			Bulk Shipping Concept for Coal via Barge and for Mineral Concentrates
Scale: 1 :: 8,000	Date: 27/06/06	Dwg # 1	Client: Yukon Economic Development

Notes:
Coal is received at enclosed truck dump building and conveyed to coal storage dome. Concentrates are trucked directly to terminal. High truck traffic may require that a second conveyor for concentrates be built. Cruise ships no longer use concentrate berth; they use a new dedicated cruise berth.

Prepared by:
Lauga & Associates Consulting Ltd.
www.port-plan.com

Yukon Government

6.1.2 Port Development Phasing

It is highly unlikely that the full development contemplated would be required in the short term. It is possible to phase the development such that the required infrastructure is delivered on a just-in-time basis. Accordingly, a series of development scenarios have been developed and are presented in Exhibit 6-6. The short description of each of these scenarios is as follows:

- **Scenario 1 – Low Volume Concentrates** – This scenario involves upgrading the existing ore loader, constructing a concentrate storage shed and building an enclosed truck dumper. Investigation of the status and acceptability of the ship loading system and dock is required. If either of these need replacing or repair, project scope and cost could increase significantly. All of this could be accomplished on the site of the old concentrate facility at the Ore Dock.

- **Scenario 2 – Moderate Volume Concentrates** – This scenario would require an upgraded vessel loading system (and perhaps associated improvements to the dock) and further expansion of the concentrate storage facility developed in Scenario 1. All of this could be accomplished on the site of the old concentrate facility at the Ore Dock.

- **Scenario 3 – Moderate Volume Concentrates Plus Coal** – This scenario adds a significant volume of coal to the volume of concentrates contemplated in Scenario 2. New infrastructure required includes a coal storage shed, barge or ship loader, truck or rail dump and conveyor system from the truck or rail dump (near the Skagway River Bridge or at the "Russell Metals" site) to the coal shed. The conveyor is required due to the significant volume of trucks or rail cars that would otherwise have to move through the town to the Ore Dock. This scenario may not be able to be contained completely within the footprint of the old concentrate facility and may start to impinge on cruise ship operations at the Ore Dock. Accordingly, at this point, a new cruise dock is required.

- **Scenario 4 – High Volume Concentrates** – This scenario would require an upgraded vessel loading system (and perhaps associated improvements to the dock) and further expansion of the concentrate storage facility developed in Scenario 1. All of this could be accomplished on the site of the old concentrate facility at the Ore Dock. Due to the significant number of trucks associated with the volume of concentrates being moved, this scenario contemplates the construction of a truck dump (near the Skagway River Bridge) and a conveyor to move at least some of the concentrates to the Ore Dock.

- **Scenario 5 – High Volume Concentrates Plus Coal** – This scenario adds a significant volume of coal to the volume of concentrates contemplated in Scenario 4. New

infrastructure required includes a coal storage shed, barge or ship loader, truck or rail dump and conveyor system from the truck or rail dump (near the Skagway River Bridge or at the "Russell Metals" site) to the coal shed. The conveyor is required due to the significant volume of trucks or rail cars that would otherwise have to move through the town to the Ore Dock. This scenario may not be able to be contained completely within the footprint of the old concentrate facility and could significantly impinge on cruise ship operations at the Ore Dock. Accordingly, at this point, a new cruise dock is required.

Scenarios 3 and 5 could potentially justify the reinstitution of rail freight service to reduce the number of trucks on the highway. The costs associated with reinstituting rail service are not included in the cost analysis. The cost of rail service is not likely to reduce the costs of shipping either coal or concentrate to Skagway. The decision to proceed with narrow gauge rail freight service would be based on reducing impacts of the traffic on the highway and border crossings.

There are a number of options for port development to proceed involving movement from one scenario to another. This report does not predict the timing of this development or the final outcome on port development. The concept is flexible and can deal with whatever happens in the future within the bounds of the overall development.

6.1.3 Alternative Coal Development Concepts

Two distinctly different concepts for the movement of coal through Skagway have been identified as follows:

C1 – Barge Based System

The solution entails the following:

- Movement of coal by tug and barge from the Ore Dock to a transshipment facility in Haines. The typical shipment size via the tug and barge system would be in the order of 8,000 to 10,000 tonnes.
- Upgrading the dock to handle a new barge loading system for coal.
- Construction of a coal dome capable of storing about 15,000 tonnes of coal (either to the north or south of the footprint of the old concentrate shed).
- Construction of a truck dump near the Skagway River Bridge.
- Construction of a conveyor to move coal from the truck dump to the coal dome.

- Construction of a coal transshipment facility in Haines (potential locations include the old tank farm or the Chilkoot Lumber site). The coal would be unloaded to an open-air storage area and accumulated until sufficient volume warranted movement by deepsea vessel.

The capital cost associated with the infrastructure to be built in Skagway is estimated at $42 million.

C2 – Deepsea Vessel Based System

The solution entails the following:

- Movement of coal in Panamax size vessels from the Ore Dock directly to markets potentially in shipment sizes of 60,000 to 80,000 tonnes.
- Potential upgrades to the dock to accommodate larger vessels than contemplated in any of the scenarios discussed in Section 6.1.2 above.
- Construction of a large coal storage facility further up the Skagway Valley – possibly at the old "Russell Metals" site.
- Construction of a rail dump facility at the coal storage facility.
- Construction of two new rail bridges over the Skagway River to accommodate easy access/egress to the site and a short segment of track through the unloading facility.
- Construction of a higher speed (capacity), longer conveyor from the coal storage facility to the Ore Dock to facilitate loading of the deepsea vessels.
- Construction of a surge storage facility on the Ore Dock and a new quadrant ship loader.

The capital cost associated with the infrastructure to be built in Skagway is estimated at $114 million[32]. This is $72 million higher than that contemplated in Concept C1.

6.1.4 Critical Success Factors

For port development to proceed as proposed above, a number of critical success factors must be addressed, as follows:

- Public and municipal acceptance of the concept must be achieved.
- The solution must be affordable and fair for shippers.
- The necessary financing must be available.

[32]Based on capital costs associated with development of coal handling from the *Southern Yukon and Port of Skagway Analysis – Final Report*, Pacific Contract Company LLC, March, 2006 and work undertaken by the KPMG team. No provision is included for the purchase of the necessary land or the additional infrastructure in Haines.

- All of the permits and processes related to construction and operation of the proposed facilities must be received.
- For scenarios 3 and 5, four additional success factors must be addressed:
    - The State of Alaska and Alaska Marine Highway must agree to the move of the ferry terminal.
    - A new cruise ship berth must be funded and built.
    - A land swap must occur between the State of Alaska, City of Skagway and White Pass & Yukon Route.
    - Approval of the construction and operation of a transshipment facility in Haines must be received.

Exhibit 6-6
Potential Scenarios for Port Development in Skagway

Scenario	Throughput (Commodity & Volume)	Key Infrastructure Elements	Capital Cost (Million)	Principal Commercial Parties	Impacts and Issues
1	Concentrates – 100,000 tonnes	Truck Dumper (at terminal) Concentrate Shed (30,000 square feet – about 1/3 the size of the old building) Shiploader (new or rebuilt) Or Same as above with a new traveling shiploader and upgrade to the wharf	$3 - $5 (AIDEA estimate) Or $14 - 16 million	AIDEA Mining Companies	• **Footprint** – All operations will occur within the footprint of the old concentrate facility. • **Truck Traffic** –Small number of trucks operating on city streets (6 to 8 loaded trucks per day – Monday to Friday basis). No issues expected on the highway or at the border crossing due to the low volumes. • **Rail Traffic** – None • **Marine Traffic** – One ship or so per month – should not affect cruise operations due to the ability to quickly load the expected small shipment parcels. • **Noise** – Mostly due to trucks • **Dust** – Potential dust issue if shiploader is not rebuilt or replaced. Trucks may have to be run through an enclosed truck wash to remove dust that could blow off on their return journey through town (this is used at the Red Dog Mine). • **Environment** – Likely insignificant other than concentrate dust issue. • **Employment –** 8 to 10 in trucking and 5 to 8 in terminal.
2	Concentrates – 500,000 tonnes	Truck Dumper (at terminal) Concentrate Shed (100,000 square feet – same size as the old building) Shiploader (new traveling loader) Wharf upgrade	$22 million	AIDEA Mining Companies	• **Footprint** – All operations will occur within the footprint of the old concentrate facility. If dock needs to be replaced or repaired to handle new loader, then construction will occur. • **Truck Traffic** –Large number of trucks operating on city streets (30 to 40 loaded trucks per day – Monday to Friday basis). May be resistance from City residents to this level of traffic. Potential occasional traffic issues on the highway and at the border crossing (peak periods only). • **Rail Traffic** – None • **Marine Traffic** – 3 to 4 ships per month – should not affect cruise operations due to the ability to quickly load the expected small shipment parcels. • **Noise** – Mostly due to trucks, though terminal being used for ship loading more often.

Scenario	Throughput (Commodity & Volume)	Key Infrastructure Elements	Capital Cost (Million)	Principal Commercial Parties	Impacts and Issues
					• **Dust** – Dust should not be an issue if shiploader is replaced or rebuilt. Trucks may have to be run through an enclosed truck wash to remove dust that could blow off on their return journey through town (this is used at the Red Dog Mine). • **Environment** – Impact of driving new piles and rebuilding the wharf may require studies and permits due to potential to disturb the seabed (which suffers from historical contamination). • **Employment –** 40 to 50 in trucking and 10 to 15 in terminal.
3	Concentrates – 500,000 tonnes Coal – 1,000,000 + tonnes	Truck Dumper (at terminal) Concentrate Shed (100,000 square feet – same size as the old building). Shiploader for concentrates (new traveling loader) Coal Dome & Coal Barge Loader Cruise Ship Dock 2.5 Kilometre Bypass Conveyor Rail or Truck Dumper **Total** **Or** Truck Dumper (at terminal) Concentrate Shed (100,000 square feet – same size as the old building). Shiploader for	$22 million $20 million $14 million $6 million $2 million **$64 million** $22 million	AIDEA City of Skagway White Pass Mining Companies Alaska DoT	• **Footprint** – While the coal dome can physically fit within the footprint of the AIDEA lease, there will need to be operations associated with the delivery of coal off-site. Potential options include: ▪ Rail operations to the dock (unlikely) ▪ Rail operations to a dumping facility near the existing WP&YR railyard ▪ Truck operation to a dumping facility near the Skagway River Bridge Both of the latter options require the construction of a conveyor • **Truck Traffic** –Very large number of trucks if everything arrives by truck (concentrates – 30 to 40 loaded trucks per day, coal – 60 to 80 loaded trucks per day, Monday to Friday basis). This level of truck traffic through the City could be expected to encounter significant local opposition. Could cause delays on the highway and border crossings during peak periods. • **Rail Traffic** – If rail is used, would result in about 3 short (35 car) trains per day, Monday to Friday basis. During the cruise ship season freight rail operations would be at night and would cause some noise and vibration issues. During the balance of the season, this would occur during the day. • **Marine Traffic** – 3 to 4 ships per month for concentrates and 8 to 10 barges per month (or 1-2 ships per month) for coal combined with existing AML and fuel barge use of the Ore Dock. This may start to create issues for the cruise ship operations in terms of scheduling time at the docks. This scenario would likely require moving the existing Alaska Marine Highways terminal and dock and building a new cruise

Scenario	Throughput (Commodity & Volume)	Key Infrastructure Elements	Capital Cost (Million)	Principal Commercial Parties	Impacts and Issues
		concentrates (new traveling loader) Coal Shed Dock Improvement & Coal Ship Loader Cruise Ship Dock 4.0 Kilometre Bypass Conveyor Rail Dumper Rail Bridges/Track Other **Total**	 $10 million $15 million $14 million $17 million $13 million $14 million $31 million **$136 million**		ship dock in its place. • **Conveyor –** The conveyor will be used to move either the coal and/or concentrate from the area of the Skagway River Bridge to the Ore Dock. While there would be some aesthetic and low level noise impacts, the conveyor would significantly reduce truck traffic moving through the town to the Ore Dock. The conveyor would run in the trench beside the runway or taxiway at the airport or alternatively on the west side of the Skagway River, and according to the Federal Aviation Administration should not be an impediment to aviation if properly designed and constructed. • **Noise** – From all aspects of the operation – truck, rail and terminal • **Dust** – Dust should not be an issue if the shiploaders are built to minimize dust and truck/rail dumpers are fully enclosed. Rail dumper might be more problematic, depending on rail car technology being used. Trucks may have to be run through an enclosed truck wash to remove dust that could blow off on their return journey through town (this is used at the Red Dog Mine). • **Environment** – Potential environmental/historical area issues related to need to reconstruct the wharf to handle two new shiploading systems, the construction of the conveyor along the river and potentially with the truck/rail dumper • **Employment –** 40 to 50 in trucking if only concentrate moves by truck or up to 120 to 150 if coal also moves by truck. Rail Operations would require about 25 to 30. Terminal operations would require 20 to 25. • **Land Use** – Will require a land swap amongst the principal parties to facilitate construction of the cruise ship dock and relocation of the ferry terminal. Potential impact in Haines as well if transshipment facility is built.
4	Concentrates – 1,000,000 + tonnes	Truck Dumper (at terminal) Concentrate Shed (100,000 square feet – same size as the old building) Shiploader for concentrates	$22 million	AIDEA City of Skagway White Pass Mining	• **Footprint** – Terminal operations can be handled within the existing AIDEA footprint, but a new conveyor and truck dumping facility would be built adjacent to the airport and Skagway River • **Truck Traffic** – Large number of trucks operating on city

Scenario	Throughput (Commodity & Volume)	Key Infrastructure Elements	Capital Cost (Million)	Principal Commercial Parties	Impacts and Issues
		(new traveling loader) 2.5 Kilometre Bypass Conveyor Truck Dumper for Conveyor **Total**	 $6 million $2 million **$30 million**	Companies	streets (60 to 80 loaded trucks per day – Monday to Friday) • **Rail Traffic** – none • **Marine Traffic** – 6 to 8 ships per month – May have a moderate impact on cruise operations resulting in the need to anchor the bulk carriers in Lutak Inlet for short periods of time • **Conveyor –** The conveyor will be used to move either the coal or concentrate from the area of the Skagway River Bridge to the Ore Dock. While there would be some aesthetic and low level noise impacts, the conveyor would significantly reduce truck traffic moving through the town to the Ore Dock. The conveyor would run in the trench beside the runway or taxiway at the airport or alternatively on the west side of the Skagway River, and according to the Federal Aviation Administration should not be an impediment to aviation if properly designed and constructed. • **Noise** – Mostly due to trucks • **Dust** – Dust should not be an issue if shiploader is rebuilt or replaced. Trucks may have to be run through an enclosed truck wash to remove dust that could blow off on their return journey through town (this is used at the Red Dog Mine). • **Environment** – Impact of driving new piles and rebuilding the wharf may require studies and permits due to potential to disturb the seabed (which suffers from historical contamination). The construction of the conveyor adjacent to the runway or river may cause environmental concerns as well as historical area concerns. • **Employment –** 80 to 100 in trucking and 15 to 20 in terminal operations.
5	Concentrates – 1,000,000 + tonnes Coal – 1,000,000 + tonnes	Truck Dumper (at terminal) Concentrate Shed (100,000 square feet – same size as the old building) Shiploader for concentrates (new traveling loader)	$22 million	AIDEA City of Skagway White Pass Mining Companies Alaska DoT	• **Footprint** – While the coal dome can physically fit within the footprint of the AIDEA lease, there will need to be operations associated with the delivery of coal and potentially concentrates off-site. Potential options include: ▪ Rail operations to the dock (unlikely) ▪ Rail operations to a dumping facility near the existing WP&YR railyard ▪ Truck operation to a dumping facility near the Skagway

Scenario	Throughput (Commodity & Volume)	Key Infrastructure Elements	Capital Cost (Million)	Principal Commercial Parties	Impacts and Issues
		Coal Dome Coal Barge Loader Cruise Ship Dock 2 X 2.5 Kilometre Bypass Conveyor 2 X Truck Dumper **Total** **Or** Truck Dumper (at terminal) Concentrate Shed (100,000 square feet – same size as the old building) 2.5 Kilometre Concentrate Bypass Conveyor Concentrate Truck Dump Coal Shed Dock Improvement & Coal Ship Loader Cruise Ship Dock 4.0 Kilometre Coal Bypass Conveyor Rail Dumper Rail Bridges/Track	 $20 million $14 million $12 million $4 million **$72 million** $22 million $6 million $2 million $10 million $15 million $14 million $17 million $13 million $14 million		River Bridge Both of the latter options require the construction of a conveyor. Given the volumes, two conveyors will be required. • **Truck Traffic** –Very large number of trucks if everything arrives by truck (concentrates – 60 to 80 loaded trucks per day, coal – 60 to 80 loaded trucks per day, Monday to Friday basis). This level of truck traffic through the City could be expected to encounter significant local opposition. Could cause delays on the highway and border crossings during peak periods. • **Rail Traffic** – If rail is used, would result in about 3 short (35 car) trains per day, Monday to Friday basis. During the cruise ship season freight rail operations would be at night and would cause some noise and vibration issues. During the balance of the season, this would occur during the day. • **Marine Traffic** – 6 to 8 ships per month for concentrates and 8 to 10 barges per month (or 1-2 ships per month) for coal combined with existing AML and fuel barge use of the Ore Dock. This would create issues for the cruise ship operations in terms of scheduling time at the docks. This scenario would likely require moving the existing Alaska Marine Highways terminal and dock and building a new cruise ship dock in its place. • **Conveyor –** The conveyor will be used to move either the coal or concentrate from the area of the Skagway River Bridge to the Ore Dock. While there would be some aesthetic and low level noise impacts, the conveyor would significantly reduce truck traffic moving through the town to the Ore Dock. The conveyor would run in the trench beside the runway or taxiway at the airport or alternatively on the west side of the Skagway River, and according to the Federal Aviation Administration should not be an impediment to aviation if properly designed and constructed. • **Noise** – From all aspects of the operation – truck, rail and terminal. • **Dust** – Dust should not be an issue if the shiploaders are built to minimize dust and truck/rail dumpers are fully enclosed. Rail dumper might be more problematic, depending on rail car

Scenario	Throughput (Commodity & Volume)	Key Infrastructure Elements	Capital Cost (Million)	Principal Commercial Parties	Impacts and Issues
		Other **Total**	$31 million **$144 million**		technology being used. Trucks may have to be run through an enclosed truck wash to remove dust that could blow off on their return journey through town (this is used at the Red Dog Mine). • **Environment** – Potential environmental/historical area issues related to need to reconstruct the wharf to handle two new shiploading systems, the construction of the conveyor along the river and potentially with the truck/rail dumper • **Employment –** 80 to 100 in trucking if only concentrate moves by truck or up to 160 to 200 if coal also moves by truck. Rail Operations would require about 25 to 30. Terminal operations would require 25 to 30. • **Land Use** – Will require a land swap amongst the principal parties to facilitate construction of the cruise ship dock and relocation of the ferry terminal. Potential impact in Haines as well if transshipment facility is built.

6.2 Haines

Haines provides perhaps the greatest potential of the options for the development of a port facility to handle larger volumes of products such as iron ore and coal, the development period for which is in the longer term. Haines can also play a role in handling smaller volumes of concentrates, but the geographic disadvantage (i.e., distance to potential mines) is a hindrance to the actualization of this potential role. Notwithstanding this issue, there is a potential to handle small quantities of mineral concentrates through either the Municipal Dock or the Chilkoot Lumber Dock.

Haines is also well positioned for a potential role in the supply of pipe and other supplies for the construction of the Alaska Highway Gas Pipeline, particularly those construction spreads west of Whitehorse. Existing marine terminals could be easily modified for this freight.

6.2.1 Long Term Development Concept

The long term development concept for Haines is based on the utilization of the old Army Fuel Tank Farm as a site for a major bulk terminal for either coal or iron ore. This site is about 200 acres in size, is relatively flat and can easily access the foreshore for the loading of deep sea vessels. The proposed rail route is shown in Exhibit 6-7 while the conceptual layout for the facility is shown in Exhibit 6-8.

The estimated cost of construction of this terminal and associated railway linkage to the mineral deposits in northeastern Yukon are as follows:

- **Port Facilities** – **$1.3 billion** (based on original costs for construction of Ridley Terminals in Prince Rupert ($250 million in 1984) and adjusted for difference in relative size, inflation over 22 years, northern construction premium of 25 percent and contingencies of 20 percent).
- **Rail Line** – **$5.4 billion** (based on an estimated route of about 900 kilometres and an average cost of construction of $6 million per kilometer – derived from rail construction cost estimates prepared for the Alaska Canada Rail Link Study using the higher end of the range due to the extreme topography to be negotiated by the railway). It is likely that this cost could be significantly higher due to the difficult topography that the line would have to traverse.

Exhibit 6-7
Rail Route to Haines

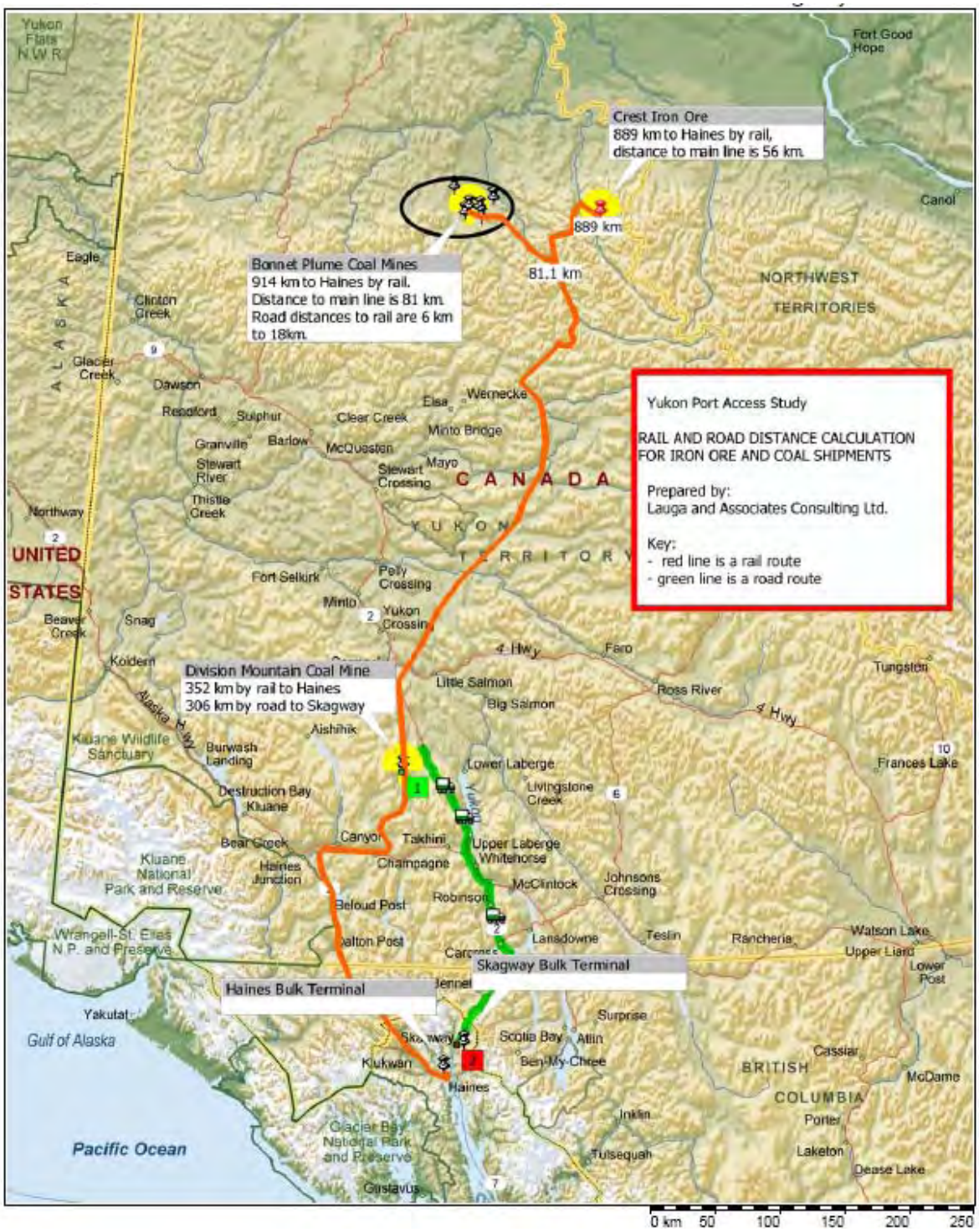
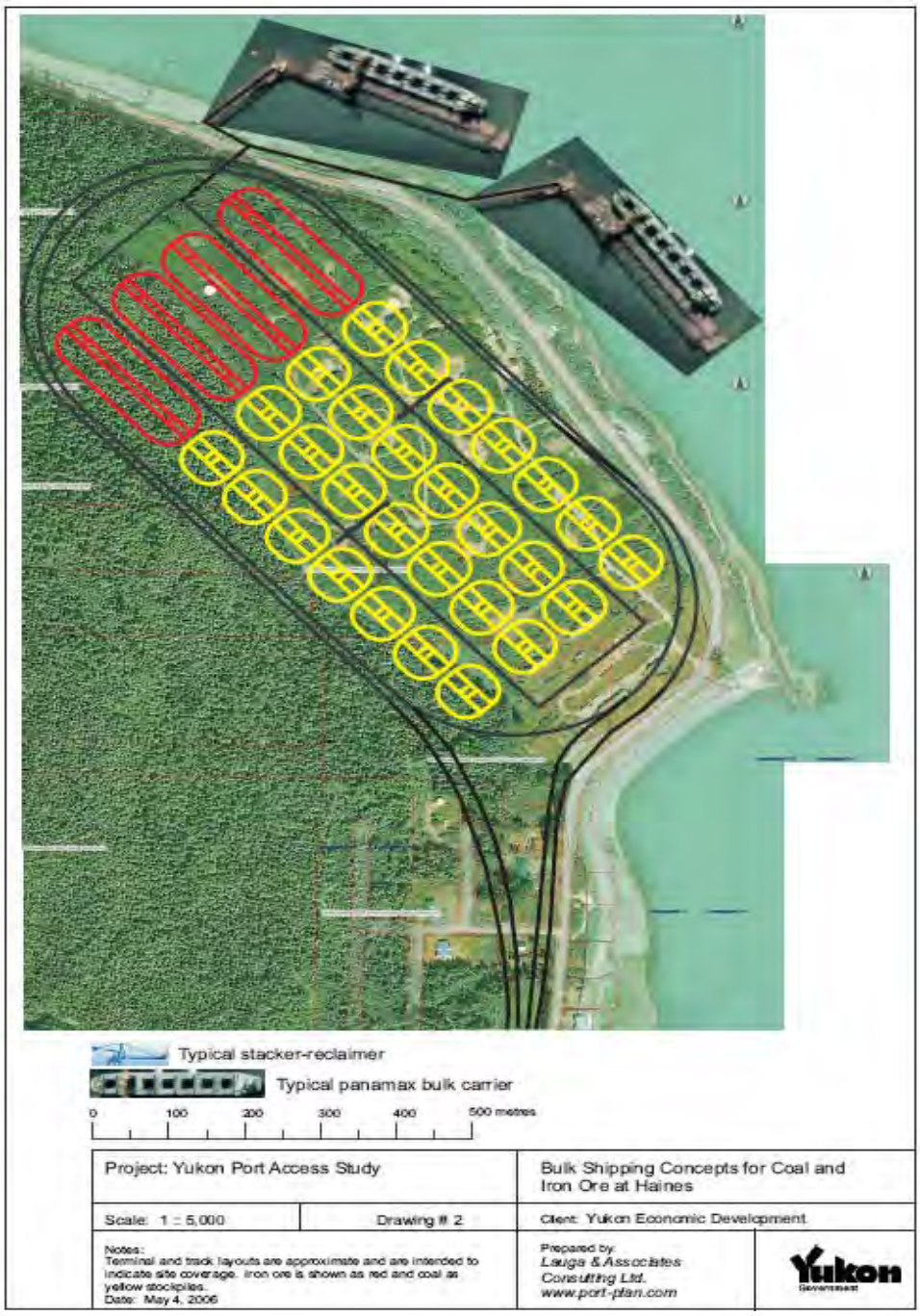


Figure 6-8
Conceptual Port Layout for Haines



The principal issues with this development include:

- The need for rail access – truck access is impractical for the potential volumes of coal and iron ore being contemplated. The rail line would have to pass through Haines Borough and follow the Chilkat River Valley before going up through the mountains to the Yukon. There are potential issues related to sensitive environmental habitat, municipal impacts (noise, traffic, etc.) and impacts on local adventure recreation activities.
- Dust from the loading and unloading of coal in particular (appropriate dust suppression technology is available to mitigate this issue).
- The impact of ship loading and navigation on local recreational and commercial fishing.
- Community acceptability of a major industrial facility.

The regulatory, land-use and environmental issues are discussed in more detail in the companion report to this document.

6.2.2 Short Term Development Concept

As noted in Section 6.1, one of the options for moving coal through Skagway involves transshipment through Haines. This would require:

- Development of an open-air storage site – options include the Chilkoot Lumber site or the old tank farm site. If the long term development option is viable, it would make sense to use part of the tank farm site in the nearer term for this transshipped coal.
- Construction of a new berth for barges and deepsea vessels.
- Installation of conveyors and associated systems for offloading barges and loading deepsea vessels.

This option requires more detailed examination once the potential viability of the development of the Division Mountain coal resource is confirmed. The infrastructure could cost in the order of $40 to $50 million.

6.2.3 Critical Success Factors

For port development to proceed as proposed above, a number of critical success factors must be addressed, as follows:

- Public and municipal acceptance of the concept must be achieved.
- A right-of-way for a potential rail line must be identified and protected for future development.
- The site for the bulk terminal must be remediated and protected for future industrial development.

- The solution must be affordable and fair for shippers.
- The necessary financing must be available.
- A detailed feasibility study of the transshipment option should be completed.
- A detailed feasibility study of constructing and operating a rail line along the proposed alignment must be undertaken.
- All of the permits and processes related to construction and operation of the proposed facilities must be received.

Insofar as Haines is largely a long term solution (the mines that could potentially use the facility are a long way from being developed), there is time to do the detailed studies and planning. However, it is important now to protect the lands that would be required to access and operate the proposed facility. Haines Borough needs to be engaged and involved in this process.

6.3 Stewart

The Port of Stewart is a case of a port with an existing facility operated by the private sector with sufficient capacity to expand in response to market demand. It is a minimum of 70 kilometres further from any of the potential mines in the Yukon than is Skagway and if the Tagish Road were available to commercial trucks; the distance disadvantage for Stewart would be 130 kilometres. This translates into a cost penalty of $8 to $15 per tonne due to higher trucking costs.

The Port of Stewart also has the potential to develop a new terminal at the end of the current jetty that could handle large volumes of products such as coal. In addition, a private developer has a plan for a major bulk terminal in Hyder, not far from Stewart Bulk Terminals. Neither of these terminals are likely to be of much use to mines in the Yukon, for the following reasons:

- The potential volumes of product from the Yukon are too low to justify significant investments in Stewart or Hyder; or
- The port is too far to be economically accessed from the Yukon by road: or
- Completion of the Alaska-Canada Rail Link would be required to handle the volumes being contemplated, including the construction of a rail spur to Stewart, to make the terminal accessible and economically viable.

In terms of the Yukon Ports Access strategy, no action is required as Stewart Bulk Terminals is ready to do business when required.

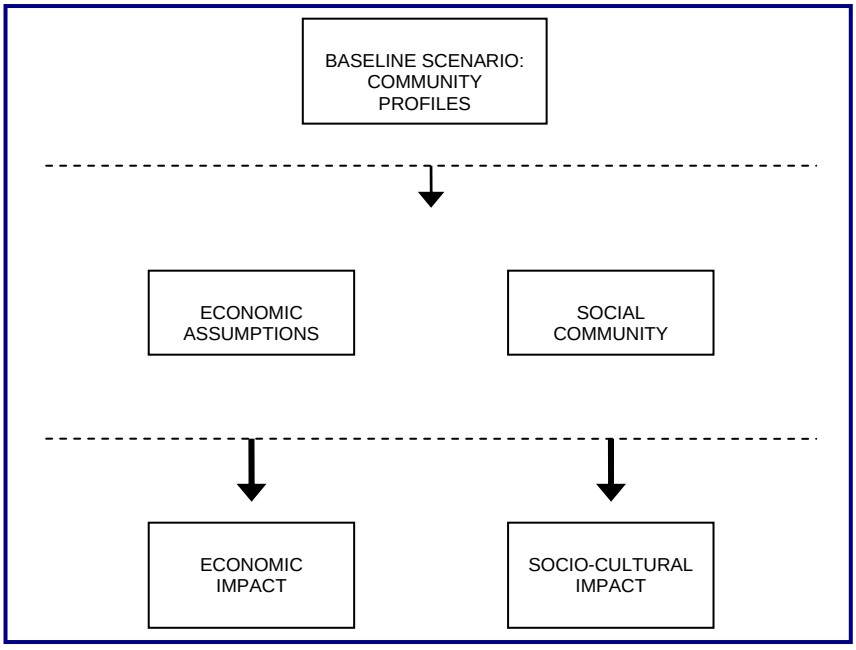
7. ECONOMIC & SOCIO-CULTURAL IMPACT OF THE PORT DEVELOPMENT OPTIONS

This chapter aims to identify and, where feasible, estimate the economic and socio-cultural impacts of the development of the Skagway or Haines ports. A baseline scenario forms the foundation of the conceptual framework that is used to model the impact. This framework supports several economic and socio-cultural assumptions. Section 1.1 outlines the theoretical framework of the impact analysis, followed by a description of the baseline scenario in Section 1.2 and supporting assumptions in Section 1.3. Sections 1.4 and 1.5 present the projected economic and socio-cultural impacts for the Yukon and Alaska, with the areas of Skagway and Haines in particular. Socio-cultural and economic impacts can either be positive (for example employment) or negative (for example noise). Although it may be possible to enhance the positive effects and reduce the negative effects, this study does not provide mitigation and enhancement measures to address these impacts.

7.1 Conceptual Framework

The main components of the conceptual framework developed for this study are depicted in Exhibit 7-1.

Exhibit 7-1
Conceptual Framework for Assessment of Socio-Economic Impacts



The evaluation presents the direct and indirect economic and socio-cultural impacts of the port development options. Direct impact is defined as the changes to a particular sector or community group, directly related to the expenditure in that sector or community group. Indirect (secondary)

impacts are defined as the changes in a sector or community group due to expenditure in another sector or community group.

As impacts are usually different during the construction phase and operation or life of the project, they will be identified separately for the port development options. It is implicit in this evaluation that some sectors or community groups will be (dis)advantaged more significantly than others.

It is important to note that the impacts of the port reconstruction will occur alongside the impacts of the increased mining activity in the Yukon; and these (economic) impacts will be similar in nature. Although this separation of effects will not be visible in reality, this section focuses on the port development impacts per se. For illustrative purposes, impact of the increased mining activity in the Yukon can be summed up as follows.

For every $100 million of output in the mining sector, the economic impacts would be as shown in Exhibit 7-2. For sake of comparison, Cash Minerals expects to produce coal with an annual value of about $100 million from its Division Mountain property.

Exhibit 7-2
Economic Impacts of $100 million of Mining Sector Output

Direct Impacts Within Yukon	
Wages and Salaries	$33,806,363
Supplementary Labour Income	$2,942,415
Mixed Labour Income	$3,415,177
Other Operating Surplus	$7,542,364
Indirect Taxes on Products	$1,019,345
Subsidies on Products	($461,275)
Subsidies on Production	$0
Indirect Taxes on Production	$1,170,385
Total GDP	$49,434,776
Output	$100,000,000
International Imports	$10,044,925
International Exports	$39,912,503
Employment (Full Time Equivalent Positions)	2,662

As indicated above, $100 million of mining output will create total direct and indirect employment of nearly 3,000 full-time equivalent jobs, $50 million of labour income, Yukon GDP of $66 million and over $3 million in taxes on productions.

Direct and Indirect Impact within Yukon	
Wages and Salaries	$41,855,319
Supplementary Labour Income	$3,907,381
Mixed Labour Income	$4,804,600
Other Operating Surplus	$13,064,225
Indirect Taxes on Products	$1,474,436
Subsidies on Products	($811,828)
Subsidies on Production	$0
Indirect Taxes on Production	$1,663,181
Total GDP	$65,957,315
Output	$131,124,633
International Imports	$12,244,393
Employment (Full Time Equivalent Positions)	2,956

7.2 Community Profiles

7.2.1 Skagway Social Community

Location – Skagway is located in the Skagway Recording District, 145 kilometres northeast of Juneau at the northernmost end of Lynn Canal, at the head of Taiya Inlet in Alaska. It lies 174 kilometres south of Whitehorse, just west of the British Columbian border of Canada. The community lies at approximately 59.458330° north latitude and -135.31389° west longitude.

Population Size – 834 people[33] (2005); over the summer months this number almost triples. According to a study by the City of Skagway (1999) 51 percent of the owners of visitor-related businesses are not year-round residents in Skagway. The population is made up as follows:

- Approx. 20% children and teenagers
- Approx. 40% people in the age range 18 – 44 years
- Approx. 30% people in the age range 45 – 64 years
- Approx. 10% people 65+ years

Culture – At present, Skagway is predominantly a tourist community, with many more residents in summer than in winter. Downtown buildings reflect the Chilkoot Pass gold rush history of the area. Although the Skagway community is recognized by the Bureau of Indian Affairs (“BIA”) as an "Alaska Native Village", it is not included in the Alaska Native Claims Settlement Act (“ANCSA”).

Recreation – Skagway has several parks and playgrounds, as well as one tennis court, a recreation centre, a two-lane bowling alley, an historical museum, an arcade and several camping

[33] http://www.dced.state.ak.us/dca/AEIS

facilities. Other recreational activities prominent in Skagway include fishing, hiking, biking, boating, cribbage, bingo, softball, ice skating, cross-country skiing and snowmobiling[34].

7.2.2 Skagway Economy

At present**,** Skagway's economy is driven by tourism. Over 900,000 cruise ship passengers and state ferry travelers visit Skagway each year. The Klondike Gold Rush Historical Park is a major attraction. The White Pass and Yukon Route railroad, originally constructed for mining, now operates for the tourist trade throughout the summer months. In addition, the famous Chilkoot Trail embarks from Skagway.

The public sector is the second largest segment of the Skagway economy. The National park service, City of Skagway, Skagway City School District, Department Of Homeland Security, and the Alaska Department of Transportation & Public Facilities employ approximately 30 percent of the year-round workforce. In addition, the transportation sector is an important economic sector. Transshipment of goods to and from the Yukon continues to be an important part of the economy. Trans-shipment of lead/zinc ore (in the past), fuel and freight occurs via the Port of Skagway and the Klondike Highway.

There are 5 churches, 1 library, 1 financial institution and approximately 250 hotel/motel rooms in 11 facilities in Skagway; only few of these are open year round.

Employment – According to the current Alaska Economic Information System, employment in Skagway is as follows:

Total Employment[35]:

- Total potential work force (age 16+): 705
- Total employment: 478 = 68%
- Percent unemployed & seeking work: 78 = 11%

Due to the seasonal nature of employment in Skagway, unemployment rates vary throughout the year. The monthly rates in the following table illustrate this.

AREA	January 2006 %	May 2005 %	July 2005 %	September 2005 %	November 2005 %
Skagway	11.7	9.0	6.6	6.8	19.9

(Source: Skagway Development Corporation)

[34] http://www.skagwaychamber.org
[35] Alaska Economic Information System – numbers for 2004

Employment by Occupation:

- Management, Professional & Related 104
- Service 78
- Sales & Office 157
- Farming, Fishing & Forestry 2
- Construction, Extraction & Maintenance 89
- Production, Transportation & Material Moving 45

Employment by Industry:

- Agriculture, Forestry, Fishing & Hunting, Mining 2
- Construction 69
- Manufacturing 0
- Wholesale Trade 5
- Retail Trade 68
- Transportation, Warehousing & Utilities 114
- Information 6
- Finance, Insurance, Real Estate, Rental & Leasing 14
- Professional, Scientific, Management, Administrative & Waste Mgmt ... 26
- Education, Health & Social Services 52
- Arts, Entertainment, Recreation, Accommodation & Food Services 74
- Other Services (Except Public Admin) 13
- Public Administration 32

GDP & Income – As it is not possible to isolate Skagway's personal income data from the Southeast region data available from the US Bureau of Economic Analysis, the following data pertaining to the Skagway community was taken from the 2000 US Census (1999 data):

- Per capita income: $27,700
- Median household income: $49,375
- Median family income: $62,188

Skagway's GDP in 2004 is estimated at approximately US$43 million[36].

Municipal Revenues & Expenditures – Due to sales and tourism tax revenues, Skagway has a budget surplus. Skagway charges a sales tax of 4 percent and a hotel bed tax of 8 percent. As an example: total municipal revenues for 2003 amounted to $8,978,544[37] and included $4,945,360 in local taxes. Total operating expenditures on government expenditures, public safety and public services in Skagway added up to $7,489,777 for the same year.

Sector: Tourism Industry – Skagway is a major tourism hub for Southeast Alaska and a gateway for tourism to the Yukon. In 2005, approximately 900,000 tourists arrived in Skagway, of which the majority arrived by cruise ship. The tourism industry provides almost 8 times more jobs in summer

[36] Gross State Product ("GSP") for the state of Alaska was US$34,023 million in 2004. Given that the state of Alaska had 657,755 inhabitants at the end of 2004, this means US$51,724 per person. Skagway's population in 2004 is assumed to be approximately 830 people.

[37] This number includes federal and intergovernmental operating revenues.

than in winter in Skagway. Cruise[38] ship traffic to Skagway is expected to continue to increase along with regional growth (3-4 percent annually). Visitor traffic by ferry, air and road has declined steadily in the past few years.

Sector: Transportation Industry – In addition to the White Pass & Yukon Route rail service, Skagway is connected via the Klondike Highway, served by scheduled and charter airline service from Juneau, Haines and Whitehorse, and served by the Alaska Marine Highway System. There is also weekly freight service via barge from Seattle throughout Southeast Alaska and year round bus service to Whitehorse and Interior Alaska is available; with availability increased on a seasonal basis. Car and RV rentals are available seasonally. The port and road infrastructure serve shipment of inbound cargo and petroleum (and outbound mineral concentrates in the past).

7.2.3 Haines Social Community

Location – Haines is located in the Haines Recording District, 129 kilometres northwest of Juneau, just south of the Canadian border at British Columbia, and 984 kilometres southeast of Anchorage and Fairbanks. It lies at 59.235830° north latitude and -135.445° west longitude.

Population Size – 2,245 people[39] (2005). In 2000 the population was made up as follows:

- Approx. 28% children and teenagers
- Approx. 32% people in the age range 20 – 44 years
- Approx. 28% people in the age range 45 – 64 years
- Approx. 12% people 65+ years

The population is increasingly made up of retired people.

Culture – Haines is also a tourist-driven community, with publicly held natural resources as the main visitor attractions. The mountains, fjords, glaciers, fish, eagles and wildlife that surround Haines bring many tourists to the area. Although Haines is now predominantly a non-Native community, the Chilkoot Indian Association of Haines is a federally-recognized first nation located in the community.

Recreation – Haines is popular for fishing, hiking, biking, boating, skiing, snowmobiling, bird-watching, snowshoeing and dog-sledding. In addition there are the Sheldon Museum, the Alaska Indian Arts in historic Fort Seward and the American Bald Eagle Foundation. In winter birdwatchers and photographers from around the world come to the Alaska Chilkat Bald Eagle Preserve to watch the largest gathering of Bald Eagles in the world. Haines also has an indoor

[38] Socioeconomic Effects Technical Report, Appendix H, Alaska Department of Transportation and Public Facilities, October 2004
[39] Haines Chamber of Commerce - 2004 Census data

swimming pool, track, tennis court, two ball diamonds, two gymnasiums and four public parks, including the 6,045 acre Chilkat State Park.

7.2.4 Haines Economy

Commercial fishing, timber, government, tourism, and transportation are the primary (many seasonal) employers in Haines. 128 area residents hold commercial fishing permits. As the population of Haines is more and more made up of retirees, the economic environment of Haines is becoming less diversified.

Employment – According to the current Alaska Economic Information System, employment in Haines is as follows:

Total Employment[40]:

- Total potential work force (age 16+): 1,381
- Total employment: 772 = 56%
- Percent unemployed & seeking work: 121 = 9%

Due to the seasonal nature of employment in Haines, unemployment rates vary throughout the year.

Employment by Occupation:

- Management, Professional & Related.....236
- Service.....110
- Sales & Office.....212
- Farming, Fishing & Forestry.....25
- Construction, Extraction & Maintenance.....113
- Production, Transportation & Material Moving 76

Employment by Industry:

- Agriculture, Forestry, Fishing & Hunting, Mining.....46
- Construction.....92
- Manufacturing.....19
- Wholesale Trade 7
- Retail Trade.....96
- Transportation, Warehousing & Utilities.....54
- Information.....20
- Finance, Insurance, Real Estate, Rental & Leasing 28
- Professional, Scientific, Management, Administrative & Waste Mgmt ...52
- Education, Health & Social Services 125
- Arts, Entertainment, Recreation, Accommodation & Food Services.....108
- Other Services (Except Public Admin).....72
- Public Administration 53

[40] Alaska Economic Information System – numbers for 2004

GDP – Haines personal income in 2002 was almost $77 million[41]. Per capita income was $32,971. Haines' GDP in 2004 is estimated at approximately US$114 million[42].

Taxes & Government Spending – Haines has a sales tax of 5.5 percent and a lodging tax of 4 percent. Total projected annual revenues for Haines Borough in 2006 are $6,260,707. Total expected expenditures for Haines Borough are $6,329,384 for the same year.

Sector: Tourism Industry – At present, approximately 50,000 visitors per year visit Haines and surrounding area[43], 90 percent of which come in by cruise ship. All modes of visitor transport have brought a declining number of tourists to the area in recent years. Haines is likely to remain a secondary port of call for the cruise ship industry in Alaska. Construction of a railroad to move freight may provide an opportunity create a passenger rail service that would significantly boost tourism.

Sector: Transportation Industry – Haines is a major trans-shipment point because of its ice-free, deep water port and dock, and year-round road access to Canada and Interior Alaska on the Haines and Alaska Highways. Haines is a northern terminus of the Alaska Marine Highway (ferry) System, a cruise ship port-of-call, and a hub for transportation to and from southeast Alaska. Haines has a State-owned 4,000' long by 100' wide paved runway, with daily scheduled flights to Juneau by small aircraft. There is also a State-owned seaplane base, two small boat harbors with a total of 240 moorage slips, a State Ferry terminal, and a cruise ship dock. Freight arrives by ship, barge, plane and truck[44].

7.3 Economic Impact

Impact of construction and operation needs to be split due to the significant differences in time and amount of impact. According to the Policy, Planning and Research Branch of Yukon Economic Development, it can be assumed that economic impact of construction and operation expenditure in the Alaskan ports of Skagway and Haines is similar to the economic impacts in the Yukon. Therefore, the economic impact tool developed by the Government of the Yukon is deemed appropriate to derive the economic impact in both the Yukon and Alaska. This tool uses preliminary 2002 based Input Output Multipliers from Statistics Canada. Please note that the Yukon projections do not capture induced impact or resulting government income (taxation); the Alaskan projections also do not exclude American inter-state or international (Canadian) effects. For simplicity reasons

[41] Socioeconomic Effects Technical Report, Appendix H, Alaska Department of Transportation and Public Facilities, October 2004
[42] Gross State Product ("GSP") for the state of Alaska was US$34,023 million in 2004. Given that the state of Alaska had 657,755 inhabitants at the end of 2004, this means US$51,724 per person. Haines' population in 2004 is assumed to be approximately 2,200 people.
[43] Estimation based on interview with employee of Haines Convention & Visitor Bureau (45,000 cruise ship passengers per year = 90% of visitors - similar division of tourists as Skagway assumed).
[44] www.dced.state.ak.us/dca/AEIS/ (quote)

it is assumed that all economic benefits in housing construction, retail and the service sector are included in indirect impacts.

7.3.1 Skagway Construction

The proposed concept for the redevelopment of the Port of Skagway results in creating both industrial and cruise ship centers within the port. The key elements of this concept are as follows:

- Creation of a dedicated concentrate and coal shipment facility on the existing ore dock.
- Potential development of a truck or rail dump near the Skagway River Bridge and a bypass conveyor to move coal and / or concentrate along the west side of the airport to the Ore Dock.
- Movement of AMH to the south end of the Ore Dock.
- Redevelopment of the Broadway Dock with an additional cruise ship berth, a dedicated marshalling area for buses for both berths and other associated facilities.
- New or rebuilt ship loader.
- Concentrate shed.
- Coal dome and coal barge loader.

The total capital expenditure on (re-)construction of the port is estimated to amount to approximately US$3 – US$144 million, depending on the commodity volume that is planned and constructed for. This amount will primarily be spent in the state of Alaska and includes all expenditures, including labour.

Using the economic development tool developed by the Yukon Department of Economic Development, and assuming an exchange[45] rate of 1.15, this leads to the projected range of direct and indirect impacts on the Alaskan economy shown in Exhibit 7-3.

[45] http://www.xe.com/ucc/convert.cgi for Monday 15th May 2006

Exhibit 7-3
Economic Impacts of Skagway Port Construction on Alaska

Direct and Indirect Impact within Alaska[46]		
Transportation Engineering Construction Expenditure	**US$3 million**	**US$144 million**
Wages and Salaries	$888,881	$42,666,306
Supplementary Labour Income	$84,395	$4,050,970
Mixed Labour Income	$79,910	$3,835,662
Other Operating Surplus	$245,670	$11,792,178
Indirect Taxes on Products	$47,108	$2,261,175
Subsidies on Products	($2,084)	($100,027)
Subsidies on Production	$0	$0
Indirect Taxes on Production	$11,429	$548,586
Total GDP	$1,355,309	$65,054,852
Output	$3,599,908	$172,795,606
International Imports	$386,019	$18,528,924
Employment (Full Time Equivalent Positions)	22	1,056

These projections do not include the impacts on other American states or Canadian provinces, induced impacts or resulting government income.

7.3.2 Skagway Operations

Ongoing operation of the terminal, including the truck dumper, the concentrate shed, the ship-loader, the coal dome, the conveyor and the coal barge loader, will require approximately 5-30 Person Years employees daily, depending on the amount of concentrate and coal shipped daily. All permanent employment is expected to fall to the population of Alaska, in particular Skagway.

Using the economic development tool developed by the Yukon Department of Economic Development in reverse order, and assuming an exchange[47] rate of 1.15, this leads to the projected range of direct and indirect impacts on the Alaskan economy shown in Exhibit 7-4.

[46] US dollars
[47] http://www.xe.com/ucc/convert.cgi for Monday 15th May 2006

Exhibit 7-4
Economic Impacts of Skagway Port Operations on Alaska

Direct and Indirect Impact within Alaska[48]		
Expenditure in Air, Rail, Water and Scenic and Sightseeing Transportation Support	**5 FTE Employees Required**	**30 FTE Employees Required**
Total estimated exogenous output	***US$240,000***	***US$1,440,000***
Wages and Salaries	$67,480	$405,124
Supplementary Labour Income	$19,774	$118,718
Mixed Labour Income	$17,955	$107,795
Other Operating Surplus	$55,360	$332,363
Indirect Taxes on Products	$747	$4,485
Subsidies on Products	($1,512)	($9,076)
Subsidies on Production	$0	$0
Indirect Taxes on Production	$425	$2,550
Total GDP	$160,229	$961,958
Output	$293,514	$1,762,148
International Imports	$28,258	$169,653

These projections do not include the impacts on other American states or Canadian provinces, induced impacts or resulting government income.

The movement of minerals through the Port of Skagway would bring more road traffic to the City. The projected resulting traffic could amount to 6 – 80 loaded trucks of concentrates plus possibly 60 – 80 loaded trucks of coal per day (5 days per week); again this depends on how much concentrate is shipped and whether coal is shipped by truck or by rail.

These 6 – 160 loaded trucks per day are equivalent to 2,160 – 57,600 truck shipments per year. Assuming 1 driver will take care of 160 shipments per year, a total of 14 – 360 Person Years driver positions will be created in trucking. Assuming a 40 percent support function for truck maintenance, overhead, management and loading assistance, the total number of positions projected for the trucking industry is 20 – 504 Person Years. All employment is expected to fall to the Yukon.

Using the economic development tool developed by the Yukon Department of Economic Development in reverse order, this leads to the projected range of direct and indirect impacts on the Yukon economy shown in Exhibit 7-5.

[48] US dollars

Exhibit 7-5
Economic Impact of Trucking Activity

Direct and Indirect Impact within the Yukon[49]		
Expenditure in Truck Transportation	**20 FTE Employees Required**	**504 FTE Employees Required**
Total estimated exogenous output (derived) :	***CAD$62,000,000***	***CAD$1,562,350,000***
Wages and Salaries	$34,692,630	$874,226,319
Supplementary Labour Income	$3,355,995	$84,568,385
Mixed Labour Income	$55,911	$1,408,927
Other Operating Surplus	($23,979,391)	($604,261,330)
Indirect Taxes on Products	$26,640	$671,328
Subsidies on Products	($10,977)	($276,617)
Subsidies on Production	$0	$0
Indirect Taxes on Production	$25,368	$639,261
Total GDP	$14,166,178	$356,976,273
Output	$65,033,750	$1,638,798,068
International Imports	$28,488,162	$717,878,715

These projections do not include induced impacts or resulting government income.

7.3.3 Haines Construction

The total expenditure on (re-)construction of the port terminal is estimated to amount to US$1.3 billion. This expenditure will primarily fall to Alaska.

Using the economic development tool developed by the Yukon Department of Economic Development, and assuming an exchange rate of 1.15, this leads to the following projected direct and indirect impacts on the Alaskan economy as illustrated in Exhibit 7-6.

[49] CAD dollars

Exhibit 7-6
Economic Impacts of Haines Port Construction on Alaska

Direct and Indirect Impact within Alaska[50]	
Transportation Engineering Construction Expenditure	**US$1.3 billion**
Wages and Salaries	$385,181,934
Supplementary Labour Income	$36,571,258
Mixed Labour Income	$34,627,510
Other Operating Surplus	$106,457,168
Indirect Taxes on Products	$20,413,391
Subsidies on Products	($903,026)
Subsidies on Production	$0
Indirect Taxes on Production	$4,952,518
Total GDP	$587,300,755
Output	$1,559,960,337
International Imports	$167,275,017
Employment (Full Time Equivalent Positions)	9,538

These projections do not include impact on other American states or Canadian provinces, induced impact and resulting government income.

The total expenditure on construction of the rail link is estimated at approximately US$5.7[51] billion, of which 85 percent ($4.845 billion) is expected to fall to the Yukon and 15 percent ($855 million) to Alaska. Using the economic development tool developed by the Yukon Department of Economic Development, and assuming an exchange rate of 1.15, this leads to the projected direct and indirect impacts on the Alaskan economy shown in Exhibit 7-7.

[50] US dollars
[51] 914 kilometers – $10 million per mile in construction costs.

Exhibit 7-7
Economic Impact of Haines Railway Construction on Alaska

Direct and Indirect Impact within Alaska[52]	
Transportation Engineering Construction Expenditure	**US$855 million**
Wages and Salaries	$253,266,783
Supplementary Labour Income	$24,046,520
Mixed Labour Income	$22,768,457
Other Operating Surplus	$69,998,258
Indirect Taxes on Products	$13,422,317
Subsidies on Products	($593,762)
Subsidies on Production	$0
Indirect Taxes on Production	$3,256,405
Total GDP	$386,164,978
Output	$1,025,713,051
International Imports	$109,987,520
Employment (Full Time Equivalent Positions)	6,271

These projections do not include impact on other American states or Canadian provinces, induced impact and resulting government income.

Using the economic development tool developed by the Yukon Department of Economic Development, this leads to the projected direct and indirect impacts on the Yukon economy and across all provinces in Canada shown in Exhibit 7-8.

[52] US dollars

Exhibit 7-8
Economic Impact of Haines Rail on Yukon

Direct and Indirect Impact within Yukon[53]	
Transportation Engineering Construction Expenditure	**CAD$4.845 billion**
Wages and Salaries	$1,435,543,438
Supplementary Labour Income	$136,298,265
Mixed Labour Income	$129,054,067
Other Operating Surplus	$396,757,676
Indirect Taxes on Products	$76,079,139
Subsidies on Products	($3,365,506)
Subsidies on Production	$0
Indirect Taxes on Production	$18,457,654
Total GDP	$2,188,824,735
Output	$5,813,852,178
International Imports	$623,421,121
Employment (Full Time Equivalent Positions)	30,909

These projections do not include the induced impacts or resulting government income.

7.3.4 Haines Operations

Ongoing operation of the terminal will require approximately 200 FTE of employment in Haines. All employment is expected to fall within Alaska.

Using the economic development tool developed by the Yukon Department of Economic Development in reverse order, and assuming an exchange rate of 1.15, this leads to the projected range of direct and indirect impacts on the Alaskan economy shown in Exhibit 7-9.

[53] CAD dollars

Exhibit 7-9
Economic Impacts of Haines Port Operations on Alaska

Direct and Indirect Impact within Alaska[54]	
Expenditure in Air, Rail, Water and Scenic and Sightseeing Transportation Support	**200 FTE Employees Required**
Total estimated exogenous output	***US$10,000,000***
Wages and Salaries	$2,463,329
Supplementary Labour Income	$721,853
Mixed Labour Income	$655,438
Other Operating Surplus	$2,020,910
Indirect Taxes on Products	$27,270
Subsidies on Products	($55,188)
Subsidies on Production	$0
Indirect Taxes on Production	$15,507
Total GDP	$5,849,121
Output	$10,714,623
International Imports	$1,031,565

These projections do not include the impacts on other American states or Canadian provinces, induced impacts or resulting government income.

7.4 Social/Community Impacts

The improvements to the local economy will be accompanied by a number of social / community impacts. Social / community impacts can either be negative or positive. The following is an example of a negative impact. If 200 loaded trucks are expected to cross through the town per day, this will equal 1 loaded truck every 4 minutes. This traffic will bring noise, dust and carbon monoxide emissions to the town. Appropriate mitigation measures and strategies could reduce the impacts. A positive impact of the development of the ports in each community is for instance the potential for improved access to the town due to infrastructure upgrades. While it is often possible to enhance positive impacts and reduce or avoid negative impacts, this report aims only to identify these impacts; no mitigation or enhancement measures are provided.

While the following paragraphs classify certain impacts as positive and others as negative, it must be noted that the general effect of these impacts on lifestyle can be viewed differently by different individuals. Lifestyle improvements are in the eye of the beholder so to speak. Take for example improved access to the community from infrastructure upgrades. This resulting impact of the

[54] US dollars

development of the port of Haines is classified in this section as positive, due to the fact that people will be able to reach the town (potential home) more easily. To residents who have chosen to retire in Haines to get as far as possible from populated areas however, this could be perceived as a negative impact.

7.4.1 Positive Social / Community Impacts

- Haines will likely enjoy **improved access to the town and recreational sites** from the construction of the rail link and the port across the Yukon. This could increase Haines' attractiveness as a retirement community, bringing more residents to the area. The infrastructure upgrades in Skagway will predominantly support movement of goods. (No additional roads or other infrastructure for the public will be constructed in Skagway.)
- The projected increase in employment will lead to population growth in both communities. Combined with increased traffic, this could lead to **improved public services (such as utilities, health care, police, education)**, especially in remote areas.
- The local governments of both communities will see **an increase in revenues from sales taxes** due to sales to temporary residents (construction workers and their families) and new permanent residents; as well as in increase in property tax revenues from new housing construction.
- The increased demand in **housing, food, clothing, recreational and hospitality services** associated with the population increase in both communities could lead to **higher quality and greater variety** in these areas.

7.4.2 Negative Social / Community Impacts

- The temporary population increase associated with construction could put a **sudden and significant pressure on public services** such as law enforcement, fire and emergency services and health care services. This is especially a concern for the development of the Port of Haines, due to the magnitude of the projected construction.
- The increased truck, marine and rail traffic through both communities will be accompanied by **noise**. To give an idea: 200 loaded trucks through the town per day equals 1 loaded truck every 4 minutes. And 3 (Skagway) to 8 (Haines) trains both ways per day means 6 to 16 trains starting and stopping movements with associated sounds per day.

- The increased truck traffic through both communities could be accompanied by **dust pollution**. Appropriate mitigation measures and strategies could reduce the impacts.
- The increased truck traffic through both communities will be accompanied by an increase in **CO2 emissions** in the area, leading to potential air pollution problems such as smog.
- The increased truck and rail traffic through both communities could pose **safety risk to other traffic** (cars, cyclists and pedestrians) and playing children in the towns.
- **Local / State / National Parks may be reduced in size** to make room for construction such as the rail link in the Haines area or the planned conveyor in the Skagway area.
- Construction during port development could be accompanied by workplace safety hazards and lead to **workplace accidents**.
- (Re)development of the ports in both communities could reposition the area(s) as more industrial than cultural; this could **damage the communities' historical, cultural or indigenous values and image**.

8. FINANCIAL ANALYSIS

The financial analyses presented in this chapter focuses on Skagway, as this port is the most critical to the short and medium requirements of the Yukon. Haines is discussed at a very high level due to the significant capital expenditures required.

8.1 Skagway

8.1.1 Financial Model

A financial model has been developed to assess the potential commercial viability of each of the scenarios for port development in Skagway. A copy of the model is contained in Appendix 3 of this report.

The key outputs of the model are as follows:

- Cash flow – on an annual basis
- Net income – on an annual basis
- Internal Rate of Return – over a 30 year period

The internal rate of return (IRR) has been used as a proxy for determining project viability. Typically, a project of this nature will require an IRR of at least 10 to 12 percent to be commercially viable. This can be equated to a weighted average cost of capital (WACC). Thus if any scenario achieves an IRR of say 12 percent, it would be able to afford the required amount of capital expenditure with a WACC of 12 percent.

This is an appropriate level of financial analysis for this study for a number of reasons:

- The estimates of capital costs are based on very conceptual development plans
- Some of the development concepts need to be reviewed by regulatory and other agencies for acceptability before more detailed cost estimates can be prepared.
- The timing of mine development is impossible to predict, hence the revenue stream is very uncertain
- Detailed operating costs need to be developed in conjunction with a more fulsome design on the terminal and assessment of its requirements for staffing, utilities, etc.

8.1.2 Model Assumptions and Inputs

The following describes each of the model inputs and the assumptions behind those inputs. All revenues and costs are expressed in terms of 2006 $ US.

Capital Costs

Exhibit 8-1 provides a summary of the amount and timing of capital expenditures for each scenario.

Exhibit 8-1
Capital Cost Assumptions

Scenario	Capital Cost	Timing
1A	$5,000,000 or $16,000,000	2006/07
2	$16,000,000 $6,000,000	2006/07 2009/10
3	$16,000,000 $6,000,000 $42,000,000 or $114,000,000	2006/07 2009/10 2010/2011
4	$16,000,000 $6,000,000 $8,000,000	2006/07 2009/10 2013/14
5	$16,000,000 $6,000,000 $42,000,000 or 114,000,000 $8,000,000	2006/07 2009/10 2010/11 2013/14

Traffic Volumes

Exhibit 8-2 provides a summary of the volume and timing of traffic development for both coal and concentrates for each scenario.

Exhibit 8-2
Traffic Assumptions

Scenario	Volume	Timing
1	**Concentrates** – 100,000 tonnes per year	2007/08
2	**Concentrates** – Increasing from 100,000 tonnes in first year of operations to 500,000 tonnes in fourth year of operations and thereafter	2007/08 to 2010/11
3	**Concentrates** – Increasing from 100,000 tonnes in first year of operations to 500,000 tonnes in fourth year of operations and thereafter **Coal** – 1,200,000 tonnes per year commencing in fifth year of operations	2007/08 to 2010/11 2011/12
4	**Concentrates** – Increasing from 100,000 tonnes in first year of operations to 1,000,000 tonnes in ninth year of operations and	2006/07 to 2015/16
5	**Concentrates** – Increasing from 100,000 tonnes in first year of operations to 1,000,000 tonnes in ninth year of operations and thereafter **Coal** – 1,200,000 tonnes per year commencing in fifth year of operations – all shipped by barge	2006/07 to 2015/16 2011/12

Operating Costs

Exhibit 8-3 provides a summary of the operating costs for the coal and concentrate facilities. Operating costs include general and administrative costs, utilities, operating and maintenance labour, purchased services, operating and maintenance supplies and other miscellaneous costs.

Exhibit 8-3
Operating Cost Assumptions

Traffic	Operating Cost Per Tonne	Basis
Concentrates	$6.00 per tonne for 100,000 tonnes per year to $4.00 per tonne for 1,000,000 tonnes per year (extrapolated on a straight line basis)	Based on a review of small bulk terminals in Anacortes and Los Angeles
Coal – Barge	$1.30 per tonne	Based on operating costs for Middle Point barge terminal (Quinsam Coal) plus allowance for conveyor and northern cost premium
Coal – Deep Sea Vessel	$3.50 per tonne	Based on the higher end of operating costs for Ridley Terminal and Westshore Terminal

Revenues

The proposed unit prices for use of the terminal are shown in Exhibit 8-4.

Exhibit 8-4
Revenue Assumptions

Traffic	Revenue Per Tonne	Basis
Concentrates	$10.00 per tonne	Based on knowledge of current market rates for similar facilities plus a premium due to the location vis-vis competing facilities
Coal	$6.00	Based on average rates for Ridley Terminal and Westshore Terminal plus 10 percent

Other

The other principal assumptions are as follows:

- Inflation – 2.0 percent per annum
- Depreciation – straight line over 30 years

8.1.3 Results of Analysis

The results of the analysis are presented in Exhibit 8-5.

Exhibit 8-5
Results of Financial Analysis

	Internal Rate of Return		
Scenario	**Concentrate**	**Coal**	**Combined**
1	Shed/Upgrade – 9.0% New Dock Req'd – (0.1%)	N/A	9.0% (0.1%)
2	11.7%	N/A	11.7%
3	11.7%	Barge – 15.0% Deepsea – (1.1%)	13.5% 2.4%
4	16.6%	N/A	16.6%
5	16.6%	Barge – 15.0% Deepsea – (1.1%)	15.9% 5.6%

As demonstrated in this exhibit, Scenarios 2 and 4 show potential to be commercially viable, with an internal rate of return of about 12 percent or higher. Scenario 1 shows a lower rate of return, particularly if a new dock and ship loader are required, but this becomes more viable as the tonnage increases. This investment is recouped if the tonnage goes up to the levels predicted in either Scenario 2 or 4.

Scenarios 3 and 5 are viable as barge loading terminals, though they are not viable as deepsea vessel terminals given the rates which are proposed.

The analyses of development Scenarios 3 and 5 is a little misleading in that in the barge option, only the cost of the terminal is considered. A true comparison would look at the barge cost to Haines and the transshipment costs at a new terminal in Haines. This is examined below.

8.1.4 Options to Improve Financial Viability

The financial viability of Scenario 1 could be improved through the use of a deferred interest loan, repayable once volumes reached a level significantly above 100,000 tonnes. The same infrastructure delivers an internal rate of return of nearly 12 percent at a throughput of

500,000 tonnes of concentrate, hence a threshold of say 400,000 tonnes would allow for repayment of the loan at that time.

Another option to improve the financial viability of all of the scenarios is to look for a contribution to fund a portion of the construction costs. Such an infrastructure investment provides benefits to a wide number of parties beyond those involved in the operation of the Ore Dock, hence it could be argued that the contribution would be provided on the basis of the benefits to these other parties. For example, movement of the cruise ship dock would improve security in the port, provide a more defined and attractive entrance to the commercial area of Skagway for cruise ship passengers and provide operational efficiencies to operators of both the Ore Dock and the cruise ship facilities.

8.1.5 Sensitivity Analyses of Coal Shipments

Exhibits 8-6 and 8-7 illustrate the impact of changing the terminal charges for coal on the internal rate of return of the barge and deep sea vessel options for the Skagway coal terminal.

Exhibit 8-6
Coal Barge Terminal IRR – Sensitivity to Terminal Charges

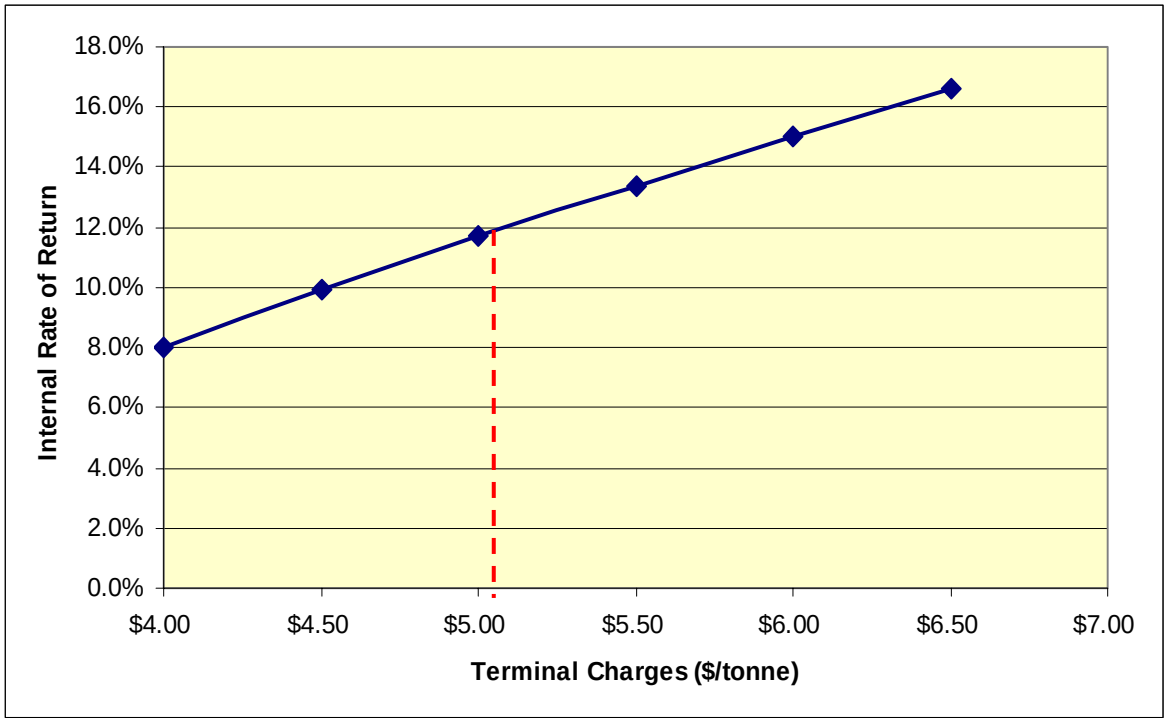
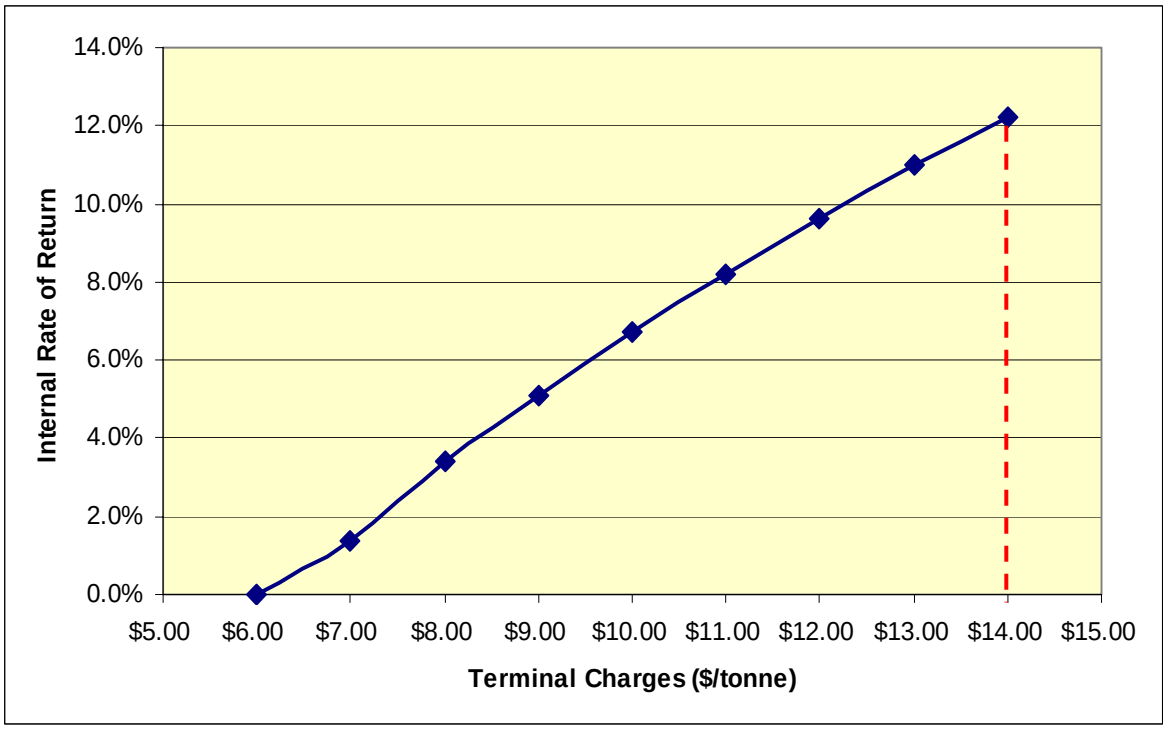


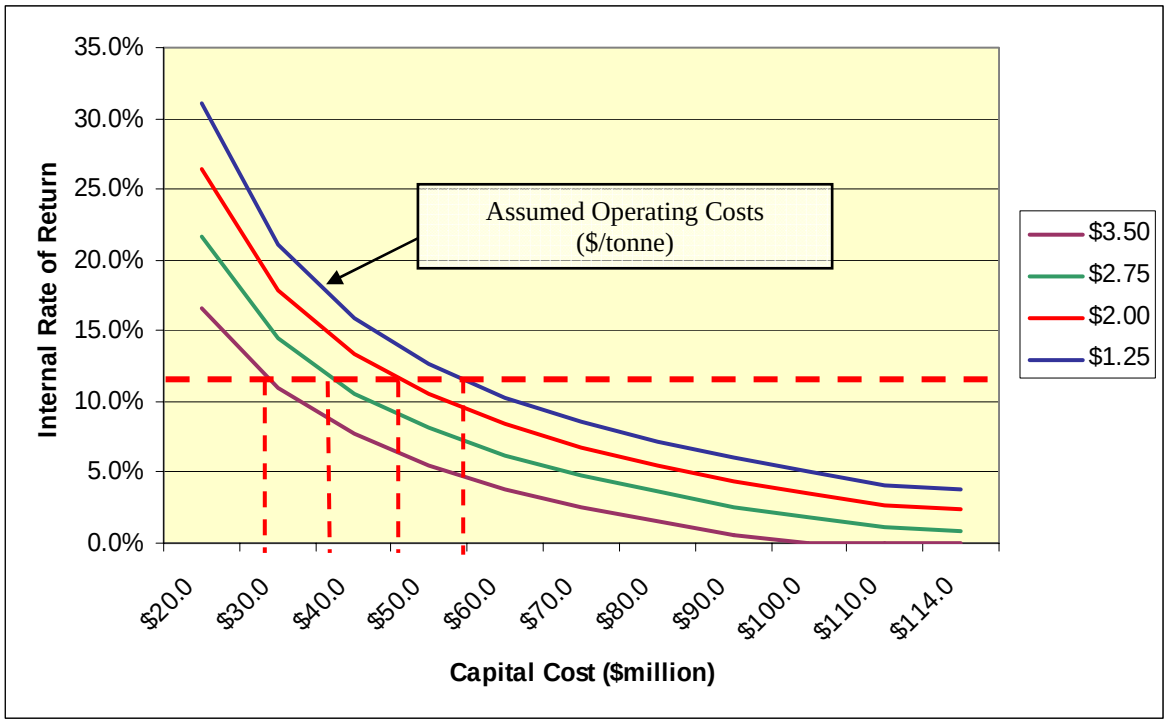
Exhibit 8-7
Coal Deep Sea Vessel Terminal IRR – Sensitivity to Throughput Charges



As indicated in Exhibits 8-6 and 8-7, the terminal charges required to obtain an IRR of 12 percent are about $5.00 per tonne for the barge options and $14.00 for the deep sea vessel option. The difference, $9.00 per tonne is about the equivalent to the expected cost to transport coal by barge to Haines ($2.00 per tonne) and transship it to a deepsea vessel ($7.50 per tonne). The difference of $0.50 per tonne is small enough that each of these options is about the same in terms of net cost to the shipper. The choice between the options thus comes down to non-financial considerations such as community impacts, acceptability and environmental considerations.

For the deep sea vessel option, the impact of operating costs and capital costs on the internal rate of return can be seen in Exhibit 8-8. As indicated in this exhibit, at a terminal charge of $6.00 per tonne, no more than about $60 million of capital can be afforded to provide an IRR of 12 percent. This is well below the estimated capital cost of $114 million. The solution is to charge higher rates, as discussed above, or apply for an infrastructure contribution.

Exhibit 8-8
Coal Deep Sea Vessel Terminal IRR – Sensitivity to Capital Cost and Operating Costs



8.1.6 Risks to Financial Viability

The principal risks to financial viability include:

- **Error in the capital cost estimates** –further detailed design work would help reduce the risk around these numbers
- **Error in the operating costs** – once a detailed design is completed a more robust assessment of the operating costs be undertaken
- **Volumes are not achieved** – this is perhaps the biggest risk and may require a significantly higher hurdle rate if the private sector is to take an interest in the project

8.2 Haines

A detailed financial model of the high volume iron ore and coal terminal in Haines has not been developed due to the significant level of uncertainty in the capital costs, the question of the acceptability of constructing the railway and the potential for mineral development that would use the facility. Nonetheless, a high level financial analysis was conducted using the following assumptions:

- Throughput – 25 million tonnes per year (iron ore and coal)
- Throughput charge – $6.00 per tonne
- Operating costs – $3.50 per tonne
- Inflation – 2 percent per annum
- Capital Cost – $1.3 billion (3 year construction period)
- Depreciation – 30 years straight line

Using these assumptions, the internal rate of return is calculated to be about 4 percent. Given the uncertainty in many of the inputs, this is not bad. Once there is more certainty about the rail route, acceptability of the project to the Haines Borough and the capital costs of construction, the financial analysis should be revised.

A financial analysis has not been conducted of the coal transshipment facility in Haines. This needs to be the subject of a more detailed engineering and financial analysis of the options for coal in Skagway.

8.3 Stewart

A financial analysis has not been undertaken on Stewart as the private sector already operates what appears to be a viable facility and is ready to increase capacity if required.

9. PORT GOVERNANCE

This chapter provides a summary of options for port governance and concludes with an assessment of the option(s) that may be most suitable for consideration in the context of the Yukon Ports Access Strategy.

Governance encompasses the safeguarding and appropriate use of financial and other resources; vesting of the ownership of assets and the degree of freedom available to modify or pledge the assets; the processes established for decision-making and for ratification of decisions; and limits established as to the scope of activities and operations to be undertaken. In a ports setting, the governance structure influences several important factors including the following aspects.

- Planning and approval processes: the types and number of stakeholders, including particular levels of government, involved in planning, consultation and approval; internal and external hurdles; timelines and timeliness of decisions especially with respect to new development
- Access to funding: different sources of funding are available depending on jurisdiction and governance model
- Representation on the Board of Directors: may include representatives of one or more levels of government (federal, provincial/state, local), port infrastructure operators, users of port facilities, and the general public
- Operations: scope of permissible or desirable operations varies depending on governance and jurisdiction, including the mix of marine versus non-marine activities and the balance sought between profitability and economic development; extent to which operations are privately controlled or available to multiple users
- Supply chain linkages: relations with other players in the supply chain, including sharing of information; partnerships with other supply chain participants for mutually beneficial projects; cross-ownership of facilities by shippers, shipping lines, etc.

Each of these factors is relevant in the development of the Yukon's port access strategy. Moreover, the list of ports that could play a role in future economic development for the Yukon covers several different governance types, particularly when considering the potential for longer term development. Therefore, various port governance frameworks bear consideration and are reviewed here.

9.1 Clarification of Roles

Prior to proceeding to a survey of different governance models, it is worth clarifying the different roles that can be played by entities active within a port. Parties within a port can have a number of

roles; because the parties carrying out these roles can vary from port to port, it's important to distinguish who plays each of these roles at a particular port:

1. Responsibility for overall coordinated and safe actions, and for shared infrastructure and operations to the benefit of all port users.
2. Ownership of a particular cargo-handling facility.
3. Operation of a particular cargo handling facility.

Coordination and shared operations (#1) refer to activities that are carried out for the benefit of all port actors, to ensure safe operations (e.g., harbour master duties such as directing vessel traffic and on-going security measures); to improve works shared by all users and providers (e.g., channel dredging); or to promote the common interests of the port through marketing activities. The ownership of cargo handling facilities (#2) may be vested in the public sector or the private sector. Although there may be a single owner of facilities within a given port, it is more common to have multiple owners of various infrastructures within a given port. The operator of a cargo handling facility (#3) may be the facility's owner, or the operator may be distinct from the owner. In the latter case, the operator typically provides lease payments to the owner in exchange for the right to operate the facility; the operator then has primary responsibility for attracting sufficient business at adequate prices to cover the costs of the lease, other operating costs, and generate a profit. Capital improvements to cargo handling facilities (e.g., repairing berth structures) and capital acquisitions (e.g., new cranes) may be undertaken by either party, depending on the terms of their mutual agreement.

Sometimes a single entity takes on all three roles. This usually occurs where the entity is a public sector agency (e.g., a public sector port agency responsible for directing vessel traffic, maintaining channel depths, etc. also owns and operates one or more terminals in the port, such as a "government wharf"). Occasionally all three roles can be adopted by one or more private sector companies, in the case of a private port. More commonly, an entity takes on roles #1 and #2 (e.g., a public sector port agency also owns, but does not operate, a container terminal); or an entity takes on roles #2 and #3 (e.g., a bulk commodity handling facility is operated by its private sector owner(s)). In the latter case, the terminal may be made available for the use of multiple shippers (e.g., Neptune Bulk Terminal and Vancouver Wharves in Vancouver), or it may be restricted largely or entirely for the use of a single user (e.g., Agricore United in Vancouver).

9.2 Port Governance Models in Canada

Historically, responsibility for ports in Canada rested with the federal government, for ports of virtually all sizes. The federal government's powers traditionally included the establishment of ports, setting of fees, close oversight of business plans, authorization for capital spending, direct employment of port personnel (at smaller ports), and nomination to boards of directors (at larger

ports). In the 1980s, significant movement began to be made by governments in Canada and internationally to extricate themselves wholly or partly from the provision of commercially-oriented infrastructure and services, and from numerous state-owned and state-run enterprises.

The government's close involvement in the operation of hundreds of ports came to be seen as counter to this major restructuring of the state economy and provision of services. Thus, in 1995 the Government of Canada announced the National Marine Policy, which outlined the federal government's intent to modernize and rationalize the Canadian marine transportation system. Over the past decade there has been marked progress towards devolution of the federal government's role and responsibilities with respect to ports. This has included efforts of the federal government to divest itself of responsibility for managing port operations and funding port infrastructure at smaller and mid-sized ports, and reducing the federal government's involvement in overseeing the business affairs at, and capital funding of, larger ports.

A vital element of the National Marine Policy's modernization strategy was the division of federal ports into three operational categories:

1. sites eligible for Canada Port Authority (CPA) status — the largest ports that are financially self-sufficient and serve a diversified traffic base, and which will remain under the authority of the federal government;
2. sites designated as Regional/Local — ports varying greatly in size, but which shared the common feature that they were slated for divestiture by the federal government; and
3. sites designated as Remote — ports that provide the only means of access to isolated communities, and which were intended to continue to be operated by Transport Canada unless local stakeholders express an interest in acquiring them.

The majority of Regional/Local ports have been removed from the authority of the federal government, although some have not yet been transferred or otherwise removed from federal responsibility. Thus, Regional/Local ports really encompass two groups from a governance perspective: those that are under the authority of local interests, and those which continue to be directly managed by Transport Canada. Although these ports may include considerable private sector ownership and operation in terms of their infrastructure (as described in Section 9.1), each of the above-mentioned types of ports can be considered "public" in the sense that they include at least some facilities for the use of, and are required to provide services at published rates for, any qualified vessel operators and shippers. By way of contrast, a few ports in Canada are "private" ports which have no such requirement.

Combining these types of ports, there are now five general types of port governance models in Canada. These are summarized with examples in the following exhibit; their governance frameworks are described in Sections 9.2.1 to 9.2.5.

Exhibit 9-1
Port Governance Models with Examples in Canada

Canada Port Authorities	Regional/Local Ports owned & managed by Local Interests	Regional/Local Ports owned & managed by Transport Canada	Remote Ports owned & managed by Transport Canada	Private Ports
Prince Rupert Vancouver Fraser River North Fraser Port Alberni Nanaimo 13 others in Canada	Stewart 62 others in B.C. (no others in northern area) 60 others elsewhere in Canada	Campbell River no other in B.C. 60 others in Canada, plus 20 others transferred but the Public Port is not yet de-proclaimed	15 in B.C. (none in northern area) 11 others elsewhere in Canada	Kitimat BC Port Cartier QC Deception Bay etc.

Source: Transport Canada website and consultant.
Note: Port governance status as at February 28, 2006

9.2.1 Canada Port Authorities

Canada's major ports have a legal designation under the federal *Canada Marine Act* as Canada Port Authorities (CPAs). They consist of 19 Port Authorities which together make up the federally-designated National Ports System. These Port Authorities were designated as being "critical to domestic and international trade." These 19 ports handle more than half of all Canadian marine cargo tonnage, valued at more than $100 billion dollars. To qualify as a CPA, a port must meet several criteria; namely, the port:

- is, and is likely to remain, financially self-sufficient;
- is of strategic significance to Canada's trade;
- is linked to a major rail line or a major highway infrastructure; and
- has diversified traffic.

Canada Port Authorities were created by an Act of Parliament in 1998 under the *Canada Marine Act* (CMA). This Act provides an overall governance structure for the management of Port Authorities and includes important elements of local governance and control. Prior to the CMA, the various port entities that became CPAs were governed under one of several regimes concurrently in place in Canada: Local Port Corporations, overseen by the Canada Ports Corporation and established under the Canada Ports Corporation Act; Divisional Ports, operating with less autonomy under the Canada Ports Corporation; and Harbour Commissions, operating under three separate pieces of legislation. These prior acts of legislation had differing provisions in terms of port governance, degree of decision-making autonomy, management processes, sources of funding, and requirements for remittances to the federal government (e.g., Special Contributions and Dividends), and requirements for remittances to local governments (e.g., grants in lieu of taxes).

CPAs were established as not-for-profit enterprises under the CMA. CPAs provide revenues both to the federal government (an annual stipend based on gross revenues) and to local municipalities (payments in lieu of property taxes). They are not subject to income taxes.

The CMA subjected the CPAs to a common legislative framework. Nevertheless, the ports' respective profiles varied considerably according to their size, commodity mix, activities (e.g., landlord versus operating ports), and the resultant impact on revenues, expenses and financial status. The CMA recognized and made allowances for differences among the ports in several ways:

- The annual remittance required by the federal government, termed the Gross Revenue Charge ("GRC"), was derived as a percentage of each port's revenues.
- The method of calculation for the GRC was structured on a sliding scale, so as to not unduly penalize smaller revenue ports or very large revenue ports. (CPAs range in size in terms of annual revenues from $1 million to over $100 million.)
- Borrowing limits set out in each port' s Letters Patent varied by port, and were intended to reflect each port' s borrowing capacity, upon the advice of professional advisors to the Minister of Transport.
- The composition of the Boards of Directors could reflect some regional factors (e.g., the importance of the Port of Vancouver to other western provinces in addition to British Columbia is reflected in its appointees).

Despite these variations, the change to CPA status has had greater impacts for some ports than for others, when compared to their status prior to the Canada Marine Act. This is particularly evident for those ports not previously subject to payments in lieu of taxes (" PILT"); not previously subject to payments to the Federal Government; and those " operating" ports that incur substantial expenses directly offsetting the revenues from certain operations (where the revenues are included in determining the GRC).

Key Governance Features of Canada Port Authorities

The overarching principle of the CMA in respect of ports was to foster greater autonomy and commercial practices. The Act promoted these aims in two basic ways: through increased local powers for decision-making, managing, and investing in port infrastructure; and through the denial of any recourse to the federal Treasury to pay off debts. Although CPAs are eligible to benefit from government programs of general application providing for grants, in practical respects the legislation limits direct investment by or support from the federal government.

Day-to-day decision making exists almost exclusively at the local level of individual CPAs, as developed by management and approved where necessary by the Board of Directors. Appointments

to the Boards of Directors of CPAs, including the Prince Rupert Port Authority, are made in accordance with the following provisions:

- the Governor in Council appoints one individual nominated by the federal Minister of Transport;
- the municipalities mentioned in the letters patent appoint one individual (the City of Prince Rupert and the District of Port Edward in the case of the Prince Rupert Port Authority);
- the province or provinces mentioned in the letters patent appoint one or two individuals as mentioned in the letters patent (one individual appointed by the Province of British Columbia, in the case of Prince Rupert); and
- the Governor in Council appoints the remaining individuals nominated by the Minister in consultation with users selected by the Minister or the classes of users mentioned in the letters patent (four individuals in the case of Prince Rupert).

The CMA requires that Directors appointed by the three levels of government have generally acknowledged and accepted stature within the transportation industry or the business community. The CMA has the same general requirement for Directors appointed in consultation with users, as well as requiring relevant knowledge and extensive experience related to the management of a business, to the operation of a port or to maritime trade. Unlike prior practice at many institutions that reported to the government, there is a removed, arm's length relationship between CPA Directors and all levels of government. Directors may not include a mayor, councillor, officer or employee of a municipality mentioned in the letters patent (i.e., in the vicinity where the port is located); a member of the legislature of a province, or an officer or employee of the public service or of a Crown corporation of a province, mentioned in the letters patent (i.e., the province where the port is located); a Senator or a member of Parliament or an officer or employee of the federal public service or of a federal Crown corporation. Directors are also removed and at arm's length from the actual users of the CPAs, whereby Directors may not be a director, officer or employee of a person who is a user of the port.

The ongoing role of the federal government with respect to CPAs can be essentially distilled to two main functions: (1) ensuring that the business activities at particular ports fall within the authority granted by their letters patent; and (2) considering requests to amend a port's letters patent, most especially to adjust (upwards) a port's borrowing limit. CPAs are required to release annual reports including audited financial statements, and to hold annual general meetings open to the public.

Sources of Funds for Canada Port Authorities

The general thrust of the CMA was to require CPAs to fund their asset renewal and infrastructure investment needs on the strength of their ability to generate revenues. Key implications of this were: in essence, ports were barred from receiving grants or other direct investments from the federal government; ports were restricted in the assets that could be pledged for loans; and the maximum amounts they could borrow were set by the government.

This regime marked a profound change in the financing of port infrastructure at major ports in Canada, and has been the source of considerable concern on the part of port authorities. In recognition of the importance to maintain the competitiveness of Canada's ports, and in keeping with a government-commissioned comprehensive review of the CMA, the federal government announced in June 2005 its intention to amend the CMA in several respects. The proposed amendments would have established a framework that provided CPAs with access to federal funding for infrastructure. They would also have provided the Minister of Transport, in certain cases, with full delegation to increase a port authority's borrowing limits without Governor-in-Council's approval. However, the proposed amendments did not become law before Parliament was prorogued in late 2005. Therefore, sources of funding available to Canadian Port Authorities at present are essentially restricted to:

- net proceeds from the issuing of commercial bonds;
- net borrowings from banks and other financial sources;
- income from cash deposits or investments in securities;
- using the cash generated by the ports' own operations;
- potential partnerships with the private sector for the construction of specific facilities (which, in fact, are not sources of capital but rather reductions of capital needs).

Not only did the previous federal government indicate its willingness in 2005 to directly fund key port infrastructure projects, it also became more flexible in finding means to do so even without the legislative amendments coming into law. Thus, the federal government used the auspices of its Pacific Gateway Initiative, and its Western Economic Diversification program, to provide $40 million to the Prince Rupert Port Authority towards the development of a new container terminal. Of course, other parties are also able to invest in port infrastructure at CPAs (and indeed at other types of ports). In the example of the Prince Rupert container terminal, other funding is being provided by the Province of British Columbia, by CN, and by Maher Terminals (the selected operator).

Security has been an area where government had already provided itself with the authority to directly assist ports. The Government of Canada announced in 2004 that it would assist Canada's ports with the cost of modernizing and strengthening their security systems and programs. The Marine Facility Security Contribution Program is a three-year, $115 million commitment. It forms part of the Government' s National Security Policy announced on April 27, 2004; as part of the

wider security policy, it is not necessarily a port-specific grant program; it is considered a cost re-imbursement, not a grant.

Positive Governance Aspects of Canada Port Authorities related to the Yukon Port Access Strategy

Prince Rupert and all CPAs are required to be financially self-sufficient and to operate in a commercial manner. So Prince Rupert should welcome any opportunity to increase traffic through the port in support of Yukon resource development or other projects. The decision making process is "internal" and straightforward, for a commercial transaction. The only reasons why "external" review or approval would be required would arise if the activity fell outside of the port's mandate as expressed in its letters patent (and the handling of marine traffic to or from the Yukon certainly does not fall outside the port's mandate), or if an increase in its borrowing limits was required in order to construct the required infrastructure. Given that excess capacity exists at its present terminals for the short and medium term requirements of the Yukon, this would not be the case. The Port of Prince Rupert exists primarily as a bulk export port and covers a large area, such that even large-scale Yukon resource volumes would not pose environmental or social concerns.

If the Yukon Government was unsatisfied with aspects of a CPA's efforts to develop its traffic, then the Yukon could raise its objections through several means, including in a public venue such as the port authority's Annual General Meeting, or by communicating with the federal Minister of Transport.

Negative Governance Aspects of Canada Port Authorities related to the Yukon Port Access Strategy

Although there are means to address potential concerns to a CPA, in the case of Prince Rupert, the Yukon Government could remain an outside party "looking in." The Letters Patent of Prince Rupert do not stipulate the Yukon as a region requiring representation on the Board of Directors, so there is no statutory requirement. (This does not prevent representation from other regions, however, it merely does not *require* it. For example, the Prince Rupert Port Authority has a Director who is a representative of the Grande Prairie, Alberta Economic Development Office.) There is a precedent set by the Letters Patent of the Vancouver Port Authority for an individual to be nominated to the Board of Directors by provinces outside the location of the port (in this case, jointly by Alberta, Saskatchewan and Manitoba), in recognition of Vancouver's important role as an outlet for commodities from the Prairie provinces. Even if some Yukon representation was granted for the Prince Rupert Port Authority (requiring a change to its Letters Patent), the Director could not be an employee of the Yukon Government (consistent with the terms of the Letters Patent for named provinces).

Other than representation on the Board of Directors, there are few apparent negative governance aspects at the Prince Rupert Port Authority for short to medium term Yukon traffic volumes. If long term volumes required port authority investment in order to handle, it is conceivable that funding could be an issue if the port's development of its container terminal (including a planned second phase) "crowded out" its ability to finance other projects. This is reflective of several key measures found in the CMA with respect to funding by CPAs that have been cited as being detrimental to their long-term competitiveness. Several of these factors are inter-related and include:

- The borrowing limits established in the Letters Patent, which some ports believe are artificially low and which may preclude them from accessing adequate capital.
- The fact that borrowings must be supported from projected revenues, as the CPAs are prohibited from pledging Crown-owned land for borrowing purposes (although they can pledge fixtures located on Crown land).
- The restriction of grant funding to programs of general application, which may put some major investments beyond the capacity of port authorities to finance.
- The inability of CPAs to retain and reinvest the proceeds from the sale of federal lands under their management.
- The lack of access to some financing arrangements available to some competing ports in the U.S.

9.2.2 Regional/Local Ports under the Authority of Local Government or Other Local Interests

The balance of Canadian marine cargo, representing some 200 million tonnes, is handled by a regional ports system consisting of several hundred ports across the country. Regional/Local ports are all ports which do not meet national port standards (i.e., are not CPAs) or Remote port standards. They range from significant regional or local operations, to small facilities with little or no commercial traffic. Some of these Regional/Local ports are very large indeed in terms of their tonnage, and may handle more traffic than some CPAs. However, they are not considered part of the national ports system, because they either lack a diversified cargo base (e.g., certain Atlantic Canada ports dominated by huge volumes of petroleum products) or are not connected to the national road system. There is also a certain historical political flavour to the distinction between CPAs and Regional/Local ports: for example, many of the former independent Harbour Commissions, and former Local and Divisional ports of the (now-defunct) federal agency Ports Canada were designated CPAs based on their former stature acquired through enabling legislation, with not a lot of regard to their actual current importance to supporting Canadian trade.

A key initiative within the National Marine Policy's framework has been the Port Divestiture Program, which seeks to transfer the ownership and operation of Regional/Local ports from Transport Canada to other federal departments, provincial/territorial governments, or local interests, including municipalities. The Port Divestiture Program was implemented in 1996, following Treasury Board approval of the terms and conditions governing the program, including the authority to establish a $125 million Port Divestiture Fund. A separate Port Transfer Fund was also put in place to finance departmental activities related to port divestiture. As at February 28, 2006, 465 of the 549 public ports and public port facilities originally operated by Transport Canada had been transferred, demolished or had their public harbour status terminated.

Transport Canada transferred forty Regional/Local ports to provincial governments; none were transferred to the Province of British Columbia. Sixty-five sites have been transferred to other federal departments including eight locations in B.C. None of these sites fall within the coastal areas under consideration as part of the Yukon Port Access Strategy. Transport Canada's interests have been terminated in eighteen sites, including six in B.C.: none of these sites fall within the coastal areas under consideration. Three sites were demolished in B.C., again none in the coastal areas under study.

As of February 28, 2006 a total of 123 sites had been transferred from Transport Canada to local interests. Some of these sites represent large-sized ports, such as Port Hawkesbury and Sydney, N.S., Bayside, N.B., Goderich and Sault Ste. Marie, ON, and Victoria, B.C. Just over half (63) of the transferred sites were in B.C. Port facilities at Stewart, consisting of a wharf, a shed, and the Arrow Barge loading facility were transferred to the District of Stewart in April 2002. The transfer included a one-time contribution of $571,000 from Transport Canada's Port Divestiture Fund to the District of Stewart, for improvements to the facilities.

In addition to the public facilities, the Port of Stewart includes privately owned Stewart Bulk Terminals Ltd., operated by the partnership of Al Soucie and Jack Elsworth. The facility is described as an enhanced and upgraded dock that loaded concentrate from the Granduc/Newmont copper mine, and various other bulk and bagged ore shipments and barge unloading.

Key Governance Features of Regional/Local Ports Transferred to Local Interests

The Port Divestiture Program follows a land and chattels transfer strategy to ensure that:

- no offer that leaves the Crown financially worse off as a result of divestiture will be accepted;
- the Crown receives the best value for port land and other assets;
- a new port owner will not enjoy any windfall profits from the subsequent sale of lands, assets and/or chattels; and
- Transport Canada fully upholds its fiduciary responsibility with respect to First Nations.

From a local community perspective, public port divestiture allows communities to own and control the use of their facilities, set their own tariff structures (if any) and determine the levels of service and maintenance appropriate to local circumstances. As a result of the transfers, the *Public Ports and Public Port Facilities Regulations* and the *Practices and Procedures* no longer apply at these ports, and the federally-appointed harbour masters whose prime responsibility was the administration of these regulations, practices and procedures, have been removed.

Although federal regulations related to public ports no longer apply at transferred sites, the terms of the transfer typically require the local organization to continue to operate the facilities as a public port for a specified period such as five years. This applies whether the local organization taking over the port is a municipality, a shipper group, a labour group, or other interest. Thus, despite the absence of ownership or involvement of the federal government (or any level of government, in some cases), the transferred facilities will continue to operate as a public port for at least some time into the future.

Harbour bed divestiture is an integral and fully consistent part of the Port Divestiture Program. To terminate Transport Canada's ownership and operation of Regional/Local ports, the department must terminate all its ownership interests in these ports, including ownership of harbour beds where applicable. In a number of cases, Transport Canada has transferred the port and port facilities but, because it continues to own the harbour bed, it must still levy harbour dues on vessels making use of the port. Only once the department's ownership interests are terminated, can Transport Canada then de-proclaim the port and cease charging harbour dues. (In the case of Stewart, Transport Canada also de-proclaimed the port and has no further interest.)

It is important to note that the provinces own the vast majority of harbour beds in the hundreds of small ports nationwide. Transport Canada owns only 41 harbour beds and negotiations for their transfer are currently underway. Only two Transport Canada harbour beds remain in B.C.

Transport Canada facilitates the divestiture initiative with the Port Divestiture Fund (PDF), which was increased in 2003 to $175 million. The fund is intended to ease the transfer process by reducing the initial financial impact of port transfers (note the more than $0.5 million contribution in the case of Stewart). The PDF is used to provide assistance in bringing existing port property up to minimum safety or operating standards or facilitate the takeover of a port. It may also be used to cover a portion of the costs incurred by the new owner to achieve compliance with regulatory or insurance requirements, fund feasibility studies or reduce potential liability. Finally, the fund may be used to assist local groups, communities or other interests to take over a collection of ports and reduce costs by rationalizing infrastructure.

As part of the post-divestiture monitoring process, and as required by the transfer agreements, Annual Verification Statements (AVS) are submitted to Transport Canada from new port owners over the life of the contribution agreement. The verification statements enable the department to

ensure the contribution funds have been expended in accordance with the agreement. In addition to the AVS, Transport Canada conducts audits on its transferred ports at least once during the life of the contribution agreement. Once an audit has been completed, a Management Response Action Plan is developed, if required, to address the audit recommendations. The audits, along with the Management Response Action Plans, are forwarded to Transport Canada's Audit Review Committee for approval and subsequent publishing on the department's web site.

First Nations Concerns

The 1997 Supreme Court of Canada decision regarding Delgamuukw vs. the Queen in Right of British Columbia has had an impact not only on Transport Canada's ability to pursue public port divestiture, but also on government-wide land transfer activities. While this ruling has affected port transfers across the country, its greatest effects have been felt in Ontario and British Columbia. In some cases, First Nations claims have been registered in the courts, thereby further complicating delivery of the Port Divestiture Program.

Transport Canada has developed a negotiator's consultation model that requires the Crown to determine the possible existence of legitimate Aboriginal rights or title before moving to conclude a transaction. It provides a mechanism with which to identify and respond to First Nations issues. Port divestiture initiatives will reflect the Crown's fiduciary responsibilities with respect to First Nations and, where warranted, consultations are conducted with First Nations prior to proceeding with divestiture of a port.

The use of Transport Canada's consultation model has enabled the divestiture of ports to proceed, albeit more slowly than was expected when the program began in 1996. The transfers in Victoria, B.C. are prime examples of such First Nations consultation. Through the efforts of Transport Canada negotiators, two First Nations now sit together on the Board of the Greater Victoria Harbour Authority, the owner of several former Transport Canada port facilities.

Provincial Issues

Provincial consent to conclude a port divestiture transaction is required in most instances in Newfoundland and Labrador, Quebec and British Columbia because these ports are located on lands that the provinces provided to the federal government for the purpose of operating public ports; the lands must be returned to the province in the event that Transport Canada ceases to require them for this purpose. This provision is referred to as the reversionary clause. The federal government therefore cannot transfer the lands to other parties without the specific approval of the applicable provincial government. A process is now in place with the government of British Columbia whereby the province enters into a lease with the new operator upon transfer.

Regional/Local ports that have been transferred have rate-setting freedom to establish the types and level of charges they may wish to assess against users of the port, for purposes of maintaining structures owned by the port's authority (e.g., District of Stewart), or to cover operational expenses (e.g., maintenance of aids to navigation, dredging of channels or alongside berths). A variety of charges can be applied, including fees levied against all vessels that use the harbour (e.g., harbour dues, assessed according to the size of a vessel; berthage charges, assessed according to the size of a vessel and the duration of time it spends at berth); for cargo that is loaded or unloaded at any terminal within the harbour (e.g., wharfage charges); handling charges at terminals or wharfs operated by the port's authority (e.g., a charge per tonne of cargo loaded or unloaded); charges for the storage of cargo; and leases of land, structures, or waterlots.

Transferred Regional/Local ports do not have the same stringent requirements as CPAs in terms of public disclosure of their activities and results. Revenues and spending are typically included within a municipality's budget. The complexity of decision-making processes and oversight at transferred Regional/Local ports can vary in accordance with the size of a port, both in terms of its cargo-handling profile and its exposure to other commercial interests (e.g., high-valued real estate not required for marine transportation, and available for commercial development). As opposed to a port such as Victoria/Esquimalt, with a Board of Directors and permanent staff developing and reviewing multiple decisions related to a wide variety of marine transportation flows and other business units such as real estate, the actions required on the part of a port authority such as Stewart are modest and straightforward.

In terms of financing available to transferred Regional/Local port authorities, the essential nature of the transfer is that funding is no longer available from Transport Canada, whether for operational expenses or major infrastructure works. Transferred Regional/Local port authorities are reliant on using the cash generated from charges they levy against users of the port, or from borrowings supported by their current or projected level of earnings.

Positive Governance Aspects of Regional/Local Ports Transferred to Local Interests, related to the Yukon Port Access Strategy

There are several positive governance aspects to transferred Regional/Local ports. Firstly, they have rate-setting freedom in terms of port charges; these can be set at very modest levels to attract marine transport movements to the port (as long as the port's authority will still be able to ensure adequate funds building up over time for the long term maintenance and asset renewal required). On the other hand, it should be noted that most charges that may be set by port authorities are quite modest to begin with; most port authorities rely on a combination of wharfage and leases for their revenue.

At smaller-sized Regional/Local ports, most decisions are made without the need to involve or consult external stakeholders, so port authorities can act nimbly for the benefit of the port overall, whether on their own or in concert with private operators of terminal facilities. Without a cumbersome legislative framework establishing reporting requirements, Boards of Directors, etc., Regional/Local port authorities can be flexible in terms of their reporting relationships (e.g., to a municipal council). It is easily conceivable that some influence, or at least avenue for established, ongoing consultation, could be set up as circumstances may warrant between a Regional/Local port authority and an external agency (such as a unit of the Yukon Government), to study, promote, and develop major new transportation opportunities.

Because the port authority at transferred ports often remains a representative or unit of government at some level or other (for example, the District of Stewart), potential port users have a public body with whom to interact and address their concerns. In general, Regional/Local port authorities are obliged to accommodate traffic at "public" facilities, to the extent feasible according to the infrastructure in place. Of course, in the case of Stewart, the port authority's facility is not appropriate for the movement of bulk commodities.

Negative Governance Aspects of Regional/Local Ports Transferred to Local Interests, related to the Yukon Port Access Strategy

Whereas the federal government was moving towards re-establishing direct contributions to CPAs for major infrastructure projects (until the end of the last Parliament), and Regional/Local ports under the authority of Transport Canada retain access to departmental funding, those ports that have been transferred have limited access to funds, to support infrastructure development. This is particularly true after the timeline expires for agreements under which monies were contributed from Transport Canada at the time of the transfer to local interests.

The smaller scope of activity at many Regional/Local ports means that port administrators may be lacking in complex business acumen beyond the day-to-day activities of a typical Wharfinger. Complex financing arrangements, or major arrangements with large shippers, may stretch the capacity and experience of local resources.

9.2.3 Regional/Local Ports under the Authority of Transport Canada

A total of 58 Regional/Local ports remain under the purview of Transport Canada, as of February 28, 2006; Campbell River on Vancouver Island is the only such port remaining in B.C. For Campbell River and other public ports that have not yet been divested, Transport Canada's port policies and programs are aimed at the development of a ports system that:

- contributes to the achievement of Canada's international trade objectives as well as national, regional and local economic and social objectives;

- functions efficiently;
- provides port users with accessible and equitable transportation services; and
- works in coordination with other marine activities and surface and air transportation systems.

Key Governance Features of Regional/Local Ports Operated by Transport Canada

It is important to bear in mind that this category of ports is not intended to remain active. Transport Canada has been active for over a decade in its efforts to fully divest itself of its Regional/Local ports (and it has succeeded in divesting itself of 90 percent of the ports under its authority a decade ago). Thus, the governance provisions and status of these port types should be considered "in limbo," pending their eventual transfer.

At most port sites under its direct authority, Transport Canada is represented locally by appointees, who receive a set commission rate calculated on tariff revenues collected from their respective ports. The Minister of Transport appoints these individuals, known as Harbour Masters and Wharfingers, and their degree of activity is in direct correlation to traffic demands.

Pursuant to the CMA, Transport Canada may fix port fees at ports under its direction, outside of the regulatory process. Departmental officials notify users and stakeholders of any public port fee adjustments before such adjustments are made. Transport Canada publishes a tariff schedule for all charges except leases and lettings. If Transport Canada must undertake improvements specifically for the benefit of a major user, the department may supplement or replace these tariffs with negotiated contracts designed to improve the overall rate of cost recovery on an investment.

To accommodate changes to the structure of the port system, Transport Canada replaced the entire regulatory regime in place at public ports. The resulting *Public Ports and Public Port Facilities Regulations* modernized Transport Canada's regulatory responsibilities for safety, order, and operations at public ports, and replaced the *Public Harbours Regulations* and the *Government Wharves Regulations*. These regulations are supported by practices and procedures to control ship traffic and to promote safe and efficient navigation in public ports.

Positive Governance Aspects of Regional/Local Ports Transferred to Local Interests, related to the Yukon Port Access Strategy

Most port authority tariffs at Transport Canada's Regional/Local ports are published, and consistent across their network except for leases, which are set according to local market rates. Thus, there is a certainty and transparency at least in terms of the tariffs levied by Transport Canada.

As a department of the federal government, the port authority is represented by a public body which should be accessible for discussions of business opportunities, or complaints regarding business practices. Likewise, the port authority is obliged to provide public access to shippers and vessel operators at its own facilities, to the extent that the facilities can accommodate the traffic.

Negative Governance Aspects of Regional/Local Ports Transferred to Local Interests, related to the Yukon Port Access Strategy

Most importantly, it must be recognized that Transport Canada's interest lies in divesting itself of ports, not running them. This means that: Transport Canada has no particular interest in attracting and developing major marine traffic opportunities at its ports; if such an opportunity did present itself, the reaction of Transport Canada would likely be to attempt to transfer the port facilities to the opportunity's proponent(s); and Transport Canada will spend the minimum it can on maintenance and asset renewal, only adequate to ensure safe operations.

Although it may be considered to have "deep pockets," Transport Canada's days of major investments in Regional/Local ports must be considered over.

9.2.4 Remote Ports

Remote ports provide the only means of access to isolated communities, typically with populations of a couple of hundred people or fewer. In the interest of public safety and economic necessity, they continue to be operated by Transport Canada unless local stakeholders express an interest in acquiring them. Under the National Marine Policy, Remote ports are defined as those where:

- marine transport is the primary mode of transportation for the movement of people and goods for at least some portion of the year;
- there is a dependence specifically on the existing Transport Canada fixed wharf structure, alongside which vessels can tie up safely; and
- the community is not connected by a road network to another site with a wharf and/or not connected to a major centre by year-round surface means or regular air service.

A total of 26 Remote ports remain under the purview of Transport Canada, as of February 28, 2006, including fifteen in B.C. The most northerly of these B.C. Remote ports is Hartley Bay, lying on the Inside Passage well south of Prince Rupert.

Key Governance Features of Remote Ports

Applying the term "port" to these locations is essentially a legal construct, in that it affirms the Government of Canada's historically acquired responsibility to provide and maintain a dock and

supporting infrastructure (with Transport Canada as the operational department within the federal government charged with this responsibility). All of these sites are small, and many are tiny, consisting basically of a very small "government wharf." They involve little or no cargo, other than inbound deliveries of basic community supplies. Some of them are even unmanned. They are intended to support the basic needs of very small communities. By way of comparison, some urban marinas for pleasure craft have a greater extent of infrastructure. They were not intended for, and could never handle, volumes of bulk commodities for offshore markets.

It is difficult to even apply the term "governance" to these Remote ports. "Management" of these ports consists essentially of periodically evaluating the physical condition of their infrastructure (wharf and jetty). Decisions regarding infrastructure spending (i.e., maintenance and rehabilitation of structures) are taken by administrative personnel at regional offices of Transport Canada (e.g., Vancouver) as a result of inspections and assessments carried out periodically. "Sources of financing" consist of a small portion of the operating budgets of Transport Canada's regional offices.

Governance Aspects of Remote Ports related to the Yukon Port Access Strategy

There are no Remote ports within the coastal areas under consideration for the Yukon Port Access Strategy. Even if they did exist, the key feature of Remote ports is their extremely small size, which would render them completely unsuitable for large bulk exports. Furthermore, as they are essentially historical constructs in place to serve isolated Aboriginal communities or other places dating from the days of self-reliant yet isolated villages, it can safely be assumed that the federal government has no intention of establishing any more Remote ports. On account of their insignificant size and complete unsuitability for moving volumes of cargo, there are no positive governance aspects of Remote ports applicable to the Yukon Port Access Strategy.

9.2.5 Private Ports

As described earlier, the transfer agreements that govern the change of Regional/Local ports from Transport Canada to local interests typically require those ports to continue to operate as public ports. In contrast, Canada has few private ports. They have generally been created by private sector interests in relatively remote areas, to be located as close as possible to major resource deposits (e.g., iron ore) or to serve very large industrial facilities (e.g., aluminum smelting). Several private ports process large volumes. For example, Kitimat BC handled 1.6 million tonnes of cargo in 2003, and Port Cartier QC handled over 17 million tonnes.

Key Governance Features of Private Ports

The defining governance feature of private ports is the pre-eminence of the private sector and the corresponding absence of government involvement. Most of the land is held privately. Shore-based marine facilities (e.g., terminals) and waterside marine infrastructure and improvements (e.g., aids to navigation; shipping channels) were originally created and continue to be owned and maintained by private sector interests.

Labour contracts, where applicable, are established locally and are not tied to external collective agreements. A hallmark of private ports has been their labour stability, good productivity, and lack of service interruptions or other labour disruptions. Private ports are not subject to "externally" imposed labour agreements applying to wages or working conditions.

In the case of Kitimat, the community is set back from the waterfront, enabling industry unfettered access to waterlots, with substantial room for expansion. Concerns about conflicting priorities for land use, between port activity and industrial users on the one hand, and public access to or enjoyment of the waterfront on the other hand (including development for recreational, light commercial, residential, or mixed use purposes) are minimal to non-existent.

Decision-making processes regarding matters of common concern are generally reached through a collegial, consultative process among the few users of a private port. This could include proposals for improvements to shared infrastructure, such as channels or breakwaters.

Sharing of common costs over a larger traffic base is desirable in private ports just as anywhere else. Thus, expansion of port facilities by new users, including greater use of existing under-utilized facilities or the development of new terminals, would in general be welcomed by existing users, provided that new users and other interested parties exhibit the same private sector priorities of locally-developed labour policies consistent with existing practices within the port, and otherwise efficient use of port resources. The exception to this is likely to be potential investment or other involvement in port activities by a government agency. Existing private sector operators may be particularly concerned about the possible impacts on their labour arrangements, as well as possible calls for greater transparency in decision making.

Governance Aspects of Private Ports related to the Yukon Port Access Strategy

Private ports offer advantages in terms of industrial and/or terminal development. With much of the land being privately owned, and with a community consensus regarding the importance of efficient and productive port activity, there are few hurdles that may be expected when considering additional port throughput or new development. With limited interaction between residential (or other commercial) areas and port industrial activity, objections on the basis of environmental impacts (including noise and air quality) are likely to be minimal. Assuming the economics are

favourable, then decisions regarding expanded throughput or new port development can be made in a very timely manner.

The same features that make private ports efficient places to do business can also lead to several governance disadvantages, from a different perspective. Operators of private ports are not accountable to the public for their decisions. This means there is no public body or public representative to appeal to regarding their actions, such as a mayor, a Minister of Transport or a transportation agency. Private port operators are under no obligation to provide cargo handling services to all parties, unlike the ubiquitous common user facilities in public ports. And if they are sufficiently concerned about the potential impacts on their labour situation and operations that could eventually arise due to government investment or the presence of a government agency within the port, then they may be very unreceptive to a proposed government-backed development. They could take the position of refusing to sell privately owned land for a government-supported development, and bring pressure on the provincial government not to sell or lease government-owned land.

9.3 Port Governance Models in the U.S.

The two greatest distinguishing governance features of U.S. ports, compared to the Canadian experience, are (1) the drastically reduced role of the federal government at even the largest ports, and (2) a very different mix of sources of funds.

Although Canada's major ports have gone through a period of commercialization, their assets remain vested with the federal government. The federal government continues to exert important influence on port operations and leadership, through such means as the setting of borrowing limits, restrictions on allowable activities as defined in the Letters Patent, and the appointment of the majority of CPA's Boards of Directors (including those meant to represent the interests of users). This level of federal involvement is nowhere to be seen in the U.S. This general absence can be traced to the provisions of the U.S. Constitution.[55]

The U.S. has never had a national port plan or strategy, and no commercial port or group of ports has ever been under the complete control of the federal government. The port industry, historically, has been decentralized. The U.S. Constitution granted to the Congress power to tax goods crossing the borders of individual states. The Constitution limited discrimination among states, stating: "no preference shall be given by any regulation of commerce or revenue to the ports of one State over those of another...." Thus, U.S. federal governments upheld the policy that the exercise of governmental policy affecting ports was to be free from competitive or discriminatory bias among ports (and hence among states).

[55] "North American Port Reform: The Canadian and American Experience," Michael C. Ircha, *International Journal of Maritime Economics*, Vol. 3, 2001, pp. 198–220.

Although some port facilities were developed originally by private sector interests such as the railways, it is fair to say that, for over a century, the vast majority of ports in the U.S. are agents of local, regional or state governments. (A few private ports do exist, such as for the export of bulk petroleum products from the Mississippi Delta, but they are rare exceptions.) The federal government does play several roles related to ports, but in general exercises little authority. The roles that it does play (in addition to operating departments such as Customs and the Coast Guard) include: constructing and maintaining channels and harbours through the U.S. Army Corps of Engineers (COE), and data collection and some policy development through the U.S. Maritime Administration (MARAD). MARAD's role is not comparable to Transport Canada, in that it does not have ownership of the assets for, nor exercise oversight of, the large ports. MARAD formerly undertook various initiatives to promote ports (in general, without favouring particular ports), and port-related research activities; these have been largely developed to the industry association that acts as a collective voice for U.S. ports.

Responsibilities of the COE include deepening and widening channels, disposing of dredged materials, building jetties and breakwaters, and other harbour works. Local ports have been responsible for maintenance dredging near or among their piers and berths. Although the federal government used to fund major harbour works in their entirety, several cost-sharing arrangements have been in place over the past nearly two decades to divide costs for particular projects between the federal government and "local" interests (e.g., a state or a municipal government). A large part of the costs for major dredging projects are covered by amounts held in the Harbour Maintenance Trust Fund. This fund was built up through an assessment on the value of domestic and international cargo handled at U.S. ports. (No such dedicated assessment or fund exists in Canada). While channel and harbour dredging in particular are necessary so as to support the efficient flow of commerce, nevertheless the COE must walk a politically fine line based on the projects it carries out. For example, harbour improvements at one location may allow a given port to solicit shipping lines operating the latest generation of large container ships. This action may be jealously viewed by competing ports, which either have not yet benefited from such dredging, or who may have naturally deeper channels and harbours and have no need of such dredging (in which case their natural advantages are "eroded" by actions of the federal government). Suffice to say that such concerns are part of the decision-making mix as the COE undertakes its projects. (This phenomenon can be observed in Canada also, for example in complaints from Halifax port stakeholders about dredging of the St. Lawrence River for the benefit of ports like Montreal; the difference is the absence of the constitutional restraints in Canada.)

In important operational respects, most U.S. ports of any size are similar to larger Canadian ports, in that they operate largely as "landlord" ports, owning land, structures and facilities, while most terminal operations are carried out by private sector companies on the basis of lease arrangements with the port authority.

9.3.1 Key Governance Features of U.S. Port Authorities

Some observers have identified as many as eleven different port governance models in the U.S. Such micro analyses are not particularly helpful at understanding the basics of U.S. port governance, however; depending on how many variables one chooses to consider, one could consider scores of models. Instead, we focus here on their key features, as noted before: ports' role as agents of state or local governments, and their funding sources. In terms of relationship to their respective government authority, the following models are among the most common or most important in the U.S.:

- a single port with its own enabling legislation, owned by a state government (e.g., Virginia Ports Authority; in addition to this characterization, VPA is a good example of a port authority that has established quasi-private operating subsidiaries, such as Virginia International Terminals Inc.)
- a single port that is jointly owned by more than one state government (e.g., Port Authority of New York-New Jersey: while the bi-state model is not at all common, the sheer size of the port of New York-New Jersey warrants inclusion of this model)
- multiple ports with a common piece of enabling legislation and common reporting relationship to a state government: (e.g., Harbors Division, Department of Transportation, State of Hawaii with authority over ten ports including Honolulu)
- a port that is under the authority of a municipality (e.g., from very small ports such as Haines, Alaska, to very large ports, such as the Port of Los Angeles—a department of the City of Los Angeles, often referred to as the Los Angeles Harbor Department).

Various governance parameters can vary significantly among U.S. ports: for example, open versus closed meeting requirements, audit reports, financial reporting relations and restrictions, borrowing authority limits, taxing authority (if any), access to local or state loans or grants, employee hiring practices.[56] Consideration of the functioning of Boards of Directors gives an indication of the wide variety of treatments at U.S. ports for this single aspect of governance:

- whether or not the port has a Board (most do, but some do not)
- whether the Board is appointed or elected
- if appointed, whether by the mayor, city manager, governor, or two governors; and whether approval is required by state legislatures or municipal councils
- whether board positions are explicitly reserved for specific stakeholder groups (users, labour, geographic regions)
- if elected, whether by district or at-large.

[56] Ibid.

9.3.2 Funding and Financing Sources

As noted earlier, sources for Canadian port financing consist of: borrowings from banks and the issuance of commercial bonds; income from investments; and cash generated from operations. U.S. ports have a greater variety of sources of capital, in general. In addition to the sources noted for Canadian ports, the following sources are available at times at U.S. ports (not all sources are available at every port):

- The right to issue tax-exempt Revenue Bonds. The interest on these bonds, like the interest on U.S. Municipal Bonds, is not subject to income tax, and therefore, the interest rates associated with those bonds are lower than other commercial interest rates (as the bondholders are willing to accept the lower tax-free rates).
- The right to issue General Obligation Bonds. Like Revenue Bonds, these are tax exempt; rather than being secured by the revenues of the port authority, they are secured by the collection of municipal taxes.
- Direct participation in municipal tax revenues in some states (such as Washington State).
- A dedicated share of transportation-related taxes levied in some states (such as Virginia).
- A variety of government grants. Although numerous grant programs exist, their total impact is relatively small when compared with the other sources of financing, at least at large, financially-stable ports.
- Cross-subsidies from other Port Authority operations, including airports, bridges, tunnels, logistics services, and real estate. More profitable, non-marine activities are particularly important at some large urban ports, including New York-New Jersey and Tacoma. Canadian ports are highly restricted from engaging in non-marine transport activities.
- In the case of New York-New Jersey, insurance proceeds as an exceptional item relating to the events of September 11, 2001.

Comparison of Funding Sources

A recent comparison over three years of three large Canadian ports and three large U.S. ports found the following reliance on various sources of funds.

Exhibit 9-2
Sources of Funds at Selected Ports (Three-year average, FY2000-2002)

Port Groupings	Bonds, Bank Loans, Proceeds from Investments and Sale of Assets	Sharing of Municipal Taxes	Grants and Insurance Proceeds	Self-Generated Cash from Operations
Sample of 3 large Canadian ports	7–17%	0%	0%	83–100%
Sample of 3 large U.S. ports	19–55%	0–8%	0–6%	34–75%

Source: "Impacts of the Sources and Costs of Capital on the Competitiveness of Canadian Ports," KPMG, July 2004.

In addition to the greater variety of sources of funds noted above, many U.S. ports also receive indirect subsidies through the *absence* of certain charges, such as exemption from local government property taxes, and a variety of non-charged services provided by the parent government.

The variances in available sources of financing affects Canadian and U.S. ports' costs of capital. The KPMG comparative study noted above found that:

- The costs of debt are approximately 0.7–0.8 percentage points lower at the U.S. ports studied than at Canadian ports, primarily on account of the tax-exempt status of bonds issued by U.S. ports.
- In both countries, the ports' return on equity is somewhat higher than the ports' cost of debt. Even though the differences are not large, an increase in the ratio of debt to equity would somewhat reduce the costs of capital and improve the competitiveness of the ports.
- The cost of capital at U.S. ports was found to be several percentage points lower than the cost of capital at most Canadian ports, with the exception of one Canadian port with no debt. This is due to:
    - the aforementioned lower cost of debt,
    - the higher debt to equity ratio at U.S. ports, combined with the generally lower cost of debt than the rates of return on equity; and,
    - at some ports, the receipt of government subsidies, which affect the costs of capital and allow for favourable user charges and fees. In fact, without external subsidies, or cross-subsidies from the ports' other operations, two of the three U.S. seaports studied would operate at a loss.

The table below summarizes public port financing methods from a much broader survey of U.S. ports. Note that even among a broad survey of ports, sizeable annual variations among different financing sources are possible. For example, revenue bonds in the late 1990s typically accounted

for 40 percent of annual financing, whereas more recently their use has dropped sharply. Conversely, the use of General Obligation (GO) bonds has risen sharply recently.

Exhibit 9-3
U.S. Public Port Financing Methods

Year	Port Revenues	GO Bonds	Revenue Bonds	Loans	Grants	Other
2002	38.3%	23.4%	13.2%	4.2%	7.7%	13.1%
10-year average, 1993–2002	40.3%	10.3%	28.4%	3.1%	7.4%	10.4%

Source: "Port Development Expenditures," U.S. Department of Transportation, Maritime Administration, May 2004.
Note: "Other" funding includes State transportation trust funds, State and local appropriations, property tax and sales tax revenues.

The governance structures of ports in both countries guide them to operate as economic drivers for the community as not-for-profit organizations. Consequently, ports are generally satisfied with relatively low returns on equity from operations. U.S. ports view their major role as regional economic engines stimulating development and jobs.[57] This is a prevalent mindset in place among management of Canadian Port Authorities also; however, attitudes within the Canadian federal government appear to be more cautious as to the relative emphasis between ports as development catalysts versus profitable, quasi-taxpaying and economically prudent wardens of federal property. The U.S. emphasis on economic development often leads to reduced port prices coupled with enhanced levels of service.[58] Such price and service competition among ports reduces port net revenues leading to a greater reliance on state and local government funds to cover financial shortfalls.

Numerous financing sources exist in the U.S. that could potentially be applied to ports, although many government programs only touch tangentially on ports themselves (as opposed to surface transportation access to ports or other cargo hubs, particularly to promote intermodal traffic). The following framework provides a useful categorization of general financing sources.

[57] Op cit.
[58] "Reduced port prices" refers to port authority user charges assessed at lower rates than they would be in the absence of access to other sources of funds: it does not imply that U.S. port charges are generally lower than at comparable Canadian ports.

Exhibit 9-4
Categories of funding assistance available to U.S. Public Ports and Other Cargo Hubs

Type of assistance	Examples	Repayment/Match Requirements	Implications of Public/Private Sector Commitment	Other Considerations
Private sector grant or donation	Cash contribution, in-kind support	No repayment required	Cash contribution implies most significant private sector commitment	Level of private sector contribution is major factor in indicating importance of project to firms
Bond financing through public credit market	Special bond issues	Repayment guaranteed by private sector generally through user fees (Project Finance)	Implies commitment from primary direct user groups	Government may act as guarantor of bonds or offer tax incentives/tax free status to reduce interest rates below market level
Local, state, or federal loans or bond issues	Federal loans, State infrastructure bank loans, State DOT or port authority bond issues	Repayment guaranteed by taxes: fees and/or general revenue not specifically tied to the project	Implies significant public interest in project initiation; ongoing public sector interest restricted to financial viability	Generally provides financing at lower interest rate than project-specific bond financing
Local, state, or federal grants	Part of most projects, different levels of national, state, or local significance	No repayment required	Implies significant public interest in project initiation; significant public interest in ongoing operation	Implies significant on-going public benefit; grant assistance may trigger environ-mental review

Source: Adapted from "Financing and Improving Land Access to U.S. Intermodal Cargo Hubs," National Cooperative Highway Research Program Report 497, Transportation Research Board, 2003.

Funding for Seaport Security

U.S. seaport security funding in a post September 11th 2001 environment far outstrips security funding prior to 2001, as well as port security funding in Canada or other nations. In April 2006 the U.S. Senate Appropriations Committee approved an Emergency Supplemental Appropriations bill that would result in a major boost in security funding for U.S. seaports. Much of the USD $648 million is targeted at enhancing the security of container movements, including purchasing more container inspection systems, hiring additional container security specialists, and installing additional radiation portal monitors. Other security aims included in the bill are more general in nature: 35 percent of the total appropriation would go towards the Port Security Grant program, which could be accessed by many ports of various sizes and vocations.

9.3.3 AIDEA Investment to Facilitate Marine Transport of Bulk Commodities

The Alaska Industrial Development and Export Authority (AIDEA) has been instrumental in assisting the development and export of bulk commodities from Alaska, particularly through the financing of transport infrastructure. This agency is a potential source of funding, in the event that one or more Alaskan ports should play a role in the Yukon port access strategy; its structure and financing role are reviewed here.

AIDEA Description and Development

AIDEA is a public corporation of the State of Alaska, constituting a political subdivision under the laws of the State. It was created by the Alaska Legislature to "promote, develop and advance the general prosperity and economic welfare of the people of Alaska, to relieve problems of unemployment, and create additional employment." It was originally envisioned in the 1960s to be a pass-through conduit agency, providing Alaskan businesses with lower interest rates available through tax-exempt financing, whereby AIDEA would issue bonds purchased by others. The tax-exempt revenue bond program continues to help finance certain facilities at lower rates (based on the credit strength of the developer); however, changes to the tax laws in the mid 1980s dramatically changed the types of projects that are eligible for tax-exempt financing in Alaska.

In the early 1980s legislation was enacted to expand the powers and financial capabilities of AIDEA to assist smaller businesses. AIDEA was capitalized with an existing loan portfolio, and with cash as oil wealth began flowing into state coffers. Using this newfound financial strength, AIDEA launched what would become its loan participation program, whereby AIDEA can provide up to 90 percent participation in a bank-originated loan, up to $20 million, to provide long-term financing for new or existing projects or to refinance existing loans. In addition to the revenue bond and loan participation programs, other AIDEA credit programs include the business and export assistance program aimed at small to medium sized businesses (guaranteeing up to 80 percent of a business loan not exceeding $1 million, originating through a commercial lender); and the rural development initiative fund and the small business economic development program (both aimed at financing the start-up and expansion of small businesses to create long term, private sector employment).

Red Dog Mine Proposal and the DeLong Mountain Regional Transportation System

In the mid-1980s Teck Cominco, in conjunction with NANA Regional Corporation, approached the state seeking assistance to develop the Red Dog Mine deposit. An approximately $128 million economic development loan portfolio held in the General Fund was appropriated to AIDEA for this purpose, and the financial structure of the transaction resulted in the creation of AIDEA's Development Finance Program.

Between 1985 and 1990 AIDEA financed and built the first phase of the DeLong Mountain Transportation System (DMTS), the road and port serving the area that includes Red Dog Mine. DMTS consists of a 52-mile long, 30-foot wide all-weather industrial haul road, a shallow-draft dock, offshore conveyor concentrate loading facility, fuel distribution and storage systems, and other port facilities. In 1993 AIDEA commissioned a study on additional uses of the DMTS; in 1997 AIDEA financed the production rate increase expansion of the DMTS portside facilities and is to be repaid by user fees; and in 2004 AIDEA participated in a study of the proposed deepwater expansion to the DMTS port.

In 1987, $103 million in tax-exempt bonds were sold by AIDEA to fund a portion of the original construction of the project. A state appropriation to AIDEA provided the remaining original investment base funding of $180 million. In 1997 AIDEA sold $150 million in bonds to finance, in part, the DMTS expansion. AIDEA's DMTS investment base is now $267 million. AIDEA's investment is being repaid with annual fees assessed to the DMTS users.

The road is designed to accommodate multiple users. Teck Cominco has contracted with AIDEA for a priority, non-exclusive right to use the DMTS system until 2040 to ship ore concentrates over the road, store concentrates in the storage buildings, and transload concentrate onto ore ships. Teck Cominco pays a toll for use of the facilities and is obligated to operate and maintain the system at a commercially reasonable rate of compensation.

AIDEA's Development Finance Program

AIDEA assists Alaskan business through its ability to develop, own and operate basic installations and facilities within the state, especially those which advance the prosperity of a region. Roads, ports, airports, utilities, infrastructure for tourism destination facilities or other public use facilities essential for regional economic well-being are considered eligible projects. With detailed information, staff and legal counsel determine eligibility, whether the project satisfies the development criteria for AIDEA participation and if the project can meet tax-exempt financing status and repayment schedules.

The following are the most relevant criteria for obtaining AIDEA's participation in a project:

1. The project and its development must prove to be economically advantageous to the state and to the general public welfare and must contribute to the economic growth of the state.
2. The project applicant is financially responsible.
3. The project is economically and financially feasible and able to produce revenue adequate to repay the bonds or loans with which it is financed.
4. The project will provide for any related increased demand on public facilities.

5. The project will provide or retain employment reasonably related to the amount of financing by AIDEA, considering the amount of investment per employee for comparable facilities and other relevant factors.
6. The scope of the project is sufficient to provide a reasonable expectation of the benefit to the economy of the state.
7. The project is in compliance with applicable law.
8. Issuance of the bonds is not expected to adversely affect the ability of the state or any political subdivision of the state to market other bonds. The Alaska State Legislature must approve all projects over $10 million.

Consideration of the benefits to the state from investment in a proposed project (i.e., return on investment) could include the following components:

- Annual taxes paid to state and local government
- Value added from in-state construction:
- Construction employment
- Alaska-fabricated components
- Annual operating payroll
- Consequential benefits:
- Other related payroll
- Other in-state goods and services.

AIDEA requires the project sponsor to provide AIDEA with clear title or lease to the portion of land on which AIDEA's portion of the project would be developed. This would be a condition of the agreement so long as debt was outstanding. Once the debt is retired, title could revert back to the project sponsor at fair market value, unless reversion is prohibited by the financing mechanism used. It is AIDEA's intention to assign maintenance and operating responsibilities back to the project sponsor. Other procurement requirements likely to be required are public solicitation of all bids and proposals and the utilization of Alaska bidders and product preference with respect to the award of all contracts.

Other Bulk Resource Assistance from AIDEA

Since the Development Finance program's inception in 1986, AIDEA has had ownership of five projects ranging from the DMTS to the Skagway ore terminal, Unalaska marine centre dock, Federal Express aircraft maintenance centre and the Healy clean coal project. In 1995 AIDEA purchased 49 percent of the Seward Coal Terminal, for which AIDEA was being repaid through semi-annual payments. Following the suspension of coal exports to South Korea, AIDEA sold its interest to the

Alaska Railroad Corporation in 2003. In 1996 AIDEA issued revenue bonds to finance the tailings facility at Fort Knox.

In 1990 AIDEA purchased and renovated the Skagway Ore Terminal. In 2003 AIDEA demolished the concentrate storage building at Skagway due to corrosion and removed residue concentrates from the entire terminal. In 2005 AIDEA contributed to a study on shipping coal through the Skagway Ore Terminal, and is in discussion with Cash Minerals and Sherwood Copper Corporation.

AIDEA has also paid for or conducted in-house a number of other studies related to the mining industry, including studies of the northwest Alaska resource development transportation, overland transportation options for the proposed Illinois Creek gold mine, the costs of exporting Healy coal to South Korean users, and feasibility activities for the Kensington mine.

Other Observations Related to AIDEA

Pursuant to Alaska statutes, the AIDEA board is required to annually determine the amount of a dividend to be made available for appropriation by the legislature. The dividend is to be between 25 percent and 50 percent of AIDEA's net income, for the fiscal year two years before the fiscal year in which the dividend is to be made. AIDEA has contributed over $178 million in dividends to the state.

AIDEA does not provide grants to business. All projects financed through AIDEA programs must be commercially viable.

The members of the board of directors of AIDEA also serve as the board of directors of the Alaska Energy Authority. However, AEA continues to exist as a separate legal entity. There is no commingling of funds, assets, or liabilities between the two organizations, and there is no responsibility of one for the debts or obligations of the other. The Board is made up of five people. Two members represent the public, and are appointed by the Governor for two year terms. The other three members are State Commissioners (Cabinet-level positions), consisting of the Commissioners of the Department of Revenue and the Department of Community and Economic Development, plus a third Commissioner appointed by the Governor (currently the Commissioner of the Department of Transportation and Public Facilities).

9.3.4 Pros and Cons of U.S. Port Governance

It is difficult to generalize about the advantages and disadvantages of U.S. port governance models because of their wide variety. Certainly one of the greatest advantages for U.S. ports is the level of direct and indirect financial support available from governments or through government actions, including in some cases taxation authority, and more generally through the avenues of direct appropriations, public bond market issues backed by government, and tax-exempt bond issues at

attractively low interest rates. This extent of government financial support is a fundamental difference between public ports in Canada and the U.S.

Not coincidentally in light of the extent of government financial support, U.S. port authorities consistently view economic development as an important part of their mandate, with an emphasis on being "economic engines" in their respective regions. In spite of this emphasis, U.S. ports consistently manage to operate at good levels of productivity and are well-managed enterprises.

The lack of direct federal involvement in ports, and the related lack of a national ports strategy, may be seen as either a weakness or a strength of the governance of U.S. ports, depending on one's penchant for coordination of public resources in the national interest. While ports within a particular region do coordinate certain efforts (such as developing consistent responses to policy initiatives), there is still strong competition among regional ports. This intra-regional competition leads to productive and well-managed ports, but may also lead to overbuilding and duplication of resources.

9.4 Port Governance Trends

Port governance can be viewed along a spectrum in terms of the roles and relationships of public and private entities active at a given port. The World Bank Port Reform Toolkit describes four such points on a continuum. At one end of the continuum lies the service port model, used in many developing countries. It is a predominately public model in which the Port Authority owns the land and all available assets (fixed and mobile) and performs all regulatory and port functions. All cargo-handling operations are performed by labour directly employed by the Port Authority. This model exists only at some of the smallest ports in North America. At larger ports (internationally), the dearth of internal competition can lead to inefficient port administration, or to a lack of innovation, and services that are not user-oriented. Dependence on government for funding may lead either to wasteful use of resources or conversely to under-investment.

Various intermediate points along the spectrum reflect shared operational responsibilities between public port authorities and private operators. These include the landlord port model found among most medium and large-sized ports in North America. They also include efforts at commercialization, as seen in Canada in the 1990s, injecting greater local autonomy into day-to-day decision making, more efficient business practices, and greater reliance on self-generated funds or borrowings supported by self-generated funds.

Among developed countries, there is a trend towards privatization of ports, a framework that is entirely different from most ports' status in North America. At its extreme, the public sector no longer has any interest in port activities. Port land is owned by the private sector; all operational

activities are performed by private companies; and even all regulatory functions are in the private sector. A few key variations, including their implications for port financing, are discussed below.

9.4.1 Port Privatization in New Zealand

New Zealand led the trend among countries in the developed world towards port privatization, at the same time as many other New Zealand economic structures and institutions were overhauled. New Zealand's ports had been publicly-owned facilities managed by Harbour Boards. (Members of Harbour Boards were elected in the three-yearly cycle of local government polls).

Pressure from exporters and other businesses prompted the national government, after a period of consultation, to eventually set three key objectives for port changes:

- The separation of the commercial functions of Harbour Boards from their non-trading roles;
- The freedom from legislative controls and the emphasis on commercial activities; and
- The need for standards of accountability for performance similar to those which apply to businesses in the private sector.

Port companies were formed and their shareholdings initially lay entirely with the Harbour Boards. The new port companies were created as private business enterprises in which were vested the land and assets of the respective ports. They were regulated under the country's company laws, they gained the ability to negotiate their own employment contracts, they acquired independent Boards of Directors, and the former system of regional demarcation of ports' hinterland territories was abolished. The Harbour Boards were subsequently abolished in the course of local government reform and their port company shares were transferred to regional or, in some cases, local government.

As owners of private companies, these regional or local governments have the flexibility to partially or entirely sell the port companies, through private sales or public flotation. Five out of thirteen port companies have been partially privatized and listed on the New Zealand Stock Exchange. For example, Port of Tauranga Limited is a publicly-listed company in which the Bay of Plenty Regional Council, through its Council-controlled organizations and subsidiaries, owns 55 percent of the voting securities. The remaining shares of Port of Tauranga Limited are fairly widely held; the next largest shareholder owns just 5 percent. For a few years, 20 percent of Ports of Auckland (the country's largest container port) was listed on the New Zealand Stock Exchange, although the publicly traded shares were re-acquired in 2005 as a strategic long term investment, and it is now wholly owned by the investment management arm of the Auckland Regional Council.

The New Zealand model has required ports to adopt fully-commercial business practices (while allowing them to divest or transfer former non-commercial responsibilities); moved their

governance from the national to the regional/local level; and allowed their initial (local government) shareholders the flexibility to raise funds by publicly listing part or all of the port companies. In practical terms, most regional/local governments have retained significant shareholdings in their respective port companies, as the ports are now operating as profitable and growing business entities with attractive dividend payments.

9.4.2 Port Privatization in Australia

Whereas in Canada the federal government is responsible for ports, this constitutional responsibility in Australia is held by the states. Prior to efforts at reform, Australian ports were generally State statutory authorities. Unlike the consistent, nationally-developed New Zealand framework, Australian states each developed their somewhat unique approach to port reform. In some instances, results have been disappointing: expectations were set for private-sector outcomes, yet the port corporations were not private sector entities: they remained under the control of their respective Ministers of Transport, and operational decisions were limited not by the dictates of the marketplace but by the provisions of their enabling statutes. Some port corporations were not given the direction, the tools, the challenge, or the impetus to deliver aggressive port management. In many cases, the government failed to remove non-core assets from ports, fund public service obligations outside of port budgets, or control staffing in excess of that necessary for core port activities.[59]

Tasmania's four port authorities were incorporated as private companies under the state's Corporations Law, with rights and responsibilities similar to other private companies.[60] If it wished, the state could sell off part or all of the shares of port corporations to the public. However, the state retains an important role with respect to the four port corporations, including an annual audit, setting borrowing limits, receiving very significant annual dividends (50 percent of pre-tax profits), and effectively nominating the members of the Boards. Being incorporated led to increased port operational costs including payment of corporate income tax and property tax equivalents (as well as the annual dividends to the state). Each of the port corporations has managed to reduce their workforces by approximately 50 percent.

Port/Mining Links in Western Australia

Recent business arrangements between Mount Gibson Iron Limited and the Geraldton Port Authority in Western Australia provide an interesting example of mutually beneficial arrangements reached between a prospective bulk resource shipper and a port authority. Mount Gibson Iron had been

[59] "Corporatization: A Legislative Framework for Port Inefficiencies," S. Everett, *Maritime Policy and Management*, Volume 30 (2003): pages 211-219.
[60] "Public Policy for Ports: To Be or Not To Be Corporatised or Privatized?", Michael Ircha, prepared for Canada Marine Act Review Panel, 2002.

initially considering shipping via Kwinana, south of Fremantle, Western Australia. The rail route from the mine to Geraldton, at 245 km, was 115 km shorter than to Kwinana (south of Fremantle). However, Geraldton lacked sufficient water depths for economic bulk exports of iron ore. The Geraldton Port Authority advised Mount Gibson Iron that shipping of iron ore through Geraldton would reinforce the economic viability of deepening the harbour and lead to decreased costs for all port users, particularly regional grain growers. The port developed a $103 million (AUS) Port Enhancement Project, of which the linchpin was a $73 million dredging contract.

As a pre-condition of state government support for the Port Enhancement Project, the Geraldton Port Authority successfully negotiated a Port Services Agreement with Mount Gibson Iron for the unloading of ore trains, handling and stockpiling of iron products, and loading of ore vessels. Under the port services agreement, Mount Gibson was required to provide security against future port charges. The agreement included the following essential elements:

- A requirement for Mount Gibson to export a minimum annual volume of 1.5 million tonnes
- A requirement for the company to provide a $2.5 million mortgage over the mining tenements at Mount Gibson
- A requirement for Mount Gibson to lodge a $5 million bank guarantee with the port authority as security for the investment and development of storage facilities at the port
- A guaranteed commitment by Mount Gibson to contribute a set annual payment of $2.25 million for the duration of the guarantee period.

The bank guarantee is to be reduced as the company constructs iron ore storage and handling facilities at the Port of Geraldton. Mount Gibson did build a 150,000 tonne capacity storage shed on land leased from the port authority for 50 years; additional leased land is held under option and expected to be taken up to expand storage capacity as exports are increased.

To accommodate Mount Gibson products, the port authority also invested $5 million to upgrade existing bulk handling facilities prior to initial exporting activity, to enable the iron ore products to be effectively and efficiently handled through the port in a manner that achieves a sound environmental standard and socially acceptable outcome.

Mount Gibson was not required to directly contribute to the cost of the port authority's port enhancement project. However, following the completion of the port enhancement project, Geraldton Port Authority did introduce a port enhancement charge of $2.20 AUS per tonne of cargo for all port customers (including Mount Gibson), allowing the port authority to recover investment costs committed in the project.

9.4.3 Port Privatization in the United Kingdom

The U.K. government commenced its port privatization efforts with a number of the country's second tier ports, and moved very quickly toward their complete privatization. The 19 ports formerly under the jurisdiction of the British Transport Docks Board were reconstituted as Associated British Ports (ABP) and 49 percent of the company's shares were sold in the stock market. This floatation, viewed by the government as successful, led to the sale of the remaining shares the following year (at almost 2.5 times the value of the initial share offering). As a private port company, ABP continued to expand and generate profits for its shareholders.

The success of ABP led the government to consider further privatization, particularly of the country's numerous Trust ports (similar to Crown corporations, or very roughly comparable to CPAs). Legislation was developed to enable all Trust ports to transform themselves into companies for sale. The legislation encouraged the sale of ports to their management and/or employees. The process to establish proceeds that would flow to government from the sales was somewhat complex, depending on competitive bidding to establish the ports' market values, and a claw-back arrangement to retain a portion of windfall profits that might arise from future land development. The government ended up retaining approximately 44 percent of the proceeds generated from the initial group of privatized Trust ports, with the balance returned to the former Trust ports for their capital needs. Although the national government owned the port lands, significant local investment and promotion had contributed to the growth of the Trust ports over time.

The sale of the various Trust ports to private enterprises represented a unique challenge because no market had previously existed for the sale of port land.[61] A major criticism of the U.K. experience was that the base values the government used to calculate the sale prices of the land were inadequate. Many port lands were significantly undervalued (with up to 75 percent discounts), and in some cases port management re-sold the ports in short order for multiples of 2.5 times what was originally paid.

9.4.4 Trends in Terminal Ownership

Two trends are apparent around the globe with respect to the ownership of terminals for general cargo. First is the trend towards concentration of ownership, as large terminal operators are expanding their portfolios of terminal operations around the world, through the acquisition of smaller or less profitable rivals. An example much reported on recently is the takeover by Dubai Ports World of the terminal operator P&O Ports, with operations at a number of large ports in North America, including Vancouver. With increasing shipping volumes forecast, the need to globally diversify to counter the risks of slowdowns in some geographic markets, and the possibility of some

[61] "The Governance Structure of Ports," Mary Brooks, *The Review of Network Economics*, Vol. 3, Issue 2, June 2004.

administrative efficiencies when combining terminalling operations, this trend may be expected to continue.

The second trend involves the ownership or long term lease of terminals by shipping lines, again particularly in the general cargo sector. It is common in the dry and liquid bulk sectors for shippers or receivers to own terminal facilities (e.g., grain companies, petroleum producers). It is much less common for bulk shipping lines to own terminals, with the exception of integrated petroleum companies with a shipping arm (in which case, it comes back to the shipper/producer once again as the key corporate entity). However, the trends among container shipping lines include growth through acquisition, growth through larger vessels, and integration of other elements of the logistics chain including terminals and freight forwarding functions. Several terminal operating companies in North America are owned by shipping lines, including OOCL (Vancouver), Hapag-Lloyd (Montreal), and NYK (Montreal and Halifax). Maximizing the competitive advantage from their corporate sister terminals is an increasingly important factor driving the network strategies of large shipping lines.

9.4.5 Trends in Channel and Quayside Depths

As noted in passing in the preceding section, container ships are increasing in size, with 8,000 TEU ships becoming increasingly common, and plans in place for vessels up to 50 percent larger again in terms of capacity. Today's largest container ships require channels, turning basins and quayside depths of 55 feet (16.75 metres). Vancouver and Prince Rupert are able to accommodate such requirements, as are their major West Coast competitors. Many smaller ports do not have this capacity, however, nor do certain key waterways such as the Panama Canal.

9.5 Governance Issues for Consideration

Based on the characterization of the potential port governance models contained in this chapter and the opportunity to further develop the port infrastructure in Skagway in particular, a number of thoughts come to mind about the appropriate model for Skagway: These are addressed under a number of headings.

AIDEA

- AIDEA is in the process of negotiating a contract with Sherwood Copper for the annual movement of up to 60,000 tonnes of copper concentrate through the new facility. AIDEA has estimated that the necessary infrastructure could cost in the order of $5 million, though it is conceivable that more detailed engineering studies will require that the dock be upgraded and the concentrate ship loader replaced. The estimate, as developed in this report, would increase the capital cost to $16 million.

- As long as AIDEA is the owner of the concentrate facility, it must be able to accommodate multiple users and pro rate charges between the users.

- AIDEA has indicated that its goal is to sell its interest in the facility, as it never was its intention to be the long term operator of the facility.

- Given the potential economic viability of this facility, as indicated in Chapter 8 of this study, AIDEA may be in a position to divest its interest in the facility in the next few years.

- AIDEA may be able to facilitate the sale through provision of a deferred interest/payment loan triggered by the ultimate operator achieving a certain throughput, for example 400,000 tonnes per year. If this option is not practical, some sort of loan guaranty or low-interest loan for future capital expenditures may also be effective.

- AIDEA's Development Finance Programs for transportation infrastructure are for "public use facilities essential for regional economic well being". The creation of jobs in either Skagway or Haines would appear to meet this criteria.

City of Skagway

- The City of Skagway currently owns most of the underlying land on the waterfront (foreshore and water lots), though it is leased to other parties (primarily White Pass & Yukon Route).

- The city receives very little revenue directly from its ownership of these lands. It receives a small annual payment related to the WP&YR lease and usage fees for the loading ramp (other than Alaska Marine Highway). Instead, it generates significant revenues from consumption taxes related to the expenditures by tourists that visit Skagway each summer, primarily by cruiseship. There is an opportunity to diversify the revenue base of the City by taking a financial interest in the new facility.

- The City would be able to use financing measures such as tax exempt bonds to raise the required capital for future expansion. The City may be able to work with AIDEA to access this source of funding.

- An ownership stake in the Ore Dock would provide the City with greater control over its economic and community development.

Haines Borough

- The potential development of a major marine terminal and associated rail line in Haines is completely contingent upon the development of the large coal and iron ore deposits in the northeastern portion of Yukon.

- Given the complete reliance of this port facility on this development, the involvement of the City should be limited to protecting the right-of-way and industrial land required for the terminal. Purchase of the land and construction of the terminal and railway would be far beyond the means of the community.

- Private sector involvement (potentially through the mine developer or a third party) is the key to the development of the facilities in Haines. Consideration could be given to a public private partnership.

Private Sector

- The financial analysis contained in Chapter 8 indicates that the returns may be sufficient to attract private sector interest in investing in and/or operating the new facility.

- The private sector could bring capital, operating expertise and technology that are required to effectively develop and operate the port. Potential operators would include stevedoring companies, terminal operating companies, shipping solution providers and integrated transportation companies.

- An independent operator, at arms-length from users, would be preferable in the eventual case where there may be a number of users of the new facility.

- A public private partnership is an option that should be investigated further and could fit neatly with a local port authority governance model.

First Nations

- There is an expressed interest by the Yukon Indian Development Corporation (YIDC) to invest in economic development opportunities that are both viable and provide direct benefit to local first nations. Creation of a first nation owned trucking company to service the concentrate traffic may be of interest to YIDC or its members.

- The principal source of jobs, at least in the short term (before the terminal and railway in Haines are built) is in the trucking industry. There is a potential for several hundred jobs in moving concentrate and/or coal to the Port of Skagway, and most of these jobs would likely

be based in Yukon. These jobs would include truck drivers, heavy duty mechanics, dispatchers and administrative positions.

Environment

- The biggest unknown, as discussed in the companion report on the environmental, land-use and regulatory issues, is the status of the contamination of the seabed adjacent to the Ore Dock from historical operations.

- If this problem is not resolved, and the uncertainty about liability to future operators is not removed, it may be difficult to find a body to take over the ownership and operation of the Ore Dock.

- This situation will require a decision about liability and potentially a guarantee to cover future costs associated with clean-up. This matter requires further investigation before decisions on guarantees and liability can be made.

Grants and Funding

- Financial viability of the development could be enhanced if government contributions were to be made available. A couple of potential sources include:
    - Transport Canada's Pacific Gateway Initiative which has earmarked $590 million to enhance flows through west coast ports. Whether or not this could be applied to the transportation infrastructure necessary to facilitate the movement of mineral products from Yukon is difficult to determine, but Yukon and Canada would ultimately benefit.
    - SAFETEA, the current versions of the Transportation Efficiency Act, may be a source of funding for projects that provide economic diversification, improve port security and reduce local congestion. These opportunities are all present in Skagway.
    - Other Federal and State programs may also be available.

- If the City of Skagway were to invest in upgrading the Ore Dock, they would be able to recoup their costs through wharfage payments.

9.5.1 Governance Structure

While the Port of Skagway currently matches the local port model of the U.S., in the future it would be desirable to overlay features of the Regional Port Model In Canada. Both contain a variety of features that are key, namely:

- Local ownership and control would be a positive factor. Local ownership of the underlying lands and some of the improvements provides for a greater degree of control.
- Flexibility to respond to opportunities is critical.
- The community can set levels of service, such as keeping trucks out of town and using a conveyor to move product to the dock.
- The community has access to some funding tools, such as tax exempt bonds, that may make this an attractive local operation.

In the longer term, this is a development where the private sector may be quite interested in taking an ownership position. The City may be able to create a public private partnership for this development. The private sector will be interested if the development passes a series of test including:

- Financially viability
- Acceptability to the local community and users of the facility
- The regulatory environment is clear and fair
- There are no operational hurdles that prevent the private sector from becoming involved

In Haines, the situation is different. The Borough could negotiate with the Army Corps of Engineers to turnover the fuel depot once remediation of the site is complete. This would give the Borough a valuable asset for future port development and would ensure that the land can be kept available for this potential use. This land could be provided to a local port authority set-up as a subsidiary of the Borough to manage the port.

9.5.2 Yukon's Role in Port Governance

The Yukon has significant economic interests in the potential development of port facilities in both Skagway and Haines. Given these economic interests, it would be desirable for Yukon to have representation on the Board of either of the port authorities. The precedent for this type of arrangement exists in the Vancouver Port Authority where the Board is comprised of a number of industry and government interests from Western Canada.

An additional consideration for Yukon is the potential to use new mineral royalties to invest in a new marine terminal or other portions of the supply chain for mineral products. This has been done, albeit indirectly, on the Sierra Yoyo Desan Resource Road in northeastern British Columbia. The royalties are used to fund the payments to a private operator of the road.

10. IMPLEMENTATION CONSIDERATIONS

This chapter discusses the potential implementation plan for the port strategy. The implementation plan covers three phases of activity – immediate (1-2 years), medium term (2-4 years) and long term, though it focuses on the first two years of activities related to implementation. The plan focuses on Skagway due to the short term need that is fulfilled by expanded port operations in Skagway. Nonetheless, several activities are relevant for Haines as well. These port development programs are independent of each other, though the probable timing of development is significantly different for the two programs.

10.1 Immediate Term Actions

1. **Create Implementation Organization** – The implementation organization will be charged with implementing the overall ports strategy. Given the diversity of interests, a corporate structure may be preferable to a committee structure, so as to provide ownership and a well defined governance process for the implementation organization (note: this is separate from the actual governance of the ports). The implementation organization needs to be defined in terms of:
    a. Overall mandate
    b. Funding for implementation activities (including approval processes)
    c. Timeline
    d. Representation (government – state, provincial and local, private sector – mining, transportation, port operations, and first nations
    e. Decision-making process and bylaws for effective governance
2. **Review Funding Options** – There are a number of programs that may have the ability to provide funding for portions of the proposed program. The review should focus on identifying:
    a. The nature and sources of available funding
    b. The degree of fit of the program (or individual elements of the program such as the cruise ship dock) with the objectives of the funding programs
    c. The level of discussion required for application for funding. What does the business case look like for each funding agency? What information is required?
    d. The application process (timing, submitting party, decision-making process, etc.)

e. The regulatory/policy implications of accepting funding from a particular source (what are the implications for timing, review, flexibility, etc.)

3. **Develop Communications Strategy/Program** – A communications program needs to be developed with the appropriate messaging about project need, project options, project development process, opportunities for consultation and key contacts.

    a. A key aspect of the communications strategy is a means to meaningfully engage key stakeholders such as first nations, White Pass & Yukon Route and the communities of Skagway and Haines.

    b. The communications strategy should contemplate linkages to other planning processes such as the comprehensive plan in Skagway, which is due for an update.

    c. The communications strategy should link the port strategy to the Alaska Canada Rail Link Study and its findings

4. **Develop Full Project Description** – The Project Description is a short document that will outline project need, project concepts/components and preliminary layouts/engineering drawings. Project Descriptions will be required for the Port of Skagway in particular, but should also be developed, albeit at a higher level, for Haines as well. The Project Description will be used for a number of purposes including:

    a. Display materials for public meetings and meetings with key stakeholders.

    b. To obtain preliminary thoughts and advice from regulatory agencies about the key issues and acceptability of the project

    c. To discuss the potential project and the financial implications with mining companies.

    d. To discuss potential funding with funding agencies

5. **Engage Regulatory Agencies** – Meet with the regulatory agencies on an informal basis to discuss the nature of the project and seek guidance/advice/comments on the project and the permitting processes/issues. Key agencies to be contacted include:

    a. Federal Aviation Authority – Impact of the conveyor on the airport and construction restrictions.

    b. Alaska Department of Transport – Acceptability of the conveyor (Alaska owns the airport), potential for moving AMH and the need to reroute the Klondike Highway to access a moved AMH operation. The planned Juneau access road and the implications for future ferry operations need to be fully understood as well.

c. Corp of Engineers – Concerns over the construction of a new ferry dock, new cruiseship dock and conveyor.

d. Department of Natural Resources – Concerns over the construction and operation of the new facilities on local habitat.

e. Department of Environmental Conservation – Concerns over the construction and operation of the new facilities on the environment.

f. Department of Homeland Security/Canadian Border Agencies – Implication of change in the port on security/safety. Implications of additional truck traffic on the ability to clear traffic at the existing border crossings on the Klondike Highway.

6. **Environmental Baseline** – Identify and undertake the appropriate environmental baseline studies that will facilitate the permitting/approval processes for the program or particular elements of the program. A significant issue to be examined is the physical and legal nature of the existing concentrate contamination on the seabed adjacent to the Ore Dock. Questions to be considered include:

    a. How big an issue is this? How extensive is the contamination (amount and over what area)?

    b. What is the extent of legal liability (who and quantum)?

    c. How does this impact further development on the Ore Dock, including matters such as dock rehabilitation?

    d. What sorts of indemnifications are possible or practical?

    e. How does this affect shippers?

    f. How does this affect project financeability (esp private sector)?

Other potential areas of examination include:

    a. Air quality monitoring and modeling

    b. Water quality monitoring

    c. Habitat assessments

    d. Archaeological/heritage impact assessments

7. **Land Ownership/Rights** – Clarify all issues related to the waterfront lands and other required property in terms of:

    a. Which lands are required for the program, and when?

b. What is the nature of the interest in the lands required (ownership, lease, easement, etc.)

c. What is the nature of the current ownership (leases, sub-leases and rights attached to the potentially affected properties)?

d. Is zoning appropriate?

e. How should the lands be acquired?

f. How will a land swap work?

8. **Governance** – While a local port governance model appears to be preferred, significant work is required to determine:

   a. The level of interest of local government in becoming more involved in the ownership, operation, regulation and financing of the port.

   b. The financial implications of becoming involved in port operations

   c. The fit with the Skagway Comprehensive Plan

   d. The potential public reaction to local control.

   e. The role and level of interest of the private sector in port operations and/or funding

   f. Transition plan with AIDEA

9. **Haines** – Haines Borough needs to be engaged at a number of levels to deal with issues such as:

   a. Community acceptability of the program

   b. Integration of the program (bulk terminal and railway) into official plans

   c. Protection of zoning on the old Fuel Depot site for a bulk terminal

   d. Protection of a potential rail corridor through the community through zoning, options to purchase or outright purchase – this may require the engagement of the state to protect a potential rail corridor along the Chilkat River as well.

10.2 Medium Term Actions

1. **Detailed engineering plans** – Detailed engineering plans for Skagway need to be developed to provide a basis for community consultation, applications for permits and approvals, to serve as an input for more detailed costing, and where appropriate, to serve as the basis for funding applications.

2. **Applications for environmental permits and approvals where required** – The application process should be started for improvements where specific permits or approvals are required. Some of the processes may be time-consuming.

3. **Community consultation process** – Both Haines Borough and City of Skagway should engage the local communities in consultation about the proposed projects, to obtain feedback on key issues and provide education on the benefits and impacts of the projects.

4. **Land acquisition** – Where land is required in either the near term or future, appropriate arrangements to acquire the land should be initiated. Outright purchase, land swaps and options could be considered as some of the key acquisition tools.

5. **Funding applications for relevant pieces of infrastructure** – Once it is clear that new infrastructure is required for which funding may be available from government programs, the applications should be completed and submitted.

6. **Engage first nations on economic development opportunities** – The projects have the potential to create significant economic opportunities for first nations in Alaska and Yukon. Discussions with the economic development agencies of these first nations should be initiated to assess the level of interest in financial and labour participation in potential construction and operating activities.

7. **Engage first nations on northern potential** – The potential development of iron ore and coal deposits along with associated rail and port infrastructure in northeastern Yukon should be the subject of a dialogue with local first nations. The intent of the dialogue should be to gauge the level of interest in participating in such a development and to discuss permitting, approval and consultation processes.

8. **Survey of private sector interest in the project –** Once the projects have reached a certain stage of maturity in terms of long term financial viability and some of the key risks have been identified and addressed, the private sector is likely to be interested in financial and other participation. A survey of private sector interest is often a good tool for marketing the opportunity well in advance of it becoming available on the market.

9. **Creation of local port authority –** Both Haines and Skagway should begin to develop the framework for a local port authority to ensure that their long term economic, financial and socio-community interests are protected.

10.3 Long Term Actions

1. **Construction –** This is the major construction needed to deal with future increases in volumes beyond that initially contemplated.

2. **Land Swap –** While the principles for the land swap need to be agreed upon earlier, the actual land swap can occur later**.**

3. **Detailed feasibility study on Haines rail route and bulk terminal –** This should be considered when there is information suggesting that development of the coal fields and iron ore deposits in northeastern Yukon are being considered more seriously.

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APPENDIX 1:

SUPPLEMENTAL SURFACE INFRASTRUCTURE TABLES

Yukon Transportation Infrastructure

					Annual Maintenance Costs		Traffic (data from 2004)		
	Length (km)	**Design speed curvature (km/h)**	**Average Maximum Grades (%)**	**Type of Surfacing**	**Annual ($1000)**	**Cost per kilometer**	**SAADT**	**AADT**	**Proposed Improvements**
Existing Highway Routes									
Haines Hwy from Haines to Haines Junction	240	RAU 100	8%	Bituminous surface treatment (BST)	$825,000	$4,000.00	188	112	Geometric and structural upgrade including BST resurfacing
Alaska Hwy from Haines Junction to Fairbanks	598	RAU 100	8%	Bituminous surface treatment	n/a	n/a	939	612	Geometric and structural upgrade including BST resurfacing
Alaska Highway from Haines Jcn to Whitehorse	156	RAU 100	8%	Bituminous surface treatment	$1,872,000	$12,000.00	1632	1225	Geometric and structural upgrade including BST resurfacing
Whitehorse to Watson Lake	453	RAU 100	8%	Bituminous surface treatment	$5,436,000	$12,000.00	897	576	
Alaska Hwy from Watson Lake to Ft Nelson	525	RAU 100	8%	Bituminous surface treatment	n/a	n/a	598	458	
Fort Nelson to Dawson Creek	460	RAU 100	8%	Bituminous surface treatment	n/a	n/a	n/a	n/a	
Klondike hwy from Carmacks to Fairbanks	313	RAU 90	8%	Mostly BST with short sections of asphalt pavement	$4,695,000	$15,000.00	382	245	
Dempster Hwy from Carmacks to Inuvik	1046	RCU 80	8%	Gravel with a 5km section of BST	$3,579,000	$3,421.61	182	111	Limited resurfacing
Hwy 37 from Stewart to Watson Lake	655	RAU 80	10%	Asphalt with intermittent gravel	n/a	n/a	1052	816	

					Annual Maintenance Costs		Traffic (data from 2004)		
	Length (km)	**Design speed curvature (km/h)**	**Average Maximum Grades (%)**	**Type of Surfacing**	**Annual ($1000)**	**Cost per kilometer**	**SAADT**	**AADT**	**Proposed Improvements**
Hwy 16 from Prince Rupert to Meziadan Jct (Jct to Stewart on hwy 37)	396	RAU 100	10%	Asphalt pavement	n/a	n/a	1820	1353	
Fairbanks to Anchorage	600	RAU 100	8%	Asphalt pavement	n/a	n/a			
Anchorage to Seward/Whittier	100	RAU 100	8%	Asphalt pavement	n/a	n/a			
Fairbanks to Seward/Whittier	776	RAU 100	8%	Asphalt pavement	n/a	n/a			
Speculative/ proposed highway routes									
Carmacks direct to Haines Hwy	400	RCU 80	8%	Gravel treated with CaCl	n/a	n/a			
Dempster hwy from Carmacks to Crest	680	RCU 80	8%	Gravel treated with CaCl	n/a	n/a			
Dempster hwy from Crest to King Point	715	RCU 80	8%	Gravel treated with CaCl	n/a	n/a			
Existing rail or existing rail platform									
Skagway to Whitehorse	110	n/a	3.90%	3.0 foot gauge, 115-lb rail on concrete ties	n/a	n/a	750,000 tourists	2,400 tons/day	
Delta Jcn to Seward/ Whittier	680	n/a	2%	Standard 4 foot 8.5" gauge	n/a	n/a			
Dease Lake to Prince George	735	n/a	2%	Standard 4 foot 8.5" gauge	n/a	n/a			
Speculative/proposed rail routes									
Whitehorse to Carmacks	160	n/a		Standard 4 foot 8.5" gauge	n/a	n/a			
Crest to Carmacks	680	n/a	2%	Standard 4 foot 8.5" gauge	n/a	n/a			

					Annual Maintenance Costs		Traffic (data from 2004)		
	Length (km)	**Design speed curvature (km/h)**	**Average Maximum Grades (%)**	**Type of Surfacing**	**Annual ($1000)**	**Cost per kilometer**	**SAADT**	**AADT**	**Proposed Improvements**
Crest to King Point	715	n/a	2%	Standard 4 foot 8.5" gauge	n/a	n/a			
Haines to Haines Junction	174	n/a	2%	Standard 4 foot 8.5" gauge	n/a	n/a			
Dease Lake to Haines Junction	870	n/a	2%	Standard 4 foot 8.5" gauge	n/a	n/a			
Dease Lake to Stewart	400	n/a	2%	Standard 4 foot 8.5" gauge	n/a	n/a			
ACRL Delta jcn to Carmacks (Klondike hwy rte)	771	n/a	2%	Standard 4 foot 8.5" gauge	n/a	n/a			
ACRL: Delta jcn to watson lake (Alaska hwy rte)	1,112	n/a	2%	Standard 4 foot 8.5" gauge	n/a	n/a			
ACRL: Watson Lake to Prince George (Tintina trench rte)	1351	n/a	2%	Standard 4 foot 8.5" gauge	n/a	n/a			
ACRL: Watson Lake to Dease Lake (hwy 37 rte)	256	n/a	2%	Standard 4 foot 8.5" gauge	n/a	n/a			

Transportation of Mineral from Carmacks and Crest Deposit

From Carmacks Destination	Projected Maximum Traffic Volume	Approximate Distance (km)	Road Upgrade (km)	Road Upgrade Cost (C$M)	New Road (km)	New Road Cost (C$M)	Additional Capital Road Costs (C$M)	Transportation cost for one tonne of mineral (C$)
Port Mackenzie (Anchorage)	n/a	1310	360	$72	0	0	$72	$105
Seward	n/a	1410	360	$72	0	0	$72	$113
Haines - Existing roads	750	580	580	$116	0	0	$116	$46
Haines with new truck route	600	400	180	$36	220	$176	$212	$32
Skagway	1295	360	360	$72	0	0	$72	$29
Stewart	1416	1050	1050	$210	0	0	$210	$84
Prince Rupert	1953	1440	1040	$208	0	0	$208	$115
King Point	711	1060	780	$156	280	$224	$380	$84
From Crest Deposit **Destination**								
Port Mackenzie (Anchorage)	n/a	1800	220	$44	250	$200	$244	$144
Seward	n/a	1900	220	$44	250	$200	$244	$152
Haines - Existing roads	n/a	1410	1160	$232	250	$200	$432	$113
Haines with new truck route	n/a	1230	760	$152	470	$376	$528	$98
Skagway	n/a	1190	940	$188	250	$200	$388	$95
Stewart	n/a	2080	1730	$346	250	$200	$546	$166
Prince Rupert	n/a	2470	1820	$364	250	$200	$564	$198
King Point	n/a	730	200	$40	530	$424	$464	$58

Assumptions:

1. All Yukon Highways and BC Hwy 37 will be upgraded for heavy truck use. Upgrading will involve a thicker pavement and limited widening of curves. Upgrading cost will be C$200,000/km.
2. New haul roads between Carmacks and Haines Highway (220 km), between the Dempster Highway and King Point (270 km) and between Dempster Highway and Crest Deposit will cost approximately C$800,000/km.
3. No highway upgrading has been calculated west of Dawson City and on any Alaskan Highway.
4. Transportation cost for one tonne of material will be C$0.08/tonne-km
5. Maximum projected traffic volume assumes 2005 traffic volumes at 2% plus 20% general traffic increase plus estimated haul trucks multiplied by 3 (truck equivalent factor)

APPENDIX 2:

DETAILED ANALYSIS OF SUPPLY CHAIN COSTS

Howard's Pass Pb-Zn exported to China					
Haines	**Skagway**	**Stewart**	**Unit**	**Basis for cost item**	Life
659,461	659,461	659,461	tonnes	annual tonnes per year	21
$0.00	$0.00	$0.00	$/t	variable mining cost	
877	623	1,007	km	trucking distance	
$96.47	$68.53	$110.77	$/t	trucking cost	
0	0	0	km	rail distance	
$0.00	$0.00	$0.00	$/km	rail cost (from AL-CAN rail model)	
$8.00	$8.00	$8.00	$/t	terminal cost	
$26.93	$26.93	$29.37	$/t	ship cost	
$131.40	$103.46	$148.14	$/t	Total CIF Shanghai	
n/a	n/a	n/a	$/t	Market price CIF Shanghai, March 10 2006	
n/a	n/a	n/a	$/t	Surplus or "Economic rent"	

Finlayson Lake District polymetallics exported to China						
Haines	**Skagway**	**Stewart**	**Unit**	**Basis for cost item**	Property	Life
116,667	116,667	116,667	tonnes	annual tonnes per year	Wolverine	12
$0.00	$0.00	$0.00	$/t	variable mining cost		
974	754	891	km	trucking distance		
$107.14	$82.94	$98.01	$/t	trucking cost		
0	0	0	km	rail distance		
$0.00	$0.00	$0.00	$/km	rail cost (from AL-CAN rail model)		
$8.00	$8.00	$8.00	$/t	terminal cost		
$26.93	$26.93	$29.37	$/t	ship cost		
$134.07	$109.87	$127.38	$/t	Total CIF Shanghai		
n/a	n/a	n/a	$/t	Market price CIF Shanghai, March 10 2006		
n/a	n/a	n/a	$/t	Surplus or "Economic rent"		

Tom & Jason and Mactung mines to China						
Haines	**Skagway**	**Stewart**	**Unit**	**Basis for cost item**	Property	Life
234,974	234,974	234,974	tonnes	annual tonnes per year	Tom & Jason	14
$470.68	$470.68	$470.68	$/t	variable mining cost		
4,700	4,700	4,700	tonnes	annual tonnes per year	Mactung	30
$0.00	$0.00	$0.00	$/t	variable mining cost		
445	794	445	km	trucking distance		
$48.66	$86.82	$48.66	$/t	trucking cost		
357	0	1,221	km	rail distance		
$5.57	$0.00	$19.06	$/km	rail cost (from AL-CAN rail model)		
$8.00	$8.00	$8.00	$/t	terminal cost		
$26.93	$26.93	$29.37	$/t	ship cost		
$89.16	$121.75	$105.09	$/t	Total CIF Shanghai		
n/a	n/a	n/a	$/t	Market price CIF Shanghai, March 10 2006		
n/a	n/a	n/a	$/t	Surplus or "Economic rent"		

Dawson Range mines to China						
Haines	**Skagway**	**Stewart**	**Unit**	**Basis for cost item**	Property	Life
26,900	26,900	26,900	tonnes	annual tonnes per year	Minto	12
$0.00	$0.00	$0.00	$/t	variable mining cost		
667	449	1,321	tonnes	trucking distance		
$73.37	$49.39	$145.31	$/t	trucking cost		
0	0	0	km	rail distance		
$0.00	$0.00	$0.00	$/t	rail cost (from AL-CAN rail model)		
$8.00	$8.00	$8.00	km	terminal cost		
$26.93	$26.93	$29.37	$/km	ship cost		
$108.30	$84.32	$182.68	$/t	Total CIF Shanghai		
n/a	n/a	n/a	$/t	Market price CIF Shanghai, March 10 2006		
n/a	n/a	n/a	$/t	Surplus or "Economic rent"		

Transport Cost Analysis for Iron Ore and Coal in C$

Crest Iron Ore Pellets exported to China

Port Mackenzie	Seward	Haines	Skagway	Prince Rupert	Stewart	Unit	Basis for cost item	Life
23,076,923	23,076,923	23,076,923		23,076,923	23,076,923	tonnes	annual tonnes per year	30
$28.81	$28.81	$28.81		$28.81	$28.81	$/t	mine operating and capital cost	
0	0	0		0	0	km	trucking distance	
$0.00	$0.00	$0.00		$0.00	$0.00	$/t	trucking cost	
1,430	1,630	889		2,110	1,780	km	rail distance	
$22.33	$25.45	$13.88		$32.94	$27.79	$/t	rail cost (from AL-CAN rail model)	
$6.00	$6.00	$6.00		$6.00	$6.00	$/t	terminal cost	
$10.24	$10.24	$11.02		$11.89	$11.89	$/t	ship cost	
$67.37	$70.50	$59.71		$79.64	$74.49	$/t	Total CIF Shanghai	
$79.27	$79.27	$79.27		$79.27	$79.27	$/t	Estimated sustainable market price CIF Shanghai	
$11.89	$8.77	$19.55		-$0.38	$4.78	$/t	Surplus or "Economic rent"	
$2,587	$1,908	$4,254		$0	$1,039	$million	Present value of economic rent	

Bonnet Plume Thermal Coal exported to China

Port Mackenzie	Seward	Haines	Skagway	Prince Rupert	Stewart	Unit	Basis for cost item	Life
5,610,000	5,610,000	5,610,000		5,610,000	5,610,000	tonnes	annual tonnes per year	12.6
$22.80	$22.80	$22.80		$22.80	$22.80	$/t	mine operating cost	
10	10	10		10	10	km	trucking distance	
$1.09	$1.09	$1.09		$1.09	$1.09	$/t	trucking cost	
1,330	1,530	914		2,010	1,680	km	rail distance	
$22.33	$25.45	$14.27		$32.94	$27.79	$/t	rail cost (from AL-CAN rail model)	
$6.00	$6.00	$6.00		$6.00	$6.00	$/t	terminal cost	
$16.00	$16.00	$17.30		$18.91	$18.91	$/t	ship cost	
$68.22	$71.35	$61.46		$81.75	$76.59	$/t	Total CIF Shanghai	
$69.56	$69.56	$69.56		$69.56	$69.56	$/t	Market price CIF Shanghai, March 10 2006	
$1.33	-$1.79	$8.09		-$12.19	-$7.04	$/t	Surplus or "Economic rent"	
$51	$0	$308		$0	$0	$million	Present value of economic rent	

Division Thermal Coal Exported to China (Standard Rail except Skagway)								
Port Mackenzie	**Seward**	**Haines**	**Skagway**	**Prince Rupert**	**Stewart**	**Unit**	**Basis for cost item**	Life
1,250,000	1,250,000	1,250,000		1,250,000	1,250,000	tonnes	annual tonnes per year	22
$10.40	$10.40	$10.40		$10.40	$10.40	$/t	mine operating cost	
20	20	3		20	20	km	trucking distance	
$2.19	$2.19	$0.33		$2.19	$2.19	$/t	trucking cost	
1,220	1,418	352		1,459	1,128	km	rail distance	
$19.05	$22.14	$5.50		$22.78	$17.61	$/t	rail cost (from AL-CAN rail model)	
$6.00	$6.00	$6.00		$6.00	$6.00	$/t	terminal cost	
$16.00	$16.00	$16.00		$16.00	$16.00	$/t	ship cost	
$53.64	$56.73	$38.23		$57.37	$52.20	$/t	Total CIF Shanghai	
$69.56	$69.56	$69.56		$69.56	$69.56	$/t	Market price CIF Shanghai, March 10 2006	
$15.92	$12.83	$31.33		$12.19	$17.35	$/t	Surplus or "Economic rent"	
$175	$141	$344		$134	$190	$million	Present value of economic rent	
$2,812	$2,048	$4,906		$134	$1,229	$million	Total total present value of iron ore and coal economic r	
$1.97	$1.26	$5.37		$0.06	$0.69	$million/km	Economic rent per km of new railway, Crest to port	

Division Thermal Coal Exported to China - Truck								
Port Mackenzie	**Seward**	**Haines**	**Skagway**	**Prince Rupert**	**Stewart**	**Unit**	**Basis for cost item**	Life
1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	tonnes	annual tonnes per year	22
$10.40	$10.40	$10.40	$10.40	$10.40	$10.40	$/t	mine operating cost	
1,240	1,438	482	261	1,479	1,138	km	trucking distance	
$136.40	$158.18	$53.02	$28.71	$162.69	$125.18	$/t	trucking cost	
0	0	0	0	0	0	km	rail distance	
$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$/t	rail cost (from AL-CAN rail model)	
$6.00	$6.00	$6.00	$6.00	$6.00	$6.00	$/t	terminal cost	
$16.00	$16.00	$17.30	$17.30	$16.00	$16.00	$/t	ship cost	
$168.80	$190.58	$86.72	$62.41	$195.09	$157.58	$/t	Total CIF Shanghai	
$69.56	$69.56	$69.56	$69.56	$69.56	$69.56	$/t	Market price CIF Shanghai, March 10 2006	
-$99.25	-$121.03	-$17.16	$7.15	-$125.54	-$88.03	$/t	Surplus or "Economic rent"	
$0	$0	$0	$0	$0	$0	$million	Present value of economic rent	

APPENDIX 3:

FINANCIAL MODEL

Government of Yukon
Skagway Port Development

Input Sheet (2006$)

	Fiscal Year 2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
CPI	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
CPI Index	1.00	1.02	1.04	1.06	1.08	1.10	1.13	1.15	1.17	1.20	1.22	1.24	1.27	1.29	1.32	1.35	1.37	1.40	1.43	1.46	1.49	1.52	1.55	1.58	1.61	1.64	1.67	1.71	1.74	1.78
Active Scenario 5																														
Concentrate																														
Tonnage	$ -	$ 100,000	$ 212,500	$ 325,000	$ 437,500	$ 550,000	$ 662,500	$ 775,000	$ 887,500	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000
2006 Revenue per Tonne	$ -	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00
2006 Opex per Tonne	$ -	$ 6.00	$ 5.75	$ 5.50	$ 5.25	$ 5.00	$ 4.75	$ 4.50	$ 4.25	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00
Coal																														
Tonange	-	-	-	-	-	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000
2006 Revenue per Tonne	$ -	$ -	$ -	$ -	$ -	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00
2006 Opex per Tonne	$ -	$ -	$ -	$ -	$ -	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30
Capex																														
Concentrate Shed	16,000,000	-	-	6,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coal Dome	-	-	-	-	20,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cruise Ship Dock	-	-	-	-	14,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bypass Conveyor	-	-	-	-	6,000,000	-	-	6,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rail or Truck Dumper	-	-	-	-	2,000,000	-	-	2,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scenario 1A																														
Concentrate																														
Tonnage	0	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
2006 Revenue per Tonne	0	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00
2006 Opex per Tonne	0	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00
Coal																														
Tonange	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2006 Revenue per Tonne	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2006 Opex per Tonne	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capex																														
Concentrate Shed	5,000,000	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coal Dome	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cruise Ship Dock	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bypass Conveyor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rail or Truck Dumper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scenario 1B																														
Concentrate																														
Tonnage	-	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
2006 Revenue per Tonne	-	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00
2006 Opex per Tonne	-	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00
Coal																														
Tonange	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2006 Revenue per Tonne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2006 Opex per Tonne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capex																														
Concentrate Shed	16,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coal Dome	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cruise Ship Dock	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bypass Conveyor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rail or Truck Dumper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scenario 2																														
Concentrate																														
Tonnage	-	100,000	233,333	366,666	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000
2006 Revenue per Tonne	$ -	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00
2006 Opex per Tonne	$ -	$ 6.00	$ 5.67	$ 5.34	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00
Coal																														
Tonange	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2006 Revenue per Tonne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2006 Opex per Tonne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capex																														
Concentrate Shed	16,000,000	-	-	6,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coal Dome	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cruise Ship Dock	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bypass Conveyor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rail or Truck Dumper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scenario 3																														
Concentrate																														
Tonnage	0	100,000	233,333	366,666	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000
2006 Revenue per Tonne	0	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00
2006 Opex per Tonne	0	$ 6.00	$ 5.67	$ 5.34	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00
Coal																														
Tonange	0	0				1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000
2006 Revenue per Tonne	0	0				$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00
2006 Opex per Tonne	0	0				$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30
Capex																														
Concentrate Shed	16,000,000	-	-	6,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coal Dome	-	-	-	-	20,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cruise Ship Dock	-	-	-	-	14,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bypass Conveyor	-	-	-	-	6,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rail or Truck Dumper	-	-	-	-	2,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Government of Yukon
Skagway Port Development

Input Sheet (2006$)

	Fiscal Year 2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Scenario 4																														
Concentrate																														
Tonnage	-	100,000	212,500	325,000	437,500	550,000	662,500	775,000	887,500	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
2006 Revenue per Tonne	-	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00
2006 Opex per Tonne	-	$ 6.00	$ 5.75	$ 5.50	$ 5.25	$ 5.00	$ 4.75	$ 4.50	$ 4.25	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00
Coal																														
Tonange	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2006 Revenue per Tonne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2006 Opex per Tonne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capex																														
Concentrate Shed	16,000,000	-	-	6,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coal Dome	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cruise Ship Dock	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bypass Conveyor	-	-	-	-	-	-	-	6,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rail or Truck Dumper	-	-	-	-	-	-	-	2,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scenario 5																														
Concentrate																														
Tonnage	-	100,000	212,500	325,000	437,500	550,000	662,500	775,000	887,500	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
2006 Revenue per Tonne	-	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00
2006 Opex per Tonne	$ -	$ 6.00	$ 5.75	$ 5.50	$ 5.25	$ 5.00	$ 4.75	$ 4.50	$ 4.25	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00	$ 4.00
Coal																														
Tonange	-	-	-	-	-	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000
2006 Revenue per Tonne	-	-	-	-	-	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00
2006 Opex per Tonne	-	-	-	-	-	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30	$ 1.30
Capex																														
Concentrate Shed	16,000,000	-	-	6,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coal Dome	-	-	-	-	20,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cruise Ship Dock	-	-	-	-	14,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bypass Conveyor	-	-	-	-	6,000,000	-	-	6,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rail or Truck Dumper	-	-	-	-	2,000,000	-	-	2,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scenario 6 Coal Moved through Rail Transfer Facility at Russell Metals Site																														
Concentrate																														
Tonnage	-	100,000	212,500	325,000	437,500	550,000	662,500	775,000	887,500	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
2006 Revenue per Tonne	-	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
2006 Opex per Tonne	-	6	6	6	5	5	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Coal																														
Tonange	-	-	-	-	-	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000
2006 Revenue per Tonne	-	-	-	-	-	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
2006 Opex per Tonne	-	-	-	-	-	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
Capex																														
Concentrate Shed	16,000,000	-	-	6,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coal Storage and Loading	-	-	-	-	75,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cruise Ship Dock	-	-	-	-	14,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bypass Conveyor	-	-	-	-	14,000,000	-	-	6,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rail Bridge and Track	-	-	-	-	11,000,000	-	-	2,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scenario 7 Haines Iron Ore and Coal Facility																														
Concentrate																														
Tonnage	-	-	-	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000
2006 Revenue per Tonne	-	-	-	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60
2006 Opex per Tonne	-	-	-	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
Coal																														
Tonange	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2006 Revenue per Tonne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2006 Opex per Tonne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capex																														
Concentrate Shed	433,000,000	433,000,000	433,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coal Dome	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cruise Ship Dock	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bypass Conveyor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rail Dumper, Bridge and Track	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Government of Yukon
Skagway Port Development

Cash Flow and Net Income Summary

	NPV															
	5%	**7%**	**10%**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
SUMMARY	Scenario	5														
Cash Flow Statement																
Revenues																
Concentrates	152,711,640	114,460,006	77,609,864	-	1,020,000	2,210,850	3,448,926	4,735,641	6,072,444	7,460,826	8,902,314	10,398,477	11,950,926	12,189,944	12,433,743	12,682,418
Coal	107,032,315	81,812,061	54,912,141	-	-	-	-	-	7,949,382	8,108,369	8,270,537	8,435,948	8,604,666	8,776,760	8,952,295	9,131,341
	262,387,126	196,272,067	132,522,005	-	1,020,000	2,210,850	3,448,926	4,735,641	14,021,826	15,569,195	17,172,851	18,834,425	20,555,592	20,966,704	21,386,038	21,813,759
Opex																
Concentrates	(63,880,363)	(48,333,094)	(33,275,812)	-	(612,000)	(1,271,239)	(1,896,909)	(2,486,211)	(3,036,222)	(3,543,892)	(4,006,041)	(4,419,353)	(4,780,370)	(4,875,978)	(4,973,497)	(5,072,967)
Coal	(23,190,335)	(17,725,947)	(11,897,631)	-	-	-	-	-	(1,722,366)	(1,756,813)	(1,791,950)	(1,827,789)	(1,864,344)	(1,901,631)	(1,939,664)	(1,978,457)
	(87,643,385)	(66,059,041)	(45,173,443)	-	(612,000)	(1,271,239)	(1,896,909)	(2,486,211)	(4,758,588)	(5,300,706)	(5,797,991)	(6,247,141)	(6,644,715)	(6,777,609)	(6,913,161)	(7,051,424)
		-	-													
Net Operational Cash Flow	174,743,740	130,213,026	87,348,563	**-**	**408,000**	**939,611**	**1,552,017**	**2,249,429**	**9,263,238**	**10,268,490**	**11,374,860**	**12,587,283**	**13,910,877**	**14,189,095**	**14,472,877**	**14,762,334**
Capex																
Concentrate Shed	(20,982,113)	(20,492,465)	(19,816,583)	(16,000,000)	-	-	(6,367,248)	-	-	-	-	-	-	-	-	-
Coal Storage and Loading	(17,381,163)	(15,966,278)	(14,098,198)	-	-	-	-	(21,648,643)	-	-	-	-	-	-	-	-
Cruise Ship Dock	(12,166,814)	(11,176,395)	(9,868,738)	-	-	-	-	(15,154,050)	-	-	-	-	-	-	-	-
Bypass Conveyor	(9,994,402)	(8,939,177)	(7,601,613)	-	-	-	-	(6,494,593)	-	-	(6,892,114)	-	-	-	-	-
Rail Bridge and Track	(3,331,467)	(2,979,726)	(2,533,871)	-	-	-	-	(2,164,864)	-	-	(2,297,371)	-	-	-	-	-
Grant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	(63,855,960)	(59,554,040)	(53,919,003)	(16,000,000)	-	-	(6,367,248)	(45,462,151)	-	-	(9,189,485)	-	-	-	-	-
Net Cash Flow before Taxes	**110,887,780**	**70,658,986**	**33,429,560**	**(16,000,000)**	**408,000**	**939,611**	**(4,815,231)**	**(43,212,721)**	**9,263,238**	**10,268,490**	**2,185,374**	**12,587,283**	**13,910,877**	**14,189,095**	**14,472,877**	**14,762,334**
Income Statement		**IRR**	**15.9%**													
Total Revenues				-	1,020,000	2,210,850	3,448,926	4,735,641	14,021,826	15,569,195	17,172,851	18,834,425	20,555,592	20,966,704	21,386,038	21,813,759
Total Operating Expenses				-	(612,000)	(1,271,239)	(1,896,909)	(2,486,211)	(4,758,588)	(5,300,706)	(5,797,991)	(6,247,141)	(6,644,715)	(6,777,609)	(6,913,161)	(7,051,424)
Gross Profit				-	408,000	939,611	1,552,017	2,249,429	9,263,238	10,268,490	11,374,860	12,587,283	13,910,877	14,189,095	14,472,877	14,762,334
Depreciation				-	(533,333)	(533,333)	(533,333)	(745,575)	(2,260,980)	(2,260,980)	(2,260,980)	(2,567,296)	(2,567,296)	(2,567,296)	(2,567,296)	(2,567,296)
Net Income				**-**	**(125,333)**	**406,278**	**1,018,683**	**1,503,854**	**7,002,258**	**8,007,510**	**9,113,880**	**10,019,987**	**11,343,581**	**11,621,799**	**11,905,581**	**12,195,038**

Government of Yukon
Skagway Port Development

Cash Flow and Net Income Summary

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
SUMMARY																	
Cash Flow Statement																	
Revenues																	
Concentrates	12,936,066	13,194,788	13,458,683	13,727,857	14,002,414	14,282,462	14,568,112	14,859,474	15,156,663	15,459,797	15,768,993	16,084,372	16,406,060	16,734,181	17,068,865	17,410,242	17,758,447
Coal	9,313,968	9,500,247	9,690,252	9,884,057	10,081,738	10,283,373	10,489,040	10,698,821	10,912,798	11,131,054	11,353,675	11,580,748	11,812,363	12,048,610	12,289,583	12,535,374	12,786,082
	22,250,034	22,695,035	23,148,935	23,611,914	24,084,152	24,565,835	25,057,152	25,558,295	26,069,461	26,590,850	27,122,667	27,665,121	28,218,423	28,782,792	29,358,447	29,945,616	30,544,529
Opex																	
Concentrates	(5,174,427)	(5,277,915)	(5,383,473)	(5,491,143)	(5,600,966)	(5,712,985)	(5,827,245)	(5,943,790)	(6,062,665)	(6,183,919)	(6,307,597)	(6,433,749)	(6,562,424)	(6,693,672)	(6,827,546)	(6,964,097)	(7,103,379)
Coal	(2,018,026)	(2,058,387)	(2,099,555)	(2,141,546)	(2,184,377)	(2,228,064)	(2,272,625)	(2,318,078)	(2,364,439)	(2,411,728)	(2,459,963)	(2,509,162)	(2,559,345)	(2,610,532)	(2,662,743)	(2,715,998)	(2,770,318)
	(7,192,453)	(7,336,302)	(7,483,028)	(7,632,689)	(7,785,342)	(7,941,049)	(8,099,870)	(8,261,868)	(8,427,105)	(8,595,647)	(8,767,560)	(8,942,911)	(9,121,769)	(9,304,205)	(9,490,289)	(9,680,095)	(9,873,696)
Net Operational Cash Flow	**15,057,581**	**15,358,733**	**15,665,907**	**15,979,226**	**16,298,810**	**16,624,786**	**16,957,282**	**17,296,428**	**17,642,356**	**17,995,203**	**18,355,107**	**18,722,210**	**19,096,654**	**19,478,587**	**19,868,159**	**20,265,522**	**20,670,832**
Capex																	
Concentrate Shed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coal Storage and Loading	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cruise Ship Dock	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bypass Conveyor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rail Bridge and Track	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Cash Flow before Taxes	**15,057,581**	**15,358,733**	**15,665,907**	**15,979,226**	**16,298,810**	**16,624,786**	**16,957,282**	**17,296,428**	**17,642,356**	**17,995,203**	**18,355,107**	**18,722,210**	**19,096,654**	**19,478,587**	**19,868,159**	**20,265,522**	**20,670,832**
Income Statement																	
Total Revenues	22,250,034	22,695,035	23,148,935	23,611,914	24,084,152	24,565,835	25,057,152	25,558,295	26,069,461	26,590,850	27,122,667	27,665,121	28,218,423	28,782,792	29,358,447	29,945,616	30,544,529
Total Operating Expenses	(7,192,453)	(7,336,302)	(7,483,028)	(7,632,689)	(7,785,342)	(7,941,049)	(8,099,870)	(8,261,868)	(8,427,105)	(8,595,647)	(8,767,560)	(8,942,911)	(9,121,769)	(9,304,205)	(9,490,289)	(9,680,095)	(9,873,696)
Gross Profit	15,057,581	15,358,733	15,665,907	15,979,226	16,298,810	16,624,786	16,957,282	17,296,428	17,642,356	17,995,203	18,355,107	18,722,210	19,096,654	19,478,587	19,868,159	20,265,522	20,670,832
Depreciation	(2,567,296)	(2,567,296)	(2,567,296)	(2,567,296)	(2,567,296)	(2,567,296)	(2,567,296)	(2,567,296)	(2,567,296)	(2,567,296)	(2,567,296)	(2,567,296)	(2,567,296)	(2,567,296)	(2,567,296)	(2,567,296)	(2,567,296)
Net Income	**12,490,285**	**12,791,437**	**13,098,611**	**13,411,929**	**13,731,514**	**14,057,490**	**14,389,986**	**14,729,132**	**15,075,060**	**15,427,907**	**15,787,811**	**16,154,913**	**16,529,358**	**16,911,291**	**17,300,862**	**17,698,226**	**18,103,536**

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