Proposed by:	Administration
First Reading:	02/19/2009
Second Reading:	03/05/2009
Vote: 4 Aye	0 Nay 2 Absent

MUNCIPALITY OF SKAGWAY, ALASKA
ORDINANCE NO. 09-03

AN ORDINANCE OF THE MUNICIPALITY OF SKAGWAY, ALASKA ADOPTING THE SKAGWAY PORT DEVELOPMENT PLAN DATED SEPTEMBER 2008.

Whereas, the Municipality of Skagway contracted with CH2M Hill to develop a Skagway Port Development Plan; **and**

Whereas, the Municipality of Skagway established a Port Steering Committee to work on the initial plan; **and**

Whereas, the Municipality of Skagway recognizes the importance of the Skagway Port for economic development;

Now, Therefore, Be It Enacted by the Borough Assembly of the Municipality of Skagway:

Section 1. Classification. This is a non-code ordinance.

Section 2. Purpose. The Skagway Port Development Plan will provide a guide for development of the Skagway Port.

Section 3. Adoption. The Skagway Port Development Plan dated September 2008 is hereby adopted.

Section 5. Effective Date. This ordinance shall become effective upon adoption by the Skagway Borough Assembly.

PASSED AND APPROVED by a duly constituted quorum of the Borough Assembly of the Municipality of Skagway this 5th day of March, 2009.

Thomas D. Cochran, Mayor

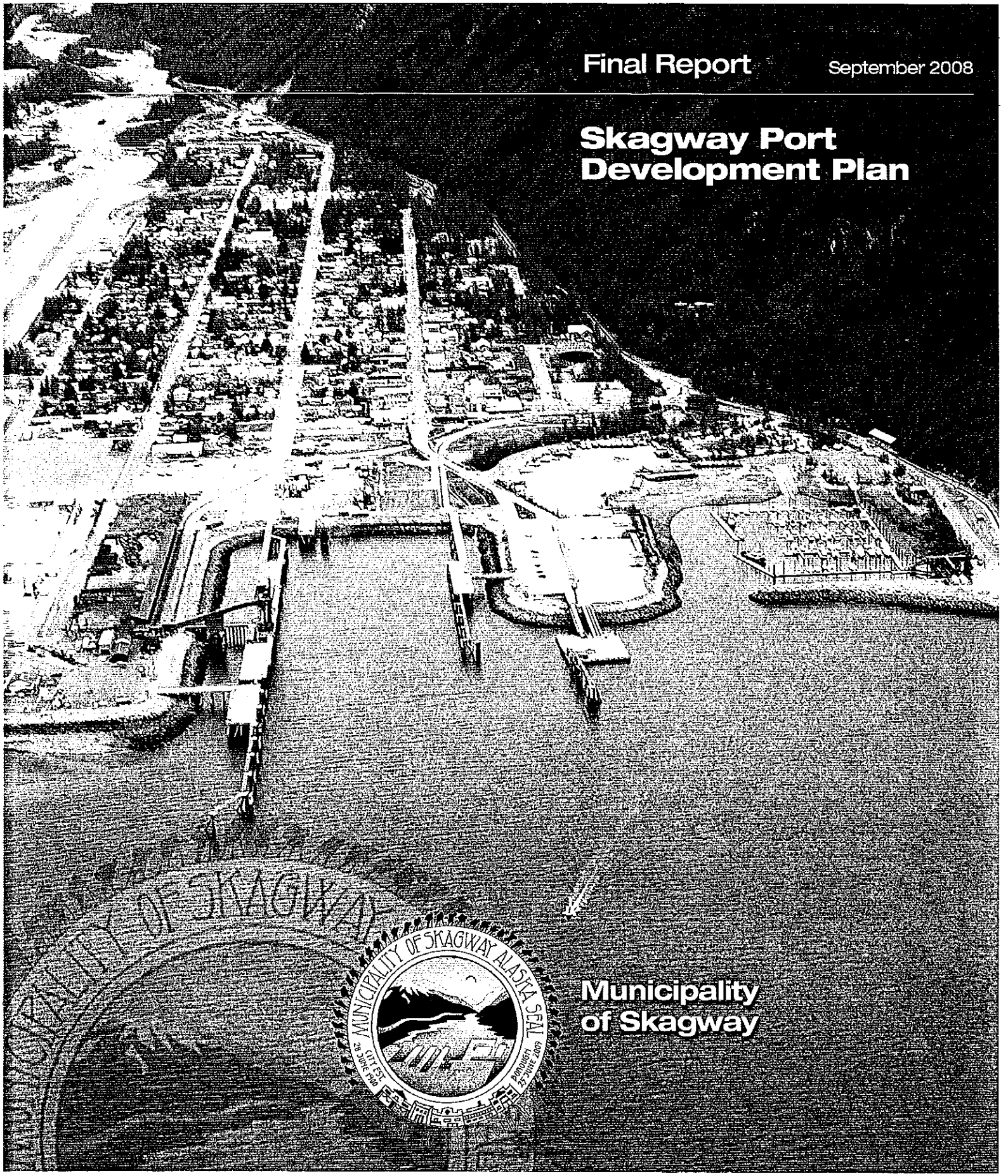
ATTEST:

Marjorie D. Harris, Borough Clerk

(SEAL)

Final Report September 2008

Skagway Port Development Plan



Municipality of Skagway

KPMG

CH2MHILL

Sandwell

Final Report

Skagway Port Development Plan

Prepared for

Municipality of Skagway

September 2008

Prepared by

KPMG CH2MHILL speed and precision worldwide Sandwell

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Acronyms and Abbreviations

AADT	annual average daily traffic
ACRLS	Alaska Canada Rail Link Study
AMHS	Alaska Marine Highway System
AIDEA	Alaska Industrial Development and Export Authority
AML	Alaska Marine Lines
ARM	Alaska Railbelt Marine
ASDT	average summer daily traffic
BC	British Columbia
BST	bituminous surface treatment
CPA	Canada Port Authority
CN Rail	Canadian National Railway
dwt	deadweight tonnes
GVW	gross vehicle weight
kg	kilogram
km	kilometre
lb	pound
IRR	internal rate of return
LPG	liquid propane gas
MARAD	U.S. Maritime Administration
MHHW	mean higher high water
MLLW	mean lower low water
MOS	Municipality of Skagway
PSC	Skagway Port Development Steering Committee
RO/RO	roll on/roll off
tpa	tonnes per annum
tph	tonnes per hour
TOTE	Totem Ocean Trailer Express
USACE	U.S. Army Corps of Engineers
VPA	Virginia Ports Authority
WPYR	White Pass & Yukon Route Railroad

Port Steering Committee

Tom Cochran - Mayor Municipality of Skagway

Tim Bourcy - Skagway Community (Chairman)

Michael Brandt - White Pass & Yukon Route Railroad

John Wood - Alaska Miners Association

Paul Axelson - Southeast Stevedoring

James R. Hemsath P.E., PMP - Alaska Industrial Development and Export Authority

Yukon Economic Development

Clynton R. Nauman - Alexco Resources

Executive Summary

ES.1 Introduction

In response to the growing mining activity in the Yukon Territory, the Skagway Port Development Steering Committee (PSC) initiated a study to assess the potential for Skagway in the resurgence of the Yukon mining industry. The purpose of this study is to help the Municipality of Skagway (MOS) position the port to capture a significant share of the export raw materials from the Yukon. Specifically, the mission of the PSC is to "prepare an actionable business plan with a conceptual port arrangement the municipality may utilize to make sound port fiscal decisions, advancing the interests of the municipality and the region."

The economic livelihood of the MOS and Yukon Territory depends on a thriving and competitive inter-modal port facility designed to provide efficient, cost-effective transshipment of bulk mineral concentrates and general cargo. The MOS is uniquely positioned to provide the nearest tidewater port access for the Yukon Territory. Skagway offers a significant transportation cost advantage over other ports is southeast Alaska and British Columbia (BC). Although the port is currently dominated by the demands of the cruise ship industry, recent developments in the mining industry in the Yukon Territory are providing an opportunity for Skagway to assert itself once again as the "Yukon Port of Skagway."

ES.2 Existing Infrastructure

ES.2.1 Roads

The Yukon is generally well served with surfaced roads traversing the populated southwestern part of the Territory and providing access to Skagway. Highways are generally proximate to the major mining regions, though local resource access roads may need to be upgraded or built for some of the potential mine development to proceed.

Existing highways are generally well constructed, lightly traveled and have sufficient capacity for further freight movements. The South Klondike Highway between Whitehorse and Skagway currently carries and average of 200 to 400 vehicles per day (400 to 600 per day in the summer months). The Yukon and British Columbia allow overweight trucks to operate on the South Klondike Highway under the auspices of the Yukon's Bulk Commodity Haul Regulations. Under their regulations trucks over 63.5 tonnes (140,000 lbs.) and up to 77.1 tonnes (170,000 lbs.) are allowed to move over the highway subject to paying a fee of $0.01 per tonne-kilometre for all weight over the legal maximum GVW of 63.5 tonnes.

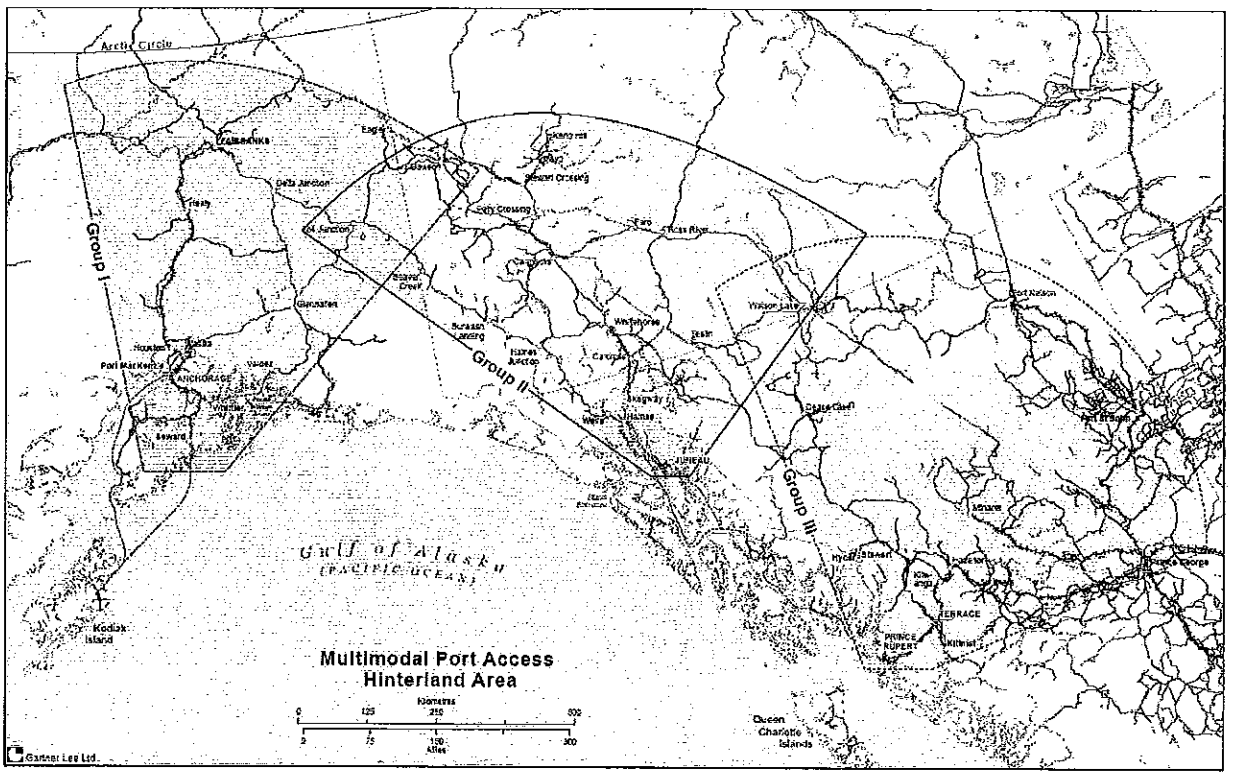
ES.2.2 Rail

One existing rail line currently operates in the Yukon. The White Pass and Yukon Route (WPYR) operates a narrow gauge railway from Skagway to Carcross. This line currently only offers passenger service, which is tightly linked with the cruise ship calls in Skagway. While the rail line used to offer freight service between Whitehorse and Skagway, that service was abandoned due to the closure of the Faro Mine. Under the right circumstances, WPYR could upgrade and re-open the track between Carcross and Whitehorse and reinstitute freight service.

ES.2.3 Ports

Skagway, and to a certain extent Haines, are the logical ports of choice for the movement of freight by water to and from the Yukon as evidenced in Figure ES-1.

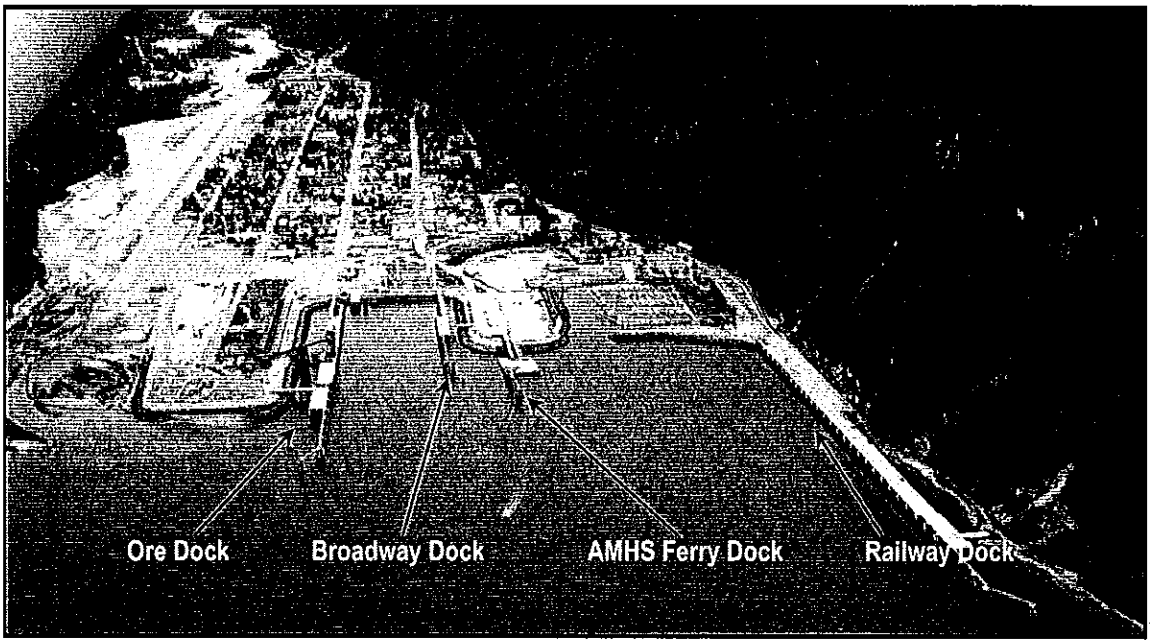
FIGURE ES-1
Port Hinterlands



Skagway is well served by highway and has a distinct distance advantage compared to other ports. Skagway is significantly closer to potential mines than its principal competitor for this type of traffic, the Port of Stewart. The Port of Skagway has a number of marine terminals for freight and passenger as shown in Figure ES-2 and as follows:

- Ore Dock – Bulk vessels for concentrates, ro-ro barges, fuel barges and cruise ships
- Broadway Dock – Cruise ships
- AMHS Ferry Dock – AMHS ferries and other vessels
- Railway Dock – Cruise ships

FIGURE ES-2
Port of Skagway



ES.3 Potential Port Traffic

The Port of Skagway has three potential significant sources of freight traffic as follows:

- Mineral concentrates (outbound)
- Major projects (inbound)
- Re-supply (inbound)

ES.3.1 Mineral Concentrate Traffic

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.

Based on work conducted by Gartner Lee[2], aggregate future potential shipments from the mineral deposits with the highest development potential is estimated at a total of about 24.6 million tonnes (27.1 million tons). Table ES-1 presents an overview of all potential mineral deposits and the corresponding total and annual shipments. It is highly unlikely that all of these mines would be producing simultaneously, so potential mineral concentrate traffic could be much different than indicated in Table ES-1.

[1] Yukon Government, *Discover Yukon's Mineral Wealth*, August 2007.

[2] Gartner Lee, Table 2C, 2E, BC & *Yukon Mineral Resource Shippable Commodity Summary* and Yukon Energy Mines and Resources, and *Yukon Mineral Deposits 2007*, Yukon Energy Mines and Resources, August 2007.

TABLE ES-1
Summary of Shippable Volumes of Minerals

Property Name	Likely Shippable Commodity (tonnes)		
	Project Life	Total Shippable Commodity	Annual Shipment
Selwyn	21	14,009,249	467,000
Grizzly (Dy)	11.5	2,330,889	78,000
Swim	9	491,000	53,000
Tom & Jason	14	3,289,635	235,000
Wolverine	12	1,400,000	47,000
Kudz Ze Kayah	9	1,492,650	50,000
Fyre (Kona)	4	711,600	24,000
Minto	12	322,800	11,000
Logtung	30	293,700	10,000
Red Mountain	17	102,098	3,000
Mactung	30	140,986	5,000
TOTAL	-	**24,584,607**	

ES.3.2 Major Project Traffic

Freight traffic associated with large resource and infrastructure projects in the Yukon will be largely inbound. The following projects could generate significant inbound freight volumes:

- Alaska Highway Natural Gas Pipeline
- Mackenzie Gas Pipeline
- Mine development projects
- Alaska Canada Rail Link

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. This traffic is typically of a short term nature and may not be sufficient to justify large capital expenditures on dedicated/shared-use facilities unless project proponents are willing to underwrite a significant portion of the cost.

ES.3.3 Re-supply Traffic

In terms of re-supply traffic, the Yukon is principally served by truck from Alberta along the Alaska Highway and by barge/truck through the Port of Skagway. According to research undertaken during the Alaska Canada Rail Link Study, the Port of Skagway accounted for an annual average of 29,000 tonnes of re-supply traffic over the period 2000 to 2004, while

the Alaska Highway accounted for 47,000 tonnes on an annual basis over the same period. This traffic is expected to grow in line with population growth.

ES.4 The Skagway Advantage

The Port of Skagway has a number of advantages over alternative routings of both inbound and outbound freight.

ES.4.1 Mineral Concentrates

Mining activity in the Yukon is focused in areas surrounding Carmacks, Ross River and Watson Lake. Any mineral concentrate traffic would have to move through these communities to get to a port. Accordingly, it is useful to determine the distance and associated transportation costs from each of these communities to the Port of Skagway and its principal competitor for this traffic, Stewart. Table ES-2 provides a summary of the distances and the associated trucking costs to these two ports. As indicated in Table ES-2, the Skagway Advantage is significant for mines located near Carmacks or Ross River and decrease for mines closer to Watson Lake.

TABLE ES-2
Quantifying the Skagway Advantage

Origin	Destination	Routing	One-Way Distance (km)	Cost Per Tonne[1]
Carmacks	Skagway	Hwy 2	350	$33.95
	Stewart	Hwy 2/1/37	1,218	$134.14
	The Skagway Advantage		**868 km**	**$100.19**
Ross River	Skagway	Hwy 4/6/1/8/2	435	$42.20
		Hwy 4/6/1/2	495	$48.02
		Hwy 4/2	579	$56.16
	Stewart	Hwy 4/1/37	1,017	$112.00
	The Skagway Advantage		**438 – 582 km**	**$55.84 to $69.80**
Watson Lake	Skagway	Hwy 1/8/2	513	$49.76
		Hwy 1/2	573	$55.58
	Stewart	Hwy 37	648	$71.37
	The Skagway Advantage		**75 – 135 km**	**$15.79 to $21.61**

[1]Based on a load of 56.7 tonnes per truck to Skagway and 45.4 tonnes per truck to Stewart.

ES.4.2 Re-supply Traffic

Much of the resupply traffic for the Yukon originates in Western Canada (Vancouver and Edmonton) and is moved by truck to Whitehorse. Additional product is sourced in a number of areas and moved by intermodal service on Alaska Marine Lines from Tacoma to Skagway and thence by truck to Whitehorse. Table ES-3 presents the findings of the

analyses of the relative costs of each option for serving the Yukon, including a potential new service similar to Canadian National Railway's (CN Rail's) AquaTrain.

TABLE ES-3
Summary of Re-supply Transportation Cost Analysis

Mode	Origin	Destination	Rate per Tonne
Truck (origin to destination)	Edmonton	Whitehorse	$225 to $332
	Vancouver	Whitehorse	$315 to $464
Rail Barge (rail from Edmonton to Prince Rupert, barge to Skagway and rail to Whitehorse)	Edmonton	Whitehorse	$116
Intermodal (barge from Vancouver to Skagway and truck to Whitehorse)	Vancouver	Whitehorse	$156

While it is clear that rail barge and intermodal services are cheaper than truck (depending on the actual source of the goods being moved), there remains a question "Why does so much re-supply traffic move via the Alaska Highway?" There are a number of reasons, as follows:

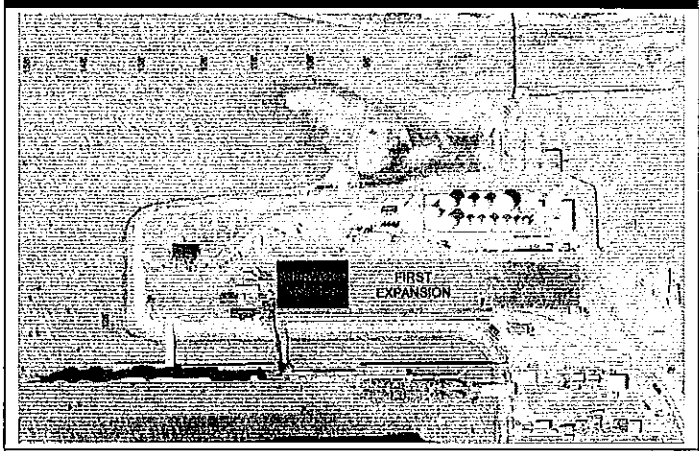
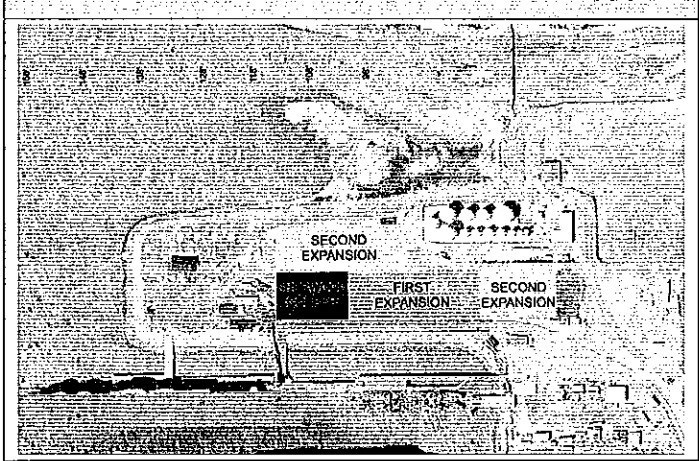
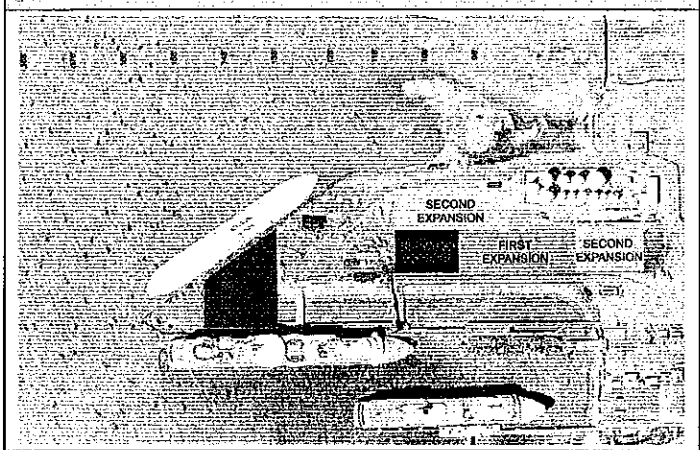
- There is no existing rail barge or intermodal barge service between Prince Rupert or Vancouver and Skagway.
- Some traffic is time-sensitive and may not be appropriate for additional handling and delays associated with a rail barge or intermodal service.
- The shipments could be part of a broader distribution network involving other delivery/pickup points along the route.
- There may not be sufficient containers available for an intermodal service.

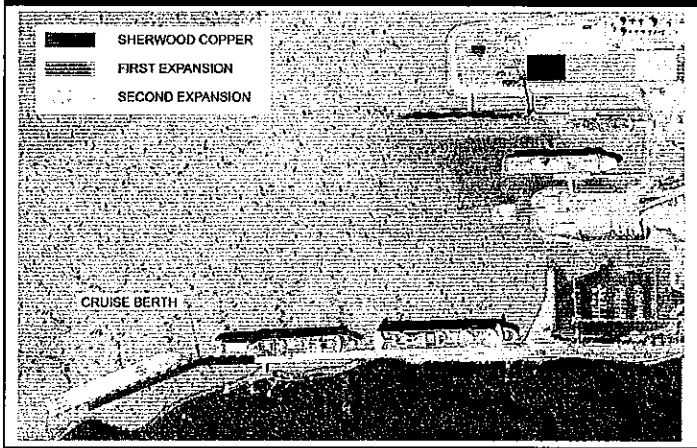
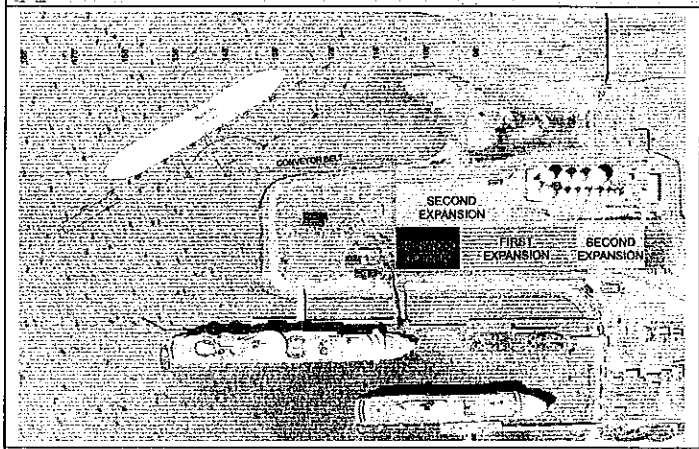
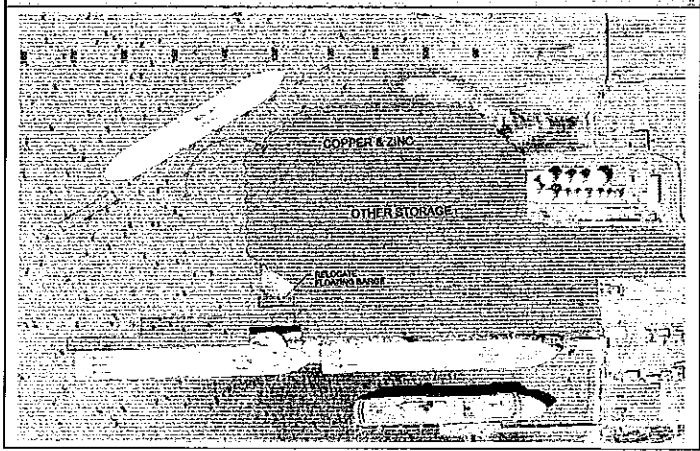
Notwithstanding the above, there may be an opportunity at some point for the Port of Skagway to persuade a carrier to institute a new barge service to Skagway to capture some of the existing re-supply traffic that uses the Alaska Highway.

ES.5 Port Redevelopment Options

A series of development options were developed to respond to potential demand (particularly for new mineral concentrate traffic). The six options are presented and briefly described in Table ES-4. It is intended that these options can be developed in a stepwise fashion.

TABLE ES-4
Redevelopment Options

Redevelopment Concept	Description
	**Option A** – Expansion of the ore storage shed to the full footprint of the previous storage shed. Capacity – 140,000 tonnes
	**Option B-1** – Expansion of the ore storage shed to about double the footprint of the previous storage shed. Capacity – 300,000 tonnes
	**Option B-2** – Expansion of the ore storage shed to about double the footprint of the previous storage shed plus construction of a new berth for ore ships at the south end of the Ore Dock. Capacity – 460,000 tonnes

Redevelopment Concept	Description
	**Option C** – Expansion of the ore storage shed to about double the footprint of the previous storage shed plus construction of a new cruise ship berth at the south end of the Railway Dock. Capacity – 300,000 tonnes
	**Option D-1** – Expansion of the ore storage shed to about double the footprint of the previous storage shed plus construction of a new berth for ore ships at the southwest end of the Ore Dock. Capacity – 460,000 tonnes
	**Option D-2** – Expansion of the Ore Dock to accommodate larger storage facilities, rail service, two cruise ship berths and an ore ship berth. Capacity – 1,000,000+ tonnes

Each of these options was examined from a number of perspectives to determine whether there were any major impediments to their development. This analysis is summarized in Table ES-5.

TABLE ES-5
Assessment of Redevelopment Options

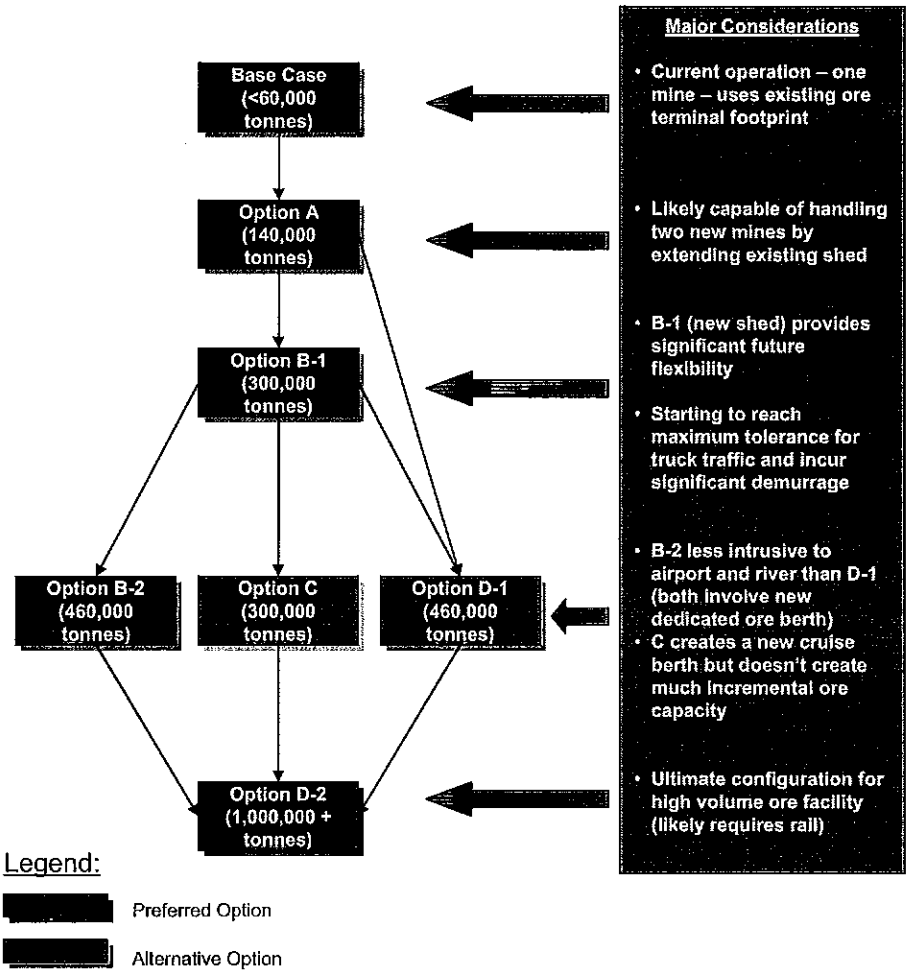
Option	Truck Traffic	Environment	Airport	TEMSCO	Vessel Interference /Demurrage	Port Capacity
A	Not an issue	Not an issue	Not an issue	Not an issue	Some potential interference already being encountered	Significant constraint
B-1	Not an issue	Not an issue	Not an issue	Not an issue	Probable interference with cruise vessels at Broadway Dock and Ore Dock	Potential constraint – little flexibility for future growth
B-2	May be at the maximum truck traffic level acceptable to residents	Potential impact due to dredging of the river estuary	Potential minimal impact	TEMSCO will need to be relocated	Not an issue	Significant capacity potential
C	Not an issue	Not an issue	Not an issue	Not an issue	Potential interference with Broadway dock	Potential constraint – little flexibility for future growth
D-1	May be at the maximum truck traffic level acceptable to residents	Potential major environmental impact due to dredging and impact on the tidelan zone	Potential significant impact	TEMSCO will need to be relocated	Not an issue	Significant capacity potential
D-2	Truck traffic level is likely to be completely unacceptable	Potential major environmental impact due to dredging and impact on the tidelan zone	Potential significant impact	TEMSCO will need to be relocated	Not an issue	Highest capacity option

Key

	No issue
	Minor issue
	Moderate issue
	Difficult issue

Based on the assessment of potential benefits and impacts of each of the redevelopment options, the preferred sequence of redevelopment would appear to be as depicted in Figure ES-3.

FIGURE ES-3
Summary of Assessment



ES.6 Financial Analysis of Options

A financial model was developed to examine the average level of throughput charges required to produce a rate of return potentially attractive to a private sector operator. The analysis is indicative only, and the results could vary significantly if any assumptions about capital costs, operating costs, mine output, long term traffic prospects and other matters are different than those contained in the model.

Table ES-6 provides a summary of the capital costs and required average rates for each of the options.

TABLE ES-6
Capital Cost Assumptions (USD 2008)

Option	Description	Required Rate per Tonne	Capital Cost ($ x million)
A	Extend existing shed to full footprint	$16.30	$15.0M
B-1	Option A plus construction of a new shed of a similar size to the existing shed	$21.10	$42.3M
B-2	Two sub-options exist: a. Option B-1 plus new ore ship berth and radial loader b. Option B-1 plus new ore ship berth and radial loader and a third shed	$44.20 $41.20	$108M $135M
C	B-1 plus construction of new cruise ship berth at Railway Dock	$36.20	$85M
D-1	Two sub-options exist: a. New ore ship berth west of existing facility with new shed and expansion of existing shed b. New ore ship berth west of existing facility with new shed and expansion of existing shed and a third shed	$42.50 $39.30	$103M $130M
D-2	D-1a plus new cruise berth at Ore Dock and larger storage facilities with potential rail access	$29.30	$151M

As indicated in Table ES-6, options A and B-1 require relatively low rates (tariff charges) to cover the required funding. The other options require significantly higher rates to cover the required funding.

Given the transportation cost differential between shipping concentrates by truck to Skagway or Stewart (see Table ES-2), the potential rates indicated above are still below the "Skagway Advantage" for most mines. For mines closer to Watson Lake, the advantage is smaller and the choice of port would depend on the port development option being considered.

ES.7 Port Governance

The appropriate governance model for the Port of Skagway is largely defined by the issues and opportunities that face the MOS. Table ES-7 notes the key factors and their implications for an appropriate governance model.

TABLE ES-7
Port Governance Considerations

Factor	Governance Consideration
The port is the major economic generator within the MOS and its ongoing viability is critical to the economic health of the Borough.	This suggests that the management of the port needs to be elevated in terms of importance and governance within the MOS. The creation of a Port Commission, Harbor Authority, or a similar organization with management, planning, development and operating capabilities needs to be implemented. The Borough also needs to have ultimate control over the port to ensure that the economic benefits are achieved. Overall port management or planning should not be left to the private sector by default. One individual, with experience in managing ports; should be hired to oversee operation, planning and marketing of the port. This will ensure that the port is seen as being professionally managed – providing a level of credibility to the Borough's efforts.
The MOS has a vested interest in the operation of the port. The Borough receives significant revenues from the passenger charge levied by the Borough and the Alaska Cruise Ship Head Tax.	The Borough, through a ports department (with a Port Commission, Harbors Board or similar organization) needs to be able to manage and plan the future of the port and not leave this important responsibility to other parties with different interests.
The economic justification for using the Port of Skagway (versus competing ports) requires careful messaging about competitiveness and future development plans. The Port of Skagway also needs to be seen as proactive and professionally managed.	This suggests that a formal Port Commission, Harbor Authority or similar organization needs to be created. The mandate of this new organization needs to include: – Marketing the port – Development of a long term plan – Working closely with potential port users
The Yukon is expected to be the source of the large majority of both inbound and outbound industrial traffic using the port of Skagway. The Government of the Yukon has a significant interest in the development of port infrastructure to serve their future needs	Create an advisory role through either an Advisory Board or through an Advisor member to a formal Harbors Board/Port Commission. This position would have no voting privileges but would be useful for provision of feedback on plans and as a means of representing other interests in the Yukon.
The MOS is unlikely to have sufficient financial capacity to take on development of the port as contemplated in this report.	While the Borough may be able to fund development of some of the short term improvements, some of the longer term developments are likely to be beyond the risk tolerance and financial capacity of the Borough to undertake on its own accord. A new port organization with the ability to raise funds, utilize port revenues for port related matters and partner with the private sector is required.
Both the cruise and mining industries have significant and perhaps competing interests in how the port is developed.	If the Borough chooses to create a Port Commission, Harbors Board or similar organization, consideration should be given to structuring memberships on the Board or Commission such that the appropriate stakeholder groups are represented. This is typical requirement of such organizations.

TABLE ES-7
Port Governance Considerations

Factor	Governance Consideration
The MOS currently has little control over how waterfront property is developed or used due to existing long term leases to other parties.	The Port of Skagway must be able to at least influence if not manage the lands necessary for efficient operation of the port. The Port should be proactive in terms of land management, including ensuring that the Borough's interests are protected by ensuring that terms of existing leases are being followed and that where changes would be beneficial, negotiating with appropriate parties for those changes. The Borough should investigate the interest of AIDEA in divesting its interest in the sub-lease of the Ore Terminal and the terms and conditions under which such a divestiture might be considered.
The MOS has limited lands suitable for port activities or to be operated in support of port activities.	The Port of Skagway should be developing a long term land-use strategy for port and associated lands. This should guide the Port, Borough and users of waterfront lands on appropriate uses, future development and public interest matters.
The Borough receives very little revenue directly from its ownership of waterfront lands.	The creation of a new governance structure provides the opportunity to play a more significant role in future development and diversify revenue sources.

The MOS has already started on the process of formalizing a more fulsome role in the management of the Port. MOS has prepared a preliminary draft of a revision to the Skagway Municipal Code that would see the adoption of a port authority model to deal with the considerations previously mentioned.

ES.8 Implementation Considerations

The MOS has already embarked upon some of the short term actions suggested in the Yukon Ports Access Strategy prepared in 2006. The creation of a Port Steering Committee reflects the commitment of the MOS to move forward with further port development that meets the needs of potential users and the community. The following actions represent those that are needed to give port development some momentum and prepare the MOS and the port for longer term actions.

ES.8.1 Short Term Actions

1. **Governance** – The MOS has taken the first step in developing a governance structure for the port, as discussed in the previous chapter. We recommend that the MOS continue with implementation of a governance structure based on the principles discussed in the previous chapter including:

    a. Representation on the agency that is put in place to govern the port.

    b. Determine the powers required to effectively manage the port (regulations, land ownership – both on-dock and off-dock, financing, etc.).

    c. Ensure that one individual (either a new hire or a current MOS staff member) has full time responsibility for the management of the port.

d. Acquire the capability to manage port projects.

e. Reinforce relationships with key stakeholders/groups.

2. **Create the Skagway Advantage** -MOS and the Port need to take this concept of the Skagway Advantage and develop an appropriate marketing/branding strategy that:

   a. Notes that the port is open for business.

   b. Highlights the MOS's commitment to port development, as evidenced by the creation of a new port organization.

   c. Partners with the private sector (mines, motor carriers, marine carriers, terminal operators and others) to ensure that the port reaches its potential.

   d. Identifies the advantages to using the port compared to other alternatives for moving freight to and from the Yukon.

   e. Proactively targets potential sources of traffic (mines, major projects, etc.).

3. **Engage the Community** - It is clear that redevelopment of the port will have an affect on the community. These changes can be both positive and negative. It is important to engage the community to:

   a. Determine their concerns.

   b. Seek ideas.

   c. Showcase the plans and develop buy-in.

   d. Discuss the need for port redevelopment and what it will do for the community in both the short and longer term.

4. **Engage Key Port Stakeholders** – The success of any port development plan depends on the buy-in from key port stakeholders including the cruise ship industry, key port tenants or leaseholders and AIDEA. Each has a different perspective on port operation, different needs and decision processes. It is important that the MOS and the Port understand these matters such that ongoing plans can involve these stakeholders and determine how they can best contribute to the future success of the port. These stakeholders could have ideas and or funding that will assist in the further development of the port.

5. **Work with AIDEA regarding the existing facility**. In the short term, most needs of the mining industry can probably be handled through expansion of the existing ore shed and perhaps creation of a second shed if required. AIDEA appears to have this process well in hand. AIDEA should be consulted to determine their future (longer term) plans regarding their role in port facility ownership and operation. This could be the first step in devolution of these responsibilities to the MOS and the Port on a sustainable basis.

6. **Engage Regulatory Agencies** - The port development plans that are proposed in this report will have potential impacts on the environment, the community and the airport. As with any major development initiative it is import to meet with the regulatory

agencies on an informal basis to discuss the nature of the project and seek guidance/advice/comments on development and the permitting processes/issues.

7. **Environmental Baseline** – Identify and undertake the appropriate environmental baseline studies that will facilitate future permitting/approval processes for the program or particular elements of the program. Discussions with regulatory agencies should provide an indication of the appropriate timing of such work and how long it will be valid if a particular development is delayed for a period of time.

8. **Funding Availability** – The MOS now has a source of funding that was not present two years ago, that being the Borough's share of the head tax on cruise ship passengers. This is a good start at providing funding for new initiatives that will enhance the port.

   Private sector funding will become more viable once the MOS has established a new port organization and is seen as effectively managing the port. This has been the case at other west coast ports, where significant investments of time and resources have been put into marketing the port and its particular advantages (for example, Prince Rupert Port Authority). Private sector port operators and users are loath to invest in ports where the local government is not closely identified with the port and is actively seeking proposals for improving service or facilities.

ES.8.2 Medium Term Actions

The medium term is likely to be the period in which most change will occur within the port. Some of the mining projects that are currently in the planning and development stage could be coming to fruition, requiring significant investments and changes to the ore handling facilities in the port. In addition, some of the proposed major projects may be in their implementation stages. This will require significant financing, planning and permitting efforts. Whereas the first 5-year period will be focused on gaining capabilities and profile, the medium term is likely to be focused on significant developments, beyond just simple expansions of storage sheds. The key activities are likely to include the following:

1. **Development of detailed engineering plans** – Detailed engineering plans will be required for each new project for financing, permitting and development purposes.

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. **Land acquisition** – Where land is required for a particular development, appropriate arrangements to acquire the land should be initiated. Outright purchase, land swaps, land-use bylaws, and options could be considered as some of the key property management and acquisition tools.

4. **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.

5. **Planning for major projects** – The construction of a major project such as one of the pipelines provides an opportunity for the MOS to consider a number of issues:

a. Can new port infrastructure be justified (or funded by the project proponent) that will provide lasting benefits to the Port?

b. What land-use decisions need to be made that will facilitate this traffic?

c. How will the port stakeholders need to work together to deal with this traffic?

ES.8.3 Long Term Actions

Fifteen years from now will see the end of the current lease with WPYR for the waterfront lands. If nothing else, this will provide the MOS with an opportunity to build on what has worked up to that point and new ideas for organization, ownership and operation of the waterfront.

Beyond this, the Port or the MOS will be monitoring performance and responding to new opportunities as they arise.

1 Introduction

In response to the growing mining production in the Yukon Territory the Skagway Port Development Steering Committee (PSC) has initiated a study to assess the potential for Skagway in the resurgence of the Yukon mining industry. The purpose of this study is to help the Municipality of Skagway (MOS) position the port to capture a significant share of the export raw materials from the Yukon. Specifically, the mission of the PSC is to "prepare an actionable business plan with a conceptual port arrangement the municipality may utilize to make sound port fiscal decisions, advancing the interests of the municipality and the region."

The economic livelihood of the MOS and Yukon Territory depends on a thriving and competitive inter-modal port facility designed to provide efficient, cost-effective transshipment of bulk mineral concentrates and general cargo. The MOS is uniquely positioned to provide the nearest tidewater port access for the Yukon Territory. Skagway offers a significant transportation cost advantage over other ports in southeast Alaska and British Columbia (BC). Although the port is currently dominated by the demands of the cruise ship industry, recent developments in the mining industry in the Yukon Territory are providing an opportunity for Skagway to assert itself once again as the "Yukon Port of Skagway."

1.1 Purpose

The purpose of this study is to provide an actionable business plan with the following planning horizons:

- Short term projects that can be constructed in the next 5 years
- Medium term projects that can be constructed in the next 6 to 15 years
- Long term projects beyond 15 years

1.2 Outline

The following sections can be found in this report.

1 **Introduction**
  1.1 Purpose
  1.2 Outline
2 **Existing Infrastructure Assessment**
  2.1 Current Road Infrastructure
  2.2 Current Rail Infrastructure
  2.3 Current Port Infrastructure
  2.4 Skagway Port Infrastructure
3 **Port Traffic Assessment**
  3.1 Mineral Concentrates
  3.2 Project Commodities

3.3 Re-Supply Commodities
3.4 Summary
4 Port and Supply Chain Competitiveness
4.1 Mineral Concentrate – Port Competitiveness
4.2 Competitiveness for Re-Supply Traffic
5 Bulk Future Infrastructure Assessment
5.1 Ore/Bulk Handling Facilities
5.2 Short term
5.3 Medium term
5.4 Long term
6 Description of Preferred Options
6.1 Short Term Projects
6.2 Medium Term Projects
6.3 Long Term Projects
6.4 Growth Options Analysis
7 Analysis of Options
7.1 Financial Model
7.2 Results of Analysis
7.3 Other Considerations
7.4 Conclusions
8 Port Governance
8.1 Scope of Governance
8.2 Clarification of Role
8.3 Port Governance Models in Canada
8.4 Port Governance in the U.S
8.5 Port Governance in Alaska
8.6 Governance Issues for Consideration
9 Implementation Considerations
9.1 Short Term Actions
9.2 Medium Term Actions
9.3 Long Term Actions

2 Existing Infrastructure Assessment

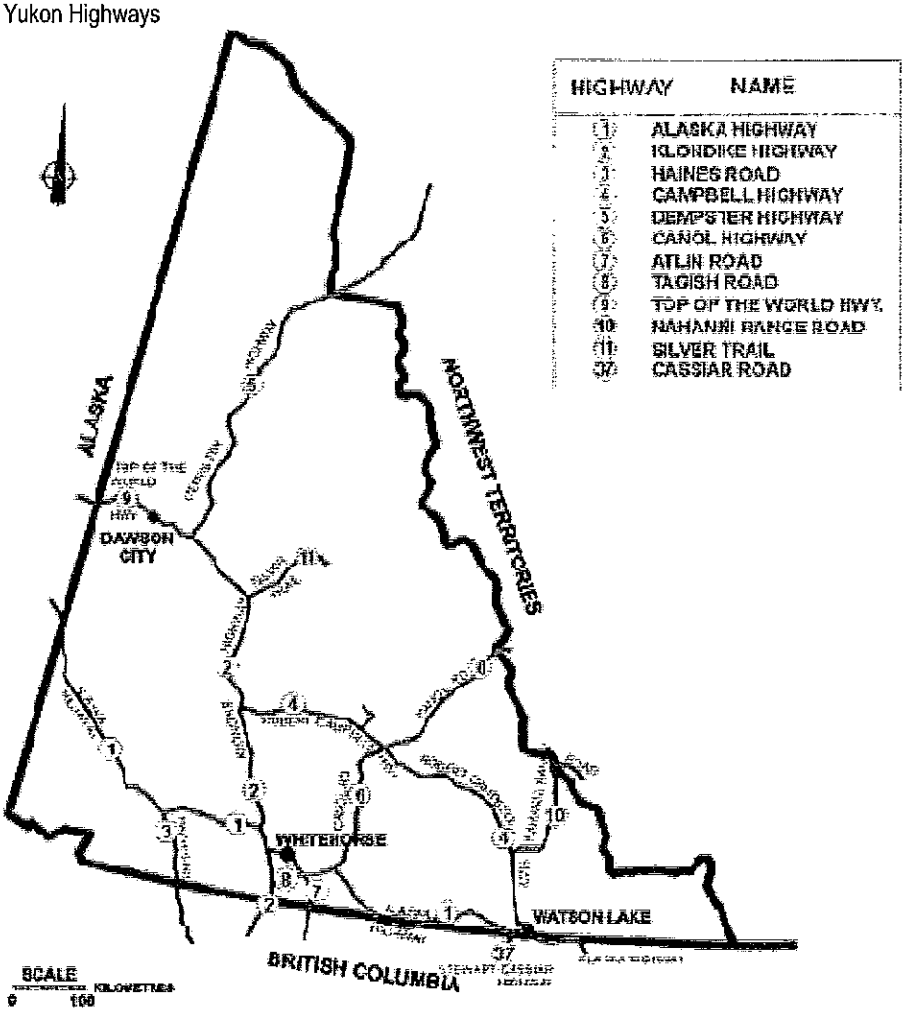
This chapter provides a brief description of the transportation infrastructure that serves the Yukon. Understanding the state, capacity and usage of this infrastructure is critical for the development of a port development strategy for Skagway.

2.1 Current Road Infrastructure

2.1.1 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. Figure 2-1 illustrates the major highways in the Yukon.

FIGURE 2-1
Yukon Highways



The main highway across the Yukon is the Alaska Highway. It originates in Dawson Creek, BC and runs for 909 kilometres (km) through the Yukon from the BC border east of Watson Lake to the Interior Alaska border at Beaver Creek. The Alaska Highway and the Haines Road 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 South Klondike Highway parallels the old White Pass trail between Skagway and Log Cabin.

Whitehorse is the centre of travel in the Yukon. Table 2-1 summarizes distances to the nearest ports and centers from Whitehorse, indicating the remote nature of the Yukon.

TABLE 2-1
Distances from Whitehorse

To Principal Ports or Other Northern Centers	Distance (kilometres)
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, Yukon	156
Dawson City, Yukon	536
Carmacks, Yukon	176
Watson Lake, Yukon	453
Dawson Creek, BC	1,426
Prince George, BC	1,622
Inuvik, NWT	1,222

2.1.2 Current Road Traffic Levels

The Alaska Highway and Haines Road carry a small amount of annual average daily 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 vehicles per day during summer months (ASDT). This

compares with AADT of 1,350 vehicles per day and an ASDT of 1,820 vehicles per day 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 lower than those on a comparable highway in northern BC.

The South Klondike Highway (between Skagway and Whitehorse) carried an average of between 200 and 400 vehicles per day in 2005, with 400 to 600 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

2.1.3 Pavement Strength

All principal roads in the Yukon have been designed to withstand standard highway loading equivalent to 2,000 standard truck movements per day. Yukon's year-round highway system is built and maintained to accommodate a maximum allowable gross vehicle weight (GVW) of 63.5 tonnes (140,000 pounds [lbs.]) and may be reduced in spring depending on the structure of a highway. A higher weight limit may also be allowed under closely controlled and unusual conditions pursuant to a bulk haul agreement.

The Yukon and BC transportation regulators allow overweight trucks to operate on the South Klondike Highway and other highways under the auspices of the Yukon's Bulk Commodity Haul Regulations. Under these regulations, trucks with a maximum GVW of 77.1 tonnes (170,000 lbs.) are allowed to move over the highway subject to paying an additional $0.01 per tonne kilometre for all weight over the legal GVW on the highway. Maximum legal weights are established at the authority of the Minister of Highways and Public Works.

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.

2.2 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 Carcross. WPYR has been improving the existing rail line through replacing older ties with newer, full-length ties and upgrading the rail. While WPYR has no plans to reactivate the balance of the old line to Whitehorse, the railroad is open to evaluating opportunities for future freight and passenger traffic that would be interested in using the full route. While it is possible to move freight over the portion of the line that is currently operated, 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: the Alaska Canada Rail Link Study (ACRLS) was completed in 2006. The results of this study are currently being considered by the Governments of both Alaska and the Yukon. Further action on the results of this study are not known, though the project has a very high capital cost and will likely require a significant financial incentive for it to proceed.

One stream of analysis[3] involved the assessment of upgrading the WPYR to facilitate the movement of larger quantities of mineral products for export as well as other traffic. The study examined the potential to reinstitute rail service as far as Whitehorse as well as extending the line to Carmacks. The capital costs ranged from about $160 million to $750 million.

2.3 Current Port Infrastructure

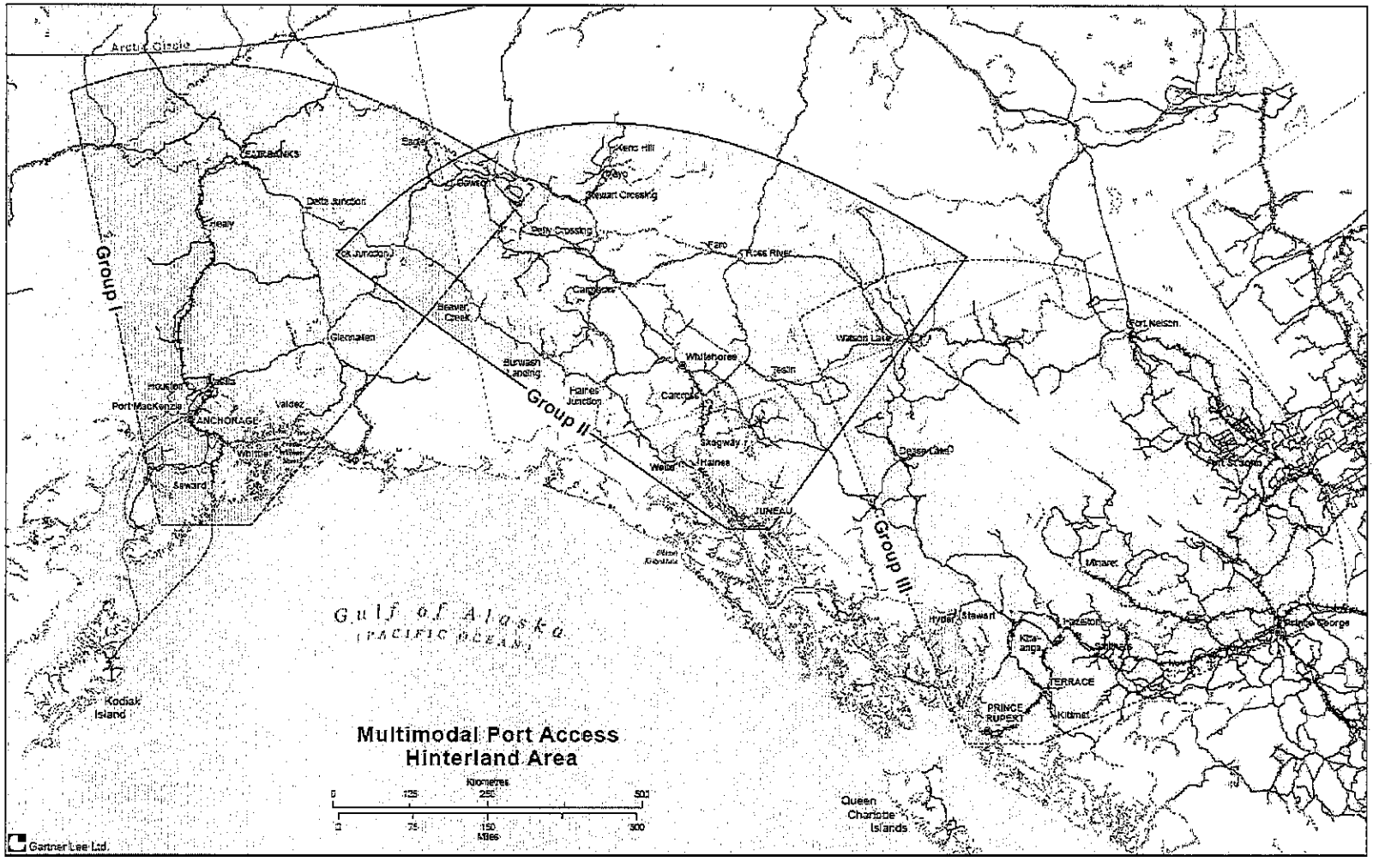
Figure 2-2 illustrates the logical hinterlands of the Yukon, Alaska and BC port areas. Depending on type and volume of the transportable commodities, the Yukon is potentially serviced by several ports in Alaska and BC. As is evident in Figure 2-2, the Port of Skagway is geographically well placed to meet the needs of most of the Yukon. The highway systems are well aligned with Skagway and distances are shorter than to competing ports.

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 supporting ports. 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. The general cargoes are then carried by truck to the Yukon and Alaska.

In southern Alaska, the Bradfield Inlet is also available for Yukon commodities and in northern BC, Stewart, Kitimat, and Prince Rupert are potential outlets for volumes of the Yukon's bulk exports that are beyond the current capacities available at Skagway. The following section provides a description of the port facilities in Skagway.

[3] Southern Yukon and Port of Skagway Analysis, Pacific Contract Company, HDR Engineering and TEC Infrastructure, March 28, 2006.

FIGURE 2-2
Hinterland and Focal Ports[4]

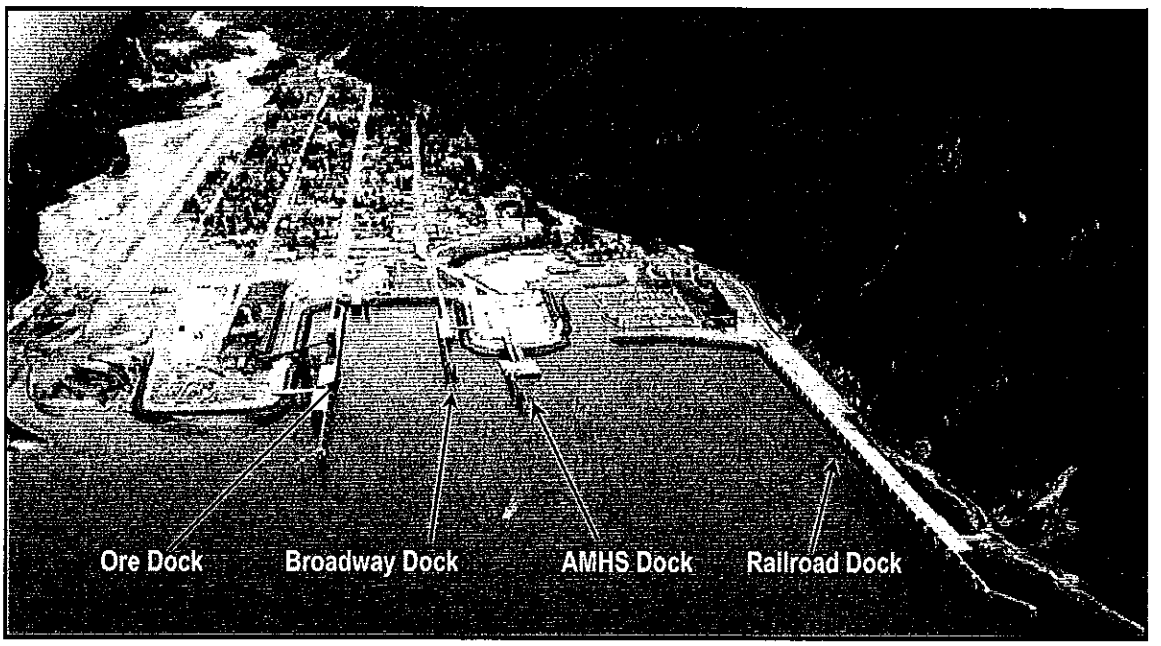


[4] Source: Alaska – Canada Rail Link Study - Multimodal Port Access Work Package B2(d) Operations Evaluation, Banjar Management Inc. and DKA Marketing, January 2006.

2.4 Skagway Port Infrastructure

The development of the port is severely constrained by the small physical size of the waterfront (see Figure 2-3). The remaining tidelands open to development are bounded by the town site to the north, the ferry terminal road to the east, deep water to the south and the Skagway River and the Skagway airport to the west (see Figure 2-4).

FIGURE 2-3
Port of Skagway



Source: KPMG, 2006

Furthermore, the White Pass tidelands lease, which includes the majority of the conceptual plan footprint, runs until March 2023. Centered under the existing ore terminal ship loader in the marine sediments is a lead sulfide contamination issue from legacy port activity.

2.4.1 Railroad Dock[3]

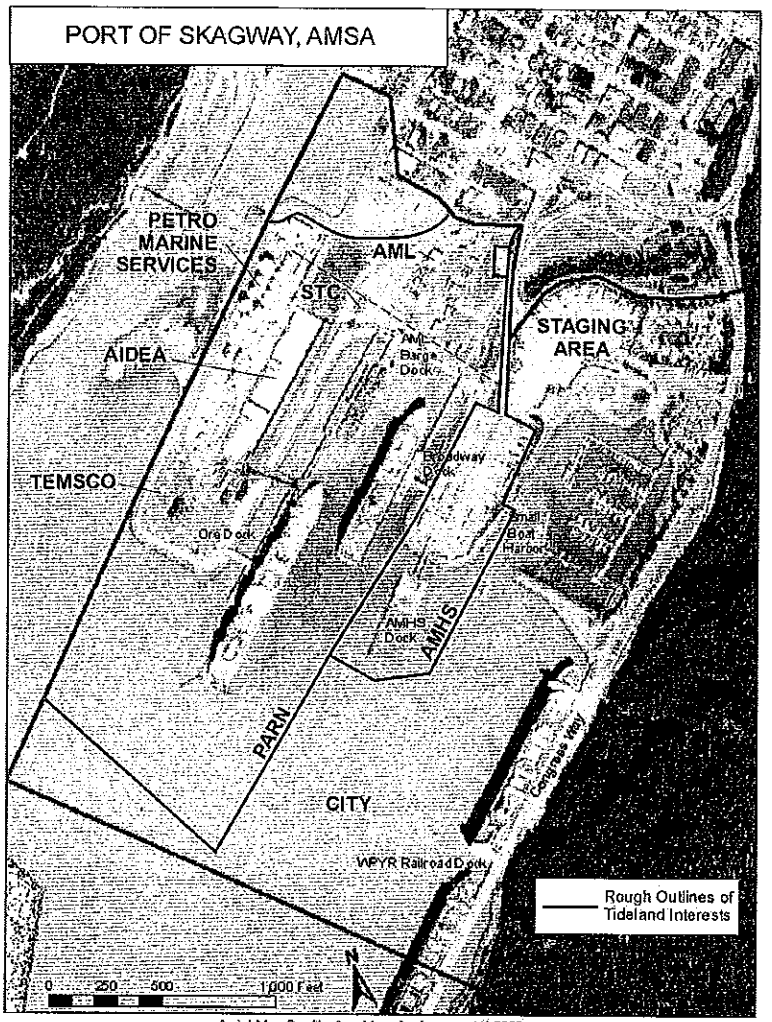
WPYR owns the dock and leases the underlying tidelands under the Railroad Dock. The Railroad Dock is 1,825 feet long with additional breasting dolphins that provide for berthing of two of the longest cruise ships that serve the Alaska market. The Railroad Dock is made up of two distinct docks (North Dock and South Dock), joined by a short steel plate.

2.4.1.1 Railroad Dock North[3]

The north 800 feet of the Railroad Dock is a heavy duty freight dock (800 feet long by 100 feet wide) designed to sustain a HS20-44 truck loading (Alaska bridge loading) or the punching load of a 60-ton axle forklift load. A single railroad track with a third rail for standard gauge operations, is located on the back side of the dock constructed to the railroad bridge rating of Cooper E-80 (heavy railroad loads). The north portion of the Railroad Dock is well suited to the heavy freight transfer operations for ship to rail or truck.

The minimum draft alongside the Railroad Dock is 36-feet at the head of the dock and becomes progressively deeper towards the open inlet end.

FIGURE 2-4
Land Ownership



Aerial Map Credit: AeroMap, Anchorage, AK 2003

2.4.1.2 Railroad Dock South[3]

The South Dock is 784 feet long and is built to a lighter standard. It is still capable of HS20-44 loading, but not heavy forklift loading. There is no railroad track on this dock. The South Dock is only 50 feet wide, and is therefore very constrained in its use by its width. WPYR also owns the Broadway and the Ore Dock—the only two docks on the Skagway waterfront capable of docking either cruise or cargo ships. WPYR owns the dock structures and the underlying tidelands are leased from the MOS until 2023.

2.4.2 AMHS Ferry Dock

The Alaska Marine Highway System (AMHS) operates a ferry facility on the Broadway Dock fill area, which is on tidelands purchased from the City of Skagway in 1962. The facility includes a parking lot, waiting-room and office-building, and a floating dock which it owns jointly with the City. While AMHS owns the entire area built on fill to the south of the City's "Staging Area," the City owns 1/3 of the floating dock. The City also owns the transfer bridge. The City occasionally collects a fee for ships or barges to moor at the dock.

2.4.3 Broadway Dock[3]

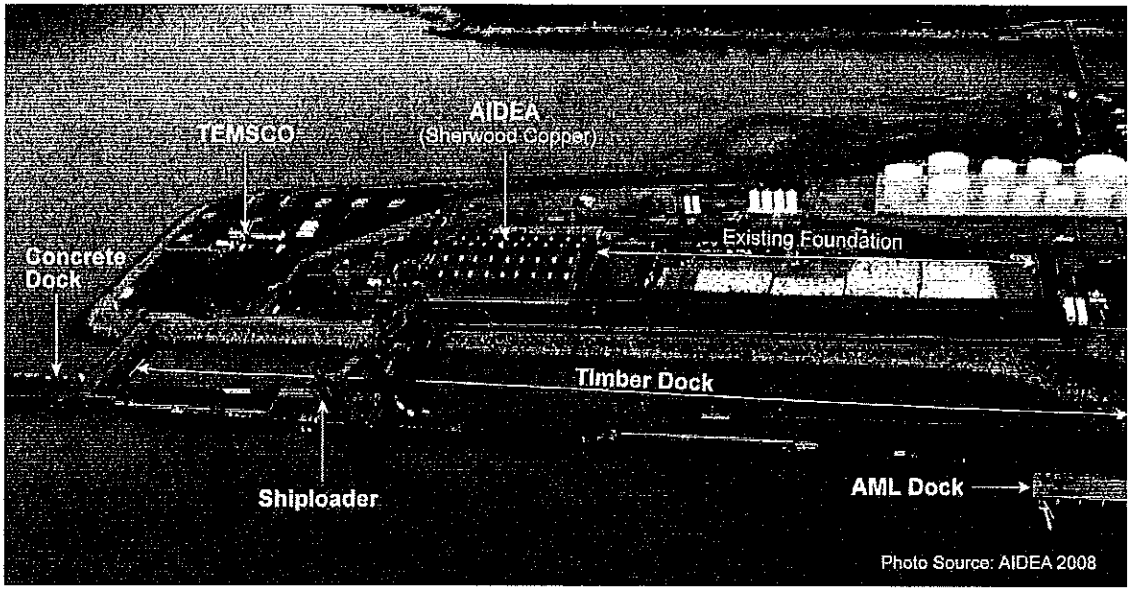
The Broadway Dock was constructed as a light duty, 300-foot by 44-foot wide, cruise ship dock with only very limited capability for handling cargo. This dock has been used to load exported Yukon logs and containers have been unloaded from the WPYR container Ship, the Frank. H. Brown, to the dock. The Broadway Dock is now only suitable for cruise ship berthing, but the useable berth length was extended recently to accommodate 900-foot long cruise ships beginning in 2006. The Broadway Dock is also heavily used during the summer tourist season, but the dock itself does not have the length, width, or favorable ship maneuvering properties of the Railroad Dock.

2.4.4 Ore Dock[3]

The Ore Dock, as its name implies, was first built as an ore dock in 1969 suitable for only the bulk loading of ore. Over the years, the dock has been modified to handle cruise ship berthing. During 2000, a construction project added a 235-foot by 50-foot HS20-44 concrete dock at the extreme south end of the dock to better serve cruise ships. The 2000 construction added additional breasting dolphins and a new end dolphin to the Ore Dock. The overall usable face length of the Ore Dock is about 1,600 feet. The older wood pile passenger platforms on the Ore Dock, dating from 1969, cannot be used for any cargo transfer due to light duty construction. (See Figure 2-5)

Harbor Enterprises operates the marine fuel depot located near the mid-point of the dock. Harbor Enterprises services Skagway and more importantly the Yukon, moving approximately 30 million gallons of fuel annually. All of the fuel arrives in Skagway on barges. Alaska Marine Lines (AML) constructed a container barge facility at the head of the Ore Dock in 2001. The approach dock forming the AML ramp is constructed to a high standard for loaded forklifts. The old ore concentrate ship loading tower, located near the mid-point of the dock, is a no-go obstruction to cruise ships. Cruise ships are prevented from being able to use the full face length of the dock because of cruise ship overhang, including some lifeboats, fouling the clearance of the old ore loading tower. The Ore Dock draft is a minimum of 42 feet and gets progressively deeper toward the open inlet end.

FIGURE 2-5
Ore Dock[5]



2.4.5 Ore Dock – Bulk Materials Handling Considerations

2.4.5.1 Background

The ore terminal had been operating intermittently until 1998, when soft base metal prices forced the mines to shut down. The terminal had not been in operation after that time until the first shipment of concentrate from Sherwood Copper Corporation in October 2007.

The Alaska Industrial Development and Export Authority (AIDEA) currently controls the terminal site and facilities. WPYR currently control the dock area immediately adjacent to the terminal, which is currently used for berthing cruise ships during cruise ship season from May to September every year.

The Skagway ore terminal was originally designed to operate with the following parameters for the export of base metal concentrates:

- Concentrates were delivered to the terminal, initially by railcars operated by White Pass and Yukon Route Railway (White Pass), and then later by trucks.
- Concentrates were reclaimed from stockpiles with front end loaders and placed over openings in the storage area floor above the feeders.
- The peak original reclaiming and shiploading rate was approximately 1,350 tonnes per hour (tph) of concentrate.
- The design ship was a Handy/Handymax sized ship, with a capacity of 35,000 deadweight tonnes (dwt).

[5] Source: AIDEA. 2008. *Skagway Ore Terminal Information Sheet.* April 2008.

- Concentrates have also been delivered to the terminal in 'pots' by highway trucks. Forklifts were then used to offload these 'pots' from the trucks and empty them in the storage area within the concentrate building.

The original concentrate building was badly corroded and due to safety concerns, the building was demolished in 2003. The 150 feet x 720 feet concrete paved floor and perimeter containment walls remain. In 2007 a smaller (150 feet x 180 feet) concentrate storage building was rebuilt on the existing foundations. The maximum storage capacity of the new storage building is approximately 13,000 tonnes of copper concentrate. The maximum storage capacity on the existing concrete floor, if the building was extended, would be approximately 50,000 to 55,000 tonnes of concentrate.

The system used for reclaiming concentrates from storage originally included the use of front end loaders to feed vibratory feeders onto a reclaim belt conveyor feeding to the shiploader. In 2007, the shiploader and associated reclaim and dust collection systems were completely refurbished, all six of the vibratory feeders were removed, and two of them replaced with belt feeders to service Sherwood Copper's current requirements. The old vibratory feeders were badly corroded and the belt feeders were selected to provide a more controlled feed system.

The existing shiploader is a fixed position design, with a maximum capacity of about 1,350 tph of mineral concentrates. There is a hoist system complete with counterweights for raising and lowering the loading boom. The loading boom can be luffed to a vertical position when the shiploader is not operating and lowered to a horizontal position when operating. Depending on whether the ship being loaded has cranes, the loading boom may have to be luffed to a vertical position whenever the ship is warped (moved) for loading into a different hold.

The boom can be raised to a maximum elevation of approximately 76.0 feet above Mean Lower Low Water (MLLW) and lowered to a minimum of 36.0 feet above MLLW. The Mean Higher High Water (MHHW) is approximately 16.7 feet above MLLW. The water depth alongside the dock is about 40.0 feet at MLLW, which is sufficient for a Handy size ship.

The boom conveyor can shuttle in and out to provide a maximum reach of 48.0 feet from the dock face and a minimum reach of 33.0 feet. The maximum reach of 48.0 feet is approximately half the breadth or beam of a Handymax ship. An articulated loading spout at the end of the boom conveyor intended to direct the concentrate to the outer sides of the ship's holds was replaced with a fixed canvas dust spout in the 2007 rebuild.

The existing berth alongside of the shiploader is owned by White Pass and currently used by the cruise ships during the summer. The current condition and structural integrity of the piles supporting the shiploader and the timber pier area are such that the operator is unable to drive a front end loader over the timber pier to access ships for trimming.

2.4.5.2 Current Operation

Sherwood Copper now exports copper concentrates from its Minto Project located about 240 km north of Whitehorse, Yukon. Sherwood is now considering increasing its current production. Annual throughput is expected to be approximately 65,000 tonnes of copper concentrates.

Receiving

Concentrates are normally delivered to the terminal by side-dump trucks capable of carrying up to 50 tonnes each (10-axle B-train). When required, these side-dump trucks are supplemented with some conventional highway trucks. Although originally designed for unloading through a dump hopper, feeder and stacker system rated at 1,000 tph, the stacker is no longer used. Truck unloading time is approximately 5 minutes and turnaround time of the trucks is approximately 15 hours.

Storage

The unloaded concentrates are placed into stockpiles (up to 12 feet high) using mobile equipment. Sherwood uses a covered storage area approximately 180 feet long with a capacity (with heavy dozing) of approximately 13,000 tonnes of copper concentrate located on the south end of the existing storage pad, leaving room (540 feet) on the north end for Sherwood expansion and other potential users. Required capacity is dictated by the shipping lot size plus tolerance for ship scheduling as well as mine logistics. Sherwood has indicated a desire to increase that safety margin beyond their current 3,000 tonnes. Handling could be more efficient if storage was limited to 11,000 tonnes. At this level of planning, allowing for storage of 1 ½ to 2 package lots seems reasonable. Since there is a significant price point at 10,000 tonnes and a further break at 12,000 to 13,000 tonnes, planning should be based on future tenants requiring approximately 20,000 tonnes storage or 280 to 320 feet of building length. This establishes a likely constraint of three tenants on the existing pad.

Shipping

Reclaiming of the product from the storage area is by mobile equipment taking product from the stockpile(s) to openings in the storage floor above the belt feeders. Two of the six existing vibratory feeders have been replaced with new feeders to provide a maximum total reclaim capacity of about 1,100 tph.

The existing belt conveyor system, which has a maximum capacity of approximately 1,350 tph, is used for delivering the reclaimed product to the existing shiploader, which also has a capacity of approximately 1,350 tph. The current lot size of each shipment to be loaded into ocean-going Handy or Handymax ships is approximately 10,000 t. The ships have to be warped in order for the shiploader to load concentrates into more than one hold. Experience during 2007/2008 has averaged 750 tph (including warping time) enabling turn around of these vessels in under 24 hours although it has peaked at 36 hours.

3 Port Traffic Assessment

This chapter provides a discussion of the types, quantities and direction (inbound/outbound) of potential Skagway Port traffic.

The following commodities are considered in these economic potential projections:

- Mineral concentrates
- Major project traffic
- Re-supply traffic

As a result of discussions with the Port Steering Committee, this study has not included assessments of potential coal and iron ore projects, as the volumes from such operations would generally be of a scale that would be inappropriate for the Port of Skagway. The discussions about particular mining projects are based on the best available public information. Differences in timing, scope of development, and potential output, are likely given the ongoing exploration and development activities for individual projects.

Most commodity projections pertain to Yukon originated or destined traffic as Skagway is not a logical feeder port to/from other points in Alaska. Due to uncertainties about the future development of mineral resources, and major projects such as the planned pipelines, this study examines the overall potential but does not develop time-based forecasts of potential traffic.

The port traffic assessment is presented in terms of tonnes. One tonne is equivalent to 2,205 pounds or about 1.1 tons.

3.1 Mineral Concentrates

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[6]. 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. Figure 3-1 on the following page provides an illustration of advanced mining exploration projects in the Yukon.

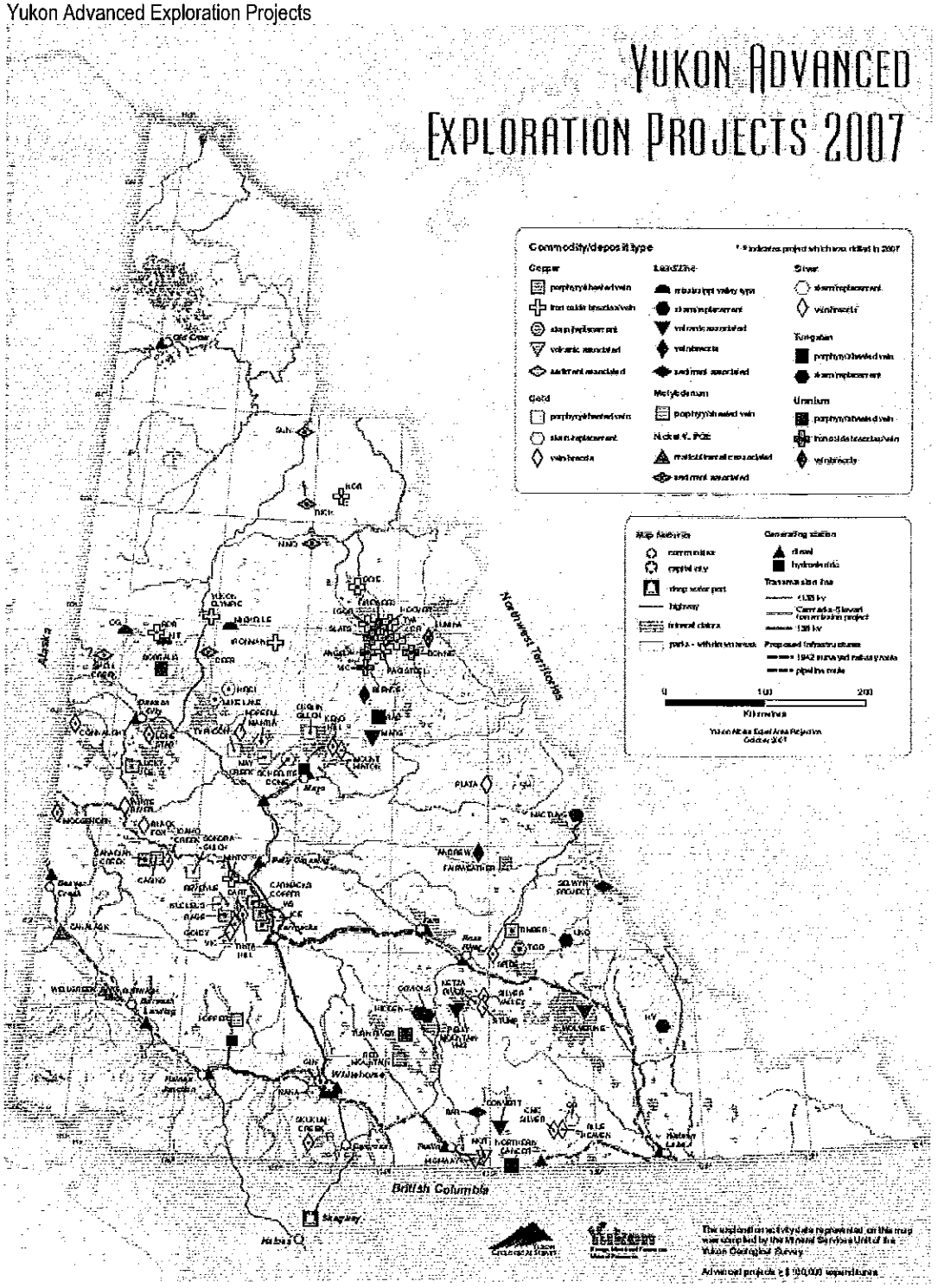
Deposits most likely to go into production (priority deposits) are described in the following paragraphs, ordered by mineral concentrate type. For each deposit that is likely to go into production, the volume, location, and traffic specifications are indicated.

All data presented in this section relies on information and analyses conducted by Gartner Lee for the Alaska Canada Rail Link Project supplemented with more current information from Yukon Energy Mines and Resources. Shippable volume represents the probability

[6] Yukon Government, *Discover Yukon's Mineral Wealth*, August 2007.

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[7].

FIGURE 3-1
Yukon Advanced Exploration Projects



[7] Gartner Lee Ltd, WPA2a – *Outbound Traffic Data Development for Mineral Resources – Overview of Assessment Methodology*, 27 January 2006.

3.1.1 Base Metals

Base metals represent a significant 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. Table 3-1 provides a summary[8].

TABLE 3-1
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 (years)
Selwyn Project		**Lead, Zinc**	**302,000,000**	**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**	**15,400,000**	**8,200,000**	**711,600**	**4**
	Ice	Copper	4,561,863	3,400,000	152,740	8
Marg		Polymetallic	8,230,000	N/A	N/A	N/A
Andrew		Lead/Zinc	5,918,506	N/A	N/A	N/A
Carmacks Copper		Copper	9,980,000	N/A	N/A	N/A
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**	**20,550,000**	**7,500,000**	**322,800**	**12**

These minerals have been located in several polymetallic deposits in the Yukon. The deposits indicated in bold font in Table 3-1 were the ones considered by Gartner Lee as being the most likely to go into production in the foreseeable future, based on their assessment in 2006. These potential mines are further described in the following sections.

3.1.1.1 Selwyn Project (formerly Howard's Pass)

The Selwyn Project is a lead, zinc and silver deposit, currently owned by Selwyn Resources. It is considered feasible for mining due to its global significance. Combined in-ground

[8] Gartner Lee, Table 2C, 2E, BC & *Yukon Mineral Resource Shippable Commodity Summary* and Yukon Energy Mines and Resources, *Yukon Mineral Deposits 2007*.

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. The site is located about 175 km east to north-east of Ross River on the border of the Yukon and the Northwest Territories. On June 19, 2008, the mine received notice that the Mackenzie Valley Land and Water Board intended to issue the necessary Land Use Permit and Water License for the rehabilitation and use of the existing all-seaon access road to the Selwyn Project. The access road connects the Selwyn Project directly to the existing Nahanni Range Road that services the North American Tungsten Corporation's operations at the Cantung mine and connects to the Robert Campbell Highway.

3.1.1.2 Tom and Jason

Tom and Jason are both lead, zinc and silver deposits. Tom and Jason are currently owned by Hudbay Minerals, Inc. 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.

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 km north-east of Ross River on the border of the Yukon and the Northwest Territories. The sites are adjacent to the North Canol Road.

3.1.1.3 Grizzly (Dy)

Grizzly, or Dy, is a deposit containing lead, zinc, silver, and gold. 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. The site is located approximately 10 km[9] north-east of Faro, close to the Campbell Highway.

Dennison Environmental Services has been awarded a 3-year contract to take over care and maintenance of the Faro Mine. Deloitte and Touche is the current interim receiver.

3.1.1.4 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. The site is located approximately 9 km[9] north-east of Faro, close to the Campbell Highway. The Grum property is currently committed to the reclamation and closure plan for the Faro mine and is not likely to be developed in the near future.

3.1.1.5 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

[9] Discover Yukon's Mineral Wealth, Yukon Energy Mines and Resources and Yukon Economic Development, 2007.

53,000 tonnes. The site is located approximately 17 km[9] east of Faro, close to the Campbell Highway.

3.1.1.6 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 11 years, this mine is estimated to generate approximately 50,000 tonnes on average per year (YEG, 2007). The site is located about 110 km southeast of Ross River in the Finlayson Lake District. Although no access roads exist, it is close to the Campbell Highway.

3.1.1.7 Wolverine

Wolverine is a volcanic sediment site containing lead, zinc, copper, silver and gold. It is currently owned by Jinduicheng Molybdenum Group Limited and Northwest Nonferrous International Investment Company, Limited 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. The site is located in the Finlayson Lake District, approximately 135 km south-east of Ross River. Phase I of the access road was completed in September 2007 and permitting includes a Class A water license and Quartz Mining License.

3.1.1.8 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 nearby mines in the Finlayson Lake District proceed through development. Combined in-ground quantity is 8.2 million tonnes, of which only about 712,000 tonnes is considered shippable. The site is located approximately 130 km[9] south-east of Ross River in the Finlayson Lake District. Although no access roads exist, it is close to the Campbell Highway.

3.1.1.9 Minto

Minto is a copper, silver and gold deposit. It is currently owned by Sherwood Copper Corporation and contains about 20 million tonnes of inbound minerals, generating approximately 320,000 tonnes of total shippable resource. Over a planned project life of 82 years, this results in about 40,000 tonnes of annual shippable commodity. Current shipments are about 60,000 tonnes per year and indications are that this could increase in 2009. The site is located about 75 km northwest of Carmacks.

3.1.1.10 Cash

The Cash property is a copper and molybdenum deposit located near the Minto property, about 75 km northwest of Carmacks. Its current ownership is unclear – the last records indicate that it is owned by Archer, Cathro and Associates, a consulting geological firm with offices in Whitehorse and Vancouver. The property is estimated to contain about 36 million tonnes of reserves.

3.1.1.11 Andrew

The Andrew property is a lead and zinc deposit. It is currently owned by Overland Resources and is estimated to include reserves of 5.9 million tonnes. The Andrew property is located 110 km northeast of Faro and is accessible by a 70 km winter road from a point 120 km northeast of the North Canol Road. A feasibility study is expected to be completed by December 2008 with production targeted for 2012.

3.1.1.12 Marg

The Marg property is a polymetallic deposit owned by Yukon Gold. It is located 80 km northeast of Mayo and contains estimated reserves of 8.2 million tonnes.

3.1.1.13 Carmacks Copper

The Carmacks Copper property is a copper deposit owned by Western Copper. The project site is located approximately 38km northwest of the village of Carmack, near Williams Creek and 8 km west of the Yukon River. The site is currently accessible by an existing 12 km exploration road that leads north from km 33 of the Freegold Road, a secondary, government maintained, unpaved roadway that originates in Carmacks. The property is estimated to contain reserves of nearly 10 million tonnes.

3.1.2 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 and are described below. Project lives range from 4 to 21 years. Table 3-2 presents a summary of these minerals[8].

The deposits indicated in bold font in Table 3-2 (Logtung, Red Mountain, and Mactung), 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 70,000 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.

TABLE 3-2
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	Copper, Nickel	46,700,000	36,500,000	500,000	10
Logtung	Tungsten, Molybdenum	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

3.1.2.1 Wellgreen

Wellgreen is a copper and nickel deposit, currently owned by Coronation Resources. The Wellgreen Mine property is located 317 km north-west of Whitehorse, just 10 km off the Alaska Highway. Significant surface and underground work has been carried out on the property between the initial discovery in 1952 and limited mining in 1972 and 1973 by Hudson Bay Mining Company Limited. Three zones of Copper-Nickel-Platinum-Palladium-Cobalt-Gold-Silver have been outlined on the property. Probable and possible reserves are calculated to be 50.03 million tonnes.

3.1.2.2 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. The site is located approximately 65 km[9] southeast of Teslin, on the Yukon, BC border, in proximity of the Alaska Highway.

3.1.2.3 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. The site is located approximately 75 km[9] northeast of Whitehorse.

3.1.2.4 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. The site is located approximately 187 km northeast of Ross River on the Yukon, Northwest Territory border, in proximity of the Upper Canol Highway.

3.1.3 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 24.6 million tonnes (27.1 million tons). Table 3-3 presents an overview of all potential mineral deposits and the corresponding total and annual shipments.

TABLE 3-3
Summary of Shippable Volumes of Minerals

Property Name	Likely Shippable Commodity (tonnes)		
	Project Life	Total Shippable Commodity	Annual Shipment
Selwyn	21	14,009,249	467,000
Grizzly (Dy)	11.5	2,330,889	78,000
Swim	9	491,000	53,000
Tom & Jason	14	3,289,635	235,000
Wolverine	12	1,400,000	47,000
Kudz Ze Kayah	9	1,492,650	50,000
Fyre (Kona)	4	711,600	24,000
Minto	12	322,800	11,000
Logtung	30	293,700	10,000
Red Mountain	17	102,098	3,000
Mactung	30	140,986	5,000
TOTAL	-	**24,584,607**	

It is highly unlikely that all of the mines shown in this table would be in production at the same time; hence it is not useful to sum the potential annual volumes. It is highly probable that some of these mines may never be developed, other mines not shown above may be developed, their estimated lives may be different than those shown above and annual production could vary. The projects identified in Table 3-4 represent the most likely source of near term concentrates for movement according to Yukon Energy Mines and Resources.

TABLE 3-4
Potential Development Projects

Mine	Stage	Main
Carmacks Copper	Permitting, feasibility study complete	Copper
Division	Feasibility study complete	Coal
Wolverine	Permitting, feasibility study complete	Zinc, silver, selenium
Skukum Creek	Permitting, feasibility study ongoing	Gold, silver
Ketza River	Permitting, feasibility study ongoing	Gold, silver, zinc
Mactung	Feasibility study complete	Tungsten
Sa Dena Hes	Care and maintenance	Silver, lead, zinc
Andrew	Permitting, feasibility study ongoing	Zinc, lead
Howards Pass (Selwyn)	Scoping study	Zinc, silver, lead

3.2 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:

- Alaska Highway Natural Gas Pipeline
- Mackenzie Gas Pipeline
- Mining Development Projects
- Alaska Canada Rail Link

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.

3.2.1 Alaska Highway Natural Gas Pipeline

In August 1, 2008, the Alaska legislature has signed off on a license for Calgary-based TransCanada Corporation to start the $26-billion Alaska Pipeline Project. TransCanada Corp. will now start the engineering, environmental reviews, aboriginal relations and commercial work and is targeting to have the pipeline in service by September 2018.

Freight volumes associated with the construction of the Alaska Highway Natural Gas Pipeline were estimated by QGI Consulting and Gartner Lee for the ACRLS as indicated in Table 3-5. 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.

TABLE 3-5

Alaska Highway Gas Pipeline - Inbound Commodity Volumes (tonnes)[10]

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. Crossing	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 Construction	18,800	18,800	37,600	Repositioned	Repositioned		Repositioned	Repositioned	
CS/Facility Construction		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 Construction		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**

[10] Gartner Lee, *Alaska Highway Natural Gas Pipeline Traffic Flows*, Yukon Segment.

3.2.2 Mackenzie Gas Pipeline

Given the recent announcement about the Alaska Highway Gas Pipeline, it is not clear what the status of the Mackenzie Gas Pipeline will be.

Potential freight volumes associated with the construction of the Mackenzie Gas Pipeline in the Northwest Territories and Alberta were estimated by QGI Consulting and Gartner Lee for the ACRLS.

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 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 Table 3-6 will actually move through Alaskan ports.

TABLE 3-6
Mackenzie Gas Pipeline - Inbound Commodity Volumes (tonnes)[11]

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

[1] The 77,100 tonnes of equipment needed for this pipeline development will be shipped out of the territory after completion of the project.

3.2.3 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:

- Mine construction
- Mine operation

3.2.3.1 Mine Construction Freight Volumes

The analytical model used by Gartner Lee indicates that about 0.00123 tonnes of construction freight is generated per tonne of shippable mineral resources. Information provided by Sherwood Copper suggests that this figure may be too low. Sherwood Copper estimates that their construction supplies amounted to about 0.031 tonnes per tonne of shippable product.

[11] Gartner Lee, Mackenzie pipeline data, 2006.

Apart from the equipment, most of this traffic will be inbound into the Yukon. Using the higher benchmark rule of thumb and assuming that the 24.6 million shippable tonnes of concentrate indicated in Table 3-3 eventually are shipped, this will generate up to 787,000 tonnes of construction material perhaps over a 25 to 30 year period. This would result in average annual shipments of 26,000 to 31,000 tonnes per year if the indicated mines are developed. The following breakdown of materials can be expected as illustrated in Table 3-7.

TABLE 3-7
Mine Construction Freight Volume Composition[10]

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%

3.2.3.2 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.

According to Gartner Lee data, the ratio of inbound freight volume to mining operations support is approximately 0.00353 tonnes of inbound supplies for each tonne of concentrate shipped. Recent information from Sherwood Copper and Novagold indicate that this could be quite a bit higher:

- Sherwood Copper (Minto property) – 0.33 tonnes per tonne of concentrate
- Novagold (Galore Creek property) – 0.08 tonnes per tonne of concentrate

Assuming an average of the estimates from these two mines, and an annual volume of 300,000 tonnes of concentrate, this would thus result in 60,000 tonnes of inbound freight. The actual volumes will depend on the rate of development and operation of new mines.

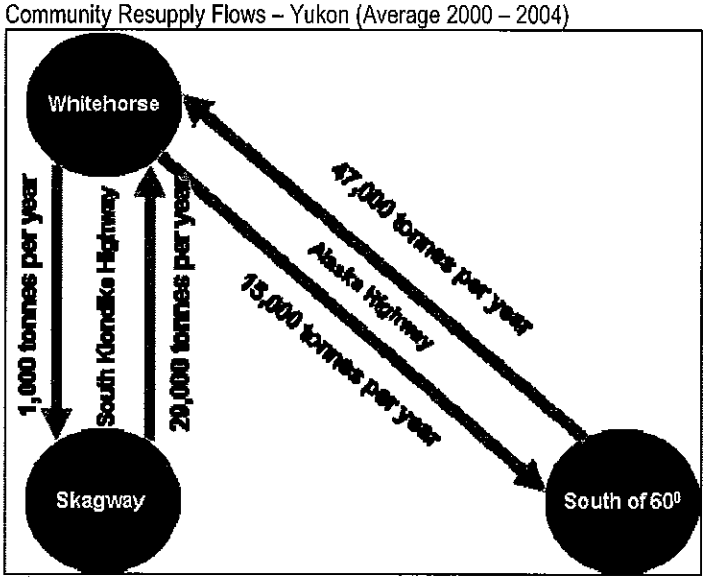
3.2.3.3 Alaska Canada Rail Link

The Alaska Canada Rail Link could provide significant volumes of construction materials and equipment if the project were to proceed. No estimates of volumes are available, but they could be as significant as the pipeline projects, though the volumes could be spread over a longer period of time.

3.3 Re-Supply Commodities

In terms of the community re-supply, the Yukon is generally served by truck from Alberta along the Alaska Highway and by barge/truck through the Port of Skagway and then along the South Klondike Highway. According to work undertaken by Vector Research as part of the ACRLS[12], community resupply flows for the period 2000 to 2004 averaged as shown in Figure 3-2.

FIGURE 3-2
Community Resupply Flows – Yukon (Average 2000 – 2004)



As indicated in this figure total inbound resupply traffic was about 76,000 tonnes, while outbound traffic was about 16,000 tonnes. The composition of the Alaska Highway inbound traffic was as shown in Table 3-8. These volumes are projected to grow by about the rate of population growth in the Yukon, so significant volume increases are not expected.

TABLE 3-8
Inbound Resupply to Yukon via Alaska Highway – Top 5 Commodities

Commodity	Average Tonnage	Share of Total
Petroleum products	22,221	47.0%
General merchandise	11,505	24,4%
Vehicles, machinery & equipment	4947	10.5%
Construction materials	4,391	9.3%
Iron, pile and steel	2,160	4.6%
Total	**45,223**	**95.7%**

[12] Inbound Traffic Data Development – Community Resupply (WPA1a), Vector Research, 2006.

Traffic moving to Whitehorse through the Port of Skagway is comprised of petroleum products (over 70 percent), general merchandise (24 percent and largely liquor shipments to the Yukon Liquor Corporation) and a small amount of other traffic.

3.4 Summary

The key conclusions to be drawn from the analyses of potential shipping volumes include the following:

- Mineral concentrates are likely to be the major traffic that could use the Port of Skagway.
- Mining activity will also generate additional traffic for mine construction and operation, though this could come by either road or marine services (through Skagway).
- Yukon community resupply volumes are relatively small and split between the Alaska Highway and barge service to Skagway. These volumes are expected to generally grow at the rate of population growth in the Yukon.
- Major project traffic could be quite large, but may only last a few years.