www.cpcs.ca

Transloading Facility Feasibility Study

Final Report

Prepared for:

City of Terrace

Prepared by:

CPCS

Solutions for growing economies

CPCS Ref: 18255
October 11, 2019

Acknowledgments

CPCS acknowledges and is thankful for input provided by The City of Terrace and other stakeholders consulted in the development of this report.

Cover image source: CPCS

Acronyms / Abbreviations

AIA	Archaeological Impact Assessment
AiP	Area In Principal
AOA	Archaeological Overview Assessment
CIMT	Canadian International Merchandise Trade
CN	Canadian National
CoC	Certificate Of Compliance
CSR	Contaminated Sites Regulation
DWT	Deadweight Tonne
EMA	Environmental Management Act
ENV	(BC) Ministry Of The Environment And Climate Change
ESA	Environmental Site Assessment
FEED	Front-End Engineering Design
FOIPPA	*Freedom Of Information And Protection Of Privacy Act*
GHG	Greenhouse Gas
KSM	Kerr - Sulphurets - Mitchell
KVL	Kalum Ventures Ltd.
LNG	Liquefied Natural Gas
LPG	Liquefied Propane Gas
MFLNRORD	Ministry Of Forests, Lands, Natural Resource Operations And Rural Development
mmfbm	Million Board Feet
NDIT	Northern Development Initiative Trust
NTCF	National Trade Corridors Fund
NEB	National Energy Board
PDH	Propane Dehydrogenation
PFR	Preliminary Field Reconnaissance
PIC	Petrochemical Industries Company
PRPA	Prince Rupert Port Authority
RO/RO	Roll-On/Roll-Off
RRUC	Road Rail Utility Corridor
RSIP	Rail Safety Improvement Program
SIDP	Skeena Industrial Development Park
TEU	Twenty-Foot Equivalent Units
TMP	(City Of Terrace) Transportation Master Plan
UWR	Ungulate Winter Range

Executive Summary

The City of Terrace ("the City") rightly views the multimodal transportation system as an important enabler of regional economic development. Better transportation connectivity and increased transportation options, can help to lower shipper transportation costs, reduce transit times, and increase supply chain reliability. This can help increase shipper competitiveness and that of the jurisdictions in which they operate. This in turn can lead to investment, growth and jobs. To these ends, a team led by CPCS (the "CPCS Team") was retained by the City to investigate the feasibility of and to develop the preliminary business case for constructing a transloading facility in or near Terrace.

Development and operations of transloading facilities are typically led by the private sector. Unlike other types of feasibility studies for public infrastructure (e.g. transit, etc.), the purpose of this study is not to opine on whether the City should proceed with developing a transloading facility itself, necessarily.[1] Rather, the purpose of the study is to provide an analysis of the likely need for such a facility based on an assessment of possible cargo markets, and, accordingly, provide the City with a vision for how it could foster the development of such a facility through appropriate planning and marketing.

What is a transloading facility?

A **transloading** facility refers to a terminal that allows for cargo to be transferred from one mode of transportation (e.g. truck) to another. In this study, the focus is on transloading cargos between truck and rail, and vice-versa. A truck-rail transloading facility can be designed accommodate any number of cargos, including dry bulk (e.g. grains, cement, etc.), liquid bulk (e.g. fuels, etc.), break bulk (e.g. lumber, steel, etc.) and project cargos.

A transloading facility can also refer to a facility for **stuffing** and **destuffing** containers.

Transloading facilities do not typically refer to facilities where containers are transferred between truck and rail, which are referred to as **intermodal** facilities. However, these opportunities will be considered as part of this study.

Market Assessment

While Terrace is a regional service centre for northwest BC, currently, there is limited industry in Terrace requiring goods movement (compared to Kitimat, mines in northwest BC, etc.).

[1] In fact, our recommendations regarding project structuring, found in Chapter 7, is that the City consider undertaking enabling measures, including zoning changes and lobbying for a grade separation, but that the development of the site itself be left to private sector proponents.

In the short-term, we understand cement and wood pellets are being handled at a spur to the West of the Sande Overpass and South of Highway 16 (Figure ES-1). Current traffic levels (based on estimates in this report) are slightly above the minimum scale cited for a facility that has existing track and that does not require covered storage (i.e. 600-700 railcars per year). Stakeholders noted that relocating this activity to other existing locations (e.g. Skeena Sawmills) would incur additional costs even if rail is in place (e.g. crossing upgrades). As a result, it is not desirable to relocate this existing facility as it is just meeting minimum scale requirements.

Figure ES-1: Existing Rail Spur Used for Cement Transloading in Terrace

Source: Google Earth/Digital Globe.

In the medium-term, the potential development of micro-liquefied natural gas (micro-LNG) plants in Terrace could provide a potential source of containerized traffic, which could then be loaded onto rail-cars in Terrace. However, at the time of reporting, to our knowledge, no micro LNG producer has made a final investment decision. Further, while conceptually rail service between Terrace and the Fairview Container Terminal is possible, there is no existing service: (1) trains handling containers are designed to expedite traffic between Prince Rupert and the US Midwest, and thus do not stop in Terrace and (2) manifest (mixed freight) train service to Prince Rupert does not service Fairview Container Terminal. Though this report makes some assumptions based on stakeholder feedback, interested micro-LNG producers would need to further explore with CN and DP World their specific needs once known, including volumes and sailing schedules, to confirm that an efficient service could be provided.

In the longer-term, stakeholders noted that the limited availability of land in Prince Rupert after the mid-2020s could create conditions for development of logistics facilities in Terrace. In the meantime, for commodities originating east of Terrace, Prince Rupert is a more desirable location for transloading, as it allows lower-cost bulk rail shipments to be used for the longest length of haul possible. As the Skeena Industrial Development Park (SIDP) develops, the companies that locate there could also provide a source of traffic.

In summary, there is an existing need for transloading in Terrace, but current traffic levels can only justify a facility the size of the existing spur/team track located west of the Sande Overpass (Figure ES-1). Further growth would be dependent on other traffic sources materializing. Given Terrace's proximity to the growing Port of Prince Rupert and the development of the SIDP, for example, this is a plausible eventuality. As one stakeholder optimistically stated: "One day someone is going to come up with something that will work." However, because of the relatively limited local flows in Terrace, another stakeholder cautioned, "if it was my money, start small. . . [m]y biggest worry, is that Terrace is not the generator (you're between Kitimat and Rupert)."

> *"One day someone is going to come up with something that will work."*
>
> *"If it was my money, start small. . . My biggest worry, is that Terrace is not the generator (you're between Kitimat and Rupert)."*
>
> *- Stakeholders consulted*

For the purposes of the remainder of the report, we have illustrated what a combined transloading and small intermodal facility could look like in Terrace. As noted in the box above, an intermodal facility would accommodate already containerized traffic from truck to rail and vice-versa, and serve potential markets such as micro-LNG containers being exported via the Port of Prince Rupert.

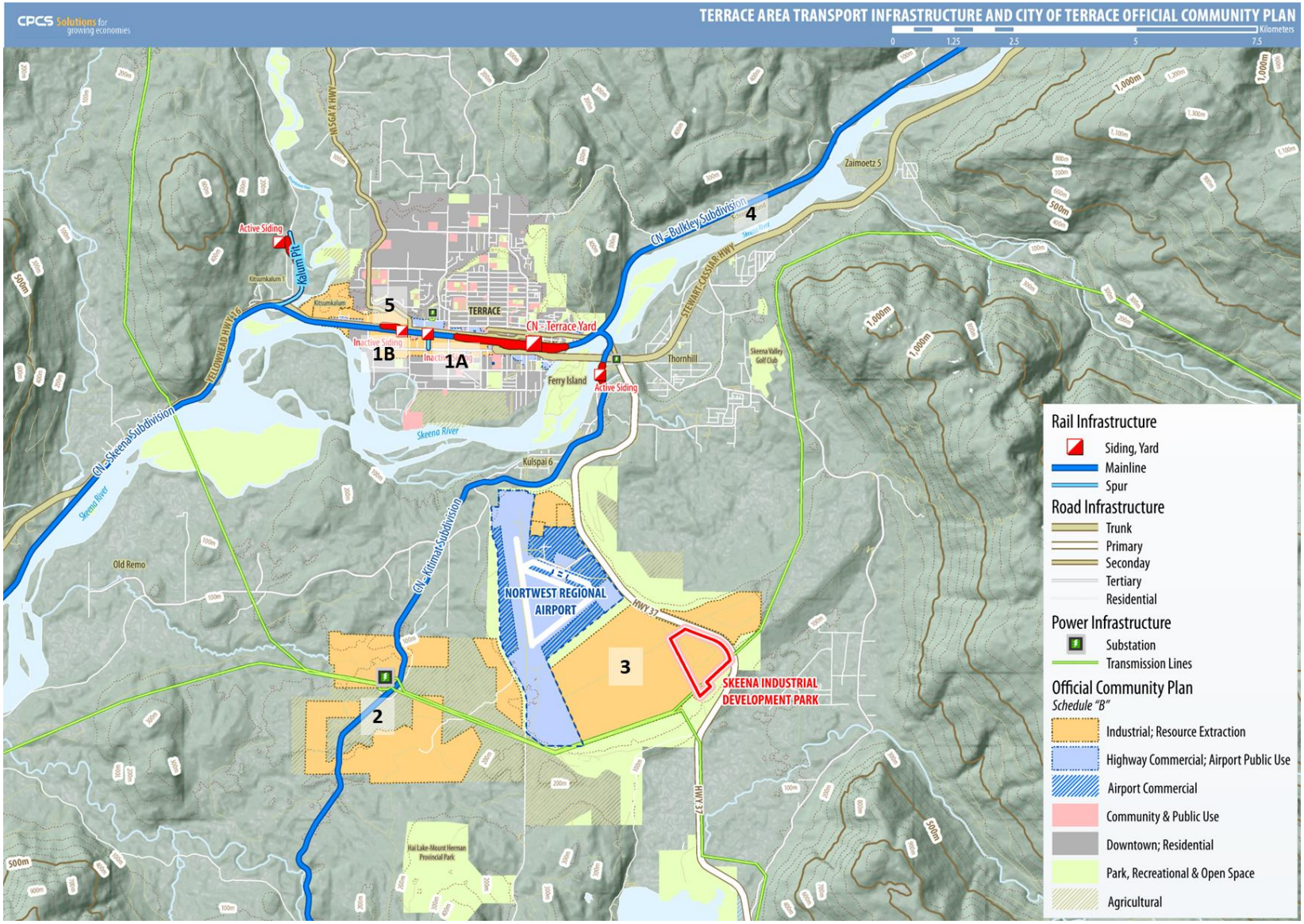
Site Assessment

We evaluated five sites in the Terrace-area (Figure ES-2). In our view, Site 1A offers the most flexibility in terms of facility size to accommodate the medium- to long-term opportunities identified in this report, is close to the CN Terrace Yard and on the route to Prince Rupert (which is advantageous in terms of having lower rail switching costs), and could be developed in an incremental manner (i.e. the existing spur on the site could remain or be part of a larger future development). Though at this preliminary stage CN does not commit to feasibility of a site, based on the team's knowledge of rail operations, this site offers the highest ease of interface with CN's operations. However, it is currently zoned for other uses, including residential and mixed use.

In addition to the potential for developing a transloading facility as a motivator, we believe there is merit to re-examining the planned land-uses at Site 1A as (1) land-use planning guidance from the Federation of Canadian Municipalities and Railway Association of Canada[2] recommends a 300 metre setback adjacent to rail yards and (2) any development other than industrial may require additional environmental remediation requirements to meet more stringent guidelines for these types of land uses.

[2] Dialog. 2013. Guidelines for New Development in Proximity to Railway Operations.

Figure ES-2: Study Area and Candidate Sites



Source: CPCS, based on data from the City of Terrace and other sources.

There are merits to the other sites; however, all face limitations and additional challenges to development inherent in the site itself. Site 1B has the advantage of being further from the downtown core, but is shorter in parallel to the direction of the CN mainline, which limits the ability to develop a small intermodal facility. In terms of size, a transloading facility could be developed on the site, however. Site 2 is also further from downtown Terrace and in close proximity to the SIDP (thus potentially limiting trucking distances); however, there would be higher costs to develop, including requiring a new access road. More importantly, there would be less ability to undertake a phased approach and reduce risk for project proponents.

Financial and Economic Case

Figure ES-3 illustrates what a small intermodal facility in Terrace could look like, based on the medium and long-term opportunities. Facilities of similar size to those shown have a capital cost of the order of magnitude of $50 million. The existing spur/team track in Terrace accommodates existing traffic levels, and could be part of a larger facility in the future.

It is plausible that a facility of this scale could generate sufficient revenues to offset the operating and some of the capital cost of the facility; however, there would need to be an anchor user of the facility who would be willing to commit to providing traffic. Micro-LNG producers, should they develop, would be natural partners.

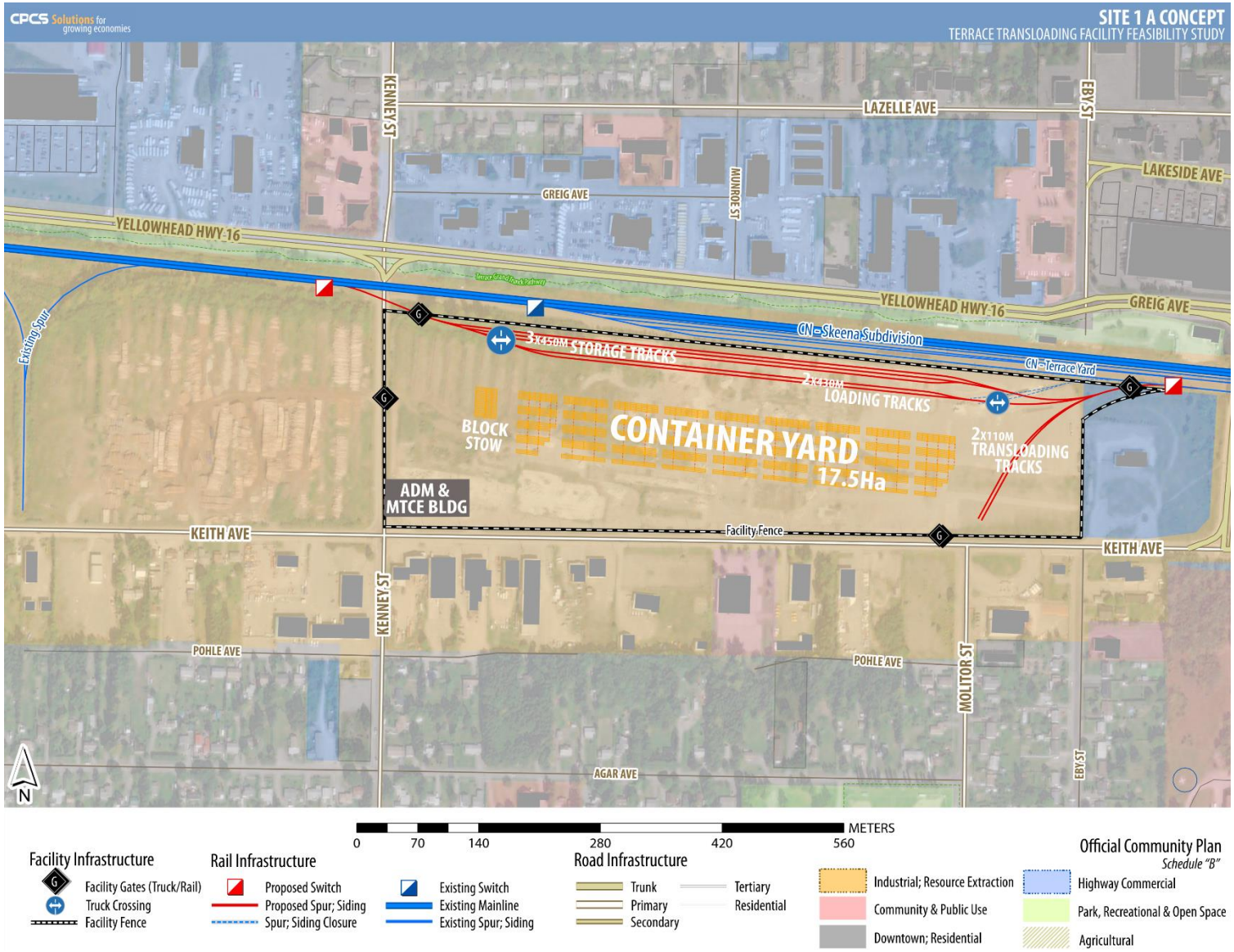
Transloading offers a number of benefits to users and non-users alike, including reductions in greenhouse gas emissions and pavement damage, and improvements in safety. Based on our traffic assumptions about traffic that could be shipped by rail rather than truck:

- 480 lumber rail cars being shipped eastward to the US; and
- 14,000 containers being transported between Terrace and Prince Rupert

Avoided pavement damage and safety benefits yields approximately $2.7 million per year in benefits within BC alone. Assuming a 3% and 7% real discount rate,[3] this is equivalent, in present value terms to approximately $50 and $30 million, respectively, nearly equivalent to the capital cost of the facility. Thus, it is possible that cost-benefit analyses required for certain government funding programs, such as the National Trade Corridor Fund, could yield a positive outcome.

[3] A lower discount rate implies that future benefits are worth more in present value terms than a higher discount rate.

Figure ES-3: Facility Concept



Source: CPCS

Overall Assessment

It is plausible though not likely that a facility as shown would develop in Terrace in the next 10 years. On one hand, the relatively short distance between Prince Rupert and Terrace makes it difficult for intermodal rail to be cost competitive with trucking on this corridor. On the other, developments at the SIDP, such as micro-LNG could provide stable traffic to anchor a facility, and there are concerns about future trucking capacity in the area, particularly as the Port of Prince Rupert and SIDP grows, which could lead to trucking rate increases.

Thus, the City of Terrace should take steps to plan for a logistics use of lands south of Highway 16 in Terrace, but should also continue to maintain a dialog with other regional stakeholders, including the Port of Prince Rupert, CN, trucking companies, local First Nations and other municipalities as to how to continue to develop logistics capacity to serve the region. Ultimately, it is less critical exactly where the facility is located its value is not the few operations jobs that are created to handle the traffic, but the value it creates for potential shippers using the facility. Ultimately, Terrace is only 1.5 hours by road from one of the largest and most-well connected container terminals in Canada over an uncongested highway, with access to lower cost land, and thus has several attractive site selection characteristics.

1 Introduction

1.1 Background and Objective

The City of Terrace ("the City") rightly views the multimodal transportation system as an important enabler of regional economic development. Better transportation connectivity, and increased transportation options, can help lower shipper transportation costs, reduce transit times, and increase supply chain reliability. This can help increase shipper competitiveness, and that of the jurisdictions in which they operate. This in turn can lead to investment in new facilities, growth and jobs.

To these ends, a team led by CPCS (the "CPCS Team") was retained by the City to investigate the feasibility of and to develop the preliminary business case for constructing a transloading facility in or near Terrace. As stated in the Request for Proposals (p. 4), the objective of the project can be summarized as follows:

> . . . to identify a preferred location in Terrace for a transloading and logistics facility, to develop a business case that will be used by the City to advise and attract private sector interest and to encourage investment and productive partnerships. Overall, this project will raise awareness, promote collaboration and support the formation of productive partnerships, all critical elements of developing innovative infrastructure and transportation solutions.

What is a transloading facility?

A **transloading** facility refers to a terminal that allows for cargo to be transferred from one mode of transportation (e.g. truck) to another. In this study, the focus is on transloading cargos between truck and rail, and vice-versa. A truck-rail transloading facility can be designed accommodate any number of cargos, including dry bulk (e.g. grains, cement, etc.), liquid bulk (e.g. fuels, etc.), break bulk (e.g. lumber, steel, etc.) and project cargos.

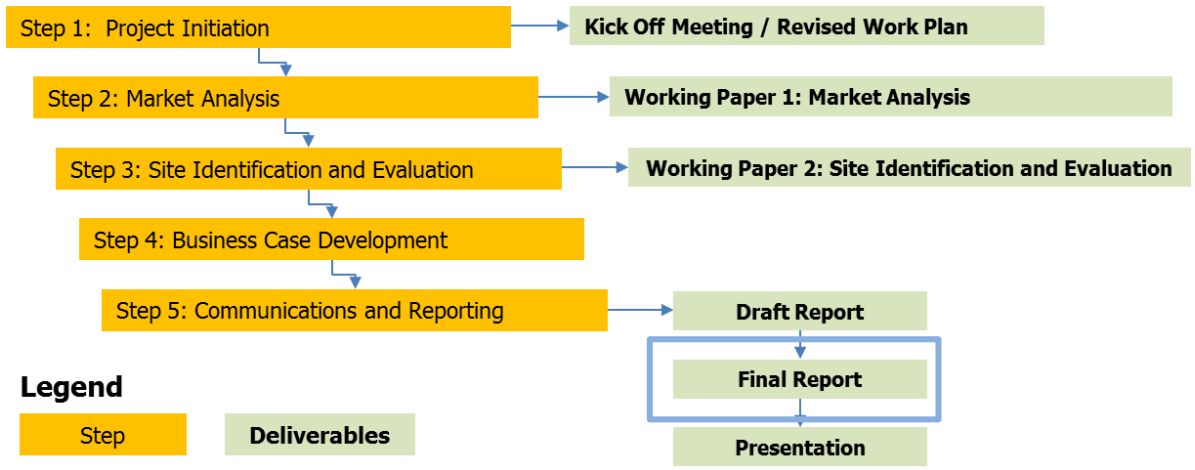
A transloading facility can also refer to a facility for **stuffing** and **destuffing** containers.

Transloading facilities do not typically refer to facilities where containers are transferred between truck and rail, which are referred to as **intermodal** facilities. However, these opportunities will be considered as part of this study.

1.2 Study Structure

The project was developed in five steps, as set out in Figure 1-1, with the Market Analysis occurring in Fall 2018,[4] and the remaining steps in 2019. This report is the output of all five steps.

Figure 1-1: Study Structure



Source: CPCS

1.3 Purpose of this Report

The purpose of this report is to assess the following key questions:

- What is the value proposition and potential market demand for a transloading facility in Terrace, including potential commodities that could use the facility?
- What are site options for a transloading facility, taking into the account the needs of potential users, site characteristics, and access requirements?
- Overall, what is the business case for a transloading facility in Terrace, including financial and economic considerations?

These key questions are also intended to inform the City's planning for the future in terms of illustrating what a transloading facility in Terrace may look like.

1.4 Methodology

The market analysis was primarily prepared using a review of publicly available data and reports, including from Statistics Canada, the Ports of Vancouver and Prince Rupert, as well as through a series of stakeholder interviews carried out from September to November 2018. Appendix A provides a list of stakeholders interviewed. When possible, we have attempted to

[4] Where appropriate, we have noted some recent developments since Fall 2018.

validate this information using independent sources, including but not limited to available freight flow data from Statistics Canada.

The site evaluations were carried out primarily using a desktop review of available literature and data sources within the respective domain of investigation (e.g. environmental, geotechnical, etc.). Site visits were conducted to familiarize the project team with the locations; however, no subsurface investigations were held. Preliminary discussions were held with CN regarding factors to be considered in the evaluation of sites.

Statement of Limitations

This report provides our opinion, based on the data available, of the probability of potential traffic sources for a transloading facility developing. As any investment or supply chain decision is made by third parties, none of the statements made in this report should be interpreted to mean any of these opportunities will develop. In addition, while CPCS attempted to validate third-party data and interview comments, we cannot warrant the accuracy of these data.

Any site extents shown are approximate, and subject to confirmation with respective third-party property owners. They are based on the extent of the properties that currently have limited development. The purpose of illustrating the boundaries is to show the extent of the site evaluation assumed.

Any commentary on rail access considerations are based on the team's knowledge of rail operations and preliminary discussions with CN regarding key considerations. No statements in this report should be construed to be acceptance by CN of the feasibility of any particular site. Any project proposed would need to go through their own approvals process.

Finally, as with the market study, the CPCS Team cannot warrant the accuracy of third-party data used in the site assessments.

2 Geographic Context

Key Chapter Takeaway

- The evaluation of a transloading facility in Terrace is taking place in the context of an increasingly developed logistics environment in Northern BC, though gaps remain (e.g. plastics handling, refrigerated warehousing, etc.). In order to fill these gaps, stakeholders opined that in principle it would more desirable to construct a transloading facility for containerized exports in the Prince Rupert area, as it would generally provide lower overall transportation costs.
- However, in the short term, Terrace's availability of existing brownfield sites and lower land development costs (e.g. $0.15-$0.25 million/acre versus $1 million/acre in Prince Rupert), were cited as a key reason for considering development in Terrace, though there are sites in Prince Rupert that are being developed could serve as a transloading facility, e.g. Watson Island in Prince Rupert.
- Longer-term, we heard that should the growth of the Port of Prince Rupert continue at its current trajectory, land around the port may become constrained by the mid-2020s. In addition, though the development of potential facility in Terrace would compete with other existing and new facilities in the Region, stakeholders noted that a key enabling measure for the future development of the Fairview Container Terminal is driving more containerized export volumes through the Port. To this end, some stakeholders noted that any facility in Terrace that could help drive these volumes and improve the competitiveness of the overall corridor, would align with the objectives of key port stakeholders.

2.1 Overall Transportation Connectivity

The City of Terrace is the retail, service, medical and educational hub for the Regional District of Kitimat-Stikine and northwestern British Columbia. Terrace is located at the crossroads of Highways 16, 37 and 113 (Figure 2-1). Prince Rupert, BC, the location of the Port of Prince Rupert, is about 150 kilometres west of Terrace and Prince George BC is about 600 kilometres east of Terrace, both along Highway 16. The municipality of Kitimat is situated 60 kilometres south of Terrace along Highway 37. Highway 37 also connects Terrace to northern BC and Yukon.

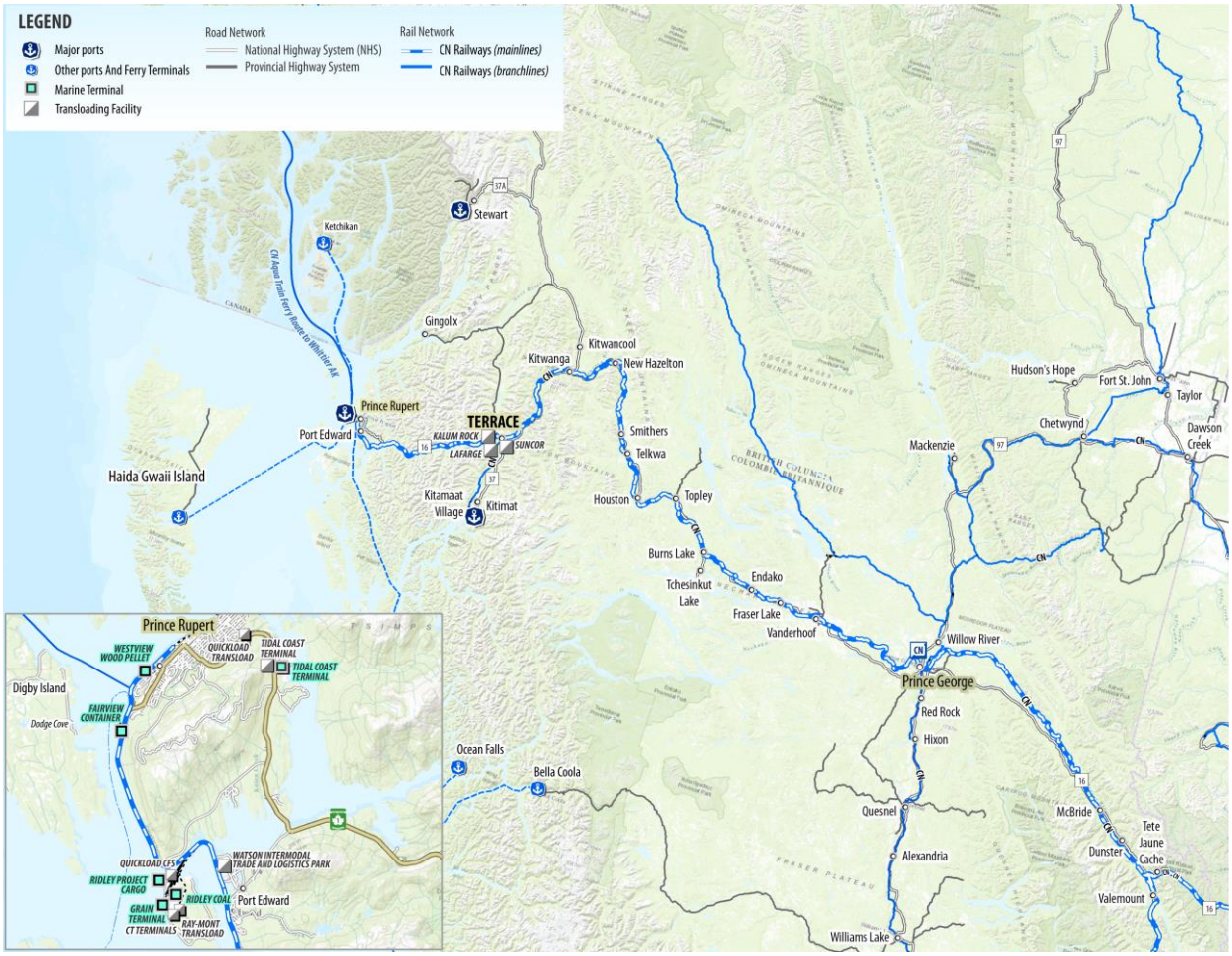
Terrace is serviced by a CN rail line that connects Prince Rupert and Edmonton, via Prince George. Another CN branch line connects Terrace and Kitimat to the south.

Northwest Regional Airport Terrace-Kitimat is located five kilometres south of Terrace. The airport offers flights to Vancouver, Calgary and other locations in BC through Air Canada Express, WestJet Encore and Central Mountain Air. Though the airport is not complementary to

a truck-rail transloading facility, because any high-value commodities that would be shipped by air do not usually get transported by rail, it does present some considerations with respect to land use in certain areas of Terrace.

The closest ocean ports to Terrace are located 75 kilometres away in Kitimat and 145 kilometres away in Prince Rupert. Both ports are connected to Terrace via CN rail lines.

Figure 2-1: Overall Transportation Connectivity in Northern BC



Source: CPCS, based on multiple sources.

2.2 Multi-Modal Facilities in the Region

There are a number of existing multi-modal facilities in the region, including marine import and export terminals and other logistics terminals, such as transloading facilities. Some of these facilities are complementary to a transloading facility in Terrace in that they could feed traffic to a transloading facility or provide an outlet for goods transloaded in Terrace. For example, the Fairview Container Terminal in Prince Rupert could load export containers stuffed in Terrace for onward shipment to Asia. Alternatively, some of the facilities would be competitors to a transloading facility in Terrace, in that they offer the same services. In order to understand the

potential market opportunities for a transloading facility in Terrace, the following subsections describe existing major multi-modal facilities in northern BC.

2.2.1 Prince Rupert

The Port of Prince Rupert, under the jurisdiction of the Prince Rupert Port Authority (PRPA), is the site of a number of marine import and export terminals, as well as other logistics facilities. These facilities are located on Kaien Island (on which Prince Rupert is also situated), as well adjacent Ridley and Watson Islands (Figure 2-2).

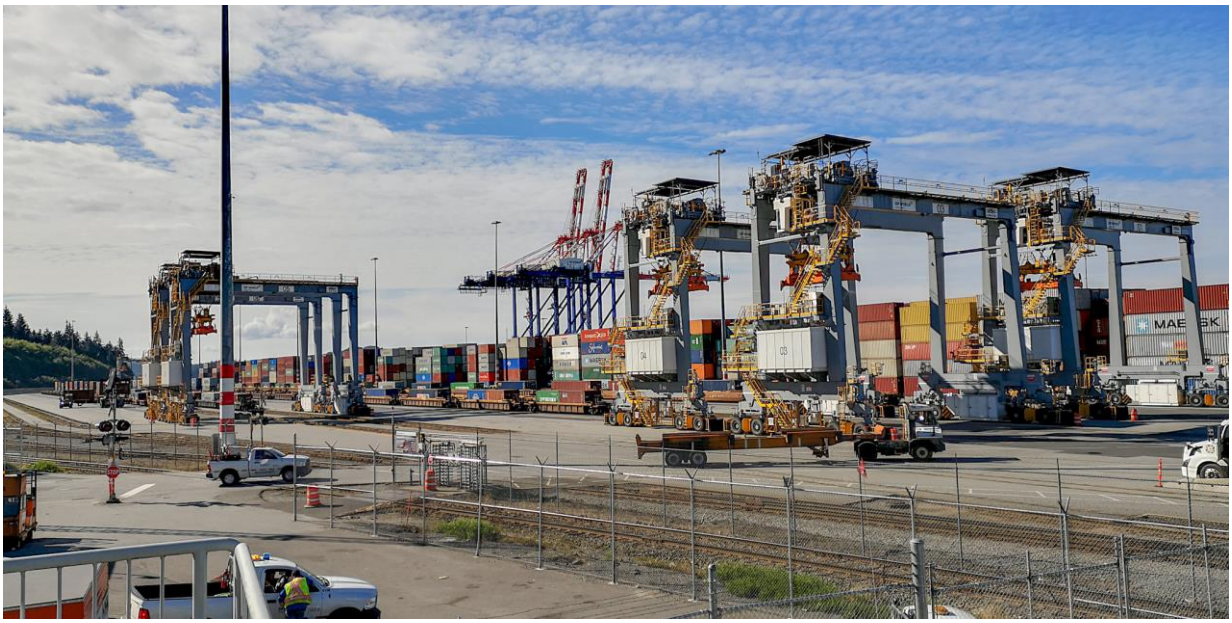
Figure 2-2: Location of Marine Terminals and Other Facilities at the Port of Prince Rupert

Source: Adapted from the PRPA

Fairview Container Terminal and Related Developments

The Fairview Container Terminal is a 74 acre facility container terminal with operational capacity of 1.35 million twenty-foot equivalent units (TEUs) per year (Figure 2-3). It is operated by DP World, which also operates Centerm Container Terminal in Vancouver. In 2018, the PRPA and DP World announced plans to increase the terminal throughput capacity to 1.80 million TEU by 2022, which is known as the Phase 2B expansion.[5]

Figure 2-3: Fairview Container Terminal

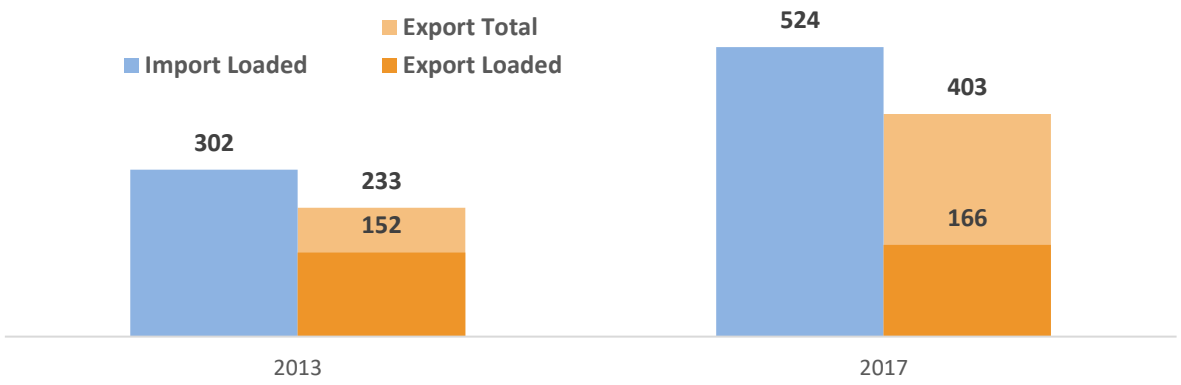


Source: CPCS

In 2017, Fairview Container Terminal handled 930,000 TEUs, of which 57% were loaded imports. As shown in Figure 2-4, while the total number of container exports have increased since 2013, the majority of these exports are empty. If a transloading facility in Terrace could increase the volume of loaded export containers from Prince Rupert, this would help make Prince Rupert more attractive as a port of call for shipping lines.

[5] Northern View Staff. 2018. Port of Prince Rupert announces Fairview Phase 2B expansion. *The Northern View.* https://www.thenorthernview.com/news/port-of-prince-rupert-announces-fairview-phase-2b-expansion/

Figure 2-4: Fairview Container Terminal Throughput, 2013 and 2017, in Thousands of TEUs



Source: CPCS analysis of PRPA data

Though Fairview Container Terminal has a truck gate, the terminal was originally designed to almost exclusively load railcars with containers from ships, and vice-versa. In response to the plans for expanding port operations and to provide greater flexibility for truck movements, the PRPA is constructing a five-kilometre Connector Road between Ridley Island and the Fairview Container Terminal. The truck gate would then be relocated to the south end of the terminal, closest to Ridley Island. In November 2018, the project received $15 million in funding from the Asia-Pacific Gateway Initiative.[6]

The road will allow trucks to bypass downtown Prince Rupert and thus reduce trucking operations through the city. From a goods movement perspective, it will also substantially reduce drayage time from transloading and other logistics facilities located on Ridley Island by increasing truck gate capacity and reducing the haul length. The magnitude of the decrease is expected to be from approximately 30 minutes to approximately five to 10 minutes. Figure 2-5 provides an overview of the proposed Connector Road.

[6] Canadian Shipper. Prince Rupert port to receive $22M for infrastructure projects. https://www.canadianshipper.com/transportation-and-logistics/prince-rupert-port-receive-22-infrastructure-projects/1003378335/

Figure 2-5: Fairview Container Terminal/Ridley Island Connector Road

Source: Adapted from Prince Rupert Port Authority / The Northern View, https://www.thenorthernview.com/news/new-road-coming-for-fairview-terminal/

The Port of Prince Rupert and its partners are proposing to construct import and export logistics parks that would complement the Fairview Container Terminal:

> **Export Logistics Park**. The Export Logistics Park will offer access to both rail lines and marine terminals to support transloading of export commodities from truck and rail to ocean container. Its close terminal access will eliminate the need for a truck gate. The park will serve as a designated logistics area for container stuffing, warehousing and other logistics activities. It is expected to handle 25% of the port's forecasted export volumes, equivalent to approximately 240,000 TEUs. . .
>
> **Import Logistics Park**. The Import Logistics Park will be a designated logistics area for container deconsolidation, transloading and other logistics activities. It will be located in close proximity to the terminals. The park will serve as a designated logistics area for container stuffing, warehousing and other logistics activities. It is expected to handle 10% of the port's forecasted import volumes, equivalent to approximately 130,000 TEUs. . . .[7]

[7] InterVistas. 2015. Port of Prince Rupert Economic Impact of Capital Expansion Plans – Update.

In September 2019, the Government of Canada announced $154 million in funding to support these, and complementary projects in Prince Rupert (i.e. the Zanardi Bridge and Causeway project).[8]

Other Marine Terminals

There are other bulk and roll-on/roll-off (RO/RO) barge terminals located at the Port of Prince Rupert. The following facilities at the Port of Prince Rupert may be complementary or compete with a transloading facility in Terrace:

- CN Aquatrain Terminal: A rail-marine barge that operates year round and provides a five-day service from Prince Rupert to Whittier, Alaska by RO/RO rail barge. The Aquatrain is 400 feet long and eight tracks wide and can accommodate 45 railcars. Approximately 1,575 railcars are transported via the Aquatrain each year. In 2017, it handled approximately 18,000 tonnes of chemicals, 37,000 tonnes of general merchandise, and 23,000 tonnes of liquefied propane gas.[9] It could complement a facility in Terrace by extending the potential market reach of rail to Alaska.

- Ridley Project Cargo Facility: Designed to accommodate the transfer of non-containerized goods from barge to rail, this facility provides a 6.5 acre laydown area with direct access to the CN rail network and Highway 16.

- Westview Wood Pellet Terminal: The first dedicated bulk wood pellet export facility in North America, Westview Wood Pellet Terminal has an annual shipping capacity of 1.25 million tonnes, a storage capacity of 50,000 tonnes, a rail unloading rate of 6,000 tonnes an hour and a ship loading rate of 2,000 tonnes an hour. To the extent that wood pellets could be shipped to customers by container or in bulk, this facility could compete with a potential transloading operation in Terrace.

There are also Prince Rupert Grain and Ridley Terminals, which handle grain and coal, respectively. However, as these facilities handle products in bulk, they are largely irrelevant to the development of a transloading facility in Terrace, other than to the extent that they create rail traffic on CN's line.

Other Existing Logistics Facilities

There are several other non-marine cargo transloading facilities at the Port of Prince Rupert that could be potential competitors with a transloading facility in Terrace (Figure 2-6)

[8] Canadian Shipper. 2019. Prince Rupert port gets $154M in infrastructure funding. https://www.canadianshipper.com/transportation-and-logistics/prince-rupert-port-gets-154m-in-infrastructure-funding/1003381284/

[9] Prince Rupert Port Authority. Monthly Traffic Summary for December 2017.

Figure 2-6: Transloading and Logistics Facilities at the Port of Prince Rupert

No.	Facility	Location	Summary of Services	Size of the facility
1	Tidal Coast Terminals	Prince Rupert Industrial Park	Log sort; forest product reload from truck; barge loading; etc.	- 54 acres
2	Quickload	1620 Prince Rupert Blvd	Export container stuffing by road Import transloading	- 1,000 sq ft cross-dock warehouse Sufferance License - 22 dock doors on 9.5 acres.
3	CT Terminals	Ridley Island	Lumber transloading from railcar to container	- Six acres, uncovered - 10 railcars per day
4	Ray-Mont Logistics	Ridley Island	Special crops transloading from railcar to container	

Source: CPCS summary of company websites.

In addition, to facilitate additional export cargo opportunities, the PRPA in conjunction with other financial partners[10] constructed the Ridley Island Road Rail Utility Corridor (RRUC) (shown in Figure 2-5). The RRUC, completed in 2015, was intended to provide additional capacity to ship potash, liquefied natural gas and other products to international markets.[11] However, since then, its capacity has or will be partially used by propane export facilities. It is also the location of CT Terminals and Ray-Mont noted above.[12]

Watson Island Trade and Logistics Park

The City of Prince Rupert is in the process of implementing a trade and logistics park on Watson Island (the Watson Island Trade and Logistics Park). Watson Island is located across from Ridley Island, and has road, rail and marine access. As of the end of 2018, a liquefied propane gas terminal owned by Pembina Pipeline is under construction. The site could provide a location for other logistics facilities, and several stakeholders pointed out this site as a key competitor with a potential transloading facility in Terrace.

[10] The infrastructure project was funded by the Governments of Canada and British Columbia, each contributing $15 million, CN contributing $30 million, along with Canpotex and PRPA, each contributing a further $15 million[10].

[11] https://www.canadianshipper.com/transportation-and-logistics/road-rail-and-utility-corridor-completed-at-port-of-prince-rupert/1003367004/

[12] We understand from stakeholders that the Ray-Mont site is currently being subleased from Vopak, which is also investigating the development of a propane and petrochemical export terminal at the location. However, based on Vopak's Project Description, the potential terminal would not take up the Vopak's entire site.
Vopak Development Canada. 2018. Project Description.

2.2.2 Terrace

Kalum Rock Quarry and Logistics Park

The Kitsumkalum own and operate several logistics businesses in Terrace including Kalum Ventures Ltd. (KVL) and Kalum Rock Quarry & Logistics Park. Kalum Rock Quarry & Logistics Park is located to

Kalum Rock Quarry & Logistics Park produces aggregate products for industrial, including rail ballast for CN, and residential use. The quarry is located along Highway 16 and is connected to the CN rail network by a three kilometre rail spur. It is estimated that the quarry has a capacity of around 22,000,000 m^3 which is enough volume to supply a continuous demand for rock over the long term. Adjacent to the quarry is a logistics park situated on 110 acres which is available for lease or investment.[13]

Suncor Fuel Distribution Terminal

Suncor Energy operates a distribution terminal in Terrace. The terminal receives gasoline, diesel and jet fuel by rail from two refineries in Edmonton, processes the fuel and distributes it to various customers (gas stations, airports, etc.) in northwest BC.[14]

Lafarge Cement Terminal

Lafarge Cement currently operates a railcar to truck transloading facility in Terrace to the west of the Sande Overpass, for its exclusive use.

2.2.3 Kitimat

Kitimat is located at the head of the Douglas Channel about 65 kilometres south of Terrace. Kitimat was developed in the 1950s as an industrial city to service Alcan (now Rio Tinto Alcan) smelter. The privately owned deep sea port in Kitimat is weather protected and ice free with minimal tidal influence.

LNG Terminals

In the Fall of 2018, LNG Canada announced a final investment decision to construct a natural gas liquefaction and LNG export terminal, which "will initially export LNG from two processing units or "trains" for an estimated 14 million tonnes per annum."[15] While the construction of the terminal might have bearing on the traffic that could be carried by a transloading facility in Terrace, it does not otherwise compete or complement it.

[13] Kalum Rock Quarry and Logistics Park. Logistics Park.

[14] Suncor. Suncor's BC Terminals. https://connections.suncor.com/british-columbia-terminals/november-2014/suncor-bc-terminals

[15] LNG Canada. https://www.lngcanada.ca/

In addition, Chevron Canada is also investigating its own LNG terminal, terminal "Kitimat LNG". As of the Fall of 2018, a final investment decision has not been made.

Pacific Traverse Energy – LPG Terminal

Pacific Traverse Energy has filed an application with the National Energy Board to export "2,669,402 cubic metres (16,790,005 barrels) of propane" on an annual basis, from a facility in Kitimat.[16] The propane would be transported to Kitimat by rail. While the facility itself would not drive traffic through a transloading facility in Terrace (beyond potential project cargo during construction), the potential increase in train volumes in Terrace and on the Kitimat Subdivision to Kitimat would need to be considered during the site selection.

2.2.4 Stewart

Stewart, British Columbia is approximately 450 kilometres from Prince Rupert via Highway 16 and Highway 37 and has a population of around 500. The municipality is located at the head of the Portland Canal, a narrow saltwater fjord 145 kilometres long, on the Canada-US border just three kilometres east of Hyder, Alaska. Stewart is a gateway to the mineral rich regions of northwest BC and eastern Yukon and its economy is supported by the mining, logging, oil, gas and tourism industries.

Stewart is Canada's most northerly ice free port and has a 100 year history of passenger service, mining and forestry development.[17] The recently expanded Stewart World Port, which officially opened in September 2015, is privately owned and the first commercial wharf built on the BC coast in over 30 years.[18] The port is located one day closer to Asian markets than more southerly ports and can accommodate 50,000 deadweight tonne (DWT) ships while offering RO/RO services to barges. Stewart World Port is in its third phase of construction which includes building concentrate sheds, conveying systems and a shiploader for outbound bulk cargo. Upon completion, the shiploader will handle 3,300 tonnes of material per hour.[19]

We understand that the Stewart World Port is currently handling bulk exports of mineral concentrates from at least one mine along Highway 37. A presentation from the Stewart World Port also indicated that Lafarge, as of the of Fall of 2018, is considering using its facilities for bulk barge shipments of cement to mines in Northern BC.[20]

Stewart World Port is investigating the concept of constructing a railway between Kitwanga and Stewart, termed the Canada Stewart Port Railway. Based on investigations thus far, the

[16] Application by Pacific Traverse Energy Limited for a Licence to Export Propane.
[17] https://www.ubcm.ca/assets/Convention/2013/Forums/Small~Talk/Durant.Port_of_Stewart.pdf
[18] https://www.miningandenergy.ca/mininginsider/article/70m_stewart_world_port_opens_to_serve_resource_sectors/
[19] https://www.miningandenergy.ca/mininginsider/article/70m_stewart_world_port_opens_to_serve_resource_sectors/
[20] Presentation by Breanne Boettcher, Stewart World Port, Van Horne Institute 2018 Rail to Ports Conference.

expected cost would be approximately $1.3 billion.[21] An initial candidate for the capacity of this facility is the BHP Billiton Jansen Potash mine in Saskatchewan,[22] whose development is currently on hold.[23]

In 2019, Stewart World Port received approximately $13.1 million in federal funding to:

> The project will increase capacity and improve the fluidity of emerging export commodities such as bulk wood, mineral and agricultural products from Northern British Columbia, Yukon, Alberta and Saskatchewan. The project consists of installing bulk loading conveyor systems and power and control facilities at the Stewart World Port.[24]

2.2.5 Prince George

CN Distribution Centre

The CN Distribution Centre located in Prince George, British Columbia is an intermodal terminal specializing in the storage and transfer of forest products such as lumber, panel and pulp. Opened in October 2007,[25] the terminal provides direct access to the North American market through CN's Class 1 rail system and to overseas markets through direct rail service to the Port of Prince Rupert.

The Prince George Distribution Centre provides 84,000 square feet of warehouse space and 15 acres of outside storage. The intermodal yard has space for 20 railcars including centerbeams, flatcars and boxcars and features two 2,400-foot pad tracks, truck pick-up capabilities and an automated gate system.[26] The range of services provided include cross-docking, product transfer, container loading/unloading, inventory control and inspection, among others.[27]

2.2.6 Port of Vancouver

For most commodities, a transloading facility in Terrace's catchment area would be within northern BC. However, for certain commodities, there is potential for a transloading facility in

[21] Presentation by Breanne Boettcher, Stewart World Port, Van Horne Institute 2018 Rail to Ports Conference.
[22] Presentation by Breanne Boettcher, Stewart World Port, Van Horne Institute 2018 Rail to Ports Conference.
[23] Shield, D. 2017. BHP Billiton puts brakes on Jansen potash mine. https://www.cbc.ca/news/canada/saskatoon/bhp-billiton-board-jansen-potash-1.4257010
[24] Transport Canada. 2019. Government of Canada invests in transportation infrastructure at the Stewart World Port to move goods to market. https://www.canada.ca/en/transport-canada/news/2019/08/government-of-canada-invests-in-transportation-infrastructure-at-the-stewart-world-port-to-move-goods-to-market.html
[25] http://www.marketwired.com/press-release/cn-opens-c20-million-intermodal-and-distribution-centre-terminal-in-prince-george-bc-tsx-cnr-780941.htm
[26] http://www.marketwired.com/press-release/cn-opens-c20-million-intermodal-and-distribution-centre-terminal-in-prince-george-bc-tsx-cnr-780941.htm
[27] 2011 Prince George Transload Facility Brochure

Terrace, as part of a larger supply chain through the Port of Prince Rupert, to compete with similar facilities at the Port of Vancouver.

The Port of Vancouver is the largest and most diversified port in Canada, with 142 million tonnes of cargo moved through the port in 2017. The Port of Vancouver serves all major freight sectors, including automobiles, breakbulk, bulk and containers. Around 95 percent of the port's total cargo volume serves Canada's import and export markets.[28] The Port of Vancouver has 27 major marine cargo terminals and is served by three Class 1 railroads (CN, CP and BNSF). CN and CP provide on-dock rail facilities at the port's container and cargo terminals. The two railways offer double-stack intermodal service across Canada, including to Toronto and Montreal, and direct service to Chicago and other US markets. In total, there is 680 kilometres of rail track within the port.[29]

2.2.7 Other Existing and Potential Sites

During the consultations, there were other sites that were noted as being locations where logistics activity could take place.

Smithers

For mining-related shipments to mines along Highway 37, one consultation noted that because many of the inbound goods arrive from Vancouver and east of BC, transhipment of most inbound products between trucks occurs in Smithers, as this location avoids transport to Terrace then backtracking to the Highway 37 turnoff.

Kitwanga

During consultations related to mining activities, one stakeholder noted that they considered using a siding a Kitwanga to transload mineral ore for transport to destinations in Eastern Canada. The plan did not end up proceeding, in part because the existing siding that was to be used was no longer in service. Regardless, from a transportation perspective, Kitwanga, located at the junction of Highways 16 and 37, is better placed for transloading activities related to mining activities in northern BC, as it would maximize the distance of transportation by rail and/or minimize the length of any backtracking.

2.3 Truck and Rail Service in Terrace

2.3.1 Truck Service

There are currently four companies licensed to provide drayage service from Fairview Container Terminals in Prince Rupert (Bandstra, Gat Leedm, Arrow and Kristoff). It was noted during some of the consultations that trucking supply in the region is constrained, through the development of the Ridley Island Connector Road is intended to reduce this issue by increasing the productivity of truck drays in Prince Rupert. One stakeholder opined that ensuring that a

[28] Vancouver Fraser Port Authority. About us. https://www.portvancouver.com/about-us/
[29] Vancouver Fraser Port Authority. Rail. https://www.portvancouver.com/truck-rail/rail/

memorandum of understanding is in place with a trucking company would be a necessary step before constructing a transloading facility.

2.3.2 Rail Service

Out of Terrace, CN currently services Prince Rupert with a daily "Logger" road switcher service. The train, destined to CN's downtown/waterfront Prince Rupert terminal brings manifest traffic to local bulk terminals in Prince Rupert, including the Aquatrain. It does not serve Fairview Container Terminal, as this is served directly by high-velocity intermodal unit trains[30] that travel to their final destinations in the US Midwest with limited stops. There is also a train serving Kitimat three to four-days per week. Finally, initial consultations noted that there was not currently a local yard assignment in Terrace (i.e. that provides switching to local industries); however, subsequent consultations confirmed that a service did indeed exist.

Otherwise, existing terminals in Prince Rupert are currently serviced exclusively by unit trains (e.g. coal and grain). We understand there are no unit train shipments to Kitimat, though a liquid propane export terminal has been proposed.

CN noted that they had investigated offering a service that shuttles containers to Prince Rupert from regions in northern BC; however, noted that because the Logger currently serves downtown Prince Rupert, would not be feasible. Container well cars would need to be switched from Fairview Container Terminal into CN's downtown yard, to be taken by train to Terrace, and vice-versa. This would result in extended transit times (a stakeholder estimated up to four days) as well as potentially impacting DP World's rail yard capacity.

2.4 Considerations for a Transloading Facility in Terrace

In the short-term, a transloading facility in Terrace would compete against an increasingly developed logistics sector in Prince Rupert and the surrounding areas. Though there are gaps in terms of logistics capacity that remain in Northern BC (e.g. plastics handling, refrigerated cargo, etc.) stakeholders opined that in principle it would more desirable to construct a transloading facility for containerized exports in the Prince Rupert area due to (1) the short dray distance between any facility and Fairview Container Terminal (particularly if the facility were located on Ridley Island) and (2) the ability to maximize the length of rail haul using bulk rail cars. These characteristics would help minimize the transportation costs in the supply chain and thus the potential benefits to shippers.

[30] A unit trains is a train consisting of a single commodity (e.g. containers), usually that cycles between a single origin and destination.

However, even in the shorter-term, stakeholders noted that the possibility of having a much lower land development cost in Terrace is a reason for considering developing a facility in Terrace. To this end, we heard that the cost of developing land for a facility could be roughly an order of magnitude less in Terrace than it is in Prince Rupert, i.e. $150,000-$250,000 versus $1 million per acre.[31] There are also brownfield sites in Terrace (e.g. along the Highway 16 corridor), which may have even lower land development costs, subject to some of the analysis to be conducted in the next phase of the study. However, stakeholders also noted that there are sites in Prince Rupert where new transloading capacity could be developed at reasonable cost, such as Watson Island, the site of a former pulp mill.[32]

We heard that the cost of developing land for a facility could be roughly an order of magnitude less in Terrace than it is in Prince Rupert, i.e. $0.15-$0.25 versus $1 million per acre, for a typical greenfield site.

Longer-term, we heard that should the growth of the Port of Prince Rupert continue on its current trajectory, land around the port may become constrained by the mid-2020s. In addition, though the development of a potential facility in Terrace would compete with other existing and new facilities in the region, stakeholders noted that a key enabling measure for the future development of the Fairview Container Terminal is driving more containerized export volumes through the Port. To this end, some stakeholders noted that any facility in Terrace that could help drive export volumes would improve the competitiveness of the corridor via the Port of Prince Rupert.

[31] From recent remarks by a Port of Vancouver presentation in Calgary, the cost for industrial land in Vancouver is approaching $2 million per acre.
[32] This comparison was based on a comparison of greenfield sites and should be considered highly approximate.

3 Market Potential

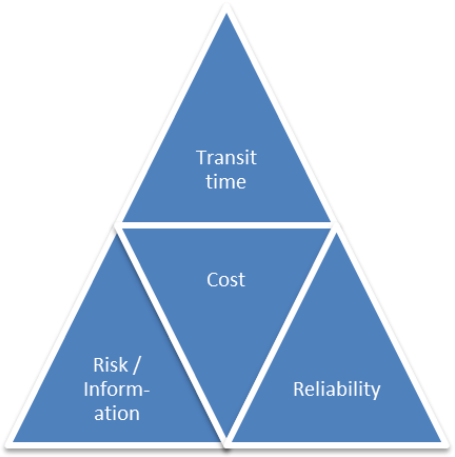
Key Chapter Takeaway

- In the short-term, while lumber, wood pellet and cement traffic could provide an anchor for a facility, it does not appear to be sufficient to meet the minimum-scale requirements. However, if one or two other opportunities were to develop (e.g. another business elects to use a facility in Terrace, such as a wood pellet plant inland), then there is the potential to meet the necessary minimum scale for a transloading facility.
- In the medium-term, should the construction of planned micro-liquefied natural gas facilities at the Skeena Industrial Development Park (SIDP) go ahead, these facilities could be potential traffic generators for a truck-to-rail container intermodal facility that could feed a shuttle rail service between Terrace and Prince Rupert. However, there are some risks associated with developing this rail traffic associated with the rail service logistics at the port.
- Longer-term, the limited availability of land in Prince Rupert after the mid-2020s (should the Port's growth trajectory continue) could create the conditions for a logistics facility to develop in Terrace. Further, developments at the SIDP could provide a potential source of traffic.

3.1 Conceptual Value Proposition

Ultimately, for a transloading facility in Terrace to be feasible, it must generate sufficient value for the shippers that would use the facility – in terms of reducing costs, reducing travel times, improving reliability, or lowering risks (through greater information, lower handling, etc.) (Figure 3-1). Improvements along these dimensions can help lower the overall supply chain costs through (e.g. reduced transportation costs, lower holding costs, reduced damage charges, etc.).

Figure 3-1: Components of Supply Chain Competitiveness



Source: CPCS

As a rule of thumb, shippers and logistics providers will favour moving product using the lower cost mode of transport. However, other factors also influence shipper decisions indirectly through cost. Below are some examples of how these factors influence cost:

- **Travel time:** Increasing travel time increases the holding/inventory costs (especially for high-value, time-sensitive products) and transportation equipment costs (e.g. rail cars) experienced by the shipper.
- **Reliability:** Decreasing reliability also increases the holding cost and transportation equipment costs experienced by the shipper, especially for high-value,

time-sensitive products, because more buffer time must be built into schedules and/or more buffer stocks must be held in the supply chain. Some shippers frame this as "consistency of supply chains": i.e. however long it takes to ship, the transit time should be consistent between shipments.

- **Risks/information:** Product damage from loading, unloading, and transit can increase the cost to shippers. For example, handling of wood pellets needs to be limited to avoid the breakdown of the pellets. Refrigerated cargo is often monitored to ensure the product integrity.

Ultimately, the specific trade-off made between these factors is influenced by the commodity (e.g. weight, value, volume, perishability) and their market characteristics (e.g. origin, destinations, cost of alternative transportation), and shipper preferences. For example, a high-value shipment of auto parts as part of a just-in-time supply chain for an assembly plant is likely to be transported by higher-cost but faster and higher-reliability trucking. By contrast, a delivery of coal, which is low-value and can be easily stockpiled, is likely to be transported by rail to benefit from the lower shipping costs.

A truck carrying auto parts to a production plant might have a value of time of $13,000 per minute, if unexpected delays in arrival will cause the shutdown of the assembly line.

Source: InterVISTAS Consulting (2009) Cross-Border Flow Analysis Report 5: Case Study for Company 5 (Automotive Parts Manufacturer) prepared for Industry Canada.

Generally, the greater the volume of cargo that can be transported in one move, the lower transportation cost per tonne-kilometre, due to economies of scale (fixed costs spread over a large volume). To this end, rail is generally lower cost per tonne-km than trucking, particularly for longer distance moves. However, handling costs, and the cost of positioning rail cars, can make rail more costly per tonne-km for shorter distances. The breakeven point in distance between truck and rail usage is generally 500 km; i.e. when the transportation distance is longer than 500 km, rail can be more economical.

To this end, one of the general value propositions for a truck-to-rail transloading facility is that it helps allow non-rail connected shippers access rail closer to the origin of their goods.[33] While there are additional fixed costs associated with using a transloading facility due to the transloading costs, if the shipping distance is long enough, then it would be less expense to use a truck to rail transloading facility. Figure 3-2 shows this highly conceptually.

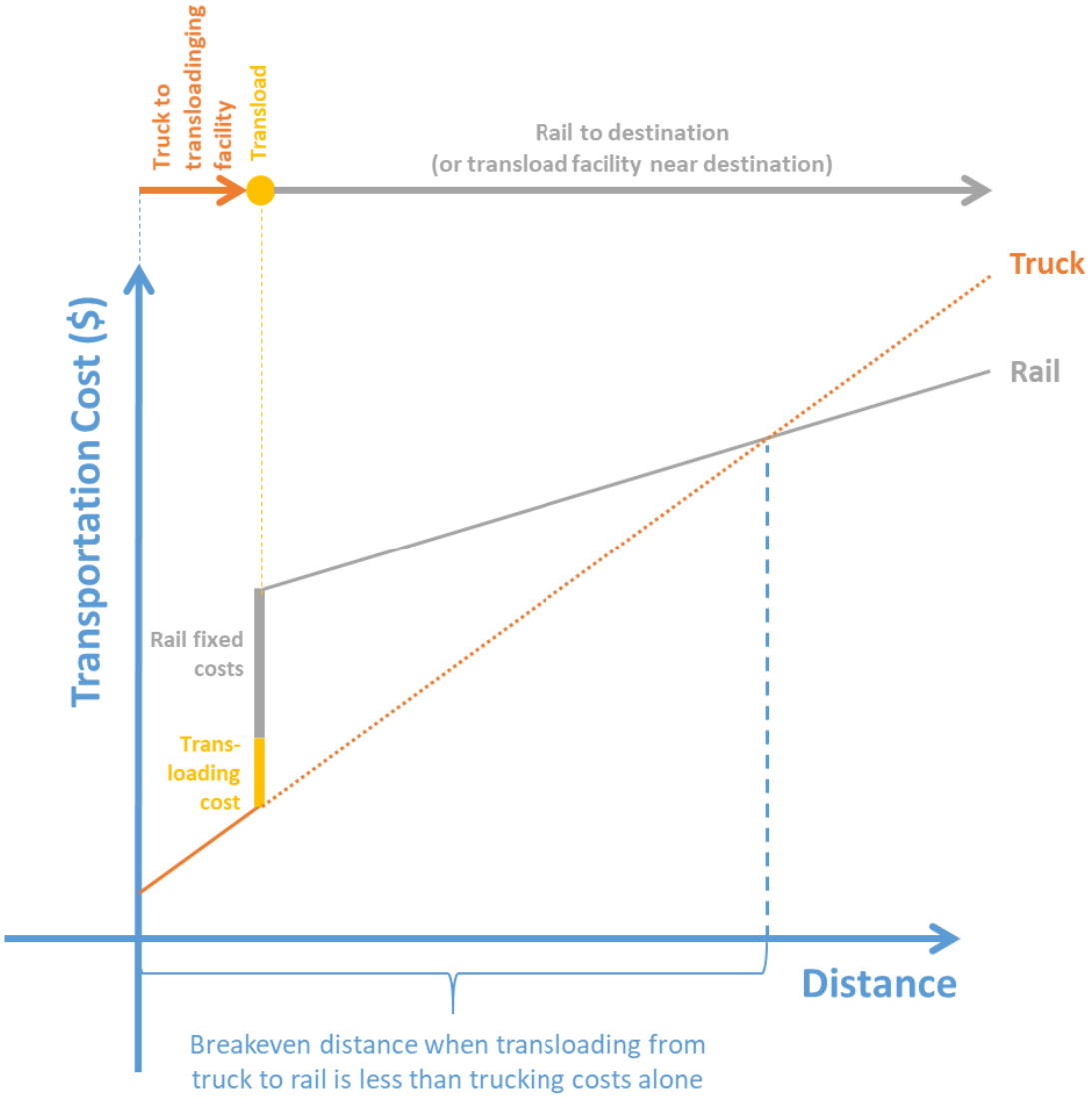
There are other reasons for using a transloading facility. For example, a transloading facility that stuffs products into containers (arriving by truck or rail), allows shippers to take advantage of backhaul container shipping rates to Asia. Containers also help preserve product integrity, which is particularly important in the case of products like wood pellets. Finally, using containers could help facilitate the distribution of the containerized product once in Asia, to more remote locations.

[33] Alternatively, receivers of inbound goods could receive products by rail from a transloading facility.

There are other scenarios as well; transloading facilities are flexible to handle a number of commodities, even opportunities that might not exist today, provided the right infrastructure is provided. They are also scalable, provided land is available for growth.

Drawing from these conceptual examples, the following sections review potential candidate commodities that could be handled at a transloading facility in Terrace. For each commodity, to the extent publicly available data and information from stakeholder consultations allow, we describe existing product flows in the Terrace area and Highway 16 corridor more broadly. Notable future developments are also summarized.

Figure 3-2: Example of Generic Cost Profile of a Transloading Facility



Note: Not to scale. Source: CPCS

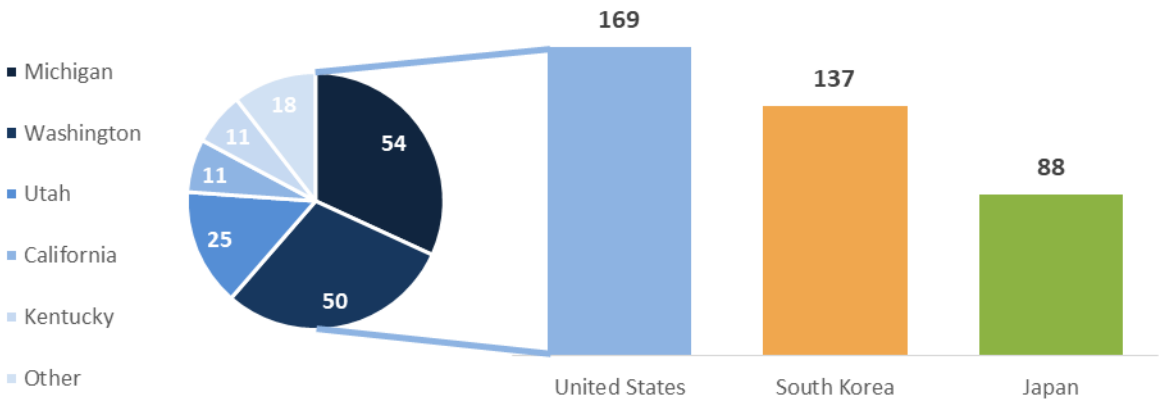
3.2 Aluminum

3.2.1 Production and Flows

In November 2007, Rio Tinto Canada Holding Inc. and Alcan merged to create Rio Tinto Alcan Inc. (now Rio Tinto). Rio Tinto now operates the aluminum smelter in Kitimat ("Kitimat Works") which is one of the largest manufacturing complexes in BC. In March 2016, Rio Tinto completed a $4.8 billion Kitimat Modernization Project, which increased the aluminum smelter's capacity by 48% to approximately 420,000 tonnes of aluminum ingot per year.[34] The facility produces three product lines: sheet ingots, commercial grade trilock and sows, which are shipped "primarily to Japan, South Korea and the USA."[35]

According to the Statistics Canada, Canadian International Merchandise Trade (CIMT) Database, there were approximately 400,000 tonnes of unwrought aluminum were exported from British Columbia in 2016. We assume that these exports are exclusively from Kitimat, as we are not aware of any other aluminum production in BC. As shown in Figure 3-3, approximately 42% of these exports were destined to the US, predominantly to Michigan and Washington State. The vast majority of these exports (over 90%) to the US were by rail.

Figure 3-3: Aluminum Exports from British Columbia, 2016 (in Thousand Tonnes)



Source: CPCS analysis of Statistics Canada, Canadian International Merchandise Trade Database.

3.2.2 Opportunity for a Transloading Facility in Terrace

Rio Tinto's Kitimat Works are connected to CN's North American rail network via the Kitimat Subdivision. While there is the possibility that Rio Tinto might use a transloading facility in Terrace on an ad hoc basis to ship goods to the US (e.g. if there was an outage of the Kitimat Subdivision, or possibly if there was a desire to decrease transit times), generally, trucking

[34] https://www.bechtel.com/projects/kitimat-aluminum-smelter-modernization/
[35] Rio Tinto. Operations. https://www.riotinto.com/canada/bcworks/operations-17848.aspx

aluminum products to Terrace for transloading onto rail would likely not be more economic than shipping directly by rail.

For aluminum that is destined for overseas, it is possible that some of the product is containerized.[36] Though trucking the aluminum in bulk all the way to Prince Rupert (and transloading there) would likely be lower cost from a transportation perspective due to the higher capacity of B-Train (over 40 tonnes) rather than a container (approximately 27 tonnes), it may be possible that some of this transloading could occur in Terrace. For illustration purposes in the summary table, we have assumed potentially 10% of Asian exports (20,000 tonnes per year) might be containerized.

3.3 Cement

3.3.1 Production and Flows

Lafarge Holcim currently operates a transloading facility in Terrace along Keith Avenue. This facility has two five-car rail tracks, which are used to pump cement from rail cars to bulk trucks. While we have not received confirmation of current volumes from Lafarge, local stakeholders believe there are approximately 10-20 cars per month (i.e. approximately 20,000 tonnes per year at an order of magnitude level). Based on triangulation with other stakeholder discussions, a significant fraction of the product is intended for mining use.

As of the fall of 2018, we understand that Lafarge is considering plans to barge cement to Stewart World Port,[37] which could potentially significantly diminish the volumes of cement transloaded in Terrace in the future. Stakeholders also noted that historically, some cement for mining had been supplied via barge to Kitimat, for onward shipment to mines, which represents an alternative competing supply chain.

3.3.2 Opportunity for a Transloading Facility in Terrace

While to our knowledge, no final decision has been made to relocate cement transloading from Terrace to Stewart, this is likely a competitive supply chain option given the lower cost of marine transportation generally as compared to rail, as well as the proximity of Stewart to mines in Northwest BC. While the construction of LNG terminals in Kitimat, for example, could increase the need for cement in the area, we understand from stakeholders that in the past, barges have delivered cement to Kitimat as well. To this end, it appears that the volume of product transloaded in Terrace could potentially be reduced in the future.

[36] The volumes are unknown. A terminal operator in Vancouver, shows stacks of metals in their warehouse that appears to be aluminum destined for transloading into containers: http://www.euroasiainc.com/. (Accessed November 15, 2018).

[37] Presentation by Breanne Boettcher, Stewart World Port, Van Horne Institute 2018 Rail to Ports Conference.

3.4 Containerized LNG

3.4.1 Production and Flows

Multiple stakeholders interviewed were considering developing a micro-liquefied natural gas (LNG) facilities at the Skeena Industrial Development Park (SIDP). At each of these facilities, natural gas arriving by pipeline would be liquefied and then loaded into ISO tank containers (tanktainers), an example of which is shown in Figure 3-4. Once loaded, the containers would be transported to Prince Rupert, where they would be sent by ship to China. Though China has the capability of receiving bulk LNG ships, there are locations where the lack of pipeline infrastructure and other logistics capacity makes shipping by container a more desirable option, according to stakeholders.

Figure 3-4: Conceptual Example of a Tank Container (20-foot)

Source: TCC1 /Wikipedia / CC BY-SA 3.0

The estimates of volume are in the area of 1,000 40-foot containers per month (12,000 containers per year),[38] though it could be lower during initial ramp up and higher if both

[38] These volumes correspond to the outbound volumes. An equivalent 1,000 containers per month would also need to return to Terrace. In other words, there would be 24,000 container movements/lifts per year (12,000 outbound to Prince Rupert, and 12,000 inbound to Terrace), assuming the volumes noted.

proposed facilities go ahead. Though none of the companies interviews had made a final investment decision, the potential operations could commence sometime in 2020.

3.4.2 Opportunity for Transloading in Terrace

The default plans noted by stakeholders are to truck the filled ISO containers from Terrace to Prince Rupert, and to return the empty containers by truck. Stakeholder estimates as well as our own estimates suggest the cost would range from $500 to $900 per round trip (i.e. including the cost of repositioning the empty ISO tank container).[39] While we anticipate that trucking will be used should these facilities go ahead given the short length of haul (i.e. 150 km) and container handling required, rail could be considered given the relatively consistent volumes, though there are a number of conditions.

First, unless rail service was provided directly to the SIDP (which is to be explored in the next step of the study), the containers would have to be transported by truck from the SIDP to the transloading facility, which we anticipate would cost about $90-$200 per container roundtrip[40] before being loaded onto rail cars. We understand that best practice in North America is to not stack tank containers.

The rail service would likely be provided by a manifest train, a train which handles a number of commodity types, between Terrace and Prince Rupert. Long-distance intermodal trains to/from Prince Rupert do not and would almost certainly never stop in Terrace, given the need to maintain a high-velocity rail service between Prince Rupert and the US Midwest, which is key element of the value proposition of the Fairview Container Terminal and related inland transportation. However, CN also operates a manifest service between Terrace Yard and Prince Rupert downtown yard (e.g. for servicing the Aqua Train, the pellet terminal).

If the estimated volumes of containers were to develop, and if a terminal in Terrace were easy for CN to serve, it is possible that CN would be interested in this traffic, as it would represent incremental revenue with relatively small incremental costs (i.e. the containers could be placed on a single set of railcars added to their existing manifest service). However, further analysis would likely need to be undertaken by the proponent, CN and the terminal operator, in part as there would be a need to switch the additional set of cars in from the Prince Rupert Downtown Yard to the Fairview Container Terminal. Figure 3-5 shows the relative locations. Other issues, such as the frequency of the vessel sailings that the LNG producers are considering, would need to be explored in terms of understanding the staging that would be required to meet the Fairview Container Terminal's allowable receiving window (i.e. no more than five days from the proposed vessel).

[39] Our point estimate is about $800, based on current trucking rates by kilometre, including fuel.
[40] We assumed a drayage cost of about $100 per hour, with the expectation that the roundtrip could be as low as 45 minutes.

Figure 3-5: Fairview Container Terminal and CN Prince Rupert Downtown Yard

Source: CPCS, adapted from Google Earth / DigitalGlobe.

3.5 Forestry Products

3.5.1 Lumber

Production and Flows

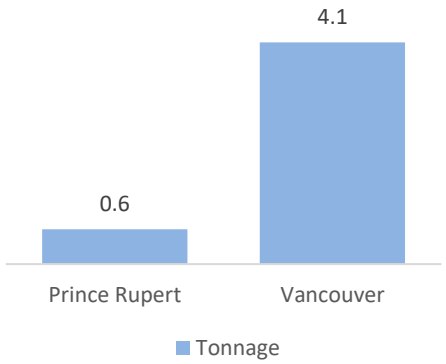
There are 22 lumber sawmills west of and in Prince George, including Skeena Sawmills in Terrace. Most of these mills have active rail connections, with a notable exception being Skeena Sawmills (Figure 3-7).[41] Based on 2016 estimates of sawmill production by the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (MFLNRORD),[42] we estimate there is approximately 2,200-3,300 million board feet (mmfbm)[43] of annual lumber production capacity along Highway 16 west of Prince George, which equates to about 17-24% of installed capacity in BC.[44] This equates to approximately 2.2-3.2 million tonnes lumber.[45]

[41] This assessment was primarily based on aerial imagery.
[42] Ministry of Forests, Lands, Natural Resource Operations and Rural Development (MFLNRORD). 2016. Major Primary Timber Processing Facilities in British Columbia.
[43] The use of mmfbm is an industry standard abbreviation.
[44] The lower bound excludes Prince George, whereas the upper bound includes Prince George.
[45] Assumes 2.07 cubic metres per mmfbm according to MFLNRORD (2016), and 0.48 tonnes per cubic metre, the approximate density of pine.

Prince George is approximately halfway between Prince Rupert and Vancouver, so can be considered a breakpoint for Prince Rupert natural catchment zone, as a first approximation.[46]

In 2016, BC exported approximately 14 million tonnes of lumber, of which approximately two-thirds was destined to the United States. Of the remaining one-third (approximately 4.7 million tonnes), approximately 14% was exported via Prince Rupert (Figure 3-6). The remaining volumes were exported via Vancouver, almost entirely containerized.[47]

Figure 3-6: Lumber Exports from British Columbia by Water, 2016 (in Millions of Tonnes)



Source: CPCS analysis of Canadian International Merchandise Trade Database.

Assuming that capacity is a proxy for production at an order of magnitude level,[48] and on average, 33% of lumber production in BC is exported to Asia,[49] then 0.7-1.1 million tonnes per year of lumber from these sawmills along Highway 16 is exported to Asia. These estimates suggest that the Port of Prince Rupert has captured a sizeable share of lumber exports from northern BC (i.e. 0.6 million tonnes in 2016, as shown in Figure 3-6), though there is still some potential growth.

[46] The 'exact' halfway point is south of Prince George.
[47] According to Port of Vancouver statistics, only approximately 2% of lumber via Vancouver (0.1 million tonnes) is exported breakbulk.
[48] According to MFLNRORD (2016), on average across BC, capacity utilization was 103%, though it varied by zone of the province.
[49] Available data sources do not allow for the further breakdown of exports by plant.

Figure 3-7: Lumber Mills in Northern BC West of and Including Prince George

Company	Location of Mill	Rail Connection	Estimated Annual Capacity (million of board feet)
Skeena Sawmills (ROC Holdings)	Terrace		82
JCI Touchwood Sawmills	Terrace		4
Lake Drive Lumber	Terrace		1
Kitwanga Forest Products	Kitwanga		34
West Fraser Mills Ltd. (Pacific Inland Resources)	Smithers	✓	257
Canadian Forest Products Ltd.	Houston	✓	483
Babine Forest Products Ltd. -Hampton Affiliates	Burns Lake	✓	250
Decker Lake Forest Products - Hampton Affiliates Ltd.	Burns Lake	✓	77
Pacific Timber	Burns Lake		38
West Fraser Mills Ltd.	LeJac	✓	261
Canadian Forest Products Ltd.	Engen	✓	481
L & M Lumber Ltd.	Vanderhoof	✓	240
BC Custom Timber Products Ltd.	Vanderhoof		14
Apollo Forest Products Ltd.	Fort St James	✓	125
Conifex Timber Inc.	Fort St James	✓	280
Canadian Forest Products Ltd.	Isle Pierre	✓	220
Carrier Lumber Ltd.	Prince George	✓	247
Lakeland Mills Ltd	Prince George	✓	115
Edgewater Holdings Ltd.	Prince George	✓	28

Note: Skeena Sawmills, in a more recent profile of the Forestry Sector in Terrace, is reported as producing 250,000 cubic meters (approximately 120 million board feet). Forestry Sector Profile –Terrace: The service and Supply Center of Northwest British Columbia. Source: CPCS analysis of Major Primary Timber Processing Facilities in BC, 2016, and aerial imagery to identify spurs. Note that we have

Opportunity for a Transloading Facility in Terrace

Lumber exports to Asia from sawmills along Highway 16 (including Skeena Sawmills) could, in principle, be transloaded from truck or rail to containers in Terrace rather than Prince Rupert. However, there are already lumber transloading facilities in Prince Rupert (truck-to-container [Quickload] and rail-to-container [CT Terminals]). Because more volume of lumber can be accommodated on a lumber B-Train (i.e. over 40 tonnes)[50] as compared to a truck carrying a single 40' container (approximately 27-28 tonnes), and because the cost of trucking over a given

[50] 63,500 kg (the maximum gross combination vehicle weight allowed in BC) minus 22,000 kg (the approximate tare weight).
Gross weight: BC Ministry of Transportation and Infrastructure. Compliance Circular NO. 05-16 August 8, 2016.
Tare weight source: https://www.todaystrucking.com/why-mackinnons-b-trains-are-heavyweight-champs/

distance is largely fixed regardless of the weight that it carries, trucking (or railing) lumber in bulk to Prince Rupert is expected to more economical, all else equal.[51]

However, if a transloading facility were set up in Terrace, it could likely reduce the cost of shipping lumber east from Terrace to markets in the US. We understand that local producers are transloading lumber from truck to rail car (e.g. centerbeams) in Prince Rupert, necessitating additional trucking costs (i.e. roughly $700 per load). Reducing these costs would make it more favourable to ship additional product eastward. To this end, this could result in increased lumber flows to the east from Terrace, from approximately 12,000 tonnes per year currently, to 48,000 tonnes per year.[52]

The current rail lumber transloading facility in Prince Rupert (CT Terminals) is adjacent to a petrochemical terminal proposed by Vopak. Should Vopak made a final investment decision to proceed, then we understand that CT Terminals may need to be relocated.

3.5.2 Wood Pellets

Production and Flows

There is approximately 1.7 million tonnes of pellet production in Northern BC and Alberta (Figure 3-8).[53] The vast majority of these pellets are exported in bulk either via terminals in Vancouver and Prince Rupert (likely about 1.5 million tonnes per year).[54,55] Specifically, in 2017, approximately 1.1 million tonnes of wood pellets was exported in bulk via the Westview Wood Pellet Terminal in Prince Rupert, which is owned by the Pinnacle Renewable Energy Group.[56] Demand for wood pellets, particularly in Asia, is expected to increase due to renewable energy targets.[57]

[51] There is also the CN Prince George Distribution Centre which can transload lumber into containers, which can then be loaded on to trains destined for Prince Rupert.
[52] CPCS estimates based on stakeholder inputs, and MFLNRORD (2016).
[53] Defined as being on or north of Highway 16. CPCS did not undertake a comprehensive search of pellet plants in Alberta.
[54] Includes exports by Pinnacle, Canfor and Pacific Bio Energy. Canfor Energy North LP plants are joint ventures with Pacific BioEnergy Corporation, which indicates that most of its exports are via Vancouver. Pacific BioEnergy handles transportation and logistics for these plants.
[55] Pinnacle Renewable Energy also owns a number of inland pellet plants in Northern BC, at least in part.
[56] Prince Rupert Port Authority. Foreign Cargo by Terminal (Tonnes). Summary Report for December 2017
[57] Strauss, W. 2017. Policies will drive Japanese demand for industrial wood pellets. *Canadian Biomass.* https://www.canadianbiomassmagazine.ca/pellets/policies-will-drive-japanese-demand-for-industrial-wood-pellets-6569

Figure 3-8: Estimated Wood Pellet Production in Northwestern BC

Company	Mill Location	Status	Estimated Annual Production (tonnes)	Notes
Canfor Energy North LP	Chetwynd		88,000	Likely exports via Vancouver*
Canfor Energy North LP	Fort St. John		60,000	Likely exports via Vancouver*
Pacific BioEnergy	Prince George		345,000	Ships via North Vancouver
Pinnacle Pellet Burns Lake	Burns Lake		380,000	
Pinnacle Pellet Houston	Houston		217,000	
Pinnacle Pellet	Entwistle, Alberta		400,000	Ships via Prince Rupert
Premium Pellet Ltd.	Vanderhoof		140,000	Bagged or bulk quantities
Vanderhoof Specialty Wood Products	Vanderhoof		41,000	Bagged for domestic and exports
Skeena Sawmills	**Terrace**	**In development**	**75,000**	**Does not have active rail access**
Pinnacle/West Fraser	Smithers	In development	125,000	
Gitxsan Development Corp./Airex	Hazelton	In development	100,000	Article notes plans to ship to Prince Rupert by rail.
		Subtotal – Likely ships via Vancouver	*493,000*	
		Subtotal – Pinnacle (operational)	*997,000*	
		Subtotal – Other Operational	*181,000*	

*These plants are joint ventures with Pacific BioEnergy Corporation, which indicates that most of its exports are via Vancouver. Pacific BioEnergy handles transportation and logistics for these plants.
Pacific BioEnergy. Communities. http://www.pacificbioenergy.ca/communities/.

Source: CPCS analysis of Major Primary Timber Processing Facilities in B.C. 2016, company websites and new articles.

Opportunity for a Transloading Facility in Terrace

According to stakeholders, these bulk exports are typically intended for industrial power generation usage, which are equipped to receive bulk quantities. The majority of these bulk exports are therefore not candidates for transloading in Terrace, to the extent that they continue to be exported by bulk. In addition, the companies that operate wood pellet export terminals in Prince Rupert and Vancouver also have ownership stakes in most of the producers, with the notable exceptions (to our knowledge) being Premium Pellet and Vanderhoof Specialty Wood Products in Vanderhoof, Skeena Sawmills in Terrace, and the proposed new plant in Hazelton.

However, there are opportunities for a transloading in Terrace. Notably, because Skeena Sawmills is not currently connected by rail, there is an opportunity to transload its annual production of pellets (75,000 tonnes) to containers or bulk rail cars. In part to preserve the

integrity of pellets and to deliver to smaller end-customers in certain markets (e.g. Japan), pellets can be bagged and containerized.[58]

While as with lumber and other products, it would likely be more economical to transport wood pellets in bulk to Prince Rupert for transloading, a new facility would need to be set up, which could happen in Terrace. However, if Skeena Sawmills were the only producer needing transloading, then the activity could take place right at the sawmill site, as well.

Alternatively, pellets could be loaded into bulk hopper cars, and transported to Westview Wood Pellet Terminal as the export terminal in Prince Rupert is not well-equipped to receive trucks.[59] This would need to take place at an offsite location, unless the rail spur to Skeena Sawmills were reactivated.[60]

3.5.3 Pulp and Paper

Production and Flows

There is an estimated 1.4 million tonnes of pulp and paper production capacity in Prince George, plus additional capacity in northeastern BC (Figure 3-9).[61] There is also production of pulp in northern Alberta that is exported via ports in BC. In 2016, exports from BC and Alberta by water were almost exclusively routed through Vancouver (Figure 3-10). According to Port of Vancouver data, in 2016, approximately 70% of wood pulp was exported containerized. Applying similar factors to below, approximately one million tonnes per year of pulp from Prince George could containerized.

Figure 3-9: Estimated Pulp and Paper Production in Northwestern BC

Company	Location of Mill	Estimated Annual Capacity (thousand of tonnes)
Canadian Forest Products Ltd.	Prince George	352
Canadian Forest Products Ltd.	Prince George	568
Canadian Forest Products Ltd.	Prince George	319
Canadian Forest Products Ltd. (paper)	Prince George	180
Canadian Forest Products Ltd.	Taylor	210
Paper Excellence BV.	Mackenzie	224

Source: CPCS analysis of Major Primary Timber Processing Facilities in B.C. 2016.

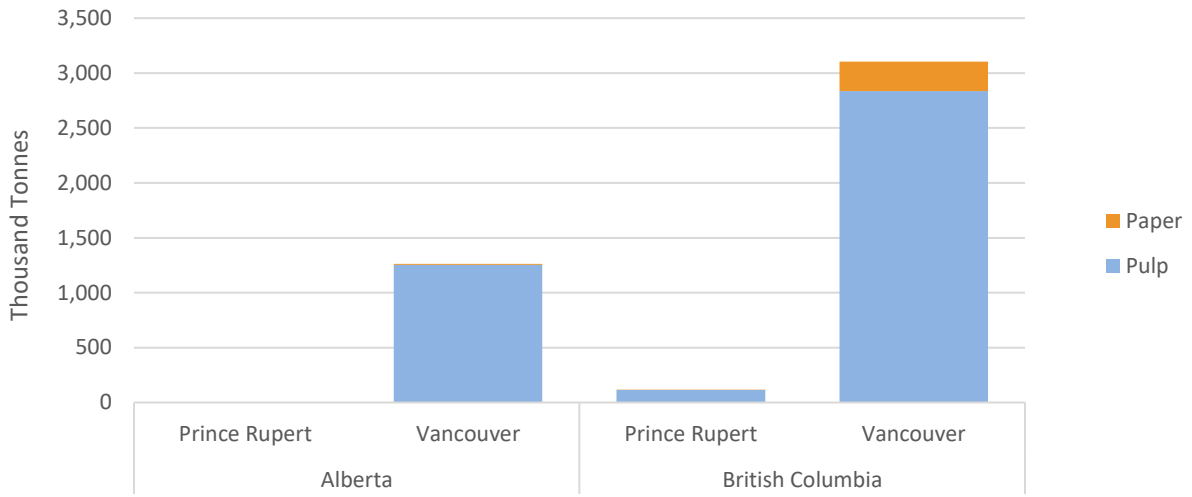
[58] According to the following presentation, the average tonnage is between 24.5 to 26.1 tonnes per container. Vinpac Lines. Wood Pellet.

[59] The only road accesses to the Westview Wood Pellet Terminal are through residential or parks, and we understand the terminal itself is not well-equipped to receive trucks.

[60] CPCS is not aware of any plans to do so.

[61] According to MFLNRORD (2016), on average across BC, capacity utilization was 100% for pulp mills,though it varied by zone of the province.

Figure 3-10: Pulp and Paper Exports from British Columbia by Water, 2016 (in Thousand Tonnes)



Note: excludes waste products. Source: CPCS analysis of Canadian International Merchandise Trade Database.

Opportunity for a Transloading Facility in Terrace

Similar to lumber, while transloading from rail or truck to container could take place in Terrace, all else equal it is more economical to transload right on the coast, to minimize the distance containers are transported by truck. Furthermore, as noted, pulp and paper is exclusively transloaded in Vancouver rather than Prince Rupert. Unlike lumber, pulp needs to be stored indoors in warehouses. There are already a number of facilities in Vancouver (e.g. Euro Asia, Coast 2000 Terminals) that have warehouses and offer this service. To this end, it is unlikely that in the short-/medium-term (i.e. less than 10 years) that there would be a rationale to relocate pulp transloading to Terrace.

3.5.4 Logs

Production and Flows

We understand from stakeholders that there can be, in a typical year, 200,000 cubic metres of timber produced in the Terrace-area. Over half of the total production remains locally in BC, either for pulp logs or local production. Timber is trucked to Prince Rupert on logging trucks, where it is sorted and loaded out for export, either on ships as breakbulk cargo, or containers. We understand from stakeholders that there are of the order of 15,000 containers per year of logs being transloaded from truck to container in Prince Rupert.

Opportunity for a Transloading Facility in Terrace

Again, similar to the lumber exports, because of the higher capacity of log trucks versus a truck hauling a container, it is more economical from a cost per tonne perspective to transport logs in bulk to Prince Rupert. As a result, it is unlikely that transloading of these commodities would take place in Terrace in the short-term.

3.6 Fuels

3.6.1 Production and Flows

There is an existing small fuel terminal in Terrace, located on the southwest corner of CN Terrace's yard, which receives fuels from refineries in Edmonton.[62] There is no publicly available information about the volumes to the facility. Based on aerial imagery, the terminal can accommodate up to six rail cars at a time. If a new set of loaded cars arrived every week, volumes would be of the order of 30,000 tonnes per year.

3.6.2 Opportunity for a Transloading Facility in Terrace

One stakeholder opined that in the future, this facility may need to expand in the future. Given the industrial developments in the area, it is plausible that expansion of the existing facility could be the first course of action, as there is some land to the south and east that could be used, subject to environmental and other project development steps. A new fuel terminal could be part of a broader master plan for a new transloading terminal, though because of the specific handling requirements for fuel (e.g. racks, tanks, etc.) such a facility does not provide a lot of complementarity with other commodities.

3.7 Grains and Special Crops

3.7.1 Production and Flows

In 2017, grain, specialty crop and feed exports via the West Coast (Prince Rupert and Vancouver) totalled at least 32.9 million tonnes,[63] of which 5.8 million tonnes was exported via Prince Rupert Grain Terminal. At the Port of Vancouver, where containerized grain exports are reported separately, the vast majority of grain exports are in bulk, though there was 2.2 million tonnes of speciality crops and 0.4 million tonnes of other cereals exported in containers, representing about 10% of grain exports.[64]

In 2017, Ray-Mont Logistics, which also has transloading operations in Vancouver, opened a unit-train capable rail car to container transloading facility in Prince Rupert. Unit trains are trains made up of one single car type, and are usually 100 cars or longer. According to their press release, "the operation will involve pulses and cereals (such as lentils, peas, beans, soybeans, flax, and wheat) as well as other specialty agricultural crops transported in hopper cars by rail from Western and Central Canada and the US Midwest."[65]

---

[62] Suncor's B.C. Terminals

[63] The Port of Prince Rupert does not report containerized grain exports.

[64] There may be other grain exports classified as other. An earlier study from 2014 citing Port of Vancouver data estimated the fraction of containerized exports from Vancouver between 13%-17%.
Prentice, B. Containerized Grain Supply Chain in Western Canada: Opportunities and Regulatory Barriers.

[65] Ray-Mont Logistics Adding Facility for Export of Containerized Crops at Port of Prince Rupert. https://www.newswire.ca/news-releases/ray-mont-logistics-adding-facility-for-export-of-containerized-crops-at-port-of-prince-rupert-616633294.html

The Port of Prince Rupert does not report containerized grain throughput, but we can make some estimates of grain volumes transloaded in Prince Rupert using data from the Grain Monitor (Quorum Corporation), triangulating with other sources. According to data from the Grain Monitor, between October 2017 and September 2018, the first full year of operation of the Ray-Mont transloading facility, approximately 70,000 tonnes of peas arrived by rail in Prince Rupert. These volumes appear to be increasing, as extrapolating 2018 year-to-date volume from September, the estimated 2018 volumes would be 90,000 tonnes. Peas are almost certainly being transloaded by Ray-Mont, as, prior to its opening in September 2017, there were negligible volumes of peas being transported by rail to Prince Rupert.

There may be other grains being transloaded in Prince Rupert. Between January-September 2018, 240,000 tonnes more wheat was received by hopper car in Prince Rupert,[66] over and above exports reported by the Port of Prince Rupert. However, it is not possible to conclude whether these volumes are transloaded, as variations between these two data sets could occur for other reasons.

In summary, there is at least 90,000 tonnes per year of peas, and other grains, being transloaded in Prince Rupert, volumes which can be expected to increase.

3.7.2 Opportunity for a Transloading Facility in Terrace

Given the presence of an existing transloading facility in Prince Rupert, in the short- to medium term (i.e. less than 10 years), we do not consider it likely that it would be viable to transload grains in Terrace. However, as with the CT Terminals, Ray-Mont's facility is adjacent to a petrochemical terminal proposed by Vopak. Should Vopak made a final investment decision to proceed, then we understand that the Ray-Mont facility may need to be relocated.

3.8 Mining and Mineral Ore

3.8.1 Production and Flows

According to the BC Mine Information website, there are two active mines in Northwestern BC along the Highway 37 corridor:

- Bruce Jack, operated by Pritium Resources, "a 2,700 tonnes-per-day high-grade gold underground mine located in northwestern British Columbia, approximately 65 kilometers north of Stewart."[67]
- Red Chris, operated by Imperial Metals, a copper and gold mine with "2018 production target for Red Chris mine is 61.9 million pounds copper and 43,200 ounces gold"; total production is 30,000 tonnes per day.[68]

[66] Based on Grain Monitor Report.
[67] https://www.pretivm.com/projects/brucejack-overview/default.aspx
[68] https://www.imperialmetals.com/our-operations/red-chris-mine/overview

Based on stakeholder discussions and online sources,[69] we understand the ore concentrates from both mines are largely exported via the Stewart World Port. One of the mine loads specialized containers with the ore concentrate (with the appearance of sand), and trucks it to Stewart, for onward export.

For these mines, one of the stakeholders consulted noted that most inbound products arrive from eastern Canada or Vancouver, so any transhipment activities take place in Smithers to avoid travelling to Terrace and backtracking.[70] One notable product exception is cement, which is currently be transloaded in Terrace, as of fall 2018.

According to the Major Projects Office, there are five projects in northwest BC that have received environmental assessment certification (Figure 3-11), and more in various stages of development, providing an indication of the potential growth of the sector.

Figure 3-11: Proposed Mining Projects in Northwestern BC that have Received Environmental Certification

Name	Description
Huckleberry Copper / Silver / Molybdenum Mine	Main zone optimization and extension of Huckleberry mine life by 7 years will include $119 million for upgrades and $82 million for dam construction. Project has received certification under the Environmental Assessment Act.
Avanti Kitsault Mine Project	Open pit molybdenum mine located 140 km northeast of Prince Rupert. Production of 11,300 tonnes of molybdenum and 1 million ounces of silver are anticipated over a 14 yr mine life. Project has been certified under the Environmental Assessment Act. An agreement has been reached with Nisga'a Nation and a Mines Act permit has been issued. Preconstruction work has completed on site. Project is on care and maintenance.
Kerr - Sulphurets - Mitchell (KSM) Gold/Copper	Open pit mine project, located approximately 65 km northwest of Stewart, consists of the copper porphyry deposits Kerr, Sulphurets, Mitchell and Iron Cap. Ore production of 80,000 to 120,000 million tonnes per day (mtpd) over 25 years is expected, with 90,000 mtpd for the remainder of a 52 yr mine life. Project has been certified under the BC Environmental Assessment Act and received federal environmental assessment approval. Exploration phase underway.
Galore Creek Gold/Silver/ Copper Mine	The proposed project is located 145 km northwest of Stewart. The mine will have a processing rate of 65,000 TPD. Concentrate would be shipped out through the port of Stewart and power would be supplied via the BC hydro grid. Project is on care and maintenance.
Tulsequah Chief Mine	Redevelopment of a copper/gold/ silver/lead/zinc underground mine 100 km south of Atlin and 60 km northeast of Juneau, Alaska. Production of 2,250 tonnes/day with reserves sufficient for 10 years. Project received provincial Environmental Assessment Act approval in Dec 2002. Amendment to environmental assessment received in Feb 2009. Project has received Mines Act and Minerals Exploration permits. Proponent is seeking to secure financing.

Source: BC Major Projects Office.

[69] https://www.mining-technology.com/projects/red-chris-copper-gold-mine-british-columbia/

[70] The stakeholder also speculated that for any mines located closer to the Yukon, mine resupply would likely take place via the Alaska Highway.

According to a 2012 report as part of the KSM Project (Seabridge), consultants for Seabridge considered logistics options for the export of copper and molybdenum exports, including bulk shipments of copper concentrate, and containerized exports of molybdenum. For copper exports, the study recommended further discussions with the Stewart World Port, though did investigate transloading options, including at an existing facility in Kitwanga (which we understand is no longer in operation), as well as transloading in Terrace or Smithers.[71] However, these options were found to have a cost of nearly double bulk exports via Stewart, and Terrace would have a higher transportation cost than undertaking the transloading in Kitwanga.[72]

The study also explored the cost of containerized exports of molybdenum concentrate, which is described as follows:

> Shipments of molybdenum concentrates will require the use of a variety of modes of transportation. The bags will be transported via truck to Prince Rupert, transferred from truck to container, and then delivered to the Fairview Terminal for ultimate loading onto ocean vessels. The following is a description and summary of the estimated costs for each mode of transportation:
>
> - Trucking: trucking is based on a [gross vehicle weight] of 63,500 lb with a payload of approximately 42 t per truck. Bags will be trucked directly from the site using B-train flat-deck trucks at a cost of Cdn$77.53/t.
> - Container Stuffing: trucks will be delivered to a warehouse where the bags will be unloaded from the trucks and stuffed into standard 40 ft ocean containers, which have a capacity of 24 t. The cost for this is Cdn$150 per container, or Cdn$6.25/t.
> - Drayage: the cost for delivering the loaded containers from the warehouse to the Fairview Terminal is Cdn$225 per container, or Cdn$9.38/t. [73]

Similar to the other commodities discussed (e.g. aluminum, lumber, etc.), transloading in Prince Rupert is assumed due to the higher load capacity of a B-train truck (over 40 tonnes) as compared to a truck hauling a container (24 tonnes assumed).

3.8.2 Opportunity for Transloading in Terrace

A stakeholder indicated that some mining companies have a desire to export mineral ore in containers; however, our sampling of discussions with mining industry stakeholders did not indicate any plans to do so. However, containerized exports have been contemplated for certain products, based on the discussions above. If a company had an interest in doing so, then this

[71] The study estimated that the cost of a transloading facility in Terrace would be around $3 million, at an order of magnitude level.
[72] Tetra Tech. 2012. KSM Project – Logistics Study 2012: Report to Seabridge Gold.
[73] Tetra Tech. 2012. KSM Project – Logistics Study 2012: Report to Seabridge Gold.

activity could plausibly occur in Terrace. Again, however, it would typically be more economical from a transportation cost perspective to have such a facility in Prince Rupert.

If a company were interested in shipping mineral ore to eastern Canada, while this activity could take place in Terrace, it would likely be more economical to do so in Kitwanga or Smithers, to avoid backtracking by truck.

There is possibly that some inbound products could be transloaded. In principle, transloading is required/desirable as handling supplies on mine sites require specific logistics (e.g. having products arrive in containers). As a result, being able to laydown products needed for mining (e.g. rods, etc.) away from the mine, and then being picked-and-packed for shipment to the mine, can be desirable for mining companies. However, based on discussions with a mining stakeholder, many of the products arrive from southern BC and provinces east of BC, so a more natural transloading location would be Smithers or Kitwanga.

3.9 Plastics

3.9.1 Production and Flows

Stakeholders raised plastic resin pellets (e.g. Figure 3-12) exported from Alberta via the West Coast as a candidate product to be transloaded in Terrace. Plastic pellets, including polyethylene and polypropylene, are used to manufacturer a wide variety of commonly used industrial and consumer products.[74] Polyethylene pellets are currently exported via the West Coast, and polypropylene plants are planned and under construction in Alberta. Plastic pellets, if they are not containerized at the plant, can be transported in bulk rail hopper cars, bagged or loaded into bladders, and then containerized near ports.

Figure 3-12: Plastic Resin Pellets

Source: gentlemanrook / Wikipedia / CC BY 2.0

Major producers of polyethylene in Alberta include Dow Chemical (facilities in Prentiss, Fort Saskatchewan) and NOVA Chemicals (two facilities in Joffre). Small amounts of propylene (an input to polypropylene) are produced as a by-product at the Williams Redwater olefin fractionator (but there are very limited, if any, exports by comparison).[75] There are two polypropylene projects are in various stages of development in Alberta:

- **Inter Pipeline Heartland Petrochemical Complex** is constructing a $2.7 billion propane dehydrogenation and polypropylene complex capable of producing 525,000 tonnes of

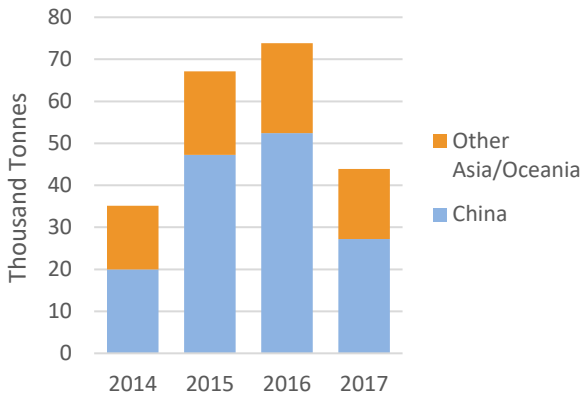
[74] The specific end product that can be manufactured depends on the type and grade of polymer.er
[75] Alberta Government. 2016. Economic Commentary: Chemicals and Petroleum Refining is the Province's largest Manufacturing Sector

polypropylene per year, near Redwater, Alberta (northeast of Edmonton).[76] It is expected to be completed in 2021.

- **Pembina Pipeline Corporation** with Petrochemical Industries Company (PIC), a subsidiary of the Kuwait Petroleum Corporation, is undertaking front-end engineering design (FEED) for a combined propane dehydrogenation (PDH) and polypropylene upgrading facility in Alberta, northeast of Edmonton.[77] The project could produce up to 550,000 tonnes per year of polypropylene.[78]

Most polyethylene exported from Alberta is sent to the US and Mexico (85% and 9% of exports, respectively, in 2017). However, in 2017, approximately 40,000 tonnes of polyethylene was exported to China and other Asian countries, most of which is currently routed via the Port of Vancouver.[79] This has been a decline since a recent peak in 2015, when 70,000 tonnes was exported from Alberta (Figure 3-13).[80]

Figure 3-13: Polyethylene Exports from Alberta, 2014-2017



Source: CPCS analysis of Canadian International Merchandise Trade Database.

Though overall imports of polyethylene imports to China have been growing during this period, this growth in imports has largely come from other Middle Eastern countries, namely Iran,[81] Saudi Arabia, and the United Arab Emirates (Figure 3-14). As result, over the period from 2014-2017, Canadian exports have lost market share. Nonetheless, the Asian market for polyethylene is expected to continue to grow, albeit at a slower pace than in the recent past.[82]

---

[76] Inter Pipeline. Heartland Petrochemical Complex.
http://www.interpipeline.com/operations/constructionprojects/heartland-complexcfm.cfm

[77] Expected completion late 2018.
Pembina Pipeline Corporation. 2018. Corporate Update.

[78] Pembina News release, "Pembina Pipeline Corporation and Kuwait's PIC Evaluate World-Scale Integrated Polypropylene Facility in Alberta" April 11, 2016. http://www.pembina.com/media-centre/news-releases/news-details/?nid=135321

[79] CPCS analysis of Canadian International Merchandise Trade Database, including:

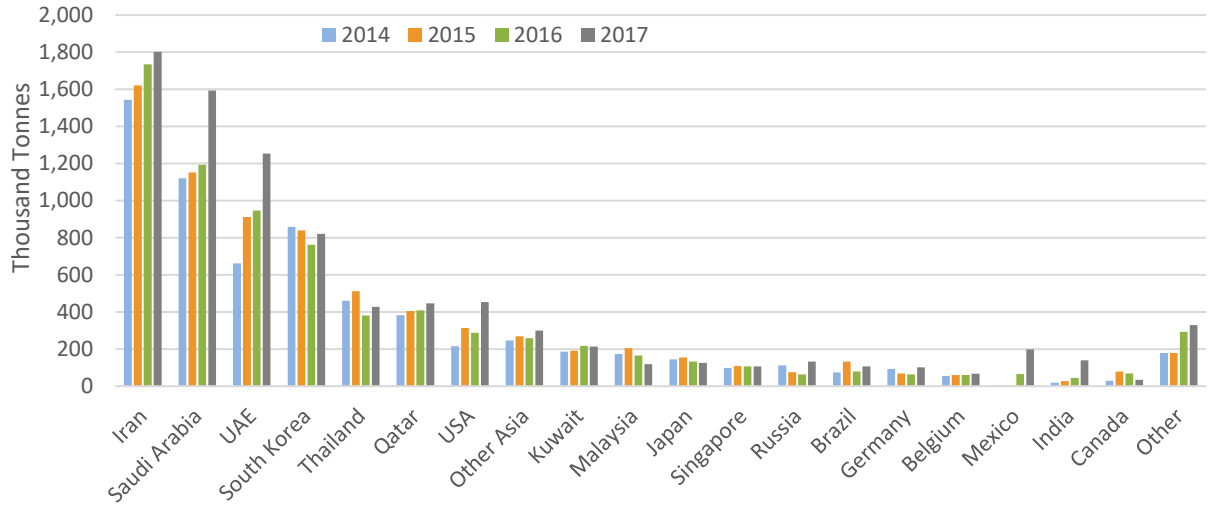
- 390110 Polyethylene, having a specific gravity of less than 0.94
- 390120 Polyethylene, having a specific gravity of 0.94 or more

[80] Asian exports as a share of overall exports have been between 5-8% between 2014-2017.

[81] This is likely in part due to the lifting of sanctions on Iran.
Kaushik, M. 2017. Lifting Iranian sanctions and the impact on the Polyethylene market IHS Markit.

[82] E.g. Freedonia. World Polyethylene. https://www.freedoniagroup.com/industry-study/world-polyethylene-3210.htm
Research and Markets. Global Polyethylene Market 2017-2021

Figure 3-14: Polyethylene Imports to China, 2014-2017



Source: CPCS analysis of Canadian International Merchandise Trade Database.

World polypropylene demand is also expected to grow; Inter Pipeline notes that worldwide polypropylene demand is expected to grow by 25% from 67 million tonnes per year to 84 million tonnes per year. However, it is hard to predict where the specific markets for new Alberta polypropylene facilities will be, given the changing market. The availability of low-cost propylene, is causing a shift of polypropylene production to geographies with cheap gas (Middle East, North America), or coal (China). Recent research suggests that by 2018, global shifts in polypropylene production would see North America, the Middle East and China become net exporters, while South America, Europe, Africa, India and South East Asia become net importers.[83]

Having said that, Inter Pipeline predicts that the "majority of [its polypropylene] production [will] … be sold into US markets, which are expected to have among the highest prices globally."[84]

If similar shares of polypropylene are exported to Asia as polyethylene, then the overall potential market via the West Coast would be approximately 10,000-30,000 tonnes per year [85]

[83] Tricon Energy presentation, What is Happening in the World of Polypropylene?, IOCL Petrochemical Conclave, February 2014. http://www.petrochemconclave.com/presentation/2014/Mr.SMoolji.pdf

[84] Inter Pipeline. 2018. Corporate Presentation: November 2018.

[85] At the low end, the estimate was based on 33% of sales being for export, 5% of those exports being destined overseas, and only the Inter Pipeline's project going forward (525,000 tonnes per year). At the high end, the estimate was based on 33% of sales being for export, 8% of those sales being destined for Asia, and both Inter Pipeline and Pembina Pipeline's projects moving forward (1,075,000 tonnes per year).

3.9.2 Opportunity for a Transloading Facility Terrace

There are already transloading facilities for bagging and containerizing plastics arriving by railcar in Vancouver; however, stakeholder discussions suggested that there is interest in developing a facility to support exports via Prince Rupert. In Summer 2019, Ray-Mont Logistics announced that it is constructing a facility for bagging and stuffing plastics into containers.[86] As a result, this is likely no longer to be developed in the Terrace-area in the short- or medium-term.

3.10 Project Cargo

3.10.1 Production and Flows

There are a number of proposed LNG (and related pipelines) and oil refineries that have been proposed in and around Kitimat, which could serve as a source of project cargo, including pipe, steel and other construction material, housing modules for worker camps, etc.

Liquefied Natural Gas (LNG)

There are several LNG export terminal facilities proposed in the Kitimat area, including:

- **LNG Canada:** In May 2012, Shell Canada announced the development of a proposed liquefied natural gas (LNG) export facility on the site of the former Methanex methanol plant in Kitimat. The project consists of natural gas treatment, liquefaction, storage and marine terminal facilities, a cryogenic transfer pipeline and supporting infrastructure. In February 2013, the National Energy Board (NEB) approved the export of up to 24 million tonnes of LNG annually over 25 years. In January 2016, the NEB increased the length of the export licence to 40 years. 5,500 to 7,000 jobs will be created during construction and the facility will employ 400-800 workers once in operation. **A final investment decision was made in fall of 2018 to proceed with construction.**

- **Kitimat LNG:** "A liquid natural gas terminal at Bish Cove, 14 km south of Kitimat, to include facilities for marine offloading, LNG storage, natural gas liquids recovery, re-gasification. The Pacific Trails Pipeline will transport natural gas to the facility. Project has received approval under the BC Environmental Assessment Act. Federal approval has been received. Front-end engineering and design (FEED) study has completed. The National Energy Board has approved a 20-year licence to export natural gas. An Engineering, Procurement and Construction Contract has been awarded to a joint venture of Fluor Canada and JGC Corp of Japan. Site preparation of access roads and worker accommodation are taking place while awaiting final investment decision."[87]

Because Kitimat has water access, most large modules for the facilities will likely arrive by barge, based on stakeholder discussions. However, for the LNG Canada specifically, we understand

[86] Kurial, A. 2019. New plastic pellet export facility to be built at Prince Rupert Port. https://www.thenorthernview.com/news/new-plastic-pellet-export-facility-to-be-built-at-prince-rupert-port/

[87] BC Major Projects Inventory - Second Quarter 2018.

from discussions with stakeholders that there may be 5,000 containers arriving via Prince Rupert that could conceivably be de-stuffed in Terrace.

Oil Refineries

There are two refineries proposed to process crude oil between Terrace and Kitimat:

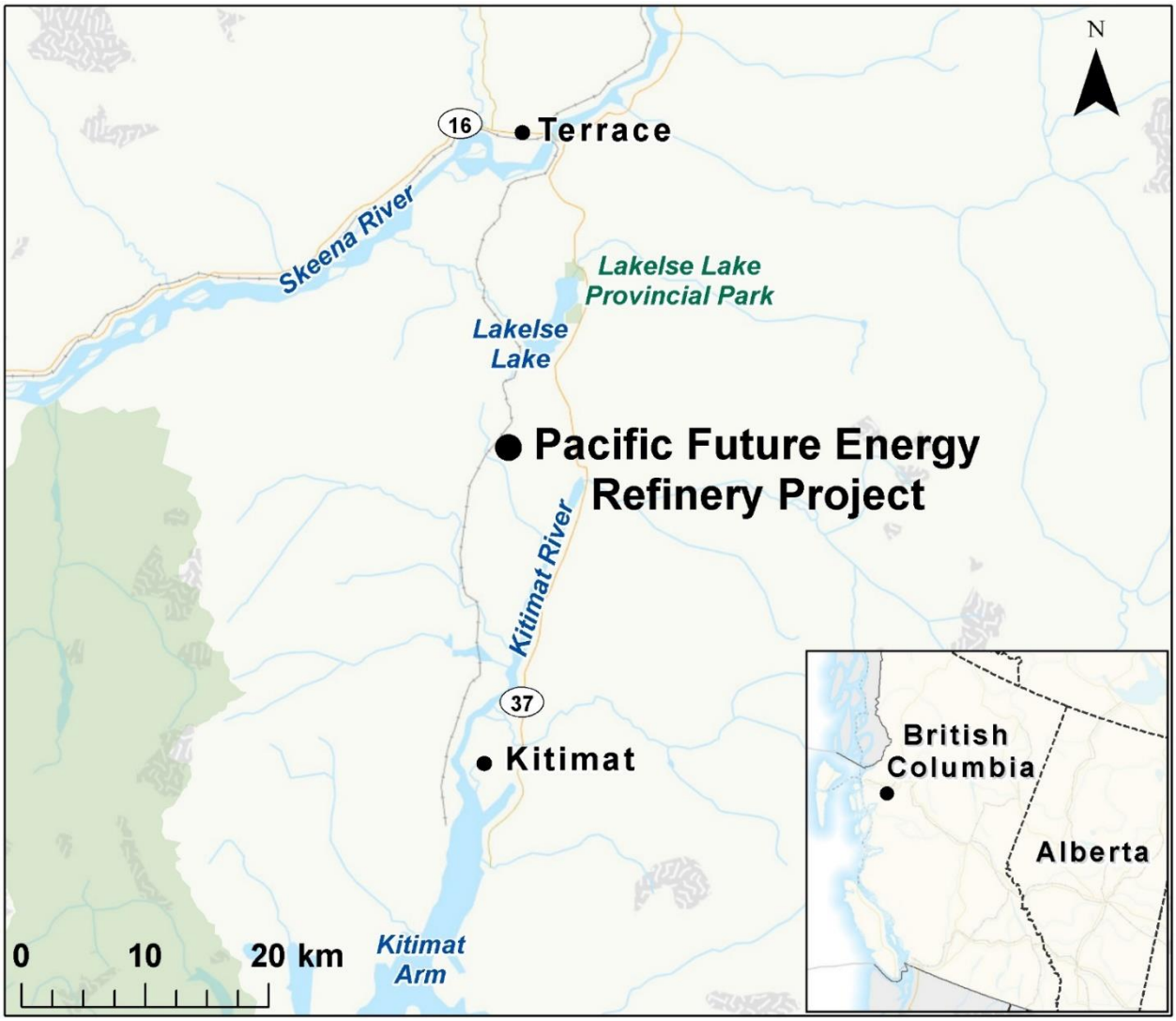
- Pacific Future Energy Refinery: "Bitumen refinery proposed for the North Coast will be built in phases, each processing 200,000 barrels/day to a total of 1,000,000 barrels/day on completion. A new rail terminal and rail connection will be included along with storage and support buildings. The site selected is called Dubose Flats, located between Terrace and Kitimat. A project description has been submitted to the federal and provincial environmental assessment agencies"(Figure 3-15). [88]

- Kitimat Clean Refinery: "Proposed refinery located 13 km north of Kitimat will process an estimated 400,000 barrels/day of Alberta oil sands bitumen refined to produce diesel, gasoline, and aviation fuel. The refined products will be stored and delivered via 23 km of 18" fuel delivery pipeline to a proposed marine terminal on the Douglas Channel, 12 km south of Kitimat. The project has entered into the pre-application stage of the Environmental Assessment process."[89]

The construction of the facilities would need to be considered during the site selection of a transloading facility in Terrace, due to the potential increases in train volumes in the area. The facilities could also affect the trade flows of fuels in the region, making it more likely that fuels are trucked directly from the refinery. They could also be a source of project cargo during construction phases, should they receive appropriate permits and proceed with construction.

[88] BC Major Projects Inventory - Second Quarter 2018.
[89] BC Major Projects Inventory - Second Quarter 2018.

Figure 3-15: Location of Pacific Future Energy Refinery



Source: Canadian Environmental Assessment Agency

Natural Gas Pipelines

There are at least three proposed pipelines intended to service LNG projects in the Kitimat area, as shown in Figure 3-16. These pipelines would travel from Northeastern BC to Kitimat.

Figure 3-16: Selected Natural Gas Pipeline Projects

Name	Description
Pacific Trail Pipeline	Chevron Canada Ltd will construct a 463 km Pacific Trail Pipeline to transport natural gas from Summit Lake to Kitimat LNG . . . TransCanada Corp will construct connecting pipeline from Dawson Creek to Summit Lake.
Pacific Northern Gas Pipeline Looping Project	Project consists of construction of a new 525 km, 24-inch natural gas pipeline between Summit Lake and Kitimat BC primarily along current pipeline rights-of-way. Project also includes a new compressor station as well as upgrades to existing stations.

Name	Description
Coastal GasLink Pipeline Project	Proposed 670 km natural gas pipeline ($4 billion) from the Dawson Creek area to proposed [LNG Canada] facility in Kitimat. . . TransCanada Corp has been selected to design, build, own and operate the project. Project has received certification under the Environmental Assessment Act in Oct 2014. Construction timeline will coordinate with LNG Canada . . . project advancement.

Source: BC Major Projects Inventory

Pipe would need to be transported to the proposed route. The Coastal Gas Link's Certified Project Description notes that rail sidings will be constructed to allow for offloading of pipe; however, does not specify the locations. Particularly, if pipe were to arrive from eastern Canada, we anticipate that most offloading would take place closer to areas around Fraser Lake, where the pipeline route approximately crosses over Highway 16, as this limits backtracking by truck. For construction of the Western end of the pipeline, while some pipe may be transported to Terrace, it would be advantageous to minimize trucking distances to transport the pipe directly to Kitimat.

3.10.2 Opportunity for Transloading in Terrace

Based on discussions with stakeholders, for the construction of LNG Canada alone, there are approximately 5,000 containers expected over a three-year period via Prince Rupert. (Larger modules are expected to be barged directly to site.) Given the relatively small volumes over a short period of time, it is unlikely that rail would be used to transport these products to Terrace. These containers could possibly be trucked to Terrace and de-stuffed prior to construction. However, given there are already existing warehouses and yards that could accommodate this activity.

For pipe for pipelines, because of the route of the pipeline, which comes from Northeastern BC and crosses Highway 16 towards Fraser Lake, a rail siding in this area would likely be better situated to minimize transportation costs. For the construction of the western end of the pipeline, given the existing construction that will be taking place around Kitimat, it may be appropriate to develop a siding in Terrace for laydown equipment.

Stakeholders also mentioned that construction equipment could also be brought to Terrace on rail and transloaded. It is also possible that housing modules could be brought to the area and transloaded.

3.11 Refrigerated Cargo

3.11.1 Production and Flows

There are several products requiring refrigeration that are being exported off of the West Coast, including meat, seafood, poultry, produce (e.g. frozen berries), and other processed food products (e.g. French fries). These products are sometimes trucked or railed from their origin in Western Canada in domestic refrigerated containers (53-feet long) and transloaded into marine containers (typically 40-feet long). Refrigerated containers are known as "reefers".

Stakeholders noted that this represented a potential market opportunity to be explored, as Prince Rupert does not currently have a refrigerated warehouse that is being used for this purpose. In addition, some stakeholders noted that fisheries in the Nass Valley could represent a potential source of traffic.

3.11.2 Opportunity for a Transloading Facility Terrace

We believe that it would be unlikely for Terrace to be the chosen location for a refrigerated warehouse as a location in Prince Rupert would result in lower transportation costs for most products, given the presence of seafood processing companies and traders in Prince Rupert there. In addition, from a product integrity standpoint, it would be ideal if the facility were in close proximity to the port, in case there was a mechanical failure of a refrigeration unit, such that a container could be brought to the warehouse and reloaded there.

3.12 Other Industries / Manufactured Goods

According to the Request for Proposals,

> Terrace is the site of the 2,400 acre Skeena Industrial Development Park (SIDP) currently under development. Approximately half of the area is owned by a Chinese developer [Taisheng International Development Services] who is currently marketing 25-40 acre lots to companies based in China. The company's vision is to see 20-30 factories on site, manufacturing a variety of goods whose component materials can be found in BC and more broadly in North America.

According to media reports and discussions with Taisheng, Taisheng is aiming for completion of the first phase of the industrial park (700 acres) by 2020.[90]

In addition, in 2014, "the Kitselas Development Corporation purchased 172 acres of the Skeena Industrial Development Park (SIDP)."[91] The land is currently the site of a camp for workers on LNG projects in Kitimat.

Figure 3-17 summarizes the facility types proposed by some of the companies that have expressed interest. There are several facility types where inbound and outbound rail could potentially be used (e.g. steel fabrication, and alfalfa processing). There are also several products that would likely require transloading into containers (e.g. seafood, bio-carbon, alfalfa pellets). However, there are also several high-value-to-weight commodities that are unlikely to be shipped by rail, and thus not need to use a transloading facility in Terrace.

[90] Gervais, B. 2018. Industrial park developer still hopeful for 2020 completion. https://www.terracestandard.com/news/industrial-park-developer-still-hopeful-for-2020-completion/

[91] Government of BC. First Nations Collaboration Success Story. https://www2.gov.bc.ca/gov/content/employment-business/economic-development/bc-ideas-exchange/success-stories/bc-partnerships/first-nations-collaboration

Figure 3-17: Analysis of Opportunities for Terrace

Facility Type	Opportunity for Terrace
Steel fabrication	• If Terrace were the site of a steel finishing plant, inbound primary steel shapes from Asia could be transported from Prince Rupert by truck (or possibly rail). • For any outbound processed steel destined for Eastern Canada, this could possibly be transloaded in Terrace for shipment by rail.
Bio-carbon	• No specific opportunity was attached to this. However, it is conceivable that products such as wood pellets, should they be manufactured in Terrace, could conceivably be containerized in Terrace for shipment to Asia.
Forestry equipment manufacturing	• Because of the limited details regarding this opportunity, the proposed supply chain is unclear. However, as BC and Alberta are the main provinces for forestry production, and given the high-value nature of this equipment, we consider it unlikely that outbound products would be shipped by rail. • Possibly, there may be a need to ship inbound products by rail.
Seafood processing	• As noted in section 3.11, we consider it unlikely that Terrace would be the selected site for a refrigerated warehouse/transloading operation, even if a processing facility were developed in Terrace.
Alfalfa processing	• In 2014, plans were announced regarding "construction of an alfalfa processing centre . . . [at a] 33-acre parcel at the industrial development park to supply 10,000 tons of feed-grade alfalfa protein annually for livestock and 2,000 tons of food grade alfalfa protein for human consumption for shipment to China."[92] The alfalfa would be sourced from Saskatchewan. • For the inbound hay, it is conceivable that it would arrive by rail given the long-distance haul. However, there would need to be transloading facilities developed at both the product source (as the hay would need to be collected from a number of farmers/producers). • For outbound alfalfa pellets, they could potentially be containerized in Terrace for shipment to Asia.
LED light manufacturing	• Given the light-weight nature of this product, and its relatively high-value, we anticipate that any products would be trucked directly to warehouses or retail stores.
Aluminum wheel manufacturing	• There is interest in developing an aluminum wheel manufacturing plant, given the proximity to Rio Tinto's aluminum smelter. Scaling linearly down from the size of a similar facility in China to a 40 acre facility (a typical lot size at the SIDP), the annual production might be 5,000 tonnes. • For inbound raw goods, because of the proximity of the aluminum smelter in Kitimat, inbound products would almost certainly arrive by truck. • Because of the high-value nature of this product and "just-in-time" delivery model used by auto manufacturers, we anticipate that it would be more likely that such a product is shipped to auto manufacturers in eastern Canada by truck. We understand that some auto parts arriving from Asia in Prince Rupert are being transloaded into truck for shipment to Eastern Canada/US Midwest. • Likewise, even if rail shipments to Prince Rupert could reduce the cost of shipping, we anticipate that any export products would be sent to Prince Rupert by truck to ensure a high-degree of transit time reliability.

[92] Massey, J. 2014. Terrace plant will feed Chinese demand for alfalfa. https://www.terracestandard.com/news/terrace-plant-will-feed-chinese-demand-for-alfalfa/

Source: CPCS, based on opportunity information provided by The City of Terrace and stakeholders.

3.13 Inbound Transloading

Inbound transloading of containers may be another opportunity for Terrace. For example, often containers are transloaded from 40-foot marine containers, to 53-foot domestic containers, for onwards shipment by rail or truck. Doing so helps lower the cost of inland transportation. One stakeholder noted that possibly marine containers could be sent by railcar to Terrace, where this activity could occur.

Given the Port of Prince Rupert's plans for an import logistics terminal near Ridley Island, as well as the supporting infrastructure that is planned for this area (e.g. the Ridley Island Road Connector), we do not consider it likely that a similar facility would be developed in Terrace. This is particularly the case because of the additional transit time required by rail to Terrace as compared to trucking locally in Prince Rupert.

Notably, since the original market study was concluded in fall 2018, the Government of Canada provided $43.3 million towards an import logistics facility in Prince Rupert:

> The $89 million project consists of a 25-hectare site development on South Kaien Island that will enable transload and warehouse operations to provide increased flexibility and value-added capabilities for import supply chains. The Import Logistics Park is a strategic complement to the Export Logistics Platform and will be fully integrated into DP World's Fairview Container Terminal and the Port's intermodal ecosystem to ensure unparalleled efficiency and fluidity.[93]

3.14 Summary of Opportunities

Based on the discussions in each of the previous sections, Figure 3-18 summarizes the potential market opportunities for a transloading facility in Terrace, ranked from very high to very low. The total size of the market provides an order-of-magnitude indication of the volumes being shipped, and from which a facility in Terrace could potentially capture; in other words, even if there is a high capture potential, Terrace may only capture a portion of this market. Furthermore, even if an opportunity is rated very high, it does not mean that a facility is feasible, as a minimum volume of traffic is also required for a facility to be feasible.

[93] Canadian Shipper. 2019. Prince Rupert port gets $154M in infrastructure funding. https://www.canadianshipper.com/transportation-and-logistics/prince-rupert-port-gets-154m-in-infrastructure-funding/1003381284/

Figure 3-18: Summary of Potential Transloading Markets Assessed

Market	Total Size of Market* (tonnes/year)	Rail Car Type	Annual Rail Cars	Annual Containers	Short-Term Capture Potential
Lumber produced in Terrace and destined to the US	12,000-48,000	Centerbeam	120-480	N/A	**Very High**
Wood pellets from Terrace destined to Asia	75,000	Hopper or container	750	2,800	**High**
Cement from Lower Mainland to Northwest BC, via Terrace	20,000	Cement hopper	190	N/A	**High**
ISO tank containers of LNG produced at the SIDP and exported to Asia	N/A	Containers (on flat/well cars)	N/A	12,000	**Medium**
Project cargo for LNG Canada arriving by container	N/A	N/A (trucked)	N/A	1,700	**Medium**
Wood pellets from northwest BC for export to Asia via containers	350,000	Wood pellets hopper	3,570	13,000	**Medium**
Plastic pellets from producers in Alberta for export to Asia	70,000	Plastics hopper	700	2,600	**Low**
Mineral ore concentrates from northwest BC exported to Asia by container	No current non-bulk flows identified, though it is a possible mode of export.				**Low**
Inbound supplies for mines in northwest BC	Stakeholders were not able to provide an estimate, though noted that most of their supplies, other than cement, come from southern BC or further east in Canada.				**Low**
Pipe for new natural gas pipelines to Kitimat	Not estimated, as there are locations closer to the pipeline alignments that could be developed.				**Low**
Containerized aluminum from Rio Tinto destined overseas	20,000	N/A (trucked)	N/A	700	**Low**
Aluminum from Rio Tinto destined to the US	170,000	Bulkhead	1,890	N/A	**Very low**
Lumber produced in Northwest BC destined for Asia	640,000	Centerbeam	6,340	23,700	**Very low**
Pulp and paper from Prince George-area destined to Asia	1,000,000	Boxcar	11,110	37,000	**Very low**
Raw logs from Northwest BC stuffed into containers for export to Asia	400,000	N/A (trucked)	N/A	15,000	**Very low**
Fuel products from refineries in Edmonton for distribution in Northwest BC	30,000	Tankcar	340	N/A	**Very low**
Grains from prairies destined to Asia by container	90,000	Grain hopper	1,000	3,300	**Very low**
Mineral ore concentrates from northwest BC exported to Eastern Canada by rail	No current flows identified, though stakeholders mentioned it was considered.				**Very low**
Manufactured goods from the SIDP	Volumes are too be determined, based on industries that decide to locate in Terrace.				**Depends on product**

*Estimated, based on a number of assumptions outlined in the text. Source: CPCS, based on the sources cited in text.

3.14.1 Short-Term (less than two-years) Opportunities and Risks

In summary, in the short-term, we believe the following markets have the greatest likelihood to be captured by a transloading facility in Terrace:

- Lumber produced in Terrace and destined to the US, which could be loaded by truck to centerbeam railcars
- Wood pellets from Terrace destined to Asia, which could either be loaded in rail hoppers or containers destined for Prince Rupert
- Cement from Lower Mainland to Northwest BC, via Terrace, which is currently transloaded from railcars to truck in Terrace.

While these flows could anchor a facility, they are less than or at the lower-end minimum scale stakeholders cited for a transloading facility to be financially viable (Figure 3-19). This is particularly the case as each of the opportunities identified will require different handling equipment (e.g. lumber requires forklifts, wood pellets require some bagging/container stuffing capability, and cement requires a bulk rail-to-truck unloader). Further, some new trackage is likely required for some of the opportunities, which increases the capital cost of the facility.

Figure 3-19: High Potential Opportunities Compared to Minimum Scale Cited by Stakeholders

Container	High Potential Opportunities for Terrace (cars or containers per year)	Minimum Scale Cited by Stakeholders
Rail cars	• Lumber: 120-480 cars • Cements: 190 cars • Wood pellets: 750 cars*	600-700 railcars per year, minimum, based on an outside facility that has existing track, that does not require covered storage
Containers	• Wood pellets: 2,800 containers*	5,000-10,000 containers per year

*These opportunities cannot be summed, as they represent alternative modes of transportation. Source: CPCS, based on analysis and stakeholder discussions.

We anticipate that additional traffic would be required to make a transloading facility financially viable. For example, if the same equipment could be used for both plastics (and plastics sourced from Alberta) and wood pellets, or wood pellets from elsewhere in northern BC could be sourced, then potentially the minimum scale could be achieved. Notwithstanding the potential lower land costs in Terrace, Prince Rupert is likely a more natural location to transload these products, however (see box, on the next page).

Finally, there is also the potential risk that some of the activity currently taking place in Terrace (e.g. cement unloading) could be potentially relocate.

Considerations for Interpreting the Market Analysis

While the analysis in this chapter, by necessity, frames the market assessment as a competition between Terrace, Prince Rupert (and other locations) for a transloading facility, this competition exists only in a narrow sense. The true benefit of any transloading facility is that it helps lower the cost for shippers. In many cases, the development of transloading facilities and other transportation infrastructure in Prince Rupert will benefit current and future shippers in Terrace. For example, the Ridley Connector Road Corridor, by reducing drayage time and truck gate waiting, helps makes it easier for goods from Terrace to get to Fairview Container Terminal. There are exceptions of course, such as the fact that lumber from Terrace destined to Eastern Canada has to be transloaded in Prince Rupert, requiring increased trucking time. However, the fact that improvements are made to facilitate exports in Prince Rupert still broadly helps all cargo being exported from northwest BC, including products being produced in Terrace.

3.14.2 Medium-Term (two to five years) Opportunities and Risks

In the medium-term, should the construction of planned micro-LNG facilities at the SIDP go ahead, these facilities could be potential traffic generators for a truck-to-rail container intermodal facility. While CN would not stop any of its intermodal trains, there may be sufficient traffic to attract them to transporting the containers on well- or flat-cars on its existing manifest service. However, there are a number of logistical challenges that would need to be further addressed based on discussions between the proponents, CN and DP World. We anticipate that it is on balance, more likely that these containers would be shipped by truck.

3.14.3 Longer-Term (over five years) Opportunities and Risks

Longer-term, there are several reasons to think that a transloading facility may be developed in the Terrace area:

- Stakeholders noted that if the expected growth at the Port of Prince Rupert is achieved, then room for additional transloading capacity for export volumes will be in short supply post mid-2020s;
- In particular, if the Vopak petrochemical export terminal were to proceed, then some of the existing transloading facilities in Prince Rupert may need to be relocated;
- More broadly, stakeholders noted that any opportunities that can drive potential export volume through Prince Rupert can help encourage the expansion of the container terminal; and
- Other businesses that relocate to the SIDP could provide a potential source of traffic.

However, in the longer-term, there is also the risk that trucking automation and connected vehicle technologies obviate the need for short-haul rail, though activities such as stuffing/de-stuffing containers, might still be required.

4 Potential Transload Facility Needs

Key Chapter Takeaway

- The purpose of this chapter is to discuss the potential sizes of transload facilities given the market potential identified.
- Transloading facilities can be a small as a single short rail spur for a low traffic commodity for a single user. However, in practice, for a single commodity, a transloading facility is typically about 0.4-0.5 km long by 0.1 km wide. Small intermodal facilities, such as Inland Port Greer, are typically closer to 1.3 km by 0.2 km.
- There are also needs outside of the terminal itself, including lead tracks, signalizing, and grade crossing surfaces and warning systems that need to be considered.

4.1 Infrastructure Needs and Dimensions

Transload facilities come in several configurations and dimensions, depending on the commodities and volumes being handled. Though there are ideal configuration for multimodal facilities, such as transloading facilities, unless a greenfield site is available, they are often sized and configured to accommodate the available land and existing configuration. Based on the market sizes estimated in Chapter 3, as well as examples of other transloading facilities, the following sections estimate the length of track required to accommodate potential commodities handled in Terrace.

4.1.1 Containers Produced in Terrace Destined Overseas

There are products being produced in Terrace (wood pellets) or potentially produced in Terrace (LNG in ISO containers) that are/would be destined to Asia and could be containerized. These products could be containerized at the plant then trucked to the transloading facility, loaded onto to rail cars, then transported directly to the container terminal in Prince Rupert for

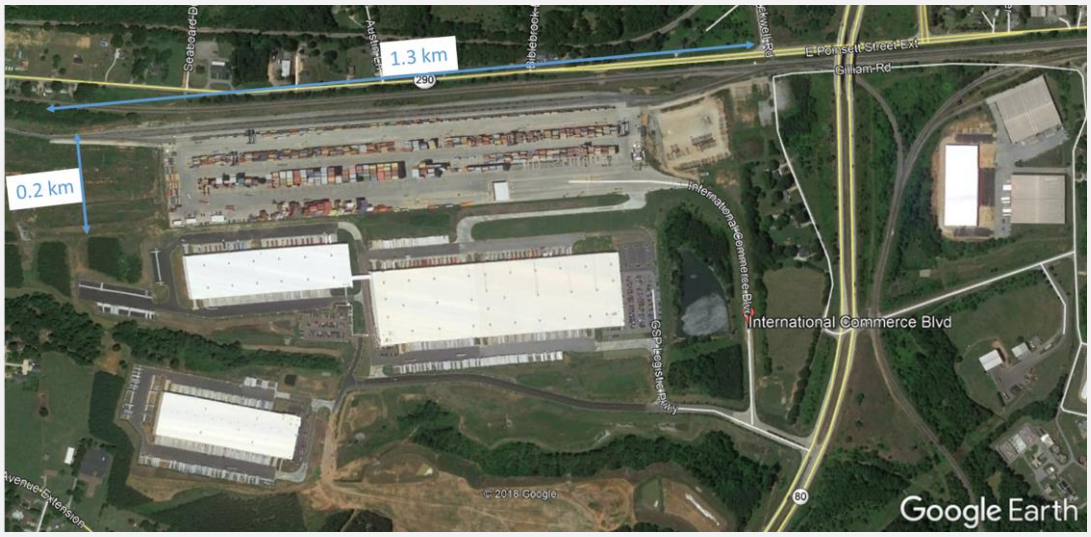
overseas export.[94] We understand that wood pellets are not currently being containerized, but are transported in bulk.

In North American transportation jargon, this would more appropriately be termed an intermodal facility, as there is no container stuffing/de-stuffing activities that would take place at the terminal. The box below provides an example of a conceptually similar inland terminal that is developed in South Carolina.

Example Inland Intermodal Facility – Inland Port Greer, SC

Inland Port Greer is a rail-served intermodal terminal approximately 340 km inland from the Port of Charleston in the southeastern US (Figure 4-1). Containers are transported to the Norfolk Southern Railroad intermodal terminal from the Port of Charleston then railed within a day to Inland Port Greer. The site itself is approximately 1.3 km long by 0.2 km wide, excluding co-located distribution centres. Inland Port Greer has five rubber-tired gantries, one toplifter and three empty handlers for equipment.

Figure 4-1: Site Overview of Inland Port Greer



Source: CPCS adaption from Google Earth. Port Greer information available from http://www.scspa.com/locations/inland-port-greer/.

[94] There are also several other markets for containerized products that originate elsewhere and could be transported to Terrace in bulk or breakbulk rail car, then offloaded and but are lower probability (e.g. grains, plastic pellets, etc.).

As discussed in Working Paper 1, there is currently no intermodal rail service between Terrace and Prince Rupert; long-distance intermodal trains do not stop in Terrace. A local service would need to be developed and agreed to by CN, as well as DP World.[95]

Intermodal trains are typically composed of rail cars with up to five wells; that is, they can accommodate up to 10 forty-foot containers. One unit, by the Greenbrier company, is 81 metres (265 feet) long and can carry up to 280 tonnes (619,000 lb).[96] The specific equipment serving a facility in Terrace would vary, but this provides an indication of the potential length of the equipment serving the facility.

Using this equipment size and the market sizes noted in Working Paper 1, Figure 4-2 provides estimates of rail car lengths required for loading out. An important consideration for this estimate is the frequency of the vessel calls that will be used to transport these containers overseas. While the LNG or pellet plants can produce nearly continually, vessels only call at periodic frequencies, and the cargo might have to line up with a certain vessel service. The container terminal in Prince Rupert only accepts containers five days prior to the vessel arrival. As a result, if the vessel call is bi-weekly, then all the containers must be transported within the approximately 5 day window prior to the vessel call.[97] At this stage, it is not certain the exact frequency though stakeholders noted it may be bi-weekly. Weekly service is also shown, which would be desirable to help smooth out the transportation requirements.

In summary, an intermodal facility would require at least **two** tracks of between about 500-1,100 metres long. At least two tracks are required as one is required for loading and the other required to deliver empties.[98] Other tracks may be required for surge storage, etc. The size is conceptually fairly similar to the Inland Port Greer facility discussed above.

[95] As noted in Working Paper 1, there is currently manifest train service between Terrace and Prince Rupert, but this service does not currently serve any containers.

[96] Greenbrier Company. Maxi-Stack I Car. https://www.gbrx.com/manufacturing/north-america-rail/intermodal/maxi-stack-i-car/

[97] For simplicity of the analysis, a cut-off date was not assumed. That is, for bi-weekly vessel calls, we estimated the number of containers per day as (using LNG containers as an example): 12,000 containers/year / 26 weeks/year / 5 days prior to sailing/week / 10 containers/railcar.

[98] Technically, switching activity could also take place using the mainline to eliminate one track, but it is unlikely that CN would accept this on the Skeena Subdivision.

Figure 4-2: Containers - Estimate of Rail Car Lengths (Loads Only)

	Annual Containers	Assuming Bi-Weekly Service		Assuming Weekly Service	
		Containers Per Day	No. Rail Cars (Total Length)	Containers Per Day	No. Rail Cars (Total Length)
ISO Containers	12,000	92	10 units (810 metres)	46	5 units (405 metres)
Wood Pellet Containers	2,800	22	2-3 units (162-243 metres)	11	1-2 units (81-162 metres)
Total	**14,800**	**114**	**12-13 units (972-1,043 metres)**	**57**	**6-7 units (486-567 metres)**

Source: CPCS analysis of sources noted.

4.1.2 Breakbulk Products Storable Outdoors

We conducted a similar analysis for breakbulk products – lumber and aluminum – that could be trucked from Terrace and Kitimat, loaded onto rail cars, then shipped to the US. As Rio Tinto has rail access, it is unlikely that they would use the facility, though the quantities have been shown to illustrate the possible needed. Rail car lengths used for the analysis are as follows:

- Centrebeam cars are typically 22 metres (73 feet) long,
- Metals bulkhead flatcars are typically up to about 20 metres (67 feet) long.[99]

Note that actual equipment might differ. Products could be stored outdoors and then loaded onto rail cars using forklifts or other equipment. Some of the aluminum products potentially shipped require heavy duty lift equipment.

Similar to the previous analysis, different service frequencies are shown: once-per-week versus three-times per week. If all of the volume of aluminum were to materialize, it is likely that the service frequency would be closer to three times per week. Thus, should this traffic materialize, two tracks of about 300 metres may be required, including one for loads and one for empties.

Figure 4-3: Breakbulk - Estimate of Rail Car Lengths (Loads Only)

	Annual Rail Cars	Assuming Weekly Service		Assuming Service Three Times Per Week	
		Rail Cars / Period	Rail Car Length	Rail Cars / Period	Rail Car Length
Lumber	Up to 480	9	200 metres	3	66 metres
*Aluminum**	*Up to 1,900*	*37*	740 metres	12	240 metres
Total	**2,380**	**46**	**940 metres**	**15**	**306 metres**

*Note: As discussed in Chapter 3, as Rio Tinto has rail access, it is unlikely that its products would use the facility. However, it has been shown to provide a range of possible needs.

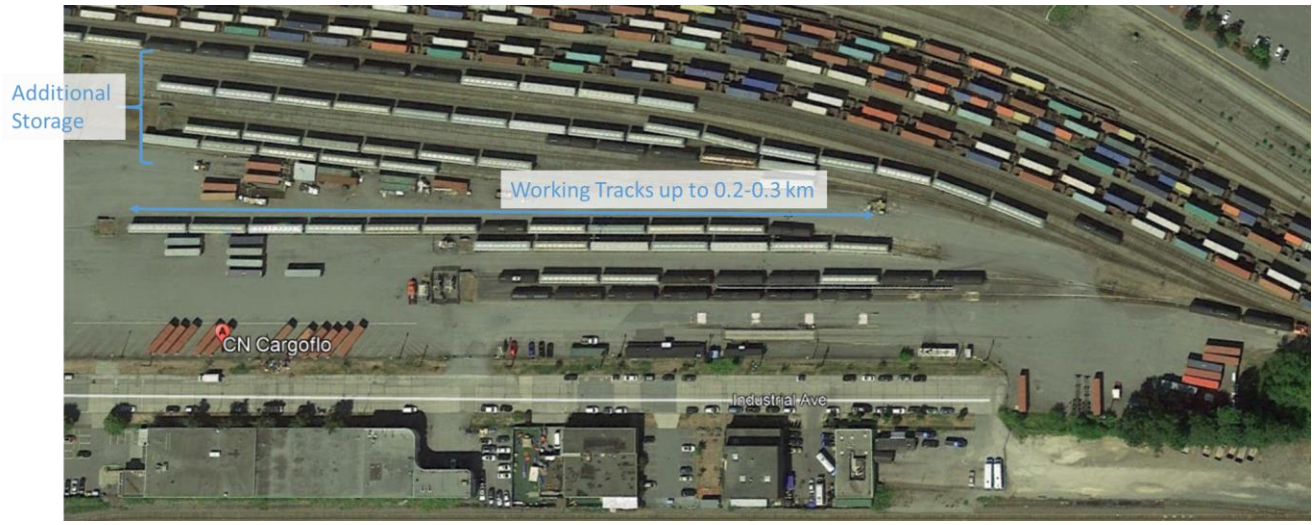
[99] Based on CN's equipment specifications.

4.1.3 Products Arriving By Rail from East of Terrace

If products such as plastic pellets from Alberta,[100] or wood pulp and lumber were to be transloaded in Terrace, additional tracks would be required to accommodate rail cars with these commodities. Because the potential traffic of these commodities is less certain, we illustrate possible needs based on similar facilities.

Figure 4-4 shows CN's CargoFlo facility in Vancouver, which can be used for transloading of products such as plastic pellets. The facility is approximately 0.4 km long by 0.1 km wide, with four working tracks and additional storage tracks. There is also storage for containers on chassis in the southwest corner.

Figure 4-4: CN CargoFlo in Vancouver



Source: CPCS adaption from Google Earth.

CT Terminals in Prince Rupert, designed for lumber transloading handles approximately 10 rail cars per day, and has 6 acres of uncovered storage.[101] Based on aerial imagery from July 2018, the site is approximately 0.5 km long by 0.1 km wide, though there is additional room for expansion.

[100] Subsequent to development of Working Paper 1, we understand that a plastic pellets facility may be developed in Prince Rupert.
[101] CN. CT Terminals Lumber Transload.

Figure 4-5: CT Terminals Lumber Transloading in Prince Rupert

Source: CPCS adaption from Google Earth.

Products such as wood pulp and paper require covered transloading. Figure 4-6 shows a complex in Vancouver where wood pulp transloading can take place. In the top left, one of the covered buildings is approximately 320 metres long by 80 metres wide. Rail cars can enter the facility from the northeast end of the building to allow for transloading to containers waiting on the northwest side. At its narrowest point, the site is approximately 0.15 km wide (excluding the rail tracks). Including the rail tracks, it is closer to 0.2 km wide.

Figure 4-6: Complex of Rail Served Transloading/Distribution Facilities

Source: Google Earth/Digital Globe.

4.1.4 Bulk

Wood pellets could also be loaded in Terrace and shipped to Prince Rupert for export in bulk rail cars, and cement traffic had historically arrived in Terrace by bulk rail cars. In Working Paper 1, this traffic was estimated at about 750 rail cars per year, or approximately 5 rail cars every three days. With hopper cars, this is equivalent to just under 100 metres every three days.

Should cement traffic continue, this is equivalent to approximately 10-20 rail cars per month. A similar loading track length as currently exists would be needed, i.e. about 120 metres (Figure 4-7). This example also illustrates the smaller end of the range of size of a transloading facility.

Figure 4-7: Existing Rail Spur Used for Cement Transloading in Terrace

Source: Google Earth/Digital Globe.

4.1.5 Summary

Regardless of the size of the facility, multimodal facilities typically have the following elements:

- *Working rail tracks:* for receiving and loading cargo from rail cars, including containers
- *Storage rail tracks:* to accommodate fluctuations in rail cars
- *Storage, working and truck travel areas*: for storing inbound products, empty containers, etc. Storage for products such as wood pulp need to be covered.
- *Ancillary needs:* May include tracks for trains to “run-around” the train, maintenance shops for equipment used on site, etc.

Transloading facilities can be a small as a single short rail spur for a low traffic commodity for a single user. However, in practice, for a single commodity, a transloading facility is typically about 0.4-0.5 km long by 0.1 km wide. Small intermodal facilities, such as Inland Port Greer, are typically closer to 1.3 km by 0.2 km.

Similar commodities, such as breakbulk commodities such as lumber and aluminum could be handled on the same tracks, with similar equipment. However, depending on traffic levels, each commodity may require its own tracks to eliminate delays in handling rail cars.

In addition to the needs on the site itself, there will also be additional needs for the facility including:

- Lead tracks: A lead track is a tracks for trains to slow down and enter the facility off of the main track. For large intermodal facilities, these can be ideally up to 3.2 km long, but for a transloading facility in Terrace it would be expected this would be shorter.[102]
- Control point: If the transload facility tied into the signalized mainline Skeena Subdivision along Highway 16, signals would also be required. These are not required if the transload lead track ties into the Terrace Yard or unsignalized territory such as on the Kitimat subdivision.
- Grade crossing upgrades: Depending on the site of the facility, new crossing surfaces may be required and/or warning systems upgraded or reconfigured.[103] Alternatively, development of a transloading facility may provide additional rationale for a grade separation.
- Track reconfiguration: A facility at Site 1 may require the reconfiguration of the existing Terrace wye that allows locomotives to turn around.

The next chapters consider these needs in the context of the evaluation of alternative sites.

[102] Based on an ideal configuration shown in "Fundamentals of Rail Freight Terminals, Yards, and Intermodal Facilities."

[103] Other systems, such as Trainfo, which can provide predictive crossing blockage warnings, can also be used to mitigate impacts from grade crossings.

5 Preliminary Site Evaluation

Key Chapter Takeaway

- We have identified five candidate sites for preliminary evaluation, most within the City of Terrace.
- The purpose of this chapter is to narrow down the candidate sites from a long list to two for further investigation.
- For further evaluation and investigation, we have selected three sites:
  - Site 1A - South of Highway 16 corridor in Terrace, eastern end near Sande Overpass
  - Site 1B - South of Highway 16 corridor in Terrace, western end near Frank Street
  - Site 2: Thunderbird site, adjacent to the CN Kitimat Subdivision, west of airport
- We also considered evaluating a transloading facility at the Skeena Industrial Development Site (Site 3), but based on previous engineering analysis supplied by the client, the order of magnitude cost of this spur (in 2019 $) is expected to be $10 to $16 million, depending on the route. As this cost is a principal development consideration for this site, and has already been studied.

5.1 Study Area and Candidate Sites

We identified five candidate sites for a transloading facility within or near the City of Terrace, for the purpose of evaluation. They are shown approximately on Figure 5-1, and described as follows:

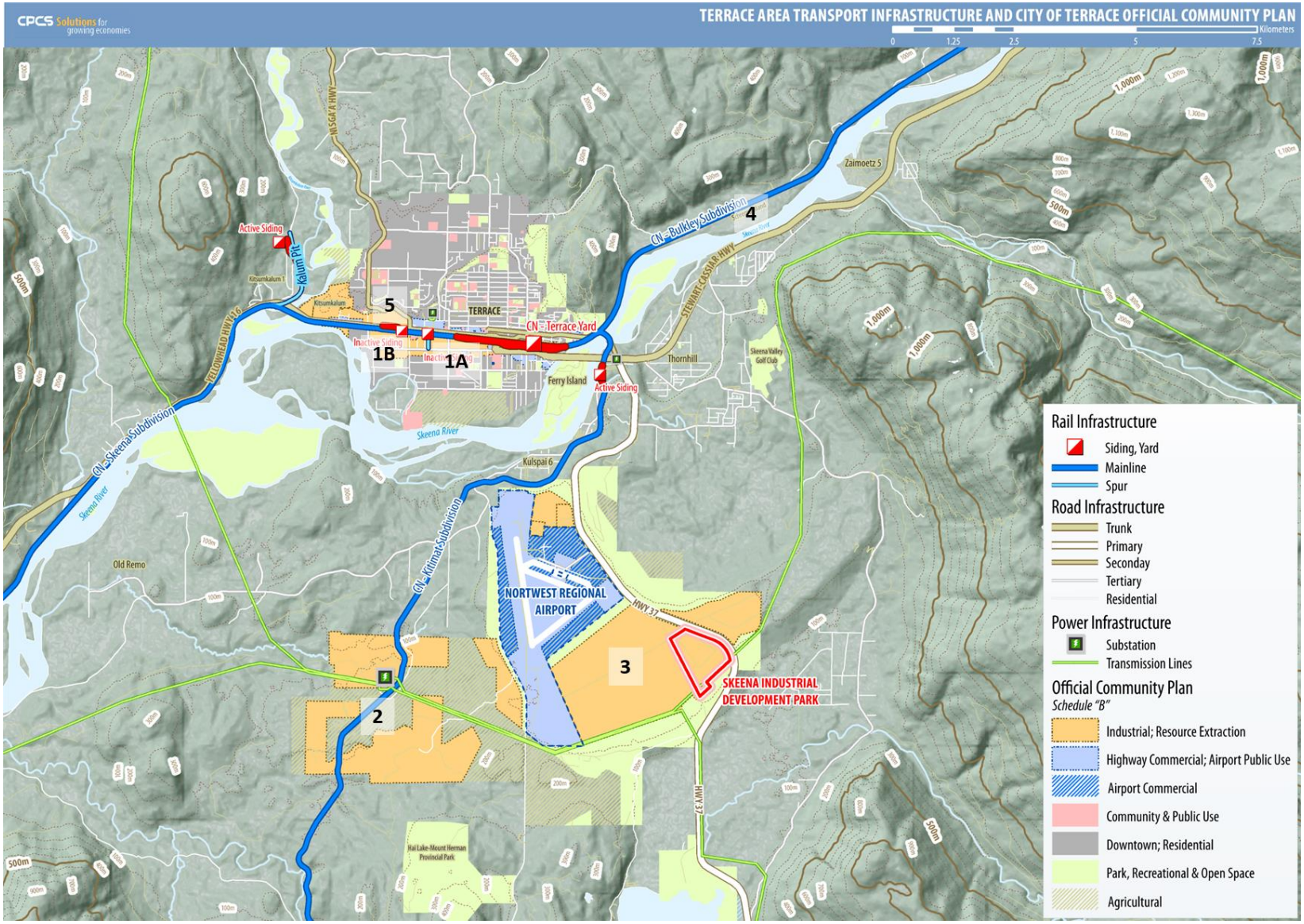
- Site 1A - South of Highway 16 corridor in Terrace, eastern end near Sande Overpass
- Site 1B - South of Highway 16 corridor in Terrace, western end near Frank Street
- Site 2 - Thunderbird site, adjacent to the CN Kitimat Subdivision, west of airport
- Site 3 – New rail access to Skeena Industrial Development Park (SIDP)
- Site 4 – Schremp Island, along Bulkley Subdivision, West of Terrace
- Site 5 – Skeena Sawmills Spur

In line with the study terms of reference, all except for one site (Site 4) is within the City of Terrace. Site 4 was included in the site evaluation as it was (1) raised by stakeholders as a candidate site, (2) is not yet the site of any multimodal facility development, and (3) is not adjacent to any other site.

At a high-level, though Sites 1A and 1B are similar in many respects (e.g. transportation access, etc.), they have been subdivided in part as there are different zonings associated with each site.

In addition to these sites, there is a smaller site to the east of the existing Suncor fuel distribution facility in Terrace. We did not explicitly consider this site for a general-use transloading facility, but note that it could be a potential area to expand the existing distribution facility.

Figure 5-1: Study Area and Candidate Sites



Source: CPCS, based on data from the City of Terrace and other sources.

5.2 Preliminary Site Selection

5.2.1 Evaluation of Candidate Sites

Criteria

We have used a three-level criteria for each of the elements of the site selection matrix, as shown in Figure 5-2. The rating is qualitative and based on **relative** considerations, though some examples are shown in the figure. A "Good" rating is typically assigned where there is a likelihood that costs or minimized or there are lower-risks to feasibility; whereas a "Poor" rating is generally assigned where there are significant additional costs expected or higher-risks of encountering issues limiting the feasibility of the site. In other words, a site with a "Poor" ranking is expected to have a higher cost of development relative to a Site with a "Good" rating.

Figure 5-2: Site Selection Criteria

Level		Examples of criteria application
Good	◆◆◆	• No new road access required • Geotechnical – firm soil expected • Lower risk of archeologically sensitive areas
Fair	◆◆	• In between good and poor
Poor	◆	• New road access would need to be constructed • Geotechnical – poor soils expected • Higher risk of archeologically sensitive areas; additional investigation required

Source: CPCS

It is also important to note that not all criteria should be given equal weighting. For example, rail and road access are principal concerns in the evaluation, in part due to the need for effective rail and truck service, but also due to the high cost of adding infrastructure should it be required.

In addition, it is critical that CN is interested in serving the facility in order to provide reliable service to potential customers. To this end, some specific subcriteria considered in the evaluation of sites included:

- **Potential for the disruption to the mainline traffic.** CN is unlikely to reliably service a site if switching service requires use of the mainline immediately south of Highway 16 and to the west of the Sande Overpass.
- **Minimum traffic volume and proximity to the Terrace Yard.** The minimum scale of facilities is discussed at the end of Chapter 3. However, the minimum traffic level will depend on the proximity to the Terrace yard. For example, it may be economical for CN to switch in and out a small number of cars at a site directly adjacent to the Terrace Yard, which is already taking place for cement traffic. By comparison, CN is unlikely to be willing to switch a small number of cars at a location near the SIDP, particularly if the destination is Prince Rupert. This is because the potential revenue for these movements cannot offset the high-fixed cost of switching to the site.

- **Inclusion of additional tracks for storage of cars.** To mitigate CN from having to store cars on their infrastructure, ensuring the facility is designed to address surge traffic where possible makes the facility more attractive. From a site selection perspective, having additional area to develop makes the site more attractive.

In summary, all else equal, an attractive site is achieved by being closer to Terrace Yard (where local switching service and manifest service to Prince Rupert is based) provided service to the transloading facility does not disrupt mainline activity along Highway 16. Thus, this criteria has been given particular weight in the evaluation.

5.2.2 Evaluation Results

Figure 5-3 summarizes the evaluation of the candidate sites; Appendix A provides further details to correspond with the figure. The bullets below discuss the pros and cons of each site:

- Both of Sites 1 have good road and rail access, and have lower engineering and archeological risks, with the exception of risks associated with site contamination. However, both are in closer proximity to residential areas in the City of Terrace and switching activity would likely block Kenney and Frank Streets, though Terrace's Transportation Master Plan recommends a grade separation in the area.
  - Site 1A is preferable in terms of it offering greater rail frontage, and likely being able to accommodate the estimated rail traffics using a parallel configuration to the existing CN Skeena Subdivision. However, it is currently partially zoned for mixed-use,[104] which would prohibit a transloading facility unless this zoning were changed.
  - Site 1B is zoned industrial, but it has much more limited rail frontage. Depending on the traffic levels, this increases the switching activity needed, which makes it less desirable location from the railway's perspective to serve.
- Site 2 would likely be more costly to develop, principally due to the currently limited road access and the poor geotechnical conditions expected in the area. It also has higher engineering, environmental (greenfield) and archeological risks. However, unlike Site 3, Site 2 avoids the construction of a new rail line to the SIDP.
- Site 3 generally ranks well for the development of the facility itself, except that a rail spur would be required from the existing Kitimat Subdivision. Based on previous engineering analysis supplied by the client, the order of magnitude cost of this spur (in 2019 $) is expected to be $10 to $16 million, depending on the route.[105] Though not noted in the table itself, the final spur alignment would need to be compared against land-use restrictions that may exist from

[104] Urban Systems. 2014. Keith Estates Neighbourhood Concept Plan.
[105] Inflated at 4%.

being near the approach to the Terrace-Kitimat Regional Airport, though it does not appear to be an issue.[106]

- Site 4 would likely require the construction of a new road bridge, and it is expected that there would other constructability issues that would make this site difficult to develop.
- Site 5 could only support a small transloading facility and require trains from Terrace yard to cross the mainline. According to stakeholder discussions, this would not be a sustainable solution. Our analysis and opinion supports this assertion. According to the Transport Canada Grade Crossing Inventory, there are approximately 12 trains per day[107] currently operating over the corridor (i.e. one every two hours on average), which is expected to increase as container and bulk traffic volumes via the Port of Prince Rupert increase in the future. Because freight trains are not precisely scheduled and the priority granted to through trains along the mainline, as well the fact that Terrace Yard is a meeting point for trains in opposing direction, it would particularly not be possible to guarantee reliable train service to a transloading facility in this location.[108] A new road crossing warning system would also be required.

On the basis of the above evaluation, we have ruled out Sites 4 and 5 from further consideration. Site 4 was excluded primarily because of the high development cost of road access. Site 5 was excluded because of the rail access issues noted above. Site 1A/1B and Site 2, because access would be via the south side Terrace Yard (rather than the mainline directly adjacent to Highway 16), would be less prone to being impacted by or impacting on mainline traffic.

Of the remaining sites, we have elected to further investigate Sites 1 (A and B) and 2. We have not evaluated Site 3 as previous studies have already documented the main cost driver associated with developing a transloading facility at Site 3: i.e. the cost of the new spur to the site. Our discussions with multiple stakeholders noted that they view the cost of installing this spur as uneconomic, and there is a significant elevation gain which would make it less desirable to service from a rail operations perspective. The market study in Chapter 3 also did not identify sufficiently high or certain levels of traffic to make

[106] Under Appendix "F" to Official Community Plan, Bylaw No. 1983-2011, Terrace Airport Lands Airport Concept Plan, March 2008, a road or rail spur is outside of the 20 metre clearance envelope required for the final approach, much higher than a double-stacked rail car, assuming level ground. There is also a restriction of 45 metres extending 4,000 metres in all directions, regardless of topography. However, a rubber-tired gantry crane is shorter than this, based on level ground. Certainly, this restriction would need to be considered in depth in any facility siting. However, there are examples of intermodal facilities being in close proximity to airports in North America (e.g. CSXT's Bedford Park Terminal is near the end of one runway at Chicago Midway Airport.

[107] CPCS in the past has noted discrepancies with the train counts in this database; however, this value appears accurate at an order of magnitude level, for the purposes of this discussion.

[108] Whereas a tractor trailer could cross a highway with a clear window between vehicles on the order of say 30 seconds, because of the length of trains, time required to accelerate/decelerate, and the nature of the dispatching system, much longer open windows of time are required to allow for a train to cross over a mainline of likely 30 minutes, if not longer. Further, there may be trains parked on a siding or yard track at the Terrace Yard, which may block access.

this site viable at this point, yet other sites, like Site 1A, offer potential to provide more immediately service, with flexibility to expand.

Overall, there is not one site that dominates in the evaluation; that is, there is not one site that has evaluation criteria that outweighs all others in the evaluation.

Figure 5-3: Evaluation of Candidate Sites

Criteria	Site 1A South of Highway 16 Corridor, East	Site 1B South of Highway 16 Corridor, West	Site 2 Thunderbird (West of airport)	Site 3 SIDP	Site 4 Schremp Island	Site 5 Skeena Sawmills Spur
In City of Terrace	✓	✓	✓	✓	x	✓
Rail Access	◆◆◆	◆◆◆	◆◆	◆	◆◆	◆◆
Minimizes grade crossing impacts	◆	◆	◆◆	◆◆	◆◆◆	◆
Quality of road access*	◆◆◆	◆◆◆	◆◆	◆◆◆	◆	◆◆◆
Zoning considerations	◆	◆◆◆	◆◆	◆◆◆	N/A	◆◆◆
Limited Proximity to population	◆◆	◆◆	◆◆◆	◆◆◆	◆◆◆	◆◆
Geotechnical	◆◆◆	◆◆◆	◆	◆◆	◆	◆◆
Environmental – Contaminated Site	◆	◆	◆◆	◆◆◆	◆◆	◆
Environmental – Greenfield	**Not applicable**	**Not applicable**	◆	◆◆	◆	◆
Civil	◆◆◆	◆◆◆	◆	◆◆◆	◆	◆◆
Archeological	◆◆◆	◆◆◆	◆	◆	◆	◆◆

Notes: *All projects, due the proximity to provincial highways, would need to go through a formal traffic impact assessment. ** If contamination present, it no Ministry Instrument obtained to date (AiP), would be required for future development. To obtain a Ministry Instrument, a Stage 1/2 PSI and DSI would be required, along with any remedial or risk assessment activities. May result in project delays. Source: Analysis by CPCS, McElhanney and Kleanza Consulting, compiled by CPCS.

6 Assessment of Alternative Sites

Key Chapter Takeaway

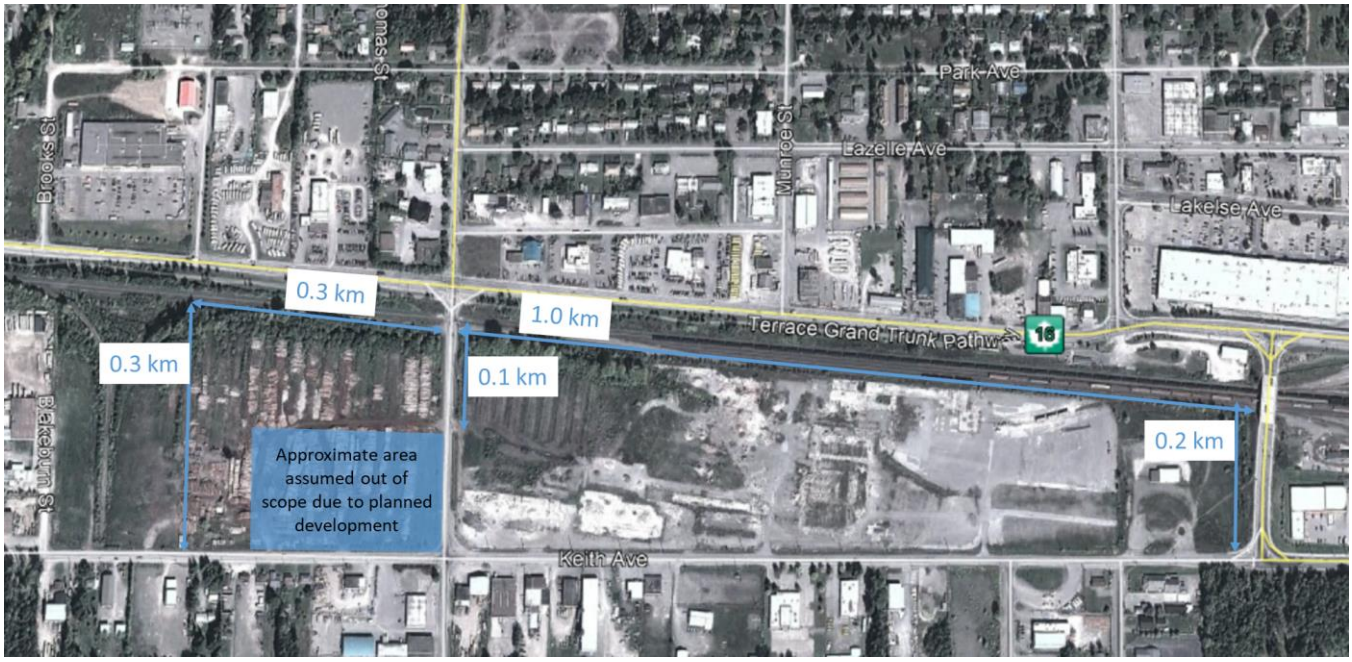
- There is not one site that clearly excels in all areas; trade-offs are involved in the selection of preferred site. However, none of the sites identified are strictly infeasible for purely technical reasons, though risks requiring further assessment and mitigation are identified.
- Site 1A has a combination of the appropriate size/configuration, good road and rail access, and least engineering/archeological risks for the development of a transloading facility, including potentially a small intermodal facility. However, key barriers to the development of a transloading facility at Site 1A include:
  - The impact to the grade crossing at Kenney Street. However, a grade separation is already recommended in Terrace's Transportation Master Plan, and the activities of a transloading facility would only be one driver of the development of a grade separation.
  - The existing zoning for mixed use in the area. While this chapter cannot weigh all of the considerations involved in changing this zoning, our knowledge of land-use planning guidelines in proximity to rail lines suggests that a transloading facility would not be an inconsistent use.
- Site 1B would likely be able to accommodate a transloading facility, but not necessarily a small intermodal facility to shuttle containers between Terrace and Prince Rupert. Besides the smaller linear dimensions of the site itself, it is also in closer proximity to the mainline, which increases infrastructure costs and/or impacts on service.
- While Site 2 has an appropriate configuration for a transloading or a small intermodal facility, it has less direct rail access to Prince Rupert. In addition, an upgraded roadway would be required to serve the transloading facility. There are also a number of geotechnical, biological and archeological considerations related to this site. These could likely be overcome, but would require further investigations and additional costs.
- On the basis of the above evaluation, we would recommend further consideration of Site 1A as a preferred site. Relatively, we anticipate that it could service the potential traffic in the most flexible manner, be the least costly to develop, and presents the fewest risks to feasibility. However, consideration of Site 2 is also given in the report.

6.1 Sites Overview

Figure 6-1 provides an overview of Site 1, which has been subdivided into subsites A and B. Site 1A is longer in the direction parallel to the existing CN Skeena Subdivision (1.3 km), though narrower perpendicular to the site (0.1-0.3 km). Site 1B is shorter perpendicular to the existing CN Skeena Subdivision (0.6-0.8 km), though somewhat wider perpendicular to the rail line (up to 0.4 km). A facility at Site 1A would almost certainly be oriented primarily parallel to the existing rail line, whereas configurations parallel and perpendicular to the rail to the rail line could be considered at Site 1B.

Figure 6-1: Site 1 Overview

Site 1A

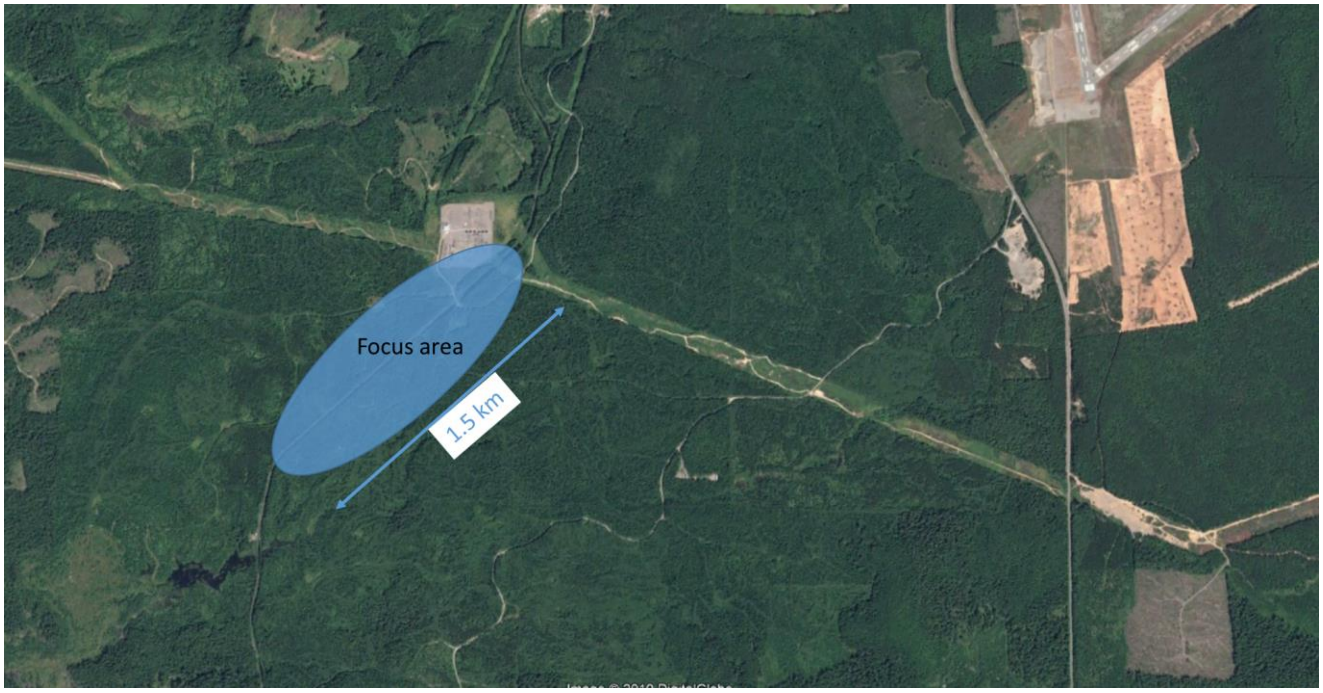


Site 1B

Source: CPCS adaption from Google Earth/Digital Globe

Figure 6-2 provides an overview of Site 2. We considered the broader site boundary to be the City of Terrace limits within the area; however, the focus area centered around the area parallel to the rail line. The focus site is approximately 1.5 km long in the direction parallel to the existing CN Kitimat Subdivision. There is limited direction perpendicular to the rail line, though there are some natural barriers that exist.

Figure 6-2: Site 1 Overview



Source: CPCS adaption from Google Earth/Digital Globe

6.2 Site Investigation Summary Results

6.2.1 Civil

Sites 1A/1B

Site connections for water, storm sewer and sanitary sewer can be made at several locations available to the site. For site 1B the sizing of existing utilities should be of sufficient size to not require upgrading for use of the site. Storm sewer capacity for Site 1A is noted as “very little” by the City of Terrace engineering department. On-site stormwater management would be required and designed to pre-development grassland conditions. Storm outfalls from Sites 1A and 1B are carried via storm sewer to the Skeena River in various locations near Braun Ave, Frank Ave and Eby St. Internal rights of way on the site may be requested by the City for access during and following site development.

Site 1A contains a municipal water cross-connection through the property. For future development of the lot the City of Terrace will only permit dead-end runs of watermain, unless backflow prevention is installed at each connection. The existing water infrastructure may impact development of the site. Utility ROW dedication and site access negotiations would have to be conducted with the City.

Some road or intersection upgrades may be required to allow truck, and other vehicle traffic to access site without significantly impacting existing traffic patterns. Intersection upgrades were completed at the intersection of Keith Avenue and the Sande overpass in 2015 and 2016. These

upgrades included changes to signalization and turning lanes. A traffic study would have to be conducted for the selected to site at the time of development to determine where traffic problems would potentially develop, if any. Traffic studies are required under the City of Terrace Official Community Plan and requires approval from the BC Ministry of Infrastructure as per Section 52 of the *BC Transportation Act* and City of Terrace Bylaws.

Access to overhead power, gas and telecommunications is available adjacent to site and minimal changes or upgrades would be required to provide adequate servicing of either site.

Site 2

Due to the distance from developed land in the City of Terrace and the Regional District of Kitimat-Stikine there is limited existing infrastructure available at Site 2.

The nearest water or sewer utilities to the site are located to the north along Queensway Drive in Thornhill, administered by the Regional District or at the Northwest Regional Airport to the east of site, a 5 km and 4.5 km distance away, respectively. With the nearest sanitary sewer being over 4 km away from Site 2, construction of a sewer connection to tie to existing sewer systems would expensive and inefficient. It is recommended that an onsite sewage system such as septic tanks or septic field be constructed to provide removal of sanitary waste from the proposed site, should this site be selected.

Storm water management is best constructed on site as there is no nearby storm water sewer system or storm water treatment facilities available in the immediate vicinity. Management of storm water can be done via adequate site drainage and discharged to local creeks via culverts or ditches. Storm water would need to be treated on site to meet applicable regulations, possibly using stormcepter to settlement pond style facilities.

The Site is currently serviced by Matson Road (unpaved) and Beam Station Road/Queensway Drive (paved). Matson Road routes through the center of the Site heading east where it intersects with Beam Station Road south of the airport. Existing access to Highway 37 is available via Beam Station Road/Queensway Drive and Substation Ave through Thornhill to the north. Upgrades to the level crossing at Substation Ave may be required.

Upgrades would be required for both Matson Road and Beam Station Road to allow sufficient access to the site and to handle the truck traffic expected with a transloading facility. A possible alternative access from Highway 37 to Site 2 would be to:

- Upgrade Matson Road east to Beam Station Road (approx. 4 km);
- Upgrade Beam Station Road at the intersection with Matson Road;
- Construct of 0.8 km of new road from Beam Station Road to Jack Talstra Way;
- Upgrade Jack Talstra Way east to Highway 37 (approx. 3km).

This would also shorten the route between the SIDP (improving trucking efficiency) and facility, and obviate concerns with respect to trucks crossing existing at-grade crossings of the CN Kitimat Subdivision. This concept is further discussed in the next Chapter and illustrated in Figure 7-3.

The adjacent BC Hydro transmission station and neighbouring areas are serviced with overhead powerlines. Overhead power is available within 1 km of the site.

No access to underground telecommunication or natural gas utilities are known for this site and would have to be installed, if required, during development of the site. The nearest known telecommunications and natural gas infrastructure is located at Northwest Regional Airport, 4.5 km away from site, or in various parts of the Thornhill community 5 km to the north of Site 2.

Conclusion

The results of this desktop study indicated that from a civil engineering perspective either site 1A or 1B are most favourable for development of a transloading facility due to their access to existing infrastructure and utilities.

6.2.2 Environmental

From an environmental (specifically, contamination) perspective, the site selection depends on the cost associated with assessing potential environmental concerns and obtaining a contaminated sites legal instrument (an instrument) under the *Environmental Management Act* (the EMA), if required, as well as the risk of potential delays in obtaining the required municipal development permits while any environmental issues are resolved.

Site 1A

Findings: The following potential issues of environmental concern have been identified for Site 1A:

- The entirety of Site 1A was previously occupied by the Skeena Cellulose sawmill, including a rail spur, sawmill infrastructure, log yards and a suspected pole soaking pond;
- The central portion of Site 1A, where the majority of sawmill operations took place, is listed as a contaminated site in the BC Ministry of the Environment and Climate Change Strategy (ENV) Site Registry database. An instrument (i.e., a Certificate of Compliance [CoC] or Area in Principal [AiP]) has not been issued for these properties;
- A negative Determination (i.e., Site Not Contaminated) was issued for the western portion of Site 1A on March 15, 2017. However, a number of changes to the Contaminated Sites Regulation (CSR) have occurred since the Determination was issued. Based on McElhanney's review of the historical data, several parameters would exceed the currently applicable BC CSR Schedule 3.1 industrial (IL) land use (which would include transloading facilities) standards for soil, and Schedule 3.2 standards for groundwater;
- The eastern portion of Site 1A was previously a Shell Cardlock service station. A CoC was issued for the property using risk-based standards on June 9, 2016, indicating that soil and/or groundwater contamination may still be present on the property;
- Actual or likely substance migration to neighbouring properties has been identified as originating from Site 1A;

- Additional surrounding properties are listed in the BC ENV Site Registry database, which may be contaminated. Without reviewing all Site Registries and/or all reports previously prepared for Site 1A, it is unknown if these properties represent APECs to Site 1A; and
- Piles of fill material of unknown quality, asphalt, plastic debris and wood waste appear piled throughout the central portion of Site 1A.

Risks: Soil and/or groundwater with concentrations of contaminants exceeding the currently applicable BC CSR standards for IL land use (which would include transload facilities) may be present at Site 1A; therefore, an instrument (i.e., a CoC or AiP) would likely be required to obtain a municipal development permit for the western and central portions of Site 1A. The costs for additional investigation, risk assessment and/or remediation required in order to obtain a CoC or AiP could be significant. It is noted that such steps would be required to take place regardless of the land-use, and may be more stringent for other non-industrial uses.

A CoC was issued for the eastern portion of Site 1A, using risk-based standards. The CoC establishes conditions for the use of the property in order to manage the risk associated with existing subsurface impacts and often restricts the type of land use (currently designated as C3 – Service Commercial) and/or the nature of development on the property. Given that a transloading facility is considered a less-sensitive (i.e., industrial) land use, it is unlikely that this type of operation would conflict with the CoC. However, the CoC could dictate the type of landcover (ex., paved vs. graveled-surface) or the location and/or configuration of any buildings constructed on the property. Furthermore, depending on the nature of the contamination, soil and groundwater management and/or Health & Safety plans may be required during construction activities (such as trenching) on this property, as per the CoC.

In addition, the potential substance migration to neighbouring properties from Site 1A as result of historical activities could represent a future liability as significant costs could arise if a surrounding property is determined to have been impacted by contamination migrating from Site 1A and the (future) owner is held responsible.

Furthermore, significant quantities of fill material of unknown quality and debris were observed throughout the site. The costs for disposing of poor-quality fill materials, especially if the material is characterized as hazardous waste, can be substantial.

Finally, the municipal permits associated with development could be delayed while any environmental issues are resolved.

Conclusions/Recommendations: Using information from the BC ENV Site Registry database, the initial site investigation also revealed that additional environmental assessments were conducted in the area but not available to the assessment team. Should this site be developed, it is recommended that the current owner(s) of the central portion of Site 1A and/or third-parties involved in the development review these reports to determine what additional risk assessment and/or remediation would be required to obtain an instrument (i.e., a CoC or AiP) for the central portion of Site 1A. Furthermore, the existing CoC for the eastern portion of Site 1A should be

obtained to determine what conditions/restrictions could potentially apply during development of this portion of Site 1A as a transloading facility, as per the CoC. If these documents are not available through the current owner(s), a request to retrieve them can be made to the BC ENV under the Freedom of Information and Protection of Privacy Act (FOIPPA). It is noted, however, that the further assessments indicated would be required regardless of the future land-use (transload or otherwise), and may be more stringent for other non-industrial uses. Thus, while this further information would be needed prior to developing this particular site for a transloading facility, it is not a factor that would be unique to developing a transloading facility at this site.

Finally, it would be recommended to confirm that all neighbouring properties potentially impacted by substance migration from Site 1A as a result of historical operations have been notified (i.e., through Appendix 2 of the BC ENV Protocol 17) prior to construction of the proposed transloading facility to avoid being held responsible for impacts identified in the future.

Site 1B

Findings: Site 1B has been utilized as a log yard since at least 1988. Dark staining was observed adjacent to an on-site lift and residual logs and piles of wood debris and soil are located throughout the site. A railway has been present to the north since the early 1900sand additional operations (i.e., Skeena Forest Products and the Petro Canada Bulk Plant) on surrounding properties that could potentially give rise to environmental impacts have been present since as early as the 1960s. A site profile was completed for portion of the site, which stated that no further work was required by the ENV; however, a PID was not included in the Site Profile so the extent of that property at that time is unknown. Furthermore, additional surrounding properties are listed in the Site Registry database, which may be contaminated.

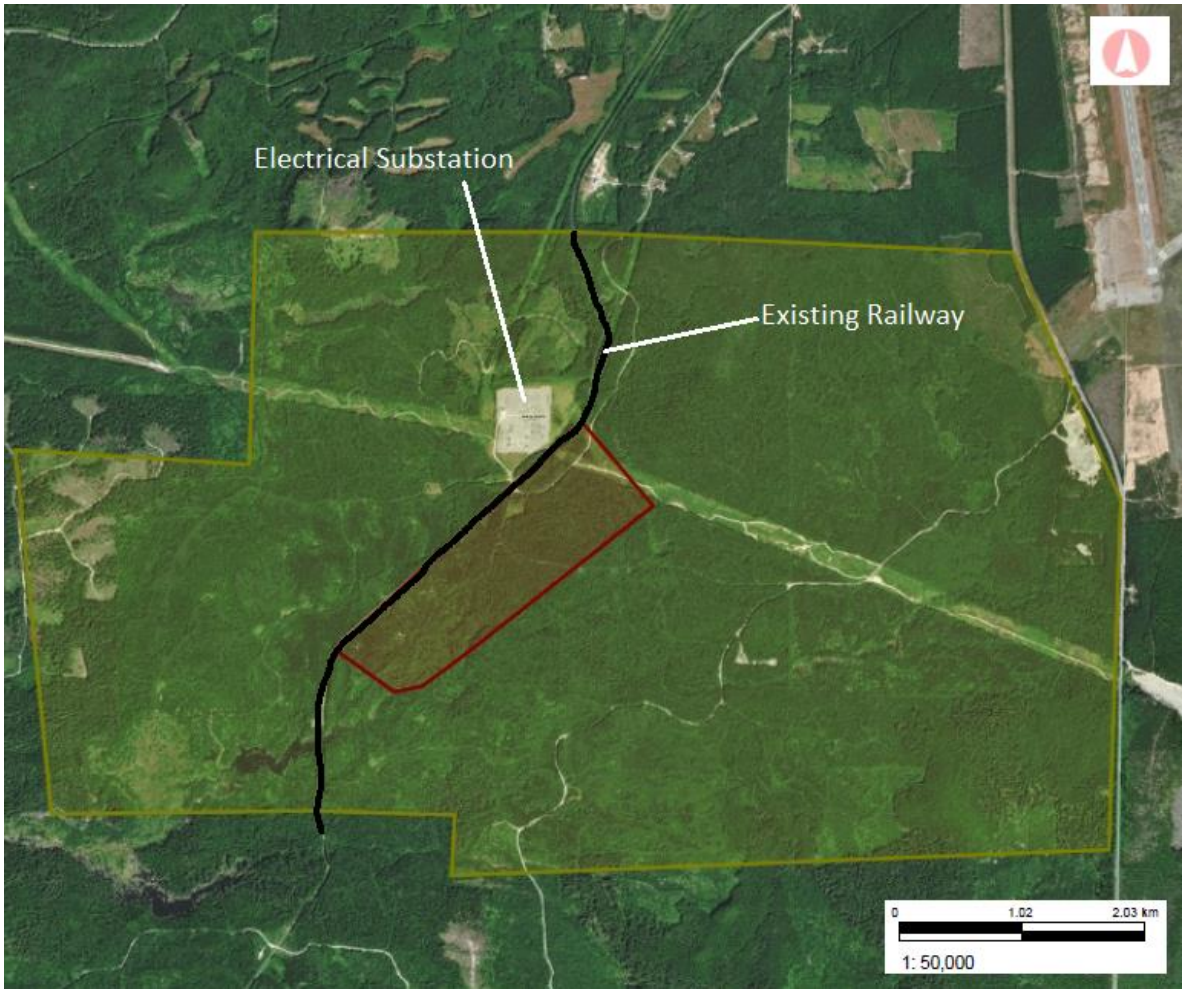
Risks: Given that no environmental site assessment (ESA) activities (that BC ENV has documented) have taken place at the Site, there is potential for subsurface impacts to exist as a result of historical activities at the Site or on surrounding properties. If contamination is identified, additional investigation, risk assessment and/or remediation may be required in order to obtain an instrument (i.e., a CoC or AiP). These activities would result in additional costs, furthermore, the municipal permits associated with development could be delayed while any environmental issues are resolved.

Conclusions/Recommendations: Should this site be selected as the preferred site, it is recommended that Phase I and II ESAs be conducted at Site 1B. If subsurface impacts are identified, additional activities (such as a Stage 1 PSI, Stage 2 DSI, risk assessment and/or remediation) may be required to obtain an instrument (i.e., a CoC or AiP); however, given that the industrial history is lesser than that of Site 1A, the costs of obtaining an instrument (if required) would likely be less significant than those for Site 1A. If no subsurface impacts are identified during the Phase II ESA, a municipal development permit could possibly be obtained without the need for an instrument (i.e., a CoC or AiP). Furthermore, as noted for Site 1A, municipal permits associated with development of Site 1B could also be delayed while environmental issues are resolved, but likely to a lesser extent than Site 1A.

Site 2

Findings: Site 2 consists of predominately undeveloped forested land, with a railway traversing the site from northeast to southwest since at least 1950, as well as an electrical substation that has been present since at least 1969. The railway and electrical substation are located centrally within Site 2, and northwest of and adjacent to, the area of focus (Figure 6-3).

Figure 6-3: Site 2 location (yellow), with focus on the area outlined in red



Source: McElhanney using base photo from Google Earth

Risks: Soil contamination may be present in the immediate vicinity of the railway line and/or electrical substation. Based on the nature of contaminates generally associated with these types of operations, potential groundwater and soil vapour impacts are likely minimal.

Conclusions/Recommendations: Should this site be selected, a limited Phase II ESA would be recommended in the immediate vicinity of the electrical substation and railway to investigate potential impacts from these operations. However, this Site likely entails the least environmental costs and lowest risk of delays in municipal development permitting due to environmental issues

given that municipal permits are likely to be obtained without the need for an instrument (i.e., a CoC, AiP or Determination).

Summary

The results of this desktop study indicate that from an environmental (specifically, contamination) perspective, Site 1A, Site 1B and Site 2 are suitable for development with a transloading facility. However, Site 2 is the most favourable site, followed by Site 1B and Site 1A based solely on the lowest potential cost of additional investigation, risk assessment and/or remediation required to obtain an instrument under the EMA (if required) and a municipal development permit, as well as the lowest risk of delays in obtaining the required development permits while any environmental issues are resolved.

6.2.3 Biological

Sites 1A/1B

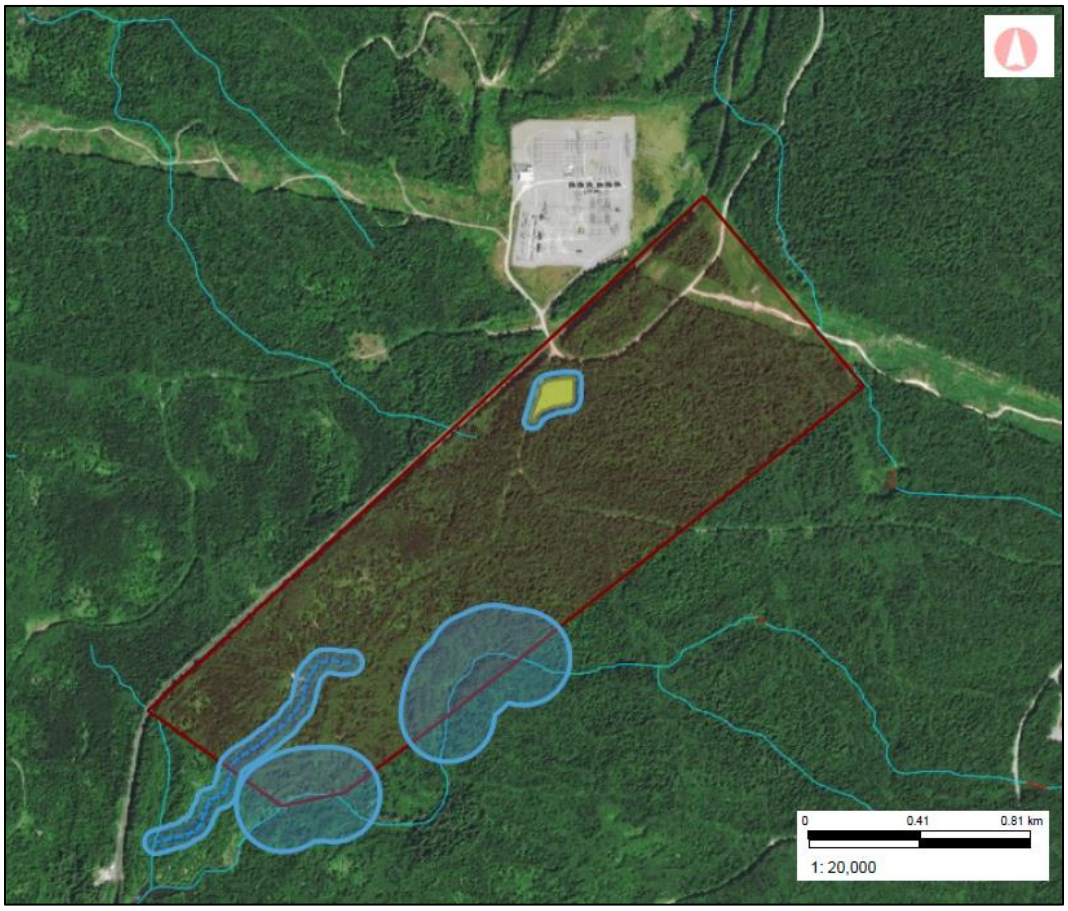
Ecological values within Sites 1A and 1B are severely limited by the site history, with habitat values restricted to ephemerally wetted ditches and forested strips along the north edge of Site 1A. None of the wetted ditches are anticipated to be fish-bearing, but they could support amphibian breeding. Development here may require adjustment of drainage patterns and possibly amphibian salvage operations, depending on the timing of the works.

Site 2

Recent forest harvesting activities within a large part of the Site 2 area to the east of the rail line have substantially reduced ecological values. Remaining values within the area of focus are associated with wetlands and streams, as well as their surrounding forested buffers. In addition to the mapped stream identified as Mink Creek, one wetland pond was identified near the north corner of the approximate area of focus, and a tributary to Mink Creek was identified within the southwest portion of the area of focus. Forest harvesting activities provided for a forested buffer of approximately 15 m around the wetland and did not extend to the unnamed tributary.

Depending on development plans within the area of focus, forested buffers should be retained around these waterbody features (Figure 6-4). If the development footprint is proposed to overlap these features resulting in direct physical impacts to the waterbodies and surrounding forested buffers, instream works are likely to require permitting and possibly habitat offsetting. In addition, development near Mink Creek could present substantial constraints, as geotechnical hazards near the known fish-bearing watercourse are unlikely to allow for development below the top of bank and may require substantial setbacks.

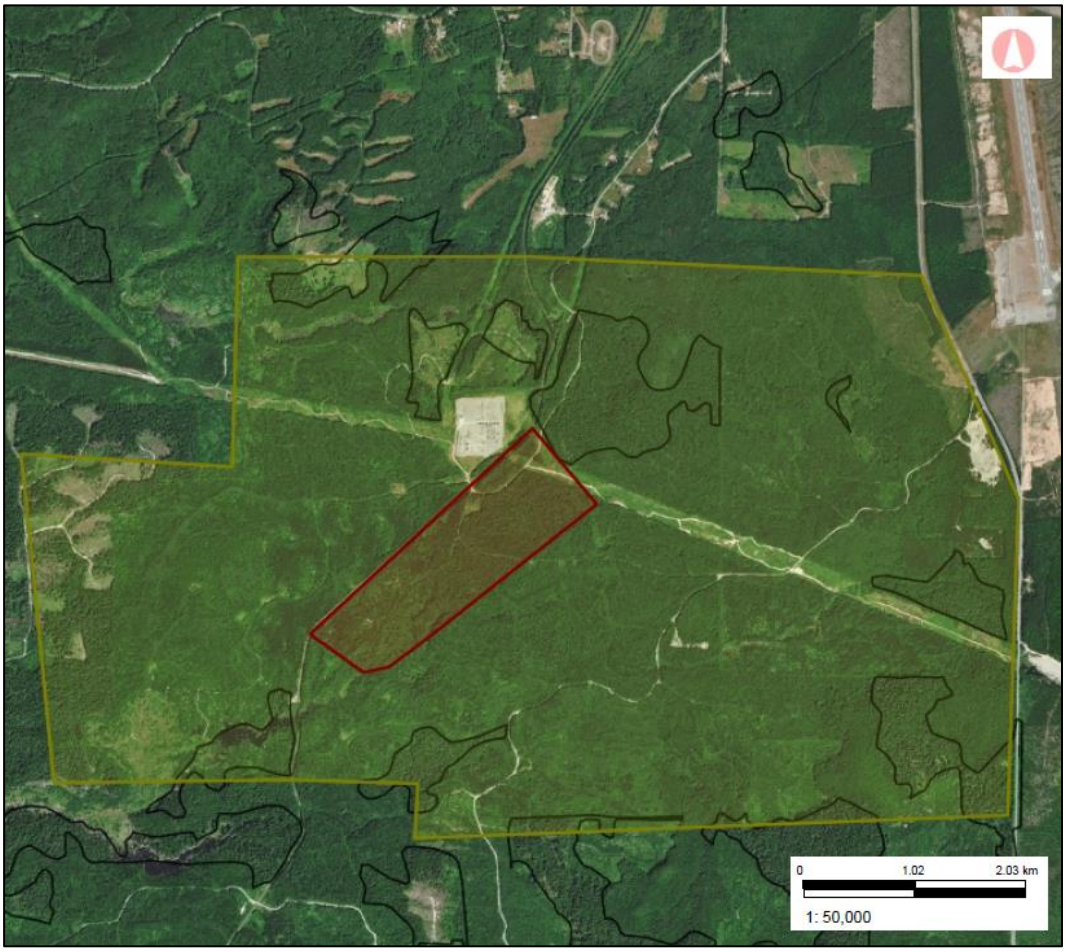
Figure 6-4: Approximate non-disturbance buffers (blue polygons) recommended around watercourses (blue lines) and wetlands (yellow) observed within the area of focus. Development within these buffers is likely to require significant permitting efforts.



Source: McElhanney analysis

Marbled Murrelets: The marbled murrelet is a provincially blue-listed, federally Threatened seabird that spends its days foraging at sea, but nests in old-growth forests up to 85 km inland. Critical habitat polygons established for marbled murrelet in BC were remotely mapped based on predictive algorithms for forest cover, with notoriously poor accuracy (Figure 6-5).

Figure 6-5: Federally-designated critical habitat (black) for marbled murrelets in and around the proposed development area at Site 2 (yellow). No critical habitat polygons are found within the area of focus (red).



Source: McElhanney analysis

There is a possibility that the critical habitat polygons mapped within the Site 2 boundary do not constitute suitable habitat for marbled murrelets, and as such, would not receive protection under the federal *Species at Risk Act*. However, development within mapped polygons would require detailed field assessment to determine habitat values and, depending on the habitat assessment findings, may require a multi-year inventory program to rule out murrelet presence.

Provided that any development within the proposed Site 2 boundary avoids these critical habitat polygons, no constraints are anticipated with regard to marbled murrelet habitat.

Moose: Provincial ungulate winter range (UWR) designation does not specifically apply under the legal order to works that are not associated with forest harvesting activities. However, the UWR boundaries and associated General Wildlife Measures are typically used as a guideline for sustainable development and protection of ecological values in most industries.

Given that the majority of the area of focus was recently harvested, moose winter range values within this area are considered low. Moose winter range values within the larger Site 2 Area are

concentrated in floodplain areas along major streams such as Mink Creek as well as older forests. Given that other ecological constraints such as fish stream setbacks and critical habitat provisions are likely to limit development within these areas, impacts to ungulate winter range are anticipated to be minor.

Conclusion

Given the substantial level of historical disturbance to Sites 1A and 1B, remaining ecological values are very limited. Ephemerally wetted ditches near the rail line at the north edge of Site 1A are unlikely to constitute fish habitat, minimizing potential permitting constraints on development.

Much of Site 2 east of the rail line has recently been cleared of forest cover by harvesting operations. Development near Mink Creek could require substantial setbacks due to fish-bearing status and geotechnical hazards. Furthermore, most sites with mature or old growth forest within Site 2 have been designated as critical habitat for marbled murrelet, which could restrict development potential in these areas. If development plans can utilize the recently cleared areas and avoid Mink Creek, its tributaries, and any mature and old-growth forests, ecological impacts and permitting constraints are likely to be limited. If development must extend to Mink Creek and/or any designated critical habitat for marbled murrelets, significant permitting obstacles are likely to be encountered.

6.2.4 Geotechnical

From a geotechnical perspective, the site selection depends on the cost associated with the potential geotechnical concerns. We understand that the proposed development would comprise of stacked or LNG shipping containers in the weight range of 20 to 30 tonnes, mobile equipment (reach stackers, fork lift trucks) with a handling capacity up to 45 tonnes, 32.5 ton axle loading on rail lines, and industrial warehouses. At this stage, no information of the facility layout is available, given it would depend on the specific site. The feasibility discussion focusses on the geotechnical issues and feasible foundation options for the proposed facilities.

Site 1A/1B

Site 1A is underlain by sand and gravel with a flat grade and the groundwater is as deep at 5.5 m (18ft). We believe that Site 1A is the most favorable site for the proposed development. Shallow foundations can be adopted, and railway tracks for the loading/unloading yard can be founded on existing grade. Site preparation requirements include stripping off the shallow unsuitable material and replacement with compacted foundation fill. Note there is an uncertainty of the depth and composition of fill soils on this site and will require further subsurface geotechnical assessment to characterize.

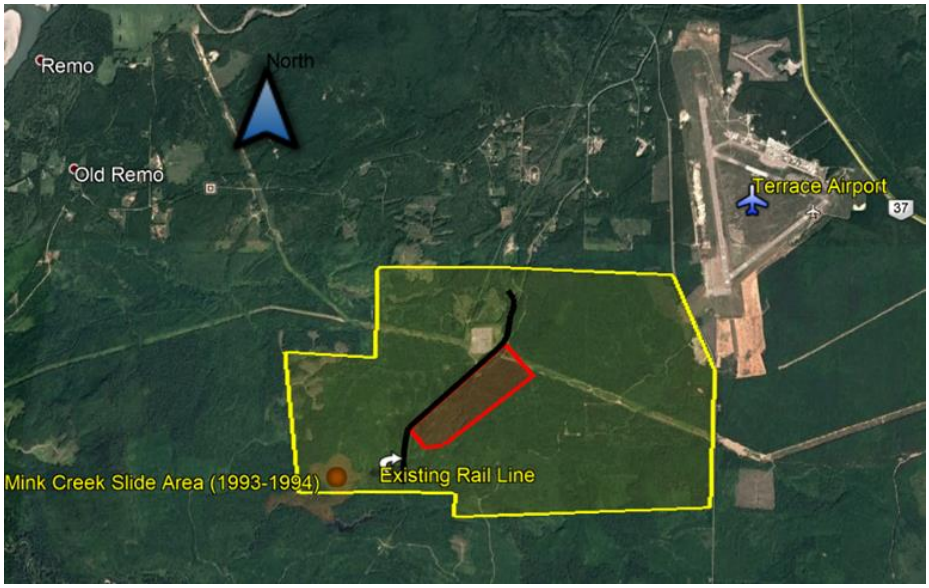
Site 1B is underlain by sand and gravel with flat grade, but groundwater is as shallow as 0.6 m (2ft). Since the site is adjacent to the Skeena River, the final grade is required to be at least 0.5 m higher than the 200 year flood level. Considering that site is currently used as a log yard, some wood chips and fill debris, if any, at shallow depth, will need to be stripped off the site. In the case that loose sandy material is encountered below groundwater in the next stage of geotechnical site investigation, liquefaction mitigations, such as dynamic compaction or rapid impact would be required within the footprint of some important components and heavily loaded facilities, such as shipping containers.

Site 2

Site 2, Mink Creek is underlain by blue silty clay and the terrain is rolling with slopes up to 20 degrees and cut by gullies. Landslides, slope failures, and consolidation settlement are major geotechnical concerns.

For Site 2, the proposed development would need to be offset from any terrain slope that is locally instable. Important components of the facility need to setback at least 100m from the Mink Creek slide scar area; the avoid area is as shown in Figure 6-6.

Figure 6-6: Site 2 location (outlined in yellow) with focus on the area outlined in soilid red. Dashed lined area to be avoided



Source: McElhanney analysis, using Google Earth imagery.

Preload can be used for a heavily loaded facility, including an LNG container yard, railway trans-loading facility and industrial warehouses, if footings/foundation pads are adopted. Alternatively pile foundation can be considered. The approximate foundations costs and site preparation in Site 2, Mink Creek, is estimated to be in the order of 3 to 5 times higher than the foundations and site preparation costs in Site 1A and Site 1B. The foundation construction period would be at least 6 months longer in Site 2, considering extensive preload is likely required in Site 2.

Conclusions

The geotechnical desk top study indicates that Site 1A is the most favorable site, followed by Site 1B. Site 2 should be considered only if Sites 1A and 1B are excluded due to major environmental or archeology reasons, since the potential risk in Site 2 can make the development costs an estimated three to five times higher than in Site 1, and the foundation construction period would be at least six months or longer in Site 2 for preload ground improvements.

From a geotechnical point of view, should Site 1 be selected as the preferred site, the client invest in further geotechnical site investigation in Site 1A and Site 1B, to determine the soil profile and compare geotechnical parameters in the next stage of design. However, if the Sites 1A and 1B are excluded for any environmental or archeological or other reasons, the client should first invest in an intensive geotechnical site investigation in the Site 2 polygon, to further identify and narrow down the potential area subject to less geohazard risk, and further assess the site topographic characteristics and quick clay behavior in the Mink Creek area. That is, the depth of investigation of Site 2 would need be much greater.

6.2.5 Archeological

This section summarizes the results of an archaeological overview assessment (AOA) of two candidate locations for a proposed rail transloading facility in Terrace, BC. This AOA study was undertaken to provide information regarding archaeological and heritage concerns for the two candidate locations and recommendations related to permitting, future studies, and First Nations consultation. Our primary results and recommendations are in Figure 6-7 below.

Figure 6-7: Archeological Results and Recommendations

Candidate location	Findings	Risks	Recommendations
Site 1	No previously recorded archaeological sites	• Limited archaeological study in inland/upland areas of Terrace • Higher archaeological potential close to the Skeena River (west end)	• Preliminary field reconnaissance (PFR) • Archaeological monitoring • Acquire a S14 AIA permit* as a proactive measure • Implement chance find management procedure
Site 2	Previously recorded archaeological sites (culturally modified trees)	• Unrecorded culturally modified trees • Subsurface potential is higher near watercourses	• Archaeological impact assessment conducted under a S14 AIA permit*

*A Section 14 permit is granted by the Archaeology Branch to a qualified archaeologist. The permit allows the archaeologist to conduct an archaeological impact assessment, using subsurface testing if necessary, to determine the presence/extent of archaeological sites within the permitted project area. Source: Kleanza Consulting analysis

Should the City of Terrace or a project developer wish to develop a site, Figure 6-8 outlines scopes and timelines for further archaeological work, based on the figure above.

Figure 6-8: Definitions of Archeological Recommendations

Task	Scope	Timeline
Preliminary field reconnaissance (PFR)	A non-permitted field visit to assess landforms, observe natural or anthropogenic exposures, and make more detailed recommendations for further study.	One or two days plus reporting time.
Archaeological Monitoring	A crew of one or more archaeologists and First Nations field technician(s) observe any ground-breaking, geotechnical, or construction activities that may expose subsurface archaeological deposits.	Dependent on geotechnical/ construction schedule.
Chance find management procedure	A document deployed on construction projects that informs work crews of how to identify and report archaeological remains.	Approx. one week to develop and one or more days to implement (i.e., visit work sites and conduct arch orientation).
Archaeological impact assessment (AIA)	An in-depth archaeological assessment conducted under a S14 permit, allowing for subsurface testing (shovel testing, excavation).	Approx. 10–12 weeks to acquire permit; 3–5 days of fieldwork, plus reporting time.

Source: Kleanza Consulting summary

6.2.6 Rail Access

There are at least two rail access considerations in assessing the rail access of the alternative sites:

1. Minimizing the impacts to the CN mainline (i.e. Skeena Subdivision running along Highway 16). With growing traffic through the Port of Prince Rupert, CN's BC North Line has evolved into a densely used primarily single-track mainline. To avoid reducing the capacity of the line, switching activity would need to take place off of the mainline.
2. Providing rail service between the transloading facility and key destinations (notably Prince Rupert in the case of containers).

Minimizing Impacts to Mainline

Site 1A outperforms Site 1B along this metric. There is approximately 1 km between the western end of Site 1 and the signal at the west end of the Terrace yard. This would allow for trains to/from Prince Rupert and the facility a longer distance to accelerate/decelerate. By comparison, if traffic were coming to/from Prince Rupert, Site 1B could impact the mainline, and there is more limited room to construct a track to the mainline in this area due to the proximity of the Skeena River (Figure 6-9). A tie in to the mainline would also require a new signalized switch, as well as a new crossing of Frank Street. A switch on the east end of the site would also need to tie into the siding track rather than Terrace yard, which would likely lower the reliability of service to this facility. While Site 1B could be a site for a smaller transloading facility, it offers less flexibility than Site 1A.

Figure 6-9: West of Site 1B

Source: Google Maps

Because of the lower traffic volumes on the Kitimat subdivision along Site 2, a transloading facility in that location would have less impact to the mainline.

Rail Service

There is a manifest service Terrace to Prince Rupert, that, subject to train capacity constraints, potentially service Site 1 (both A and B). By comparison, there is no direct train service between Site 2 and Prince Rupert, and we understand that there are limitations of train lengths on the Kitimat Subdivision. The traffic does not appear to justify a unit train service between Site 2 and Prince Rupert.

6.3 Summary of Evaluation

Figure 6-10 summarizes the key strengths and weaknesses of the alternative sites considered based on the above investigation. As suggested by the preliminary evaluation in Chapter 5, there is not one site that clearly excels in all areas; trade-offs are involved in the selection of preferred site. However, none of the sites identified are strictly infeasible for purely technical reasons, though risks requiring further assessment and mitigation are identified.

Figure 6-10: Key Strengths and Weaknesses of Alternative Sites

	Site 1A	Site 1B	Site 2
Key Strengths	• Sufficient length parallel to existing rail line for a transload facility, including possibly a small intermodal facility • Better rail service to Prince Rupert and close to Terrace Yard (than Site 2) • CN already serving traffic in this area	• Zoning aligned with proposed site use, and further away from downtown Terrace (than Site 1A) • Better rail service to Prince Rupert and close to Terrace Yard (than Site 2)	• Sufficient length parallel to existing rail line for a transload facility, including possibly a small intermodal facility • Closer to SIDP and further away from residential uses (than Site 1A)
Key Weaknesses	• Current zoning would not allow for development of a transloading facility • The City is wishing to develop commercial/light industrial usage on the City-owned parcels west of Kenney, and would prefer not to have Kenney Street closed/impacted. • Operations would impact on existing grade crossings, though existing TMP* notes a grade separation as a need	• Not expected to be large enough to accommodate a larger facility, so less flexibility for expansion • Operations would impact on existing grade crossings, though existing TMP* notes a grade separation as a need	• Less frequent and direct rail access to Prince Rupert; less likely CN would be interested in serving with lower volumes • Higher development costs for civil needs, including road access • Biological, geotechnical and archeological factors are less favourable towards development

*TMP = Transportation Master Plan. Source: CPCS analysis based on team inputs.

Site 1A has the combination of the appropriate size/configuration, good road and rail access, and least engineering/archeological risks for the development of a transloading facility, including potentially a small intermodal facility. We also believe CN would be most interested in serving this area, given that they are already serving an existing spur in the area.

However, key barriers to the development of a transloading facility at Site 1A include:

1. The impact to the grade crossing at Kenney Street. However, a second grade separation in the vicinity (at Braun Street/Nisga'a Highway) is already recommended in Terrace's Transportation Master Plan in the vicinity, which could mitigate impacts to the reduced

availability of this crossing,[109] and the activities of a transloading facility would only be one driver of the development of a grade separation.[110] Refer to further discussion in Sections 7.3 and 7.5.

2. The existing zoning for mixed use in the area. Figure 6-11 shows the Keith Estates Neighbourhood Concept Plan showing this below. Selecting Site 1A would require the City of Terrace to prioritize freight-based use at this location instead of the concept below.

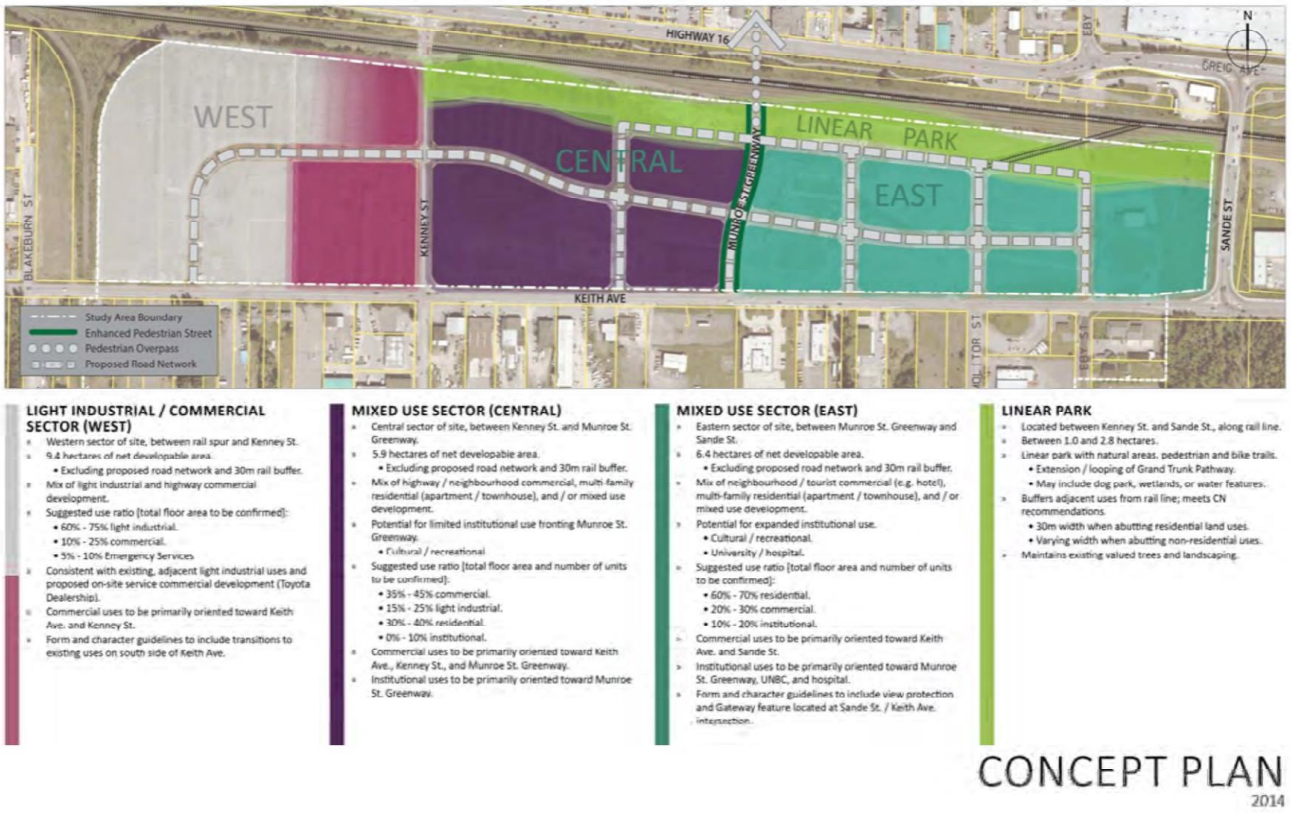
Weighing the trade-offs involved in (2) is beyond the scope of this study. However, in reviewing the concept, we note that the study makes the following assumption:

> The width of the park would average approximately 30 metres and thus align with CN Rail's proximity recommendations (p. 17).

While 30 metres is indeed the recommendation for residential development adjacent to "Principle [or] Secondary Main Lines", the Federation of Canadian Municipalities/Railway Association of Canada's Proximity Guidelines recommend 300 metre setbacks adjacent to rail freight yards for residential areas (and other sensitive facilities, e.g. educational institutes and churches. While CN's yard in Terrace is not as large or active (as compared to classification yards in Toronto), its tracks extend to the West of the Sande Overpass along the north side of Keith Estates. In addition, CN's trains do start/stop in this location, resulting in noise from buff/draft forces on the train drawbars compressing. If a buffer of 300 m were used, a transloading facility would not be inconsistent with the uses available within this buffer. In addition to this zoning consideration, any environmental remediation required at Site 1A would be more stringent for non-industrial uses.

[109] For clarity, the Transportation Master Plan does not recommend closure of the Kenney Street crossing. Source: McElhanney Consulting Services. 2017. Transportation Master Plan: City of Terrace.
[110] Increased rail traffic to the Port of Prince Rupert and other community needs would also drive this.

Figure 6-11: Keith Estates Neighbourhood Concept Plan



Source: Urban Systems, 2014.

Though not as desirable of configuration as Site 1A, Site 1B would likely be able to accommodate a transloading facility handle the cement and forestry products traffic envisioned in the market study. However, Site 1B not would be able to accommodate small intermodal facility to shuttle containers between Terrace and Prince Rupert. The dimensions of the site are too small for the traffic envisioned: a small comparable intermodal facility is closer to 1.2 km long, whereas Site 1B has only approximately 0.6 km of frontage.

Site 1B is also in closer proximity to the mainline, and there is less room to construct a lead track to minimize impacts to the mainline to the west. To the east, the site would likely tie into the existing siding, which would impact service reliability. There is also potentially increased geotechnical risks in this area due to the proximity of the Skeena River. However, the existing zoning is appropriate at Site 1B to accommodate a transloading facility, as compared to Site 1A.

The primary user of a small intermodal facility would be LNG containers from micro-LNG facilities that are planned in the Terrace area. In addition, potentially wood pellets could be loaded into containers and transported to Prince Rupert using this mechanism. At present, these LNG facilities are not yet developed and traffic has not yet materialized; however, one of the project proponents indicated a medium-term need (e.g. early 2020s) to mitigate the risk of truck driver shortages impacting their ability, as well as the ability of other potential exporters

in the Terrace area, transporting their products to market.[111] Thus, the need for an intermodal facility of this nature would at this time, be dependent on the development of these LNG facilities (or another significant traffic source at the SIDP).

In summary, Site 1B is likely feasible for a transloading facility based on existing traffic, though provides less flexibility for any future expansion than Site 1A.

Finally, while Site 2 has an appropriate configuration for a transloading or a small intermodal facility, it has less direct rail access to Prince Rupert. In addition, an upgrade roadway would be required to serve the transloading facility. There are also a number of geotechnical, biological and archeological considerations related to this site. These could likely be overcome, but would require further investigations and additional costs. With the existing traffic levels, we do not consider that it would be financially feasible to contract a transloading facility here, nor would CN be as interested in serving this particular location.

On the basis of the above evaluation, we would recommend further consideration of Site 1A as a preferred site. Relatively, we anticipate that it could service the potential traffic in the most flexible manner, be the least costly to develop, and presents the fewest risks to feasibility. However, consideration of Site 2 is also given in the report.

[111] Labour shortages is a concern raised by stakeholders during this and other studies carried out in 2018/2019 by CPCS. While greater use of rail is one potential strategy to address this concern, there may be others that are possible, including greater automation of port activities (freeing up existing labour to carry out longer haul truck moves), increasing recruitment efforts, etc. The scope of this present study does not address all of the potential policy solutions that could be used to address this concern. We nonetheless raise these alternatives to point out that other stakeholders in the area may develop strategies to mitigate the labour shortage concern.

7 Facility Concept, Financial and Economic Case

Key Chapter Takeaway

- This chapter illustrates what a small intermodal facility in Terrace could look like, based on the medium and long-term opportunities identified in Chapter 3 (i.e. up to 14,000 containers and 480 rail cars per year). Facilities of similar size to those shown have a capital cost of the order of magnitude of $50 million. The existing spur/team track in Terrace could accommodate existing traffic levels, and could be part of a larger facility in the future.
- It is plausible that a facility of this scale could generate sufficient revenues to offset the operating and some of the capital cost of the facility; however, a user of the facility would need to be willing to provide long-term support of the facility, such as through a take-or-pay contract.
- Overall, all else equal, key stakeholders including the Port of Prince Rupert and CN would rather concentrate logistics activity in Prince Rupert, as this would allow rail to be used for the longest distance possible, which is also a more efficient mode in terms of safety and greenhouse gas emissions. It is therefore unlikely that commodities from outside of Terrace would be transloaded in Terrace, at least in the short-to-medium term.
- Transloading offers a number of benefits to users and non-users alike, including reductions in greenhouse gas emissions and pavement damage, and improvements in safety. Based on the traffic assumptions within the potential pavement damage and potential safety benefits yields approximately $2.7 million per year in benefits within BC alone. These benefits could provide justification for government of support of aspects of the project.

7.1 Potential Facility Concepts

7.1.1 Illustrative Concept

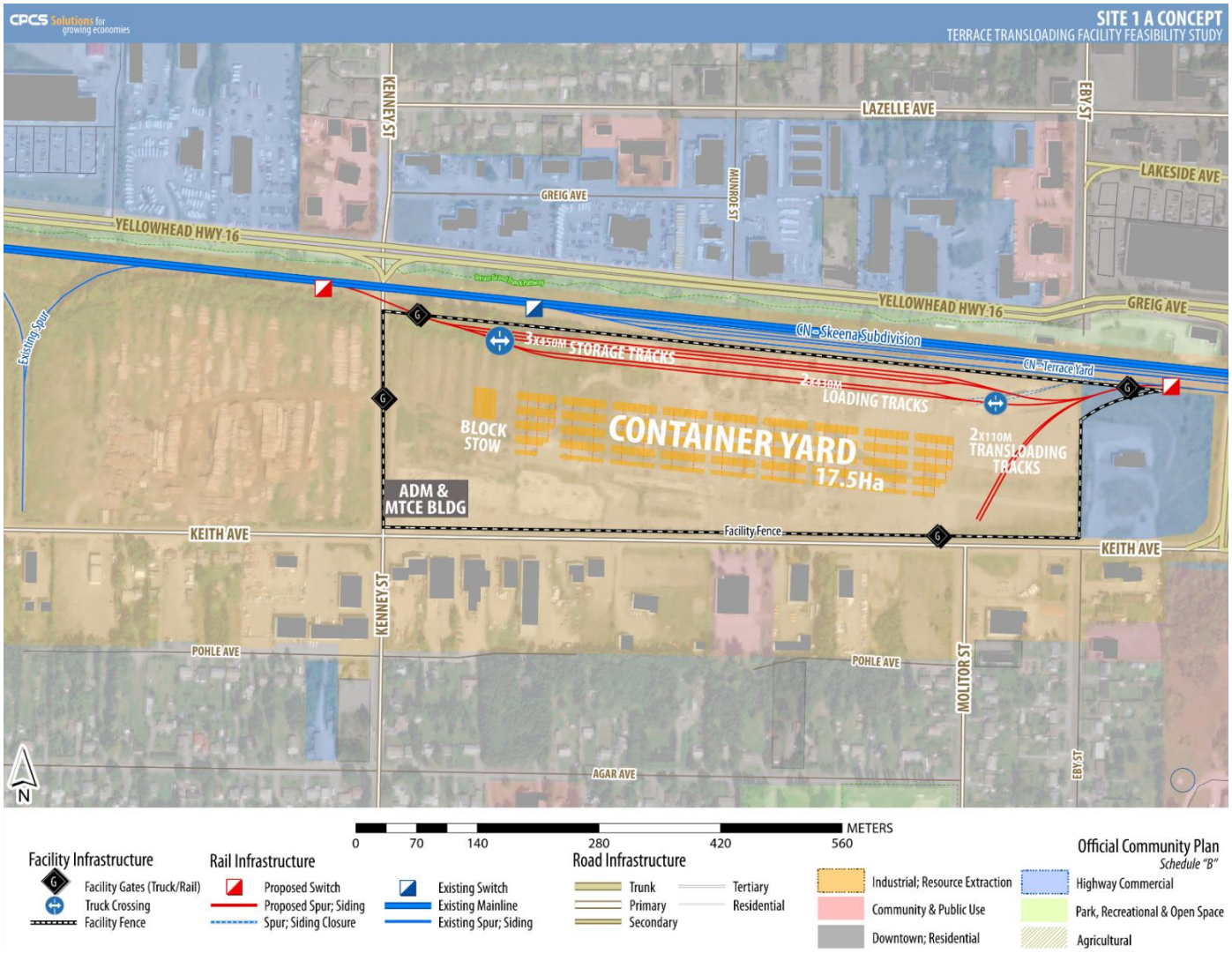
For the existing/short-term opportunities for a transloading facility in Terrace discussed in Chapter 3 (Figure 3-19) – lumber, wood pellets and cement – the existing spur, also sometimes referred to as a team track, is sufficient to accommodate these commodities. However, an intermodal facility would be required to accommodate containers, such as micro-LNG containers. We developed the remainder of the chapter assuming the facility would accommodate the following traffic:

- **Westward Traffic:** Handling of up to 14,000 containers, predominantly made up micro LNG containers, shipped from Terrace to Prince Rupert by rail for onward shipment to Asia.
- **Eastward traffic:** transloading of up to 480 cars per year of lumber to the US Midwest[112]

As a long-term vision, Figure 7-1 shows a potential concept at Site 1A, having two loading (working) tracks and three storage tracks to accommodate fluctuations in traffic and rail service. The facility also could accommodate transloading tracks on the east side of the site, for handling products between trucks and bulk rail cars.

[112] Chicago was assumed as a possible destination.

Figure 7-1: Site 1A Concept



Source: CPCS

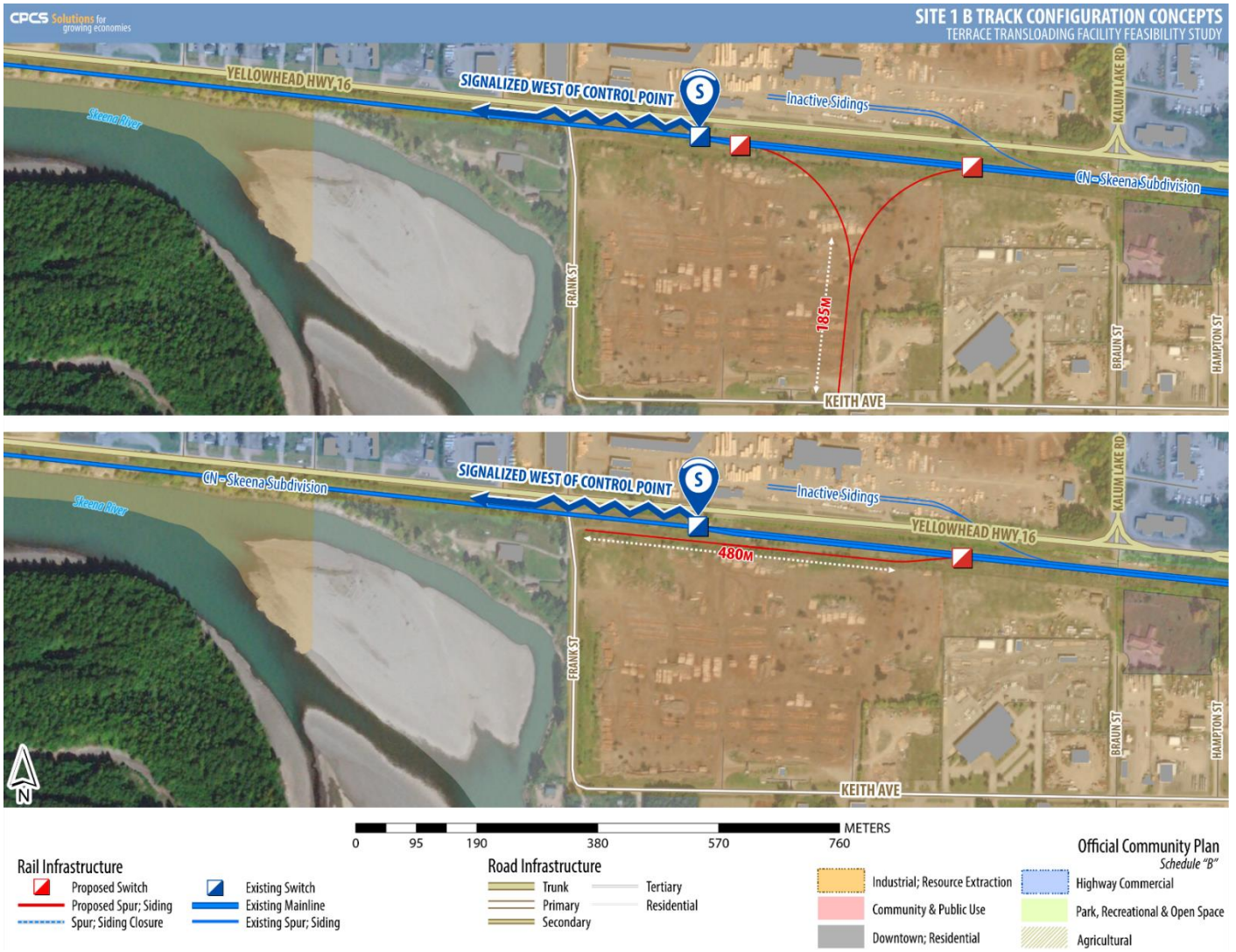
7.1.2 Comparison with Other Sites

An objective of this study is to illustrate what a transloading facility may look like. Given that some of the traffic sources offer longer-term potential for developing, including development at SIDP, the following maps compare concepts for develop at alternative sites, notably Site 1B and Site 2.

The configuration of Site 1B provides sufficient area for a relocated spur from Site 1A, in order to provide capacity to transload products such as cement, etc. However, the length of the site parallel to the CN Skeena Subdivision and location next to the mainline does not provide the flexibility in terms of length to construct an intermodal facility similar in concept to Site 1A. In particular, if a siding were to have a switch at the West end of the site, there would need to be some addition or reconfiguration of the signalized track (shown using the zig-zag line), which would increase costs relative to Site 1A. Figure 7-2 shows the track lengths available depending on the configuration of the site.

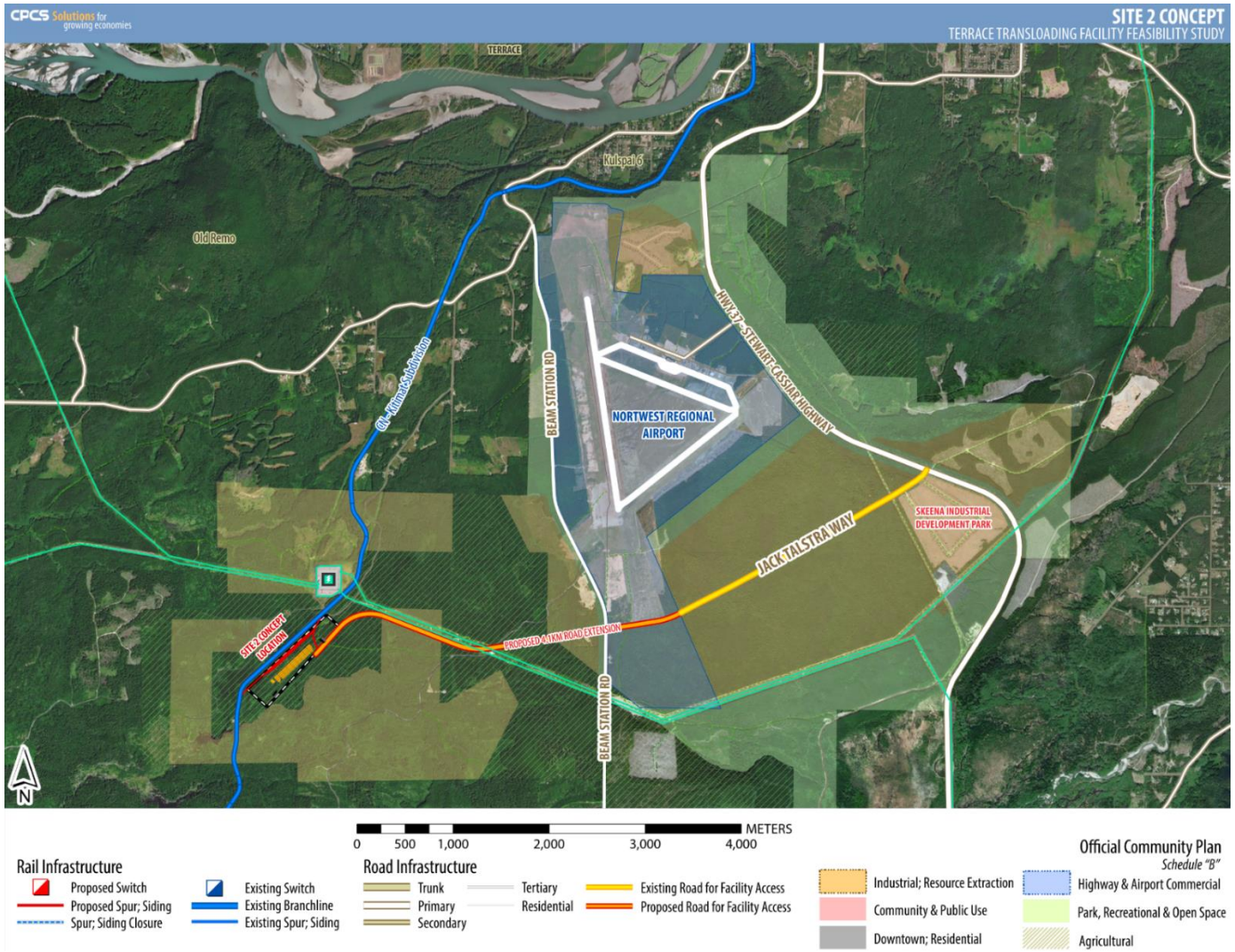
Site 2 could, in size, accommodate a similar concept to Site 1A. However, a new 4 km access road would need to be constructed to provide access to the facility, as the existing roads in the area would not be able to accommodate heavy truck traffic. Figure 7-3 illustrates a concept of a road coming off of the existing Jack Talstra way at the SIDP.

Figure 7-2: Site 1B Potential Track Configurations



Source: CPCS

Figure 7-3: Site 2 Access Road Concept

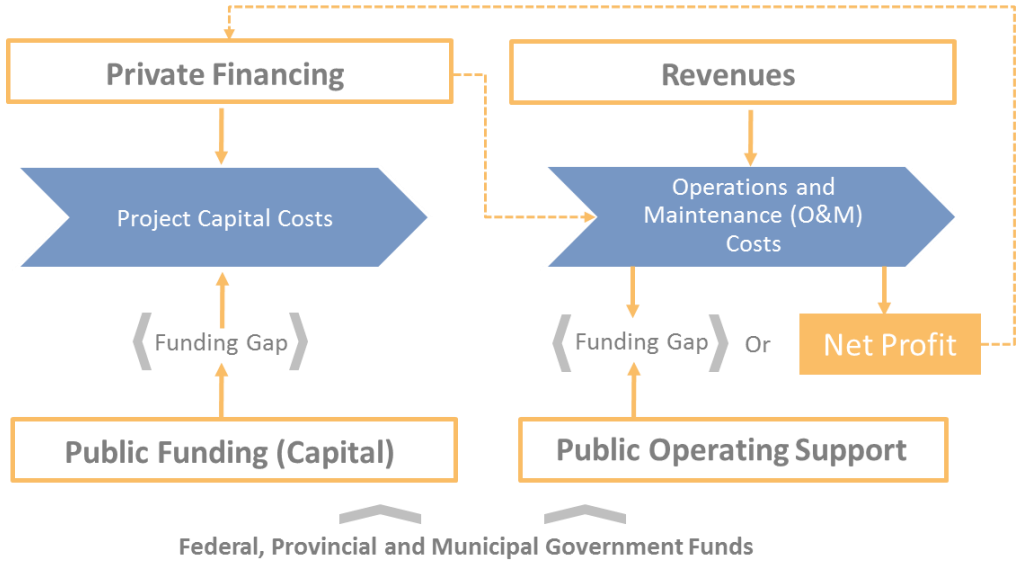


Source: CPCS

7.2 Financial Feasibility

Figure 7-4 provides a conceptual framework of the project funding and financing requirements.

Figure 7-4: Conceptual Framework of Project Funding and Financing



Source: CPCS

A first test of viability is whether revenue at a transloading facility (paid by shippers) would cover operating and maintenance costs, including the cost of the services provided (e.g. loading/unloading containers, rail cars) and the maintenance cost of the infrastructure itself. The second key viability test is the extent to which revenues from the transloading facility can make a contribution to capital, and/or whether additional funding can be brought to bear to cover any remaining funding gap for the infrastructure and related capital costs (whether through government funding grants, or otherwise).

While there are government grants that can help support the capital cost (see Appendix C) particularly if public benefits (such as reduction in greenhouse gas emissions, etc.) be demonstrated, it is crucial that revenues from the transloading facility be able to recoup its operations and maintenance costs as it is unlikely that provincial or federal funding would be available to cover an ongoing operating funding gap (i.e. operating subsidies).

7.2.1 Capital Cost

Overall Capital Cost

To estimate the capital cost, we have reviewed the costs of similar sized facilities developed in North America:

- In South Carolina, two inland intermodal terminals were recently developed of similar scale to a facility in Terrace. Inland Port Greer and a slightly smaller similar facility (Inland Port Dillon) cost approximately $80 million (US$60 million) and $45 million (US$35 million), respectively. The latter accommodated about 30,000 containers in its first year of operation.[113]

- An inland terminal for transloading and handling containers with grain, constructed in 2018, cost of the order of "tens of millions of dollars."[114]

With 14,800 loaded containers per year (i.e. about 30,000 container lifts per year total), the facility would be most closely comparable to the Inland Port Dillon facility. This would suggest that the cost is of the order of $50 million, for a facility similar to the proposed buildout.

Comparison Between Sites

While our approach to estimate the overall capital cost is based on figures from comparable facilities elsewhere, Figure 7-5 shows how site development costs may differ between Site 1A and Site 2, all else equal with respect to size. Based on the costs that can be reasonably quantified at this time, the development costs at Site 2 would be expected to be nearly $6 million higher than at Site 1 (or approximately 10% of the overall capital cost).

Figure 7-5: How Development Costs May Differ Between Sites

Issue	Site 1A	Site 2
Site Preparation	Includes: - Stripping - Excavation - Gravel Infill/Grading Other notes: - Site preparation locations would include container area as well as track subgrade preparation. - Due to the large area of the container yard paving of the yard may be prohibitively expensive and therefore we have included estimates for gravelled surface only.	Includes: - Stripping - Excavation - Gravel Infill/Grading Other notes: - Site preparation locations would include container area as well as track subgrade preparation. - Due to the large area of the container yard paving of the yard may be prohibitively expensive and therefore we have included estimates for gravelled surface only. - Due to the geotechnical conditions at Site 2, more extensive site works, such as

[113] Christian, M. 2019. Inland Port Dillon's first year a big success. https://www.scnow.com/news/business/local/article_54be6fa2-a3f1-11e9-ba12-3b7bbf6a03ef.html

[114] Briere, K. 2018. New intermodal terminal coming to Regina. https://www.producer.com/2018/11/new-intermodal-terminal-coming-to-regina/

Issue	Site 1A	Site 2
		thicker gravel substrates or preloading of areas, will have to be undertaken.
	Approximate Costs: $2,640,000	*Approximate Costs: $6,600,000*
Utilities	Includes: - Watermain (tie-in to municipal) - Sanitary Sewer (tie-in to municipal) - Storm Sewer (tie-in to municipal, municipal upgrades required) - Electrical (tie-to adjacent utility) - Telecommunications (tie-to adjacent utility) - Gas (tie-to adjacent utility)	Includes - Watermain (On-site well, municipal tie-in costs expected to be higher) - Sanitary Sewer (On-site sewage lagoon) - Storm Sewer (on-site drainage and storage) - Electrical (tie-to adjacent utility) - Telecommunications (tie-to adjacent utility or use of cellular communications)
	Approximate Costs: $425,000	*Approximate Costs: $825,000*
Access	- Construction of on-site roads and site access upgrades.	- Upgrading 3-4 km of existing gravel road (unpaved) - Construction of 4 km access road (unpaved)
	Approximate Costs: $100,000	*Approximate Costs: $1,560,000*
Site Contamination	Costs cannot be determined at this time (other than costs of further studies).	Not applicable as Site 2 does not have existing or previous development.
Total*	***Approximate Costs: $3,165,000***	***Approximate Costs: $8,985,000***

***Based on items quantified only.** Source: McElhanney, with CPCS summation.

Equipment

Equipment would be required as a component of the overall capital cost. The type of equipment to handle commodities at an intermodal and transloading facility will vary depending on the products. Figure 7-6 shows the type, typical uses, and approximate costs. Note that the photos are intended for illustration only of the general class of equipment, and may not represent the specific model.

In general, the number of pieces and types of equipment can vary with the size of the operation as traffic expands. However, for a container operation for example, at least two pieces of equipment are needed to load/offload containers (in the event of a mechanical breakdown, for example).

For example, another inland terminal in the US, Inland Port Dillon, has two RTGs and two container handlers, equivalent to approximately $7 million in capital cost. However, to start, two reach stackers would be sufficient for a terminal of this size.

Figure 7-6: Equipment Examples

	Photo	Name	Approximate Cost
Container		**Rubber Tire Gantry (RTG)** (moving containers between trucks and railcars)	$2,600,000
		**Reach stacker** (moving containers between trucks and railcars)	$700,000
		**Terminal tractor** (moving containers between trucks and railcars)	$160,000
Dry Breakbulk		**Forklift (5 to 25+ tonnes capacity)** (breakbulk products between trucks and railcars, such as lumber or aluminum slabs. To handle larger aluminum slabs, a unit at the higher end of the capacity and cost range would be required.)	$35,000- $420,000
Various		**Rail car mover** (relocate small number of cars from storage track to loading tracks and vice-versa)	$100,000+ (used)

Photo sources (from top to bottom): SignalPAD, joost j. bakker, Exit2DOS2000 (CC BY-SA 2.0), Kone Cranes, Sterling rail. Source: Compiled by CPCS.

7.2.2 Operating Revenues and Costs

Figure 7-7 provides examples of tariff rates at container handling facilities in Canada and the US. The range of rate is from $75 to $508 per container, but the low and high end are not ideal comparables. Inland Port Greer can potentially recoup its cost through other fees (e.g. terminal handling at port), so is likely to be lower than rate at a standalone facility. At the high end,

terminals transferring from rail to vessel have rates over $500; however, their equipment needs are higher (including the ship-to-shore cranes). In summary, these rates represent a plausible range of rates that could be charged for handling at a terminal, but each example is not directly comparable.

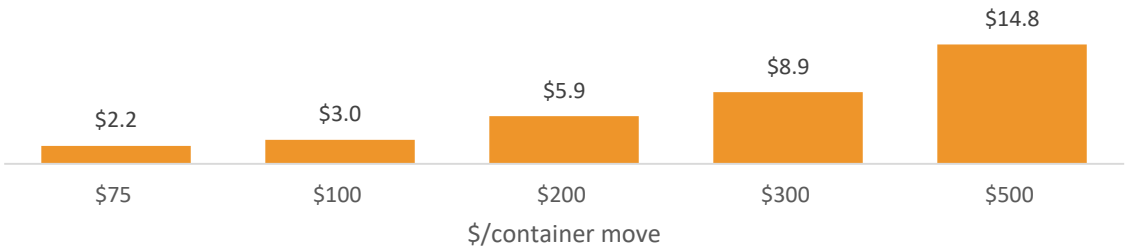
Figure 7-7: Container Terminal Handling Rates

Source	Rate (per container handling)
DP World Vancouver Tariff (Vessel to Rail)	$508
Inland Port Greer – loaded container	$72 (US$55)
Inland Port Greer – empty container	$46 (US$35)
Previous quote provided to CPCS for handling ISO tank containers in Eastern Canada	$490
CP Terminal Service Charge for International Moves (Canada-to-Canada)	$160
CP Additional Handling (if a container cannot be directly moved from truck to railcar at an intermodal terminal; i.e. requires temporary storage)	$80

Source: CPCS summary of tariffs and other sources listed.

Figure 7-8 estimates the potential annual revenues on the basis of a range of handling rates. On the basis of the range provided, revenues could range from $2.2 to $14.8 million per year. Ultimately, a terminal operator will charge what the market will bear, considering the rates of competing (e.g. truck) and complementary (e.g. rail) modes. This is further discussed in Section 7.4.1.

Figure 7-8: Potential Revenues at Different Handling Rates per Container Move (in Millions per Year)



Source: CPCS analysis.

For comparison purposes, we have assumed the following staffing profile to estimate the labour component of the operating costs (Figure 7-9). At an order of magnitude level, we anticipate that the labour costs would be approximately $700,000 per year. With revenues based on a $75 per container move, a terminal could likely cover the labour cost and other direct costs (e.g. fuel, etc.) but not make any significant contribution towards capital expenditures.

Figure 7-9: Potential Staffing Costs

Staff	Annual Cost
Two heavy equipment operators (at $90,000 per operator per year)	$180,000
Two labourers/tractor operators to move chassis (at $90,000 per operator per year)	$180,000

Two clerks / administrators (at $60,000 per clerk per year)	$120,000
Heavy equipment maintainer (at $90,000 per person per year)	$90,000
General manager	$130,000
Total	**$700,000**

Source: CPCS assumptions.

7.2.3 Discussion

Based on the above analysis, it is plausible that a facility handling 12,000-14,000 containers could offset operating costs and make some contribution to capital cost, though a funding gap may still remain. The following conditions would make it more likely that a facility such as this develop:

1. An anchor user, such as a micro LNG producer or another manufacturer that moves to the SIDP site, makes a long-term financial commitment to the facility, such as through a "take-or-pay contract".

2. There is a labour shortage in the trucking industry, leading to increased trucking rates, which would allow a facility operator (and CN) to charge rates that would be competitive with trucking.

7.3 Project Structuring Considerations

7.3.1 Stakeholder Alignment

Figure 7-10 articulates how a proposed could align/diverge with stakeholder expectations.

Overall, all else equal, key stakeholders including the Port of Prince Rupert and CN would rather concentrate logistics activity in Prince Rupert, as this would allow rail to be used for the longest distance possible, which is also a more efficient mode in terms of safety and greenhouse gas emissions, as discussed in Section 7.4. As a result, in the short- and medium-term, it is less likely that transloading commodities coming from outside of the Terrace-area would be directly supported by these parties.

However, longer-term, to ensure continued growth in this corridor and should land constraints develop in Prince Rupert (or be of too high of cost to develop) these stakeholders would support continued planning and exploration of a transloading facility in Terrace. These stakeholders would likely also support a concept that would enable regional consolidation of freight traffic by existing shippers in the area, as well as potential new businesses locating in Terrace.

Figure 7-10: Stakeholder Alignment

Stakeholder	Stakeholder Expectations/Objective	How a Facility in Terrace potentially Aligns/Diverges from Objectives
City of Terrace	• Regional economic development activity (job creation, local investment, attract warehousing/ distribution centres, etc.), while ensuring quality of life for residents	• Supports objective by lowering transportation costs and/or providing alternative outlets for new and potential future businesses locating in Terrace. Thus, supports investment attraction, though is not enough to assert: "if you build it, they will come," as value proposition depends on non-transportation related factors as well. • A site downtown would diverge from the previously expressed policy position of the City (i.e. the Keith Estates plan).
Local shippers	• Minimize logistics cost by lowering shipping cost and transit time, and improving reliability.	• Lowers transportation cost for certain routings and provides alternative modes of transportation (e.g. bulk rail shipments to Prince Rupert).
Shippers from outside of Terrace (not relocatable to Terrace)	• Minimize logistics cost by lowering shipping cost and transit time, and improving reliability.	• For cargos from east of Terrace destined for export via the Port of Prince Rupert, a transloading facility in Prince Rupert (rather than Terrace) will likely maximize their objective, as bulk rail shipments (lower cost) can be used for the longest-possible distance. • Likewise, a rail-served shipper like Rio Tinto Alcan would prefer to load directly at their plant under most circumstances.
Facility Operator	• Sustainable revenues sufficient to achieve a sufficient rate of return given capital, operating costs, and any government support provided. • Predictability with respect to process and timelines for environmental reviews and other permitting required	• If the identified traffic sources materialize, there is some potential that a transloading facility could offset the operating and some of the capital cost. • The City's current Official Community Plan for Site 1A would preclude developing a facility; changing this designation would be a risk to a developer wishing to proceed. • There are other permits required at both sites. The environmental review at Site 2 would likely raise additional risks, based on the site assessment.
Prince Rupert Port Authority	• Continue to grow the Port of Prince Rupert as a container gateway to North America, particularly by attracting outbound/export traffic to fill empty containers • Develop facilities that generate revenue for the PRPA (i.e. on land controlled by PRPA)	• To the extent that a transloading facility drives increased export container traffic through the Port of Prince Rupert, the development of a facility would align with their objectives. • There is some divergence with respect to their plans to develop export logistics lands on their property in the short-term. However, longer term, this land may not be sufficient to allow for all growth potential.

Stakeholder	Stakeholder Expectations/Objective	How a Facility in Terrace potentially Aligns/Diverges from Objectives
CN	• Attract net new traffic at reasonable cost, and without disruption to more lucrative longer-haul traffic	• In principle, a transloading facility aligns with this objective; however, incremental revenues from rail transport from Terrace to Prince Rupert relatively small (as compared to longer haul traffic). Facility needs to be easy to serve, and not disrupt longer-haul traffic (i.e. CN's East-West mainline). • Longer-haul traffic (e.g. potentially forestry products eastward) more attractive to CN, but volumes are small. • For cargos coming from east of Terrace (e.g. grains, forest products, etc.), a location in Prince Rupert would maximize revenues for railway through increasing length of haul.
Kitselas	• Promote business ventures that improve the wellbeing of their communities, in particular its portion of the SIDP	• Neutral to aligned: even if a transloading facility were in Terrace, it could still support the attraction of businesses with rail access needs at the SIDP
Kitsumkalum	• Promote business ventures that improve the wellbeing of their communities, in particular its rock quarry/logistics park	• Developing a transloading facility in Terrace would diverge from this objective, given their existing facility.
Trucking Companies	• Grow business for truck logistics • Improve efficiency/asset and labour utilization	• A transloading facility is intended to divert longer-distance movements by truck; however, trucking companies are still required for short-distance movements (i.e. to/from the transloading facility to the production facility). This could allow for optimizing the use of existing labour available.
Provincial Government (BC MoTI)	• Encourage modal shift from trucks, where economic. • Promote transportation network fluidity and economic growth.	• Broadly, a transloading facility aligns with government objectives; however, for commodities from outside of the region, a transloading facility in Prince Rupert maximizes the use of bulk rail, thus maximizing the benefits from modal shift.
Federal Government (Transport Canada [TC])	• *improve the flow of goods and people in Canada* • *increase the flow of trade in and out of Canada* • *help the transportation system to: withstand the effects of climate change and better adapt to new technologies and innovation** • TC's objective also includes promotion of the safety of the transportation system, including related to at-grade crossings	• Broadly, a transloading facility aligns with government objectives; however, for commodities from outside of the region, a transloading facility in Prince Rupert maximizes the use of bulk rail, thus maximizing the benefits from modal shift.

*Direct quote from National Trade Corridors Fund application.

7.3.2 Project Structuring

Potential Models

There are a range of models for how a transloading facilities could be developed. Typically, they are operated if not owned by private-sector entities (e.g. railways, third-party logistics providers); however, governments (or quasi-government bodies, such as port authorities) often support the development of the transloading facilities by providing enabling infrastructure or funding if a project meets government objectives. More specifically, some of the potential models include:

1. **Pure private:** some transloading facilities are constructed/owned and operated by the private sector alone. Examples include the existing team track in Terrace, CN's CargoFlo facilities, among others. These facilities are supported by the fees that they charge to users to load/unload cargo.

2. **Private sector driven but publicly supported model:** common-user infrastructure for transloading (e.g. the Ridley Island Road-Rail Corridor) was developed by the Prince Rupert Port Authority in part out of their revenues from their user fees, and have in turn leased properties to operators such as Ray-Mont Logistics and CT Logistics. The further development of Ridley Island is also being supported through the federal government's National Trade Corridors Fund.[115]

3. **Concession model:** Under such a model, a public-sector entity concessions the design, build and/or operations/maintenance to a private-sector entity. The public sector entity recoups its costs through upfront and/or ongoing fees charged to the terminal operator. The terminal operator recoups these fees through fees charged to shippers. The public sector entity would need to, however, control the land on which the terminal is being constructed for such a model to be viable.

4. **Public operation:** The City constructs and operates the terminal. We are not aware of such a model in practice; however, there are examples in the US where the port authority (a public agency/commission) operates aspects of the terminal.

While we have segmented into four models, it is important to note that these models exist along a spectrum, and usually there is some form of public and private participation. In all of these models (except model 4), an operator with experience operating a transloading facility would need to be identified. Examples of operators in Northwestern BC include Quickload, Ray-Mont Logistics, and Tidal Transport. A small transloading facility is already operating at Site 1A, as noted.

[115] Canadian Shipper. 2018. Prince Rupert port to receive $22M for infrastructure projects. https://www.canadianshipper.com/transportation-and-logistics/prince-rupert-port-receive-22-infrastructure-projects/1003378335/

Discussion

In general, freight transportation infrastructure can be funded through user fees as a private/quasi-private enterprise. Railways, for example, fund most of their capital investments directly through their revenues, and Canada Port Authorities (such as the Port of Prince Rupert) recoup their costs through user-fees borne directly.

However, as noted in the models, these supply chain participants can receive funding through government funding sources, if these projects can meet that align with the government criteria set out. (Potential benefits from a transloading facility are discussed in Section 7.4). These projects are usually to support common-user facilities (e.g. access roads, grade separations, etc.).

Given the revenue risk involved and that the preferred sites identified for the transloading facility are not on municipally owned property, **our recommendation is that the City does not actively develop the facility (i.e. models 3 or 4),** but rather helps to enable a private sector developer should it wish to proceed with a transloading facility (i.e. model 2). Some specific next steps are further discussed in Section 7.5.

There are also natural partners should be further engaged for potential financial support in the development of a transloading facility, including micro-LNG producers. One of the potential producers expressed that there would be long-term value in a transloading facility to ensure there is sufficient transportation capacity to export its containers. Should these facilities be developed, these producers should be engaged to see if they would be willing to provide capital funding support and/or long-term "take-or-pay" contracts with a transload operator (and other participants). This would provide "anchor" traffic and associated revenue.

7.4 Project Benefits and Impacts

7.4.1 Shipper Benefits

As discussed in Chapter 3, shippers typically make their decisions on routing and mode on the basis of the actual cost of transportation, as well as other factors including transit times, reliability and risk/information.

Westward Shipments

For products destined from Terrace for export via Prince Rupert, because of the relatively short distance (140 km), rules of thumb would indicate that trucking is generally the quicker and least costly way to transport products. Approximate analysis would support this:

- **Trucking-only:** Based on stakeholder comments, the cost to truck between Terrace and Prince Rupert is approximately $500-$600 roundtrip (i.e. $120 per hour times four to five hours).
- **Transloading and Rail:** Assuming, for illustration, CN's average revenue per revenue ton-mile for intermodal containers (5.76 cents/ton-mile) and the loaded weight of an LNG

container (including the weight of the container itself) of 34 tons, a possible estimate of cost of rail between Terrace and Prince Rupert is **$175** per container.[116] To emphasize, this is **not** an estimate of a rate that CN might charge, but intended to illustrate costs involved in rail transport; in practice, it is likely to be higher on a ton-mile basis because of the short distances involved. While this cost is less than the cost of truck, the cost of trucking from the SIDP to the terminal would need to be added (potentially $**120**, if it can be done in an hour roundtrip). In addition, there would be the terminal handling charge at the transloading facility (which would be in the hundreds of dollars for both loading the full container, and unloading the empty container).

In other words, the primary driver of using transloading to Prince Rupert is not cost savings. In addition, transporting by rail is generally slower, due to the transloading process. However, stakeholders indicated that there are at least two reasons why transloading in Terrace could be beneficial for shippers, now and in the future:

- Stakeholders indicated that for wood pellets from Terrace destined for overseas export, the existing bulk export terminal in Prince Rupert is not configured to accept truck shipments. As a result, for market access using this terminal, wood pellets would need to be transloaded to bulk rail cars (for export through the existing bulk terminal in Prince Rupert) and/or to containers.

- Stakeholders also expressed concern over potential labour shortages impacting their ability to transport products via truck to Prince Rupert, particularly as facilities develop at the Skeena Industrial Development Park. For example, if 12,000 LNG containers are shipped from Terrace every year, that would be equivalent to nearly 40 roundtrips per day. Potentially, if this were to materialize, trucking rates could be driven up.

In other words, the primary rationale for a transloading facility to handle traffic destined to Prince Rupert is one of **access.**

Eastward Shipments

Stakeholders indicated that because they would currently have to ship lumber from Terrace to Prince Rupert for transloading, there are additional costs to truck the shipments to Prince Rupert, as well as potentially additional costs for the longer-distance rail shipments.

- **Rail:** CN's tariff rate for lumber from Prince Rupert is approximately $1,000 (US$763)[117] higher per carload than an origin in Terrace.

- **Truck:** A rail car can hold approximately 90 tonnes, so two truckloads would be required per rail car (i.e. $1,000-$1,200 per rail car, assuming an empty backhaul).

[116] For clarity, we would anticipate that there would need to be a minimum of 5-10 containers at a time for this estimate to be plausible, i.e. container movements would have to be on-mass.
[117] Based on CN's published tariffs. Note that actual rates quoted to shippers may differ.

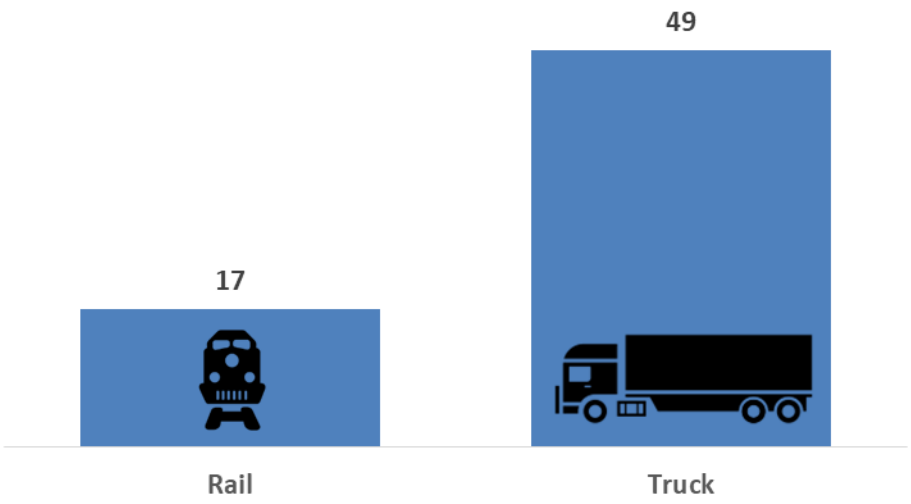
Based on these values, there is a potential savings of $2,000-$2,200 per rail car, or approximately $1 million per year (based on 480 rail cars per year).

7.4.2 External Benefits

Greenhouse Gas (GHG) Emissions Reduction

It is well established that in most circumstances, rail shipments usually have lower GHG than truck shipments. Based on Environmental and Climate Change Canada (ECCC) data, rail shipments produce about one-third the GHG emissions as truck (Figure 7-11). As a result, a transloading facility, by enabling a shipment to use the most efficient mode of transport (i.e. rail), can help reduce GHG emissions.

Figure 7-11: Greenhouse Gas Emissions from Rail and Truck Shipments, t CO2 per Mt-km[118]



Source: CPCS based on analysis by the Conference Board of Canada of Environmental and Climate Change Canada Data, 2017. Icons by Leonardo Schneider and Yazmin Alanis, Noun Project.

Using the parameters above, if a transloading facility diverted the traffic in the Westward and Eastward scenarios, it could reduce GHG by approximately 8,900 t/year. Assuming a $50 per tonne carbon price – the price set by the federal government for 2022—these savings would be valued at approximately $450,000 per year.[119]

[118] Mt = million tonnes (i.e. million metric tons).

[119] While $50 per tonne is the proposed federal price on carbon emissions, there is a range of values that may be appropriate for the social price of carbon emissions.
Environment and Climate Change Canada. 2016. Technical Update to Environment and Climate Change Canada's Social Cost of Greenhouse Gas Estimates. http://www.ec.gc.ca/CC/default.asp?lang=En&n=BE705779-1

Figure 7-12: Potential GHG Emissions Reduction Potential

	Freight Diverted to Rail (Mt-km/year)	GHG Reduction Potential (t/year)
Westward	88	2,800
Eastward	189	6,100

Source: CPCS analysis.

Pavement Damage Savings

Diverting shipments from truck to rail contributes to reducing the costs of maintaining pavement, as trucks have a much higher impact on the pavement structure than passenger cars. In addition, while trucks contribute to the cost of maintaining roads through various taxes and fees (e.g. fuel taxes), railways, as for-profit entities who control their own infrastructure, have to ensure their rates entirely cover the cost of infrastructure maintenance.

Based on an estimate of $0.003/t-km for the pavement damage savings, there could be approximately $840,000 in annual savings under the scenarios considered. The majority of this is in Canada; however, because only about one-quarter of the Eastward scenario would take place in BC, the savings in BC alone are closer to half ($410,000 per year).[120]

Figure 7-13: Potential Pavement Damage Reduction Potential

	Freight Diverted to Rail (Mt-km/year)	Annual Pavement Damage Savings
Westward	88	$270,000
Eastward	189	$570,000

Source: CPCS analysis.

Safety

Freight transportation in general is very safe. One US estimate finds the rate of injuries and fatalities for trucking as 0.0254 injuries per Mt-km and 0.00109 fatalities per Mt-km, with rail being an order of magnitude lower by both metrics.[121]

The estimates for rail do not include injuries and fatalities at rail crossings and due to trespassing. However, the rate of these incidents is typically driven by the number of *trains* per day, and not the freight tonnage. Given that the volume of traffic under study is largely incremental to a single train, it would not be expected that this volume would lead to greater

[120] Quebec Ministry of Transportation. 2019. Programme visant la réduction des émissions de GES par le développement du transport intermodal (PREGTI).
The report "Default Values for Benefit Cost Analysis In British Columbia 2018" does not provide a value for savings due to modal shift. However, similar analysis by CPCS based on US Department of Transportation, Federal Highways Administration data found that the cost per km for a 27 tonne truck was $0.07/km (or $0.0026/t-km).

[121] Texas Transportation Institute. 2017. A Modal Comparison of the Domestic Freight Transportation on the General Public.

accidents by rail (particularly relative to truck). It is also important to note that truck accident rates may differ in Northern BC as well (as compared to the US overall) due to terrain, design of the highway, climatic conditions, etc.

Figure 7-14 estimates the potential safety benefits from diversion to rail from truck in terms of reduction in injuries and fatalities per year. It estimates the value of the injuries and fatalities using the "Default Values for Benefit Cost Analysis in British Columbia 2018"[122] as $300,000 and $8.1 million (per injury and fatality respectively). On this basis, the diversion from truck to rail could reduce injury and fatality costs by $4.6 million on an annual basis. While the avoided fatalities are expected to be infrequent, the high value placed on avoiding them results in a relatively high annual benefit. As with the pavement damage avoided, as only a portion of the diverted trip is in BC, the benefits within BC are approximately $2.3 million per year (i.e. approximately one-quarter of the overall distance).

Figure 7-14: Potential Safety Benefits

	Freight Diverted to Rail (Mt-km/year)	Estimated Number of Injuries/Fatalities Avoided per Year		Estimated Value of Injuries/Fatalities Avoided per Year (millions)	
		Fatalities	Injuries	Fatalities	Injuries
Westward	88	0.1	2.2	$0.8	$0.7
Eastward	189	0.2	4.8	$1.7	$1.4

Source: CPCS analysis.

Local Impacts

In addition to the benefits of the project, there would be local impacts from a transloading facility that would include:

- There would be an increase in switching activity across Kenney Street as well as other crossings in and around Terrace. A transloading facility at Site 1A would, relative to the other sites, impact the Kenney Street crossing, as trains would need to move slowly in and out of the facility. However, train service to other sites would also impact this crossing through higher train volumes and switching activities. Section 7.5 further discusses next steps in this regard.
- A transloading facility would increase train switching and truck activity at Site 1A, which could increase noise, vibration, lighting and localized air pollutants in the area. There are some residential areas (and other sensitive facilities, e.g. educational institutes and churches) and are within the 300 metre buffer recommended by the RAC/FCM Proximity Guidelines, and the rail yard would reduce this distance. These impacts would need to be assessed in a subsequent study should a proponent wish to proceed.

[122] Prepared by Apex Engineering for BC Ministry of Transportation and Infrastructure.

- If tank containers holding LNG are transloaded, there would be an increase in the storage of LNG within Terrace. Section 7.5 further discusses next steps in this regard to mitigate these potential risks. Note that if micro-LNG facilities are developed at the SIDP, there would be an increase of the transportation of these containers regardless of the construction of a transloading facility.

These and other impacts (including the considerations discussed under Section 6.2) should be further documented and assessed a proponent wished to move forward with developing a transloading facility. Section 7.5 further detailed investigations that could be considered.

Summary

Figure 7-15 summarizes the benefits noted above. Summing the potential pavement damage and potential safety benefits yields approximately $2.7 million per year in benefits within BC alone.[123] Assuming a 3% and 7% real discount rate,[124] this is equivalent in present value terms to approximately $50 and $30 million, respectively. These benefits could be used to support applications for capital funding to offset some of the costs of constructing a transloading facility.

Figure 7-15: Summary of Benefits

Category	
GHG emissions	A transloading facility could reduce GHG by approximately 8,900 t/year. Assuming a $50 per tonne carbon price – the price set by the federal government for 2022— these savings would be valued at approximately $450,000 per year.
Pavement damage avoided	There could be approximately $840,000 in annual savings under the scenarios considered. The majority of this is in Canada; however, because only about one-quarter of the Eastward scenario would take place in BC, the savings in BC alone are closer to half ($410,000 per year).
Safety	the diversion from truck to rail could reduce injury and fatality costs by $4.6 million on an annual basis. As with the pavement damage avoided, as only a portion of the diverted trip is in BC, the benefits within BC are approximately $2.3 million per year (i.e. approximately one-quarter of the overall distance).

Source: CPCS analysis.

7.5 Key Next Steps

The following are next steps would need to be considered in developing a transloading facility and to support additional logistics activity in Terrace. Items 1-3 inclusive would be led by the City (with private sector participation); whereas Item 4 would be led by the proposed developer of a transloading facility.

[123] We have not included the GHG emissions benefit in the benefit-to-cost analysis, as over time, because of the increase in carbon tax to $50/t, these will be internalized within fuel costs, and hence freight rates.
[124] A lower discount rate implies that future benefits are worth more in present value terms than a higher discount rate.

1. **Support and lobby for provincial and federal funding for a grade separation mitigate impacts from reduced availability of the Kenney Street crossing.**

To make effective use of Site 1A, a transloading facility at Site 1A would reduce the availability of the Kenney Street crossing to vehicle and pedestrian traffic, as switching activity would occur over the crossing. Construction of a grade separation can come at significant cost, on the order of $10 million and up depending on the complexity.

However, a transloading facility is not the sole driver of a grade separation in Terrace, as rail traffic will increase to Prince Rupert to serve the port. Further, even if a facility were developed or operations expanded at another site in and around Terrace (e.g. Site 1B, Site 2), including outside of Terrace (e.g. Kalum) there is the potential for increased switching activity over Kenney Street.

In addition, the objective of MoTI is to promote the fluidity of the transportation system and economic development, in part through modal shift to more efficient modes.[125] Further, there are federal funding programs including the National Trade Corridor Fund and Rail Safety Improvement Program[126] (see Appendix C). Because the intent of a transloading facility is to promote trade and modal shift, it increases the alignment with these funding programs and stated priorities.

Thus, a transloading facility at Site 1A increases the need for a grade separation, but also the business case for applying to federal and provincial funding programs, and is not the only driver for such an installation.

Full closure of the Kenney Street crossing could also be explored as part of the addition of the grade separation, including whether it would merit reviewing the preferred location of the grade separation (currently Braun Street/Nisga'a Highway).

2. **Consider changing zoning at Site 1A, to provide flexibility to develop a transloading facility, as well as other transportation and logistics-dependent uses.**

Site 1A would be the site with the lowest development costs, flexibility to accommodate a larger facility, and proximity to CN's mainline network. Further, while we understand that land use planning is subject to competing priorities, FCM/RAC Proximity Guidelines indicate that it is a less desirable site for residential development, given their recommendation for a 300 metre setback adjacent to rail yards. In addition, the environmental review of the site indicates that non-industrial development would likely be subject to additional requirements prior to

[125] Some of the stated objectives in BC MoTI's 2018/19 – 2020/2021 Service Plan echoing these discussions include include:

- *Improving transportation network efficiency and promote clean transportation options*
- *Develop Canada's western trade corridors* (at p. 6)

[126] This particular funding program is relatively limited, however.

development. Finally, at the study outset, land owners in the area indicated an interest in developing a larger transloading facility in this area, in addition to the small facility that currently exists. As a site with excellent road and rail access, there is merit to re-examining this site for potential transportation and logistics related purposes. However, for clarity, we are **not** recommending restricting development to a transloading, given that there is uncertainty as to whether traffic may materialize and given the existence of other potential priorities for this site.[127]

3. **Review dangerous good routing and conduct a risk assessment with regard to the expected increase in LNG shipments.**

Regardless of whether a transloading facility is constructed, multiple proponents are considering developing a micro-LNG facility at the SIDP, and exporting the containers via the Port of Prince Rupert. LNG is considered a Class 2.1 Dangerous Good (Flammable Gas) under the Transportation of Dangerous Goods Regulations, and trucking activity would increase in Terrace and Prince Rupert area. If a transloading facility were developed, then the routings may change, and there may be a need for risk mitigations to address the storage of these containers (e.g. berms, etc.). Should these proposed micro-LNG developments move forward, we would recommend that the City of Terrace, working with the proponents of these facilities, the proponents of a transloading facility, as well as its regional partners, conduct or update any risk assessments associated with the transportation of dangerous goods in the area.

4. **To develop a transloading facility, the following investigations would need to be carried out.**

The project sector proponent would need to carry out the following investigations as part of its next steps of design (Figure 7-16).

Figure 7-16: Permits/Investigations to be Carried Out

Assessment Discipline	Required Upcoming Tasks	Costs or Impacts
General	Development Permit	Cost Varies
Civil	Topographical Survey	$10,000
	Preliminary Site Design	$20,000 to $40,000
	Traffic Impact Study	$7,500
Environmental	Data Gap Assessment (Site 1A only)	$7,500
	Stage 1 Preliminary Site Investigation (Site 1A Only)	$10,000
	Stage 2 Preliminary Site Assessment/Detailed Site Investigation (Site 1A Only)	$100,000+
Biological	None for site 1A	N/A

[127] The study of other priorities was not part of the scope of this study, beyond considering the site zoning.

Assessment Discipline	Required Upcoming Tasks	Costs or Impacts
	Site 2 permitting for construction near at-risk wildlife (depends on final site location)	Approx. $15,000
Geotechnical	Subsurface geotechnical assessment (i.e. test pitting, or drilling)	$25,000 to $75,000 depending on method and conditions.

Source: McElhanney

A proponent would also need to further investigate which environmental reviews and permits would be required to undertake the project, which can be influenced by the design. For example, if the facility includes “seven or more yard tracks or a total track length of 20 km or more”, it would be considered a designated project under the Regulations Designating Physical Activities, and thus be subject to federal jurisdiction under the *Canadian Environmental Assessment Act, 2012*. The facility concept shown in this chapter identifies seven tracks (Figure 7-1), though it may be possible to further optimize this design in the future.

8 Overall Strategic Case

A transloading facility in Terrace offers a number of benefits to users (e.g. shippers) and non-users alike. Shippers in the Terrace noted that transloading from truck to rail car provides access to bulk-only terminals in Prince Rupert, which are not accessible by truck. It could also contribute to lowering transportation costs for eastward movements, as local shippers without rail access could no longer have to transport its goods to Prince Rupert for transloading. Finally, stakeholders opined a facility that could handle containers from truck to rail for shipment to Prince Rupert could help mitigate the risks that a trucking capacity shortage, should it develop in the future, would prevent its ability to transport its goods for export in the future.

For non-users, potential benefits include reductions in greenhouse gas emissions and pavement damage, and improvements in safety. Based on the traffic assumptions within the potential pavement damage and potential safety benefits yields approximately $2.7 million per year in benefits within BC alone. These benefits could provide justification for government of support of aspects of the project.

However, at the present time, Prince Rupert is the more desirable location for transloading goods arriving from East of Terrace, in part as this allows CN and shippers to maximize the length of bulk rail transport, which is the most efficient mode of transportation for longer-distance shipments of products such as grains, plastics, lumber, etc. Thus, in the short- to medium-term, the priority of regional stakeholders such as the Port of Prince Rupert, CN, etc. is to continue to develop logistics activity in the Prince Rupert area.

However, longer-term, in order to ensure the continued growth of the gateway, growth of exports is required to ensure that it continues to be viable to expand port infrastructure. Thus, to the extent that additional logistics facilities in Terrace could contribute to generating this growth, there is broader alignment between the concept of a transloading facility in Terrace and the long-term objectives of these other stakeholders. Some discussions also noted that longer-term land constraints beyond the mid-2020s may prevent further logistics facility growth in the Prince Rupert area.

The market assessment for this study noted that while there were some relatively small rail volumes generated in the Terrace-area, there is potential for future growth through the expansion of the SIDP, such as the development of the micro-LNG facilities.

Thus, while we do not believe that the City of Terrace should take the lead on developing a transloading facility, it should take steps to enable such a facility through lobbying for a new grade separation in Terrace and exploring changes to zoning in the Keith Estates area to provide greater flexibility, should a proponent wish to develop a transloading facility in the area.

Furthermore, it is important to emphasize that even if a truck to rail transloading facility does not develop in Terrace, this is not an indication that Terrace is not an attractive location for investment. From a transportation perspective, Terrace is only 1.5 hours by road from one of the largest and most-well connected container terminals in Canada over an uncongested highway. This is an extremely short distance for rail traffic. More importantly, it is not significantly longer haul than most locations in the Lower Mainland of BC, where roadway congestion limits the efficiency of truck operations. Combined with relatively low land development/aquisition costs (e.g. $250,000 per acre versus $1 million or more in Prince Rupert and Vancouver), by a number of dimensions, Terrace is an attractive location for businesses that require good access to marine import/export logistics, regardless of whether a transloading facility developments.

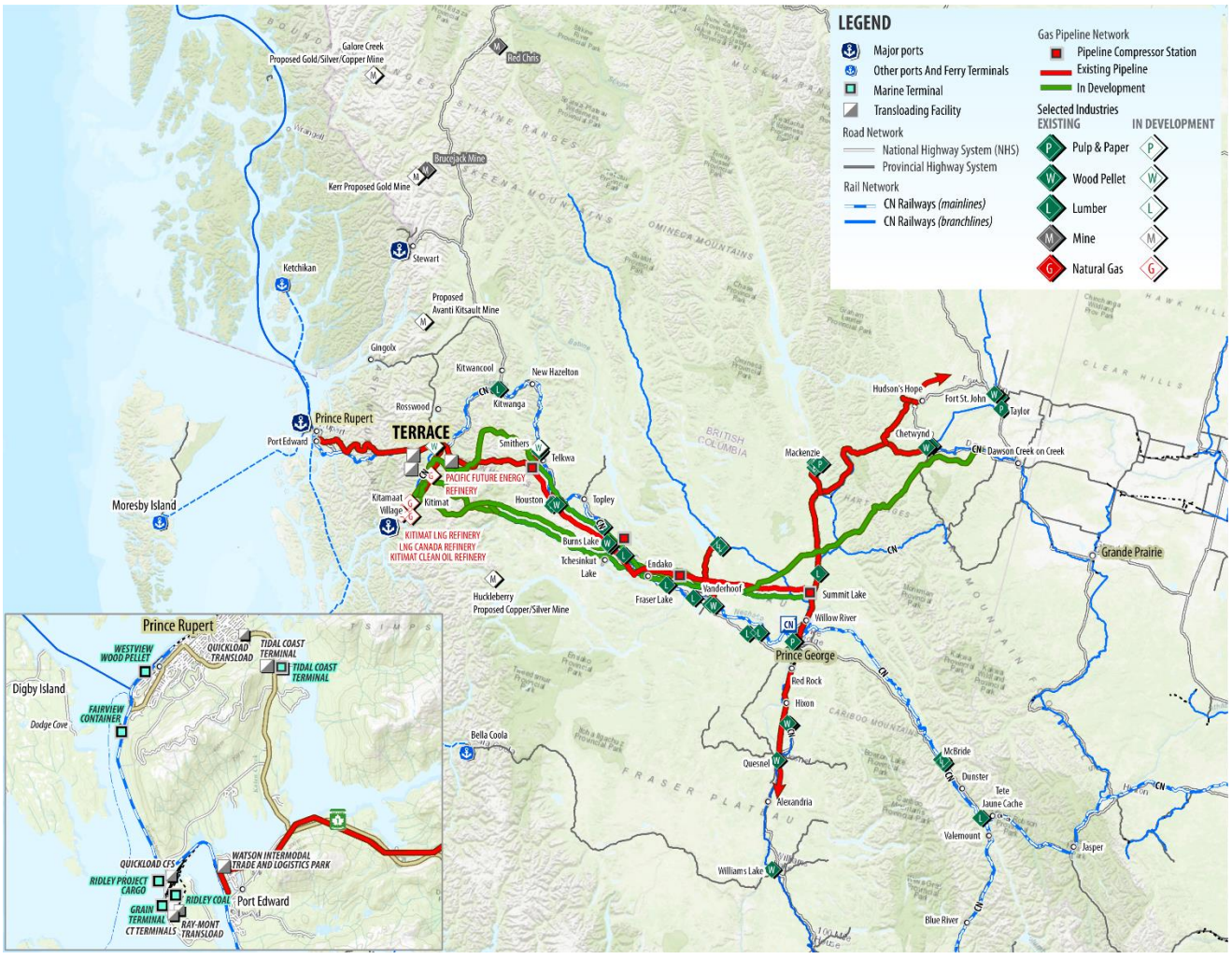
Thus, while we believe that the City of Terrace should take steps to plan for a logistics use of lands south of Highway 16 in Terrace, it should continue to maintain a dialog with other regional stakeholders, including the Port of Prince Rupert, CN, trucking companies, and local First Nations and other municipalities as to how to continue to develop logistics capacity to serve the region. Ultimately, it is less critical as to exactly where the facility is located, as its value is not the few operations jobs that are created to handle the traffic, but rather the value it creates for potential shippers using the facility.

Appendix A: Organizations Interviewed

- Skeena Sawmills
- Taisheng / Qinhuangdao Economic and Technological Development Zone
- Progressive Ventures in Terrace
- Prime LNG
- Pritivm Resources
- Distributed Gas Solutions Canada
- Bear Creek Contracting
- Regional District of Kitimat Stikine
- BC Ministry of Transportation and Infrastructure
- Kitselas Development Corporation
- Nisga'a Lisims Government
- Prince Rupert Port Authority
- DP World
- CN
- Quickload Logistics
- Bandstra
- Rio Tinto
- Kra Mar
- A&A Trading

Appendix B: Map of Selected Industrial Facilities in Northwest BC

Figure B-1: Selected Industries in Northwest BC



Source: CPCS, based in part on BC provincial databases (mines, major projects, and forestry products). Not all potential projects are shown for clarity.

Appendix C: Potential Funding Sources

Transloading facilities can be entirely private-sector financed using funding from usage charges assessed to shippers. Nonetheless, public-sector funding could be used to (1) de-risk the development of a facility and/or (2) spur the development of or increase the public benefits that could be accrued from a facility. For example, shifting cargo from truck to rail could reduce greenhouse gas emissions.

The following subsections summarize various public funding sources that could potentially be applied for to support different aspects of the project (e.g. project development, construction costs, ancillary infrastructure [grade separations], etc.).

Potential Funding Sources

Northern Development Initiative Trust

The Northern Development Initiative Trust (NDIT) focuses on economic development in central and northern British Columbia by working with communities, First Nations, local government and businesses. No programs under the NDIT require fund matching.

Competitive Consulting Rebate

This program helps small to medium sized companies fund the costs of external business consulting projects within the manufacturing, innovative technologies, resource processing, transportation, distribution sectors. Contributions consist of 50% of total costs and are limited to a yearly maximum of $30,000. The mandate focuses on projects that increase productivity, create new or incremental revenues, and create jobs. Companies must be privately owned and be headquartered within the Northern Development Initiative Trust region. Applications must outline the estimated permanent or seasonal jobs created, annual operational revenues and costs for the next three years.[128]

Capital Investment Analysis

This program targets First Nations groups, municipalities, regional districts, not-for-profits who are in need of help developing a business case for an infrastructure project. Funding is provided

[128] https://www.northerndevelopment.bc.ca/funding-programs/business-development/competitiveness-consulting-rebate/

up to $10,000 and can only cover 50% of budget costs. Applications must include the rationale for the project, outline the projected economic benefits for the local economy, and forecast expected revenues and jobs created.[129]

Economic Diversification Infrastructure

This program targets major infrastructure projects or public multi-use facilities located throughout central and northern BC. Grants or loans are available up to $250,000 and can only consist of 70% of the project budget. First Nations groups, municipalities, regional districts, not-for-profits are all eligible to apply. Applications must include current and forecasted annual revenues and costs, number of jobs created, the rationale for the project, how the project contributes to environmental sustainability and a business viability assessment for the next five years.[130]

Strategic Initiatives Fund

This annual grant serves to diversify and enhance the economies of central and northern BC communities. Welcomed applicants are First Nations groups, municipalities and regional districts, partnerships with not-for-profit corporations or private sector businesses where a local government or registered First Nation band is the lead applicant. The goals of the program are to support the development of resilient and profitable business and enhance regional capacity, investment and opportunities growth. This includes major engineering plans related to redeveloping or repurposing a defined area. Only 80% of the project budget may be funded by the grant with a solid cap of $900,000. Applications must outline the desired economic outcomes and provide an indicator which can measure its performance.[131]

National Trade Corridors Fund

The National Trade Corridors Fund (NTCF) is part of the Government of Canada's Transportation and Trade Corridors Initiative, which was created in 2017 with the purpose of spending $10.1 billion on transportation investments over the next 11 years. The NTCF was allocated $2 billion of that amount, and this $2 billion in funding will be used to invest in strategic projects that:

- support the flow of goods and passengers by reducing bottlenecks, and address capacity issues
- help the transportation system withstand the effects of climate change and make sure it is able to support new technologies and innovation

[129] https://www.northerndevelopment.bc.ca/funding-programs/community-development/capital-investment-analysis/
[130] https://www.northerndevelopment.bc.ca/funding-programs/community-development/economic-diversification-infrastructure/
[131] https://www.northerndevelopment.bc.ca/funding-programs/community-development/strategic-initiatives-fund/

- address the unique transportation needs in Canada's territorial North to improve safety and foster economic and social development
- build on investments made by a variety of public and private sector partners
- increase the flow of Canadian trade around the world through ports, airports, roads, railways, intermodal facilities, bridges and border crossings[132]

NTCF funding is available to a wide range of parties, including provincial, territorial, and municipal governments, indigenous groups, non-profits and for-profits, Crown Corporations, Canadian Port Authorities, and airport authorities. The first call for NTCF proposals was issued in 2017 and require comprehensive proposals including:

- project description, project rationale, work schedule, delivery method, performance measurement strategy;
- funding rationale;
- project budget including activity expenditure breakdown, financial plan and evidence of support;
- project risks;
- cost-benefit analysis; and
- legal and regulatory requirements such as environmental review, climate change adaptation assessment, greenhouse gas (GHG) emissions analysis, and Aboriginal consultation information.

In early 2019, the Government of Canada issued a new call for applications on a rolling basis.

Canada Infrastructure Bank

The Canada Infrastructure Bank is a Crown Corporation that will use federal support to attract private investment in public infrastructure projects that generate revenue. The goal of the Bank is to invest in projects that "contribute to long-term economic growth and support the creation of good, well-paying jobs for the middle class." Using federal support to attract private investment is intended to help raise additional funding for complex projects, and save grant funds for other public projects.[133]

The Bank was announced in 2016 and created by Parliament in June 2017, as part of the *Investing in Canada* infrastructure plan. The bank has been tasked with investing $35 billion over the next ten years.[134] Of these $35 billion in funds, $5 billion has been earmarked for trade

[132] http://www.tc.gc.ca/en/programs-policies/programs/national-trade-corridors-fund.html
[133] https://www.infrastructure.gc.ca/CIB-BIC/index-eng.html
[134] http://canadainfrastructurebank.ca/functions/

and transportation corridors.[135] Currently, the Bank is working on developing a pipeline of projects but has made its first investment, a $1.28 billion loan for the Réseau express métropolitain project in Montréal.[136,137] The criteria for eligible projects are very broad and are described on the Corporation's website as

> a project must be in the public interest, able to generate revenue, and within the Canadian government's priority areas of public transit, green infrastructure and trade and transportation. We will then evaluate a project based on specific economic and investment criteria, which are under development.[138]

A transloading facility broadly meets many of the above requirements. However, typically the cost of constructing a transloading facility does not exceed the ability of the private sector to finance the project on its own, so involvement of the Canada Infrastructure Bank may not be required. Furthermore, funding from the Canadian Infrastructure Bank may come with a number of other administrative and other requirements, so if the funding is not required, it may not be worth pursuing.

Rail Safety Improvement Program (RSIP)

Depending on the site, should a transloading facility in Terrace be developed, there may be greater train volumes across certain at-grade crossings. In addition, closure of a crossing may be desirable to allow for longer lengths of cars to be assembled. To this end, crossing warning system improvements and/or grade separations may need to be considered to enable the feasibility of a transloading facility. To this end, the Government of Canada's:

> The Rail Safety Improvement Program (RSIP) provides grant and contribution funding to improve rail safety and reduce injuries and fatalities related to rail transportation. The program funds:
>
> - safety improvements to existing rail lines
> - closures of grade crossings
> - initiatives to raise awareness about rail safety issues across Canada.

In the last round of funding, "$55 million in funding [was] available over three-years."[139] While funding from this larger amount would not offset a significant portion of a grade separation, it could provide funding for crossing system improvements, for example.

---

[135] https://www.infrastructure.gc.ca/CIB-BIC/index-eng.html
[136] https://www.theglobeandmail.com/report-on-business/canada-infrastructure-bank-bank-aims-to-start-approving-projects-by-end-of-year/article37561270/
[137] http://canadainfrastructurebank.ca/news_and_events/
[138] http://canadainfrastructurebank.ca/about-us/frequently-asked-questions/
[139] https://www.canada.ca/en/transport-canada/news/2017/04/rail_safety_improvementprogramrsip.html

BC Rural Dividend Program

This BC program provides $25 million per year to fund projects to diversify local economies in rural communities with less than 25,000 residents. Eligible participants include local governments, First Nations band councils or corporations, and non-for-profit organizations located in British Columbia. For-profit entities may partner with the eligible participants so long as the project does not negatively impact other local businesses. The proposed Terrace transload facility easily falls into three of the four eligible project categories (workforce development, community and economic development, and business sector development; the fourth being community capacity development). There are three funding streams:

- maximum funding of $10,000 for feasibility work (can apply for 100% of project costs)
- maximum funding of $100,000 for projects developed by a single applicant (can apply for 80% of project costs, remaining 20% must come from applicant, which 10% can be in-kind contributions)
- maximum funding of $500,000 for projects developed via partnership (can apply for 60% of project costs, remaining 40% must come from partnership, which 10% can be in-kind contributions)

The 2018-19 application window is closed as of July 31, 2018, but there is no indication that the program will be shut down.[140]

[140] https://www2.gov.bc.ca/assets/gov/employment-business-and-economic-development/economic-development/plan-and-measure/rural-communities/bcrdp-guide_fifthround_may2018_fin_rev.pdf

Appendix D: Detailed Evaluation Matrix

Criteria	Site 1A South of Highway 16 Corridor, East	Site 1B South of Highway 16 Corridor, West	Site 2 Thunderbird (West of airport)	Site 3 SIDP	Site 4 Schremp Island	Site 5 Skeena Sawmills Spur
In City of Terrace	✓	✓	✓	✓	x	✓
Rail Access	• **Good;** West of yard; switching would not require use of mainline	• **Good;** West of yard; would not require use of mainline	• **Fair;** connectivity exists, but existing curvature and grades limits length of trains on Kitimat Subdivision • No direct service to Prince Rupert (other than limited-stop intermodal trains) • Any trains to/from east of Terrace need to pull through Terrace.	• **Poor;** New multi-million rail spur would be required, in addition to facility costs • Existing curvature and grades limits length of trains on Kitimat Subdivision • No direct service to Prince Rupert (other than limited-stop intermodal trains) • Any trains to/from east of Terrace need to pull through Terrace	• **Fair;** Directly adjacent to Bulkley Subdivision • No direct service to Prince Rupert (other than limited-stop intermodal trains)	• **Fair;** Adjacent to mainline (Skeena Subdivision); however, switching activity between yard and site ties up mainline

Criteria	Site 1A South of Highway 16 Corridor, East	Site 1B South of Highway 16 Corridor, West	Site 2 Thunderbird (West of airport)	Site 3 SIDP	Site 4 Schremp Island	Site 5 Skeena Sawmills Spur
Minimizes grade crossing impacts	**Poor**; Switching would impact Frank and Kenney Street; however, a grade separation at Braun Street is noted as a need in Terrace's Transportation Master Plan.	• **Poor**, Switching would impact Frank and Kenney Street; however, a grade separation at Braun Street is noted as a need in Terrace's Transportation Master Plan.	• **Fair;** switching of longer trains could impact Frank and Kenney Street; however, a grade separation at Braun Street is noted as a need in Terrace's Transportation Master Plan. • Increased rail traffic at Substation Avenue and Queensway Drive crossings	• **Fair;** Switching of longer trains would impact Frank and Kenney Street; however, a grade separation at Braun Street is noted as a need in Terrace's Transportation Master Plan. • Increased rail traffic at Substation Avenue and Queensway Drive crossings	• **Good;** no at-grade crossings in vicinity	• **Poor;** would increase rail traffic over Kenney Street; however, a grade separation at Braun Street is noted as a need in Terrace's Transportation Master Plan. • Switching activity blocks Highway 16 near West end of Terrace, though bypass is possible.
Quality of road access*	• **Good;** Keith Avenue intersection with Sande Overpass recently upgraded	• **Good;** Keith Avenue intersection with Sande Overpass recently upgraded	• **Fair;** would likely require new road between SIDP and site	• **Good;** directly off of Highway 37	• **Poor;** Existing forest road connects to residential area in Terrace • New Skeena River crossing likely required	• **Good;** directly off of Highway 16
Rail frontage	• **Fair to good;** up to about 1,400 m	• **Fair,** up to 700 m	• **Fair,** up to 1,400 m	• **Good,** possibly 2-3 km	• **Good,** possibly 2-3 km	• **Poor,** relatively short
Zoning considerations	• **Poor,** Planned for mixed use	• **Good,** Zoned Industrial	• **Fair,** Zoned industrial and agricultural	• **Good,** Zoned Industrial. However, proximity to airport would need to be considered, due to structure height restrictions.	• N/A	• **Good,** Zoned industrial
Limited Proximity to population	• **Fair**	• **Fair**	• **Good**	• **Good**	• **Good**	• **Fair**

Criteria	Site 1A South of Highway 16 Corridor, East	Site 1B South of Highway 16 Corridor, West	Site 2 Thunderbird (West of airport)	Site 3 SIDP	Site 4 Schremp Island	Site 5 Skeena Sawmills Spur
Geotechnical	**Good to Fair** • Previously developed site with unknown disturbed surficial soils – possible unsuitable fills. • Alluvial terrace soils from surficial geology mapping. • Generally flat topography, no slope hazards.	**Good to Fair** • Previously developed site with unknown disturbed surficial soils – possible unsuitable fills. • Alluvial terrace soils from surficial geology mapping. • Generally flat topography, no slope hazards.	**Poor** • Undisturbed site • Glaciomarine clay soils shown on surficial geology map. Historic glaciomarine clay landslides in the area. • Undulating terrain. Historic glaciomarine clay landslides can occur on slopes <5% grade.	**Good to Fair** • Undisturbed site • Glaciofluvial delta landform (sand and gravel soils) shown on surficial geology map. • Significant slope to the south towards Lakelse Lake	**Fair** • Generally undisturbed site • Alluvial flood plain soils shown on surficial geology map (sand and gravel). • Likely construction challenges due to shallow groundwater near Skeena River. • Flooding concerns – needs hydrotechnical review	**Fair** • Previously developed site with unknown disturbed surficial soils – possible unsuitable fills. • Alluvial flood plain soils shown on surficial geology map (sand and gravel). • Flooding concerns – needs hydrotechnical review
Environmental – Contaminated Site	**Poor** • Previously developed, Adjacent to existing industrial infrastructure**	**Poor** • Previously developed, Adjacent to existing industrial infrastructure**	**Fair** • Adjacent to an active substation. • Preliminary site investigations would be required adjacent to railway and substation to confirm no off-site migration of contamination. • Limited historical development observed based on current aerial photograph.	**Good** • Developed, vacant land with no historical development known. • No issues or limitations identified.	**Fair** • Adjacent to existing industrial infrastructure (railway). • Historical land development appears to be for the purposes of forestry (logging) and agriculture. • Historical activities presents a low risk (apart from railway) to potential contamination.	**Poor** • Previously developed, Adjacent to existing industrial infrastructure**

Criteria	Site 1A South of Highway 16 Corridor, East	Site 1B South of Highway 16 Corridor, West	Site 2 Thunderbird (West of airport)	Site 3 SIDP	Site 4 Schremp Island	Site 5 Skeena Sawmills Spur
Environmental – Greenfield	**Not applicable**	**Not applicable**	**Poor to Fair** • three documented fish-bearing streams, potential for fish stream delineation. If the project footprint is extensive and inflexible, the permitting challenges could be significant. • Potential for nesting surveys depending on timing of clearing works and amphibian exclusion and salvage.	**Fair to Good** • likely some small watercourse crossings along new rail spur, but no apparent red flags at site itself.	**Poor to Fair** • potential floodplain issues. • likely to require fisheries permitting. • potential impacts to moose habitat, depending on project siting.	**Poor to Fair** • Howe Creek runs through site in Culvert.
Civil	**Good** • Fully serviced (water, sewer, storm). • Access from collector road. • Some road upgrades may be required.	**Good** • Fully serviced (water, sewer, storm) • Access from collector road. • Some road upgrades may be required.	**Poor** • Unserviced • Approximately 3km road access to be constructed from the nearest collector road. • Upgrades to the existing collector road and road network may be required.	**Poor** • Under-development	**Poor** • Unserviced. • Road access to be constructed from Terrace (approximately 4 km from Old Bridge) or a bridge across the Skeena River constructed. • Upgrades to the existing road network required.	**Fair** • Unserviced, but water, storm and sanitary sewers within 300m of site. • Access from highway. • Upgrades to the existing highway and road network may be required.

Criteria	Site 1A South of Highway 16 Corridor, East	Site 1B South of Highway 16 Corridor, West	Site 2 Thunderbird (West of airport)	Site 3 SIDP	Site 4 Schremp Island	Site 5 Skeena Sawmills Spur
Archeological	**Good** • No recorded archaeological sites in proximity	**Good** • No recorded archaeological sites in proximity	**Poor** • There are four previously recorded sites within 300 m of the approximate candidate location CMTs	**Good** • no recorded archaeological sites in proximity	**Good** • No recorded archaeological sites in proximity	**Fair** • There is one previously recorded site adjacent to the candidate location - CMT

*All projects, due the proximity to provincial highways, would need to go through a formal traffic impact assessment. ** If contamination present, and no Ministry Instrument (AiP) obtained to date, a Ministry Instrument would be required for future development. To obtain a Ministry Instrument, a Stage 1/2 PSI and DSI would be required, along with any remedial or risk assessment activities. May result in project delays. Source: Analysis by CPCS, McElhanney and Kleanza Consulting, compiled by CPCS .