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Northern Assets: Transportation Infrastructure in Remote Communities



Northern Assets: Transportation Infrastructure in Remote Communities
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Preface

Transportation infrastructure plays an integral role in the socio-economic well-being of Northern communities in Canada. It improves commercial prospects, strengthens regional connections, provides access to key health and social services, and facilitates the flow of people and goods. Moreover, it benefits all Canadians through its contribution to national sovereignty, safety, and security. Yet the challenges of developing transportation infrastructure in Northern communities, separated in many cases by vast distances, are particularly acute. The negative effects of climate change, such as permafrost degradation, are exacerbating these challenges.

This report examines the role of Northern transportation infrastructure development in creating community links, enhancing commercial prospects, and facilitating economic growth. It features a case study of Churchill, Manitoba, to look at lessons learned and to analyze the implications of transportation infrastructure development that are relevant for other Northern communities. It also identifies policy issues and gaps in transportation infrastructure, as well as areas for further research.

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ABOUT THE CENTRE FOR THE NORTH

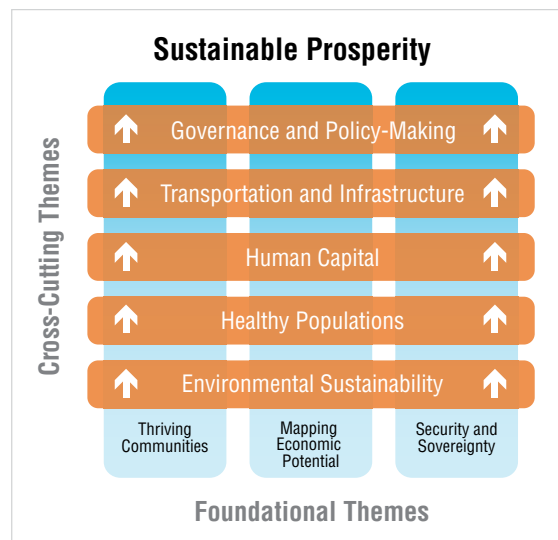
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The Centre examines issues from a Northern perspective, seeks to maximize Northern engagement, and prioritizes Northern interests. The Centre looks at issues and opportunities across the North—a vast region that includes the three Northern territories, as well as the northern portions of seven provinces.

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EXECUTIVE SUMMARY

Northern Assets: Transportation Infrastructure in Remote Communities

At a Glance

- ♦ Transportation infrastructure is considerably more expensive to build and to maintain in the North than in the South, and climate change is disrupting existing rail and winter-road links.
- ♦ Canada needs a coordinated strategy to strengthen transportation links to and within the North, to support social and economic development, and to enhance Canada's security and sovereignty.
- ♦ Planners and policy-makers must consider the unique social and economic benefits, and full life-cycle costs, of proposed transportation infrastructure projects in the North. They should engage communities to understand their needs and concerns, and address competing public, business, and individual interests.
- ♦ While governments must lead in setting priorities, they should also consider greater use of public-private partnerships to accelerate development.

The remoteness of Canada's North contributes to a lifestyle that is cherished by many residents and has helped to preserve local traditions and cultures. But it also poses challenges for the transportation infrastructure necessary for access to health care

and other public services, food security, shipping resupply and industrial cargo, and economic development and growth. This transportation infrastructure not only benefits Northerners, it also benefits all Canadians through its contribution to national sovereignty, safety, and security.

Transportation infrastructure in Northern communities is significantly more expensive to develop than in the South, and its benefits and costs are more difficult to assess, especially given its high operational and maintenance costs. The broader benefits of these projects are not always realized, and even when they are, their high ongoing costs may not be covered sufficiently.

The declining viability of winter roads is becoming a major problem for many Northern communities and resource development projects that rely on them for supplies.

Climate change is exacerbating these challenges. It is causing temperatures to rise more quickly in the North than in other regions of Canada, resulting in permafrost degradation, extreme precipitation, and other complications that are creating havoc for Northern road, rail, and air infrastructure. In particular, the declining viability of winter roads is becoming a major problem for the many Northern communities and resource development projects that rely on them for supplies.

This report examines the role of Northern transportation infrastructure development in creating community links, enhancing commercial prospects, and facilitating economic growth. It features a case study of Churchill, Manitoba, to look at lessons learned and to analyze the implications of transportation infrastructure development that are relevant for other Northern communities. It also identifies policy issues and gaps in transportation infrastructure, as well as areas for further research.

TRANSPORTATION INFRASTRUCTURE REQUIREMENTS IN CANADA'S NORTH

With an abundance of natural resources and a youthful population, Canada's Northern communities provide opportunities for economic growth and prosperity. Maximizing the potential of these communities will

require an expansion of transportation services, but the best way to achieve this is not clear. In many cases, investments are required for projects that do not stand on their own economically yet are vital for economic and community development. Benefit-cost analyses for these projects must capture a full range of economic and social benefits unique to Northern communities.

The public sector, in particular, has an opportunity to take a leadership role by developing a sustained and coordinated transportation policy strategy that responds to the North's unique circumstances. Policies to strengthen transportation links would support the economic and social sustainability of Northern communities, and would also advance the current federal government's interests in strengthening Arctic sovereignty and developing resource industries.

Case Study: Churchill, Manitoba

Churchill is a small, remote community in northern Manitoba, on the coast of Hudson Bay. Churchill is not connected to Manitoba's road system, but it does have access to air, rail, and marine transportation. The Bay Line is a single-track, 870-kilometre railway line that connects Churchill to Thompson and The Pas, and provides crucial rail service to a number of other small, isolated communities. Churchill is also the site of Canada's only deepwater port in the Arctic.

The Port of Churchill and the Bay Line are privately owned by OmniTRAX Inc., yet they play a key role in Manitoba's Northern transportation system and provide the province with direct tidewater access. Therefore, the provincial government has a vested interest in the viability of the port and rail line and, along with the federal government, contributes substantial funding for its upkeep.

Used mainly to export modest volumes of grain, the port could play a larger role in Canada's shipping industry. The effects of climate change are lengthening the time that shipping lanes are navigable. Over the long term, this could open up the possibility of establishing shorter and more efficient marine routes between North America, Asia, and Europe. The port is also pursuing opportunities to capitalize on the rising demand for freight services to Nunavut, fuelled in part by the territory's growing mining industry.

Developing Churchill's role as a shipping hub in Northern Canada will require substantial investment in transportation infrastructure in and around the community, consolidated effort from public and private stakeholders, and sound management of the significant risks involved. Constraints to the potential growth of traffic through the port include the difficulty of maintaining the rail line. Portions of the rail line are built on discontinuous permafrost: when the ground periodically thaws, it causes the track to warp, disrupting freight and passenger services.

Another risk is the uncertain future of the port's longstanding partnership with the Canadian Wheat Board, the main source of grain exports flowing through the port. In November 2011, the House of Commons passed legislation to change the Wheat Board's mandate, which may affect the volume of wheat currently routed through the port. Agriculture and Agri-Food Canada has pledged up to \$9 million to help support the continuation of grain shipments over the next several years, but the long-term consequences of these changes are not clear.

A potential game changer for the Port of Churchill's prospects is the proposed construction of an all-weather road connecting Rankin Inlet, Nunavut, to Manitoba's highway system. Churchill would be linked to this highway, giving the community year-round road access. However, the Nunavut and Manitoba governments are still investigating the feasibility of this road, and it is unknown if or when the project will start.

KEY ISSUES FOR NORTHERN COMMUNITIES

A number of key issues in the Churchill case study are relevant for transportation infrastructure development in other Northern communities. A major issue is the substantial funding often required for ongoing operating and maintenance expenses, making it even more important to carefully examine a project's full life-cycle costs. Public resources are already spread thinly across the North, and demands for infrastructure investment will require inventive solutions that target the most cost-effective means of achieving economic and social policy objectives.

In addition, Northern communities that rely on a single main industry face severe difficulties if that industry winds down. In these situations, infrastructure that is not economically viable on its own risks becoming a “white elephant”; in some cases, the community may be forced to assume financial responsibility for its ongoing maintenance and operation. These issues require careful attention and long-term planning.

The case study also sheds light on public-private partnerships in the North, differing interests among key stakeholders, and the community impacts of development. Climate change mitigation and adaptation, as well as the possible contribution of alternative transportation options such as airships, are also explored.

KEY RECOMMENDATIONS FOR TRANSPORTATION INFRASTRUCTURE IN THE NORTH

The costs and benefits of investment in transportation infrastructure in the North must be measured by different standards than in Canada's more densely populated Southern regions. Investment in transportation infrastructure in Northern regions requires active collaboration among governments, communities, and the private sector. In investing in new projects and in maintaining and encouraging better use of existing infrastructure, planners and policy-makers should consider the following recommendations:

Assess the full value created by infrastructure as well as its life-cycle costs.

Major investments in infrastructure last a long time, but their extended benefits come with continuing as well as initial costs. When assessing new or competing proposals, decision-makers must consider the full life-cycle costs, including design, construction, environmental and regulatory approvals, maintenance, rehabilitation, and eventual abandonment. At the same time, decision-makers must recognize the full range of benefits that may flow from investing in transportation infrastructure.

Recognize and address conflicting public, business, community, and individual interests.

Developing effective public policy often requires finding a balance between competing public, business, community, and individual interests. This challenge is especially evident in decisions about transportation infrastructure in the North. For example, abolishing the Canadian Wheat Board's exclusive role in wheat sales may offer more flexibility to farmers, but it could affect the economic viability of the Port of Churchill.

Conflicts can also arise when multiple stakeholders have competing visions for transportation infrastructure development. In the case of Churchill, this could have implications for the ongoing operation and future development of the port and rail line.

Take measures to adapt to the effects of climate change.

To be sustainable over the long term, the design, construction, and operation of new transportation infrastructure must include measures to mitigate and adapt to the potential effects of climate change. These include extreme weather, higher volumes of precipitation, flooding, washouts, increasing freeze-thaw cycles in the winter, and higher temperatures in the summer. Governments must also work with industry to ensure the consequences and the costs of climate change are reflected in public policy and business practices.

Ensure community residents are prepared for the impacts of development.

Infrastructure development must include a full examination of the potential benefits and possible negative impacts for local residents, investigating questions such as:

- ♦ Will the community be able to keep up with the demands of infrastructure growth, such as the increased demand for labour?
- ♦ How can the economic and social benefits of development be maximized?
- ♦ How will a change in transportation access affect local cultures, traditions, and lifestyles?

Frequent and inclusive communication between project planners and community members is an important element of effective community engagement. It ensures the interests of all parties remain aligned, and that decision-making processes remain transparent and accessible.

Consider traditional and alternative financial arrangements, including public-private partnerships, but ensure risks are managed properly.

Public and private interests can potentially both be served by transportation infrastructure projects in the North. When pursuing public-private partnerships, it is essential to properly manage the risks of such arrangements.

Build and maintain efficient and reliable supply chain partnerships.

Building efficient and reliable supply chains to provide transportation services is an important aspect of the effective use of transportation infrastructure, especially in remote communities that rely on these services for basic needs. They reduce the possibility of service failures and play a key role in maximizing infrastructure capacity.

Overall, addressing the North's infrastructure needs will require a concerted effort involving the public and private sectors. The public sector should take the lead in these efforts by developing a sustained and coordinated transportation strategy that responds to the unique social, economic, and environmental circumstances of the North. But the development of this strategy must engage businesses, communities, and individuals and take into account the many ways transportation infrastructure affects them all.

CHAPTER 1

Introduction

Chapter Summary

- ◆ Gaps in transportation infrastructure in Canada's North need to be addressed to improve commercial prospects, strengthen regional connections, provide access to key health and social services, and facilitate the flow of people and goods.
- ◆ Providing infrastructure in the North is significantly more expensive than in the South—especially given long-term operational and maintenance costs—and the benefits are more difficult to quantify, because of the minimal shared use of infrastructure in remote areas.
- ◆ The negative effects of climate change, such as permafrost degradation, are exacerbating these challenges.
- ◆ When developing transportation infrastructure, local community and Aboriginal groups must be consulted and engaged as partners in infrastructure projects.
- ◆ A case study of Churchill, Manitoba, sheds light on opportunities and challenges for infrastructure development in other Northern communities.

Transportation infrastructure plays an integral role in the socio-economic well-being of Northern communities in Canada. It's an asset that improves commercial prospects, strengthens regional connections, provides access to key health and social services, and facilitates the flow of people and goods.

However, the cost of providing transportation infrastructure can be prohibitive, and is a primary consideration in development decisions. Furthermore, because of the long service lives of infrastructure capital, investment must often be made upfront to produce benefits that could take decades to fulfill.

Because of the long service lives of infrastructure capital, investment must often be made upfront to produce benefits that could take decades to fulfill.

The challenges of developing transportation infrastructure in Northern communities, separated in many cases by vast distances, are particularly acute. Providing infrastructure in Canada's North is significantly more expensive than in the South, especially when factoring in long-term operational and maintenance costs. The negative effects of climate change, such as permafrost degradation, are exacerbating these challenges.

The benefits and costs of infrastructure in the North are more difficult to assess, because of the low population density and the minimal shared-use of infrastructure in remote areas. The broader benefits are not always realized, even over the long term. And, even in cases where they are, the high ongoing costs of maintaining the infrastructure may not be covered sufficiently, leading to operational problems and increased risks for investment.

Furthermore, when developing transportation infrastructure, the interests of local community and Aboriginal groups must be considered, and the fragile ecosystems of the North are also of great concern. For example, the report *The Sea Ice Is Our Highway*, from Inuit Circumpolar Council Canada, discusses the concerns of Inuit people about the potential impact of increased Arctic shipping on their traditional way of life. The report demonstrates the need to balance the pursuit of infrastructure development in the North with concerns about protecting the environment and maintaining cultural and traditional ways of life.

Aboriginal communities must also be directly engaged as partners in development projects, to provide opportunities to achieve their economic and social objectives.

Aboriginal communities must also be directly engaged as partners in development projects, to provide them with opportunities to achieve their economic and social objectives. In many cases, there are opportunities for Aboriginal communities to use land-claim agreements as vehicles to advance socio-economic development.

This report examines the role of transportation infrastructure development in the North in terms of creating community and regional connections, enhancing commercial prospects, and facilitating economic growth. The report features a case study of Churchill, Manitoba, to discuss lessons learned and the implications of transportation infrastructure development that are relevant for other Northern communities.

CASE STUDY: CHURCHILL, MANITOBA

Churchill is in Northern Manitoba, on the shore of Hudson Bay. While Churchill is well known for polar bear tourism, it is also located strategically for freight transportation: it is Canada's largest port to the Arctic Ocean. The town has access to air, rail, and marine transportation, and may gain road access in the future, yet it remains a truly remote community.

Manitoba and Nunavut are also investigating the development of a road linking the province and territory, which would open up road access to Churchill.

Churchill's port is mainly used to export modest volumes of grain. However, the potential for growth in shipping through Churchill has recently expanded because of the rising interest in developing Arctic trade routes. Climate change is causing Arctic sea ice to melt in the summer, lengthening the time shipping lanes are navigable. Over the long term, this trend could open up the possibility of establishing shorter and more efficient marine routes between North America, Asia, and Europe. There are also opportunities for the Port of Churchill to capitalize on the rising demand for freight services to Nunavut, fuelled in part by growth in the territory's mining industry. Capitalizing on this potential will require a consolidated effort by key stakeholders, while considering the impacts of growth on the local community.

The governments of Manitoba and Nunavut are also investigating the development of a road linking the province and territory, to open up road access to Churchill. This road could be a potential game changer for the community's long-term prospects.

As a remote community with existing transportation infrastructure and the potential for further development, Churchill provides a case study with valuable insights into issues that are relevant to the broader subject of

transportation infrastructure development in the North. In particular, the case study illustrates the major challenge represented by the funding required for the ongoing operation and maintenance of Northern infrastructure, and the financial burden this places on private and public sector interests.

Proper long-term assessments of the costs and benefits of infrastructure developments, taking the full infrastructure life-cycle into consideration, are key in Northern regions, where better transportation links may also lead to reduced costs to provide public services such as health care as well as access to more choices and lower prices for consumers. The case study also examines the implications and risks of public-private partnerships and some of the obvious community impacts of development.

METHODOLOGY

Research for this report included personal and telephone interviews with an extensive range of key stakeholders. The objective was to obtain feedback about the specific opportunities and challenges facing local and other interests, if Churchill is to expand its role as a gateway to Northern Canada and international shipping routes.

Stakeholders interviewed for this report included representatives from the Town of Churchill, the local steering committee for the Sustainable Churchill Initiative, the Churchill Chamber of Commerce, the wider community, the Churchill Gateway Development Corporation, OmniTRAX Inc., Aboriginal groups, CN Rail, trucking companies, and the provincial and federal governments. A full list of interview subjects is found in Appendix B.

Interviewees were asked about issues such as:

- ♦ potential impacts—positive and negative—of port development on the community
- ♦ risks associated with capital investments
- ♦ the ability of local resources to keep up with the demands of infrastructure growth
- ♦ implications of the community growing too quickly
- ♦ efforts to ensure the interests of all local stakeholders are considered
- ♦ cooperation between public and private interests
- ♦ supply chain logistics and regulatory hurdles
- ♦ the potential contribution of non-conventional transportation modes (e.g., airships)
- ♦ implications of the proposed Manitoba–Nunavut highway

The project also examined the current status of transportation infrastructure in Canada's North and the need to address existing infrastructure gaps. As listed in Appendix A, the authors reviewed a broad range of studies and reports related to transportation infrastructure development, including ones that focused on the unique needs of Northern Canada.

This report begins in Chapter 2 with an overview of transportation infrastructure in the North. Chapter 3 examines the specific situation facing Churchill, Manitoba, and efforts by key stakeholders to expand its role as a Northern shipping hub. This is followed by a discussion of the community impacts of development in Chapter 4, which draws heavily on the issues that emerged in the stakeholder interviews. Chapter 5 discusses the implications of addressing infrastructure requirements in the North and the key issues facing Churchill that are also relevant for other Northern communities. Finally, Chapter 6 presents the report's conclusions and policy recommendations, including areas where further research could be pursued.

CHAPTER 2

Transportation Infrastructure in Canada's North

Chapter Summary

- ♦ Transportation access provides Northern communities with regional links that are crucial to each community's identity.
- ♦ The lack of transportation infrastructure in the North limits access to health care, public services, social assistance, education and training, industrial cargo, and opportunities for economic development and growth.
- ♦ Climate change is leading to shorter seasons for ice roads and decreasing the stability of all-weather roads through permafrost degradation.
- ♦ Competition from Southern airlines is bringing lower fares to larger Northern cities, but over the long term, it could hurt service to smaller communities and erode the profitability of Northern carriers.
- ♦ Opening the North's underdeveloped markets to greater competition through better transportation access can help to lower prices and increase the supply of goods.
- ♦ Improving the Northern transportation system requires multiple approaches: developing new infrastructure, optimizing existing infrastructure, and implementing measures to mitigate and adapt to climate change.

In May 2011, Fort Liard, a remote community in the southwest corner of the Northwest Territories, endured a two-week closure of the only highway linking it to the rest of the territory. Highway 7, also known as Liard Trail, was in such poor condition that several sections were impassable.

The highway has been plagued with severe maintenance issues in recent years. Shortcomings in the highway's original design and construction from several decades ago have been exacerbated by wet weather and high volumes of heavy-vehicle traffic. The territorial government acknowledges the need to rebuild the road but, given its limited resources, must weigh that need against other infrastructure requirements across the territory. Yet residents of Fort Liard were relatively unperturbed by the latest closure; according to a senior official of the hamlet, "we gave up on the road years ago."¹

In fact, residents of the community are much more concerned about road access to Fort Nelson, B.C., which connects Fort Liard to the South. The community receives its mail and the majority of its supplies via Fort Nelson. As a result, the community feels more closely linked to the province of British Columbia than it does to its own territory.

¹ Thompson, "Fort Liard Feels Cut Off From N.W.T. Due to Poor Road."

This example illustrates the unique circumstances and challenges associated with transportation infrastructure in the North. Road access connects the community to the outside world and establishes regional links that are a crucial aspect of that community's identity. It also illustrates some of the difficulties encountered with the ongoing maintenance and operation of infrastructure in remote areas, particularly given that public resources are thinly stretched.

The consequences of disappearing sea ice are less straightforward than other impacts of climate change, presenting both opportunities and threats.

The lifestyle associated with remote Northern communities is a unique aspect of Northern living that many residents cherish. It has helped preserve local traditions and cultures. However, the lack of transportation infrastructure in the North also has negative consequences, limiting community access to health care, public services, social assistance, and education and training.² Threats to transportation access are also threats to food security, the cost and reliability of shipping resupply and industrial cargo, and opportunities for economic development and growth.

In a recent survey of the public sector in the North by the Northern Ministers Development Forum, all respondents cited transportation infrastructure as a barrier to economic growth. In particular, respondents pointed to the “prohibitive transportation costs affecting all sectors of the economy, including tourism”³ as the most pressing problem associated with insufficient infrastructure.

Moreover, transportation infrastructure in the North affects the public interest of all Canadians through its contribution to national sovereignty, safety, and security.⁴ Infrastructure that allows for a better response to environmental disasters and threats to sovereignty fulfills a role

that benefits the entire country. However, there is little infrastructure in place in the North to fulfill this role. The Dempster Highway in Yukon, an all-weather gravel road, is the only Northern highway that crosses the Arctic Circle.

Another critical issue is climate change, which is causing temperatures to rise more quickly in the North than in other regions of Canada. Continuous permafrost is an important element of infrastructure stability in the North. In permafrost zones, infrastructure is engineered to sit upon a foundation of frozen ground. But, warming temperatures are causing areas of discontinuous permafrost to move further north, causing permafrost to thaw in regions where it previously did not. Regions of discontinuous permafrost must contend with “ground slumping, tilted trees, sinkholes, and other disturbances,”⁵ which are causing massive problems for all-weather and seasonal roads, rail lines, and airport runways.⁶

Warming temperatures are also causing more Arctic sea ice to melt. The consequences of disappearing sea ice are less straightforward than other impacts of climate change, presenting both opportunities and threats. On the one hand, it is increasing the length of time marine shipping routes are navigable and may open up the possibility of developing international shipping lanes through the Arctic Ocean, both of which could create new economic opportunities for the North. On the other hand, increased marine traffic in the Arctic's highly sensitive ecosystem introduces frightening new threats, such as the possibility of toxic spills. There are also concerns about navigational hazards, such as icebergs, that pose a danger for shipping vessels operating in Northern waters.

Northern regions outside permafrost zones are facing other consequences of climate change. For example, increasing freeze-thaw cycles during the winter and hotter temperatures in the summer are causing massive problems for road infrastructure. Roads that endure multiple freeze-thaw cycles in the winter deteriorate

2 Sisco and Stonebridge, *Toward Thriving Communities*, 32.

3 Southcott and Irlbacher-Fox, *Changing Northern Economies: Helping Northern Economies Build a Sustainable Future*, 17.

4 Government of Yukon, *Northern Connections: A Multi-Modal Transportation Blueprint for the North*, 7.

5 Smith, *The World in 2050: Four Forces Shaping Civilization's Northern Future*, 165.

6 Natural Resources Canada, *Climate Change Impacts and Adaptation: A Canadian Perspective*, 137.

faster and require more maintenance. Hot temperatures cause pavement to soften and form ruts, and cause asphalt to liquefy and bleed out of pavement.⁷

Another effect of climate change is an increase in extreme precipitation events. Increased rainfall is causing landslides, flooding, and road washouts, which pose a significant risk for rail and road infrastructure. For example, a state of emergency was declared in the Peace River District of northeastern B.C. in July 2011 following torrential rains that caused massive flooding. Major highways in the region were washed out, causing millions of dollars in damages.⁸

CURRENT STATUS OF NORTHERN TRANSPORTATION INFRASTRUCTURE

Northern Canada encompasses a land area that includes the three territories, plus significant portions of all provinces except New Brunswick, Nova Scotia, and Prince Edward Island. However, transportation data are often published at the provincial and territorial level, making comprehensive North–South comparisons difficult. Given these limitations, it is still instructive to use territorial data to provide a picture of some of the transportation challenges facing Northern communities.

Northern communities must deal with the lack of economies of scale resulting from their sparse populations.

Transportation infrastructure in Canada's North is sparse. Of the 416,000 kilometres of two-lane equivalent paved roads⁹ in Canada, just over 3,000 kilometres are found in the three territories.¹⁰ None of these paved roads are in Nunavut. Furthermore, provincial road networks are naturally more concentrated in the denser Southern regions.

Calculating the length of these networks on a per capita basis tells a different story. At 155 km of road per 1,000 residents, Yukon has the most extensive per capita road network in the country.¹¹ The usage patterns reflect this: while the busiest parts of the Yukon network see about 3,700 vehicles per day,¹² the busiest parts of Highway 401 through Toronto see well in excess of 400,000 vehicles per day.¹³

Maintaining access to transportation is crucial; if there are few or no transportation alternatives, an infrastructure failure can result in bare grocery shelves or being cut off from emergency medical services.

The contrast between the extent of the network in absolute and per capita terms illustrates the challenges facing transportation infrastructure in Northern communities. In absolute terms, providing basic access may not appear to be cost-prohibitive. However, the lack of traffic relative to Southern communities makes the costs of providing the infrastructure exorbitantly high on a per user or per capita basis. While many of Canada's Southern urban areas have been dealing with the economic disadvantages associated with density, such as traffic congestion, many Northern communities must deal with the lack of economies of scale resulting from their sparse populations.

Constructing and operating transportation infrastructure also becomes much more challenging and costly in remote locations and in extreme weather. Yet maintaining access to transportation is crucial, particularly in areas where there are few or even no transportation alternatives. According to the National Round Table on the Environment and the Economy, these are key issues differentiating Northern transportation infrastructure from that of the South. Southern parts of the country often have many transportation backups and redundancies in the event of an infrastructure failure. However,

7 Natural Resources Canada, *Climate Change Impacts and Adaptation: A Canadian Perspective*, 136–137.

8 CBC News, "State of Emergency Declared in Peace River District," and "Peace Region Under Flood Warning."

9 Using this measurement, a 10-km stretch of four-lane highway, for example, is equivalent to 20 km of two-lane equivalent highway.

10 Transport Canada, "Transportation in Canada 2009," Addendum Table R02.

11 Government of Yukon, *Northern Connections: A Multi-Modal Transportation Blueprint for the North*, 8.

12 Ibid., 8.

13 Ontario Ministry of Transportation, "Provincial Highways Traffic Volumes, 2007," 38.

an infrastructure failure in the North can result in bare grocery store shelves or being cut off from emergency medical services.¹⁴

For these reasons, the benefits and costs of investing in transportation infrastructure are much different in the North than they are in Southern regions of the country. A detailed discussion of these differences appears later in this chapter.

ROAD TRANSPORTATION

Exhibit 1 presents a full picture of public road infrastructure in the North. With 4,800 km of all-weather roads, Yukon has the most extensive road network of the three territories, although more than half of these road kilometres are gravel. Over 2,000 km of Yukon's roads have been designated core or Northern/remote routes within Canada's national highway system.¹⁵ All communities in Yukon have all-season road access, except Old Crow in the northwest.¹⁶ There are no major winter roads in the territory.

In contrast, Nunavut has no permanent road network and only one 21-km all-weather road that links Nanisivik with Arctic Bay, on Baffin Island. A few private winter roads have been built to supply mining operations.¹⁷ However, the territory is not connected to the national highway system, and must therefore rely heavily on air and marine transportation for supplies. Many residents use snowmobiles and all-terrain vehicles to get around.

In between is the Northwest Territories, with 2,200 km of permanent roads. Roughly 1,400 km of the territory's roads are designated routes in the national highway system.¹⁸ Yet despite the reasonably extensive highway network, only 19 per cent of residents have year-round highway access.¹⁹ Most residents have access only to seasonal roads. Nearly two-thirds of residents require ferry services in the summer and ice crossings in the winter to access the highway system, but do not have access during the transitional period in the spring and fall. In addition, there are 1,450 km of public winter roads in the territory, plus more than 570 km of private winter roads serving the oil, gas, and mining industries. About 13 per cent of the territory's residents rely solely on winter roads for surface transportation.²⁰

The differences in road infrastructure between the three territories are reflected in the different levels of light-vehicle ownership and usage. At 808 vehicles per 1,000 residents, Yukon has the highest rate of light-vehicle ownership in the country (the Canada-wide average is 583 per 1,000 residents). The relatively extensive road infrastructure in the territory, combined with limited public transportation options common to rural areas, are two of the main factors for this high rate of vehicle ownership. Rates in N.W.T. and Nunavut are 507 and 106 vehicles per 1,000 residents, respectively.²¹

The harsh climate and reliance on seasonal roads naturally have implications for safety. At the national level, the road fatality rate was 7.4 for every billion vehicle-kilometres driven in 2008. (See Table 1.) Unsurprisingly, the rate

14 National Round Table on the Environment and the Economy, *True North: Adapting Infrastructure to Climate Change in Northern Canada*, 49.

15 Canada's national highway system has three route categories, as determined by the National Highway System Task Force: core, feeder, and Northern/remote. Transport Canada, "Transportation in Canada 2009," Addendum Table R01.

16 National Round Table on the Environment and the Economy, *True North: Adapting Infrastructure to Climate Change in Northern Canada*, 53.

17 Ibid.

18 Transport Canada, "Transportation in Canada 2009," Addendum Table R01.

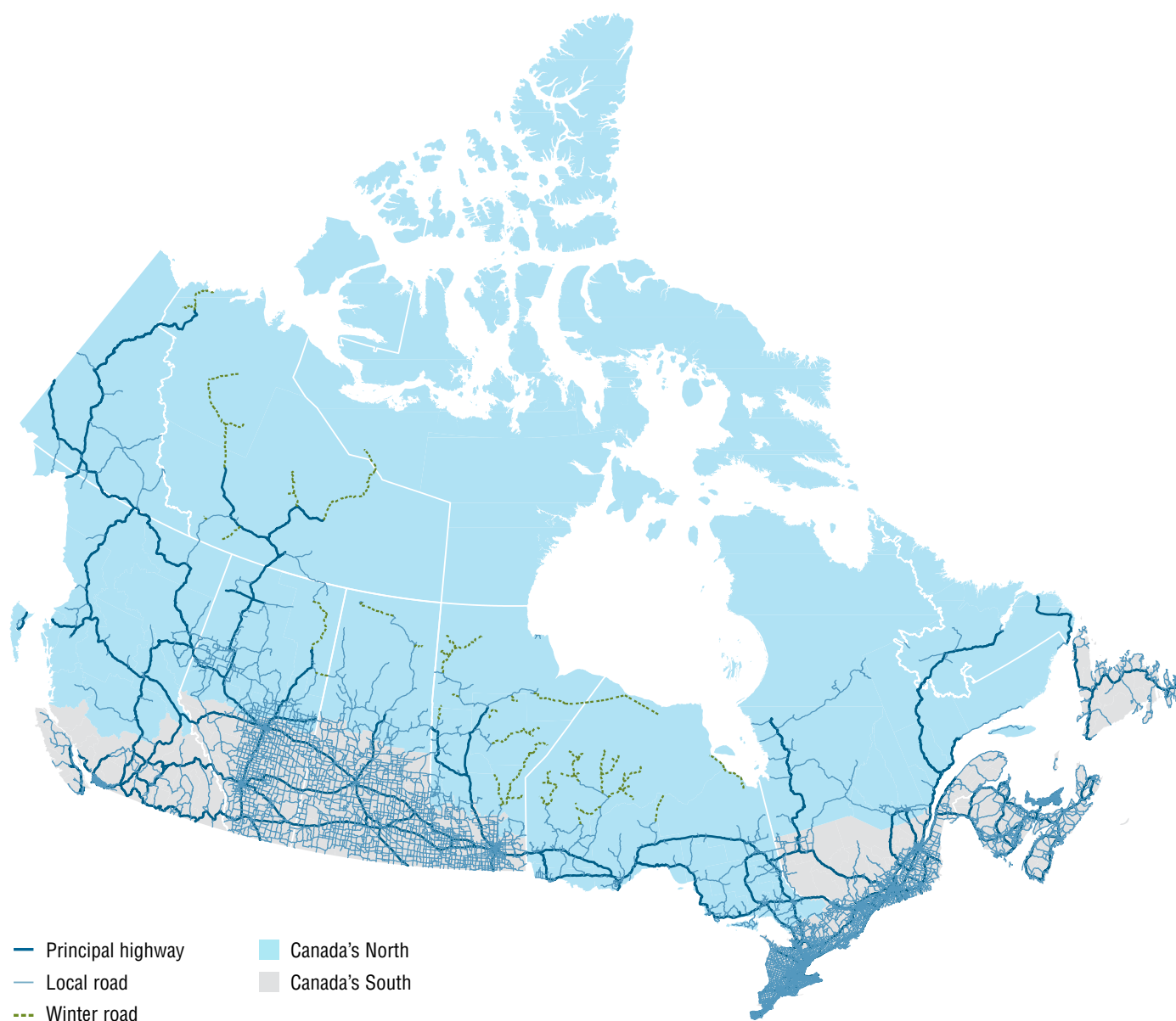
19 Government of Yukon, *Northern Connections: A Multi-Modal Transportation Blueprint for the North*, 10.

20 National Round Table on the Environment and the Economy, *True North: Adapting Infrastructure to Climate Change in Northern Canada*, 53.

21 Transport Canada, "Transportation in Canada 2009," Addendum Table R04.

Exhibit 1

Road Infrastructure in Canada



Sources: Golder Associates; The Conference Board of Canada.

was higher in all three territories.²² In N.W.T. the rate was 11.8, while in Yukon it was 15.4. However, these figures pale in comparison with Nunavut's rate, which

was 198.7 fatalities per billion vehicle-kilometres driven. At this rate, a passenger in Nunavut was over 25 times more likely to die in a road accident compared with the national average.

²² Fewer than 1 billion kilometres were driven in the three territories, so the figures reflect the ratio of fatalities if 1 billion kilometres were driven.

Table 1
Road Fatality Rates by Province and Territory, 2007
and 2008
(fatalities per billion vehicle-km)

	2007	2008
Canada	8.3	7.4
Newfoundland and Labrador	9.4	7.8
Prince Edward Island	6.3	14.9
Nova Scotia	9.3	10.4
New Brunswick	11.0	9.6
Quebec	8.8	8.1
Ontario	6.1	4.8
Manitoba	7.9	8.1
Saskatchewan	10.6	12.2
Alberta	9.6	8.6
British Columbia	11.5	9.9
Yukon*	10.3	15.4
Northwest Territories*	13.9	11.8
Nunavut*	184.6	198.7

*Fewer than 1 billion kilometres were driven in the three territories, so the figures reflect the ratio of fatalities if 1 billion km were driven.

Source: Transport Canada, "Transportation in Canada 2009."

Climate change is creating major problems for road infrastructure in Northern Canada.²³ Warmer temperatures are a huge obstacle for the construction and maintenance of winter roads. They are also lengthening the transition time between the availability of ferry services in the summer and ice routes in the winter, reducing access to road networks. Changes in freeze-thaw cycles and permafrost degradation are also decreasing the stability of all-weather roads, particularly those that are paved.

Other climate change impacts affecting road access in the North include washouts due to flooding, as well as a growing number of wildfires. According to the National Round Table on the Environment and the Economy, 2004 was a record year for forest fires in central Yukon. The

high number of fires increased the sensitivity of permafrost in the region, leading to a high number of landslides that compromised the area's transportation routes.²⁴

Shorter seasons for ice roads are one of the more troubling impacts of climate change on transportation infrastructure, creating significant problems for the Northern communities and resource development projects that rely on winter roads for supplies. Typically, these roads are used beginning in November or December and are viable until March or April, but milder winters are disrupting this schedule.²⁵ In cases where the only other option is air-lift, this results in a significant increase in the cost of supplies.

The East Side Transportation Initiative is a \$1.125-billion project to build an all-season road network in a remote region east of Lake Winnipeg.

For example, in Northern Manitoba, over 25,000 people in 28 communities are served by the 2,300 km of winter roads constructed there every year. The Centre for Indigenous Environmental Resources studied the impact of climate change on winter roads and natural trails on the Aboriginal communities in Northern Manitoba.²⁶ The report noted that First Nations communities in Northern Manitoba were especially vulnerable to reduced road access, because of their remote, inland locations and their reliance on roads and trails to maintain their cultural and economic way of life. The study focused on five First Nations in particular: Barren Lands, Bunibonibee Cree, Poplar River, St. Theresa Point, and York Factory Cree.

The findings revealed that over the previous 10 years, warmer weather and higher levels of spring runoff had affected the quality and reliability of winter roads and

23 For further details about the impacts of climate change on road infrastructure in the North, see *True North: Adapting Infrastructure to Climate Change in Northern Canada* by the National Round Table on the Environment and the Economy.

24 National Round Table on the Environment and the Economy, *True North: Adapting Infrastructure to Climate Change in Northern Canada*, 64.

25 Natural Resources Canada, *Climate Change Impacts and Adaptation: A Canadian Perspective*, 137.

26 Centre for Indigenous Environmental Resources, *Climate Change Impacts on Ice, Winter Roads, Access Trails, and Manitoba First Nations*.

trails—a trend expected to worsen as the effects of climate change intensify. Deteriorating winter road access reduced access to healthy food and medical services, intensified social isolation among community members, and significantly increased the cost of living. Reduced road and trail access also hindered the ability of community members to participate in traditional activities such as hunting and gathering, as well as cultural events.

The Government of Manitoba is addressing some of these concerns with the East Side Transportation Initiative, a \$1.125-billion project to build an all-season road network in a remote region east of Lake Winnipeg. The first component of the project is to build a 170-km road to link the Berens River, Bloodvein, and Hollow Water First Nations with the communities of Princess Harbour, Loon Straits, Manigotagan, Aghaming, and Seymourville.

The need to land in a variety of conditions requires fleets that are considerably different from those used by Southern-based carriers.

These isolated communities have winter road access for only about eight weeks of the year. In recent years, this short window of use has been reduced even further by the effects of climate change. Otherwise, residents must rely on air or marine transportation for passenger and freight services.²⁷

The second component of the East Side Transportation Initiative is a Large Area Transportation Network Study, currently under way. It is examining options for expanding the all-weather road network to other isolated communities.²⁸

27 Manitoba East Side Road Authority, “Transportation Challenges on the East Side.”

28 Further information about the East Side Transportation Initiative can be found on the project’s website at www.eastsideroadauthority.mb.ca/index.html.

AIR TRANSPORTATION

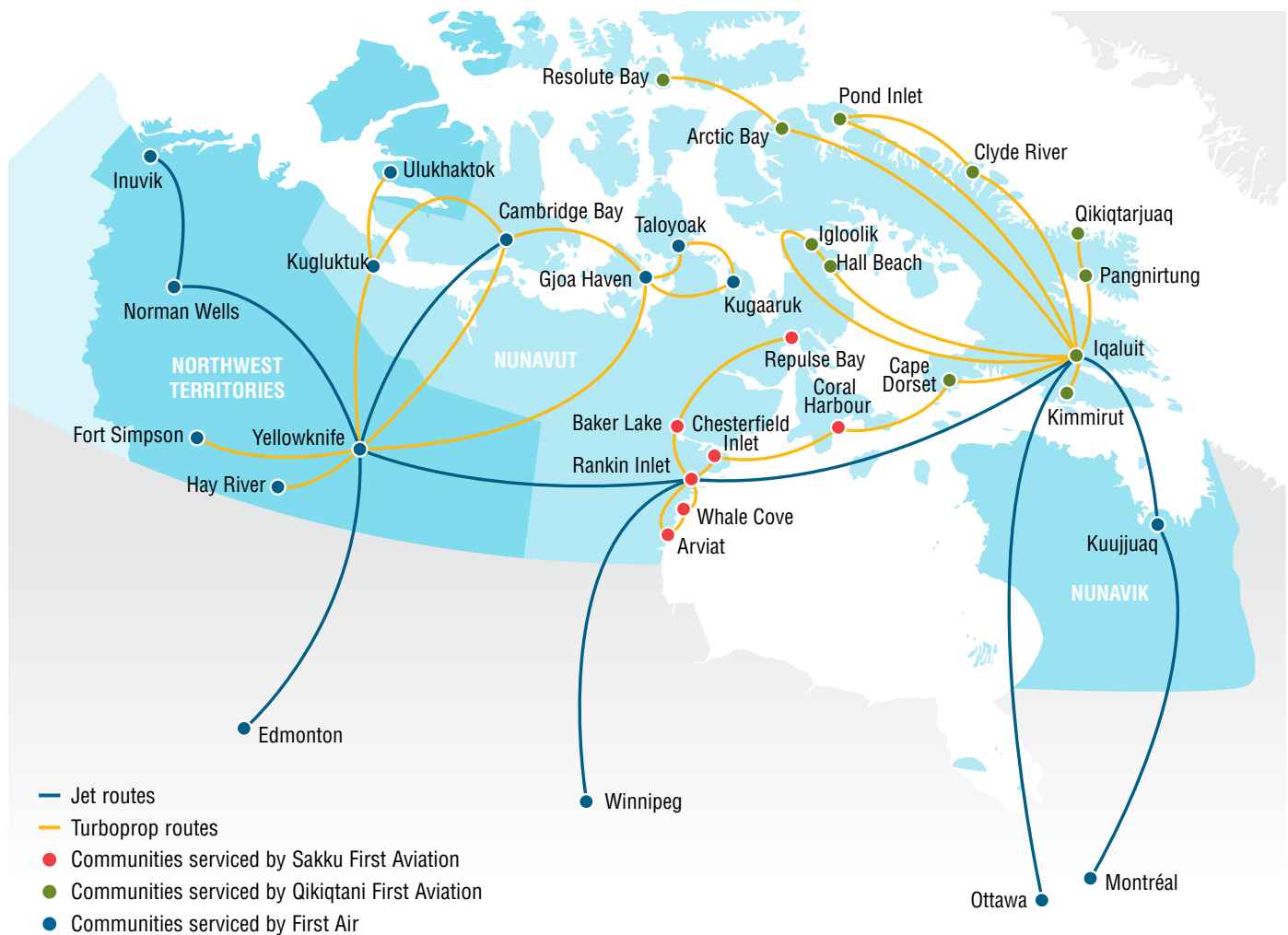
The lack of ground connectivity between Northern communities and the rest of Canada has led to a heavy reliance on air transport both for resupply and passenger services.²⁹ Canadians in Southern regions of the country are accustomed to the near ubiquitous presence of Air Canada or WestJet at their airports, as well as a plethora of international air carriers at the larger airports. While the national carriers do service several points in the North, most Northern airports are served by regional air carriers. First Air is one of the largest Northern carriers, serving 30 points in the North, mainly in the three territories. Exhibit 2 presents the airline’s route map, as an example of a regional route network serving small, remote Northern communities.

Numerous other regional carriers operate in the North. Air North serves communities in Yukon. Canadian North serves communities in the Northwest Territories and Nunavut. Central Mountain Air operates in the west, connecting many areas of Northern B.C. and Alberta with the South. Wasaya Airways serves a similar role in Northern Ontario communities, while Air Labrador and Air Inuit serve many points in Northern Quebec and in Newfoundland and Labrador.

In addition to providing intercity mobility to residents and visitors of Northern cities, these carriers play important roles in cargo and community resupply. This, coupled with the need to land in a variety of conditions, requires fleets that are considerably different from those used by Southern-based carriers. For example, most of First Air’s aircraft are equipped to land on gravel and ice-strip runways, and many are “combi” aircraft that can be configured to accommodate various combinations of passengers and cargo.³⁰

29 Passenger statistics are not publicly available for most Northern airports because of confidentiality issues for the small carriers serving these airports.

30 First Air, “About First Air: Our Fleet.”

Exhibit 2**Route Map: First Air and Its Subsidiary Airlines**

Sources: First Air; The Conference Board of Canada.

First Air also operates an all-cargo Boeing 767 that is generally used for the Food Mail program, through which the federal government subsidizes the shipping of nutritious, perishable foods to Northern communities. The company's two Hercules aircraft, the only civilian-owned and -operated Hercules in Canada (the aircraft is typically used for military applications), are particularly useful for landing at and supplying mining and exploration areas.

Through its Airport Capital Assistance Program, Transport Canada provides capital assistance for a number of regional and remote airports. Annual funding has historically been in the \$30-million to \$40-million range, with the bulk of these subsidies going to regional and remote airports in Quebec, Ontario, Alberta, and British Columbia. The largest recipients spending under this program in 2009 were North Bay, Ontario (\$5.3 million), and Port Menier, Quebec (\$3.9 million).³¹ In both cases, funds were granted to rehabilitate runways and taxiways.

31 Transport Canada, *Transportation in Canada 2009*, Addendum Table A4.

Competitive Pressures From the South

In recent years, Northern carriers have faced increasing challenges through competition from Southern-based air carriers. WestJet launched a daily scheduled service in 2009 between Edmonton and Yellowknife, as well as seasonal flights linking Fort McMurray to Toronto and Vancouver. Similarly, through its seat purchase agreement with Jazz Airlines, Air Canada has launched services to Northern destinations such as Fort McMurray and Whitehorse.

In the long term, competition from the South could hurt services to smaller communities and erode the profitability of Northern carriers.

To some extent, the expanding presence of national carriers is a welcome market development for Northern residents, leading to greater flight frequencies and increases in air services, while greater competition puts downward pressure on air fares. However, it also represents a significant risk to the services Northern carriers are able to provide, according to Joe Sparling, President and CEO of Air North.³² In a presentation at the 2009 Northern Transportation Conference in Iqaluit, Sparling said the additional capacity national carriers are introducing into the Northern air market is putting significant pressure on airline revenue yields. This could ultimately lead to lower overall air service and higher airfares for Northerners, if Northern carriers are not able to survive.

Sparling noted that while Northern carriers use Northern airports as network hubs, national carriers tend to treat Northern airports as spokes on their network. For example, Yellowknife is the major western hub for First Air, but only a small spoke on WestJet's network. According to First Air, WestJet's presence has created a market situation where available seats on the

Edmonton–Yellowknife route are 300 per cent over-capacity, creating unsustainable downward pressure on fares.³³ Because this is a major route for First Air, this situation has created difficult financial pressures for the entire company.

Similarly, Whitehorse-based Air North contends that Air Canada expanded capacity on its Whitehorse flights while offering fares on this route that were below cost. It should be noted, however, that allegations of predatory pricing are difficult to verify without access to a detailed account of an air carrier's cost structures; in some cases, lower fares may be a result of greater efficiencies, or lower—but still positive—margins.

Tracy Medve, President of Canadian North, described competition from Southern airlines as “threatening the viability of the broader air transportation system in the North.”³⁴ She noted that Northern airlines provide a broad range of services to Northern communities that the major carriers do not provide and that are much less profitable, such as freight airlift to small communities. In fact, Northern carriers provide services to remote communities that major carriers such as Air Canada and WestJet have no interest in serving.

This raises the question of whether Northern carriers will be able to continue providing services to smaller Northern communities at current fare levels if their revenues deteriorate on more lucrative routes to major Northern cities. Competition from the South lowers fares to major Northern cities, but over the long term, it could hurt services to smaller communities and erode the profitability of Northern carriers.

Many regional carriers in the North are owned by Northerners and have a significant impact on the local labour market. Air North, for example, has relied on

32 Van Horne Institute, *Northern Transportation Conference 2009: Weathering the Economic Storm*, 6.

33 Dunn, “At the Gate: The Capacity Question.”

34 Van Horne Institute, *Northern Transportation Conference 2009: Weathering the Economic Storm*, 6.

local equity offerings for capital expansion—nearly one in ten Yukoners has an ownership stake in the airline.³⁵ Overall, more than 1,500 people are employed in the three territories by the three largest Northern carriers.³⁶ If one of these three carriers were to fail, it would have an impact on employment in the region.

RAIL TRANSPORTATION

Rail transportation plays a smaller role in the North than other modes, overall. There is less disparity in rail infrastructure between Northern and Southern Canada than there is with other categories of transportation infrastructure. Nearly 14,800 km of Canada's rail system is in the North, mainly in Northern parts of British Columbia, Alberta, Manitoba, Ontario, and Quebec. In comparison, Southern Canada has 33,724 km of rail lines. (See Exhibit 3.)

The effects of climate change are destabilizing the ground underneath the rail lines, particularly in areas of discontinuous permafrost.

Canadian National Railway—one of the three Class 1 rail carriers, along with CP Rail and Via Rail, that have over \$250 million in revenues—has an extensive network of secondary feeder and connecting short lines in the North, as well as a main line that runs through Northern B.C. to the Port of Prince Rupert.³⁷ There are also numerous regional and short-line operators—Class 2 rail carriers—serving Northern rail lines.

Transporting freight by rail costs substantially less than by trucking or air, a savings that can be a boost for communities with access to rail service. Examples of regional services include the Hudson Bay Railway, profiled in Chapter 3 of this report, and the Mackenzie Northern Railway, which connects Hay River, N.W.T., to the railway system in Northern Alberta. About 50 per cent of the freight entering the Northwest Territories

is shipped on the Mackenzie rail line, making it an “important link that helps alleviate the high cost of living in the North.”³⁸

Rail service can also be an important mode of passenger transportation in remote areas of the North. Numerous communities in Northern Manitoba rely on the rail service provided by the Hudson Bay Railway and the Keewatin Railway as their only access to year-round surface transportation. Via Rail, a Crown corporation, provides subsidized passenger services on these lines.

However, in the North, the inherent cost advantage of rail transport can be partly offset by the high cost and difficulty of maintaining rail infrastructure in extreme weather. Freezing temperatures increase the frequency of broken rail tracks, frozen switches, and the need to replace wheels.³⁹ This can significantly hamper the speed and reliability of passenger and freight services. Moreover, the effects of climate change are destabilizing the ground underneath the rail lines, particularly in areas of discontinuous permafrost, exacerbating these challenges. These issues are discussed in greater detail in Chapter 3.

MARINE TRANSPORTATION

As the least expensive mode of freight transportation, marine transport is a crucial part of the supply chain for transporting fuel, groceries, and other commercial freight to the Northwest Territories, Nunavut, and the Northern regions of provinces with tidewater access. Yet despite this reliance on marine transportation services, there is very little marine infrastructure in the North overall, and almost none in Nunavut. It's common for cargo to be offloaded onto beaches, but access to these landing sites can be unpredictable because of ice buildup—which also leaves vessels and cargo vulnerable to damage. In addition, the marine shipping season is short, ranging from one to five months, depending on the location of the community.⁴⁰

35 Locke, “One on One With Joe Sparling, President of Air North.”

36 Van Horne Institute, *Northern Transportation Conference 2009: Weathering the Economic Storm*, 6.

37 Canadian National Railway, “CN System Map.”

38 Government of Yukon, *Northern Connections: A Multi-Modal Transportation Blueprint for the North*, 12.

39 Natural Resources Canada, *Climate Change Impacts and Adaptation: A Canadian Perspective*, 137.

40 Government of Yukon, *Northern Connections: A Multi-Modal Transportation Blueprint for the North*, 14.

Exhibit 3

Rail Infrastructure in Canada



Sources: Golder Associates; The Conference Board of Canada.

In the Northwest Territories, an important marine resupply route has been established through Hay River and Fort Simpson. Freight is brought in to these towns by truck or rail via Alberta, and then shipped by barge through Great Slave Lake up to the High Arctic.⁴¹

In Nunavut, eastern regions of the territory are served primarily by a supply route originating in Quebec, via the St. Lawrence River, although a small volume of freight is shipped via the Port of Churchill. Western regions of Nunavut are served by barge services from Hay River, N.W.T. All communities in Nunavut have

⁴¹ Government of Yukon, *Northern Connections: A Multi-Modal Transportation Blueprint for the North*, 11.

tidewater access. For the Nunavummiut, the people of Nunavut, marine transportation is a natural part of their culture and a common mode of travel.⁴²

Sea travel is also an important mode of transportation for the coastal communities of Nunavik in Northern Quebec. These communities rely on marine access for traditional activities, such as hunting, fishing, and gathering, as well as economic and recreational pursuits. In response to the need for marine facilities in these communities, Makivik Corporation, owned by the Inuit of Nunavik, embarked on a marine infrastructure development program in 1998, with \$88 million in funding from the federal and provincial governments. Within a decade, marine infrastructure was built in all 14 of the region's communities, tailored to the unique challenges each community faces with respect to currents, tides, ice, and weather. Phase two of the program is now under way to improve port facilities in the communities for shipping operations, for fishing, and for search and rescue vessels.⁴³

Port of Prince Rupert

The largest port in Northern Canada is in Prince Rupert, B.C. This international port is part of the federal government's Asia-Pacific Gateway and Corridor Initiative, which is a set of policy and funding measures aimed at increasing Canada's trade capacity with the Asia-Pacific region.⁴⁴ The port opened a container terminal in 2007 with a capacity of 500,000 TEUs (that is, twenty-foot equivalent units, the unit used to describe the size of a standard intermodal container). By 2010, it was the fastest-growing container terminal in North America. A second phase of development is planned to quadruple the terminal's container capacity and increase the port's depth. The port also has grain and bulk commodity terminals, and it opened a cruise terminal in 2004 that is a port of call for Alaskan cruises.



Unloading freight onto the shore at Deception Bay, Quebec
Source: Nunavut Sealink and Supply, Inc.

In 2010, the port handled over 16.4 million tonnes of cargo, including 343,366 TEUs of containers, and nearly 4.3 million tonnes of grain exports. The port also received 55,300 cruise passengers, from 25 ships.⁴⁵

Prince Rupert's largest advantage is its proximity to Asia relative to other west coast ports: it is 400 km (about one day's sail) closer than Vancouver and 1,200 km (about three days) closer than Los Angeles. It is also a natural deep-sea port that is ice-free, located at the western terminus of CN's Northern mainline. Because this portion of CN's main line is free of urban congestion, trains can run at speeds of up to 100 km per hour and use less fuel when transporting freight to and from Prince Rupert.⁴⁶ To improve the flow of freight to and from the port, CN has invested millions of dollars in recent years in rail-line upgrades.⁴⁷

42 Government of Yukon, *Northern Connections: A Multi-Modal Transportation Blueprint for the North*, 14.

43 Makivik Corporation, "Marine Infrastructure."

44 Transport Canada, "Asia-Pacific Gateway and Corridor Initiative."

45 Prince Rupert Port Authority, *Prince Rupert Handles Record Annual Cargo Volumes in 2010—Becomes the Fastest Growing Container Port in North America*.

46 Prince Rupert and Port Edward Economic Development Corporation, *Transportation and Logistics Sector Profile*.

47 Interview with Brad Bodner, CN Rail.

Development of the port's container terminal infringed on the land rights of the Coast Tsimshian First Nation, and so the Prince Rupert Port Authority worked out an agreement with the Tsimshian involving a land lease arrangement and financial payments.⁴⁸ The agreement also confirmed that First Nations would receive preferential treatment in some contract bids, and that 50 jobs would be set aside for local Aboriginal workers. In addition to this agreement, training and employment opportunities for Aboriginal people have been established at the port through the federal government's Aboriginal Skills and Employment Partnership.⁴⁹

BENEFITS AND COSTS OF TRANSPORTATION INFRASTRUCTURE DEVELOPMENT

In her opening address at the 2009 Northern Transportation Conference, Nunavut's Premier, Eva Aariak, discussed the importance of addressing the gap in transportation infrastructure in the North, particularly in her territory. She said infrastructure added by mining projects in Nunavut has not led to broader improvements in her territory's transportation system, and that Nunavut was left out of the federal government's Roads to Resources program in the 1950s.⁵⁰

To address the territory's infrastructure deficit, Nunavut's Department of Economic Development and Transportation recently released *Ingirrasiliqta (Let's Get Moving)*, a comprehensive plan to build a territorial transportation system. It details the territory's need to repair and maintain existing infrastructure, to develop new infrastructure, and to obtain the funding needed from public and private sector stakeholders.

The requirements discussed in Nunavut's transportation plan are indicative of the broader infrastructure requirements in Canada's North, overall. However, addressing

these needs is a monumental challenge for policy-makers. As Peter Wallis of the Van Horne Institute writes, the North's unique economic, social, and environmental circumstances must be considered when designing a policy regime for Northern transportation infrastructure development. He describes this as "a real policy challenge, perhaps the toughest and greatest in this country."⁵¹ Even the notion of what a transportation infrastructure gap means for Northern communities must be thought of in a different context.

DEFINING THE TRANSPORTATION INFRASTRUCTURE GAP

The existence of an infrastructure gap in Canada has been well documented, but its definition has not always been made clear. A report commissioned by the Federation of Canadian Municipalities calculated Canada's infrastructure gap at \$123 billion.⁵² This figure refers to the expenditures required to replace the used service life of the municipal infrastructure currently in place. Without these expenditures, the services Canadians now enjoy from water and wastewater assets, roads, and bridges, etc., would continue to degrade over time and eventually end.

Addressing transportation infrastructure requirements in Canada's North is a monumental challenge for policy-makers.

This definition, however, is distinct from the transportation infrastructure requirements in the North that are needed to address basic economic and social development objectives. This distinction can have important ramifications for policy recommendations. For example, in the case of municipal water and wastewater infrastructure, The Conference Board of Canada has recommended a move toward full-cost pricing for services in order to reduce the infrastructure gap.⁵³ In most cases, full-cost pricing would not be a viable option in the North.

48 Hale, "Prince Rupert Port Authority Outlines Details of Deal With Coast Tsimshian."

49 Human Resources and Skills Development Canada, "Prince Rupert Aboriginal Skills and Employment Partnership."

50 Van Horne Institute, *Northern Transportation Conference 2009: Weathering the Economic Storm*, 4.

51 Wallis, "Go North."

52 Mirza, *Danger Ahead: The Coming Collapse of Canada's Municipal Infrastructure*.

53 Coad, *Improving Infrastructure Management*.

Ongoing operating and maintenance subsidies are often required for financially unviable infrastructure. As a result, capital subsidies provided for the expansion of this type of infrastructure may increase the infrastructure gap, rather than decrease it. Recognizing this consequence and calculating the financial liability up front may help to avoid situations where services depend on ad hoc and inconsistent government financing.

The tendency is to spread funding widely to satisfy as many interests as possible, which may make it more difficult to achieve economies associated with density.

In addition to competing with other government services for funding, Northern infrastructure projects may also compete against each other. As a result, there is a tendency to spread funding widely to satisfy as many interests as possible. However, this may make it more difficult to achieve economies associated with density, while heightening the risk of stranded fixed assets—that is, assets put in place to serve a particular purpose that never materialized or has since dissipated.

ECONOMIC BENEFITS OF TRANSPORTATION SERVICES

Reliable transportation services have clear economic benefits that make a compelling case for public investment in transportation infrastructure. Transportation infrastructure provides increased mobility for goods and passengers. However, the economic value of transportation services comes from the access it provides, more than the mobility itself. For example, two economic centres connected by air service can benefit from the increased access they have to each other through this service. The act of travelling itself (the mobility aspect), is generally of no particular economic value. However, when investments are made to improve the speed of travel, users who were already using that particular service will benefit from the savings in time achieved through that improvement.

Indeed, the benefits of reduced travel times are often the focus of discussions about urban and inter-urban transportation investments. Passengers benefit from the

travel time saved according to the value they place on their time. Shippers benefit from the lower costs associated with faster shipping times, such as reduced in-transit inventory costs.

The increase in access provided by transportation services can have other benefits as well, such as the possibility of increased specialization and trade.⁵⁴ Greater transportation access allows producers to choose from a wider range of suppliers for intermediate goods, which in turn allows more products to be made from goods obtained from the most efficient suppliers. Better access may also allow specialized suppliers to achieve greater economies of scale. Similarly, it provides producers with access to larger consumer markets, again increasing the possibility of specialization and increased economies of scale.

The increase in access provided by transportation services can have other benefits as well, such as the possibility of increased specialization and trade.

Consumers benefit from increased specialization and trade because they are given a greater number of producers to choose from when purchasing products. This generates benefits typically associated with increased market competition (i.e., greater economic output and lower prices).

Increased accessibility can also generate benefits for labour markets, expanding employers' access to labour supply and creating opportunities to improve job-skill matching. The resulting improvement in labour productivity can lead to further opportunities for economic growth.

When considering the costs and benefits of public investments in transportation infrastructure, it is important to identify the internal (or private) benefits of infrastructure development and the external (or public) benefits.

⁵⁴ Lakshmanan, "The Wider Economic Benefits of Transportation: An Overview," 11.

Internal benefits are those that accrue directly to the user of the product or service. The value of the time a traveller saves because of an improvement in transportation services, or the costs a shipper saves because of reduced transit times, is generally considered to be an internal benefit.

Other benefits may be external to direct users. Investments in transportation infrastructure that induce a shift from a mode of transport with higher greenhouse gas emissions to a mode with lower greenhouse gas emissions can have a positive impact on those not directly involved in this shift. In addition, infrastructure development that contributes to an increase in the concentration of economic activity can also generate significant benefits for those other than direct users.⁵⁵

Infrastructure improvements that result in a greater shared use of large structures and institutions can be a significant benefit of development.

The distinction between internal and external benefits is particularly relevant when considering public investment in transportation infrastructure. Internal benefits will, by definition, be valued by individual users, and as a result, there are some products and services that can be adequately supplied through market forces alone. However, there are some situations where the external benefits of some products or services are as important—or perhaps even more important—than the internal benefits, and therefore leaving the provision of these goods or services to direct users may result in them being undersupplied by the market. In these situations, a greater case for public investment can be made.

Infrastructure improvements that result in more buyers and sellers for products and services markets, or a greater shared use of large structures and institutions, can be significant benefits of development. This is especially true if the development enhances access to public services. For example, population density in urban areas allows

public institutions, such as hospitals and schools, to operate at lower costs per user, because capital costs are spread over a larger base of users.⁵⁶ These economies are not as likely to be achieved in less populated areas, unless the institutions are made more accessible through the provision of transportation services.

As a result, increased investment in transportation infrastructure can reduce the need for investment in other infrastructure. For instance, a hospital in one community may have the capacity to serve another, but cannot do so because of a lack of transportation access. The creation of a transportation link to the second community would increase the hospital's patient base, which might reduce the average capital cost per patient.

Another example would be a new road that allows a shift in freight transport to a community from airlift to trucking, something that could reduce a community's ongoing operating costs. Or, it could result in a greater supply of goods and services at the same cost.

Underdeveloped markets served by few suppliers are more likely to be subject to imperfect competition.⁵⁷ Often, the result is higher prices and lower output. Lower transportation costs increase the potential for more suppliers to enter a market. By enhancing this potential for competition, lower transportation costs can lead to an increase in output and reduce the mark-up of prices over marginal production costs, lowering the overall price of goods.

This benefit is likely to be insignificant in mature markets. However, markets in the North are often underdeveloped, and opening these markets to greater competition through better transportation access can help to lower prices and increase the supply of goods. This is especially true for retail and food items, where transportation costs are particularly important.

56 Naturally, density can bring with it decreasing economies after the point in which congestion is introduced. For example, when too many people try to use a given road at the same time, travel times and fuel efficiency decrease.

57 Mackie, *Cost-Benefit Analysis in Transport: A U.K. Perspective*, 19.

55 Department for Transport, *The Eddington Transport Study*, 15.

When evaluating the benefits and costs of transportation investments, these factors should be considered, as they can tip the balance between one investment option and another. Increasing transportation access between two communities can allow for greater sharing of other public infrastructure, while reducing capital costs per user. The implications of this benefit can be particularly significant in the North. For example, given that Canada is committed to providing a particular level of health and education services to all Canadians, investments in transportation infrastructure may be able to assist in achieving these goals at a lower cost. In the hospital example above, investing in transportation infrastructure would make sense and would be more efficient if it cost less than building another hospital to serve a second community.

The initial investment in infrastructure may be beneficial if it saves ongoing operating costs over the long term.

Transportation infrastructure can play a similar role in accessing other necessities. If a new road lowers the cost of providing food and other goods to a remote community, what are the annual savings for public finances? Similarly, replacing a winter road with an all-season road could reduce a community's dependence on air freight, thereby reducing ongoing passenger and freight costs. In both cases, the initial investment may be beneficial if it is exceeded by the present value of the ongoing operating cost savings.

Opportunities may exist to leverage shared public and private uses of Northern transportation infrastructure. For example, infrastructure provided to serve a mining development may benefit nearby communities as well. In that case, public support for such infrastructure could be considered.

Where these benefits potentially exist, they should be specifically identified and quantified. Ex-post evaluations of infrastructure projects can verify that the benefits were realistically estimated and ensure the best ongoing use of public funds.

Despite evidence of wider benefits, transportation infrastructure projects in the North will generally not be viable according to a cost-benefit analysis. This is due primarily to the inherently low use of these assets, relative to the typically large upfront capital costs. As a result, some projects may benefit from an evaluation of their cost-effectiveness, instead of or in addition to a cost-benefit analysis.

For example, a fixed amount of public resources may be allocated to Northern transportation projects through the political process. To determine projects most worthy of these resources, the cost-effectiveness of each project can be determined by factors such as on-time and on-budget completion and other key criteria. Determining the cost-effectiveness of competing projects can help to achieve pre-defined public objectives at the lowest cost.

BENEFITS FOR RESOURCE EXTRACTION PROJECTS

The abundance of land in the North brings with it numerous opportunities for natural resource extraction. Naturally, the harsh climate and lack of transportation infrastructure is often a barrier to investment in remote areas.

For resource commodities, transportation costs are largely a factor of production. The value of a commodity is derived not only from the intrinsic characteristics of the item itself but also from its physical location. For example, wheat may be valued at \$200 per tonne at a farmer's gate in Saskatchewan, \$250 per tonne at the domestic port, and \$260 per tonne at its foreign destination. The difference in values is due to the transportation and logistics costs of moving the wheat between each point. The closer the wheat is to a consumer market, the higher its value.

This means that the benefits generated by an improvement in transportation services accrue directly to the producer. The degree to which these benefits are then passed on to the consumer depends largely on the relative competitiveness of the market. In the above example, the difference between the value of the wheat at the farm gate and its foreign destination is \$60. If the producer had an opportunity to use transportation services that reduced the transportation and logistics costs by \$10 a tonne, this would increase the value of the wheat at

the farm gate to \$210. Since the producer benefits directly, there is an incentive for the producer to pay for this improvement.

To a large degree, this also applies to mining projects in the North. The fact that many resource extraction opportunities are untapped because of challenges with accessing these locations is not necessarily a failure of market forces. Rather, they are often a signal of functioning markets, because the cost of supplying transportation services to these locations is often a considerable obstacle. These costs are—and should continue to be—a primary consideration in the selection of resource extraction projects to be pursued.

Baffinland Iron Mines Corporation is planning to build a 143-km railway, a deep-sea port, and an airstrip to service its Mary River iron ore mining project.

When commodity prices are high, mining companies have greater incentive to make the substantial investments in transportation infrastructure required to establish and operate new projects. Private companies already construct winter roads and air strips in the North specifically for this purpose. Some examples of this include the privately built Tibbitt–Contwoyto winter road that services the diamond mines in the Northwest Territories, as well as the air strip and road Agnico-Eagle Mines Limited built to access its Meadowbank gold mine in Nunavut.

In addition, Baffinland Iron Mines Corporation is planning to build a 143-km railway, a deep-sea port, and an airstrip to service the Mary River iron ore mining project it is developing on Baffin Island, Nunavut. The capital costs of the entire project are projected to be \$4.1 billion, but over its 20-year life, the project is expected to generate after-tax revenues of \$11.2 billion.⁵⁸

58 Baffinland Iron Mines Corporation, “Baffinland Announces Exceedingly Robust Economics for the Mary River Direct-Shipping Iron Ore Project.”

THE OPPORTUNITY COST OF LABOUR

In cost-benefit analyses, labour is considered a cost, alongside the cost of capital, energy, and other materials and services. The cost of labour stems not from the depletion or effort of the individual workers, but from the value of the product they could have otherwise produced. In other words, accounting for labour in a specific project eliminates the possibility of using that labour for producing something else.⁵⁹

In competitive labour markets, the opportunity cost of labour is equal to the wage rate. As a result, a cost-benefit analysis can conveniently use the expenditures on labour as a proxy for the opportunity cost. Even if labour markets are not entirely competitive or fully employed, the use of this proxy is generally adequate.

But some Northern communities may be subject to circumstances that render this assumption inadequate for the cost-benefit analysis of Northern investments. This is partly because of the higher rate of unemployment among Aboriginal peoples, which has typically been two to three times higher than the unemployment rate among non-Aboriginal people.⁶⁰

If infrastructure investments are able to tap into the high proportion of unemployed people in a Northern community, the opportunity cost of that labour can be low. But if investments in the North lead to the use of labour from outside the region, rather than drawing from the unemployed local population, this benefit obviously does not apply.

Another issue is the shortage of skilled workers in the North. Those with the requisite skills tend to earn substantially higher wages than they would in the South. Higher wage rates in the North reflect the high demand for skilled workers and the high cost of living.

59 See Mishan and Quah, *Cost-Benefit Analysis*, Chapter 11 for a discussion of the opportunity cost of labour and implications for cost-benefit analyses.

60 Mendleson, “Aboriginal People in Canada’s Labour Market,” 18.

TRADE-OFF BETWEEN CAPITAL AND OPERATING COSTS

When evaluating the costs of transportation alternatives, both private investors and government decision-makers are often faced with a trade-off between upfront capital costs and ongoing operating costs. It is important for decision-makers to explicitly recognize this trade-off with life-cycle cost analyses to remove any bias in favour of capital or operating costs.

For example, a highway may lower freight and passenger costs relative to air freight costs. In terms of operating costs alone, this will generally be true. But when considering the upfront capital costs required to build the highway, the overall costs may be higher or lower, depending on the life of the assets, the opportunity cost of the capital rate used in the life-cycle cost analysis, and the absolute level of expenditures. For a true comparison of annual costs, capital costs should be amortized over the life of the asset and combined with ongoing operating costs for all alternatives. Similarly, all costs should be discounted to a present value, in order to compare costs in lump-sum terms.

The economics favouring one mode or another will vary depending on the size of the market and conditions to which the assets must be built, among other considerations. Table 2 illustrates the trade-off between the capital and operating costs of freight transportation modes. This is a rough estimate only, and does not consider the different levels of service provided by each mode of transportation. Additionally, costs vary substantially from region to region in the North, and therefore must be analyzed on a case-by-case basis.

Further complicating the cost-benefit analysis, the effects of climate change have increased uncertainty when designing and constructing transportation infrastructure to withstand the extreme conditions of the North. According to the Transportation Association of Canada, infrastructure built on permafrost terrain must now be “developed on a risk-based approach, with design processes which recognize and rationalize future uncertainty from changing climatic conditions.”⁶¹

Table 2

Illustration of Trade-Off Between Capital and Operating Costs of Freight Transport Modes

	Capital costs	Operating costs
Air transport	High	High
Rail transport	Medium	Low
Road transport	Medium/high	High
Marine transport	Medium/high	Very low
Airships	Low/medium	Low

Source: The Conference Board of Canada.

The association notes that a unique challenge with transportation infrastructure projects in the North is the balance that must be struck between the cost and the performance of infrastructure—a balance that is becoming increasingly tenuous, given the worsening instability of permafrost terrain. When analyzing the overall cost of development, planners must consider the project’s high construction and maintenance costs, as well as the infrastructure’s vulnerability to the effects of climate change. Moreover, planners should “incorporate mitigative or adaptive measures into their design and future operations, or at least understand what the risk and cost implications are of not incorporating such measures.”⁶² Other considerations include environmental impacts and regulatory clearances that need to be addressed during the development process.

With an abundance of natural resources and a youthful population, Canada’s Northern communities provide opportunities for economic growth and prosperity. But maximizing their potential requires an expansion of transportation services. Improving the transportation system requires multiple approaches, including the development of new infrastructure, the optimization of existing infrastructure, and the implementation of measures to mitigate and adapt to climate change.

61 Transportation Association of Canada, *Primer on Developing and Managing Transportation Infrastructure in Permafrost Regions*, 2.

62 Ibid.

CHAPTER 3

Case Study—Transportation Infrastructure in Churchill, Manitoba

Chapter Summary

- ♦ The Port of Churchill and the Bay Line are privately owned but receive public funding because they play a key role in Manitoba's Northern transportation system and provide the province with direct tidewater access.
- ♦ Churchill could increase its role as a shipping hub by diversifying the range of agricultural products it handles and increasing its share of freight Nunavut-bound freight—especially for mining projects.
- ♦ Melting sea ice is opening up the possibility of developing polar shipping lanes between Churchill, Asia, and Europe.
- ♦ Developing Churchill's role as a shipping hub in Northern Canada will require substantial investment in transportation infrastructure in and around the community, consolidated effort from public and private stakeholders, and careful analysis and sound management of the significant risks associated with such an investment.
- ♦ Constraints to the potential growth of traffic through the port include the difficulty of maintaining the rail line, and the uncertain future of the port's long-standing partnership with the Canadian Wheat Board.

Churchill is a small, remote community in the northeast corner of Manitoba, on the western shores of Hudson Bay. The town's location provides it with unique advantages for tourism and shipping: it is known internationally for its polar bear tourism, which attracts more than 10,000 domestic and international visitors every fall,¹ when polar bears gather on the shores of the Bay for six to eight weeks to wait for the waters to freeze over. Churchill is also the location of Canada's only deepwater port in the Arctic region, making it well positioned to serve as a shipping hub for the Far North.

According to its latest census profile, Churchill's population is 923.² However, the town's population rises by several hundred people for several months over polar bear season, when local tourism businesses hire extra staff from outside the community.³

1 Figures from Tourism Manitoba indicate there were an average of 20,700 annual overnight leisure travel visits to Churchill each year between 2006 and 2008. These visits generated an average of \$21.5 million in spending in each of those years. Interviews with Destination Churchill and the Churchill Chamber of Commerce revealed that most of these visits occur during polar bear season in October and November.

2 Manitoba Bureau of Statistics, *2006 Census Profile: Churchill*.

3 Interviews with Merv Gunter, Destination Churchill, and Rose Preteau, Churchill Chamber of Commerce.

More than half of the town's permanent population is Aboriginal, many of whom are Cree, Dene, Inuit, or Métis.⁴ A recent community development report noted that Aboriginal identity is a significant aspect of the community's culture.

Churchill is not connected to the road system in Northern Manitoba, but the community does have access to air, rail, and marine transportation. Air and rail provide the only year-round transportation access. Air access to Churchill is provided by two regional airlines, Calm Air and Kivalliq Air. Both are owned by a single parent company, Exchange Income Corporation, which also owns two other Northern carriers, Perimeter Aviation and Bearskin Airlines. Calm Air and Kivalliq Air offer daily scheduled passenger and cargo services between Winnipeg and Churchill on routes that also include other communities in Northern Manitoba and Nunavut.

Marine access to the Port of Churchill is available in the late summer and fall, during the 14 to 16 weeks when Hudson Bay is relatively ice-free and navigable.

Churchill's airport was built by the U.S. Air Force during the Second World War, with an impressive runway infrastructure that can still accommodate intercontinental aircraft as large as Boeing 777s.⁵ Transport Canada acquired it from the U.S. government in 1964 and has run it since then as a remote airport under its National Airports Program.⁶

Rail service is provided by the Hudson Bay Railway Company (HBRY), which owns the Bay Line, a single-track, 870-km railway line that connects Churchill to

Thompson and The Pas. A number of communities along the Bay Line rely on it as their only access to year-round surface transportation. Truck-rail interchanges are located in Thompson and The Pas. There is also a key railway interchange point in The Pas, which connects the Bay Line to a CN Rail feeder line leading south and to the Keewatin Railway Company's line leading north to Pukatawagan.⁷ (See box, "Keewatin Railway Company.")

Keewatin Railway Company

Keewatin Railway Company is the first First Nations-owned railway company in Manitoba, and the second in Canada (after Tshiuetin Rail Transportation Inc., in Quebec). It owns the 296-km Sherridon rail line between Sherritt Junction and Lynn Lake, providing rail service to a number of communities in Northern Manitoba. The company was created as a partnership between three local First Nations communities, the Tataskweyak Cree Nation, the War Lake First Nation, and the Mathias Colomb Indian Band.

The group purchased the rail line in 2006 with financial assistance from the governments of Canada and Manitoba, after the Hudson Bay Railway announced its intention to abandon the line in the wake of a mine closure near Leaf Rapids. Keewatin currently operates passenger and freight services between The Pas and Pukatawagan, in conjunction with service agreements with Via Rail and Hudson Bay Railway. Additional federal government support has been committed for rail upgrades, such as track rehabilitation and bridge re-decking.

The Hudson Bay Railway Company is owned by OmniTRAX Inc., an American railroad company based in Denver, Colorado. OmniTRAX purchased the Bay Line in 1996 from CN Rail, which at the time was undergoing a major divestiture of its secondary rail lines.⁸ OmniTRAX subsequently acquired the Port of Churchill in 1997, and operates it under another subsidiary, the Hudson Bay Port Company.

Marine access to the Port of Churchill is available in the late summer and fall, during the 14 to 16 weeks when Hudson Bay is relatively ice-free and navigable. But

4 Institute of Urban Studies, *Sustainable Churchill Interim Report*, 16. Note: A detailed profile of the community is presented in Chapter 4 of this report.

5 Telephone call with Jarrett O'Connor, Manager of Resource Management, Churchill Airport, Transport Canada. Mr. O'Connor also stated that passenger and cargo statistics for the airport are not publicly available, to protect the confidentiality of the carriers.

6 Transport Canada, "Churchill Airport—Manitoba."

7 Manitoba Infrastructure and Transportation, "Churchill Gateway System—Briefing Note."

8 Canadian National Railway, "CN Sells Its Northern Manitoba Network to OmniTRAX."

there are no scheduled marine passenger services in or out of the port. Apart from the occasional Arctic cruise ship that has included a trip to Churchill on its itinerary, the port has been used primarily for outbound freight shipping.

THE CHURCHILL GATEWAY SYSTEM

Although they are privately owned, the Port of Churchill and the Bay Line play a key role in the Government of Manitoba's Churchill Gateway System, the assets and services that provide transportation access to communities in Northern Manitoba. Moreover, the port provides Northern Manitoba with direct tidewater access. For these reasons, the provincial government has a vested interest in the viability of the port and rail line and, along with the federal government, contributes substantial funding for its upkeep.

Passenger services on the Bay Line are provided by Via Rail, through an operating agreement with OmniTRAX. The latest passenger figures from Via Rail indicate more than 20,000 trips are taken on the rail line annually. (See Table 3.)

Table 3

Annual Via Rail Passenger Statistics, Winnipeg to Churchill Route

	Passenger miles (000s)	Passenger numbers
2010	6,423	20,615
2009	6,793	20,430
2008	8,012	22,346
2007	9,525	26,618

Source: Via Rail.

As noted earlier, rail service is crucial for a number of small communities located along the Bay Line, including Thicket Portage, Ilford, and Pickwitonei, which are otherwise accessible only by winter road and by air. Rail service also provides freight services for First Nations communities located along the rail line, including Fox Lake and War Lake.⁹

Via Rail has been undergoing a federally funded equipment overhaul program since 2008, and has temporarily removed a number of locomotives from service, disrupting the Bay Line's regular passenger schedule. The work is expected to be finished in 2012. Via had proposed to reduce passenger services to Churchill from three to two times per week, but those plans were cancelled after significant pressure from the Town of Churchill, Hudson Bay Railway, and the Manitoba government. Maintaining passenger rail services to these communities is an ongoing concern for the provincial government, which does not want to see any reductions in service.¹⁰

OmniTRAX, Transport Canada, and the Government of Manitoba each committed \$20 million to repair the Bay Line.

According to the Manitoba government, passenger and freight service on the Bay Line "had been declining for many years due to the North's challenging operating environment and the need for significant annual investments in infrastructure maintenance."¹¹ The rail line is built on discontinuous permafrost, which means that portions of the ground ice melt during the summer. This instability wreaks havoc on the rail bed, causing undulations in the rail track, making the rail line difficult and expensive to maintain.¹² These issues recur each year, requiring spot tie and resurfacing repairs and limiting the speed of rail cars, which affects freight and passenger services.

In response to the need to improve the rail infrastructure, a public-private partnership agreement was struck in 2007 between OmniTRAX, Transport Canada, and the Government of Manitoba. Each partner committed \$20 million to rehabilitate the line: the two government partners will contribute their shares over five years, and OmniTRAX will contribute its share over 10 years.¹³

10 Interview with Doug McNeil and John Spacek, Manitoba Infrastructure and Transportation.

11 Manitoba Infrastructure and Transportation, "Churchill Gateway System—Briefing Note."

12 Interview with Doug McNeil and John Spacek, Manitoba Infrastructure and Transportation.

13 Manitoba Infrastructure and Transportation, "Churchill Gateway System—Briefing Note."

9 Interview with Kevin Carlson, Manitoba Keewatinowi Okimakanak.

According to the provincial government, about half of this money has been spent so far, with “noticeable improvements” in the speed and reliability of the rail line.¹⁴ One measure of this improvement is the number of “slow orders” on the line—that is, the number of times the railway company places a speed restriction at a specific location on the line.¹⁵ Since the repairs began, slow orders have decreased significantly, and average transit times have increased by 10 per cent.¹⁶

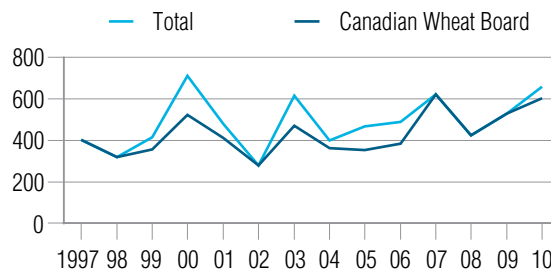
The Northern terminus of the Hudson Bay Railway is at the Port of Churchill. OmniTRAX assumed ownership of the port in 1997 from Ports Canada, making Churchill the first privatized port in Canada. OmniTRAX acquired the port with a symbolic payment of \$10; however, the port was in significant disrepair, and so part of OmniTRAX’s obligation in acquiring the port was a commitment to invest substantially in rehabilitation and upgrades.

The Port of Churchill was built in 1931 as a grain shipping terminal, and grain exports still dominate the port’s shipping business. (See box “The Port of Churchill—Fast Facts.”) In 2010, the port handled 603,352 tonnes of

wheat and durum grain exports for the Canadian Wheat Board, plus an additional 55,596 tonnes of canola and feed peas. (See Chart 1.) Destinations for these grains and seeds include import markets in North Africa, Europe, South America, and Mexico.¹⁷

Chart 1

Port of Churchill, Grain Export Volumes,
1997–2010
(000s tonnes)



Source: Hudson Bay Port Company.

The Port of Churchill—Fast Facts

- ◆ North America’s only deepwater Arctic port
- ◆ Located on the western coast of Hudson Bay, in northeast Manitoba
- ◆ Infrastructure includes fuel tank farm (capacity: 50 million litres) for gas, diesel, and jet fuel; four deep-sea berths; grain elevator (capacity: 140,000 tonnes); 82,000 square feet of indoor storage; 6 miles of rail track for loading and off-loading
- ◆ Primarily used as grain exporting terminal for the Canadian Wheat Board; also handles small volumes of other grains and seeds, as well as resupply cargo bound for the Kivalliq region of Nunavut.
- ◆ Open from mid-July to the beginning of November (about 16 weeks).

However, the House of Commons recently passed legislation that will change the mandate of the Canadian Wheat Board, so that farmers are no longer obligated to sell their wheat and barley through the organization. This could have severe consequences for the Port of Churchill because, if the Wheat Board is no longer responsible for transporting wheat exports, the grain routed through the port could be redirected elsewhere. A more detailed discussion of this risk appears later in this chapter.

Apart from grain exports, the port handles a small share of Nunavut’s resupply market for dry goods, fuel, and industrial cargo. Annual cargo volumes destined for Nunavut typically average 6,000 tonnes per year.¹⁸ There was a spike in 2007 and 2008, when Agnico-Eagle arranged for a large portion of the extra industrial cargo it needed to develop its Meadowbank gold mine near Baker Lake to be shipped through the

14 Manitoba Infrastructure and Transportation, “Churchill Gateway System—Briefing Note.”

15 Note: A “slow order” is a speed restriction placed at a specific location on a rail line that is lower than the track’s normal speed limit. It is set by the railway company, and depending on conditions, can be as low as 10 miles per hour. Source: Interview with Doug McNeil and John Spacek, Manitoba Infrastructure and Transportation.

16 E-mail from John Spacek, Manitoba Infrastructure and Transportation, September 7, 2011.

17 Hudson Bay Port Company, *1997–2010 Export Summary*.

18 Manitoba Infrastructure and Transportation, “Churchill Gateway System—Briefing Note.”

Port of Churchill. But a number of logistical challenges resulted in Agnico redirecting most of its cargo through the Port of Bécancour in Quebec after 2008.¹⁹

The volume of inbound freight to the Port of Churchill has also been minimal. A series of nitrogen fertilizer shipments were imported from Russia by the group Farmers of North America: one in 2007 and two in 2008, destined for farms in Western and Central Canada. However, these dried up when the price of U.S.-made fertilizer dropped, making overseas imports less cost-effective. The port has also received inbound shipments of copper concentrate destined for Flin Flon, Manitoba.²⁰

CHURCHILL GATEWAY DEVELOPMENT CORPORATION

In addition to the public-private partnership discussed earlier in this chapter, OmniTRAX, Western Economic Diversification Canada, and the Government of Manitoba have also partnered to create the Churchill Gateway Development Corporation. The mandate of this non-profit organization is to “market the port and achieve sustainability of the Gateway,” through the growth and diversification of freight traffic.²¹

The Churchill Gateway Development Corporation also provides a venue through which the provincial and federal governments can work with OmniTRAX to achieve common goals. The development corporation administers the public-private partnership funding allocated to Churchill’s port and the Bay Line. Its board of directors reviews funding requests for projects from the port’s owner, such as capital improvements or expanding the port’s infrastructure.²²

The board of directors is made up of key stakeholders in the Churchill Gateway System: OmniTRAX, a representative from the provincial government’s economic development branch, the mayor of Churchill, and others. The board’s chair is Lloyd Axworthy, who was the federal Foreign Affairs Minister and the regional minister for Manitoba when OmniTRAX acquired the port, and played a key role in facilitating the transaction.

Because of its strategic location as a Northern gateway, many stakeholders view Churchill as a port community with potential for growth.

In addition to the \$60 million allocated for rail repairs in 2007, the Churchill Gateway Development Corporation will administer \$8 million from the federal and provincial governments for capital improvements to the port. A number of projects are being considered for this funding, including installing bulk import facilities and upgrading freight stationing to improve the port’s ability to handle Nunavut resupply cargo.²³ The board of directors is also exploring the possibility of acquiring an ice-breaker tug to help expand the port’s shipping season.²⁴

GROWTH OPPORTUNITIES: SHORT TO MEDIUM TERM

Because of its strategic location as a Northern gateway to the Arctic and to international trade routes, many stakeholders view Churchill as a port community with potential for growth. The port was constructed as a grain terminal; therefore, diversifying and increasing its share of grain and seed exports is a major priority for the Churchill Gateway Development Corporation. The group is also hoping to capitalize on the “tremendous opportunities” associated with the growth in Nunavut’s demand for freight services.²⁵

19 Interviews with Dennis Engel, Gardewine Group Inc., and Larry Connell, Agnico-Eagle Mines Ltd.

20 Interview with Mike Ogborn, OmniTRAX, Inc.

21 Manitoba Infrastructure and Transportation, “Churchill Gateway System—Briefing Note.”

22 Interview with Doug McNeil and John Spacek, Manitoba Infrastructure and Transportation.

23 Manitoba Infrastructure and Transportation, “Churchill Gateway System—Briefing Note.”

24 Interview with Verna Flett and others, Churchill Town Council.

25 Interview with Mike Ogborn, OmniTRAX, Inc.

Western Economic Diversification Canada recently reported that, together with the Province of Manitoba, it was “looking to further develop the Port as a North American hub.” To help achieve this goal, the government agency partnered with the Manitoba government to provide Churchill Gateway Development Corporation with \$3 million over four years for marketing and port diversification activities.²⁶

WHEAT AND OTHER AGRICULTURAL EXPORTS

Despite efforts to upgrade and market the port, its prospects hinge on its ability to retain the freight traffic it currently has—that is, the grain exports the port handles on behalf of the Canadian Wheat Board. But, as mentioned above, the House of Commons has passed legislation to change the Wheat Board’s mandate, eliminating its marketing monopoly in Canada’s wheat and barley markets.

Agriculture and Agri-Food Canada has pledged up to \$9 million to help support the continuation of grain shipments over the next several years, and to “maintain the port over the transition period.”²⁷ But the long-term consequences of these changes are not clear. Although it is outside the scope of this report to define the impact of this change on Canada’s grain markets, or to determine the future of the Wheat Board as an organization, it is safe to say that this legislation introduces a considerable risk to the future of the port’s grain exports.

The House of Commons has passed legislation to change the Wheat Board’s mandate, eliminating its marketing monopoly in Canada’s wheat and barley markets.

This risk is directly related to the Port of Churchill’s long-standing partnership with the Canadian Wheat Board. The port handles Wheat Board grain exports that originate in the Churchill catchment area, which covers farming communities in central and Northern Saskatchewan and Manitoba. The Wheat Board states it is able to reduce its freight costs by using this route

instead of the port of Thunder Bay, because of the shorter rail distance and the avoidance of St. Lawrence Seaway charges.²⁸

The timing of Churchill’s shipping season, which ends at the beginning of November, requires the grain to be stored over the winter for export the following summer. Because of this, and to ensure grain can start moving through the port as soon as it opens, the Wheat Board created the Churchill Storage Program. It pays farmers a premium for their wheat plus storage fees as an incentive to store their own wheat until it is called to port.²⁹

However, it is unclear whether or not these arrangements will continue if the proposed changes to the Wheat Board are implemented. It would depend on numerous factors, such as the board’s future role as a wheat marketer, whether it will continue to be involved in transporting grain exports, and whether another organization could step in to somehow facilitate the continued flow of wheat shipments to the port from the Churchill catchment area.

For instance, the Hudson Bay Route Association is another organization dedicated to using the Port of Churchill as a grain exporting terminal for Prairie producers. The organization was formed in 1924 by Prairie farmers who wanted access to a regional grain port, and therefore lobbied provincial and federal governments to build the port and Bay Line. The association continues to actively promote the revitalization and greater use of the Port of Churchill, on behalf of the western Canadian grain producers who benefit from the port’s close proximity.³⁰

At the same time, the Churchill Gateway Development Corporation is hoping to diversify the range of agricultural products it handles. These include canola seeds, feed peas, and human-grade peas—a product that is fragile and easily damaged, and which the port successfully handled in 2010. The Churchill Gateway Development Corporation actively promotes the fact that it is closer in nautical miles to key Northern European ports than ports accessed via the St. Lawrence River, providing Churchill with a competitive advantage in terms of distance. (See Table 4.)

26 Greg, “Expanding Horizons for Canada’s Only Arctic Port.”

27 Agriculture and Agri-Food Canada, “The Port of Churchill.”

28 Canadian Wheat Board, *2009-10 Annual Report*, 41.

29 Ibid., 38.

30 Interview with Arnold Grambo, Hudson Bay Route Association.

Table 4

Distance to European Ports, Port of Churchill vs. Port of Thunder Bay
(nautical miles)

	Distance from Churchill	Distance from Thunder Bay	Savings in distance
Rotterdam	3,344	4,325	981
Murmansk	3,763	5,210	1,447
Liverpool	2,992	4,035	1,043
Oslo	3,370	5,368	1,998

Source: Churchill Gateway Development Corporation.

NUNAVUT RESUPPLY AND INDUSTRIAL CARGO

Another potential growth opportunity is Churchill's proximity to the Kivalliq region of Nunavut, which makes it an ideal gateway for Kivalliq-bound freight traffic originating in Western Canada. (See Exhibit 4.) The port already handles modest volumes of dry goods, fuel, and industrial cargo bound for communities along the Kivalliq coast.³¹ These include Rankin Inlet, Arviat, Whale Cove, and the inland community of Baker Lake, which is accessible by barge via Chesterfield Inlet.

Opportunities for the Port of Churchill to increase its share of freight traffic bound for Nunavut will multiply as Nunavut's economy continues to expand, driven by growth in resource development activity.

Most of Kivalliq's resupply is handled through ports in Quebec,³² in part because of strong business and institutional ties that have developed over the years between Nunavut and Quebec (discussed in detail later in this chapter). Yet Churchill is well positioned to handle a greater share of this resupply traffic. Its proximity to the Kivalliq means vessels destined for the region will

arrive much faster if they originate in Churchill than if they come via the St. Lawrence River, potentially arriving weeks earlier in the season.

Last-minute shipping requests—a common occurrence in the North—can also be accommodated later in the season if they are shipped via Churchill. This makes a significant difference for communities whose only other option is the much costlier option of airlift.

Moreover, it can be more efficient to use the Churchill corridor for freight originating in western regions of North America—a point that was repeated in many stakeholder interviews. But, as mentioned earlier, converting this potential efficiency into an advantage will require a number of logistical issues on the Churchill corridor to be addressed.

Opportunities for the Port of Churchill to increase its share of freight traffic bound for Nunavut will multiply as Nunavut's economy continues to expand, driven by growth in resource development activity. The Conference Board's latest economic forecast for the territories suggests mining exploration and activity will remain strong for the next few years, with two major projects already under way.³³ Perhaps as a sign of things to come, OmniTRAX recently formed a partnership with Nunavut Connections, a new, majority-owned Inuit company. Nunavut Connections will provide stevedoring services at the Port of Churchill and will actively pursue new opportunities to expand the volume of Nunavut-bound freight through the port.³⁴

Agnico-Eagle's Meadowbank mine, a \$700-million project north of Baker Lake that opened in 2010, is expected to produce 3.5 million ounces of gold over the next 10 years. This project alone brings in 2,000 shipping containers and 57 million litres of fuel to Baker Lake every year.³⁵ Agnico-Eagle is also planning to develop a second gold mine, Meliadine, near Rankin

31 Manitoba Infrastructure and Transportation, "Churchill Gateway System—Briefing Note."

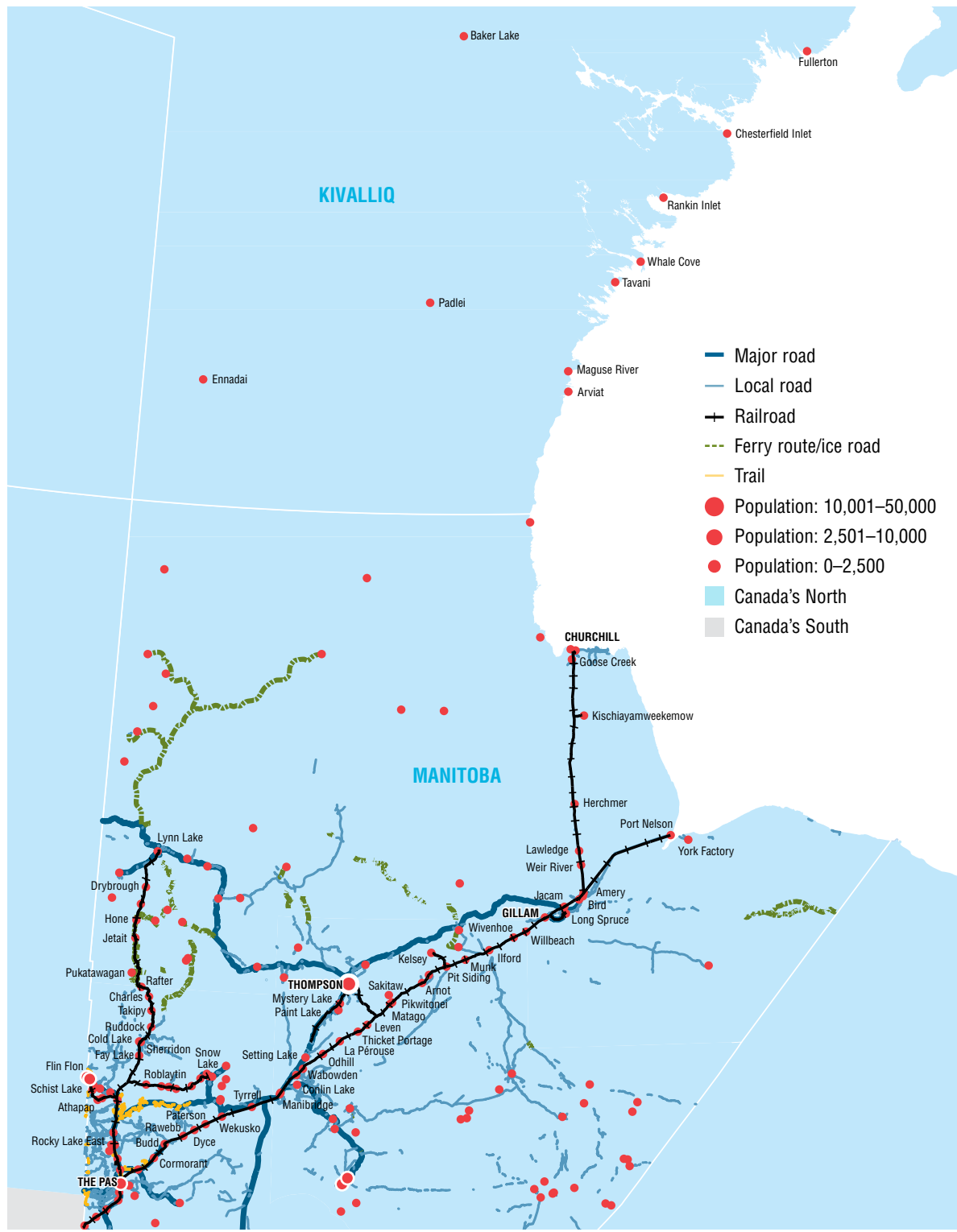
32 Government of Nunavut, Department of Government and Community Services, *Dry Cargo Resupply Activity Summary Shipping Year 2009*, 5.

33 The Conference Board of Canada, *Territorial Outlook: Economic Forecast*, 1–2.

34 OmniTRAX, Inc., "Nunavut Connections to Pursue Port, Fuel and Resupply Business."

35 Interview with Larry Connell, Agnico-Eagle Mines Ltd.

Exhibit 4
Northern Manitoba and the Kivalliq Region of Nunavut



Sources: Golder Associates; The Conference Board of Canada.

Inlet. The company expects to begin construction on the mine in 2014 and to commence operations two years after that.

In addition to these mines, numerous other mineral exploration projects are under way—including the \$4.1-billion Mary River iron ore project on Baffin Island—which are expected to significantly increase demand for freight traffic to the region.³⁶ OmniTRAX is also exploring potential opportunities to handle inbound industrial cargo destined for the Alberta oil sands.³⁷

GROWTH OPPORTUNITIES: MEDIUM TO LONG TERM

Climate change is causing changes to the sea ice in the Canadian Arctic, lengthening the period of time shipping lanes are navigable. If warming trends continue, climate models suggest that within the next 40 years, Arctic sea ice will disappear completely during the summer.³⁸ While these changes present numerous risks and challenges for Canada's North, they also open up the possibility of developing polar shipping lanes between North America, Asia, and Europe that are shorter and potentially more efficient than traditional marine routes.

A number of initiatives are under way that promote Churchill's strategic location and potentially significant role in the development of polar trade links between Canada and key international markets, including the Arctic Gateway Initiative, the Manitoba International Gateway Strategy, and CentrePort Canada.

ARCTIC GATEWAY INITIATIVE

The Churchill Gateway Development Corporation is leading the Arctic Gateway Initiative to develop the Port of Churchill as a federally recognized gateway for international trade and for trade between Manitoba and Nunavut. A key objective is to have the port designated as a gateway as the basis for the development of a strategic capital investment plan.³⁹

Manitoba and Nunavut signed a Memo of Understanding to collaborate on a range of initiatives, including the promotion of an Arctic gateway.

A summit was held at the University of Winnipeg in November 2010, co-hosted by the university and the Government of Manitoba, to discuss the opportunities and challenges associated with developing an Arctic gateway. Participants included trade delegations representing the Russian and Chinese governments, as well as a wide range of public and private sector stakeholders. One of the outcomes of the summit was the signing of a memorandum of understanding between the Manitoba and Nunavut governments to collaborate on a range of initiatives, including the promotion of an Arctic gateway.

MANITOBA INTERNATIONAL GATEWAY STRATEGY

The Manitoba International Gateway Strategy includes a series of initiatives by the Government of Manitoba to develop international trade flows through the province, with Winnipeg as a key transportation hub. (See Exhibit 5.) The overarching aim of the strategy is to “advance Manitoba's position as a sustainable transportation and distribution gateway of choice for North American mid-continent global commerce and international travel.” The development and growth of the Port of Churchill is a key element of this strategy.⁴⁰

36 Indian and Northern Affairs Canada, “Nunavut Mineral Exploration, Mining and Geoscience Overview 2010,” 38.

37 Cash, “Port of Churchill Eyed for Mega-Load Shipment.”

38 Environment Canada, “2010 Literature Review Archives—Climate Change Projections.”

39 Interview with Lloyd Axworthy, Chair of Churchill Gateway Development Corporation.

40 Manitoba Infrastructure and Transportation, “Churchill Gateway System—Briefing Note.”

Another key element of the strategy is the Arctic Bridge initiative. The Province of Manitoba has been in formal discussions with regional governments in Russia since 2002 to develop Arctic trade routes between Winnipeg and Krasnoyarsk by air, and between Churchill and Murmansk by sea. (See Exhibit 6.) Russia has committed to developing the Port of Murmansk to capitalize on emerging Arctic trade routes and opportunities, which are projected to expand over the medium and long term.⁴¹

CENTREPORT CANADA

CentrePort Canada Inc. is a non-profit corporation established in Winnipeg in 2008 to capitalize on the economic opportunities associated with the transportation and trade corridors that pass through the province. It is developing an “inland port” on a 20,000-acre site near the James A. Richardson International Airport, where transport, warehousing, and manufacturing companies can base themselves, creating a hub of intermodal transportation and warehousing services. One of the main features of CentrePort is its designation as Canada’s first foreign trade zone. This means that certain imported products received at the port for warehousing or other services may be exempt from customs duties and other taxes if they are ultimately destined for another country, such as the United States.⁴²

CentrePort is actively pursuing opportunities to develop its role as a North American hub for international supply chains, including the Arctic Bridge route identified in the provincial government’s Manitoba International Gateway Strategy. This includes polar air routes to destinations in Russia and China, as well as the marine route between Churchill and Murmansk. Even in the short to medium term, the Port of Churchill could potentially benefit from CentrePort’s function as an inland port. One of the opportunities CentrePort promotes is its strategic location as a staging area for resupply cargo bound for Northern Canada.

Exhibit 5
Manitoba International Gateway Strategy



Sources: Government of Manitoba; The Conference Board of Canada.

CONSTRAINTS TO GROWTH: CLIMATE AND INFRASTRUCTURE

Growth in traffic through the Port of Churchill has been constrained by numerous barriers and challenges through the years. Near the top of the list is the short shipping season, which typically lasts about 16 weeks in the late summer and fall, resulting in a short window of time that the port can be used. And although this window is

41 Manitoba Infrastructure and Transportation, “Churchill Gateway System—Briefing Note”; and additional briefing documents provided to Marta Bristow by Doug McNeil, Manitoba Infrastructure and Transportation.

42 CentrePort Canada Inc., “About CentrePort.”

Exhibit 6**Arctic Bridge Between Churchill and Murmansk**

Sources: Government of Manitoba; The Conference Board of Canada.

lengthening as the effects of climate change progress, other infrastructure issues remain, limiting the pace at which traffic can flow through the Churchill corridor.

Input from the key stakeholders interviewed for this project suggests that the greatest constraint to growth is the condition and reliability of the Bay Line. Unfortunately, the debilitating effects of melting permafrost are expected to worsen as climate change progresses. Interviewees were unanimous in their opinion that significant upgrades to the rail line would be required to substantially improve the speed and efficiency of traffic flows. However, these upgrades would involve a massive capital investment beyond the \$60 million recently allocated for rail repairs. Although there are engineering solutions for the problems presented by the melting permafrost, they would be very expensive to implement.

For the port and railway line to accommodate oversized cargo, another infrastructure constraint is the size of the bridges on the Bay Line. They were constructed to handle grain cars; therefore, many would need to be replaced to handle the greater width and height of oversized loads.⁴³

Moreover, the Bay Line is only a single-track railway, making two-way traffic very inefficient. There are sidings where trains can pull over if another oncoming train is approaching, but this can be time-consuming. Often, the passenger trains are forced to pull over to make way for freight trains, reducing the level of service that train passengers receive, especially while the port is in operation.⁴⁴

Many stakeholders point to the need to modernize the infrastructure already in place, which has not changed substantially since it was built in 1931.

Another constraint to growth is the infrastructure at the port itself. The facility was built as a grain terminal and is therefore set up to handle exports of bulk grain. Additional upgrades and equipment would be required for the port to expand its capacity for handling other types of freight and to attract inbound traffic.

One priority for OmniTRAX is to build a bulk-handling facility for higher volumes of cargo, such as larger shipments of imported fertilizer.⁴⁵ The port would also require a paved lay-down area on the wharf for transferring heavy equipment and large volumes of containers—the types of freight common to the resource development activity happening in Nunavut. OmniTRAX is also considering other upgrades, such as strengthening the foundation of the wharf to handle greater weights of cargo.

43 Interview with Doug McNeil and John Spacek, Manitoba Infrastructure and Transportation.

44 Ibid.

45 According to Mike Ogborn, OmniTRAX Inc., the fertilizer shipments imported from Russia in 2007 and 2008 arrived in bags, but larger volumes of this type of cargo would require bulk-handling facilities.

Still, many stakeholders point to the need to modernize the infrastructure already in place, which has not changed substantially since it was built in 1931. This outdated infrastructure constrains the port's ability to substantially increase the volume of grain it handles now.

Steve Ashton, Minister of Infrastructure and Transportation for the Government of Manitoba, acknowledged the deficiencies of the rail line and the port in a letter to John Stockwell of Umingmak Supply, a customer of the Churchill Gateway System. The letter stated that “this system has not been able to realize its full potential due to less than ideal infrastructure and an apparent lack of coordination among the service suppliers.” Minister Ashton went on to say that “the development of this system is a priority for our province as evidenced by many initiatives now underway,” such as the funding provided for port and rail upgrades and to support the Churchill Gateway Development Corporation.⁴⁶

CONSTRAINTS TO GROWTH: INSTITUTIONAL BARRIERS

The challenges facing the Port of Churchill in its efforts to increase traffic volumes are not limited to issues with the port and rail infrastructure. There are also institutional barriers that will need to be addressed.

The most significant issue is the port's close partnership with the Canadian Wheat Board. Although this partnership has been beneficial for both parties, it also comes with the inherent risks associated with the port relying on a single customer for the majority of its cargo business. If the Canadian Wheat Board ceases to be involved with the transportation of wheat, it is unclear whether the port would continue to receive the wheat shipments it currently handles—particularly if the logistics of wheat transportation are assumed by private grain companies, none of which own infrastructure in Churchill. In this scenario, it is possible the wheat currently flowing through the Port of Churchill would be rerouted to ports where the grain companies handling the wheat have established their own storage facilities.

This risk was documented in an economic impact analysis report conducted by Pricewaterhouse Coopers in 2005. The report stated that “it is questionable whether the POC [Port of Churchill] would remain viable in the absence of the CWB given that it is not owned by any grain companies. In normal practice, grain companies move more grain through port terminals they own in order to earn profits.”⁴⁷

The challenges facing the Port of Churchill in its efforts to increase traffic volumes are not limited to issues with the port and rail infrastructure.

Another major obstacle is the erosion of the Churchill corridor's reputation in the wake of service failures that have occurred in the supply chain along the Winnipeg–Churchill–Nunavut corridor. Other challenges include the need to build back-haul and two-way traffic through the port, difficulties in obtaining marine insurance extensions as the shipping season lengthens, and the need for greater coast guard support.

SUPPLY CHAIN LOGISTICS

Complications have emerged in recent years in developing and maintaining an efficient intermodal supply chain along the Winnipeg–Churchill–Nunavut corridor, especially since mining development has ramped up in Nunavut. A supply chain has come together along the corridor that primarily involves Gardewine trucking (although other trucking companies ship through Churchill), OmniTRAX, and Braden-Berry Expediting (BBE).

Nunavut-bound freight is generally shipped by truck to Thompson or The Pas, and then transported by rail the rest of the way to Churchill. Once it arrives at the Port of Churchill, it is loaded on to barges or other marine vessels for shipment to communities in eastern Nunavut.

46 Ashton, “Letter to John Stockwell, Umingmak Supply 2007 Ltd.”

47 Pricewaterhouse Coopers LLP, *Canadian Wheat Board—Economic Impact Analysis*, 45; and Keith, “Big Upside Seen for Viterro If Wheat Board Monopoly Broken.”

So far, the supply chain has mainly been coordinated by BBE, a subsidiary of NorTerra Inc., which is a holding company owned by two Aboriginal development corporations.⁴⁸ BBE is an expediting company that works closely with OmniTRAX to provide resupply services to Nunavut via the Port of Churchill. Gardewine has a major loading facility in Thompson, and is often hired to truck goods from Winnipeg to Thompson, and to load them onto the Hudson Bay Railway there. Gardewine also has infrastructure in place in Churchill for unloading freight. Harris Transport Ltd. is another major supply chain partner on the Churchill corridor, as part of an ongoing transportation service contract it has with the Government of Nunavut.⁴⁹

The two weakest links have been the rail service and the unreliability of marine shipping services between Churchill and the Kivalliq coast of Nunavut.

Freight bound for Churchill from Winnipeg is generally transported by truck as far as Thompson, because there is no direct rail line from Winnipeg to The Pas, the southern end of the Hudson Bay Railway. A CN feeder line provides passenger services between Winnipeg and The Pas, but the route is much longer, indirect and slow, swerving into eastern Saskatchewan for part of the way before swerving back into Manitoba just south of The Pas. It has therefore been more efficient to transport cargo directly by road to The Pas or Thompson.⁵⁰

According to the feedback received in stakeholder interviews, the two weakest links in this supply chain have been the slowness of rail service on the Hudson Bay Railway and the unreliability of shipping services between Churchill and the Kivalliq coast of Nunavut. Some stakeholders are of the opinion that OmniTRAX

could do more to provide a higher level of service on the rail line, despite the challenging operating conditions. There have also been difficulties in coordinating shipping schedules, partly because of some operational problems experienced by the shipping operator and partly because of delays on the rail line. At times, freight traffic has stalled at the port for days or even weeks—a serious problem made worse by the fact that the shipping season is so short.

OmniTRAX has stated that part of the challenge with this arrangement was that it did not control the marine shipping portion of the supply chain—it was using a company contracted by the Government of Nunavut, which arranges marine shipping services to the territory that all residents are able to access.⁵¹ However, a different marine shipping operator, Nunavut Sealink and Supply Inc., was secured for the 2011 shipping season. OmniTRAX is hopeful that this new partnership, combined with the upgrades that are under way on the rail line, will result in demonstrable improvements to the efficiency and reliability of the supply chain along the Winnipeg–Churchill–Nunavut corridor.

Still, the Port of Churchill has lost business in Nunavut over the years because of these difficulties, and overcoming the damage inflicted on the port's reputation will not be easy. For example, Agnico-Eagle encountered problems on this corridor when it tried to ship a significant volume of freight through the Port of Churchill to Baker Lake in 2007, shortly after it acquired the Meadowbank mining operation. The company had little time to prepare for the upcoming Arctic shipping season, and intended to transport as much as it could given the short notice. It attempted to move a significantly higher volume of resupply cargo through Churchill than the port was used to handling—more than four times the volume handled the previous year. Although most of the freight was moved successfully, some cargo did not move as quickly as expected, arriving in Churchill after shipping services ended for the season. Consequently, Agnico-Eagle was forced to airlift this cargo out of Churchill to Meadowbank at a considerably higher cost.

48 NorTerra Inc. is owned by Nunasi Corporation and Inuvialuit Development Corporation. Nunasi is a "birthright development company," formed to foster economic opportunities and distribute financial dividends among the Inuit beneficiaries of the Nunavut Land Claim. Inuvialuit Development Corporation has a similar mandate to serve the Inuvialuit people of the western Arctic.

49 Interview with Eitan Dehtiar, OmniTRAX Inc.

50 Ibid.

51 The Government of Nunavut provides this service to residents through the Dry Cargo Resupply Program.

Although the supply chain partners on the Churchill corridor have taken steps to address the logistical problems that have occurred, winning back the business they have lost in recent years is a daunting task. The Port of Churchill is already facing intense competition from the ports in Thunder Bay and in Quebec that are served by Class 1 railways and the extensive transportation infrastructure on the east-west trade corridor.

Assembling trucks at Bécancour allows Agnico-Eagle to avoid the extra labour costs associated with doing this type of work in Baker Lake.

These ports already have the equipment and infrastructure in place to handle the heavy-equipment cargo needs of mining companies like Agnico-Eagle. As one example, Agnico-Eagle finds it convenient and cost-effective to ship components of its mining trucks to the Port of Bécancour, and then have the trucks assembled at the port before they are loaded on the marine vessels bound for Nunavut. In fact, the company chose the Port of Bécancour over Montréal because there is more space available at Bécancour's lay-down area for handling freight. Assembling trucks at the port allows the company to avoid the extra labour costs associated with doing this type of work in Baker Lake.

Agnico-Eagle's exploration division is also based in Quebec, and is therefore inclined to use Quebec-based suppliers. For this reason, a natural supply chain out of that province has evolved for the company. A number of interviewees for this project—including Agnico-Eagle—mentioned that Quebec-based businesses and economic development organizations have aggressively pursued opportunities to provide resupply and industrial freight services for Nunavut. These efforts have been well received by Nunavut's public and private sectors, and have gone a long way to strengthen the supply chains running between Quebec and Nunavut.

Certainly, businesses in Winnipeg and other parts of the Prairies could similarly pursue business opportunities in Nunavut and capitalize on the economic growth potential emerging in Manitoba's Northern neighbour. The provincial government continues to participate in economic

initiatives to build trade between Manitoba and Nunavut, but stakeholder interviews suggest that, aside from a few champions, Manitoba's private sector has been slow to get on board. A major priority for the Churchill Gateway Development Corporation is to educate Manitobans about the significant business opportunities available in Nunavut.⁵² If trade between Manitoba and Nunavut increases, this will lead to consistent growth in freight traffic (as opposed to the sharp spike that occurred in 2007) and contribute to the development of a stronger supply chain on the Winnipeg–Churchill–Nunavut corridor over the long term.

Back-Haul and Two-Way Shipping

Another constraint for growth at the Port of Churchill has been the challenge of developing two-way shipping, particularly back-haul shipping—the movement of goods on the return leg of a two-way shipping route. An important factor in offering competitive shipping rates for cargo moving through the Port of Churchill is the ability to develop supply routes that not only move cargo to outbound destinations, but also bring inbound cargo into Manitoba. This allows shipping vessels to maximize their efficiency and offer more competitive rates for loads carried on each leg of the route.

The Port of Thunder Bay, located in Northern Ontario on the shores of Lake Superior, has recently been focusing its marketing efforts on building inbound cargo traffic to improve its competitive advantage.⁵³ Although its traditional source of traffic has been outbound grain and coal shipments, the port has received growing volumes of industrial cargo headed for various destinations in Western Canada. One example was a German shipment of wind turbine and windmill components bound for a wind farm in Alberta. Once unloaded, the vessel was reloaded with a shipment of flax exports for the return trip to Europe. Looking ahead, the port authority views development of Alberta's oil sands and of the extensive mineral reserves in the James Bay Lowlands area dubbed the "Ring of Fire" as potential opportunities for further growth in its inbound traffic.

⁵² Interviews with Mike Ogborn and Eitan Dehtiar, OmniTRAX, Inc.

⁵³ Ross, "Port of Thunder Bay Developing Two-Way Traffic."

MARINE OPERATIONS AND NAVIGATIONAL SUPPORT

The expansion of marine shipping operations at the Port of Churchill has been hampered by the difficulties vessels have encountered in obtaining marine insurance to dock at the port outside the shipping season, as defined by marine insurance companies. A number of stakeholders interviewed for this project stated that marine insurance policies are out of date, using ice data obtained decades ago, when the period during which the port was navigable was much shorter. Consequently, there are times when marine vessels cannot dock at the port because if they approach the port after the prescribed season has ended, obtaining insurance for docking is prohibitively expensive. If they do dock, the cost of insurance significantly increases the cost of transporting the load.

The Canadian Coast Guard operates only six ice-breaking vessels in the Arctic region between late June and early November.

The Churchill Gateway Development Corporation and the federal and provincial governments have approached the marine insurance industry to address this issue, according to Mike Ogborn, Managing Director of OmniTRAX. Although they were able to obtain a modest increase in the length of time during which vessels could obtain affordable marine insurance when docking at the port,⁵⁴ more progress in this area is needed.

Another issue frequently mentioned in interviews for this report was the level of navigational support provided at the port by the federal government. This includes ice-breaking services by the Canadian Coast Guard and navigational aids commonly found at other ports, such as buoys, radar beacons, and light-stations. The Port of Churchill falls under the Coast Guard's Central and Arctic region, which includes the three Prairie provinces, Ontario, Nunavut, and the Northwest Territories—more than two-thirds of Canada. Churchill must therefore compete with most of the Arctic, Northern Ontario, and the Great Lakes for navigational services.

⁵⁴ Interview with Mike Ogborn, OmniTRAX, Inc.

Given the Coast Guard's limited resources, it is not surprising Churchill receives a lower level of service than it would like. For example, the Coast Guard operates only six ice-breaking vessels in the Arctic region between late June and early November. These vessels perform a wide range of services that involve "assisting shipping, delivering cargo to some isolated communities, maintaining a sovereign presence and conducting essential science missions."⁵⁵

RISKS FOR CAPITAL INVESTMENT

Feedback received in stakeholder interviews suggests the Churchill Gateway System will require significant capital investments in infrastructure for the Port of Churchill to become a major commercial shipping hub. Although an influx of capital investment would boost commercial prospects for the port, there are a number of risks associated with this investment, for investors and other key stakeholders in the Churchill Gateway System.

The primary risk is the uncertain future of the Canadian Wheat Board, and the wheat it exports through the port. In the 2010 shipping season, Wheat Board exports made up over 90 per cent of the 658,948 tonnes of grains and seeds that flowed through the port, and the vast majority of overall freight. The loss of this wheat would be a massive financial blow to the port and the Hudson Bay Railway, and would severely weaken the port's prospects over the short to medium term.⁵⁶

Beyond this worst-case scenario, there are a number of secondary risks to investment in the Churchill Gateway System:

- ◆ **Operational and/or financial changes within OmniTRAX—**
Given that the key infrastructure in the Churchill Gateway System is owned by a private company, OmniTRAX Inc., the viability of the port and rail line are vulnerable to operational and/or financial issues that may arise in the company itself. This

⁵⁵ Canadian Coast Guard, "Questions and Answers on Icebreaking Operations."

⁵⁶ Interview with Mike Ogborn, OmniTRAX, Inc.

could include changes in operational priorities, changes in the company's mix of assets, financial problems, or bankruptcy.

- ♦ **Changes in government policies or priorities**—Public sector support of the Churchill Gateway System hinges on the level of priority it is given by the federal and provincial governments. Manitoba's current transportation policies explicitly recognize the economic and social value of this system. This provincial support is leveraged to marshal federal support through Western Economic Diversification Canada and forms the basis for the public-private partnership with OmniTRAX. However, policy priorities can change if there is a shift in the political landscape, something that could potentially affect the level of public support this system receives in the future.
- ♦ **Fluctuations in commodity demand or prices**—If export demand falls for grain, seeds, and other agricultural products, the flow of commercial freight through the Port of Churchill could drop. Similarly, freight demand is vulnerable to fluctuations in the price of imported products. A good example of this vulnerability is the port's experience with fertilizer imports, which dried up when the price of U.S.-made ammonium nitrate fell, reducing the incentive to import fertilizer from Russia.
- ♦ **A downturn in Nunavut's resource extraction industries**—The Conference Board of Canada's latest economic forecast for the territories suggests the outlook for mining and mineral exploration activity in Nunavut is very strong, with minimal downside risk to the forecast over the long term.⁵⁷ This is good news for the projected demand for commercial freight bound for Nunavut, and a boon for the Port of Churchill's prospects for increasing its volumes of resupply and industrial freight traffic. Still, mining industries in the North are vulnerable to global risks, such as economic slowdowns, changes in credit markets, and fluctuating mineral prices—any of which could cause a deceleration in mining and exploration activity in Nunavut, curtailing demand for commercial freight.

- ♦ **Developments in global trade patterns**—The expansion of the Panama Canal, expected to be finished in 2014, will allow the canal to handle larger, "New-Panamax" container vessels that can carry up to 13,000 TEU.⁵⁸ This expansion will create a shortcut for these massive vessels between Asia and the east coast of North America, and between Europe and the west coast of North America, potentially affecting global trade flows.⁵⁹ Combined with the unpredictability of Arctic sea ice conditions, this could undermine the impetus for developing the Northwest Passage as a viable shipping route in the future, according to a briefing by the Parliamentary Information and Research Service.⁶⁰
- ♦ **Anticipating and adapting to the effects of climate change**—Churchill's location on the coast of Hudson Bay and at the edge of continuous permafrost terrain leaves the community and its infrastructure vulnerable to numerous potential effects of climate change over the long term. These include possible changes in sea levels, increases in shoreline erosion and sediment, and the degradation of the permafrost underlying the community, among other potential impacts. The Bay Line is also vulnerable to further changes in permafrost patterns along the railway. The ability of key stakeholders to anticipate and adapt to the impacts of climate change will have a direct bearing on the long-term prospects for the port and rail system.

PROPOSED MANITOBA–NUNAVUT HIGHWAY

A potential game changer for the Port of Churchill's prospects is the proposed construction of an all-weather road connecting Rankin Inlet, Nunavut, to Manitoba's highway system. This gravel road would link Churchill to Manitoba's highway network and provide the community with year-round road access.

57 The Conference Board of Canada, *Territorial Outlook: Economic Forecast*, 4.

58 "Rickmers Christens Four Containerships."

59 United States Department of Agriculture, "Impact of Panama Canal Expansion on the U.S. Intermodal Transportation System." Note: A recent study by the Van Horne Institute, *Factors Impacting North American Freight Distribution in View of the Panama Canal Expansion*, presents an alternative view of the expansion's potential impacts.

60 Christopher and Fast, "The Arctic: Transportation, Infrastructure and Communication."

The Nunavut–Manitoba Route Selection Project Working Group released a preferred route option in 2007, based on feedback received from community consultations and a technical analysis of the terrain.⁶¹ A memo of understanding signed in November 2010 by the premiers of Nunavut and Manitoba states the two governments will “continue exploring the potential for an all-weather road between Manitoba and Nunavut, including conducting initial stakeholder consultations on a cost-benefit study.”⁶²

Developing this road is a priority for the Nunavut government. *Northern Connections*, a joint transportation infrastructure report by the Yukon, Northwest Territories, and Nunavut governments, cites the development of a road corridor between Nunavut and Manitoba as a requirement for economic development in the region—in particular, to access the region’s considerable resource wealth and to develop hydroelectric opportunities—and to reduce the cost of living in nearby communities.⁶³ The road is also cited as an action item in the Nunavut government’s transportation development strategy.⁶⁴

The working group, funded by the federal, Nunavut, and Manitoba governments, chose a route that would begin just outside Gillam, Manitoba, run 1,100 km north to the Kivalliq region of Nunavut, and end in Rankin Inlet. Although the main route would not run through Churchill, the town would be connected to the road system by a 110-km spur.

Determining the most feasible route for this road was a challenge, according to the findings of the route selection study. The biggest obstacles were a lack of construction material for roadfill in Nunavut, the combination of discontinuous and continuous permafrost along the route, the boggy terrain in Northern

Manitoba, and the many lakes and rivers along the way. The process of selecting a route also involved considerations about natural habitat, such as protected lands and parks, caribou calving grounds, and bird sanctuaries.⁶⁵

The rationale for selecting the preferred route was based on four main points: it was deemed to be the shortest, safest, and most reliable route with the lowest maintenance costs; it received “strong” community support; its shorter length will have less of an environmental impact; and it offers “the greatest potential for early implementation” to address trade, security, and sovereignty needs.⁶⁶

The road would include more than 60 bridges and structures built to the highest standards set by the Transportation Association of Canada.

The cost of constructing the highway has been estimated at \$1.2 billion (in 2007 \$). This includes more than 60 bridges and structures built to the highest standards set by the Transportation Association of Canada, to reduce the road’s vulnerability to spring flooding and washouts.⁶⁷ The initial cost-benefit analysis for the road has not yet been publicly released, but the findings were favourable, according to the provincial government.⁶⁸

THE CASE FOR INFRASTRUCTURE INVESTMENT

Looking ahead, it is clear that there are opportunities for the community of Churchill to increase its role as a shipping hub in Northern Canada. However, this will require substantial investments in transportation

61 Nunavut–Manitoba Route Selection Project Working Group, *Review: Nunavut–Manitoba Route Selection, Issue Three, Volume One*.

62 Governments of Manitoba and Nunavut, “Memo of Understanding Between the Province of Manitoba and the Territory of Nunavut.”

63 Government of Yukon, *Northern Connections: A Multi-Modal Transportation Blueprint for the North*, 13.

64 Department of Economic Development and Transportation, *Ingirrasiliqta (Let’s Get Moving)*, 22.

65 Nunavut–Manitoba Route Selection Project Working Group, *Review: Nunavut–Manitoba Route Selection, Issue Two, Volume One*.

66 Ibid.

67 Interview with Doug McNeil and John Spacek, Manitoba Infrastructure and Transportation; and Nunatsiqa News, “Premiers Revive the Manitoba–Nunavut Road Project.”

68 Interview with Doug McNeil and John Spacek, Manitoba Infrastructure and Transportation.

infrastructure in and around the community, as well as a consolidated effort among public and private stakeholders in the Churchill Gateway System. It will also necessitate a careful analysis and sound management of the significant risks associated with such an investment. Most—but not all—stakeholders asserted that the most logical approach was to make incremental investments that would facilitate modest and manageable growth moving forward.

Churchill is also emblematic of the “company towns” that are prevalent in the North, which rely heavily on a dominant company for employment or other reasons.

This assumes, of course, that the Port of Churchill will not lose a substantial volume of the grain exports it currently handles, as a result of changes with the Canadian Wheat Board. If it does, it is unknown at this time how the port’s owner, OmniTRAX, would respond to this loss.

It is also important to acknowledge the impacts of transportation access on the economic and social well-being of remote communities such as Churchill and those served by the Hudson Bay Railway. Community impacts are discussed in Chapter 4.

A broader perspective of the Churchill case study evokes other issues relating to transportation infrastructure development in the North. A major issue is the question of infrastructure investment requirements. Infrastructure in the North often requires substantial funding for ongoing operating and maintenance costs throughout its lifetime. This makes it even more important to carefully examine the project’s full life-cycle costs. In some cases, where governments are considering subsidizing these services on an ongoing basis, the full life-cycle costs of a given project may actually tip the balance in favour of alternative investments that could reduce the ongoing financial burden, while serving a broader number of communities.

Churchill is also emblematic of the “company towns” that are prevalent in the North. These communities rely heavily on a dominant company for employment or other reasons. In the case of Churchill, OmniTRAX is a major employer, but potential changes to the mandate of the Canadian Wheat Board, its primary customer for the port and rail line, have generated substantial uncertainty about the company’s future operations in Churchill. Communities, businesses, and all levels of government must be aware of the risks associated with such dependence and must plan in advance for the possibility of a negative turn of events.

CHAPTER 4

Community Impacts and Responses

Chapter Summary

- ♦ A closer look at the community impacts of infrastructure development in Churchill highlights the socio-economic considerations of addressing infrastructure development in other Northern communities.
- ♦ As in other Northern communities, employment in Churchill is focused in a few main areas: the port, tourism, and health care.
- ♦ Concerns expressed by local stakeholders in the Churchill Gateway System and proposed Manitoba–Nunavut road project reveal the importance of acknowledging and responding proactively to community impacts of transportation infrastructure development.

Any decision about infrastructure investment in the North must take into account the impacts of transportation access on the economic and social well-being of remote communities. Just as the closer look in Chapter 3 at the opportunities and challenges for infrastructure development in Churchill shed light on opportunities and challenges for other Northern communities, a closer look at the community aspects of development in Churchill—and other communities

in Northern Manitoba—highlights the community considerations of addressing infrastructure requirements in the North more generally.

COMMUNITY OVERVIEW

The residents of Churchill are in many ways the primary stakeholders in the Churchill Gateway System. They rely heavily on the rail line for passenger and freight services, and are strongly invested in the success of the port as a major employer in the community.

Churchill's history as a port community dates back to 1930, when the federal government built the port primarily as a sea terminal for wheat exports originating in the region. However, in its early years, it also handled other exports, such as honey, lumber, and livestock. In the 1950s and 1960s, it also handled a wide range of imported products, such as automobiles, industrial machinery, and transmission towers.

For more than 60 years, the port was owned and operated by Ports Canada, a Crown corporation, until it was purchased by OmniTRAX. But by the time OmniTRAX assumed ownership, the port had fallen into significant disrepair. The state of the port had declined to the point where, from year to year, the community was uncertain about whether or not the port would open for the summer.

In addition to its role as a port community, Churchill also served as a strategic military base for the Canadian and U.S. governments for about 40 years during and after the Second World War. The base was established in 1942, but military operations declined during the 1960s and 1970s, disappearing completely by the mid-1980s. A positive legacy of this military presence is the impressive infrastructure left behind, including the airport and the research facilities now used by the Churchill Northern Studies Centre.

The decreasing population in Churchill results in difficulty maintaining the town's infrastructure due to declining revenues.

Since the withdrawal of the federal government's military presence, the community's population has been declining. Between 1996 and 2006, the town's population decreased 15 per cent, from 1,089 to 923. And, while the overall population is shrinking, the proportion of Aboriginal residents is expanding. In 2006, Cree, Inuit, Dene, and Métis residents made up 56 per cent of the town's population, up from 48 per cent in 1996.¹

One implication of the community's decreasing population is the difficulty of maintaining the town's infrastructure, built when the population was much larger, while the community's revenues are decreasing.² Overall, community leaders are looking for ways to reverse this trend, so that the community may begin growing again.

COMMUNITY EMPLOYMENT PROSPECTS

As in other Northern communities, employment opportunities in Churchill are focused in a few main areas. The three main employers in Churchill are the Hudson Bay Port Company, the tourism industry, and the Churchill Regional Health Authority. The health authority is the largest, with more than 100 staff.³ However, not all staff are permanent residents of Churchill; for instance,

three full-time physicians share on-call duties, and their services are supplemented by medical staff who travel back and forth from Winnipeg.⁴

The port employs about 90 workers from May to November, but then drops down to a skeleton staff of about 4 during the off-season. The town's tourism industry provides hundreds of local jobs, but most of these are short-term positions during the six to eight weeks spanning the peak polar bear-watching season.

Similar to many Northern communities, Churchill's unemployment rate is high. The 2006 Census placed it at 14.5 per cent, well above the provincial average of 5.5 per cent. But many of the community's employment opportunities are seasonal. Furthermore, the community's labour force participation rate is very high, at 80.1 per cent—much higher than the overall participation rate for the province of 67.3 per cent.⁵

Tourism is the industry for which Churchill is most widely known. The town has established itself as the "Polar Bear Capital of the World," a reputation it reinforces every fall when thousands of domestic and international tourists flock to the town to see polar bears. By all accounts, the town is so famous for this tourism experience that local businesses receive employment enquiries from all over the world, making it relatively easy for tourism businesses to attract temporary, short-term workers during polar bear season. Many local residents also take advantage of the abundance of employment opportunities during polar bear season, often taking two or three short-term jobs at a time.

But by the end of November, tourism in Churchill dies down, and it stays relatively low during most of the year. The town's tourism industry is taking steps to build interest in other wilderness tourism opportunities, such as bird-watching and beluga whale-watching in the summer and northern lights viewing in the winter. As with polar bear viewing, the community is well positioned to provide these other tourism experiences. Churchill is on a major migratory flyway for birds and is close to

1 Statistics Canada, "2006 Aboriginal Population Profile."

2 Interview with Verna Flett and others, Churchill Town Council.

3 Churchill Regional Health Authority Inc., *Community Health Assessment 2009*, 2–8.

4 Churchill Regional Health Authority, "Welcome to the Churchill Regional Health Authority, Inc."

5 Manitoba Bureau of Statistics, *2006 Census Profile: Churchill*.

the nesting grounds of some rare bird species. In addition, thousands of whales travel into the Churchill River in July and August to raise their young in the river's warmer waters. The town is also in a region that receives a high concentration of Northern lights events.⁶

Aside from tourism jobs, the port employs about 90 staff each year to cover the shipping season. Staff are hired in May to conduct pre-season preparations, and they work full time until the first week of November. About three-quarters of these workers are local residents, and the rest are hired from outside the community. Similar to the town's tourism industry, the port has little difficulty staffing positions; the work is lucrative and, for the most part, does not require special skills.⁷ The port's general manager noted that a significant factor in the port's success is the high number of local residents working at the port. Staff tend to be strongly invested in the port's success, because it is directly tied to the town's success.

A core function of the Churchill Northern Studies Centre is to host and support scientific researchers travelling to the North to conduct their research.

The Churchill Northern Studies Centre is another organization contributing to the town's economic activity. This non-profit research institute, located 23 km east of Churchill, offers research and education programs focused on Northern ecological issues. One of its core functions is to host and support scientific researchers travelling to the North to conduct their research. In 2009–10, the centre hosted 150 researchers working on 29 different projects. It also offers learning vacations for tourists.

The centre is on a former rocket range, and many of its facilities are vestiges of the region's past military presence. The Canadian military decommissioned its base in Churchill long ago, but many of the town's residents would like to see the military return. Several residents

interviewed for this project mentioned the town has been actively courting the Department of Defence, promoting Churchill's strategic location as a port community on the doorstep of the Arctic—a location that could potentially give Churchill a role in federal Arctic sovereignty activities. The military currently uses Churchill as a base from which to conduct cold weather training, but no longer maintains a permanent posting there. Some residents believe a permanent military presence would raise the federal government's interest in the community.

The Canadian military currently uses Churchill as a base from which to conduct cold weather training, but no longer maintains a permanent posting there.

Some interpreted Prime Minister Stephen Harper's visit to the community in August 2010 as a signal of the federal government's interest in developing Churchill's role in Canada's Arctic sovereignty and security. Harper's brief stop was part of a five-day trip to Northern Canada to promote the federal government's Northern policy priorities, the most prominent being "the protection of and promotion of Canadian sovereignty."⁸ While in Churchill, Harper announced \$13.4 million in funding for upgrades to the Churchill Airport. But so far, a more substantial defence or military role for Churchill has not materialized.

Still, residents view the port as offering the best prospects for growth in the community. This was an opinion put forward in a number of stakeholder interviews for this project, and was also a view that emerged in a recent community development project that focused on Churchill's growth prospects.

SUSTAINABLE CHURCHILL INITIATIVE

In 2008, local residents and other key stakeholders in the development of the Port of Churchill embarked on a community development project called the Sustainable Churchill Initiative. The project emerged from a recognition that plans for growth required a sustainable approach involving social, environmental, and economic

6 Churchill Regional Health Authority Inc., *Community Health Assessment 2009*, 2–6.

7 Interview with Shane Hutchins, Hudson Bay Port Company.

8 "Churchill Airport Gets \$13.4 Million for Improvements."

priorities. The project involved extensive consultations with residents to identify key areas of concern, which led to the creation of a development framework for pursuing solutions.

A primary goal of the project was to explore ways to develop the community in order to provide the highest quality of life possible for its residents over the long term, while protecting the environment and promoting social equality.⁹

The project focused on priority areas such as food security; economic development; youth education, training, and recreation; waste management; and housing. Transportation infrastructure was a major theme, in particular for food security and economic development. In fact, in the initial community consultations for the project, “investing in transportation infrastructure” was identified as the top economic priority among residents.¹⁰

A project interim report noted that “given the town’s remote location, transportation issues touch almost every aspect of the town’s social and economic life.”¹¹ For instance, food security is a primary consideration, as Churchill residents rely on the railway to provide the most affordable access to groceries. On occasion, interruptions in rail service have led to food shortages in the community’s single grocery store. Even when grocery shipments are running smoothly, the cost of freight pushes up grocery prices significantly.

According to a 2009 community health assessment report, the price of a “nutritious food basket” in Churchill was about \$224, compared with \$180 in Winnipeg. Moreover, the quality and availability of fresh and nutritious groceries in Churchill is sometimes compromised by long transit times. This decreases residents’ consumption of nutritious food and contributes to negative community health outcomes.¹²



Northern Store in Churchill, Manitoba
Source: The Conference Board of Canada.

Community consultations for the Sustainable Churchill Initiative revealed a number of other concerns among residents related to transportation infrastructure and access. The high costs of travelling to and from Churchill and of transporting groceries and other freight to the community were frequently cited. The absence of competition in shipping freight to the community was cited as a contributing factor to high shipping costs. Residents were also concerned about the state of the port and rail infrastructure, expressing some frustrations over operational problems with the Hudson Bay Railway (as discussed earlier), and the hope for upgrades to the port that would facilitate growth in its freight business.

Similar concerns emerged in the interviews conducted for this project. During the interviews, some residents expressed frustration with the fact that the town itself has no control over the operation of the port, even though it plays a dominant role in the town’s economy.

A common theme that emerged during interviews was the question of whether or not the American owner of the port and rail line was sufficiently invested in the success of these assets, compared with what was at stake for the community as a whole if port and/or rail operations failed. Some suggested OmniTRAX was not investing enough into the maintenance of port and rail infrastructure, preventing the Churchill Gateway System from living up to its potential. Some viewed

9 Interview with Jino Distasio, Institute of Urban Studies.

10 Institute of Urban Studies, *Sustainable Churchill Interim Report*, 12.

11 Ibid., 27.

12 Churchill Regional Health Authority Inc., *Community Health Assessment 2009*, 3–42.

this as affecting not only the passenger and freight services that are so important to the community but also the port's—and by extension, the community's—long-term growth prospects.

INFRASTRUCTURE DEVELOPMENT AND COMMUNITY RESPONSES

Given the Port of Churchill's role as a key employer in the community, residents are, by and large, enthusiastic about the potential opportunities emerging from developing the port and increasing its freight business. Many residents believe it would strengthen the local economy, attract new business to the area, and expand the local labour market. They also view the town's viability as inextricably tied to the port's success.

One issue to address is the perception among Aboriginal members of the community that, despite their majority status in the town, they are not sufficiently involved in plans for the community's future.

When asked about the potentially negative impacts of development, such as the community's ability to keep up with the demands of infrastructure growth, few residents had concerns. For example, in a discussion with Churchill's Town Council, council members were confident that an expansion of the port's operations would help the community attract new residents to fill the additional jobs that growth would generate. Because the port and local tourism businesses have been relatively successful in finding staff when needed, they were not concerned about the port's ability to recruit additional staff in the future. Moreover, council members said the town's infrastructure was currently underutilized, and could easily accommodate an influx of additional workers, as the town's infrastructure had been built up several decades earlier when the town's population was significantly larger.

That being said, feedback from other residents suggested the town was facing some challenges with aging infrastructure that required extensive repairs or upgrades. Community housing and the town's water and sewage systems were two areas mentioned specifically. A large rise in the town's population could intensify the pressure on this infrastructure, exacerbating existing challenges.

It is also possible that the expansion of the port's infrastructure could limit tourism. Churchill Mayor Michael Spence, himself the owner of a local tourism business, indicated that if the port required more land, it could displace some local tourism operations. However, he noted that the effects of climate change were a far greater threat to the community's tourism industry, particularly for polar bear viewing. Warming temperatures are causing delays in the freeze-up of Hudson Bay, postponing the time when polar bears gather on the shore to wait for the ice to form. Mayor Spence noted that the peak period for polar bear viewing starts two to three weeks later than it did 20 years ago and doesn't last as long.¹³

Another issue that needs to be addressed is the perception among Aboriginal members of the community that, despite their majority status in the town, they are not sufficiently involved in plans for the community's future. This was a point that emerged in the community consultations conducted for the Sustainable Churchill project. Community elders were approached to elicit the input of Aboriginal, Inuit, and Dene community members. The findings revealed a need to increase the engagement of Aboriginal residents in community affairs.¹⁴

At the root of this issue is an unfortunate history of discrimination in the community. On the surface, it appears to have subsided; but in previous generations, it pushed Aboriginal, Dene, and Inuit residents to withdraw from the community, because they did not feel they belonged. Consequently, Aboriginal youth in the

13 Interview with Michael Spence, Mayor of Churchill.

14 Institute of Urban Studies, *Sustainable Churchill Interim Report*, 16.

community are growing up feeling disconnected from their culture and apathetic about their futures. The report notes that “Aboriginal leaders would like to see more participation and a return to a stronger sense of cultural identity and political structures.”¹⁵ Moving forward, it is very important for Churchill’s Aboriginal residents to have a voice in any development plans for the town.

MANITOBA–NUNAVUT HIGHWAY

In contrast to the strong consensus among residents about the positive impacts of expanding the port, residents appeared to be divided about the potential benefits of road access via the proposed Manitoba–Nunavut Highway. According to the latest available information about the road, the highway would not pass through the town of Churchill, but it would be linked to the community through a short spur off the main route. Some were optimistic about the economic benefits, but others were concerned about the crime and security issues that would accompany the road, as well as potential changes to the community’s culture.

Some residents view road access as a crucial step in becoming a key player in CentrePort’s trade initiatives.

Most residents acknowledged the economic benefits of having road access to their community. They view it as improving the port’s growth prospects, because it would provide an alternative mode of transportation access, and therefore foster competition for goods being shipped to the port. This may or may not affect the volume of freight shipped to Nunavut via Churchill (which could instead be trucked directly to Nunavut year-round), but it could contribute to the port’s future prospects for participating in international Arctic trade. Some residents view road access as a crucial step in becoming a key player in CentrePort’s trade initiatives, as the road would provide access to the port that is more competitive and more efficient than the rail line.

But even while acknowledging the potential benefits of road access, many residents expressed concerns about the resulting changes in the community’s dynamic. The most prominent concern was the increase in criminal activity that could follow. Some noted that the community’s remote location and the high cost of travelling there were effective barriers against the spread of drug and gang activity in the region.

Even while acknowledging the potential benefits of road access, many residents expressed concerns about the resulting changes in the community’s dynamic.

Some were also concerned about changes to Churchill’s remote status that could affect income tax deductions and other financial benefits offered to residents of remote Northern communities. For instance, Canada Revenue Agency allows Canadians in remote Northern communities to claim Northern Residents Deductions. The extent of the benefit depends on whether the community is assigned full remote status or partial remote status.¹⁶

Mayor Michael Spence and other town council members believe it will be important to address the concerns of residents by communicating the benefits of road access and emphasizing the positive impacts of increased transportation access. Mayor Spence summed it up by stating “we are a close-knit community, isolated, and that’s great. But, who are we to deny our grandchildren the opportunities that would come along with road access and redevelopment? Especially when a road is needed for the port to succeed.”¹⁷

An extensive series of public consultations conducted in Northern Manitoba and Nunavut by project developers in 2007 indicate strong support for the road among the

15 Institute of Urban Studies, *Sustainable Churchill Interim Report*, 17.

16 Canada Revenue Agency, “Line 255—Do You Qualify for the Northern Residents Deductions?”

17 Interviews with Michael Spence, Mayor of Churchill, and Verna Flett and others, Churchill Town Council.

communities along the proposed route. In fact, public support appeared to have strengthened considerably since the first set of consultations conducted a year earlier. The findings indicated that the communities in the Kivalliq region of Nunavut were “eager to have the road constructed soon,” and that Manitoba First Nations communities “had come to recognize the benefits of a new road and would adapt to the associated changes.”¹⁸

However, a representative from Manitoba Keewatinowi Okimakanak (MKO), an advocacy group representing 30 First Nations communities in Northern Manitoba, said support of the chosen route was not as widespread as the above findings suggest.¹⁹ The organization argues that the eastern route selected, which runs from Gillam straight north to Nunavut, bypasses nearly all of the First Nations communities in Northern Manitoba. Of the four potential routes proposed, the group strongly advocated for the selection of the northwestern route, which would have connected many of these communities.²⁰

Ultimately, Manitoba Keewatinowi Okimakanak wants to make sure the First Nations it represents benefit from the economic opportunities that arise from access to a road network. The organization believes that regional opportunities for growth would emerge from better transportation connections between communities, and to communities in Nunavut. The road project itself could offer significant opportunities for local communities, such as training, employment, and the ability to provide services related to the construction project. The Manitoba government responded to the organization’s concerns by saying that development plans for the Manitoba–Nunavut Highway were still at an early stage, and that community consultations would continue throughout the planning process.

The East Side Transportation Initiative is an example of a Manitoba government road project that has recently entered the construction phase of development, and has

involved an extensive public engagement process. The project entails the creation of an all-season road network connecting 13 isolated First Nations communities on the east side of Lake Winnipeg. The project authority was given a mandate by the Government of Manitoba to implement the initiative in a way that would create economic opportunities for local residents. The project team was instructed to visit every community within the planning area to obtain input on the consultation process, and to address local concerns.²¹

All community groups affected by development projects need to be given a voice in development plans early on.

About 35 per cent of the project’s budget has been allocated to providing jobs, training, and other economic opportunities to local residents through community benefit agreements. In addition, there are local hiring, training, and procurement requirements for construction tenders. The local hiring requirement is set at 30 per cent for road work and 20 per cent for bridge work.²²

The concerns expressed by local stakeholders in the Churchill Gateway System and proposed Manitoba–Nunavut road project reveal the importance of acknowledging and responding proactively to community impacts of transportation infrastructure development. As discussed in Chapter 2, transportation access, or the lack thereof, has significant implications for community economic development and well-being. It is important that all community groups affected by development projects, including Aboriginal people, be given a voice in development plans early on, as well as opportunities to participate in project works.

Furthermore, increasing the participation of community members in local development projects improves the economic benefits of such projects and enhances the human resource capacity in the North. This point is discussed in greater detail in Chapter 5.

18 Nunavut–Manitoba Route Selection Project Working Group, *Review: Nunavut–Manitoba Route Selection, Issue Three, Volume One*.

19 Interview with Kevin Carlson, Manitoba Keewatinowi Okimakanak Inc.

20 As discussed in Chapter 3, the rationale for selecting the eastern route was based on its shorter length and lower construction and maintenance costs.

21 Briefing document provided by John Spacek, Manitoba Infrastructure and Transportation, September 16, 2011.

22 Manitoba East Side Road Authority, “2011 Summer Newsletter—Issue 3.”

CHAPTER 5

Addressing Transportation Infrastructure Requirements in the North

Chapter Summary

- ◆ Benefit-cost analysis for transportation infrastructure investments in the North must capture a full range of economic and social benefits that are unique to Northern communities.
- ◆ Public-private partnerships can be an effective way to fund transportation infrastructure, but their risks must be properly managed.
- ◆ Governments and private sector companies should ensure that Northern communities—Aboriginal and non-Aboriginal—continue to have a say in how decisions are made and how wealth derived from economic development is distributed.
- ◆ Mitigating and adapting to the effects of climate change require substantial upfront investments but will be less expensive over the long run.
- ◆ The challenges of supply chain logistics are magnified in remote Northern communities, where operating conditions can often be extreme, and where there are few options for transportation suppliers.

Clearly, the transportation infrastructure gap in Canada's North must be addressed. What's not so clear is the best approach for addressing this gap. In many cases, transportation infrastructure investments in the North are for projects that do not stand on their own economically, yet are vital for economic and community development. Benefit-cost analysis for these projects must capture a full range of economic and social benefits that are unique to Northern communities.

However, public resources are stretched to the limit, and demands for infrastructure investment will require inventive solutions. This is true for Canada overall, but in the North, the challenge is exacerbated by the lower usership and higher costs of building transportation infrastructure in remote locations and in extreme climates. Public-private partnerships, such as the one established in Churchill between OmniTRAX and the federal and provincial governments, can be one effective approach. But, as discussed later in this chapter, the risks of these partnerships must be properly managed.

Economic development in Northern communities is often associated with just a few or even single industries. Development projects therefore face severe challenges in surviving or prospering if that industry winds down—for example, if a mining project ends. Infrastructure that is not economically viable on its own, based on direct revenues, is at risk of becoming a white elephant.

Situations where communities are company towns require a recognition of the inherent risks of stranded infrastructure. With mining, for example, the price of a particular commodity may be high right now, but investing in fixed infrastructure assumes the commodity will be lucrative far into the future. If fortunes change, the community will assume the responsibility for assets requiring ongoing maintenance and reinvestment at public expense, intensifying the problem of limited financial resources already spread thinly across the North. These issues require careful attention and long-term planning to ensure community well-being.

Given the current federal government's focus on Arctic sovereignty, and the political stability accompanying a majority government, now is a good time to give greater attention to the transportation infrastructure needs of Northern Canada. Indeed, in its June 2011 budget, the federal government allocated \$150 million to build an all-weather road between Inuvik and Tuktoyaktuk, in order to connect the Dempster Highway—which now runs from Dawson City, Yukon, to Inuvik, N.W.T.—all the way to the Arctic coast.

KEY ISSUES FOR TRANSPORTATION INFRASTRUCTURE DEVELOPMENT

A number of key issues emerged in the case study of Churchill that are relevant for policy discussions about infrastructure development across the North. These include the implications of public-private partnerships, differing interests among key stakeholders, community impacts of development, mitigating and adapting to the effects of climate change, managing supply chains, and the possible contribution of alternative transportation options.

PUBLIC-PRIVATE PARTNERSHIPS AND CONFLICTING STAKEHOLDER INTERESTS

The monumental cost of providing transportation infrastructure can be spread out among multiple stakeholders, including all three levels of government and the private sector. In the case of Churchill, a public-private partnership has formed between Western Economic Diversification (a federal government agency), the Province of Manitoba,

and OmniTRAX to rehabilitate the port and railway system. The partnership has allowed these stakeholders to pool their resources to carry out badly needed repairs, in order to meet common objectives.

Yet conflicting objectives among stakeholders was a theme that emerged frequently in the interviews conducted for this report. Conflicts were mainly related to the reality that the port and rail system is owned privately, yet the infrastructure plays a key role in the provision of transportation access to Churchill and other remote communities in the region served by the Hudson Bay Railway. There appeared to be a lack of alignment between the long-term visions presented by key stakeholders. This may have implications for the ability of all partners to work together on an ongoing basis, particularly if one or more partners perceives that its own objectives are not being served.

Conflicting objectives among stakeholders was a theme that emerged frequently in the interviews conducted for this report.

Stakeholders have argued that, as a private company, OmniTRAX's priority is to ensure its asset contributes to its short-term profitability—a priority that influences decisions about capital reinvestment, maintenance, and operational expenditures, etc. However, a substantial improvement in the reliability of the rail line and the potential expansion of the port's role in Nunavut resupply and Arctic trade routes would require significant capital investments that would not likely see a return for many, many years—perhaps decades.

At the same time, the provincial government is concerned with maintaining and potentially expanding the capacity of this infrastructure for long-term objectives, such as facilitating trade between Manitoba and Nunavut and capitalizing on international polar trade opportunities. The province has a long-term vision for the port as a provincial transportation asset and an Arctic gateway—a vision that does not necessarily intersect with OmniTRAX's vision. Differences exist between the private owner and the government about the future of the rail line and

port, but ultimately, the provincial government's role in determining a long-term vision for this infrastructure is limited because the infrastructure is privately owned.

Meanwhile, Churchill's community leaders have their own vision for developing the port. They believe the town is missing out on opportunities right now (e.g., Nunavut resupply and a partnership with CentrePort) because of insufficient investments in the port and rail infrastructure. Some have questioned OmniTRAX's broader commitment to this asset—only one of its many assets located throughout North America—and to the community itself, given that the town relies so heavily on the port and related service suppliers for jobs.

In a true financial partnership, all partners should share the risks associated with the capital investment provided for development.

Although the federal government has committed financial support to enhance port and rail operations, proposed changes to the Canadian Wheat Board's mandate pose a significant risk to the commercial prospects of the Port of Churchill and the Hudson Bay Railway. This is a stark example of the vulnerability of company towns. In these cases, public and private stakeholders must be prepared for the potential turmoil caused by operational changes in the community's dominant employer.¹

Another question that emerges in the discussion of public-private partnership is who bears the risk. In a true financial partnership, all partners should share the risks associated with the capital investment provided for development. A case where this has not happened

is the Deh Cho Bridge project, near Fort Providence, Northwest Territories. The project began as a public-private partnership between the territorial government and the Deh Cho Bridge Co., a private company formed by the Fort Providence Combined Council Alliance, made up of First Nations and Métis stakeholders. With a budget of \$182 million, it is the largest public infrastructure project ever undertaken in the territory.²

However, a report by the Office of the Auditor General of Canada revealed that financing obtained by the private company for the project was underwritten by the Government of the Northwest Territories. This returned all financial risk back to the territorial government. When the company defaulted on its loan in February 2010, the territory was forced to assume the debt. Since then, the territory has taken full responsibility for the project, managing it through its Department of Transportation. Not surprisingly, the Auditor General's report found that the territorial government had not adequately managed its financial risk in the project. Moreover, it emphasized that the relationship between the territorial government and the Deh Cho Bridge Co. was not a true public-private partnership.

COMMUNITY IMPACTS OF INFRASTRUCTURE DEVELOPMENT

Another pervasive theme of this report is the community development imperative associated with the expansion of transportation systems in the North and the infrastructure development this will require. Communities receive significant benefits from enhanced transportation access, and for the most part, community members recognize the contribution of improved transportation infrastructure to their quality of life.

In Churchill, local residents and other key stakeholders responded proactively to the needs of the community by collaborating on the Sustainable Churchill Initiative, a community development project. The initiative emerged from a recognition that plans for growth require a sustainable approach involving social, environmental, and

¹ A previous Conference Board study, *From Earth to Berth: Improving the Efficiency of Canada's Grain Supply Chain*, examined the efficiency of the Western Canadian grain handling and transportation system. The study found that the transportation of Canadian Wheat Board grain is less efficient than transporting non-CWB grains, mainly because CWB grain moves through the system more slowly. While a change in the CWB's mandate could adversely affect the Hudson Bay Port and the Hudson Bay Railway, the study suggests the change may help reduce the system's overall costs and increase its efficiency.

² Office of the Auditor General of Canada, *Northwest Territories Deh Cho Bridge Project—Department of Transportation*.

economic priorities. The project identified key areas of concern for residents and developed a framework for implementing solutions.

But major infrastructure projects can also provoke deep anxiety among community members, and these concerns must also be considered. For example, many Churchill residents recognize the economic benefits of connecting the community to the South via the proposed Manitoba–Nunavut Highway. Yet at the same time, they grapple with concerns about the social impacts of road access, including increases in criminal activity and changes to the community’s unique culture.

Road access has allowed Cree communities in the James Bay region to make significant progress in developing economic opportunities.

The Cree communities in the James Bay region faced similar experiences with the development of the James Bay hydroelectric project in the 1970s. The project involved the construction of a 620-km road stretching from Matagami to Radisson in northwestern Quebec. Although the main route runs 100 km inland from the coast, the project included the construction of a series of access roads connecting to numerous communities along the coast of James Bay.

According to William Macleod, President of Cree Construction and Development Company, there were significant concerns among these communities about the negative impacts associated with road access.³ Public consultations were conducted by the chief and council members in each community, allowing all residents to voice their concerns. Like the residents of Churchill, members of the James Bay communities acknowledged the substantial economic benefits of developing road access, but were also concerned about an influx of crime, drug use, and alcohol smuggling.

Now that the access roads have been built, it is true that communities have been forced to deal with some negative social impacts, including those noted above. In addition, increased road access in the region has resulted in some land-use conflicts between local Cree hunters and fishers—who have exclusive right to hunt and fish in the region under the James Bay Northern Quebec Agreement—and tourists who come into the region to hunt and fish.

Yet at the same time, road access has allowed the Cree people to make significant progress in developing economic opportunities in their region. For example, Macleod’s company, Cree Construction and Development, is fully owned by Cree Regional Economic Enterprises Co., a holding company established as part of the James Bay Northern Quebec Agreement. Cree Construction and Development worked extensively on the James Bay road project and provides maintenance services for these roads. Other local companies have also been formed to provide infrastructure maintenance services in the region.

Significant progress has also been made in developing and upgrading infrastructure within local communities, such as housing and water and sewage systems. These development projects were made much more affordable by the ability to bring in building materials by road.

Cree Construction and Development Company is using its expertise in this area to help First Nations communities in other parts of the country build their capacity to participate more fully in major development projects. Christian Sinclair, the company’s Director of Development, Marketing, and Promotion, is working with the Tataskweyak Cree Nation in Northern Manitoba.⁴ His role is to advise them in strengthening their capacity to participate in Manitoba Hydro’s Keeyask Generating Station project near their community. The main objective is to maximize the community’s opportunities for employment and training on the project. Cree Construction and

3 Interview with William MacLeod, Cree Construction and Development Company Ltd.

4 Interview with Christian Sinclair, Cree Construction and Development Company Ltd.

Development is also planning to work with First Nations communities in Northern Ontario involved with the development of mining projects.

As discussed in Chapter 4, another good example of community engagement can be found in the Government of Manitoba's East Side Transportation Initiative, an all-season road project in a remote region east of Lake Winnipeg. The provincial government has entered into community benefit agreements with 13 First Nations communities, to provide local residents with access to jobs, training, and other economic development opportunities related to the project. Construction tenders for the project are required to meet local hiring and procurement obligations.

A report by the Arctic Council points to significant concerns among Arctic residents about the growth of marine shipping activities in the North, including cultural, social, and environmental impacts.

In general, governments and private sector companies should ensure that Northern communities—Aboriginal and non-Aboriginal—continue to have a say in how decisions are made and how wealth derived from economic development is distributed. Community consultations are most effective when they are frequent, inclusive, and participatory. First Nations communities should apply the levers they negotiated when agreements were made to use their lands as transportation corridors. In this way, productive gains can be made on all sides.

ADAPTING TO THE EFFECTS OF CLIMATE CHANGE, AND OTHER ENVIRONMENTAL ISSUES

As permafrost temperatures continue to rise, exacerbating the instability of terrain in more and more areas of Northern regions, the challenge of building and maintaining infrastructure will continue to intensify. The hazards of thawing permafrost have been made all too clear in the case of the Hudson Bay Railway. When the ground thaws, it heaves, creating undulations in the rail, and as a result, rail cars must often travel very slowly. This severely impacts the level of passenger and freight service the rail line can provide. Heaving in the ground

also makes the rail line difficult and expensive to maintain. Engineering solutions to counteract these effects are expensive.⁵

At the same time, higher temperatures are causing greater sections of the Arctic sea ice to melt in the summer, something that may open up opportunities for increased marine shipping. This could have positive economic impacts for some Northern coastal communities, including Churchill.

However, a report by the Arctic Council points to significant concerns among Arctic residents about the growth of marine shipping activities in the North, including cultural, social, and environmental impacts.⁶ A particular concern is the threat of oil spills and other toxic discharges and disruptions to the ecosystem affecting hunting and fishing activities. And, given the limited infrastructure in place in the North to accommodate marine transport, additional infrastructure would be required. There are concerns that this infrastructure development could have implications for the fragile ecosystems of Northern coastal regions.

Meanwhile, climate change could have the opposite effect on freshwater transport on Northern river and lake systems. Freshwater levels are declining, making it increasingly difficult to navigate rivers by barge, especially in low-lake and low-flow periods.⁷ This is becoming a significant problem for barge-based supply routes that rely on river and lake access, such as those that follow the Mackenzie and Yukon rivers.

As the problem worsens, communities may have to increase their use of all-weather and seasonal roads for resupply. Yet, as discussed in Chapter 2, the effects of climate change are also posing significant challenges for permanent road systems throughout Northern Canada.

5 Interview with Doug McNeil and John Spacek, Manitoba Infrastructure and Transportation.

6 Arctic Council, Protection of the Arctic Marine Environment Working Group, *Arctic Marine Shipping Assessment 2009 Report: Executive Summary With Recommendations*.

7 Lemmen and others, *From Impacts to Adaptation: Canada in a Changing Climate 2007*, 85.

Over the long term, the cumulative effects of climate change will result in greater and greater hindrances to accessing remote areas of the North. A recent study by the University of California, Los Angeles, quantified the impact of climate on Northern transportation systems. The findings suggest milder winters and higher snowfalls will severely reduce inland access in the coming decades, mainly because of the reduced viability of winter roads. The study projects that in the next 50 years, Canada will see a 13 per cent reduction—nearly 400,000 square miles—in the land area suitable for winter roads.⁸

This trend could have severe implications for the remote communities and the resource industries that must otherwise rely on airlift for freight transportation. It could even eliminate the economic viability of some resource extraction projects, including some of the diamond mines in remote areas of the Northwest Territories.

According to Rio Tinto, the owner of the Diavik Diamond Mine, the road is essential for the economic resupply—and viability—of its mining operation.

For example, the operating season of the Tibbitt–Contwoyto road—the longest winter road in the Northwest Territories—is projected to shorten by 17 per cent between 2008 and 2020.⁹ This 600-km ice road is privately constructed as a joint venture between Diavik Diamond Mines Inc., BHP Billiton Diamonds Inc., and De Beers Canada Inc. It stretches from Yellowknife, northeast through the Northwest Territories to the Northern tip of Contwoyto Lake in Nunavut, to service a series of mines. For the past 25 years, it has been open for about 10 weeks.¹⁰ According to Rio Tinto, the owner of the Diavik Diamond Mine, the road is essential for the economic resupply of its mining operation. If the road did

not exist, the mine would be economically unviable.¹¹ A reduction in the road's viability could have severe consequences for the mining projects it serves.

Moving forward, the design and construction of infrastructure in the North will require special attention to the ongoing and long-term effects of climate change. As discussed in Chapter 2, infrastructure planners must either incorporate these measures into the design and operation of a project or understand the risks of not doing so.

Existing transportation infrastructure in the North may require modifications and upgrades to improve its resilience against the effects of climate change.

For example, Manitoba has taken these issues into account in the planned design of the proposed Manitoba–Nunavut Highway. The selected route runs through areas of continuous and discontinuous permafrost; therefore, the road will be gravel, rather than paved, to reduce its vulnerability to the effects of thawing and freezing. The terrain will also require numerous bridges and stream crossings to reduce flooding and washouts from spring runoff. The proposed budget includes the cost of constructing these structures at the highest possible rating, to ensure their long-term viability.

Existing transportation infrastructure in the North may require modifications and upgrades to improve its resilience against the effects of climate change. This could involve modifying the design, location, or use of infrastructure, or the use of a range of technological solutions to minimize the impact of climate change. A number of emerging technologies can be used to stabilize permafrost terrain, including heat-extraction devices to keep ground frozen and ground-penetrating radar to monitor sub-surface temperatures.¹²

8 Stephenson, Smith, and Agnew, "Divergent Long-Term Trajectories of Human Access to the Arctic."

9 Ibid. Note: The journal article cites D. Haley and S. Proskin of Laval University as the source of this projection.

10 Rio Tinto, *Diavik Diamond Mine Fact Book*.

11 Smith, *The World in 2050: Four Forces Shaping Civilization's Northern Future*, 68.

12 Transportation Association of Canada, *Primer on Developing and Managing Transportation Infrastructure in Permafrost Regions*, 7.

Mitigating and adapting to the effects of climate change require substantial upfront investments. But evidence suggests that over the long term, a proactive response is less expensive than dealing with infrastructure damage after the fact.¹³ A University of Alaska study estimated the expected impact of climate change would increase Alaska's public infrastructure costs between 10 and 20 per cent from now until 2080. However, proactive adaptive measures could reduce those cost increases by up to 45 per cent.

As well, a Natural Resources Canada study suggested that adapting vulnerable buildings in the Northwest Territories to the effects of permafrost degradation would cost the government up to 70 per cent less than the non-adaptation scenario. Still, the proactive approach would be expensive: the study estimated the cost of proactively adapting vulnerable buildings would be at least \$230 million.

CHALLENGES WITH MANAGING SUPPLY CHAINS IN REMOTE AREAS

For new transportation infrastructure to be used effectively, efficient and reliable passenger and/or freight transportation services must be provided. Such services are also a key aspect of maximizing the capacity of infrastructure already in place.

For freight services, this usually involves developing intermodal supply chains between shipping companies—supply chains that are subject to problems and failures at the best of times. However, the challenges of supply chain logistics are magnified in remote Northern communities, where operating conditions can often be extreme, and where there are few options for transportation suppliers.

The risk of supply chain failures becomes much more acute in these situations, and such failures can have severe consequences for remote communities that depend on these services for their basic needs. It can also hurt commercial prospects. In the Port of Churchill's case,

various supply chain failures in recent years have eroded the port's reputation. As a result, much of the Northern resupply business it could have secured has been lost to other ports (mainly Montréal and other ports in Quebec).

Canadian National Railway reported that in recent years, it has become much more proactive in building better, more efficient supply chain partnerships and in addressing supply chain issues.¹⁴ CN holds regular meetings with supply chain partners (i.e., other shippers and terminal operators) to collaborate on supply chain processes and identify opportunities for improvements.

By collaborating on operation reviews and performance targets, and by adjusting operational practices, the partnership achieved a dramatic improvement in productivity.

For example, CN partnered with Ridley Terminals Inc. in Prince Rupert to optimize connections between coal mines, rail transport, the terminal, and export shipping lines. By collaborating on operation reviews and performance targets, and by adjusting operational practices, the partnership achieved a dramatic improvement in productivity. As a result, the volume of coal exports through the terminal grew to record highs in 2010.

POTENTIAL CONTRIBUTION OF AIRSHIPS

The prospect of alternative technologies such as airships is an intriguing possibility for the North. Like fixed infrastructure, airships would require significant upfront investment. But unlike fixed infrastructure, investments in airships would not need to be permanently tied to a single community. Airships could serve multiple communities while reducing the risk of stranded capital assets.

Today, airships are commonly thought of as an old, obsolete technology. However, that perception may change after the launch of Northrop Grumman's long-endurance multi-intelligence vehicle (LEMV). Three

13 The citation for these two studies were found in National Round Table on the Environment and the Economy, *True North: Adapting Infrastructure to Climate Change in Northern Canada*, 78.

14 Interview with Brad Bodner, CN Rail.

of these vehicles will be supplied to the U.S. Army primarily for surveillance purposes. The first is on track to be delivered by the end of 2011.¹⁵

These hybrid airships, which combine lighter-than-air technologies (buoyant gases) and heavier-than-air technologies (fixed-wing aircraft), are designed to carry a payload of over one tonne at nearly 10,000 metres, while staying continuously airborne for over three weeks. At this capacity, their use for Northern resupply would be negligible. However, trade-offs can be made between range, altitude, and capacity. Cargo applications would not require the same type of endurance and would not need to fly at those high altitudes.

An airship would be faster, more fuel efficient, and able to land virtually anywhere.

Barry Prentice, a professor of supply chain management at the University of Manitoba, argues there are no technological barriers to building freight airships able to carry a payload of 20 tonnes or higher.¹⁶ This payload is in the same range as a single tractor-trailer truck, but an airship would be faster, more fuel efficient, and able to land virtually anywhere, removing the need for expensive road construction and maintenance.

In fact, airships may be operating in the North as early as 2014. Discovery Air Innovations Inc., a subsidiary of a Yellowknife aviation company, has signed a tentative agreement with Hybrid Air Vehicles Ltd. (HAV) to procure a fleet of airships to be used in the North. HAV is the same company manufacturing the LEMVs for Northrop Grumman. The companies are expecting to

finalize the agreement in 2012, with the first delivery of airships targeted for 2014. The aircraft will be designed to transfer loads onto multiple surfaces, including water, ice, snow, and land, and will be capable of carrying up to 50 tonnes of cargo.¹⁷

A paper for the 5th Annual Airship Convention and Exhibition in 2004 compared the economics of airships for Northern resupply with the conventional modes of air and truck. It found that operating costs for a hybrid airship with a 30-tonne payload, including passengers and freight, would be competitive with conventional modes. Without passenger services, the operating costs of an airship with a freight-only payload of 150 tonnes would also be competitive.¹⁸ Moreover, this analysis did not include the full public infrastructure costs required for air and truck transport. Nor did it include the inventory cost savings achieved by a vehicle that could operate year-round. Communities served by seasonal roads must receive supplies for the whole year during a small window of time. This results in inventory carrying costs that are greater than the carrying costs of smaller, more frequent deliveries. For the retailer North West Company, for example, annual carrying costs for diesel fuel alone are an estimated \$80,000.¹⁹

There is significant potential for the widespread commercial application of airships, particularly for resource extraction industries. And, given that federal, provincial, and territorial governments are committed to supporting Northern resupply activities, there may be opportunities for public-private partnerships to help finance infrastructure capital and maintenance costs.

15 Peniston, "Northrop: LEMV on Track for 1st Flight This Year."

16 Janssen, "Flying Flatbeds."

17 Discovery Air, Inc., "Discovery Air Innovations Announces Agreement With Hybrid Air Vehicles to Launch a Commercial Heavy Lift Air Vehicle Program."

18 Prentice and Thompson, *Economics of Airships for Northern Re-supply*.

19 Ibid., 4.

CHAPTER 6

Conclusion and Policy Recommendations

Chapter Summary

- ♦ The North's vast distances and harsh climate make transportation links costly to build and maintain. But these links are essential for health and education services, and for enabling economic growth.
- ♦ Investment decisions must consider the full range of social and economic benefits and full life-cycle costs—including the impact of climate change.
- ♦ Assessments of project proposals must address potential impacts on individuals and communities, and competing public and private interests.
- ♦ Governments must lead in developing transportation policy—but there is a clear opportunity for the greater use of well-managed public-private partnerships.
- ♦ An overall transportation strategy for Canada's North must deal with diverse regional and community needs, including more all-season roads; railway investment to maximize the potential of the Port of Churchill for import and export traffic; improved sea-lift capacity to serve coastal and island communities; and new transportation technologies, such as hybrid airships.

Both the costs and benefits of investment in transportation infrastructure in the North must be measured by different standards than in Canada's more densely populated Southern regions.

Building better connections to and between remote Northern communities is costly because of the long distances and extreme weather. The Northern climate also adds to the ongoing costs of operating and maintaining infrastructure, while the low population density and low shared use of the infrastructure leads to even higher measures of cost per resident. Economic projects like mines with finite lives and subject to highly variable market conditions may also lead to stranded infrastructure investments.

But transportation access to Northern communities is vital for providing basic needs, such as food and other goods, and facilitating public services including health care and education. It also plays a critical role in enabling greater economic growth and encouraging labour mobility. The existence or absence of adequate transportation infrastructure may be decisive in investment decisions for private investment, especially for the large, capital-intensive and export-oriented projects in the natural resource sector that will be central to the North's economic future.

The costs and benefits of building new transportation connections to remote communities have social as well as economic dimensions. The loss of existing seasonal

roads in the North due to climate change may undermine traditional links and activities. Building new connections to the South can bring negative impacts, such as increased criminal activity, and positive ones, such as new investment and jobs.

In these conditions, investment in transportation infrastructure requires active collaboration among governments, businesses, and communities. Both in investing in new projects and in maintaining and encouraging better use of existing infrastructure, planners and policy-makers should consider the following recommendations.

Assess the full value created by infrastructure as well as its life-cycle costs.

Major investments in infrastructure last a long time, but their extended benefits come with continuing as well as initial costs. When assessing new or competing proposals, decision-makers must consider the full life-cycle costs, including design, construction, environmental and regulatory approvals, maintenance, rehabilitation, and eventual abandonment. This life-cycle analysis also must take into consideration long-term risks, ranging from the pluses and minuses of climate change to competitive developments such as expansion of the Panama Canal and the volatility of global commodity markets.

Further research could address issues such as public and private sector roles and responsibilities.

At the same time, decision-makers must recognize the full range of benefits that may flow from investment in transportation infrastructure. This goes well beyond the obvious measures of resulting private sector investment and job creation. Better transportation links between communities may lead to reduced costs for the provision of public services such as health care and education, as well as access to more choice and lower prices for consumers.

Further research could be done to develop a framework for the quantitative analysis of the costs and benefits of developing transportation infrastructure that are specific to Northern communities. Research could also address

issues such as public and private sector roles and responsibilities in the development and ongoing maintenance of transportation infrastructure.

Future research also needs to take into account the different modes of transportation, their implementation and operation costs, and their functionality for Northern residents. Alternative transportation options, such as airships, are being considered and are making headway.

Recognize and address conflicting public, business, community, and individual interests.

Developing effective public policy often requires balancing competing public, business, community, and individual interests. This challenge is especially evident in decisions about transportation infrastructure in the North.

Mainline Southern carriers that add spokes to serve larger Northern communities bring new competition and perhaps lower fares on those routes, but this could come at a cost to Northern carriers.

For example, in air services, one company's hub is another one's spoke. Mainline Southern carriers that add spokes to serve larger Northern communities bring new competition and perhaps lower fares on those routes. However, this can amount to skimming the cream off the most lucrative routes for Northern carriers and may undermine their ability to serve the broad web of smaller communities across the North from these hubs. Similarly, while abolishing the Canadian Wheat Board's exclusive role in wheat sales may offer more flexibility to farmers, it could affect the economic viability of the Port of Churchill.

Conflicts can also arise when multiple stakeholders have competing visions for infrastructure development. The case study of Churchill presents an example of where a potential lack of alignment in long-term objectives among stakeholders could have implications for the ongoing operation and future development of the port and rail line.

Take measures to adapt to the effects of climate change.

Warming temperatures are a consequence of climate change that has introduced both opportunities and threats for transportation infrastructure in the North. Melting Arctic sea ice may lead to the development of polar trade routes, which could expand economic opportunities for some Northern coastal communities. But at the same time, the negative impacts of climate change are creating havoc for existing Northern transportation systems—particularly those that are vulnerable to the effects of degrading permafrost—and are exacerbating the challenge of building and maintaining infrastructure in the North.

Infrastructure development must also include a full examination of the potential benefits and possible negative impacts for local residents.

To be sustainable over the long term, new transportation infrastructure must include measures in its design, construction, and operation to mitigate and adapt to the potential impacts of climate change. This includes measures to increase the infrastructure's resilience to extreme weather, higher volumes of precipitation, flooding, washouts, rising frequencies of freeze-thaw cycles in the winter, and higher temperatures in the summer. In permafrost regions, infrastructure projects must also take into account the increasing instability of permafrost terrain.

Existing infrastructure must be analyzed to determine its vulnerability to the potential effects of climate change and whether modifications or upgrades are required. A recent report by the National Round Table on the Economy and the Environment suggests there is a need to improve the availability of climate data and other information necessary to make these site-specific decisions. It also

notes that at a broader level, there is a need to strengthen the capacity of Northern communities to effectively respond to the impacts of climate change and to manage risks.¹

Finally, governments must work with industry to ensure that the consequences and the costs of climate change are reflected in public policy and business practices. For instance, governments should ensure that ice data are updated and shared with the insurance industry so that the availability and cost of marine insurance in the North reflects the lengthening shipping season and reduced ice risk as a result of climate change.

Ensure community residents are prepared for the impacts of development.

Infrastructure development must also include a full examination of the potential benefits and possible negative impacts for local residents. Questions that should be investigated include:

- ♦ Will the community be able to keep up with the demands of infrastructure growth, such as the increased demand for labour?
- ♦ How can the economic and social benefits of development for residents be maximized?
- ♦ How will a change in transportation access affect local cultures, traditions, and lifestyles?

The involvement of local Cree communities in the development of the James Bay road project and the approach taken with the Sustainable Churchill Initiative are two examples where impacts of development on the community were carefully considered and integrated into project plans. Clear efforts were made to maximize the economic and social benefits for community members and to address concerns about the negative impacts of development on local cultures and lifestyles.

¹ National Round Table on the Environment and the Economy, *True North: Adapting Infrastructure to Climate Change in Northern Canada*, 112.

Frequent and inclusive communication between project planners and community members is an important element of effective community engagement. It ensures that the interests of all parties remain aligned and that decision-making processes remain transparent and accessible.

As many transportation infrastructure development projects occur on or through Aboriginal lands, it is important to directly engage Aboriginal communities in development projects, to provide them with opportunities to achieve their economic and social objectives. This could include using the local labour force in construction activities, to help expand local employment and training opportunities. If labour is brought in from outside the region, this opportunity is lost. Manitoba's East Side Transportation Initiative is a good example of an infrastructure project with an effective strategy for engaging Aboriginal communities and generating economic opportunities for local residents.

Consider traditional and alternative financial arrangements, including public-private partnerships, but ensure risks are managed properly.

Public and private interests can potentially both be served by transportation infrastructure projects—particularly in the North, where lower population densities and minimal shared use of infrastructure reduce economies of scale. There may be an opportunity for more public-private partnerships in Northern projects, such as the one created to finance the rehabilitation of the Hudson Bay Railway in Northern Manitoba.

However, as was made clear by the difficulties encountered with the Deh Cho Bridge project in the Northwest Territories, the risks of such partnerships must be managed properly. If the full risk of financing falls on the public sector partner, there could be severe consequences for government resources if the partnership fails.

In 2008, the federal government created PPP Canada, a Crown corporation with a mandate to encourage the greater use of P3 arrangements in public infrastructure projects. It offers financial support to eligible projects in a broad range of categories, including transportation,

through its \$1.2-billion P3 Canada Fund. In addition, British Columbia, Quebec, and Ontario have established provincial agencies to support the development of P3 arrangements. In the future, there may be an opportunity for these organizations to play a role in Northern transportation infrastructure development.²

Build and maintain efficient and reliable supply chain partnerships.

Building efficient and reliable supply chains to provide transportation services is an important aspect of the effective use of transportation infrastructure, especially in remote communities that rely on these services for basic needs. They reduce the possibility of service failures and play a key role in maximizing infrastructure capacity.

Successful supply chains are built on strong relationships between partners. Relationships can be fostered through frequent communication, and by ensuring each partner is aware of its role in the supply chain process. Then, when problems arise, partners are in a much better position to resolve them quickly and effectively, before severe disruptions to the supply chain occur.

Overall, addressing the North's infrastructure needs will require a concerted effort involving the public and private sectors. The public sector should take the lead in these efforts by developing a sustained and coordinated transportation strategy that responds to North's social, economic, and environmental circumstances. Key elements of this strategy include developing more all-season roads, such as the proposed route between Nunavut and Manitoba; railway investment to maximize the potential of the Port of Churchill for both import and export traffic; improving sea-lift capacity to serve coastal and island communities; and investigating new transportation technologies, such as hybrid airships. Furthermore, the development of this strategy must engage businesses, communities, and individuals, and take into account the many ways in which transportation infrastructure affects them all.

2 For more information about public-private partnerships in Canada, see Mario Iacobacci, *Dispelling the Myths: A Pan-Canadian Assessment of Public-Private Partnerships for Infrastructure Investments*.

APPENDIX A

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APPENDIX B

List of Interviews

IN PERSON:

Lloyd Axworthy

President, University of Winnipeg; and
Chair of the Board, Churchill Gateway
Development Corp.

Dennis Engel

Vice-President, Gardewine West, Gardewine Group Inc.

Verna Flett, Jennifer Massan, and Gerald Azure

Churchill Town Council Members

Albert Meijering

Chief Administration Officer, Town of Churchill

Michael Goodyear

Executive Director, Churchill Northern Studies
Centre; and Chair, Local Steering Committee for
the Sustainable Churchill Project

Merv Gunter

Chief Executive Officer, Frontiers North Adventures;
and President, Destination Churchill

Shane Hutchins

General Manager, Hudson Bay Port Company

Doug McNeil

Deputy Minister, Transportation Policy Division,
Manitoba Infrastructure and Transportation

John Spacek

Assistant Deputy Minister, Transportation Policy
Division, Manitoba Infrastructure and Transportation

Rose Preteau

President, Churchill Chamber of Commerce

John Stockwell

Acting General Manager, Umingmak Supply

BY TELEPHONE:

Brad Bodner

Director, Network Strategies, CN Rail

Kevin Carlson

Housing, Capital & Transportation Advisor,
Manitoba Keewatinowi Okimakanak Inc.

Larry Connell

Corporate Director of Sustainable Development,
Agnico-Eagle Mines Ltd.

Eitan Dehtiar

Director, Energy and Commodities Marketing,
OmniTRAX Canada Inc.

Jino Distasio

Director, Institute of Urban Studies

Todd Frederickson

Regional Director, Coordination and Policy,
Transport Canada

Arnold Grambo

Past President, Hudson Bay Route Association

Diane Gray

Chief Executive Officer, CentrePort Canada Inc.

William MacLeod

President, Cree Construction and Development
Company Ltd.

Mike Ogborn

Managing Director, OmniTRAX, Inc.; and President,
Churchill Gateway Development Corporation

Barry Prentice

Professor of Supply Chain Management, I.H. Asper
School of Business, University of Manitoba

Christian Sinclair

Director of Development, Marketing and Promotion,
Cree Construction and Development Company Ltd.

Michael Spence

Mayor, Town of Churchill

Centre for the North

Purpose

The main purpose of the Centre for the North is to work with Aboriginal leaders, businesses, governments, communities, and educational institutions to achieve a shared vision of sustainable prosperity in the North.

Key Objectives

- Examine the full range of challenges and opportunities related to sustainable prosperity and then develop policies and strategies that take into account the interrelationships among the factors.
- Engage First Nations, Inuit, and Métis leaders and communities to ensure that their voices are incorporated into the dialogue and analysis on the full range of issues.

Our Goal . . .

. . . is, through research and dialogue, to provide policy-makers and others with new insights that strengthen their foundation for informed decision-making.

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