THE CASE FOR NEESTANAN

While a significant and challenging project, the NeeStaNan can be argued to be vital to both the concept of a resilient infrastructure and the ability of the Port of Churchill to reach its full potential. What is needed is for all levels of government, the private sector, and Indigenous communities to come together and focus on the result, not be daunted by the challenge.

A Path Forward

About the Author

Allan McDougall has focused on critical infrastructure protection and assurance over the past 30 years. This has included formal streams encompassing military, public sector, and private sector activities, including within the Department of Fisheries and Oceans/Canadian Coast Guard, Transport Canada (as the Senior Inspector for Ports), and Canada Border Services Agency. Within the private sector, this has included working to support transportation networks and maritime operations both domestically and in higher-risk environments. He is a founding member of the International Association of Maritime Security Professionals and one of Canada's original trainers under the IMO Train the Trainer program. He has worked across the lifecycle from design activities within the CSC Program at Irving Shipbuilding.

Allan has co-authored four books on Critical Infrastructure Protection and one book on Transportation Systems Security, which focus on establishing and managing resilient networks. These works have been used as graduate texts at several universities.

Allan holds an MA in Security Management from the American Military University (focusing on autonomous shipping) and a BMASc from the Royal Military College of Canada. Additionally, he holds a BA from the University of Western Ontario. He holds several security-related certifications, including the Certified Protection Professional (ASIS), Physical Security Professional (PSP), Professional in Critical Infrastructure Protection (PCIP), Certified Master Anti-Terrorism Specialist (CMAS), and Computer and Information Systems Security Professional (CISSP).

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About the National Center of Excellence and Innovation

Founded in 2024, the National Center of Excellence and Innovation is a multi-disciplinary focal point for communities coming together to address complex maritime security challenges While young, it brings together academics, practitioners, and others who have experience ranging from law enforcement to the impacts of severe weather and changing ocean conditions. You can visit the website at https://marseccoe.com.

Limitations of Examples

Specific place names should be considered approximate and illustrative. They are intended to situate the reader in a general area, not a very specific site. Specific sites should be selected based on the best outcome of a combination of engineering-led (capacity) and social (community involvement) factors.

Contents

Executive Summary

The NeeStaNan project would involve the creation of an international shipping seaport at or near the mouth of the Nelson River. While the Port of Churchill services clients in Alberta (AB), Saskatchewan (SK), and Manitoba (MB), the NeeStaNan project is vital to establishing this region as a viable shipping destination.

With the Port of Churchill operating in isolation, shipping companies will face significant risk-management decisions concerning any condition that disrupts or delays the ship's arrival at the port. This includes delays due to weather, port conditions (such as icing), disruptions in services (such as labour or equipment failure), or disruptions within the transportation network behind the port that limit the movement of persons or goods.

This risk involves the costs associated with either waiting and consuming resources until the disruption has passed or the consumption of resources (such as time and fuel) that would result from redirecting the ship. Depending on the nature of the vessel and its decisions, these impacts could become significant. They may deter shipping companies from establishing "liners" (fixed scheduled routes) into the region.

The NeeStaNan project at the Nelson River offers an option to mitigate several risks. With approximately 110 nautical miles between the two locations, a reporting point can be established along the approaches through Hudson's Bay, resulting in a diversion of only approximately ten nautical miles. While the port operations would change, the transportation networks behind the port could absorb this change, if aligned appropriately, before moving goods reach the main rail networks the region connects to.

The ports' relative proximity also allows each port to consider its infrastructure and operational needs, then harmonize its efforts to achieve economies of scale. Training and other standard services could be shared between the two parts and managed as a coordinated effort, increasing the size of the available workforce and broadening the opportunities for those in the area.

Given the strategic opportunity that the NeeStaNan project presents, the two Ports and different levels of government have a chance to demonstrate forward-thinking as Canada seeks to diversify its client base and establish a more resilient transportation network.

Purpose

This document presents a basis for discussion about the value of a second port in Manitoba (on the Hudson's Bay) to establish resilient infrastructure and improve the ports' attractiveness to European and northern clients.

Background

Canada's economic prosperity is at a turning point. The recent actions in the USA have galvanized both the political and popular will to diversify Canada's trading partners and reduce the risks associated with one trading partner being able to wield undue influence over Canada's economy.

The Geography

This work uses three routes to illustrate the case for resilience. Each route terminates at an arbitrarily determined split point near the center of Hudson's Bay (near 59 degrees 46 minutes N and 85 degrees 46 minutes W). This split point represents the decision point for the ship to proceed to either Churchill or Nelson, given that the distance from this point to either port is within 10 nm. The routes are as follows:

1. Split Point to Reykjavik: 2085 nm (approximate)
2. Split Point to Antwerp: 3178 nm (approximate)
3. Split Point to Bremerhaven: 3129 nm (approximate – and close to Hamburg).

The red route marked on the map reflects the route to the nearest major seaport of Iqaluit, NU that is slightly over 800 nm distant.

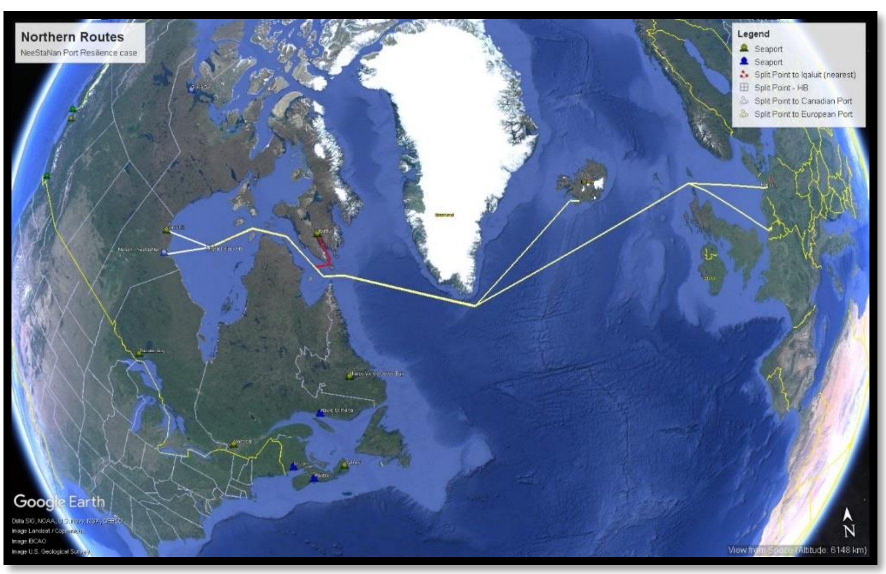

Figure 1 - General trade routes for liners considered

Defining the Challenge

Transportation networks seek to move persons or goods from their point of departure so that they arrive at their intended destination on time, in acceptable condition, and for a reasonable cost.

The traditional approach treats each port as a unique entity and in isolation. This approach is not viable in the Hudson's Bay region for two reasons:

1. From a shipping perspective, the next major port is Iqaluit, some 820 nm distant (or 82 hours at 10kn). This means that if a ship is unable to call at the Port of Churchill, its options are to remain in situ in an austere environment until the challenge is resolved or be exposed to significant costs without return if leaving the area.

2. From the export perspective, the Port of Churchill represents a potential single point of failure that would disrupt the entire transportation system. For example, an event at the Port of Churchill that closed a terminal for a day would cascade down through the transportation network. Examples of this kind of disruption can be found in the labour disruptions at the port in Vancouver that saw grain stocks pile up throughout the entire network due to labour disruptions.

It is also noteworthy that many approaches consider the port as simply the end point of the transportation network. This approach is also not viable in modern transportation systems. The port is serviced through any one or more of (1) rail networks, (2) road networks, or (3) transhipment or Ship-to-Ship transfers. Depending on the nature of the disruption, disruptions in road and rail infrastructure can also result in a disruption of operations at the port where personnel, resources, or the necessary space becomes unavailable. Notably, the Arctic Gateway Group's significant work in improving and monitoring the infrastructure behind the port represents a sounder approach.

Finally, we must consider the end state of the infrastructure in terms of what market it services. Ports in this region are most likely to service northern European markets, likely as far south as Germany or France at the start. The question should not be limited to today's market but understanding where these markets are trending.

According to its website, the Port of Churchill can handle approximately 600,000 tonnes of grain in a season and has a storage capacity of roughly 5 million tonnes. (Ref https://www.arcticgateway.com/) Using 2018 Statistics Canada figures for exports, the demand from Western Europe already approached the limit of its declared capability, with 2018 exports to Western Europe being over 770,000 tonnes. Current market intelligence points towards these markets growing.

Regardless of the exact figures, the challenge lies in accomplishing growth. This again raises the challenge of a region serviced by a single port. While traditional business models tend to prefer ports operating at full capacity, this creates a significant risk for port operators. Where no slack is available (surplus capacity), any system disruption results in a performance degradation since the demand cannot be shifted.

Challenge Being Addressed

The core challenges considered here include the following:

1. Reducing the risk of service disruption that would undermine client confidence. This may also be translated into the potential clients' assessment that the risk of disruption undermines the ability to stabilize/normalize routes (liners).
2. Reducing the challenges of expanding port infrastructure that come from operating at full capacity.
3. Reducing the challenges that may occur in terms of being able to export goods through the region should the single supporting transportation route be disrupted due to accidents or other events.

Challenge 1: Client Confidence

Current situation: With the Port of Churchill operating in isolation, clients have two options should the port no longer be able to deliver its services on time. In these situations, the ship must either wait until the appropriate organization resolves the issue or may take other steps (such as leaving) to maintain its charter.

When considering the grain operations at the Port of Churchill, we should note that the following impacts (fuel cost only) illustrate the potential financial impacts:

- Auxiliary Engines Only (Power Generating): $3000 - $6000 US based on current costs of Heavy Fuel Oil (HFO) of about $518 US/ton.
- Handysize ships travelling out of the port are likely to consume 20-25 tons per day for costs of approximately $35K USD to $44K USD (assuming ten kn and neutral factors affecting navigation).
- Handymax to Supramax ships travelling out of the port are likely to consume twenty-five -30 tons per day for costs of approximately $44K USD to $53K USD per day (same assumptions as above).
- Panamax ships travelling out of the port likely to consume 30-35 tons per day for costs of about $53K USD to $61K USD.

It is worth noting that the route from the waypoint in Hudson's Bay to Iqaluit would take 82 hours (with an additional day to port), meaning that these costs should be multiplied by not less than a factor of 4.5. From a risk management perspective, a failed transit (i.e. where the ship was forced to return could result in costs of over a $0.25 million (USD) in fuel alone.

Challenge 2: Expanding Port Infrastructure

One significant challenge for any port is being able to expand to meet new demand. Given the need to move products from Western Canada to the EU, this is a challenge that is likely for the Port of Churchill.

Figure 2 - Port of Churchill

The Port of Churchill has opportunities to expand but construction challenges (including the movement of materials) may disrupt operations. Movement of building materials, other raw materials, and equipment to the site would likely be along the same routes as service the port operations. Concurrently, construction at the port would also require space for both storage, staging, and movement.

Challenge 3: Reducing Export Issues

As illustrated by the various disruptions at the Port of Vancouver during strikes affecting grain movement, transportation networks can quickly become clogged or blocked where the port operations are disrupted. (Ref Vancouver Port Strikes, Ports Gear Up) In those cases, the blockage at the Port prevented approximately 100,000 tonnes of grain from arriving at shipping terminals and resulted in approximately $26 million per day (Canadian Grain Commission cited as the source of estimates).

A single port transportation system creates a potential single point of failure. This potential single point of failure may be disrupted through natural events (weather, etc.), non-intentional events (accidents, etc.), or deliberate events (labour disruption, attacks, etc.). It should also be noted that these disruptions may be direct (such as a strike) or indirect (such as lost space due to a spill requiring a cordon).

Shared Services and Infrastructure

This also allows the two ports to have certain kinds of infrastructure and services. This sharing of services and infrastructure creates conditions where:

1. The rationalization for specific services can be made due to the shared market.
2. The cost of maintaining certain services or infrastructure can be reduced and balanced.

Shared Services

Bird, MB is approximately 250 km from the Port of Churchill and 116 km from Port Nelson. For the Port of Churchill, this must be done by rail. Conversely, there is no direct road connection by rail from Port Nelson, MB to Bird, MB. To expand the ports effectively, it is likely that both ports will need to benefit from both road and rail transportation networks. (Ref https://en.wikipedia.org/wiki/Hudson_Bay_Railway_(1997))

The current configuration (one road, one rail) allows for a broader range of inland shipping options. While rail would likely be the most cost-efficient means of movement, this could allow for the following:

1. For delayed cargo, the Port of Nelson allows smaller loads to be shipped to the Port of Churchill, which acts as the system's main distribution point.
2. If the Port of Churchill is disrupted, shipping is diverted to the Port Nelson / NeeStaNan project, where it can be moved the shorter distance by road to the rail staging area in the Bird area. This reduces the waste of attempting to move large numbers of containers by truck and addresses the disruption to the Port of Churchill or its supporting rail line.
3. This also allows both ports to gradually improve their transportation network.

While the initial configuration would allow for some resilience, it is assumed that each port would develop its supporting transportation infrastructure until basic highway-level road and rail services were provided to each port.

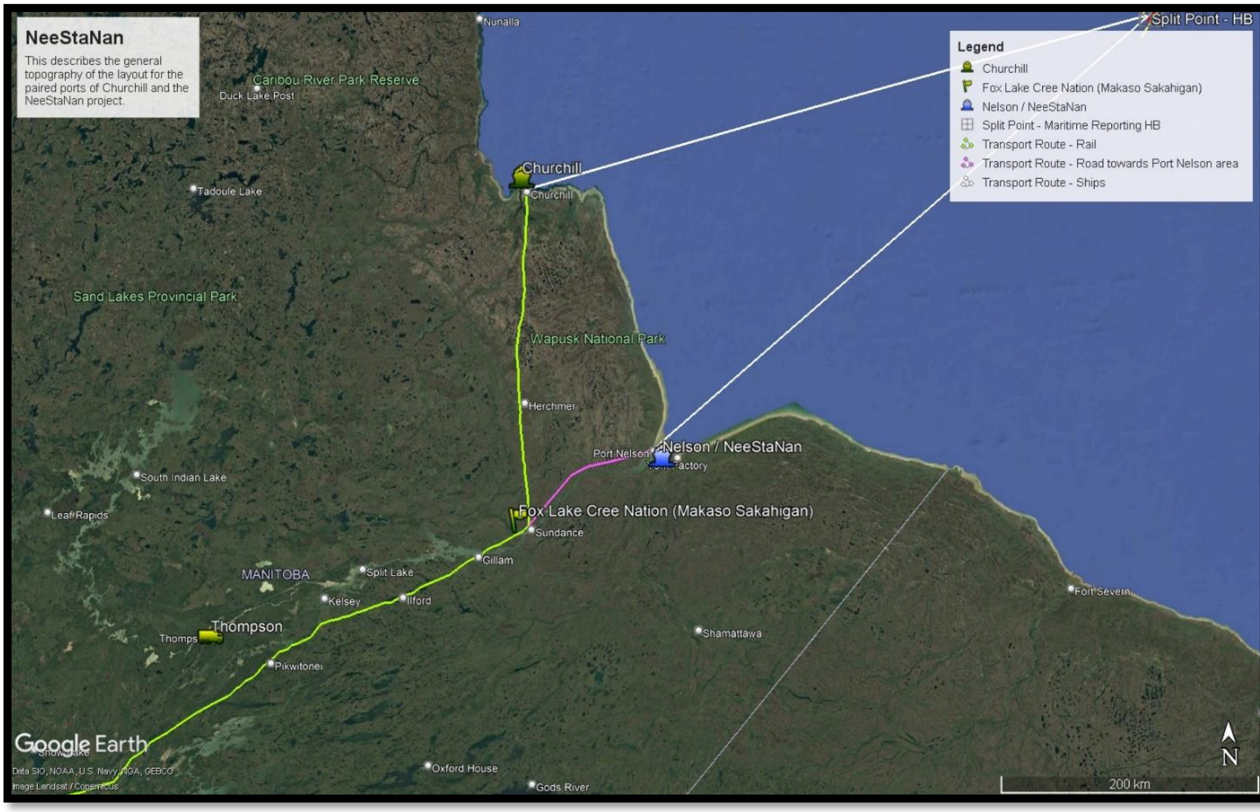

Figure 3 - Landside infrastructure

Supporting Industry

In this context, the infrastructure supporting the port is broken down into the following:

1. Port operations
2. Logistics and Supply Chain
3. Public Safety and Emergency Management.
4. Shipbuilding, repair, and maintenance
5. Energy and utilities.
6. Technological support (IT/ OT)
7. Legal and Financial services.

While the Port of Churchill may be able to provide a modest market for these supporting infrastructures, the concept of operations under the resilient port structure (NeeStaNan and Port of Churchill) creates conditions that are more conducive to establishing and maintaining these supporting services.

Port Operations: Port operations include those services necessary to maintain the terminals, to support the resupply of vessels (refuelling, chandlers, etc.), to support the movement of the ships within the port (dock workers) and to/from the port (tugs, pilotage), as well as dredging and marine engineering. While some services will be in constant demand, others will only be needed occasionally. In a one-port environment, those occasional services must increase their prices significantly to break even. Where they service two ports, the number of units of work increases over the year, allowing for a general reduction in prices.

By sharing services such as marine engineering, dredging, and similar services, the ports can leverage the increased demand to reduce their operating costs without jeopardizing the stability of the service. Where the services are in constant demand, the presence of the services (such as tugs, pilotage, dock workers, etc.) allows for a surge or emergency capacity from the other port should need arise.

Logistics and Supply Chain: This includes freight forwarding, customs, warehousing, routing, and distribution. It may involve bulk goods (grain, minerals, etc.) or more sensitive goods (perishables). It also involves the movement of cargo inland. With the Port of Churchill not being serviced by a road, this aspect is limited to rail or air movement, which can lead to complications in movement. Similarly, the lack of rail to the NeeStaNan/Port Nelson location would impact mass movement.

By locating the central staging point for this pair of ports near the Bird/Sundance area (inland of the rail split), the port can free up significant space for warehousing. The NeeStaNan project could offer a relief valve for the Port of Churchill should there be a disruption along the rail line. To accomplish this, cargo would be moved to the coordination point and then further routed to the appropriate port. Given that NeeStaNan (110 km versus 250 km) is closer to this coordination point with road service, this would allow for cargo to be taken by road (truck) using a shorter route to the port and allowing for cargo to be loaded. In the case of mass cargos (bulk grain and minerals), the storage on the rail cars at this space also prevents the rail network from becoming clogged and requiring time to clear before the resumption of operations.

Security / Inspection: The next element in this structure involves establishing a key inspection point/staging point in the Bird, MB area (near the Fox Lake Indian Reservation). The risks associated with inland inspection can be offset by establishing sealing routines before cargo shipments arrive at the port. Inbound traffic would be scanned at the staging area. A segregation of inbound, outbound, and empty containers would allow infrastructure (such as truck-mounted VACIS) to have adequate containers or other shipments to inspect. The added security controls may offer greater assurance to shippers, importers, and others that the port provides sufficient security controls.

Similarly, this approach allows for a layer of defence structure. Should a container leave the port in a manner that raises the security concern, creating the inland staging area enables the port to catch the container as part of natural work processes. This would allow for between one to three hours of notice to be given to identify the container and issue and have resources in place.

This key feature would allow a mechanism to prevent disruptions from cascading into the transportation network. By routing cargo in such a way that demand is being met, time is bought to clear the disruption and return to normal operations. For example, if one hundred containers were intended to be moved through Churchill but the port became disrupted, those containers now occupy space before the port, acting to block the transportation network. By having the staging area and alternate route, this situation can be avoided.

Training and Certification Services: Several supporting industries require formal certification (such as welding). While one port may offer an adequate market for this activity, the supporting infrastructure may become too reliant on that port and be vulnerable to downturns or a drop off of demand if that port becomes saturated. The two-port structure allows shifting these resources between ports (within a day's travel). Similarly, cooperation between the ports would allow for some fluidity in the labour pool. This fluidity allows for a level of resilience should the supporting population of one port be impacted by events that limit the availability of personnel.

Repair Services: Shipbuilding and repair services may be required but are challenging to offer without significant effort under the current one-port model. The service demand would likely need a broader market than could be provided. Having an adequate port presence (including its increased shipping traffic) would likely be necessary to establish a viable local industry in more specialized areas that would likely require expertise to be brought in under the current conditions.

These services may also require ships to remain alongside for some time. Being able to direct the ship to a location where repairs can take place with minimal operational disruptions would be simpler under this kind of structure.

Environmental: Similarly, certain services could be established using more advanced technology. This would include waste management, bilge treatment, and other similar services used to protect the environment. Having controlled environments supporting the more advanced infrastructure allows each port to offer both a higher level of service and a greater assurance that environmental risks are being managed appropriately.

The movement of material may pose some risks in terms of accident or spillage. This would need to be balanced by the ability to offer more reliable and supported services resulting from the broader market.

What Resilience May Look Like

Ideally, the transportation system maintains a balance between robustness and resilience. Robustness involves being able to withstand foreseeable or predicted events without unduly impacting operations. Resilience involves being able to identify and adapt to changing environments.

This concept operates at both the individual port level and the system level. Resilient port management (including design) maintains the capacity of the individual port to continue its operations. At the regional level, resilience involves shifting the demand for port services so that where disruptions may occur, compensatory controls take effect.

Scenario: Ships are coming into the Port of Churchill to load cargo. That cargo is expected to arrive approximately 24 hours before the ship's arrival. However, the Port of Churchill facility handling the shipment suffered a disruption that was expected to take 48 hours to clear. It is estimated that the cargo will arrive in the middle of the disruption, and the ship will be forced to wait, losing a day off its planned transit.

Within the regionally resilient structure, this would be offset through the following:

1. Where the shipments are expected to arrive at the port by rail, they are identified at the coordination point (in this case, the Fox Lake location acting as a nominal control point).
2. Under the terms of a Mutual Aid Agreement that allows for the shifting of services between ports without impacting long-term client relationships, shipments are routed to the port with the capacity to handle them.
3. Under Standing Operating Procedures for directing ship traffic, the ship is informed at the Split point of the change of location. The ship advises the Coordination point of any additional services (crew change, etc.) that may be affected by the redirection.
4. The services are adjusted to the new port under the terms of the Mutual Aid Agreement.
5. The ship's course is adjusted as it hits the Split Point. The overall distance for the redirection is less than 10 nm, meaning disruption to both schedule and costs is reduced significantly.
6. This allows for each port to manage its operations in a way that promotes stable business and operations, a key factor to establishing the market for supporting services.

Figure 4 - One option in terms of establishing regional resilience.

Conclusion

The Port of NeeStaNan/Port Nelson may appear to be a source of competition for the Port of Churchill. Another interpretation provides a more positive approach for both the ports and the province of Manitoba.

Adopting the competitive approach and maintaining a single port (Churchill) in the Hudson Bay area creates risks that may be unacceptable to shipping companies. This is mainly due to the unique circumstance that the Port of Churchill is isolated. Any disruption to the port or its supporting transportation network (at this point, rail only) can cause misdirection (should a ship have to reroute), delays (late shipments), increased risk of damage in shipment, or increased costs.

The creation of the NeeStaNan/Port Nelson infrastructure, supported by a road network, can act as a relief valve that prevents these circumstances. A reporting point approximately 262 nm from either port would allow for diversion without significant additional costs in terms of time or fuel consumption. Establishing a coordination point in the area of BIRD or slightly to the west of where the railroad turns north would allow for shipments to be directed to the appropriate port ahead of the arrival of the ships. This relieves the Port of Churchill and the NeeStaNan project of these risks.

The creation of this staging point may also allow for cost savings. The staging point is well connected to the main transportation network, allowing for persons and goods to move to that point relatively quickly. From that point, they can be directed to the appropriate port. This allows for goods and services required by both ports to reduce their per-unit costs. Similarly, it allows for a concentration of various support services that can reduce the overall costs to each port.

Finally, the use of the staging area offers a unique opportunity for quality control for shipments (outbound), export control (outbound) and security/public safety (inbound) by creating a situation where layers of control can be applied without unduly affecting operations.

The overall approach for this structure creates conditions that may allow the two ports to achieve the necessary economic demand to support small and medium-sized enterprises. On one hand, the increased demand for services (such as welding, etc.), creates a need for a generally larger workforce. The distribution of this demand between the two ports establishes a condition where that workforce is less susceptible to impacts or disruptions of demand at either port. This assists in the development of more stable and sustainable industries.

Finally, certain key services would benefit from leveraging the demand of the two ports. These would include customs, immigration, ship maintenance/repair, and environmental controls (wastewater, bilge water, etc.) and similar services. At small ports, these services could create conditions where the need to maintain those services (a critical factor in environmental protection, etc.) competes with the available resources to sustain them. Creating a structure where the services support the two ports allows for each port to contribute to more capable systems. This is particularly important in this part of Canada, where environmental response plays a key role in protecting sensitive environments and preserving traditional lands.

The outcome of this assessment recommends that the Province of Manitoba approach the federal government, the Province of Saskatchewan, the Province of Alberta, and, as an additional resilience measure, the Province of Ontario to assist in creating this gateway. While the project may appear competitive against the Port of Churchill, a shift in philosophy offers both ports and the province significant opportunities to create both a resilient gateway to the north and supporting industries for local communities in the area.