Cape Breton Regional Municipality Light Rail Transit

FEASIBILITY REPORT

PREPARED BY:

Cape Breton University

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Executive Summary and Background

Cape Breton University

Executive Summary

In June 2024, the Government of Nova Scotia and Cape Breton University (CBU) commissioned a feasibility study for the proposed establishment of light rail transit in the Cape Breton Regional Municipality (CBRM). The study rigorously examined critical factors, such as rail/track engineering, passenger demand, economic viability, emissions reduction, and future growth patterns. The resulting analysis demonstrates that an eco-friendly renewable-powered light rail transit (LRT) system or a Go-Train system for a major passenger corridor in the CBRM is both realistic and 'capital' cost-effective for enhancing and expanding transit options in the region.

Key findings from the study include:

- CBRM LRT is a feasible transit solution and is economically competitive when considering the total cost of ownership and operation over the 50-year lifespan of the track and trains.
- The proposed trains would be zero-emission vehicles, battery-powered using electricity from renewable sources.
- A Bus Transit-LRT assessment concludes that the LRT line would function as a trunk line, allowing greater focus on wider feeder services and local routes beginning and ending at LRT stations.
- A single ticketing system for all transit options (bus-train) would allow seamless travel across the entire system.
- Utilizing unused or underutilized rail lines would require one-time upgrades to tracks and some bridges, but this is feasible from both engineering and economic perspectives.
- The trains would accommodate over two hundred passengers at a time and be fully accessible.
- Buses are often overcrowded and passenger demand is growing rapidly.
- The number of bus passenger rides has increased fivefold in recent years, rising from 300,000 to 1.3 million separate transit trips.
- Fifty percent of bus traffic begins or ends at CBU Campus.
- An optimal location for a main transit hub for buses, trains, and parking is near Centre 200, with additional stations at Sydney River, Kings Road (with transit to and from Membertou via bus), Grand Lake Road, and CBU Campus.
- The estimated capital cost of Phase One is $142.9 million, with a system lifespan of 50 years, is comparable to that of a bus system, but has the advantage of moving more passengers faster and with fewer fleet replacement needs.

The proposed Cape Breton passenger rail line would be the first of its kind in Atlantic Canada. It is not just a transportation project; it is a visionary investment in the future of urban mobility, sustainability, and economic vitality. Its 50-year lifespan allows CBRM to reap long-term benefits while addressing immediate transportation challenges.

Given these findings, it is proposed that Phase One of the CBRM LRT development begin immediately.

Background

One of five strategic directions in Cape Breton University's Strategic Plan, 2019-2024 is "Champion the Island's Prosperity." It captures the institution's commitment to the betterment of the communities it serves. The vision for light rail transit (LRT) in the CBRM emerged from CBU's desire to improve access to public transportation in the community, help to reduce carbon emissions, and develop infrastructure necessary to support population growth in the area. The development of LRT would also benefit the community by reducing congestion and improve safety on two major thoroughfares – the four-lane, undivided Glace Bay highway and King's Road – and further encourage active transportation in the community.

As a result of Cape Breton's industrial past, the majority of the tracks required for an LRT system already exist in the CBRM. Repurposing the tracks once used to transport coal and steel to serve the needs of population growth and economic development will significantly benefit the entire community well into the future. Such an initiative also aligns with provincial and federal carbon reduction strategies in support of the goal to be net-zero emissions by 2050, as well as the province's population growth strategy by creating the infrastructure necessary to double the population by 2060.

Conceived of in four phases, the LRT system would connect Sydney River to CBU first, with later phases extending service into Glace Bay, New Waterford, North Sydney (and Marine Atlantic), and eventually the airport. A number of terminals would be constructed with parking lots to enable park and ride at key access points.

In January 2024, CBU engaged DMDE Engineering Limited to prepare a pre-feasibility study. Specifically, it determined the availability and condition of existing trackage, as well as the high-level costs associated with developing and operating an electric train system. That pre-feasibility study confirmed that the concept had merit and that a major portion of the rail infrastructure is already in place, only requiring some rehabilitation. Additionally, a regulatory overview of the rail line development was commissioned, alongside a property report. To move the project forward, further legal consultation and a more fulsome feasibility study were needed.

The Government of Nova Scotia provided $610,000 funding in June 2024 for a feasibility study. The eight-month study was led by DMDE Engineering and included AECOM Engineering, HDR Consultants, ATN Researchers, Prendergast Surveys, Martin Media Aerial photography/video, M5, McInnis Cooper, Trifos Design and other professional services as required. All final reports were received in February 2025 and DMDE and CBU assembled to create a 200+ page final comprehensive valuation.

CBRM Light Rail Transit Feasibility: Summary

The conclusion from multiple independent reports is clear: a renewable-powered light rail system stands as a practical and competitive option compared to merely adding buses, thus allowing CBRM to effectively redeploy resources to bolster services across the municipality.

By reallocating buses that currently serve the Sydney-to-CBU route, transit services can be expanded to emerging neighbourhoods and enhance service frequency in high-demand areas. This innovative transit solution will serve a diverse range of passengers—workers, students, seniors, and shoppers—who will be able to conveniently embark and disembark at five strategically located stations: Sydney River Walmart, Kings Road near Membertou, Centre 200, Spar Road, and the CBU campus. Each station will include ample parking, ensuring effortless access and encouraging community participation in an expanded transit system.

The project would require a multiphase approach. Phase One will incorporate an optimized bus routing system that connects seamlessly to the train stations, creating a cohesive, user-friendly transit experience. This integration is designed to attract more passengers and significantly reduce traffic congestion, transforming the transit system into a first-choice option for mobility rather than a last resort.

Phase One involves approximately 13.6 kilometers of rail infrastructure composed of a portion of the CN owned Sydney Rail Subdivision that is currently nonoperational, but rail infrastructure remains largely in place, a portion of the Sydney Coal Railway Victoria Rail Subdivision that is currently operational for freight traffic and a portion of the former Cape Breton Tramway that has been nonoperational for over 78 years, but of which most of the rail-bed embankment still exists.

LRT systems are built with durability and longevity in mind, utilizing infrastructure designed to withstand decades of heavy use. Investing in LRT is a forward-thinking decision that provides significant benefits over a 50-year horizon and beyond. This makes them an ideal solution for municipalities seeking sustainable, long-term transportation options. Unlike bus systems, which require frequent vehicle replacements, or road expansions that degrade over time, LRT tracks and vehicles are engineered to deliver reliable service over generations, ensuring consistent value for the investment.

The long lifespan of LRT infrastructure makes it particularly attractive from an economic perspective and once established, LRT systems require less ongoing maintenance compared to road networks, which face continuous wear from heavy traffic.

Additionally, LRT encourages a shift away from car dependency, reducing the need for costly expansions of roadways and parking infrastructure. Over 50 years, these savings compound, providing substantial returns for municipalities and taxpayers.

LRT lines often act as corridors of growth, attracting businesses, residential developments, and cultural hubs. Over time, this fosters vibrant, transit-oriented communities where people can live, work, and raise families without needing a car. The presence of a dependable LRT system also enhances property values and increases economic activity along its routes. These benefits extend far into the future, shaping the municipality's infrastructure and economy in enduring ways.

With an estimated Phase One capital cost of $142.9 million, implementing an LRT system using existing rail lines is comparable, over the long-term, to introducing electric buses. Establishing the LRT as the central hub of a new transit system will allow the municipality's 'Transit Cape Breton' to reallocate buses dedicated to CBU, enhance neighborhood coverage, and significantly improving service frequency across the municipality.

The LRT will be seamlessly integrated into Transit Cape Breton, ensuring a well-planned transportation network that offers a unified fare for both train and bus services. The 223-passenger trains will be fully accessible, and all stations will be staffed for safety, security and convenience. In line with Canadian transit practices, all systems will operate on a cost-sharing model between the government and passengers.

Moreover, evidence from other jurisdictions demonstrates that LRT transit not only encourages a reduction in car dependency but also serves as a catalyst for urban development, drawing both residents and businesses with its promise of rapid and reliable transportation.

The Appendix reports and analyses will be instrumental in guiding discussions with the three (3) levels of government about the next steps, including applications for federal and provincial financing for capital construction and operational logistics and costs. Once started, it is anticipated the construction/implementation will be completed in approximately two to three years.

The current rail-line is excellent for freight and light rail as it was specifically constructed to accommodate heavy freight. There are multiple locations along the Sydney River to downtown area where continuous welded rail (CWR) exists. Welded rail is a major component in noise reduction for passenger trains.

Rapid operating speeds and the potential quiet operation of an electric train brings concern to the safety of individuals who may trespass on railway property. Extensive fencing will be placed in selected areas to prevent access to the rail corridor. There will also be a large public safety and awareness campaign.

Along the Phase One route there are three water crossing bridges and one Roadway bridge. Preliminary assessments have been made of the current state of the bridges and plans will be made to upgrade components that are deficient. Detailed inspections will be performed on any bridge prior to returning it into operation.

This report looked at two possible companies for provision of passenger vehicles; Siemens and Alstom. Both companies offer a wide range of customizable options such as size of consist, floor plan layout and custom finishes to make the vehicle unique to the region or city it serves.

Siemens:

A global technology company, with Canadian headquarters in Oakville, Ontario, that is focused on industry, infrastructure, mobility and healthcare. Approximately 4,200 Canadian employees work in the 33 office and production facilities that are located coast to coast.

Acquisition of the locomotive has a cost estimate of $16-20 million. Passenger cars carry a separate acquisition cost which would drive the total cost of a train consist (locomotive and passenger car) significantly higher.

Alstom:

Alstom's (formerly Bombardier) headquarters for the Americas Region is based in St-Bruno, Quebec. The company has been present in Canada for over 80 years, in the areas of naval and rail transport, power generation and power transmission.

Alstom does carry a product line that is capable of interoperability with freight traffic known as the Adessia model commuter train. Estimated cost is $17-20 million for a three car consist which would be made up of a cab control car on each end with a seating capacity of 71 seats per car and a trailer car in the middle with 81 seats with a total capacity of 223. The Alstom train is the preferred mode of locomotion.

The track in the proposed Phase One is in fairly good condition overall. Given the track has been out of service for so long, a maintenance program will be required to ensure proper track structure and geometry.

The findings of the rail/track inspection to re-establish track service along the route results in an estimated cost of around $34,734,500 over a total route length of 13.6 kms. Two passenger trains (Adessia) and accompanying charging and train control system are estimated to be $43,600,000.

While the report acknowledges potential barriers, it also outlines strategic approaches to proactively mitigate challenges. Such measures are crucial in ensuring the project's viability, sustainability and to secure long-term support.

The CBRM LRT system is posited as a transformative infrastructure investment, reimagining public transit's role in supporting CBRM's sustainable urban growth. By aligning modern urban planning principles with the community's economic and environmental objectives, the proposed LRT system stands to significantly enhance the

Region's transit landscape, fostering a more interconnected, inclusive, and sustainable future for its residents.

As part of the study, secondary research to profile and analyze relevant case study targets to guide the development of the LRT business case were conducted. This exercise profiled selected regions on the current state of their LRT system, historical considerations, critical success factors, future planning and aspirations, challenges, and sustainability, implementation challenges, lessons learned, best practices followed, and final outcomes.

This report identified trends, patterns, and lessons learned that can inform the design, implementation and operation of the CBRM LRT system.
Five regional LRTs were reviewed/researched;

1. The Region of Waterloo, Canada – ION LRT
2. Edmonton, Canada LRT
3. Calgary, Canada – CTrain System
4. Buffalo, USA - LRT
5. Lund, Sweden – LRT

One of the most significant take-aways is the importance of managing the cost of building and maintaining LRT infrastructure, especially in cities facing budgetary constraints. Another challenge is ensuring consistent ridership, particularly in regions with strong car cultures. Weather conditions may affect service reliability and ridership, positively or negatively, as many may prefer rail in inclement weather, underscoring the need for climate-resilient infrastructure.

A key lesson is the importance of aligning LRT projects with broader urban planning and sustainability goals. Success requires a well-integrated approach that includes supportive policies, community engagement, and long-term financial commitment.

This study, utilizing the same consultants used by CBRM for the Transit Operational Review Comprehensive Report, examined the long-term proposed plan designed around a hub in Downtown Sydney with routes extending outwards on both local roads serving neighbourhoods in the Sydney area, and on major arterials that connect to neighbouring municipalities.

The two major corridors, Grand Lake Road and Kings Road, have several routes providing service for a higher level of combined service along the corridors. It is generally expected that connections will be made between bus routes and LRT at the Downtown Sydney hub.

Transit Cape Breton highlighted the operational importance of establishing a dedicated transit hub in Downtown Sydney. Such a facility would enhance service reliability and offer significant benefits. Key strengths include:

- **Seamless LRT Integration**
- **Enhanced Passenger Experience**
- **Operational and Service Reliability**

The proposed passenger terminal designs for the CBRM LRT Phase One includes the construction of one (1) main terminal and four (4) satellite terminals, strategically located. The focus of the terminal design(s) will be to support a safe, reliable, inclusive, and seamless customer experience through a highly-functional and thoughtfully-addressed, customer experience design solution. The end goal is to provide well-connected, safe, convenient, and friction-free movement experience for the commuting public.

In an effort to determine strategic and logical locations for passenger terminals, an extensive and detailed investigation of several the properties along the rail-line was conducted. Assessing the properties involved legal examinations and property searches conducted by the project's legal team, as well as site visits by the project engineer and CBU project manager.

After a thorough review, four (4) properties along the proposed route were identified with some of the owners being contacted for a preliminary discussion. Once locations were determined, architectural and engineering assessments were made to address suitability for terminals/property/rail connectivity. The selected 'future passenger terminal' properties meet the engineering and architectural requirements and will be pursued once project funding has been secured.

The projected cost for the main terminal is $9.2 million with four (4) satellite terminals projected at $4.1 million each. Total for five (5) 'integrated bus/rail' passenger terminals is $25.6 million.

A regulatory roadmap to guide the environmental permitting process for the scoping of a CBRM LRT project was conducted. The roadmap describes all the possible environmental permits, including Environment Act, Contaminated sites, Impact Assessment Act, Fisheries Act, Wetland Alternatives and Canadian Navigable Waters Act.

Considering the majority of the rail line already exists, this would reduce the amount of permitting required. However, should all the listed permits be required the projected cost is $200,000.

The proposed CBRM LRT will operate solely within the Province of Nova Scotia. It will be provincially regulated.

Since the CBRM LRT will be the first operation of its kind in Atlantic Canada, detailed discussions with the Province of Nova Scotia will be initiated to determine the exact course of action to obtain appropriate authorizations for final operational approval.

Conclusion

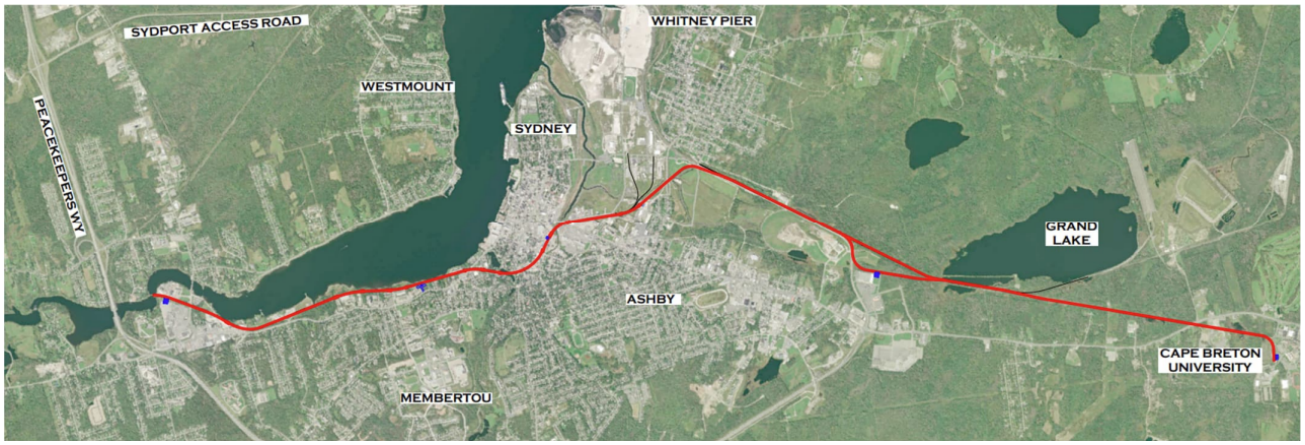
Beyond the financial, safety and environmental considerations, a CBRM LRT represents a 50-year investment in urban development and community well-being. LRT lines often serve as growth corridors, attracting businesses, residential developments, and cultural hubs.

This fosters vibrant, transit-oriented communities where people can live, work, play and raise families without the need for personal vehicles. The presence of a dependable LRT system also enhances property values and increases economic activity along its routes. These benefits extend far into the future, positively shaping the municipality's infrastructure and economy.

The underlining distinguishing feature of the proposed CBRM LRT system is the current existence of a railbed, rails and infrastructure. This ensures a cost-effective capital investment versus the implementation of new infrastructure which would be a minimum of 3-5 times the projected cost of the CRBM LRT.

	Item	Cost
1	Engineering – Infrastructure	34,734,500
2	Eco-friendly trains	43,600,000
3	Bridge repairs	1,760,000
4	Culvert/Drainage rehabilitation	2,000,000
5	Power Station Crossing/Utilities	1,400,000
6	Utility relocation	1,000,000
7	Passenger Terminal	9,200,000
8	Satellite Passenger terminals	16,400,000
9	Land acquisition	3,000,000
10	Environmental permits	200,000
11	Marketing/Media & PR	800,000
12	Prep/finalize funding applications	30,000
13	Engineering/Architect	200,000
14	Subtotal	114,324,500
15	Contingency (25%)	28,581,125
16	Total	**142,905,625**

Photo Appendix



Phase One – Sydney River to downtown to CBU Campus.

With the current rail-line not seeing any rail traffic nor maintenance activities for a decade a large portion of the right of way has become covered with heavy brush including the ditches and drainage courses.

Flashing lights, bell and gates will be necessary at most crossings.

There are extensive requirements that must be achieved to align with the Transport Canada grade crossing regulations. Due to the quiet and frequent nature of operating passenger rail service, each crossing location will require at a minimum flashing lights, bell and whistle with gates (FLB+G) where necessary to enhance vehicular safety.

Overhead wires at Old Tramway near CBU.

During the site inspection numerous overhead electrical wires were observed at some crossings. Any track re-profiling will need to take into account the crossing locations with respect to overhead clearances. Crossings with overhead wires were primarily observed at public road crossings, especially at the Grand Lake Road 'tramway' location, where Nova Scotia Power has multiple overhead lines that will require modifications.

Adessia train by Alstom

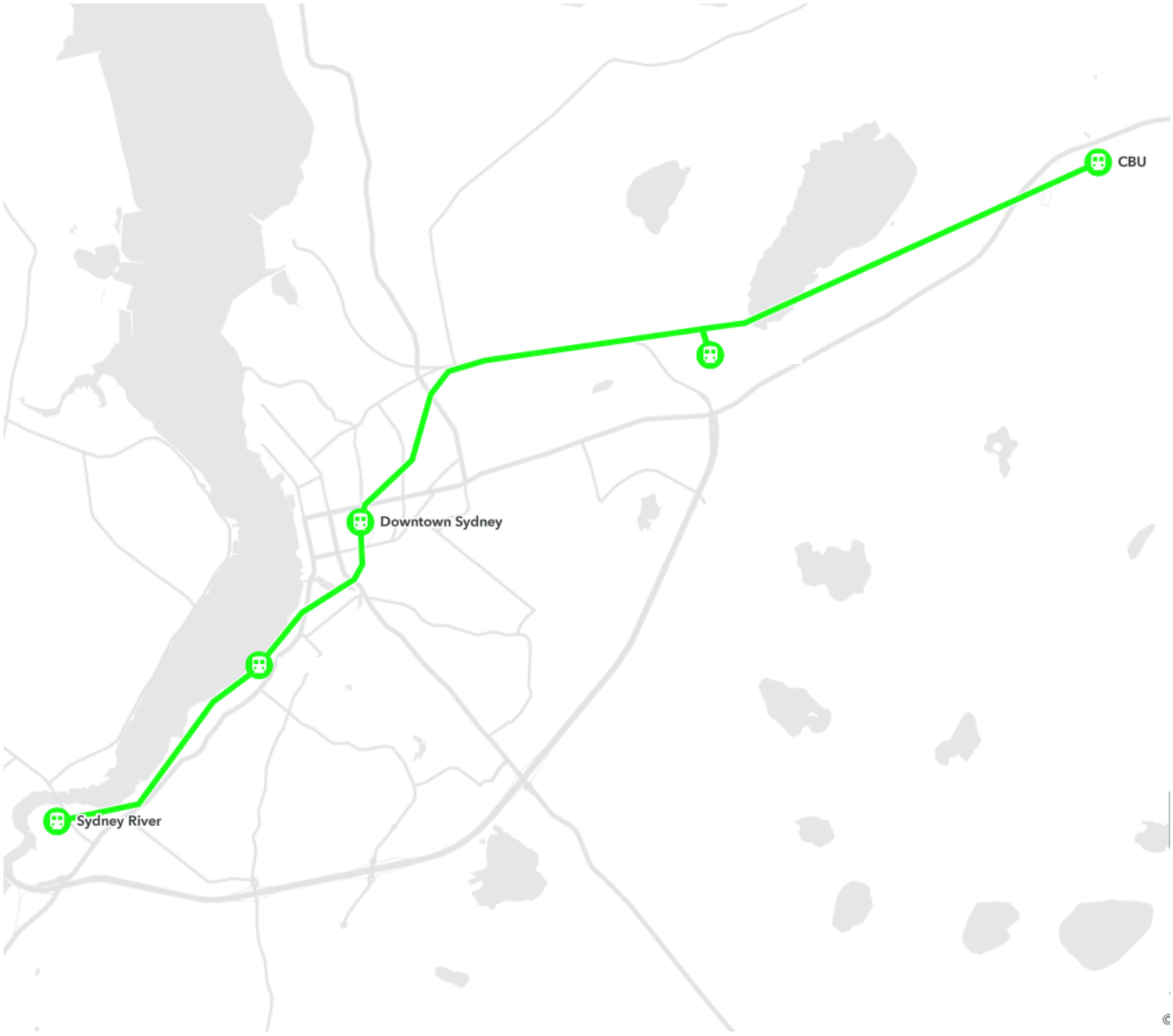
ANTICIPATED BENEFITS OF THE LRT SYSTEM IN CBRM

Improved Public Transportation	Economic Development Opportunities	Social Benefits	Environment Benefits
• Enables faster commutes. • Provides reliable service. • Handles growing transit demand. • Enhances connectivity with strategically placed stations.	• Creates jobs in planning, construction, and operation. • Drives investment and revitalization near transit stations. • Expands labor pool and enhances business appeal. • Attracts tourists.	• Reduces accidents. • Alleviates road congestions. • Provides accessible features. • Connects communities. • Reduces parking issues.	• Reduces greenhouse gas emissions. • Lowers vehicle pollution. • Sustainable transit options align with climate goals and urban eco-friendly initiatives.

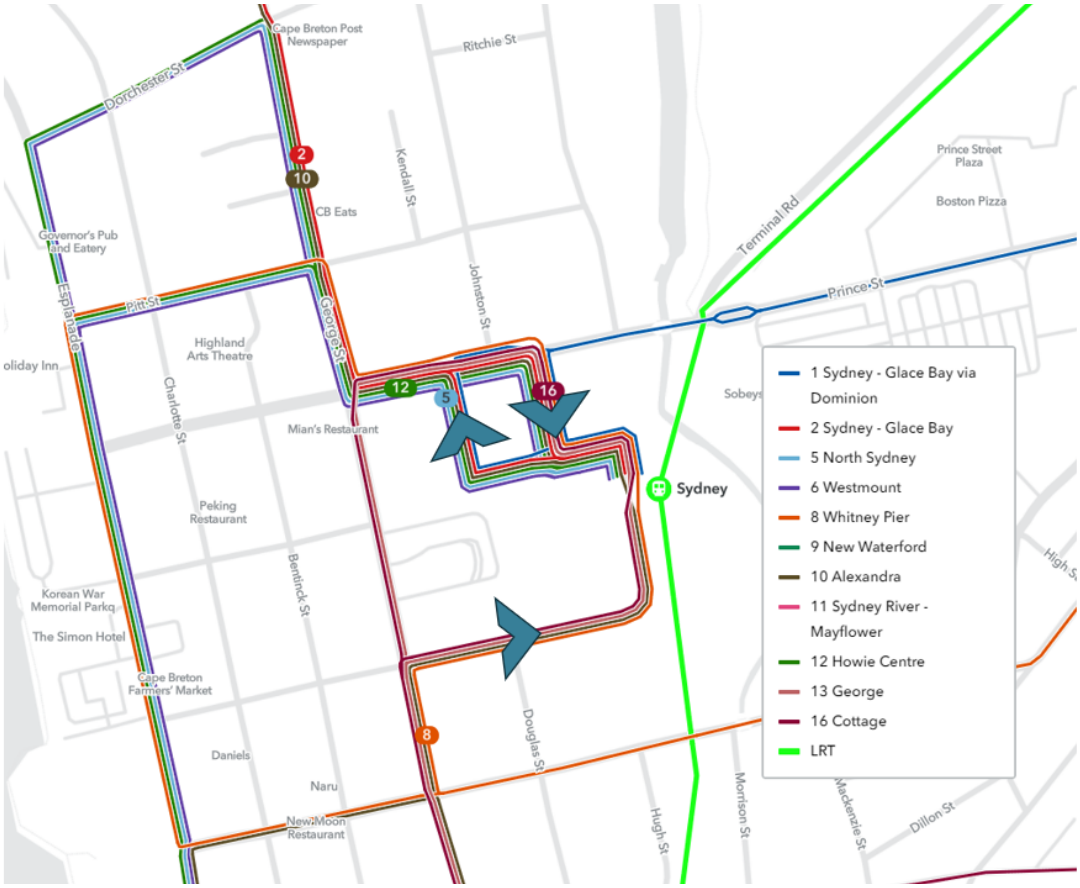
The potential benefits of the CBRM LRT are significant – ranging from social, environmental, safety and economic. An overview of the business case is presented below and detailed within the body of the report.

Comprehensive stakeholder engagements were conducted as part of the feasibility study. The project team engaged key partners and stakeholders in bilateral and small-group interviews. The insights are organized around themes and captured perceptions about the project, its benefits, opportunities, and potential challenges. Stakeholders consulted included:

- Municipal officials
- Business leaders
- Economic development and business support organizations
- Federal and provincial officials
- Community and environmental organizations
- Post-secondary education leaders; and
- Elected officials.



Five (5) passenger terminals will be incorporated in Phase One.



Downtown Sydney would be the major hub location with a combination Bus/LRT terminal located behind Centre200 adjacent to the rail tracks.

Main Terminal Building – behind Centre 200 (adjacent to rail line)

Rendering of Satellite Terminal at CBU

Engineering Review

AECOM

Cape Breton University

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AECOM: 2015-04-13

Executive Summary

DMDE has engaged AECOM for the purposes of conducting a feasibility study of implementing a light rail electric passenger service or a GO Train system as it has been referred to throughout the Cape Breton Regional Municipality (CBRM) in conjunction with Cape Breton University (CBU). The end goal includes integration with the current bus transit system to serve the needs of the growing community and increased demand for public transportation. Some of the driving factors that make this potential project attractive is the need to meet the demands of the increased ridership growth experienced by Transit Cape Breton in recent years, the desire to create a green alternative for public transportation potentially utilizing available energy generation from the CBU windfarm and increasing the community accessibility to modern streamlined integrated public transportation systems. The entire project would be a multiphase approach, and this report places a focus on the first phase of the project and proposed routes.

Phase one involves approximately 13.6 kilometers of rail infrastructure composed of a portion of the CN owned Sydney Subdivision that is currently nonoperational, but rail infrastructure remains largely in place, a portion of the Sydney Coal Railway Victoria subdivision that is currently operational for freight traffic and a portion of the former Cape Breton Tramway that has been nonoperational for over 78 years. The former tramway route does not have rail infrastructure in place, but most of the embankment still exists.

AECOM visually inspected and assessed the existing track infrastructure and portions of future track route for use as a light passenger electric rail line in the fall of 2024. This report is two-fold, it highlights the results of the findings and makes recommendations to potential approaches to remediate any found conditions and additional requirement considerations that should be contemplated and assessed to bring the track infrastructure and public crossings into safe operating condition in compliance with Transport Canada requirements and current engineering track standards. It also makes an assessment of potential electric rail vehicles and equipment to be utilized in the delivery of the intended service. On both focus subjects of the report a high order of magnitude cost estimate is provided for insight to the potential costs of achieving the desired result, a safe, efficient and green light rail passenger transportation system to serve the population of the Cape Breton Regional Municipality.

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Figures

1. Introduction

1.1 Inspection

In September of 2024 a walking track inspection was conducted by AECOM Canada ULC on a portion of the Cape Breton & Central Nova Scotia Railway (CBNS) line In Sydney, the Sydney Coal Railway and a section of the former Cape Breton tramway. The rail line and infrastructure referred to as the Sydney Subdivision is owned by Canadian National Railway (CN) with running rights granted to CBNS which is under the ownership of Genesee & Wyoming Canada Inc. For the purpose of the report this portion of the line will be referred to the Sydney Subdivision. Inspection was carried out on foot from approximately mile point 110.85 which is the northeast side of the rail bridge that crosses the Sydney River to the junction with the Sydney Coal Railway, Victoria Subdivision just east of Lingan Road. The purpose of the inspection was to assess the existing track infrastructure and portions of potential future track route for use as a light passenger electric rail transit line. The total phase 1 route length is approximately 13.6km.

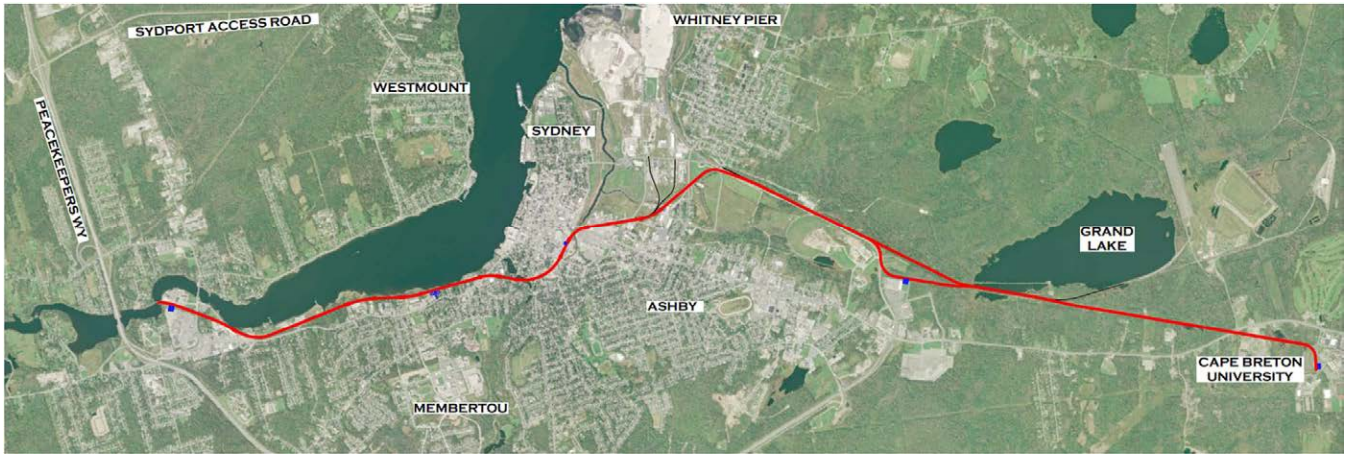


Figure 1: Route Map

The inspection of the route consisted of sample measures of track gauge, existing rail head loss and flange wear, visual assessment of the ballast, subgrade, ties, joint bars, other track material (OTM), right of way and existing drainage; visual inspection of existing track appliances such as turnouts, derails and track signs. Track geometry was not measured but visually observed and measurements and assessments were made static and not underload.

This report will highlight the results of the findings and suggest a potential approach to remediation of found conditions and requirement considerations that should be assessed and executed to bring the track into operating condition. Any track standards or thresholds in track measurement that might be discussed in this document are analyzed against the CN Engineering Track Standards most recent version 2023-01-10 as most of the existing rail infrastructure is owned by CN.

2. Background

2.1 Cape Breton Central Nova Scotia Railway

The Cape Breton and Central Nova Scotia Railway (CBNS) is a short line railway that operates in the Canadian province of Nova Scotia. CBNS operates (245 miles or 394 kilometres) of main track and associated spurs between Truro in the central part of the province to Point Tupper on Cape Breton Island to Syndey Nova Scotia. The rail lines CBNS operates were previously owned by the Canadian National Railway. CBNS began operations in 1994 after the rail lines were purchased in October 1993 by the holding company RailTex.

On February 4, 2000, RailTex and all of its assets, including CBNS, were sold to the holding company RailAmerica. On December 12, 2012, RailAmerica and all of its assets, including CBNS, were sold to the holding company Genesee & Wyoming. In 2014 CBNS ended 135 years of rail service to Sydney, NS when it took its Sydney Subdivision out of service. Running from Point Tupper to Sydney, NS. The track is still in place however service remains suspended. In November of 2023 Canadian National acquired a stake in the CBNS from Genesee & Wyoming. Under the deal, CN now manages interline shipment over the railroad while G&W continues to handle day-to-day operations.

2.2 Sydney Coal Railway

The Sydney Coal Railway (SCRY) is the former Cape Breton Development Corporation (DEVCO) rail line. Devco transported coal from the mines to the coal preparation plant and the International Coal Pier. In 1999 the coal mines were closed. Nova Scotia Power operated coal fired power plants in the area and imported coal to maintain operations. The rail line was sold to Nova Scotia Power and they currently operate and maintain the line from the International Pier to the Lingan Generating Station. The section of the SCRY from Lingan Road, approximately Mile 7 heading East to approximately Mile 9.3, was assessed as a potential route segment for passenger rail service.

2.3 CBU Segment

The CBU segment as defined in this report is the old Tramline rail. The Tramline was an electric train that operated from 1901 to 1947. One of its major routes was from Sydney to Glace Bay. The line has been abandoned for over 78 years and has had the track structure removed. The track embankment remains and is currently being used as a recreational trail. The section from Grand Lake to the CBU campus is being considered for this project.

3. Track Assessment

3.1 Sydney Subdivision Segment

3.1.1 Track Inspection

With the Sydney Subdivision not seeing any rail traffic nor maintenance activities for a decade a large portion of the right of way has become covered with heavy brush including the ditches and drainage courses. Rail is rusty and roadbed conditions deteriorated due to lack of maintenance.

Rail is 115lb Sydney Control Cooled. Track construction is comprised of jointed rail in 78' lengths fastened by 6-hole joints. There are multiple locations along the southern portion of the line inspected, mostly the portion that follows the shoreline that continuous welded rail (CWR) was observed. The range of measured head loss is 0-4.5mm and the measured flange or gauge face wear is 0-2.5mm which places the rail in good condition with maximum allowable head loss or gauge face wear being 16mm individually and maximum combined wear (head loss and gauge face wear) being 21mm.

Ties are hardwood and observed defect percentages range between 15-51%, average defect tie rate was approximately 34.6%. Tie plates are double shoulder 11" plates with 2-3 spikes per plate which by CN ETS are a suitable plate on Tangent track and curves less than 2 degrees for lines that see less than 5 million gross tons of rail traffic per year. Anchor patterns for the line are box anchoring every 2nd or 3rd tie and are a combination of woodings and fair anchors. Several locations were observed where there were no anchors present, possibly from recapture into track inventory for use in active areas.

Ballast is generally weak ½"-2" fractured face granite rock. There are multiple areas were observed with heavy fines and heavy vegetation in the rock and a few locations where the ballast shoulder is low regarding the track standard and few locations where ballast is fully grown over by soil and grass. Ballast remediation or replacement will need to be done prior to lifting and profiling activities.

3.1.2 Track Improvements

Prior to the discontinuance of the operations on the Sydney Subdivision the last timetable produced by CBNS indicates that the rail traffic was operated at class 2 speeds (25mph freight and 30mph passenger) on the portions of the track that operated under Occupancy Control System (OCS) method of control. Under previous operations OCS limits ended just south of Prince Street Mileage 115 and changed to Cautionary Limits where trains typically operate under rule 105 which is a speed relative to visibility and operating conditions, not exceeding reduced speed (15mph). The desired operating speed for this section of track should be confirmed and all infrastructure remediation should then be done in accordance with the applicable standards for that class of track.

3.1.3 Track Remediation

The purpose of this section is to make analysis of a proper and methodical approach to remediating and upgrading the proposed route that will run on the Sydney Subdivision as noted for Phase 1 of the project. It should be noted this is a suggested approach and many of the items can occur simultaneously but there are some that logically must occur one before the next.

3.1.4 Brush Cutting and Vegetation

Heavy brush occurs in multiple sections of the route and throughout the entire route vegetation is present in the track superstructure. Preferential approach would be to utilize a rail capable machine such as a hi-rail equipped track hoe or a track hoe on a railcar. This is due to the tight property lines surrounding the rail and a reduction of damage to the rail superstructure.

Photo 1 - Heavy Vegetation in Several Locations

It would be preferable to utilize a set of appropriate grapple tongs to uproot any large trees or bushes that are growing within the ballast area to attempt to remove the root system at the same time. A brush cutting head can then be used to cut remaining brush along the ballast sections and the adjacent ditches. Wherever possible the brush cutting operation should cut the full width of the rail property to optimize sightlines for operations. Cut brush should be loaded into a gondola car and be transported off the property for disposal. Once larger brush has been removed vegetation control should be done to eliminate the smaller vegetation.

3.1.5 Track

Once the track structure has been cleared and redundant turnouts removed a full assessment of the existing tie conditions should be done. Locations where ties meet the required standards to remain in service a verification of track gauge should be done and if necessary, remediate any gauge issues. When re-gauging track spikes should be removed from the tie plates and holes chemically plugged prior to re-spiking. In areas where the ballast appears to have heavy fines or contamination spikes should be added to secure the rail base to the plate prior to any track lifting activities. Most locations were observed to have only two spikes per plate so there would be the availability to add spikes for this purpose.

In areas where ties are identified as defective a tie renewal program should take place. Removed ties should immediately be removed from the property due to the urban setting of most of the track. The new ties should be installed, correct rail gauge verified, and proper plates should be spiked with new spikes.

During the tie renewal and gauging activities, it should be verified that the correct tie plates are in place to meet the required standards. It was observed that 11” double shoulder tie plates were in place during the walking inspection. Current track standards indicate that for 5 ½” base rail which is the base width for 115lb rail, 11” base plates are

adequate for tangent track and curves up to 2 degrees in measure. For curves exceeding 2 degrees the minimum requirement is 13” wide plate. If areas of deficiency are found, then plates should be upgraded, and the proper spiking patterns used during the installation and gauging of the rail.

3.1.6 Ballast and Surfacing

Multiple sections of the track were identified as having heavily contaminated ballast or inadequate ballast either between the rails or on the shoulders. There are multiple approaches that must be contemplated to remediate the ballast in sections where it is required. This will require an assessment of the line that can be broken down into sections and then assigned a productive approach. Some areas may need a top up of ballast as the existing rock is clean and meets track specifications. Other areas may need to be undercut to remove heavily contaminated ballast which will have to be loaded and removed due to the urban location of the work. Once removed from track it can be determined if there is value in screening and cleaning the ballast for reuse or if it is more economical to simply replace the undercut locations with new ballast that meets track specifications. For extended locations where the ballast section is appropriate but fouled, the use of ontrack ballast cleaning equipment may be considered. The worst of the ballast areas may need to have the track and ties removed in panels and have excavation take place to re-establish the sub ballast layer and then replace the track sections prior to flooding with new track ballast to achieve proper elevation.

Photo 2 - Ballast and Surfacing

As ballast is flooded and remediated an out of face lifting program should take place and during the lifting program all curves should be analyzed against the desired track speed to achieve the proper superelevation to allow for rider comfort and minimize wear on track components. Proper horizontal and vertical alignment must be established prior to surfacing activity.

Should an Advanced Train Dispatching System be implemented through this section of rail corridor then sampling may have to be done of the current ballast to ensure that it meets the required standard for use in a signaled track environment.

3.1.7 Rail Profiling and Defect Detection

Upon completion of lifting and welding activities it is recommended that a rail grinding operation take place on the entire line. Not only will this remove the rusty rail conditions that were observed which can affect track and crossing circuit performance, but it was also observed that some areas have flow on both the field and gauge side of the rail from wear due to traffic. It is important to maintain a proper rail head profile to ensure proper wheel rail interaction for ride comfort and extending the life of the assets.

As the line has been out of service for over a decade and many of the activities associated in the renewal of the track structure will involve lifting and manipulating the rail it is recommended that ultrasonic rail flaw detection is conducted over the entire rail network to be brought into service to ensure that there are no internal rail flaws that could potentially disrupt service or cause derailment.

3.1.8 Rail Joint Elimination and Rail Distressing

Joints are the weakest location in rail and it is recommended that they be eliminated wherever possible. Welding is the preferred means of joint elimination and can be done in track either at time of construction or as part of a planned maintenance program. Joint elimination, in addition to improving rail performance will also provide smother ride characteristics for improved passenger comfort.

Rail needs to be in a neutral state to eliminate pullaparts in colder weather or kinks when the temperatures rise above a predetermined number. Destressing the rail during construction or joint elimination will leave the steel in this neutral state. This will be done during joint elimination.

The use of a hi-rail butt welding unit is the preferred method of welding and this can be done in conjunction with the ultrasonic rail flaw detection program.

3.2 CBU Segment

This right of way of the abandoned tramline consists mainly of the track embankment after the track and granular material was removed. The trackless embankment is used mostly as a recreational trail. The expectation is that with some remediation work that operational track could be reestablished within this segment and used for the proposed traffic. Significant clearing and drainage improvement are required along this segment of track.

Photo 3 - East of Grand Lake Road

Photo 4 - West of Grand Lake Road

3.2.1 Crossings

There are several public and private crossing locations along this segment. Due to the quiet and frequent nature of operating passenger rail service, each crossing location will require at a minimum flashing lights, bell and whistle with a recommendation for gates to enhance safety. A safety assessment will need to be conducted for each crossing that needs to be maintained operational. A review of the operational needs of each public and private crossing should be considered in order to establish an appropriate warning system. Ultimately the safety measures implemented at each crossing must be agreed to by the operating railway and the road authority.

3.2.2 Brush Cutting and Vegetation

Heavy brush occurs in multiple sections of the route and throughout the entire route vegetation is present in the track superstructure. Wherever possible the brush cutting operation should cut the full width of the rail property to optimize sightlines for operations.

3.2.3 Track

No track is present along the CBU section of the route. Proposed track should consist of a minimum 115lb rail and be continuously welded to eliminate operating noise.

3.3 General Safety

Assessment and consideration must be given to the new rail corridor for this phase as it runs through both urban and rural areas. With rapid operating speeds and the potential quiet operation of an electric train this brings concern to the safety of those who may trespass on railway property. Evidence of trespassing was observed from discarded waste and tires tracks from frequent all terrain vehicle use along and across the track corridor in rural areas. In urban areas people were observed using the track as a walking path.

Fencing along the right of way should be assessed to prevent persons from accessing the rail corridor. But since fencing is not a fail-safe approach and cannot fully prevent access there should be a large public safety and awareness campaign ahead of the start of service and messaging should continue through various forms of local media including school rail safety campaigns. An allocation for fencing was included in the costing.

3.4 Track Operational Considerations

Determination of the route complete with operational requirements should completed first after which will be able to determine where turnouts and additional tracks would be required. Any locations that require a switch installation or additional tracks would then have to have plans developed to construct proper subgrades and drainage for the new components. The installation of additional turnouts or new track structure can take place at any time weather permitting but should occur before ballasting and surfacing so they can be included in the plan to achieve proper track alignment and profile. The turnouts should be of a size that allows maximum fluidity through the corridor at the desired operating speeds while maintaining passenger comfort and safety. New turnouts should be dual control allowing for remote operation by a rail traffic controller to establish the route prior to the arrival of the train.

Track and routing analysis will also determine what current in track turnouts and existing tracks are no longer needed. Once the routing of the line is established the required clearance envelope for train operation must then be assessed to identify any potential obstructions such as overhead lines or pole lines so plans can be started to remediate them.

Tracks and turnouts that are not required should be removed and any switch locations would then be required to be straight railed. The most efficient approach to straight railing old switch locations would be to make use of pre constructed track panels.

Additional support trackage may be required at key locations not only to support track inspection and maintenance work but also activities such as snow removal.

Prior to undertaking any track construction details of track maintenance responsibility will need to be in place between the various stakeholders. Expectation would be the owner of the track undertakes the actual capital and operating maintenance with the equipment operator(s) sharing the cost. However this is structured it will need to be executed in advance of any construction. Details of any agreement is beyond the scope of this report.

3.5 Drainage

Drainage features were difficult to observe at time of the inspection due to heavy bush and vegetation in many areas. A hydrotechnical study should be conducted on the drainage courses of the ditches adjacent to the rail line. Any necessary culvert upgrades and ditch profiling should take place prior to track construction/improvements.

3.6 Train Traffic Control

A method of control improvement should be contemplated online to not only enhance the safety of traffic management but also allow for better control of routing of the movements to streamline the service.

The suggested improvement would be an Advanced Train Dispatching System which involves addition of a track circuit and signaling to control traffic and block occupancy through signal indication and a method of control referred to as Centralized Traffic Control (CTC). CTC involves monitoring and control by a dispatcher from a central control office often referred to as the Rail Traffic Control (RTC) center.

Operating over track owned by different railways will require coordination to determine what is acceptable. A placeholder cost was included for traffic control infrastructure, discussions with all railway owners will be required to ensure the proposed system meets the needs of all railways.

4. Public Crossings

4.1 Overview

There are extensive requirements that must be achieved to align with the Transport Canada grade crossing regulations. Many of the crossings were observed to have no rail remaining running through the crossing surface and those that did were observed to have inadequate flangeway protection and poor surface. Utility locates will have to be done at all crossing locations and an assessment of the current infrastructure done. Plans will need to be developed to upgrade each crossing to meet the current requirements and the crossing material will have to be ordered as soon as the requirements have been determined. It has been realized that there are long lead times required to obtain some of the crossing technology components and to meet deadlines this portion should be started as soon as possible. Track structure when installed should have rails of adequate length to traverse the entire crossing and if this is not possible all rail joints should be welded at the time of installation to eliminate having joints within the road crossing and reduce potential for failure.

Due to the large associated cost of installing automated warning devices an assessment of crossing requirements should be undertaken as it was noted during the walking inspection that there may be a possibility of removing some crossings from service as crossing the rail track is not the only way to access a piece of land.

An active flashing lights, bell and whistle with gate (FLB+G) crossing protection system should be considered for each crossing along the route. The addition of advanced warning systems and cantilevered masts will be required were deemed necessary. The safety at each crossing is a shared responsibility of both the road authority and operating railway. Both parties will need to be in agreement on the proposed safety measures to be implemented at each location.

4.1.1 0+735 Lewis Drive

Lewis Drive is a public gravel road with rail still present through track with no flange protection. The track crosses the road at an angle with light curvature to the east and west side of the road. Sightlines are restricted in all quadrants due to adjacent material storage and heavy vegetation. There is a pole line that parallels the track on the north side, a communication line on the east side of the road and a service line to the west side of the road that crosses over the track. There is no crossing protection in place. Crossing closure should be considered given the limited use of the road and its close proximity to the Keltic Drive underpass 300m to the west.

Photo 5 - Lewis Drive

Road Speed	Railway	Mileage	Train Speed	Protection
50kph	CBNS (CN)	Mile 111.14 Sydney	25mph	None

4.1.2 1+105 Rose Street

Rose Street is a public paved road that starts at Kings Road to the east and splits provide access to four residential properties and a commercial property “OK Tire” to the west. There is no crossing protection in place. There is a steep descending grade off Kings Road and sightlines are minimally restricted southbound.

Photo 6 - Rose Street

Road Speed	Railway	Mileage	Train Speed	Protection
50kph	CBNS (CN)	Mile 111.40 Sydney	25mph	None

4.1.3 1+525 Advanced Glazings

Advanced Glazings has a gravel private crossing off an access road off Kings Road. The crossing is protected passively by a faded crossing and stop sign. There is a steep descending grade off Kings Road and sightlines are poor due to vegetation.

Photo 7 - Advanced Glazings Ltd.

Road Speed	Railway	Mileage	Train Speed	Protection
50kph	CBNS (CN)	Mile 111.60 Sydney	25mph	Stop sign

4.1.4 1+598 Imperial Oil

Imperial Oil has a gravel private crossing off an access road off Kings Road. The crossing is protected by an active flashing lights and bell warning system, a gate is also present east of the crossing. There is a steep descending grade off Kings Road and sightlines are poor due to vegetation.

Photo 8 - Imperial Oil

Road Speed	Railway	Mileage	Train Speed	Protection
50kph	CBNS (CN)	Mile 111.70 Sydney	25mph	FLB

4.1.5 3+650 Kings Road

Kings Road is a paved 4 lane undivided public crossing in Sydney. The crossing is located in the middle of an intersection with School Street to the east heading into a residential area and Newton Court to the west with residential properties along Sydney River that dead ends 150m west of the crossing. Sidewalks are present on both sides of Kings Road and several overhead power and communication lines run along the intersecting streets. The crossing is protected by an active cantilevered flashing lights and bell warning system on Kings Road and a flashing lights and bell warning system on School Street and Newton Court. Gates appear to have been removed from the cantilevered signal mast. The crossing is at a poor angle and sightlines are heavily restricted due to vegetation and adjacent properties.

Photo 9 - Kings Road

Road Speed	Railway	Mileage	Train Speed	Protection
50kph	CBNS (CN)	Mile 112.95 Sydney	25mph	FLB+G Cantilevered

4.1.6 3+965 Bentinck Street

Bentinck Street is a paved 2 lane public crossing in Sydney. The area is primarily residential with a park to the north along the water. The crossing is in close proximity to Crescent Street that heads west just north of the crossing and east just south of the crossing. Sidewalks are present on both sides of Bentinck Street and several overhead power and communication lines run along the intersecting streets. The crossing is protected by an active flashing lights and bell warning system. Stop signs are present on the adjacent Cresent Street. Sightlines are heavily restricted due to vegetation and adjacent properties.

Photo 10 - Bentinck Street

Road Speed	Railway	Mileage	Train Speed	Protection
50kph	CBNS (CN)	Mile 113.14 Sydney	10mph	FLB

4.1.7 4+188 George Street

George Street is a paved 2 lane public crossing in Sydney. The area is primarily residential with a park to the southeast. The crossing is in close proximity to Byng Avenue that heads west just north of the crossing. Sidewalks are present on both sides of George Street and several overhead power and communication lines run along the intersecting streets. The crossing is protected by an active flashing lights and bell warning system. Stop signs are present on the adjacent Byng Avenue. Sightlines are heavily restricted to the east due to vegetation and adjacent properties.

Photo 11 - George Street

Road Speed	Railway	Mileage	Train Speed	Protection
50kph	CBNS (CN)	Mile 113.28 Sydney	10mph	FLB

4.1.8 4+360 Brookland Street

Brookland Street is a paved 2 lane 2 track public crossing in Sydney. The area is primarily residential with commercial businesses in the northeast, southeast and southwest quadrants. Sidewalks are present on both sides of Brookland Street and several overhead power and communication lines run along the intersecting streets. The crossing is protected by an active flashing lights and bell warning system. Sightlines are restricted due to vegetation, adjacent fencing and properties.

Photo 12 - Brookland Street

Road Speed	Railway	Mileage	Train Speed	Protection
50kph	CBNS (CN)	Mile 113.39 Sydney	10mph	FLB

4.1.9 4+530 Townsend Street

Townsend Street is a paved 2 lane public crossing in Sydney. The properties adjacent to the crossing are industrial/commercial, with residential properties beyond. Sidewalks are present on both sides of Townsend Street and several overhead power and communication lines run along the intersecting streets. The crossing is protected by an active flashing lights and bell warning system with a cantilevered signal on the west side. Sightlines are restricted due to adjacent fencing and properties.

Photo 13 - Townsend Street

Road Speed	Railway	Mileage	Train Speed	Protection
50kph	CBNS (CN)	Mile 113.50 Sydney	25mph	FLB

4.1.10 4+948 Prince Street

Prince Street is a paved 4 lane public crossing in Sydney. The properties adjacent to the crossing are industrial/commercial. Sidewalks are present on both sides of Prince Street and several overhead power and communication lines run along the intersecting streets. The crossing is protected by an active cantilevered flashing lights and bell warning system with gate. Terminal Road intersects Prince Street though the angles track crossing with the west signal masts inline with Terminal Road. Sightlines are restricted due to adjacent properties and vegetation.

Photo 14 - Prince Street

Road Speed	Railway	Mileage	Train Speed	Protection
50kph	CBNS (CN)	Mile 0.09, off 113.78 Sydney	10mph	FLB+G Cantilevered

4.1.11 5+468 Inglis Street

Inglis Street is a paved 2 lane 2 track public crossing in Sydney. The properties adjacent to the crossing are primarily open fields and commercial. Sidewalks is present on the east side of Inglis Street and several overhead power and communication lines run along the intersecting streets. No crossing protection is present. Terminal Road intersects Inglis Street just north of the crossing. Sightlines are partially restricted due to adjacent property in the southeast quadrant and some minor vegetation.

Photo 15 - Inglis Street

Road Speed	Railway	Mileage	Train Speed	Protection
50kph	CBNS (CN)	Mile 0.50, off 113.78 Sydney	10mph	None

4.1.12 5+900 Inglis Street

Inglis Street is a paved 2 lane single track public crossing in Sydney. The properties adjacent to the crossing are primarily open fields and commercial. No crossing protection is present. Terminal Road intersects Inglis Street just north of the crossing. Sightlines are partially restricted due to adjacent property in the southeast quadrant and some minor vegetation.

Photo 16 - Inglis Street

Road Speed	Railway	Mileage	Train Speed	Protection
50kph	CBNS (CN)	Mile 0.77 off 113.78 Sydney	10mph	None

4.1.13 6+610 Crawford Crossing

Crawford Crossing is a paved 2 lane single track public crossing in Sydney. The track had been removed from the road and no crossing protection is present. The crossing location is in close proximity to the signalized intersection at Sydney Port Access Road which is just north of the crossing. Sightlines are clear around the crossing as open fields are present to the south and residential properties are north of Sydney Port Access Road. Given the close proximity to the 4 way signalized intersection, a specialized signal design may be required to ensure the track is protected from southbound cars. Cantilevered signals will likely be required. Triggering both the Lingan Road and Sydney Port Access Road crossing systems together may be required to secure the location when trains are passing.

Photo 17 – Crawford Crossing

Road Speed	Railway	Mileage	Train Speed	Protection
50kph	CBNS (CN)	Mile 1.21 off 113.78 Sydney	10mph	None

4.1.14 6+780 Sydney Port Access Road

Lingan Road is a paved 2 lane single track public crossing in Sydney. The track crosses at a severe angle due to the location of the Sydney Coal Railway that parallels just north of Sydney Port Access Road, resulting in the signal masts being over 80m apart. The crossing location is in close proximity to the signalized intersection at Lingan Road just west of the crossing. Sightlines are clear around the crossing as open fields are present to the south and residential properties are north of Sydney Port Access Road. Given the close proximity to the 4 way signalized intersection, a specialized signal design may be required to ensure the track is protected from southbound cars. Cantilevered signals will likely be required. Triggering both the Lingan Road and Sydney Port Access Road crossing systems together may be required to secure the location when trains are passing.

Photo 18 - Sydney Port Access Road

Road Speed	Railway	Mileage	Train Speed	Protection
50kph	CBNS (CN)	Mile 1.37 off 113.78 Sydney	10mph	FLB+G

4.1.15 10+359 Junction Road

Junction Road is a gravel single track private crossing east of Sydney. The properties adjacent to the crossing are primarily treed. The crossing is currently passively protected by a stop sign. Sightlines are not restricted from a stopped position but approaching sightlines are reduced due to vegetation.

Photo 19 - Junction Road

Road Speed	Railway	Mileage	Train Speed	Protection
50kph	SCRY	Mile 113.28 Sydney	10mph	Stop Sign

4.1.16 11+559 PowerStation Crossing

PowerStation Crossing is a future gravel single track private crossing east of Sydney. The properties adjacent to the crossing are treed. Nova Scotia Power is the only user as the road dead ends just north of the crossing. Crossing protection will be required. Terminal Road intersects Inglis Street just north of the crossing. Sightlines are restricted from an approaching and stopped position due to trees and vegetation.

Photo 20 - PowerStation Crossing

Road Speed	Railway	Mileage	Train Speed	Protection
50kph	N/A	TBD	TBD	None

4.1.17 12+500 Grand Lake Road

Grand Lake Road is a future paved 5 lane undivided public crossing in Sydney. The crossing is located east of Sydney. A sidewalk is present on the east side of the road and a quad trail parallels to the west with several overhead power and communication lines run along it. The crossing would likely require cantilevered FLB+G protection with advanced warning signs. Sightlines are poor due to trees and vegetation in all four quadrants.

Photo 21 - Grand Lake Road

Road Speed	Railway	Mileage	Train Speed	Protection
80kph	N/A	N/A	TBD	None

4.1.18 12+720 Bud's Speedway Crossing

Bud's Speedway is a future gravel single track private crossing east of Sydney. Bud's Speedway is located of the proposed track and access to the property will need to be maintained. The are is primarily treed with commercial properties nearby. Crossing protection will be required. Approach sightlines are restricted and sightlines should be clear.

Photo 22 - Bud's Speedway Crossing

Road Speed	Railway	Mileage	Train Speed	Protection
30kph	N/A	N/A	TBD	None

5. Bridges

5.1 Overview

Along the route there are three water crossing bridges and one roadway bridge. Assessments should be made of the current state of the bridges and plans made to upgrade any components that are deficient. As there could potentially be long lead times to procure material and develop design plans for these locations this step should begin in the early phases of construction planning. A detailed inspection should be performed on any bridge prior to returning it into operation.

5.1.1 Keltic Drive Underpass

The Keltic Drive underpass is located at Mile 110.95 on the Sydney Subdivision, and station 0+430. The bridge is a ballasted deck bridge with a walkway on the west wide. Fencing is present on both sides of the bridge. The bridge will require a detailed inspection prior to returning to operation.

Photo 23 - Keltic Drive Underpass

5.1.2 Irving Oil Bridge

The bridge is located near Mile 111.60 on the Sydney Subdivision, and station 1+543. The bridge is an ope bridge with a walkway on the west wide. Two culverts are present on the east side of the bridge that chann through it. The bridge deck is in poor condition and replacement would likely be required. Prior to undertaki remediation activity, a hydrology study should be completed to determine if a bridge fill and culvert installati be an option. Should this not prove feasible then a full detailed inspection is required to assess the extent o rehabilitation work to bring into operation.

Photo 24 - Irving Oil Bridge

5.1.3 Wentworth Park Bridge

The bridge is located near Mile 113.20 on the Sydney Subdivision, and station 4+087. The bridge is a ballast deck bridge. The bridge will require a detailed inspection prior to returning to operation.

Photo 25 - Wentworth Park Bridge

5.1.4 Muggah Creek Bridge

The bridge is located near Mile 0.05 on the Sydney Interchange off Mile 113.90 on the Sydney subdivision a station 4+845. The bridge was lifted off it's foundation due to frequent damming that occurred resulting in th backing up through town. The bridge will require a full redesign and replacement to allow proper operation c creek below. The current top of rail approach profile will allow some room to raise the approach grades to in clearances over the water below.

Photo 26 - Muggah Creek Bridge

6. Utilities

6.1 Overview

As with many railway right of ways in Canada, utility companies will have crossings that pass through as well as have parallelisms within, both types under agreement between the railway company and the utility owner. These crossings, overhead and underground are governed by Transport Canada (TC) regulations with respect to their technical installation requirements.

Utility investigation was limited to overhead impacts visible at time of the inspection. A detailed assessment of all utility crossings will be required in the next phase.

6.2 Wire – Overhead

6.2.1 Crossings

During the site inspection numerous overhead crossings were observed. Expectations are that when initially installed they would have been with operated track in place and as such met the TC requirements. Prior to start of operations each utility owner will need to be contacted and advised of the new operation. Any track reprofiling will need to take into account the crossing locations with respect to overhead clearances.

Overhead crossings were primarily observed at public road crossings.

Sydney Power has multiple overhead lines crossing near station 11+560 that will require modifications.

Photo 27 - Overhead Lines

6.2.2 Parallelisms

There is a section of right of way located in the CBU segment without track that has a high voltage hydro line occupying one side of the old track embankment. Reintroducing track in this location will require offsetting the track alignment from the center of the right of way, securing additional property or moving the poles. Construction cost for this segment will be higher than average for new construction.

6.3 Wire – Underground

Similar to overhead wire crossings there is an expectation that communication cable, either copper or fiber cross the right of way. Agreements will also cover these crossings occupying the right of way. Addition or modification of track in proximity of fiber lines will involve substantially more effort than the copper lines due to the fragile nature of fiber.

6.4 Pipe Crossings

Public utility pipe crossings should have signs just to the outside of the right of way on both sides of a crossing and therefore be easy to locate. These signs should indicate the name of the pipe owner who can then be contacted regarding the terms of their agreement should their lines require track work above their location.

7. Battery Powered Rail Equipment

7.1 Background

The purpose of this report is to convey potential electric rail passenger vehicles for the CBU feasibility study to provide a zero emissions light passenger rail service between Sydney Nova Scotia and Cape Breton University utilizing some of the existing standard gauge rail network and further developing the network in phases to eventually service areas of North Sydney, Glace Bay and New Waterford.

It should be noted that the estimated costs that are provided in this report are a high order of magnitude estimate based on contract award information that was provided to AECOM from potential suppliers. Furthermore the cost estimates were adjusted for currency exchange for contract values studied that occurred outside of Canada and adjusted for inflation based on the date of the contract. It must be understood that there are many factors that potentially could affect the costs of acquisition for equipment of this nature such as and not limited to:

- Market variability in costs of raw materials
- Changes to inflation pertaining to acquisition costs
- Quantity of vehicles ordered
- Quantity of car bodies per train
- Layout of floor plan of the car bodies and any extra amenities such as phone charge stations or advertising screens.
- Additional goods and or services that may be added to the acquisition of the rail vehicles.

Based on previous discussion with DMDE and AECOM members this report will look at two possible companies for provision of passenger vehicles; Siemens and Alstom. Both companies offer a wide range of customizable options such as size of consist, floor plan layout and custom finishes to make the vehicle unique to the region or city it serves.

7.2 Siemens

A global technology company that is focused on industry, infrastructure, mobility and healthcare Siemens has a Canadian headquarters in Oakville Ontario. Approximately 4200 Canadian employees work in the 33 office and production facilities that are located coast to coast. However most light rail and locomotive manufacturing for Siemens in North America is located in California.

Siemens is capable of supplying mobility solutions in the electric light rail passenger area but has limitations when it comes to sharing a line of rail with freight traffic which in the case of the CBU project portions of the rail network will be shared with the Sydney Coal Railway that operates unit train coal freight service from the Sydney International Coal Pier to the Lingan Coal fired Generating Station located just east of New Waterford. In addition, there is the possibility that freight traffic could also be present on the Sydney Subdivision in the future.

For safety and regulatory reasons passenger rail vehicles that share the line with freight must meet strict crash worthiness ratings and be capable of withstanding a buff load of 800,000lbs just to cite one of the criteria.

It is this requirement that places a large limitation for the offerings that Siemens can provide for and takes away from what would be an economical solution. Siemens has a variety of light rail passenger solutions but all are

limited to environments where the passenger service remains in a closed loop system and does not have interoperability with freight trains. However the one solution that was tabled in discussions with company representatives would be to utilize a push pull style of consist that would require an electric battery powered locomotive to move the consist and be on the leading end. This locomotive would have the crash worthiness rating to share infrastructure with freight but is not the same style of power such as a cab control car that has an operator station combined with a portion of the seating for riders to make up the consist.

Acquisition of the locomotive high order of magnitude cost estimates are approximately 16-20 million CAD depending on the desired make up of the drive and battery/catenary system and the number of axels on the locomotive (4 or 6 axel models available). The passenger car bodies would then carry a separate acquisition cost and switching would have to take place to ensure the locomotive was the leading piece of equipment unless two locomotives were utilized, one for each end of the consist.

Figure 2: Siemens ACS-64 Battery/Electric Bi-Directional Locomotive

7.3 Alstom

Alstom's headquarters for the Americas Region is based in St-Bruno, Quebec. The company has been present in Canada for over 80 years, in the areas of naval and rail transport, power generation and power transmission. In 2015, Alstom went back to its roots and refocused all its activities on mobility. After the acquisition of Bombardier Transportation in January 2021, Alstom has become the reference partner for Canada in terms of mobility and the lead private rail operator in North America.

Alstom carries a large Canadian presence and is the only rail vehicle supplier with manufacturing facilities located in Canada such as Kingston and Thunder Bay, Ontario, La Pocatiere, Quebec and a prototype center in Saint-Bruno-de-Montarville, Quebec.

Alstom does carry a product line that is capable of interoperability with freight traffic known as the Adessia model commuter train. In discussions with Alstom representatives a comparable contract press release was provided for cost estimates but it should be noted it is not the Adessia model. High order of Magnitude rough cost estimates are approximately 17-20 million CAD for a three car consist which would be made up of a cab control car on each end with a seating capacity of 71 seats per car and a trailer car in the middle with 81 seats with a total capacity of 223. There is a large possible variability in consist make up from 2-10 cars and car design can be customized for seating arrangements and could even include café, sleeper or restaurant cars. Battery operation depending on operational

conditions can range up to 60 miles and there are integrated charging solutions available such as regenerative braking systems or a small portion of catenary or between the rail charge strips that allow the unit to take on short durations of charging during passenger entraining and detraining.

Benefit of Alstom is there is an opportunity to support made in Canada and the number of additional services that can be supplied by Alstom corporate vail range from Station design, charge infrastructure solutions, ticketing, maintenance packages and training, operator training, dispatching and traffic control just to name a few.

Figure 3: Typical Alstom Equipment

Figure 4: Seat Arrangement

Figure 5: Interior Configuration

7.4 Equipment Selection

While there are several types of charging methods possible for the train, only overhead catenary systems are considered for this report as it is the most common type utilized on passenger trains. A discussion with the supplier will help establish what the best solution for this project.

Most units can accommodate accessibility need such as wheelchair access, as well as support users need for bicycle storage.

It should be noted that heavily customizing a specific passenger unit with a low volume order will result in a higher cost per unit. Production lead time can vary depending on the type of unit and features requested. The supplier may provide alternative options based on larger production orders in the queue which could help accelerate procurement time.

8. Costing

The purpose of the track infrastructure review was to provide a list of major items that were visible at time of the walking inspection along the proposed route and forecast the mediation efforts required to put the track into service. This review is limited to the track structure only and excludes land acquisition, subsurface investigations as well as operating requirements beyond a basic track structure.

A breakdown of the major items identified as part of this investigation can be found in Appendix B.

Subsequent detailed inspection, design and operational reviews may identify items beyond what was identified as part of this report.

9. Summary and Conclusion

Overall the track in the CBNS segment is in fair condition. Given the track has been out of service a track for so long, a maintenance program will be required to ensure proper track structure and geometry. All areas will require bush and vegetation clearing to the property limits and a drainage review should be completed once all areas are clear. All bridges will require a detailed inspection prior to resuming operations.

The Sydney Coal main track segment was in fair condition, the second track north of Sydney Port Access Road was in poor condition and it would be best to make use of the mainline from the CBNS connection to just east of Grand Lake.

The old tramway section required bush clearing and drainage improvements prior to constructing track.

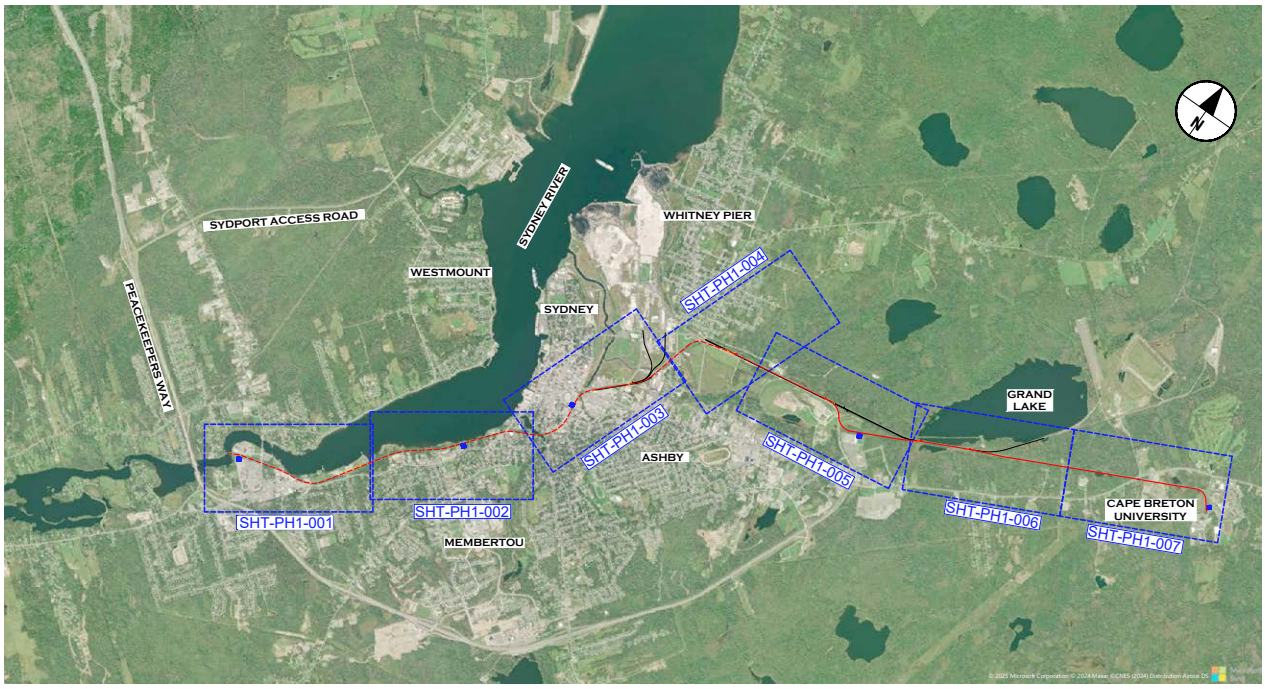
An utility review will be required to ensure vertical clearances are maintained and adequate protection exists for any line under the old tramway.

It is recommended that each crossing over the route be protected with a FLB+G crossing system plus fencing be installed given the visible high rate of people utilizing the right of way as a walking path.

The findings of the walking track inspection to reestablished track service along the route results in an estimated cost of around $35,000,000 over a total route length of 13.6 kms.

Alstom, a North American Equipment Manufacturer, and AECOM, have had high level preliminary discussions which have resulted in them being the current recommended equipment supplier. These discussions have suggested that two passenger trains and accompanying charging and train control system are estimated to be around $43,500,000. It should be noted that heavily customizing a specific passenger unit with a low volume order will result in a higher typical cost per unit which is reflected in this estimate. Production lead time can vary depending on the type of unit and features requested. The supplier may provide alternative options based on larger production orders in the queue which could help accelerate procurement time.

Appendix A. Route Map

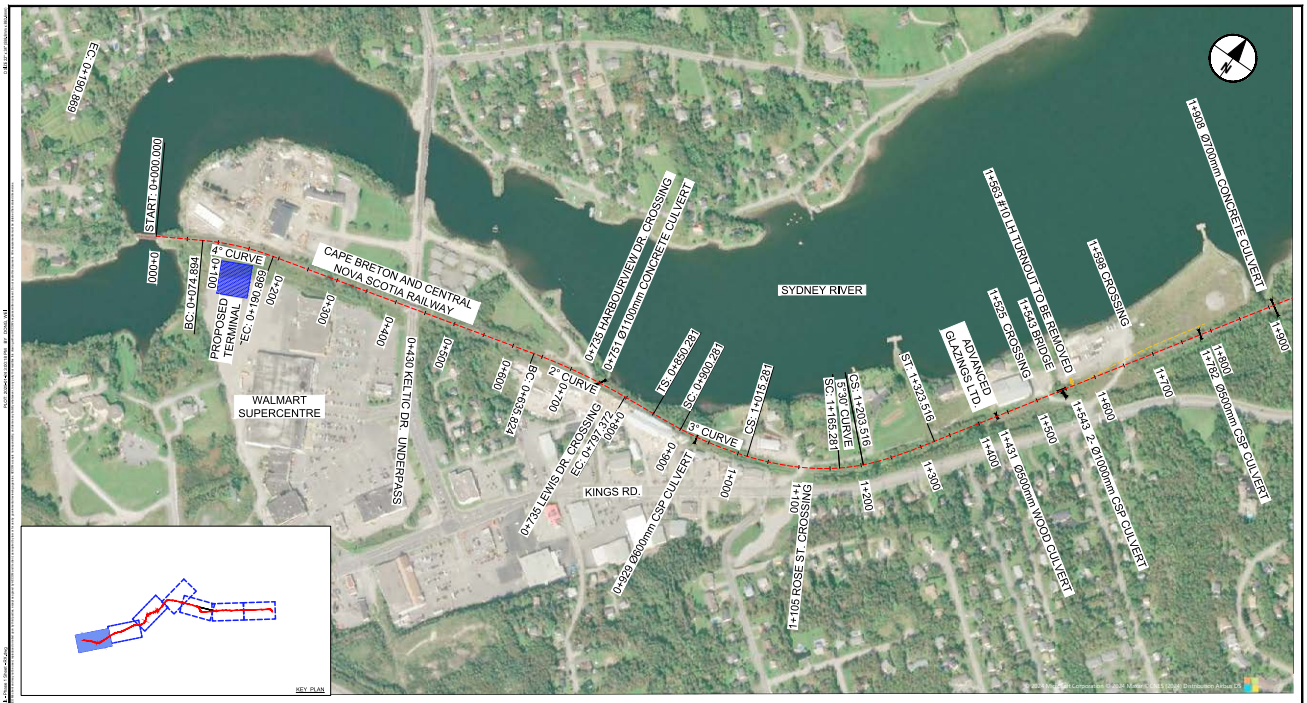


PLAN

LEGEND
PHASE 1 PROPOSED TRACK
PHASE 1 EXISTING TRACK
EXISTING TRACK REMOVAL
EXISTING TRACK
PROPOSED TERMINAL

AECOM

CBU
TRACK INFRASTRUCTURE REVIEW
PHASE 1
OVERALL PLAN
AECOM Project # 60729925
FIGURE SHT-000



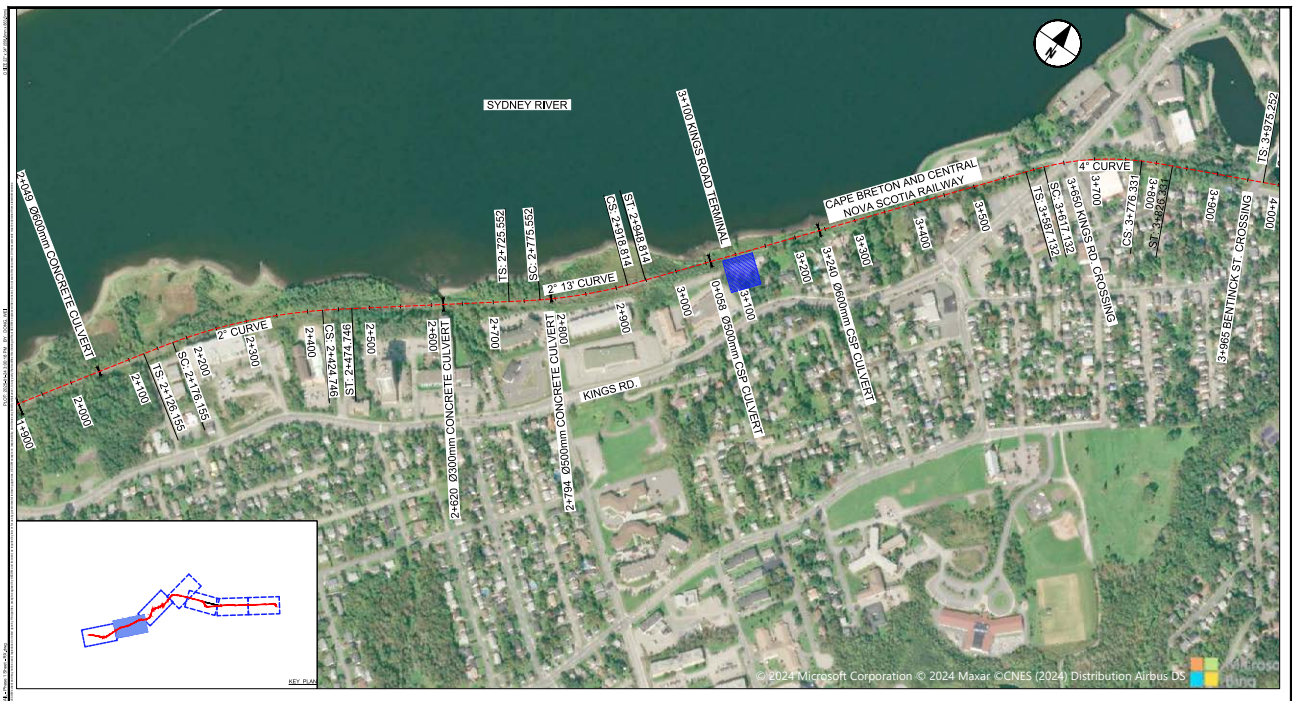
PLAN

LEGEND

- PHASE 1 PROPOSED TRACK
- PHASE 1 EXISTING TRACK
- EXISTING TRACK REMOVAL
- EXISTING TRACK
- PROPOSED TERMINAL

AECOM

CBU
TRACK INFRASTRUCTURE REVIEW
PHASE 1
PLAN
STA. 0+000 TO STA. 1+900
AECOM Project # 60729925
FIGURE SHT-001



PLAN

LEGEND

- PHASE 1 PROPOSED TRACK
- PHASE 1 EXISTING TRACK
- EXISTING TRACK REMOVAL
- EXISTING TRACK
- PROPOSED TERMINAL

AECOM

CBU
TRACK INFRASTRUCTURE REVIEW
PHASE 1
PLAN
STA. 1+900 TO STA. 4+000
AECOM Project # 60729925
FIGURE SHT-002

PLAN

LEGEND

- PHASE 1 PROPOSED TRACK
- PHASE 1 EXISTING TRACK
- EXISTING TRACK REMOVAL
- EXISTING TRACK
- PROPOSED TERMINAL

AECOM

CBU
TRACK INFRASTRUCTURE REVIEW
PHASE 1
PLAN
STA. 4+000 TO STA. 6+100
AECOM Project # 60729925
FIGURE SHT-003

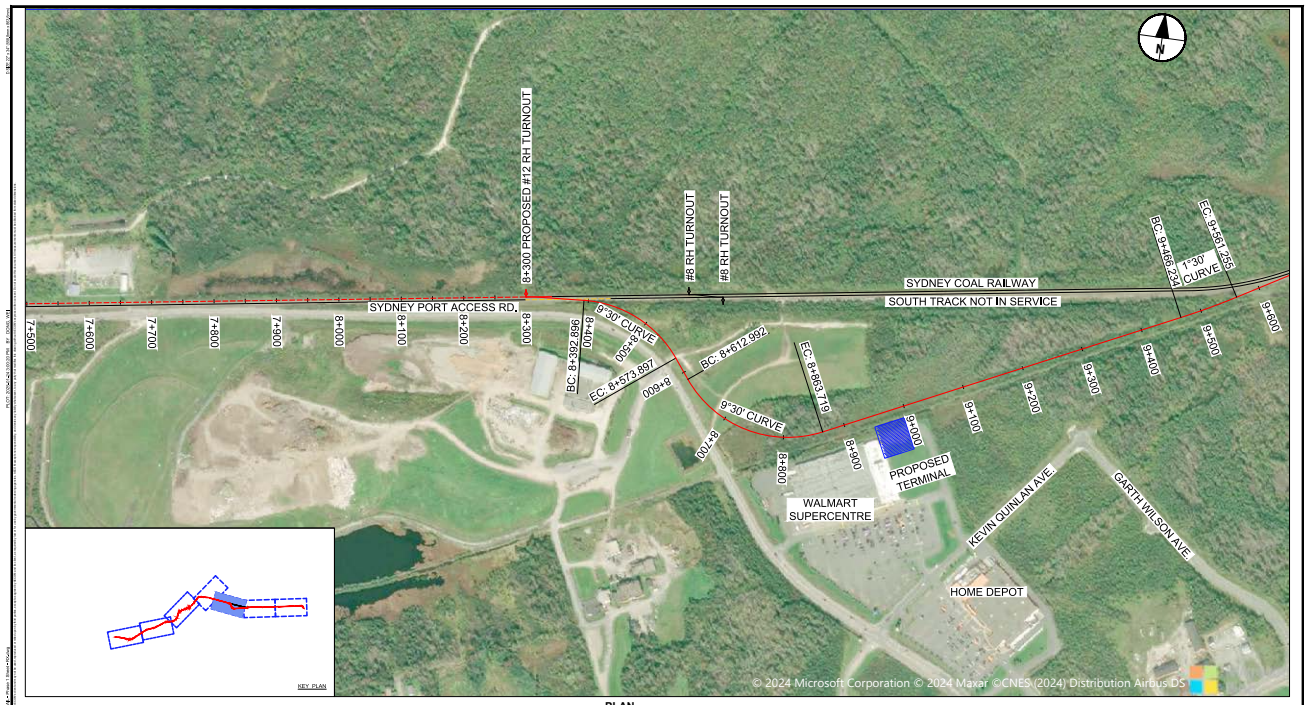
PLAN

LEGEND

- PHASE 1 PROPOSED TRACK
- PHASE 1 EXISTING TRACK
- EXISTING TRACK REMOVAL
- EXISTING TRACK
- PROPOSED TERMINAL

AECOM

CBU
TRACK INFRASTRUCTURE REVIEW
PHASE 1
PLAN
STA. 6+100 TO STA. 7+020
AECOM Project # 60729925
FIGURE SHT-004



PLAN

LEGEND

PHASE 1 PROPOSED TRACK
PHASE 1 EXISTING TRACK
EXISTING TRACK REMOVAL
EXISTING TRACK
PROPOSED TERMINAL

AECOM

CBU
TRACK INFRASTRUCTURE REVIEW
PHASE 1
PLAN
STA. 7+500 TO STA.9+500
AECOM Project # 60729925
FIGURE SHT-005

PLAN

LEGEND

PHASE 1 PROPOSED TRACK
PHASE 1 EXISTING TRACK
EXISTING TRACK REMOVAL
EXISTING TRACK
PROPOSED TERMINAL

AECOM

CBU
TRACK INFRASTRUCTURE REVIEW
PHASE 1
PLAN
STA. 9+500 TO STA.11+500
AECOM Project # 60729925
FIGURE SHT-006

PLAN

LEGEND

- PHASE 1 PROPOSED TRACK
- PHASE 1 EXISTING TRACK
- EXISTING TRACK REMOVAL
- EXISTING TRACK
- PROPOSED TERMINAL

AECOM

CBU
TRACK INFRASTRUCTURE REVIEW
PHASE 1
PLAN
STA. 11+500 TO STA.13+384
AECOM Project # 60729925
FIGURE SHT-007

Appendix B. Costing

CBU Track Infrastructure Review
Feasibility Study
Summary

AECOM

Project No. 60729925
Revised 2025-01-20

No.	Item	Quantities Amount	Unit	Unit Cost	Total Cost	Comments
Section 1: Track and Grading						
1.01	Clear Right of Way	1	LS	$700,000	$700,000	
1.02	CBNS Track Ballasting	6,500	m	$90	$585,000	
1.03	CBNS Track Rehab	6,500	m	$80	$520,000	
1.04	CBNS Track Line and Surface	6,500	m	$35	$227,500	
1.05	CBNS New Segment Grade and Track Construction	600	m	$1,500	$900,000	
1.06	New Segment Grade and Track Construction	4,700	m	$1,700	$7,990,000	
1.07	Station Track	4	Each	$650,000	$2,600,000	Double end connected.
1.08	#12 Turnout	2	Each	$300,000	$600,000	
1.09	#20 Turnout	2	Each	$400,000	$800,000	
1.10	Maintenance tracks	2	Each	$400,000	$800,000	
1.11	Fencing	10,900	m	$180	$1,962,000	
				Section 1 Total	**$17,684,500**	
Section 2: Crossings						
2.01	0+735 Lewis Drive	1	LS	$50,000	$50,000	Closure
2.02	1+105 Rose Street	1	LS	$900,000	$900,000	FLB&G
2.03	1+525 Advanced Glazings Ltd	1	LS	$900,000	$900,000	FLB&G
2.04	1+598 Irving Oil	1	LS	$900,000	$900,000	FLB&G
2.05	3+650 Kings Road	1	LS	$1,500,000	$1,500,000	Cantilevered FLB&G, additional masts.
2.06	3+965 Bentinck Street	1	LS	$900,000	$900,000	FLB&G
2.07	4+188 George Street	1	LS	$900,000	$900,000	FLB&G
2.08	4+360 Brookland Street	1	LS	$900,000	$900,000	FLB&G
2.09	4+530 Townsent Street	1	LS	$900,000	$900,000	FLB&G
2.10	4+948 Prince Street	1	LS	$900,000	$900,000	FLB&G
2.11	5+468 Inglis Street	1	LS	$900,000	$900,000	FLB&G
2.12	5+900 Inglis Street	1	LS	$900,000	$900,000	FLB&G
2.13	6+610 Lingan Road	1	LS	$1,200,000	$1,200,000	Cantilevered FLB&G
2.14	6+780 Sydney Port Access Road	1	LS	$1,200,000	$1,200,000	Cantilevered FLB&G
2.15	10+359 Junction Road Private Crossing	1	LS	$900,000	$900,000	FLB&G
2.16	11+559 Powerstation Crossing	1	LS	$900,000	$900,000	FLB&G
2.17	12+500 Grand Lake Road	1	LS	$1,400,000	$1,400,000	Cantilevered FLB&G with advanced warning
2.18	12+720 Speedway Crossing	1	LS	$900,000	$900,000	FLB&G
				Section 2 Total	**$17,050,000**	
Section 3: Drainage & Structures						
3.01	Bridge 1 Keltic Drive	1	LS	$70,000	$70,000	Detailed assessment and minor rehab.
3.02	Bridge 2 Irving Oil	9	M^2	$30,000	$270,000	Replacement with Culvert
3.03	Bridge 3 Wentworth Park	1	LS	$70,000	$70,000	Detailed assessment and minor rehab.
3.04	Bridge 4 Muggah Creek	30	M^2	$45,000	$1,350,000	Bridge Replacement
3.05	Culvert/Drainge allowance	1	LS	$2,000,000	$2,000,000	Culvert allowance
				Section 3 Total	**$3,760,000**	
Section 4: Utilities						
4.01	Power Station Crossing	1	LS	$400,000	$400,000	Review ongoing
4.02	Utility Relocations	1	LS	$1,000,000	$1,000,000	Placeholder
				Section 3 Total	**$1,400,000**	
Section 5: Passenger Train						
5.01	Passenger Train	2	Each	$20,000,000	$40,000,000	Note: pricing can vary.
5.02	Overhead catenary charging stations	2	Each	$800,000	$1,600,000	
5.03	Traffic Control system	1	LS	$2,000,000	$2,000,000	
				Section 3 Total	**$43,600,000**	
				Grand Total	**$78,334,500**	

Notes

- Estimate is in CDN$
- Nature of operations and costs may vary through subsequent design and re-planning based on the final operating plan.
- Design and Construction costs not included in items above.
- Operating and maintenance equipment not reviewed as part of the report.
- Underground utitlities not assessed.
- These cost estimates represent AECOM's best judgment in light of its experience and the knowledge and information available to AECOM at the time of preparation. Since AECOM has no control over market or economic conditions or bidding procedures, AECOM cannot make any guarantees or warranties with respect to such estimates or opinions, and accept no responsibility for any loss or damage arising therefrom.

CBU Light Rail Transit Business Case

atn strategies

Cape Breton University

Table of Contents

1 Executive Summary

This report enumerates the business case for a proposed Light Rail Transit (LRT) system within Cape Breton Regional Municipality (CBRM), presenting it as a strategic solution to the Region's increasing public transportation needs as well as an investment in the future of its residents. This initiative is set against a backdrop of significant ridership growth —a 430% increase in five years—a trend primarily driven by the burgeoning student population at Cape Breton University (CBU). These dynamics underscore a pivotal shift in public transit perception and utilization, evolving from a mere "choice of last resort" to a favored option for a more diverse user base.

Building on the encouraging outcomes of a Pre-Feasibility Study by DMDE Engineering, this business case leverages insightful stakeholder engagement and an extensive background and case study research conducted by ATN Strategies. Through a series of strategic dialogues involving municipal authorities, business leaders, federal and provincial officials, and community representatives, the study assimilates diverse perspectives to refine the LRT business case, highlighting its potential economic, social, and environmental impacts.

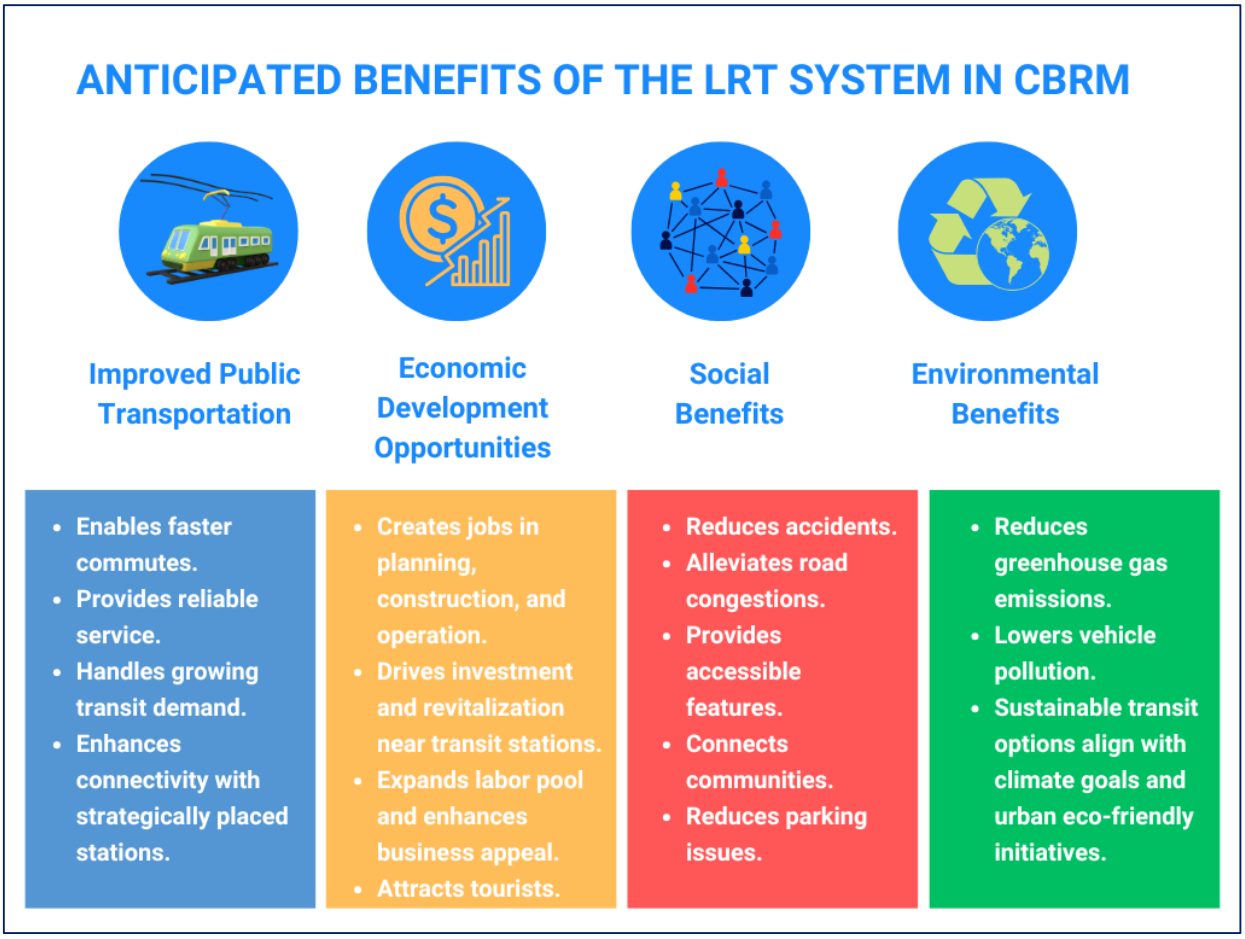
Economically, the LRT system promises to be a catalyst for growth by creating jobs in the planning, construction, and operational phases. The introduction of the system is expected to spur transit-oriented development around station areas, thereby enhancing property values and attracting new business investments. This infrastructure could revitalize underutilized neighborhoods, transforming them into thriving economic hubs that enhance CBRM's overall competitiveness.

Socially, the LRT system will enhance public accessibility, particularly benefiting vulnerable communities by offering an efficient, safe and reliable transportation alternative. This improved mobility can potentially expand employment opportunities and reduce transportation-related barriers. Environmentally, the shift from personal vehicular use to public transit is anticipated to result in a significant reduction in greenhouse gas (GHG) emissions, aligning with broader sustainability goals. Importantly, the LRT system will also alleviate parking issues – most notably in downtown areas.

Figure 1: Design of the Proposed LRT Main Terminal

While the report acknowledges potential barriers, it also outlines strategic approaches to proactively mitigate challenges. Such measures are crucial in ensuring the project's viability, sustainability and to secure long-term support.

The potential benefits of the CBRM LRT are significant – ranging from social, environmental and economic. An overview of the business case is presented below and detailed within the body of the report.



In conclusion, the LRT system is posited as a transformative infrastructure investment, reimagining public transit's role in supporting CBRM's sustainable urban growth. By aligning modern urban planning principles with the community's economic and environmental objectives, the proposed LRT system stands to significantly enhance the Region's transit landscape, fostering a more interconnected, inclusive, and sustainable future for its residents.

2 Context

Cape Breton Regional Municipality (CBRM) has witnessed a dramatic surge in public transportation usage in recent years that outpaces the growth of most urban transit operators in Canada, with annual passenger volumes rising from 300,000 to some 1.3 million over just five years. This substantial growth is largely attributed to the student population, especially international students attending CBU. There are no indications

that such growth will loose momentum as CBU and Nova Scotia Community College (NSCC) are expanding[1]. This upward trend has bolstered demand for reliable transit services while transforming public transportation into a necessity rather than a "choice of last resort" for a community with a strong car culture.

Recognizing the need for sustainable and efficient urban transit solutions, authorities are considering an LRT system to accommodate the municipality's growing needs. DMDE Engineering conducted a Pre-Feasibility Study to better understand potential LRT implications. Building upon promising early findings, DMDE Engineering commissioned ATN Strategies (ATN) to engage key stakeholders, community members, and prospective partners to investigate the business case for an electric GO Train system in CBRM.

3 Case Study Research and Analysis

As part of the feasibility study, ATN leveraged secondary research to profile and analyze relevant case study targets to guide the development of the LRT business case. This exercise profiled selected regions on the current state of their LRT system, historical considerations, critical success factors, future planning and aspirations, challenges, and sustainability. critical success factors, implementation challenges, lessons learned, best practices followed, and final outcomes. By analyzing these case studies, the study aims to identify trends, patterns, and lessons learned that can inform the design, implementation and operation of the CBRM LRT system.

3.1 Overview of Case Study Findings

This section summarizes insights and lessons learned from the case study analyses of five cities in North America and Europe. A comprehensive report is provided in **Appendix A**.

The Region of Waterloo stands out for its strategic use of the ION LRT to drive Transit-Oriented Development (TOD). By concentrating residential and commercial growth around transit hubs, the region enhanced accessibility and stimulated investment. Additionally, strategic station placement prioritized areas with high demand, such as business districts and residential hubs, which helped establish strong ridership from

[1] CBU is, for instance, opening a medical school in 2025, and NSCC already inaugurated a new campus on Sydney Waterfront.

the outset. A unified fare system across various transit modes further simplified passenger experience, boosting transit use. These practices suggest that CBRM could replicate TOD strategies and streamline its fare systems to create a more efficient and appealing transit network. Moreover, the phased implementation of the ION allowed the Waterloo Region to test its system, adapt to community needs, and expand over time. CBRM could also begin with a core network of high-priority stations, monitoring demand and gradually scaling the system based on performance and ridership patterns, avoiding overbuilding while focusing on sustainable growth.

Edmonton offers lessons in its semi-metro design, which blends dedicated right-of-way, street-level tracks, and underground sections. This mix improves reliability and reduces congestion, an approach well-suited to urban environments like CBRM's. Edmonton's integration of transit expansion with broader urban planning exemplifies how strategic alignment can create sustainable growth. The city also employs flexible service frequencies to match demand, which CBRM could emulate to balance costs with quality service. Edmonton's challenges, such as inflationary pressures, underline the importance of proactive financial planning for large-scale infrastructure projects.

Calgary's CTrain system thrives on strong accessibility, supported by a well-coordinated feeder network of buses and parking facilities. Although it doesn't directly connect to the airport, the system bridges the gap with integrated bus services. Stations are optimally spaced to balance speed and coverage, while green-powered trains reinforce environmental priorities. Extensive safety protocols, including peace officer patrols, CCTV, and improved lighting, address security concerns, enhancing rider confidence. CBRM should consider Calgary's blend of connectivity, sustainability, and safety when designing its transit network.

Buffalo's LRT struggles underscore the importance of demographic alignment and technological modernization. Buffalo faces challenges, including declining ridership, increased car ownership, and a rise in ride-hailing trends. CBRM can learn from these issues by projecting population and assessing user demographics to future-proof its transit system. While Buffalo's fare-free zone was innovative, harsh winter weather reduced its viability, emphasizing the importance of weather-adapted station designs. Student passes and tailored fare policies could improve accessibility. Learning from Buffalo's challenges can help CBRM ensure its transit investments remain relevant and attractive year-round.

Lund, a smaller Swedish city, demonstrates how LRT can be used to enhance sustainable urban growth and support cutting-edge research facilities Lund's emphasis on connectivity, including seamless transitions between trams, buses, and cycling infrastructure, supports a cohesive transit ecosystem. The city's foresight in leveraging existing Bus Rapid Transit (BRT) routes as precursors to its LRT demonstrates a practical path for scalable transit development. Furthermore, Lund's investment in sustainable infrastructure highlights the role of green transit solutions in attracting environmentally conscious investments, a strategy CBRM could adopt to enhance its appeal.

3.2 Case Study Take-Aways for CBRM

For CBRM's proposed transit system, eight key considerations are critical for successful implementation and long-term sustainability, including:

1. **Funding and Financial Planning:** A robust funding model should explore partnerships with municipal, provincial, and federal governments, as seen in other cities like Calgary, where provincial government contributions played a significant role (49%).
2. **Governance and Oversight:** Establishing clear governance and oversight structures will ensure streamlined decision-making, accountability, and effective management of the transit system over time.
3. **Integration with Urban Development:** Transit-Oriented Development (TOD) is a proven model for driving growth. It is important to adopt TOD strategies to align transit with urban intensification and sustainable growth.
4. **Understanding User Demographics:** Aligning with the user demographic is equally important, as transit needs vary among residents, students, and workers. Targeted fare policies, like student passes and annual senior discounts, could increase accessibility and inclusivity.
5. **Scalability and Adaptability:** Taking a phased and scalable approach, as seen in Waterloo's incremental LRT development and Lund's evolution from Bus Rapid Transit (BRT) to LRT, will allow CBRM to test and adapt its system over time. This ensures the transit infrastructure evolves to meet changing community needs and technological advancements.

6. **Sustainability and Connectivity:** Green-powered trains and a seamless integration of bus, cycling, and pedestrian networks can position CBRM as an environmentally conscious and modern transit region. These elements also attract investments and support livable urban environments.
7. **Security and Public Confidence:** Security is vital to building public trust and increasing ridership, necessitating the integration of officers, surveillance systems, and lighting at stations to ensure both perceived and actual safety.
8. **Weather-Adapted Design:** Weather conditions must be factored into station and system design to ensure year-round usability, particularly in winter-heavy regions.
9. **Safety:** Both train operations and increased safety on highways with reduced traffic.

These considerations together can help CBRM develop a transit model that meets community needs while fostering regional development.

Across these case studies, **common lessons** emerge. One of the most significant take-aways is the importance of managing the cost of building and maintaining LRT infrastructure, especially in cities facing budgetary constraints. Another challenge is ensuring consistent ridership, particularly in regions with strong car cultures. Weather conditions also could affect service reliability and ridership, underscoring the need for climate-resilient infrastructure. A key lesson from these cities is the importance of aligning LRT projects with broader urban planning and sustainability goals. Whether it's supporting TOD in Waterloo or fostering economic regeneration in Buffalo, LRT can be a powerful tool for shaping urban development. However, success requires a well-integrated approach that includes supportive policies, community engagement, and long-term financial commitment.

In conclusion, while LRT systems can drive significant benefits in terms of economic development, sustainability, and quality of life, they require careful planning and ongoing investment to realize their full potential. Each city's experience offers valuable insights into how LRT systems can be tailored to meet specific urban needs, providing lessons for other municipalities considering similar projects.

4 Stakeholder Engagement

A comprehensive stakeholder engagement was conducted to inform the feasibility study of an LRT in CBRM. In collaboration with the DMDE project team ATN engaged key partners and stakeholders in bilateral and small-group interviews. This section of the report summarizes the insights generated through these conversations. The insights are organized around themes and capture perceptions about the project, its benefits, opportunities, and potential challenges. Stakeholders consulted included:

- Municipal officials
- Business leaders
- Economic development and business support organizations
- Federal and provincial officials
- Community and environmental organizations
- Post-secondary education leaders; and
- Elected officials.

The insights gathered from these sessions are summarized thematically below.

4.1 Key Findings

The engagements facilitated input from community leaders, transportation experts and provincial officials to provide a comprehensive overview of stakeholders' perspectives on the proposed LRT system's potential. Findings are organized under key themes that emerged from the discussions. Topics include support for the proposed project, perceived benefits of the project, and challenges and considerations as the proposal advances. Key takeaways are summarized below. A comprehensive report is available in **Appendix B**.

- **Community and Regional Support**
  - Strong community support exists for the LRT, driven by the potential for improved public transit to reduce reliance on personal vehicles.
  - The LRT is seen as an opportunity to transform CBRM's identity from a historically industrial region to one aligned with environmental sustainability.
- **Economic and Urban Development Benefits**
  - The LRT is expected to act as a catalyst for economic growth by improving access to retail and employment hubs, potentially

invigorating local businesses and increasing tourism with strategically located stations.
    - Enhanced connectivity may spur residential and mixed-use developments, alleviating housing pressures and supporting transit-oriented community growth.
- **Public Transit and Connectivity Enhancements**
    - Stakeholders view the LRT as a critical upgrade needed for the current transportation infrastructure, particularly in high-demand corridors.
    - Integration with existing bus services is essential to create a cohesive and efficient public transit network.
- **Environmental and Social Benefits**
    - The LRT could significantly reduce vehicular emissions, contributing to improved air quality and alignment with climate change initiatives.
    - The LRT system may increase mobility, making it easier for people to reach destinations that are within walking distance, thereby encouraging more physical activity as individuals are likely to choose to walk to nearby services. Additionally, the provision for carrying bicycles or scooters on the trains enhances this effect, as passengers can combine different modes of transportation – both active and public - to reach their final destinations, promoting independence and a more active lifestyle.
    - Enhancing accessibility for students and seniors, the LRT is expected to provide a more inclusive transportation option, with interchangeable (bus and train) fares.
    - The LRT is also expected to help reduce road accidents by reducing the number of personal vehicles on the road, as well as alleviating parking pressures in the downtown core.
- **Challenges and Considerations**
    - Funding is a substantial challenge with competing municipal priorities, requiring a strategic financial plan involving multiple funding sources.
    - Achieving community buy-in and shifting away from a car-dependent culture will require robust public awareness and incentive programs.
    - There will be a need to recruit a skilled workforce for the LRT's operations, necessitating partnerships with educational institutions and government training programs.
    - Monitoring immigration policies to anticipate population growth and

5 Ridership Projections

CBRM is in the midst of a transformation in its public transit landscape, driven by burgeoning ridership and infrastructure enhancements. The transit system has become an essential service, particularly for the growing international student population at CBU, resulting in an upsurge in annual ridership.

As a cautionary note, changes in immigration policies or reductions in international student visas could impact transit demand, particularly on key routes like Glace Bay-CBU-Sydney. Such fluctuations highlight the need for transit planning that considers variability in ridership, ensuring long-term financial and operational stability. Diversifying transit funding sources and expanding service appeal beyond student populations could mitigate these risks and provide a more stable foundation for the system's growth. However, given the LRT project's 2.5 to 3-year implementation timeline to become operational, challenges linked to immigration are expected to be mitigated by anticipated relaxations in federal immigration policies, which could increase the pool of international students and temporary workers in the Region, while further boosting ridership.

The proposed LRT system is poised to revolutionize transportation within the Region. This initiative would integrate LRT with bus networks to create a streamlined transit experience, with Phase 1 of the LRT set to operate along key routes with high passenger demand, such as the Glace Bay-CBU-Sydney corridor. The project envisions using satellite terminals to enhance connectivity and optimize transit operations.

The two following sub-sections discuss the current transit system and demand projections for the LRT in CBRM.

5.1 Current CBRM Transit System and Ridership

The transit system in CBRM has experienced remarkable growth, largely fueled by the increasing number of international students attending CBU. This demographic shift has contributed to passenger usage soaring from approximately 300,000 users five years ago to 1.3 million annually by 2024, representing a four fold increase. Such a significant rise underscores the impact of CBU's student base, transforming the transit system from a "last resort" option into a mainstream choice for many. The

highlighting its importance in the network. Further, more and more people from the CBRM community are turning towards public transit as buses become more frequent and gas prices increase.

To meet the demand, the Glace Bay-CBU-Sydney route is serviced from 6 a.m. to 11 p.m. with four buses, each accommodating between 50 to 70 passengers, reflecting steady patronage even during non-peak hours due to the varied schedules of students engaged in work and study.

Figure 2: A bus in CBRM

The current transit landscape, while thriving, presents financial challenges for CBRM. The system is heavily reliant on general revenues, subsidizing 80% of transit costs with farebox revenues covering about 20%. Additionally, legislative changes mandating the purchase of electric buses impose sizable costs. The introduction of six electric buses, priced at approximately $700,000 each, pushes the investment in modern transit vehicles and associated infrastructure, such as a maintenance facility, to $56 million—a cost partially offset by federal funds. Despite these challenges, CBRM remains committed to enhancing its transit offerings, with plans to integrate rail systems to expand hub-and-spoke services, thereby increasing connectivity.

Ridership of the public transit system in CBRM soared from 300,000 to approximately 1.3 million users in 5 years, putting significant strain on the existing bus system. The Proposed LRT could attract a significant portion of those riders to alleviate pressure on the bus services.

5.2 LRT Demand Projections

Phase 1 of the proposed LRT system in CBRM is designed to address the substantial demand along the Glace Bay-CBU-Sydney corridor, which currently makes up half of total transit ridership. This route is heavily traveled by CBU students who primarily rely on public transportation as well as commuters living outside the Sydney core. Phase 1 includes the corridor from Sydney River Walmart to downtown Sydney to acknowledge this heavily traveled transit route. Covering a 14.96-kilometer section (two-way), this initial phase has five terminals/stops strategically utilizing semi-dormant rail corridors to improve transit efficiency while alleviating crowding issues experienced by the bus transit system. By integrating the LRT with the current bus network, the system is expected to attract a significant share of current bus passengers travelling along the Sydney-CBU-Glace Baycorridor, while generating incremental LRT -induced demand. As an example, if the LRT attracted 40% of the roughly 650,000 bus passengers on the corridor and an additional 50,000 'new' passengers, LRT's annual ridership would total 310,000 or almost 1,200 daily riders. This would significantly alleviate pressure on bus services.

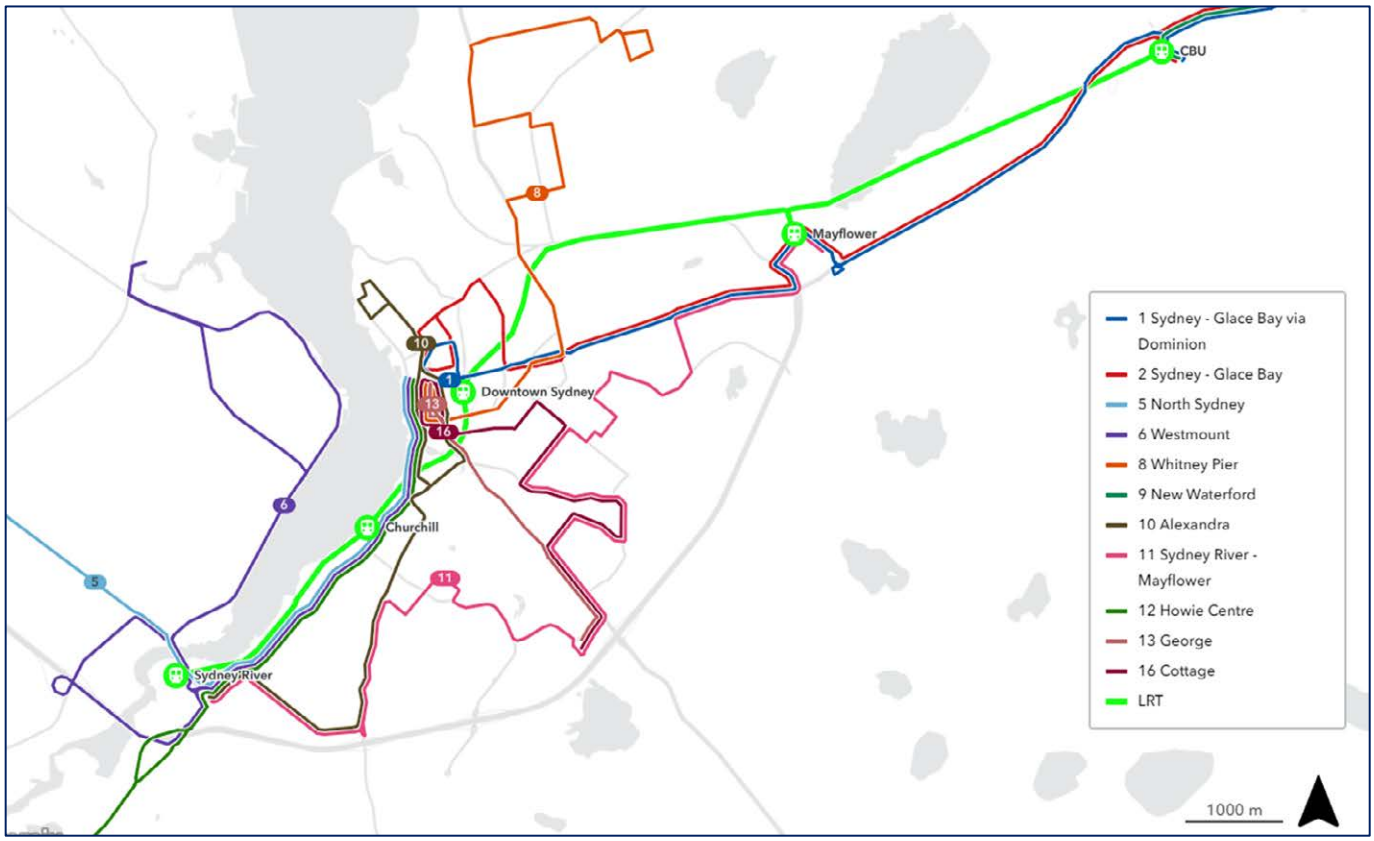


Figure 3: Proposed Route for Phase 1 of the CBRM LRT Transit

Integration with existing bus services is key to maximizing the LRT's impact on transit operations within CBRM. Fare integration will ensure seamless transfers, allowing the bus network to be restructured around the LRT. This will involve redirecting key bus routes as feeder lines to LRT stations, eliminating route duplication along the LRT corridor, and improving overall network connectivity. The restructuring will enhance service to outlying areas and optimize the use of resources, with buses serving as connectors from less populated regions to the LRT stops. This strategic shift will not only help in meeting the increasing transit demand but will also contribute to more efficient public transportation, promoting sustainable urban development in the Region.

6 Business Case for an LRT in CBRM

Investing in LRT is a forward-thinking decision that provides significant benefits over a 50-year horizon and beyond. LRT systems are built with durability and longevity in mind, utilizing infrastructure designed to withstand decades of heavy use. This makes them an ideal solution for municipalities seeking sustainable, long-term transportation options. Unlike bus systems, which require frequent vehicle replacements, or road expansions that degrade over time, LRT tracks and vehicles are engineered to deliver reliable service over generations, ensuring consistent value for the investment. As CBRM experiences urban development and population growth, a modern LRT system has the potential to address key mobility challenges while positioning the Region for long-term sustainable growth. This business case outlines the strategic value of the LRT initiative, focusing on its multi-faceted benefits and the critical considerations for successful implementation.

Investing in an LRT is a forward-thinking decision that provides significant benefits over a 50-year horizon and beyond. LRT systems are built with durability and longevity in mind, utilizing infrastructure designed to withstand decades of heavy use.

The methodology of this section draws from the multiple lines of evidence employed through this project including case study research and analysis (**Appendix A**), stakeholder engagement (**Appendix B**), and a range of authoritative secondary resources such as *Trains, Buses, People: An Opinionated Atlas of US and Canadian Transit*[2] and other leading transportation planning resources.

An improved public transportation system is a cornerstone of this Business Case. An LRT system will provide efficient, reliable, and sustainable mobility solutions, improving connectivity between key areas within CBRM. By offering a viable alternative to car-dependent commuting, the LRT will alleviate congestion, reduce travel times, and enhance the quality of life for residents. Furthermore, this enhanced transit infrastructure will serve as a catalyst for economic development, attracting

[2] Spieler, Christof. *Trains, Buses, People: An Opinionated Atlas of US and Canadian Transit*. Island Press, 2021.

businesses, boosting tourism, and unlocking investment opportunities in both urban and surrounding areas.

The LRT project also could bring significant social and environmental benefits. It supports equitable access to services, employment, and education, particularly for underserved populations. Environmentally, the shift from car-dominated travel to a cleaner, more energy-efficient transit system will contribute to reducing GHG emissions and fostering a greener CBRM. Through a comprehensive analysis, this section aims to guide stakeholders in realizing the transformative potential of LRT in CBRM.

6.1 Improved Public Transportation

Generally speaking, effective public transportation means faster commutes and lower emissions, which is crucial for creating livable communities. The introduction of an LRT system in CBRM has the potential to revolutionize public transportation and setting a foundation for a sustainable and efficient mobility network.

The speed of LRT systems is a significant advantage. By bypassing traffic and operating on designated corridors, LRT vehicles can offer shorter travel times compared to buses operating on congested roadways. This makes them particularly effective for medium- to long-distance commutes, reducing overall travel times and increasing the appeal of public transit over private car use. Faster transit options encourage higher ridership, easing pressure on road networks and improving overall mobility for the Region.

Reliability is nearly as important to transit users as travel time. Light rail is also known for its ability to provide frequent, on-time service, which is a critical improvement over traditional bus systems, often subject to delays from traffic congestion and route deviations. With dedicated tracks and right-of-way infrastructure, LRT systems maintain a consistent schedule, fostering trust among users who can plan their commutes with confidence. This reliability is essential for attracting commuters who prioritize punctuality, particularly for work or school-related travel. To make these advantages effective, Phase 1 of the proposed LRT will have two trains to ensure redundancy and reliability.

Capacity is another advantage as the LRT is designed to accommodate significantly more passengers than buses. This scalability is crucial in urban areas experiencing population growth, where existing bus services might struggle to keep pace with increasing demand. High-capacity vehicles and frequent service intervals mean LRT systems can move large numbers of people efficiently, even during peak hours, making public transit a viable option for a broader segment of the population.

Furthermore, LRT can improve accessibility and integration within a region's transportation network. Stations are often strategically located to serve densely populated areas, employment centers, and key urban nodes, creating seamless connections between neighborhoods and city hubs. These stations also serve as multimodal transit points, linking with bus routes, pedestrian pathways, and bike-sharing systems. This comprehensive connectivity fosters a more cohesive transit ecosystem that supports diverse mobility needs.

"Building transit takes decades of planning and delivery. That's why we need a permanent transit funding mechanism now. So that we can continue to invest in transit projects that move more people more efficiently, boost the local economy, and help cities meet their environmental goals."

6.2 Economic Development Opportunities

The development of an LRT system in CBRM holds huge potential to stimulate economic growth in the Region by creating new opportunities for businesses, industries, and communities. One of the most immediate economic benefits comes from the jobs generated during the planning, construction, and operation of the system. From civil engineers, skilled trades and construction workers to administrative staff, transit operators, and maintenance personnel, LRT development supports a wide array of employment opportunities, bolstering local economies.

Beyond direct job creation, LRT systems are powerful catalysts for economic development in areas surrounding transit stations. Known as **transit-oriented development** (TOD), this phenomenon drives investment in residential, commercial, and mixed-use developments near stations, transforming them into vibrant economic hubs. Developers are drawn to the improved accessibility provided by LRT, which increases property values and attracts businesses seeking proximity to reliable public transportation. This can lead to the revitalization of underutilized or declining areas, turning them into thriving neighborhoods.

LRT systems also provide an advantage for businesses by improving access to a larger labor pool. Reliable and efficient transit allows workers from various parts of the region to reach employment centers quickly, reducing the barriers posed by transportation limitations. This expanded accessibility not only benefits employers by widening their potential workforce but also makes the region more attractive to investors and companies considering relocation. Improved mobility is often cited as a key factor in site selection decisions, making CBRM more competitive in attracting new businesses
.

From a taxpayer standpoint, the long lifespan (50 years and beyond) of LRT infrastructure makes it attractive economically. Although initial construction costs can be substantial, the operational savings and indirect benefits accrue over time, offsetting the upfront expenditure. Once established, LRT systems require less ongoing maintenance compared to road networks, which face continuous wear from heavy traffic.

What's more, tourism, a vital sector for the Region, could also benefit from the implementation of the LRT system upon completion of subsequent phases. Improved transit options would enhance the visitor experience by providing tourists with an easier way to navigate the area without relying on cars. By connecting key attractions, accommodations, and cultural sites, an LRT network can encourage longer stays and greater exploration, thereby boosting tourism revenue.

While the initial construction costs of an LRT can be substantial, the operational savings and indirect benefits accrue over time, offsetting the upfront expenditure.

6.3 Social Benefits

The implementation of the LRT systems can enhance social well-being across CBRM. Key social benefits of the LRT system include improved safety, reduced traffic congestion, enhanced accessibility and inclusivity, while strengthening community connectivity. These benefits collectively contribute to a more sustainable and integrated urban environment, making CBRM not only more efficient but also a more enjoyable place to live.

6.3.1 Safety

The LRT system enhances public safety in several ways, making it a crucial component of urban mobility. Rail systems operate on dedicated tracks, separating them from regular vehicular traffic and significantly reducing the likelihood of accidents compared to buses or cars navigating shared roadways.

Modern LRT systems are also equipped with advanced safety technologies, such as automated braking systems, signaling, and passenger monitoring, which minimize the risk of collisions and other transit-related incidents. The infrastructure surrounding LRT systems, such as well-lit stations and clearly marked pedestrian crossings, further contributes to public safety. These features create safer environments for commuters and pedestrians, especially in high-traffic urban areas.

Additionally, the presence of transit staff at stations and onboard LRT vehicles provides an added layer of security, deterring criminal activity and ensuring that passengers feel safe throughout their journey.

6.3.2 Traffic Congestion and Parking Pressures

Another visible social benefit of LRT systems is the capacity to alleviate traffic congestion and parking pressures.

By providing an efficient alternative to personal vehicles, LRT reduces the number of cars on the road, which can significantly ease congestion during peak hours. This improvement in traffic flow benefits not only public transit users but also drivers, as less crowded roadways lead to shorter travel times and reduced stress for all commuters. In the case of CBRM, parking pressures in downtown Sydney could also be alleviated.

6.3.3 Enhanced Accessibility and Inclusivity

LRT systems are designed with accessibility and inclusivity in mind, ensuring that all members of the community can benefit from improved public transit. Features such as level boarding, elevators, tactile paving for visually impaired passengers, and spaces for wheelchairs and strollers make LRT systems highly accessible for individuals with mobility challenges.

> "Access to transportation is essential in building an inclusive and thriving community."
> *--Amanda McDougall-Merrill, Former Mayor of CBRM*

Additionally, LRT systems are often more inclusive compared to other forms of transit

because they attract a diverse range of riders, from low-income residents who depend on public transit to higher-income individuals who might otherwise avoid buses. This increased ridership can have a positive impact on existing transit users: the growth of rail transit systems can lead to increased demand for bus services and increasing funding for services as well.

6.3.4 Community Connectivity

LRT systems strengthen community connectivity by linking neighborhoods, employment centres, and cultural hubs. These connections foster a greater sense of belonging and integration within the region, as residents can easily travel for work, education, or leisure without facing significant transportation barriers. By reducing travel times and increasing access to essential services, LRT systems contribute to a more cohesive and connected community.

6.4 Environmental Benefits

The LRT systems provide significant environmental benefits, particularly in reducing GHG emissions and improving air quality.

Electric-powered LRT vehicles are more sustainable than traditional diesel buses or personal cars, as they produce minimal direct emissions. By replacing a portion of car traffic with an efficient, clean mode of transportation, LRT systems can lower overall emissions in urban areas. This aligns with regional and global climate goals, including commitments to reducing carbon footprints and promoting sustainable urban development.

LRT systems also contribute to environmental sustainability by decreasing traffic congestion and the associated emissions from idling vehicles. By providing an efficient alternative to personal car use, LRT systems help reduce the number of vehicles on the road, leading to a significant drop in both localized and regional air pollution.

6.5 Funding and Investment Considerations

Public transit funding typically relies on a combination of local, provincial, federal, and sometimes private sources, with distinct challenges and opportunities in operational and capital cost financing.

6.5.1 Operating Cost Considerations

Operating costs for transit systems are often funded at the local level, through mechanisms such as sales taxes, property taxes, or user fees. In some regions, toll revenue from bridges or highways supports transit operations. In the U.S. and Canada, federal funding is generally designated for capital projects rather than operations and often requires matching contributions from local governments, typically at a 50% level. Smaller and mid-sized transit agencies tend to depend more heavily on federal funding due to limited local revenue streams.

Fares contribute to operating budgets, typically covering 20-50% of costs in systems with high ridership. They can also manage demand, for instance, by charging peak-time fares to distribute usage. However, excessive reliance on fares may deter low-income riders, impacting equity and accessibility.

6.5.2 Expanded Considerations

To supplement operational funding, some transit agencies explore creative approaches such as partnerships with local businesses benefiting from transit access. Additionally, advertising within transit systems and sponsorships for stations or vehicles can provide modest but consistent revenue streams. These auxiliary income sources are particularly valuable for offsetting operational deficits without placing additional strain on passengers or local taxpayers.

6.6 Potential Challenges to be Addressed in Next Stage Planning

While developing an LRT system for CBRM offers numerous benefits, it also presents challenges that must be addressed in the next stages of planning to ensure feasibility, sustainability, and community acceptance.

Securing adequate funding and investment for the project is anticipated to be a challenge, although not insurmountable. LRT systems require significant upfront capital for planning, land acquisition, construction, and the purchase of rolling stock. Fortunately, much of the infrastructure, such as land and tracks, is already in place in CBRM. Identifying reliable funding sources—whether through federal and provincial grants, public-private partnerships, or municipal budgets—will be critical. Additionally, long-term operational funding must be considered to ensure the system remains functional without placing an undue burden on taxpayers or fare-paying passengers.

Figure 4: Overview of the Existing Tracks Crossing Sydney River

Integrating the LRT system with existing infrastructure and transportation networks may pose another challenge. The construction of stations and other facilities in all Phases as well as supplementary tracks in subsequent phases may conflict with existing roadways, utilities, or natural features. Proper planning and stakeholder engagement will be necessary to navigate these challenges while identifying solutions that minimize disruption while maximizing the efficiency of the LRT system.

Community acceptance and public support for the LRT project will be crucial for its success. Some residents may express concerns over potential noise, construction disruptions, or changes to property values. Transparent communication, public consultations, and active involvement of local communities in the planning process can help address these concerns, fostering greater acceptance for the project.

consideration. While the LRT system itself is eco-friendly, the construction phase can temporarily disrupt ecosystems, lead to increased emissions, and produce waste. These impacts need to be carefully assessed, with mitigation measures implemented to minimize adverse consequences. An environmental scoping review is being conducted separately to address these aspects of the proposed LRT.

Technical feasibility and design complexity add to the planning challenges. The system must account for CBRM's weather conditions, and potential ridership demands. Designing routes that balance accessibility with efficiency will require detailed ridership forecasts and traffic studies. Additionally, identifying and adopting appropriate technologies for operations and maintenance, such as electrification and automated systems, will require in-depth evaluation.

Finally, long-term operational sustainability is a critical consideration for all LTR systems. CBRM's LRT system must not only attract sufficient ridership to justify its costs but also to operate efficiently for decades to come. Issues such as fare structures, maintenance, and potential competition with other modes of transportation must be addressed during the planning phase to ensure the system remains economically and socially viable.

7 Conclusion

The analysis of the business case for the LRT system in CBRM presents a compelling vision for transformative urban development and sustainable transit solutions. As a long-term investment into the future of CBRM, the proposed LRT system emerges as a strategic infrastructure initiative poised to deliver multifaceted benefits across economic, social, and environmental domains.

Economically, the introduction of an LRT system is expected to not only create direct employment opportunities through its construction and operation but also serve as a catalyst for broader regional development. By encouraging transit-oriented development (TOD), the LRT can transform surrounding areas into vibrant economic zones, thereby attracting new commercial investments

> The proposed LRT system is not merely a transportation upgrade but a long-term investment into CBRM's future, with the potential to redefine regional connectivity and quality of life.

and increasing property valuations. This urban revitalization strategy has the potential to unlock latent economic capacities within CBRM, driving growth and innovation.

Socially, the LRT system provides a critical service that enhances safety, mobility and equitable access across the municipality. By offering a reliable, safe and efficient transit option, it helps dismantle existing transportation barriers that disproportionately affect vulnerable communities. Improved accessibility and safety mean broader participation in economic opportunities, essential services, and social activities, contributing to enhanced quality of life and community well-being.

From an environmental perspective, the shift towards public transit marked by the LRT system is poised to reduce GHG emissions, decrease traffic congestion, and align with the Region's goals for sustainability. LRT represents a commitment to sustainability, reflecting CBRM's proactive stance in championing environmental stewardship.

Acknowledging the challenges inherent in launching such an ambitious project—such as securing funding and garnering widespread community support—the report advocates for a phased implementation strategy complemented by ongoing stakeholder engagement. By ensuring transparent communication and collaborative decision-making, community buy-in can be strengthened, thereby smoothing the path towards project realization.

Ultimately, the LRT system is presented not merely as a transportation upgrade but as a pivotal investment in CBRM's future, with the potential to redefine regional connectivity and quality of life. By fostering a more interconnected, inclusive, and environmentally conscious community, the LRT system is envisioned as a cornerstone of CBRM's urban planning and development strategy, delivering lasting impacts that extend well beyond the transit sector.

Appendix A: Case Studies Analysis Findings

This case study report profiles five light rail transit (LRT) systems: Waterloo, Edmonton, Calgary, Buffalo, and Lund. Each case highlights distinct approaches to urban transit, addressing specific economic, environmental, and social goals. These LRT projects illustrate both successes and challenges in integrating new infrastructure into the urban landscape. The findings emphasize the multifaceted role of LRT systems, not just as transit solutions but as tools for sustainable urban development and economic growth.

Waterloo serves as an example of a smaller metropolitan area investing in LRT to manage rapid urban growth. The ION LRT system is credited with supporting transit-oriented development (TOD), increasing property values along the rail corridor, and attracting new businesses and residents. A key lesson from Waterloo is the importance of aligning transit infrastructure with urban planning goals. The ION LRT has helped curb sprawl by encouraging development in designated growth areas.

In **Edmonton**, the LRT has been instrumental in connecting key urban and suburban areas, promoting economic growth, and increasing accessibility to employment centers. Edmonton's experience demonstrates the importance of continuous investment in transit infrastructure to meet the demands of a growing population.

Calgary highlights the role of LRT in shaping regional growth and reducing car dependency. The city's C-Train system, one of North America's busiest LRT systems, plays a critical role in managing suburban sprawl and reducing carbon emissions. Calgary's success lies in its integration of LRT with extensive bus services and TOD projects. The city has effectively used LRT to connect residential areas with employment hubs, fostering a transit-oriented lifestyle.

Buffalo presents a case of an aging LRT system that has played a role in revitalizing the city's downtown. The Metro Rail, though smaller in scale, has been key in promoting economic development in Buffalo's urban core. While the system has contributed to the city's recovery from industrial decline, it also underscores the challenge of maintaining older infrastructure and the difficulties of expanding an established network in a city with a shrinking population base.

Lund, a smaller Swedish city, demonstrates how LRT can be used to enhance sustainable urban growth and support cutting-edge research facilities. The Lund

tramway, designed to serve both residential areas and key institutions like the European Spallation Source (ESS), highlights the role of LRT in promoting eco-friendly development and reducing carbon emissions. The city's success is rooted in its comprehensive planning and integration of LRT with cycling and pedestrian infrastructure.

Across these case studies, several common challenges emerge. One of the most significant is managing the cost of building and maintaining LRT infrastructure, especially in cities facing budgetary constraints. Another challenge is ensuring consistent ridership, particularly in regions with strong car cultures. Weather conditions also could affect service reliability and ridership, underscoring the need for climate-resilient infrastructure.

A key lesson from these cities is the importance of aligning LRT projects with broader urban planning and sustainability goals. Whether it's supporting TOD in Waterloo or fostering economic regeneration in Buffalo, LRT can be a powerful tool for shaping urban development. However, success requires a well-integrated approach that includes supportive policies, community engagement, and long-term financial commitment.

In conclusion, while LRT systems can drive significant benefits in terms of economic development, sustainability, and quality of life, they require careful planning and ongoing investment to realize their full potential. Each city's experience offers valuable insights into how LRT systems can be tailored to meet specific urban needs, providing lessons for other municipalities considering similar projects.

8 Introduction

In response to the growing need for sustainable and efficient urban transportation solutions, DMDE Engineering has commissioned ATN Strategies to develop a comprehensive business case for an electric GO Train light rail transit (LTR) system in the Cape Breton Regional Municipality (CBRM). This initiative builds upon the promising results of the Pre-Feasibility Study previously conducted by DMDE Engineering. As part of this effort, ATN Strategies is leveraging a multi-faceted approach to profile and analyze relevant case study targets to guide the development of the Go Train business case.

This document profiles selected regions on the current state of their LRT system, historical considerations, critical success factors, future planning and aspirations, challenges, and sustainability. critical success factors, implementation challenges, lessons learned, best practices followed, and final outcomes. By analyzing these case studies, the study aims to identify trends, patterns, and lessons learned that can inform the design and implementation of the Go Train system in CBRM. This comparative analysis will provide valuable insights and recommendations to guide the development of an effective and sustainable rail transit solution for the region.

This section summarizes insights and lessons learned from the case study analyses to be leveraged in the CBRM Business Case, including:

- Background
- Global Trends and Emerging Innovations
- Success Factors
- Common Challenges
- Social Considerations and Societal Impacts; and
- Lessons Learned.

9 Methodology

The case study analyses relied on an extensive review of secondary research from a variety of sources, including media, academic literature, government resources, trade publications, advocacy groups and respected institutes (e.g., Brookings, Conference Board, Public Policy Alternatives, Canadian Centre for Public Policy). The search terms used in the secondary research are outlined in Appendix A.

Case Study Candidate Selection Criteria

The following criteria were considered in selecting candidates for the case study analyses to ensure high-value targets to best inform the Business Case and Ridership Analysis.

- **Geographic:** The geographic size of CBRM is a consideration as is the dispersed population in both urban and rural settings.
- **Ridership Profile:** The resident and economic composition of CBRM are important considerations. Early research suggests CBRM ridership would likely be comprised of domestic and international students, commuters, marginalized residents, shoppers, and people attending health care appointments, among other travel purposes.
- **Population:** Population size is another important consideration. While we have identified 30 light and 38 commuter rail systems in North America, they tend to be in the larger urban areas. The smallest cities in North America with light rail are Waterloo (pop. 524,000) and Winnipeg (pop. 778,000). While the European candidates are comparable in population, their local rail systems tend to connect to national and pan-European rail networks; and
- **Access to Information**: While ATN boasts a fluent French speaker, accessing information is typically more challenging in non-English speaking jurisdictions. We have attempted to mitigate this challenge by proactively reaching out to Canadian Trade Service offices in France, Spain and Sweden, although we have yet to receive material guidance.

Based on the above criteria, the following five regions were selected for case study analysis:

- Waterloo, ON
- Edmonton, AB
- Calgary, AB
- Buffalo, NY; and
- Lund, Sweden.

10 Waterloo, ON: ION LRT

10.1 Local Context

The Region of Waterloo is spread over seven municipalities, including the cities of Waterloo, Kitchener and Cambridge. This Region, with a 2021 population of 587,165 and an estimated growth to 673,910 by the end of 2023, is a thriving community in the heart of southwestern Ontario [i] Waterloo is strategically positioned, and conveniently connected to major highways leading to London, Stratford, Niagara, and the Greater Toronto Area.

Transportation options are robust and include the Grand River Transit (GRT), which serves the municipalities of Kitchener, Waterloo, Cambridge, Elmira, St. Jacobs, and New Hamburg, offering a range of services including ION light rail, an express bus network, conventional buses, busPLUS for community routes, and MobilityPLUS, a door-to-door service for riders with disabilities.[ii]

Figure 1: ION train at Central Station. Photo Credit: Grand River Transit

The ION Light Rail Transit (LRT)system is a significant step in improving transportation infrastructure and accessibility within this region and beyond. Notably, it is the smallest metropolitan area by population in North America with its own rail transit line. The rail investment spurred an unprecedented urban transformation in Waterloo, rapidly leading to condo developments along the route. By the ION's launch, Waterloo became Canada's second fastest-growing community, driven by over $2 billion in core investment.[iii]

LRT is core to the Region's ambitious master plan for sustainable mobility to create a one urban area, from the three cities, which includes the cities of Cambridge, Kitchener

and Waterloo, and to increase the attractiveness of this Technological Triangle of Canada, a region recognized for its strong innovation ecosystem, thriving tech sector, and advanced manufacturing industries.

10.2 Overview of Infrastructure and Service

In 2014, the Region of Waterloo, with a population of 550,000, was the fourth-largest community in Ontario and the 10th-largest in Canada. To address the challenges of suburban sprawl and single-occupancy car travel, the construction of the ION LRT began in 2014, following initial utility relocation work that started in late 2013.[iv]

The cost of the ION LRT includes several components. Capital costs for building the system amounted to $818 million, funded by the Government of Ontario ($300 million), the Government of Canada ($265 million), and the Region of Waterloo ($253 million).

GRANDLINQ

GrandLinq is comprised of Plenary Group Canada; Meridiam Infrastructure Waterloo; Aecon; Kiewit; Mass Electric Construction Canada; Keolis; STV Canada Construction and CIBC World Markets.

GrandLinq, a consortium responsible for designing, building, and maintaining the system, contributed to this budget with a total capital cost of $593 million, which includes intersecting public infrastructure works projects, like King Street and Northfield Drive rehabilitation.[v]

The ION LRT service was initially expected to begin in 2017, delays in the manufacture and delivery of rolling stock pushed the launch to June 2019.

As of 2024, the ION LRT spans a 19 km network with 19 stations. Approximately 22% of the region's population lives within walking distance (800 meters, roughly ten minutes) of the LRT, which is the Central Transit Corridor (CTC) that connects these stations in a continuous corridor. The ION LRT connects the cities of Kitchener and Waterloo, starting and ending at the region's two largest shopping malls. In between, it runs through both downtowns (Downtown Kitchener and Uptown Waterloo), two universities, a major hospital, and several neighborhoods.[vi]

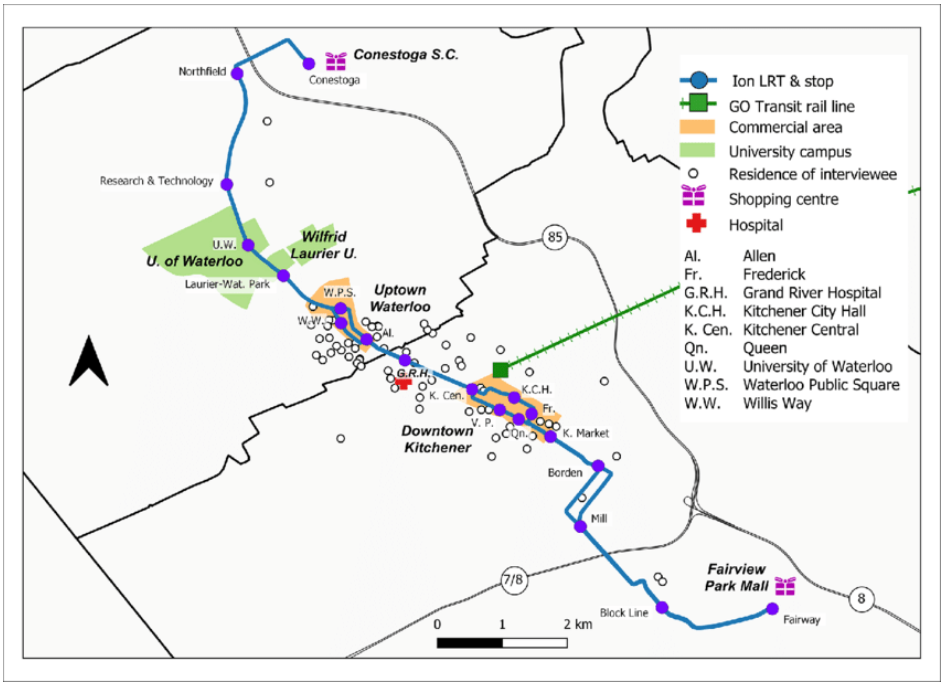


Figure 2: Kitchener/Waterloo and the ION LRT line. Source: From "Big Small Town" to "Small Big City": Resident Experiences of Gentrification along Waterloo Region's LRT Corridor

This ION LRT system consists of 15 accessible, low-floor electric light rail vehicles (LRVs), each approximately 32 meters in length, accommodating 60 seated passengers and over 140 standing passengers. The ION is in service between 5 am and midnight daily with a frequency of every 10 minutes from 6 am to 10 pm on weekdays and 15 minutes at other times. The trains have passenger displays and audio announcements for station information.[vii]

The ION trains also incorporate several safety and security measures to protect passengers. The trains are equipped with security cameras, emergency intercoms, and fire extinguishers. In case of emergencies, passengers can use the yellow emergency strip to alert the operator or access intercoms to communicate with staff. Additionally, emergency call boxes are available at all ION stations, directly connecting passengers to security personnel who can access live video feeds for real-time assistance. These comprehensive safety features aim to ensure a secure travel experience for all passengers.

The operation is supported by a team of 40 LRV operators, trained through an extensive 120+ hour program, and a 24/7 Control Room staffed by 15 employees for

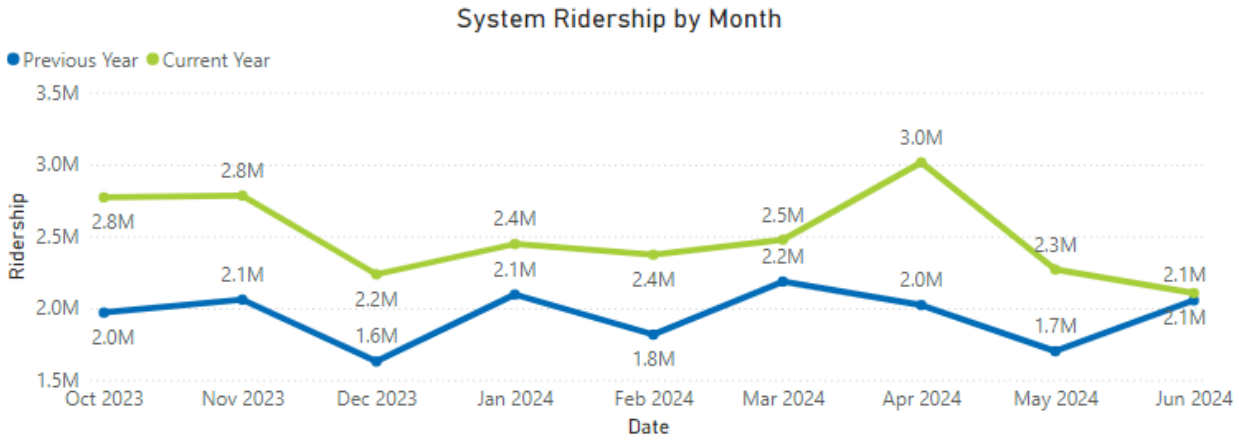
train operations and incident response. Additionally, 30 technicians and engineers are dedicated to maintaining the LRVs and infrastructure. The LRT operates on exclusive right-of-way throughout, operating primarily along the centre or the side of the street, with stretches of higher speed right-of-way alongside freight railroad tracks and Hydro rights-of-way.[viii]

Figure 3: Laurier-Waterloo Park station. Photo Credit: Grand River Transit

Each station designed for convenience and safety, including EasyGO[3] platform card readers, which could make fare payments quick and easy, fare vending machines, unique anchor walls reflecting local neighborhoods, benches, and information displays. The stations also offer canopies and shelters for weather protection, security cameras, emergency call boxes, and clearly marked platform edges for safe boarding.[ix]

[3] "EasyGO" is a lay term for the fare system used by Grand River Transit (GRT) in the Waterloo Region. It simplifies transit by allowing passengers to tap cards or devices at card readers located at each station, making fare payments quick and easy. The system also includes mobile apps for real-time bus tracking and trip planning, aiming to improve the overall convenience of using public transit.

10.3 Operational Performance



Annual Ridership Summary

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2019	1.92M	1.73M	1.97M	1.72M	1.69M	1.77M	1.60M	1.44M	2.16M	2.14M	2.19M	1.63M	**21.96M**
2020	1.36M	1.81M	1.30M	0.59M	0.70M	0.72M	0.77M	0.79M	0.88M	0.90M	0.84M	0.74M	**11.38M**
2021	0.56M	0.57M	0.80M	0.62M	0.60M	0.70M	0.76M	0.79M	1.07M	1.11M	1.17M	0.99M	**9.74M**
2022	0.81M	0.98M	1.43M	1.34M	1.45M	1.44M	1.34M	1.33M	2.00M	1.97M	2.06M	1.63M	**17.78M**
2023	2.10M	1.82M	2.19M	2.02M	1.70M	2.05M	1.89M	1.93M	2.89M	2.77M	2.78M	2.24M	**26.38M**
2024	2.45M	2.37M	2.48M	3.02M	2.27M	2.11M							**14.69M**

Figure 4: ION LRT system ridership by month since 2019. Source: GRT Performance Dashboard

The above figure shows ION LRT's monthly system ridership since 2019, which illustrates a significant recovery and growth in ION LRT's ridership after the pandemic. Ridership accounts for a passenger's entire journey, including fare payment and all transfers. In 2023, the ION LRT had an annual ridership of 4.3 million, and a daily ridership of 11,780.[x]

Regional staff have partly credited the increase in ridership to the students nearby as well as the growth in the regional population.[xi] The ION LRT serves a significant portion of the region and connects Waterloo's innovation ecosystem. Since it connects key destinations such as universities, tech companies, Google's Canadian engineering headquarters, David Johnston Research + Technology Park, main shopping centres, and business districts, the user base is diverse including students from the University of Waterloo and Wilfrid Laurier University, commuters traveling to and from work, and shoppers heading to key commercial areas such as Conestoga Mall and Fairview Park Mall. This mix of users highlights the system's role in supporting various aspects of daily life, from education and employment to retail and recreation.

It is also important to note that the ION LRT is fully integrated with the existing GRT network, offering a seamless experience with a single fare system that includes buses and park-and-ride facilities. The fare structure is unified across the transit network, allowing for transfers between buses and the LRT. For example, at major hubs like Fairview Mall, passengers can easily transfer to express ION buses that connect to other key destinations, illustrating the system's comprehensive connectivity.[xii]

Specifically, the ION LRT and GRT provide University of Waterloo, Wilfrid Laurier University and Conestoga College students with convenient and unlimited transportation across the region through the U-Pass program, included in full-time students' termly fees. Eligible students can use their ONE Card for unlimited rides on Grand River Transit[xiii]

Moreover, the ION LRT's annual operating and maintenance costs are divided into categories, including operations, maintenance, lifecycle costs, financing and insurance.

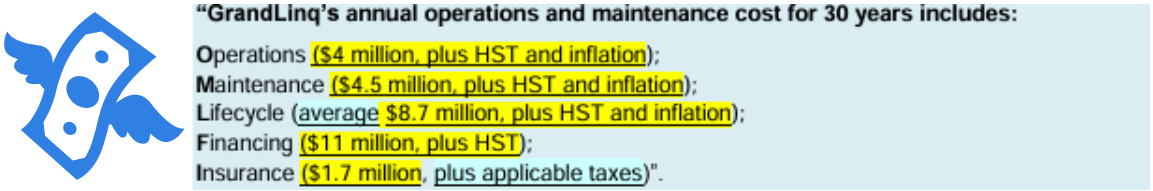


Figure 5: GrandLinq's annual operations and maintenance cost for 30 years. Source: Grand River Transit

Operations and maintenance, financing, lifecycle and Region costs (electricity, project office, etc.) will be funded by transit fare revenue and a 1.2% tax increase implemented from 2012 to 2018. Fare revenue, which includes payments from single ride fares and reloadable fare cards, plays a crucial role alongside government subsidies and tax levies. This diverse funding strategy ensures the sustainability of the ION LRT by maintaining a steady flow of resources for its long-term operational needs.[xiv]

In 2023, increased ridership led to GRT generating $50.7 million in revenue, which surpassed the budget estimate by $8.5 million.[xv] As the staff report notes, this additional ridership could also enhance future allocations from the provincial gas tax fund.

10.4 Governance and Strategic Factors

The Waterloo Region's public transportation is overseen by the Grand River Transit (GRT). The region holds ultimate authority, and strategic decisions are implemented through GRT. This unified governance ensures that the LRT system aligns with broader transit goals, providing cohesive management and oversight across the urban area. The Region also governs through collaboration with local councils to ensure alignment with urban growth and sustainability policies.

10.4.1 Strategic Planning

Government's strategic planning has played a critical role in advancing public transportation in the Region of Waterloo.

In 2004, the region initiated an Individual Environmental Assessment (EA) to evaluate the feasibility of a rapid transit line, ultimately leading to the selection and approval of LRT in 2009 to enhance public transport and foster compact urban growth. The EA's three-phase process assessed route options and transport technologies before settling on the LRT as the preferred solution.[xvi]

> "Moving people more efficiently in and around our community, limiting urban sprawl, and saving our farmland through the protection and preservation of the environment are three of the fundamental goals of ION." --- *Thomas Schmidt, commissioner, transportation and environmental services, for the Region of Waterloo*

A central rationale for the development of the ION LRT was to manage growth and encourage new development to take place within the existing urban footprint of the region.

Before the ION LRT began operations, more than $3 billion had been invested along the central corridor, including new condominium towers, commercial spaces, new businesses, and public spaces, indicating early success in growth management policies. This shift led to 20% of the region's population living along the LRT corridor by 2018, up from 17.5% in 2011, showcasing its impact on urban intensification with the denser development.[xvii]

10.4.2 Key Benefits and Challenges

As the largest project in the region's history, the ION LRT faced extensive media and political scrutiny. Consensus and funding took time, but **strong leadership and**

continuous public consultation kept the project on track. Vendor and construction delays, including issues with the manufacture and delivery of rolling stock, presented significant challenges. However, these delays ultimately provided the project team with additional time to ensure a smooth and successful launch. Initially estimated at $818 million, project costs saw overruns of approximately $50 million by December 2017.[xviii]

Figure 6: Interior of Ion vehicle 506. Source: Grand River Transit

After the system began operations, the ION LRT demonstrated several key strengths for the Waterloo Region across suburban, urban, and rural areas, including[xix]:

- **Traffic Reduction:** Development along the ION corridor helps reduce overall traffic congestion, particularly in suburban areas, and limits cut-through traffic in existing neighborhoods.
- **Cost Efficiency:** By reducing the need to build new roads and limiting road maintenance costs, the ION minimizes the strain on the region's infrastructure. This includes a reduction in the need for 500 kilometers of additional roadway, saving $1.4 billion in associated costs.

- **Sustainability:** The ION promotes environmentally friendly transportation options, lowering emissions and greenhouse gases, and improving air quality. This shared transit solution helps preserve the region's agricultural lands and local ecosystems.
- **Urban Development:** The ION corridor fosters new business, residential, and commercial developments in city centers, creating opportunities for economic growth, employment, and vibrant communities. It also helps balance daily car and transit use, particularly benefiting those who live or work near ION stops; and
- **Commuter Accessibility:** The system ensures efficient public transit access across the region, connecting Kitchener, Waterloo, and beyond with easy transfers between GRT buses and the ION light rail. For rural areas, it enhances access while maintaining natural land integrity.

These advantages collectively position the ION as a significant contributor to regional growth and sustainability. The increased property values and median incomes along the LRT corridor demonstrate the economic uplift generated by the ION LRT.

10.4.3 Building the Future

In response to the recent concerns about overcrowding, council voted in 2024 to implement 10-minute intervals during weekday peak times. This decision came after feedback from community members, including students and daily commuters, who emphasized the importance of maintaining reliable and frequent service. For many, especially those without cars, the ION is a vital transportation option, making service frequency crucial to ensuring accessibility and supporting the region's growing population. [xx]

Waterloo plans to extend the ION LRT by 17 km from Fairway Station in Kitchener to Downtown Cambridge, adding seven new stations for continuous service across three urban centers. In June of 2021 the Minister of the Environment, Conservation and Parks signed a Notice to Proceed for the Stage 2 ION project followed by the Region of Waterloo publishing a Statement of Completion for the Transit Project Assessment Process, marking the final step in the formal six-month process.[xxi]

10.5 Leading Practices and Lessons Learned

The Region of Waterloo's approach to the ION LRT project demonstrates several leading practices and valuable lessons that can guide CBRM:

- **Transit-Oriented Development (TOD):** The Waterloo Region capitalized on the ION LRT to spur TOD, ensuring that new residential and commercial developments were concentrated around transit stations. CBRM can strategically plan its Go Train system to encourage TOD, potentially revitalizing certain areas by making them more attractive for investment and development due to improved transportation access.
- **Strategic Station Placement**: The Waterloo Region's ION LRT placed stations in high-demand areas such as business hubs, business park and residential districts, promoting high ridership from the start. Early planning considering population density, major employment centres, and key public services when choosing station locations was considered a key success factor.
- **Unified Fare System:** The Waterloo Region uses a single fare system integrated across different modes of transportation, making it easy for passengers to transfer between buses, light rail, and other transit options. CBRM could implement a similar system, allowing seamless travel between trains, buses, and other local transit, providing convenience for passengers and encouraging public transit use.
- **Adaptable and Scalable Network**: The phased implementation of the ION allowed the Waterloo Region to test its system, adapt to community needs, and expand over time. CBRM could begin with a core network of high-priority stations, monitoring demand and gradually scaling the system based on performance and ridership patterns, avoiding overbuilding and focusing on sustainable growth.
- **Community Engagement and Inclusivity:** Continuous public engagement and consultation have been integral to the ION LRT project. Addressing concerns such as overcrowding through feedback-driven decisions, like the increase to 10-minute intervals during weekday peak times, demonstrates responsiveness to community needs. The inclusive fare structure, including discounted programs for students and low-income riders, ensures broad access to the transit system.

11 Edmonton, AB: Edmonton LRT

6.1 Local Context

The city of Edmonton, Alberta, with a 2021 population of 1.3 million, is a growing urban centre. Edmonton is known as a gateway to northern Alberta and a hub for industries such as oil, gas, and agriculture. The city is also home to a thriving arts and cultural scene, along with a strong education sector anchored by five universities.

Transportation infrastructure in Edmonton has evolved to meet the needs of this growing population, with an emphasis on providing sustainable urban mobility options. The city's public transit network is managed by Edmonton Transit Service (ETS), which includes buses, paratransit, and the LRT system.

Figure 7: The Capital Line LRT heads north out of downtown Edmonton. Source: Edmonton Journal

Edmonton was the first city with a population under one million in North America to have an LRT system, with the first opening in 1978. Edmonton benefited from excellent construction planning and a strong project management team, which provided oversight for the project, using consultants, architects, contractors, and other city departments to complete the work. The project stayed within budget and was completed ahead of schedule.[xxii]

Edmonton LRT network has seen multiple expansions over the years. It plays a crucial role in the city's efforts to create connected, efficient, and green transportation

options. As Edmonton continues to grow and diversify, the LRT system will remain central to its goal of enhancing urban livability, improving accessibility, and encouraging economic development across the region.

6.2 Overview of Infrastructure and Service

Edmonton's population surged from 160,000 in 1951 to 451,000 in 1976. During this time, the central business district saw a boom in high-rise construction, while suburban development expanded significantly. In response to growing transportation challenges, especially in the northeast sector, the City Council opted to study LRT as a "balanced" solution; being more cost effective and flexible than heavy rail (i.e., subways), and higher-capacity than bus-only networks utilizing freeways.[xxiii]

In 1978, the first Edmonton LRT system was inaugurated. This original line was 6.9 km long, and the total construction costs of the first LRT were approved at $65 million, with $45 million supplied by the province of Alberta at $7.5 million per year from 1974 to 1979. The city of Edmonton is covering the remaining amount through debenture borrowing, which will be repaid using revenues from Edmonton Transit.[xxiv]

Today, the Edmonton LRT system has expanded significantly, featuring **29 stations** and **37.4 km** of track across **three lines**. An estimated **20-25%** of Edmonton's population lives within **800 meters** of an LRT station, making it a key component of the city's transit infrastructure.[xxv]

The Capital Line connects northeast Edmonton with south Edmonton via Downtown. The Metro Line, which began limited operations in September 2015, links Downtown with northwest Edmonton. The Valley Line, running from Southeast Edmonton to Downtown, opened in late 2023. The ongoing Capital Line extension from is estimated to cost $1.34 billion. The Metro Line, opened in 2015, had an initial capital cost estimate of $665 million, with additional expenditures due to delays and issues related to the signaling system. The Valley Line, the latest addition opened in late 2023, had a total projected cost of $1.8 billion, funded by a combination of city, provincial, and federal contributions.[xxvi]

Figure 8: Transit diagram of Edmonton LRT. Source: Edmonton LRT

The system provides convenient transit to prominent locations including the University of Alberta, Northern Alberta Institute of Technology (NAIT), MacEwan University, Norquest College, Concordia University, Royal Alexandra Hospital, University of Alberta

fully integrated with the bus transit system, and timed transfers is provided between bus and rail.[xxvii] This comprehensive network has enhanced mobility for students, workers, shoppers, and patients, ensuring Edmonton's essential services are more accessible and interconnected.

Additionally, the Edmonton LRT system has a mix of dedicated right-of-way and street-level tracks, with key sections running underground in the downtown core. This subway-surface design, also known as the **semi-metro system**, allows the LRT to avoid traffic congestion in busy central areas. The underground sections connect to **Edmonton Pedway network**, a 13 km climate-controlled pedestrian network in downtown Edmonton. The pedway connects over 40 buildings, shopping centres, government facilities and parkades through tunnels and elevated walkways about 4.6 meters above ground. The main network links three of the five downtown Edmonton LRT stations.[xxviii]

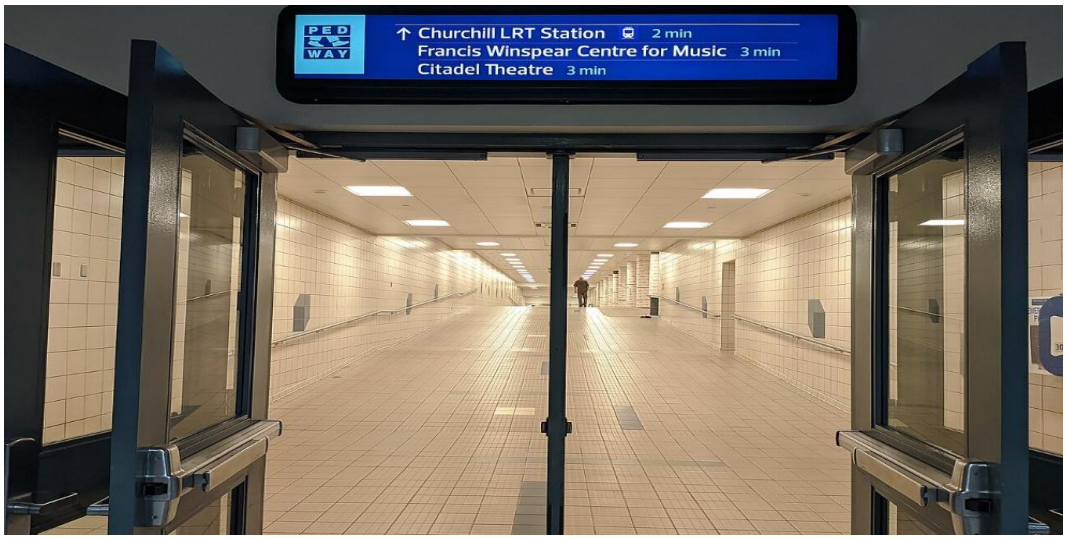


Figure 9: One underground tunnel in the Edmonton Pedway system, beneath Churchill Square. Source: Edmonton LRT

This integration has enhanced pedestrian mobility in the downtown area, providing sheltered pathways that extend the reach of the LRT system and facilitate access to commercial and business hubs throughout the city.

Edmonton LRT system has several unique features compared to other North American light rail systems. Both the Capital Line and Metro Line use island platforms, and the system operates high-floor trains, unlike other Canadian systems such as ION, which

use low-floor trains. Passengers cannot move between train cars while in transit; if needed, they must switch trains via the platform when the train is stopped.[xxix]

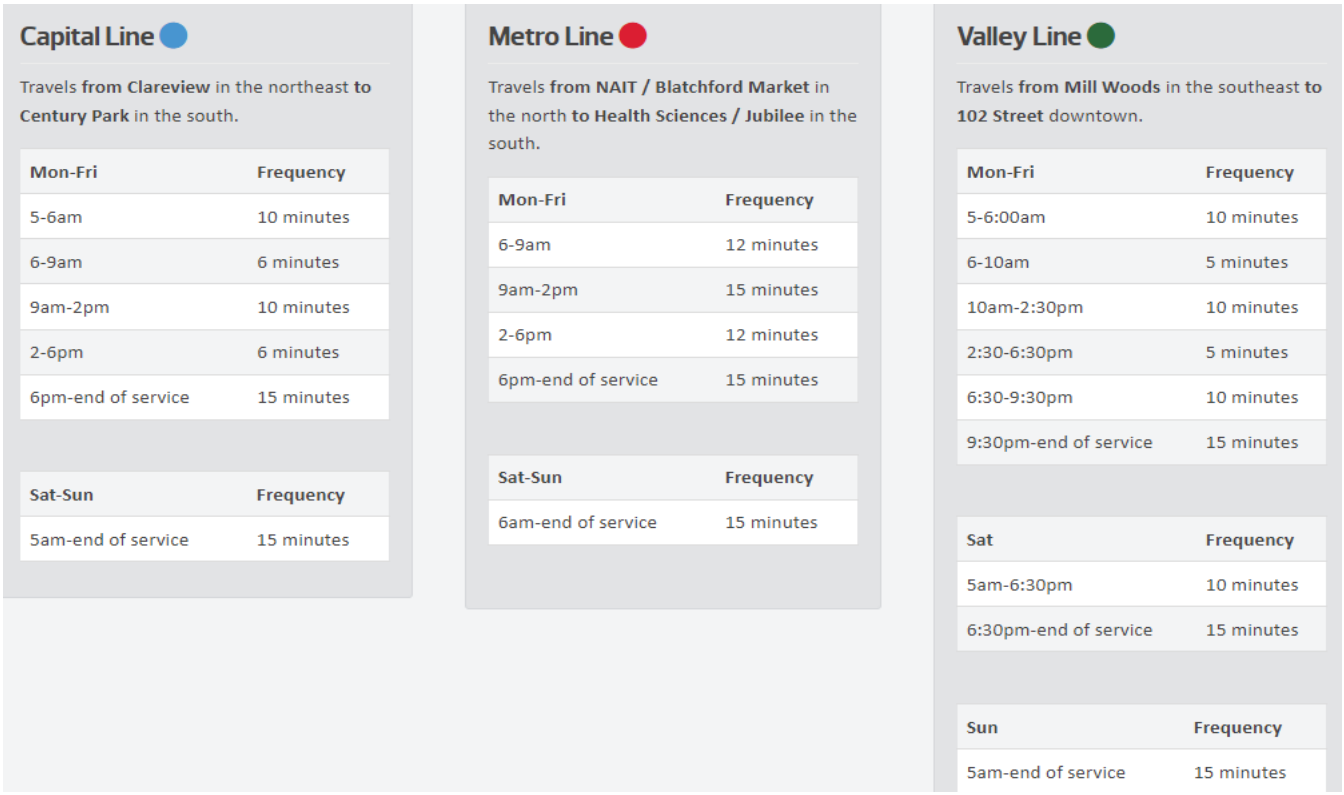
Figure 10: Interior of a Siemens SD-160. Source: Edmonton LRT

Specifically, the Edmonton LRT employs a diverse fleet of Light Rail Vehicles (LRVs). The Capital Line uses five-car trains during peak hours, four-car trains on weekends, and two-car trains for late-night service. All future extensions to the Capital and Metro lines will have five-car platforms. The Valley Line utilizes low-floor Bombardier/Alstom Flexity Freedom vehicles, composed of seven articulated segments that can run as single trains or coupled together. Further expanding the low-floor fleet, LRVs are set to enter service between 2021 and 2025, supporting the Valley Line's West extension.[xxx]

Edmonton LRT also offers several features to enhance the convenience and accessibility. Park & Ride lots are available across the city for easy transit access. Free Wi-Fi service is provided at all LRT platforms via the Open City Wi-Fi network. Accessibility features at LRT stations include automatic doors, elevators, escalators, ramps, yellow warning tiles, audio announcements, and accessible public washrooms.

To support safety and security, all stations are monitored by CCTV, and each train is equipped with an operator alert system for emergencies. Stations also have blue emergency help phones connecting directly to ETS Security, and transit peace officers regularly patrol the areas. Despite these security measures, incidents still occur; in 2008, there were 328 reported crimes against persons on ETS property.[xxxi]

LRT frequency varies by LRT line and station and changes during peak and non-peak times. During peak hours, trains generally run every 5-12 minutes, with the Capital Line and Valley Line operating more frequently. During non-peak times, frequencies on all lines slow to 10-15 minutes.[xxxii] The LRT operates approximately between 5:00 a.m. and 1:00 a.m. daily.



Capital Line

Travels **from Clareview** in the northeast **to Century Park** in the south.

Mon-Fri	Frequency
5-6am	10 minutes
6-9am	6 minutes
9am-2pm	10 minutes
2-6pm	6 minutes
6pm-end of service	15 minutes

Sat-Sun	Frequency
5am-end of service	15 minutes

Metro Line

Travels **from NAIT / Blatchford Market** in the north **to Health Sciences / Jubilee** in the south.

Mon-Fri	Frequency
6-9am	12 minutes
9am-2pm	15 minutes
2-6pm	12 minutes
6pm-end of service	15 minutes

Sat-Sun	Frequency
6am-end of service	15 minutes

Valley Line

Travels **from Mill Woods** in the southeast **to 102 Street** downtown.

Mon-Fri	Frequency
5-6:00am	10 minutes
6-10am	5 minutes
10am-2:30pm	10 minutes
2:30-6:30pm	5 minutes
6:30-9:30pm	10 minutes
9:30pm-end of service	15 minutes

Sat	Frequency
5am-6:30pm	10 minutes
6:30pm-end of service	15 minutes

Sun	Frequency
5am-end of service	15 minutes

Figure 11: LRT Frequency Schedule. Source: City of Edmonton

6.3 Operational Performance

As of 2024, Edmonton LRT was the 7th busiest LRT system in North America, with 3.9 million passengers per year and an average of 110,000 passengers on weekdays.[xxxiii]

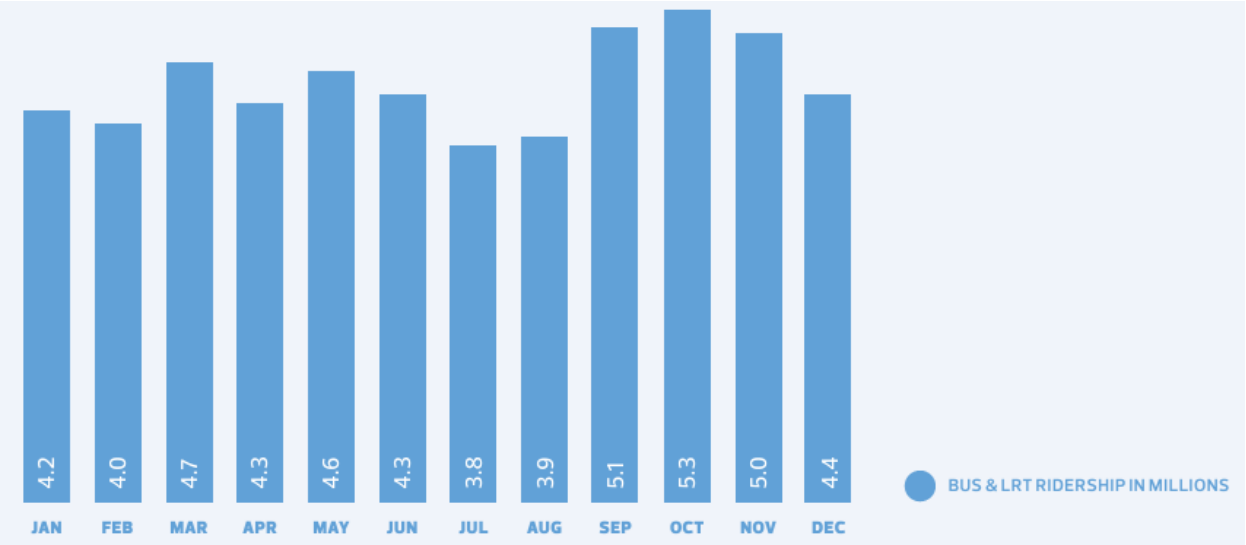


Figure 12: LRT and Bus Ridership 2023. Source: Edmonton Transit Service 2023/2024 Annual Service Plan

Total bus and LRT ridership was 53.5 million in 2023, representing a 27% increase from 42 million in 2022.[xxxiv] While bus ridership recovered, LRT use remained at about 70-75% of pre-pandemic levels, partly attributed safety concerns and changes in commuter behavior such as hybrid work arrangements.[xxxv]

Notwithstanding, the population served by the LRT is significant, particularly in the central areas where the lines intersect or run underground. With stations at the University of Alberta, NAIT, MacEwan University, and Norquest College, the LRT is crucial for students commuting to and from campus. The proximity of the system to major hospitals ensures accessibility for healthcare workers and patients.

Furthermore, the expansion of the Valley Line in 2023 further increases accessibility in Southeast Edmonton, which is a growing residential and commercial area. Since it began operations in November 2023, the Valley Line has contributed to a 62% increase in transit usage, with ridership numbers rising from 138,000 in its first month to 223,000 by April 2024. The line now accounts for 13% of the total LRT ridership.[xxxvi]

In September 2021, the **Arc electronic fare payment system** was introduced in the greater Edmonton area. Riders now use reloadable Arc cards and single-use Arc tickets, tapping validators when entering and exiting buses and LRT. Paper tickets and passes are no longer available at LRT vending machines; instead, passengers can purchase Arc cards and tickets, including 90-minute and 24-hour options, at the machines.[xxxvii]

Such fare payment system offers a seamless experience across various modes of transit. Passengers can use the Arc card for both buses and the LRT, allowing for easy transfers within the ETS network. This integration ensures a unified fare structure and smooth connectivity between different transit options, much like the ION LRT and GRT network. Major transit hubs facilitate convenient transfers, enhancing the overall efficiency and reach of the system.

A flat rate fare is calculated based on the tap-on and tap-off locations of each trip. If each tap is located within the same zone, a local flat rate fare is calculated.[xxxviii]

Arc Card Pay-as-you-go (90min)	$2.75
Arc Card Daily Fare Cap	$10.25
Arc Card Monthly Fare Cap	$100
Arc Ticket (90min)	$3.50
Arc Ticket (24hr)	$10.25
Cash	$3.50
10 Ticket Pack	$27.75
Monthly Pass	$100
Family / Day Pass	$10.25

Figure 13: Adult tickets and passes in Edmonton region. Source: Edmonton Transit Service

If the taps are located in different zones, a commuter flat rate fare is calculated.

Zone	Edmonton	Airport	St. Albert	Strathcona County	Spruce Grove	Acheson	Fort Saskatchewan	Beaumont	Leduc
Edmonton	$2.75								
Airport	$5.00	$5.00							
St. Albert	$4.25	$9.25	$2.50						
Strathcona County	$5.00	$10.00	$9.25	$2.75					
Spruce Grove	$5.60	$13.35	$9.85	$10.60	$3.00				
Acheson	$5.60	$13.35	$9.85	$10.60	$3.00	$3.00			
Fort Saskatchewan	$9.50	$12.25	$8.75	$4.50	$12.85	$12.85	$2.50		
Beaumont	$4.50	$12.25	$8.75	$9.50	$12.85	$12.85	$11.75	$4.50	
Leduc	$5.00	$2.00	$9.25	$10.00	$13.35	$13.35	$12.25	$13.75	$2.00

Black text = Cost for one journey, including transfers within 90 minutes.
Red text = An estimate that reflects multiple transfers between different agencies, fares will vary based on the routes chosen.

Figure 14: Flat Rate Fares. Source: Arc Fares System

Additionally, ETS offers various fare programs to make public transit accessible and affordable for different groups. The Providing Accessible Transit Here (PATH) program offers free monthly transit passes to individuals who are homeless or at high risk of homelessness. Low-income Edmontonians can benefit from the Ride Transit program, which provides monthly passes at a subsidized rate. Seniors aged 65 and older can qualify for the Senior Annual Pass. The ETS@Work program offers employees discounts of up to 24% off the cost of a monthly pass.[xxxix] Eligible students can take advantage of the Universal Transit Pass (U-Pass) for unlimited travel on ETS.[xl]

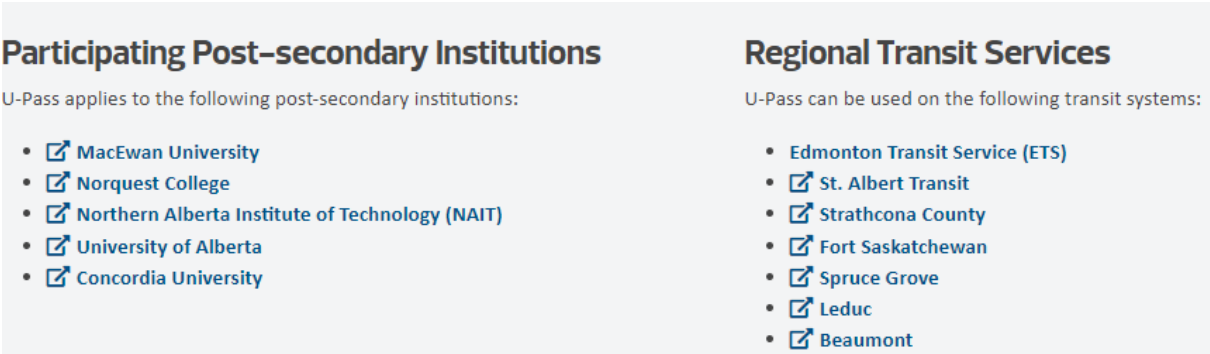


Figure 15: Universal Transit Pass. Source: Edmonton Transit Service

Board, Public Policy Alternatives, Canadian Centre for Public Policy). The search terms used in the secondary research are outlined in Appendix A.

Case Study Candidate Selection Criteria

The following criteria were considered in selecting candidates for the case study analyses to ensure high-value targets to best inform the Business Case and Ridership Analysis.

- **Geographic:** The geographic size of CBRM is a consideration as is the dispersed population in both urban and rural settings.
- **Ridership Profile:** The resident and economic composition of CBRM are important considerations. Early research suggests CBRM ridership would likely be comprised of domestic and international students, commuters, marginalized residents, shoppers, and people attending health care appointments, among other travel purposes.
- **Population:** Population size is another important consideration. While we have identified 30 light and 38 commuter rail systems in North America, they tend to be in the larger urban areas. The smallest cities in North America with light rail are Waterloo (pop. 524,000) and Winnipeg (pop. 778,000). While the European candidates are comparable in population, their local rail systems tend to connect to national and pan-European rail networks; and
- **Access to Information**: While ATN boasts a fluent French speaker, accessing information is typically more challenging in non-English speaking jurisdictions. We have attempted to mitigate this challenge by proactively reaching out to Canadian Trade Service offices in France, Spain and Sweden, although we have yet to receive material guidance.

Based on the above criteria, the following five regions were selected for case study analysis:

- Waterloo, ON
- Edmonton, AB
- Calgary, AB
- Buffalo, NY; and
- Lund, Sweden.

An important component of this strategic planning is **Transit Oriented Development** (TOD). Their TOD approach focuses on concentrating housing, shopping, and employment within a **five-minute walk** (400 meters) of existing or planned LRT station or transit centre. By promoting higher-density, mixed-use developments along LRT corridors, TOD aligns with the city's goal of creating more sustainable neighborhoods that encourage walking, cycling, and the use of public transportation. *Edmonton's TOD guidelines*, approved by the City Council in 2012, help guide property owners and city planners in shaping future developments around transit hubs, ensuring that infrastructure investments not only enhance transit accessibility but also contribute to the city's broader vision of environmental, social, and economic sustainability.[xliii]

Additionally, Edmonton's approach to **Sustainable Urban Integration** (SUI) enhances the livability and character of neighborhoods surrounding LRT stations. This includes the creation of shared-use pathways, bike lanes, pedestrian-friendly zones, and streetscaping that reflects each community's unique aesthetic. By embedding these principles into the planning and construction phases, Edmonton ensures that the LRT network doesn't just serve as transportation infrastructure but also as a catalyst for creating more connected and resilient urban environments.

6.4.2 Key Benefits and Challenges

Edmonton LRT system faces several challenges, many of which are common in large-scale urban rail projects. One challenge is the frequent delays related to facilities and train systems. Issues include frequent repair work, unexplained low-speed operations, and an inefficient system that waits for the opposite train to enter and depart, even on double tracks. While necessary repair work is usually announced in advance and conducted on weekends to avoid peak hours, minor repairs often occur on weekdays, causing ongoing inconveniences like slow-running trains.

Security has deteriorated significantly in Edmonton LRT trains and stations, especially throughout 2022. The influx of homeless individuals using the facilities, along with issues such as smoking, public urination, and drug use, has led to a rise in threats, assaults, and general misconduct. Despite increased security personnel and police patrols, incidents of crime remain high, as security guards are often passive and ineffective. For example, an incident in March 2022 at University Station highlighted the ineffectiveness of security measures, as officers failed to intervene during a violent riot, contributing to the perception that public transportation in Edmonton is unsafe. This

has led to an urgent need for more robust security measures and countermeasures to protect passengers.

Another challenge is the difficulty of building LRT lines in cities like Edmonton, which have relatively low population densities outside the city core. This makes it less economical to run train lines to low-density neighborhoods, where fewer people are using the service, compared to more densely populated urban areas. This factor can lead to underutilized infrastructure and reduce the financial viability of the project. One solution to this challenge is focusing on the mixed-use development near LRT stations, since TOD can help make the transit system more economically viable.[xliv]

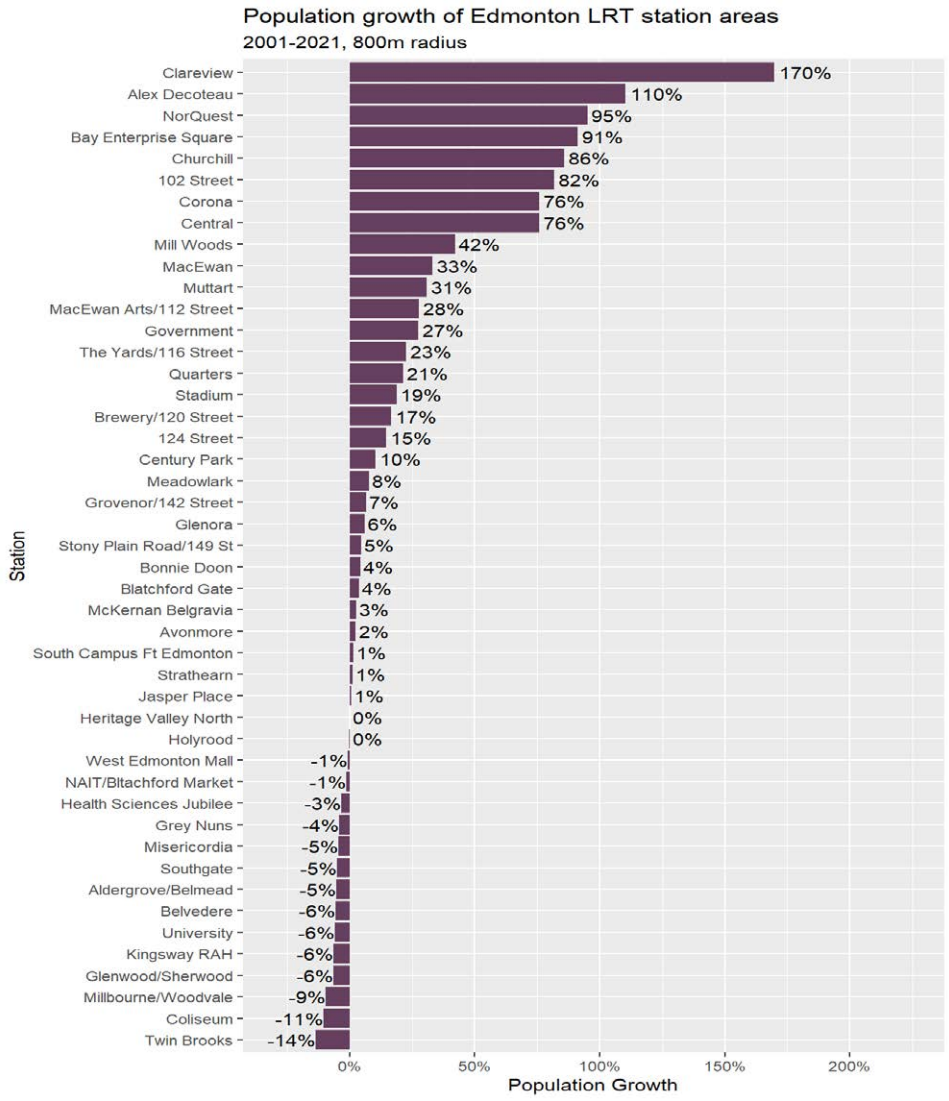


Figure 16: Population Growth of Edmonton LRT station areas between 2001-2021. Source: Jacob Dawang, Land use and growth around Edmonton's LRT stations

After the system began operations, the Edmonton LRT demonstrated several key strengths for the area across suburban, urban, and rural areas, including:

- **Job Creation:** The Valley Line LRT projects have significantly contributed to Edmonton's economic growth by creating thousands of jobs during construction. For instance, the Valley Line Southeast employed over 3,000 local workers, while the Valley Line West is expected to generate approximately 8,800 jobs and $760 million in salaries. This surge in employment provides a vital boost to the local economy, supporting industries across the region and enhancing the financial stability of numerous households.
- **Enhanced Connectivity:** The LRT system improved transportation links between suburban, urban, and downtown areas, making it easier for residents to access employment, education, and recreational opportunities.
- **Urban Renewal:** The LRT system encouraged urban renewal and revitalization, particularly in older and underdeveloped areas, by making them more accessible and attractive for investment.
- **Economic Development:** The presence of the LRT spurred economic growth and development around station areas, attracting new businesses, residential developments, and retail opportunities, which benefited communities across different densities.
- **Traffic Congestion Reduction:** By providing a reliable transit alternative, the LRT helped reduce traffic congestion on major roads and highways, particularly during peak hours, enhancing overall mobility in the city.

The system's capacity to integrate with existing transportation networks, along with ongoing expansions, underscores its role in fostering sustainable urban development.

6.4.3 Building the Future

The City of Edmonton plans to expand light rail and public transportation services throughout the city in the future, envisioning two new lines, the Energy Line and the Festival Line. The 2024 mid-season update on the LRT construction outlines significant progress, including:[xlv]

- **The Valley Line West**, a $2.6 billion project extending 14 kilometers from Downtown to Lewis Farms, is under active construction. Major milestones include the completion of critical infrastructure such as bridge decks, track

installations, and foundational work on key facilities. In 2024, installations will focus on major alignments, including track slab installations and the reopening of the Stony Plain Road bridge. The Valley Line is expected to enhance connectivity with 14 stops and two stations, contributing to a seamless transit experience across the network. Hyundai Rotem will supply 46 low-floor light rail vehicles compatible with the entire Valley Line, ensuring a consistent customer experience;

- **Metro Line Northwest** has seen significant progress, with Phase 1 from NAIT to Blatchford already operational as of January 2024. Future phases include a planned 4.2-kilometer extension to Castle Downs, with a $20 million budget approved for land acquisition; and
- **Capital Line South extension** from Century Park to Ellerslie Road has begun preliminary construction and is slated to start major construction in 2025. This phase will address the growing population in south and southwest Edmonton, with an anticipated construction timeline of 4–5 years. However, Edmonton City Council has approved an additional $242 million for the Capital Line LRT south extension, raising the total cost to $1.34 billion due to inflation, supply chain disruptions, and labor shortages. The 4.5-kilometre extension was initially budgeted at $1.08 billion. Despite previous cost-saving measures, such as reducing the number of LRT vehicles and modifying station designs, the project faced unavoidable budget shortfalls.

In addition, as Edmonton continues to face a budget shortfall, the City Council is considering raising transit fares. The fare increases, expected to take effect in 2025, include raising the ARC single-trip fare to $3.50 and the cash fare to $4.25, with monthly fare caps also increasing. City officials emphasize that these changes are necessary to close the funding gap while maintaining essential transit services and enhancing safety measures, such as increasing surveillance and personnel on transit systems. The ETS fare increase schedule was included in the 2024-2026 operating budget, approved by City Council.[xlvi]

6.5 Leading Practices and Lessons Learned

The Edmonton LRT project demonstrates several leading practices and valuable lessons that can guide CBRM:

- **Semi-Metro System Benefits:** Edmonton employs a semi-metro design with a mix of dedicated right-of-way, street-level tracks, and underground sections. This design reduces traffic congestion and enhances service reliability. CBRM can consider a semi-metro approach to address diverse urban landscapes and create a more efficient transit system.
- **Strategic City Planning and Transit-Oriented Development:** Edmonton's extensive LRT expansion is part of a broader strategic plan integrated into the city's long-term vision. It also strategically utilized the LRT to promote Transit-Oriented Development by concentrating housing, shopping, and employment within walking distance of stations. By aligning transit expansion with city planning, CBRM can ensure sustainable growth and improved urban mobility, making transit a backbone of regional development.
- **Flexible Service Frequencies:** Edmonton LRT adjusts its train frequencies and different train lengths based on demand. This flexible scheduling helps match capacity to rider needs, reducing operational costs while maintaining service quality. CBRM can implement a similar approach by dynamically adjusting service frequencies and train lengths to efficiently manage resources and meet passenger demand throughout the day.
- **Managing Inflationary Pressures:** Edmonton's Capital Line South extension faced significant cost increases due to inflation, supply chain disruptions, and labor shortages. The city managed these challenges through careful financial planning and flexible budgeting. CBRM should proactively address potential economic fluctuations in its budget planning for large-scale infrastructure projects to ensure financial stability.
- **Enhancing Security and Accessibility:** Despite enhanced security measures, Edmonton LRT still faces challenges with security incidents. It also prioritizes accessibility with features like automatic doors, elevators, and audio announcements. CBRM should also prioritize robust security protocols and comprehensive accessibility features to ensure a safe and inclusive transit experience.

12 Calgary, AB: CTrain

12.1 Local Context

The city of Calgary has a population of 1.3 million residents according to the 2021 Canadian census, making it one of the largest and fastest-growing cities in the country. Known primarily for its role in the energy sector, the city is also home to a growing technology sector and a robust education network anchored by institutions such as the University of Calgary, Mount Royal University, and Southern Alberta Institute of Technology (SAIT).

Figure 17: Calgary CTrain Station. Source: Calgary Transit

As the population grows, so does the demand for efficient and sustainable transportation options. Public transit in Calgary is managed by **Calgary Transit**, which oversees a comprehensive network of buses and the CTrain—the city's LRT system. Transit was targeted to carry 50% of work trips to and from downtown, reinforced by parking policies, resulting in a high-density employment centre.

CTrain, first launched in 1981, has undergone several expansions over the years. CTrain system carries about 285,000 people every weekday making it one of the most successful LRT in North America. CTrain integrates several features that prioritize

functionality, cost-efficiency, and service accessibility, all while reflecting local community needs. As the city evolves, CTrain remains central to Calgary's ambitions of enhancing urban connectivity, reducing carbon emissions, and supporting economic growth.

12.2 Overview of Infrastructure and Service

Calgary CTrain system started in 1981 with the 12.9 km South line at first. The Northeast line opened in 1985, followed by the Northwest line in 1987, just before the 1988 Winter Olympics. Extensions to the Northwest and South lines occurred in 1990, 2001, 2003, 2004, 2012 and 2017.[xlvii]Design principles of CTrain specifically focused on minimizing construction and operating costs while maximizing service effectiveness and system length. The CTrain system had a total capital cost over $543 million for its various expansions, including land acquisition, track work, station construction, vehicles, maintenance facilities, and project oversight.[4]

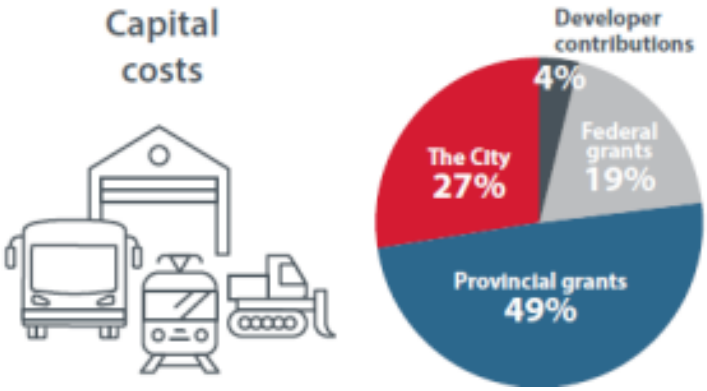


Figure 18: Calgary Transit's recent capital funding source. Source: Calgary Transit

Funding for new infrastructure and rapid transit network expansion involves partnerships with provincial and federal governments, while maintaining or replacing existing infrastructure is largely funded by The City's budget. The above figure shows the capital funding sources Calgary Transit accessed from 2019-2021.

As of today, the CTrain system spans **59.9 km** with **45 stations**, operating two main lines: the **Red Line** (35 km) connecting Somerset/Bridlewood in the south to Tuscany in the northwest, and the **Blue Line** (25.7 km) linking Saddletowne in the northeast to

[4] The cost of the Blue Line extension to the northeast, completed in 2012, was approximately $1.4 billion, while the 2017 expansion of Calgary's Red Line, which allowed platform extensions for four-car trains, cost around CAD $300 million.

69 Street in the west. Both lines share tracks along 7th Avenue South in downtown Calgary.[xlviii] Approximately **46%** of Calgary's population lives within a 400-meter radius of frequent transit stops.[xlix]

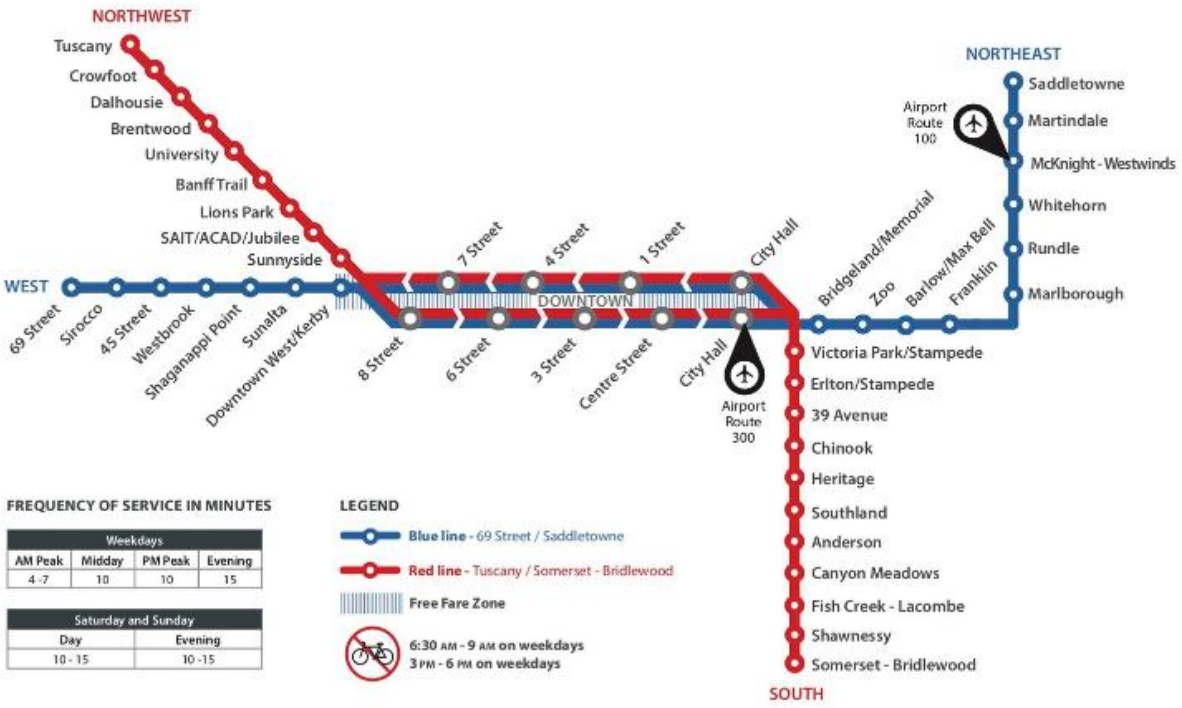


Figure 19: Calgary CTrain Map. Source: Calgary Transit

The CTrain system is strategically designed to connect key educational institutions, commercial areas, and business hubs, making it an essential part of the city's transportation infrastructure. For instance, University Station serves the University of Calgary, offering convenient access for the large student and staff population, while SAIT/ACAD/Jubilee Station connects the Southern Alberta Institute of Technology (SAIT), the Alberta University of the Arts (AUArts), and the Jubilee Auditorium, a significant cultural venue. This station facilitates efficient travel for both students and event attendees. Another notable station, Banff Trail, is situated near McMahon Stadium, providing a transit solution for large crowds during sports events. Chinook Station offers access to Chinook Centre, one of the largest shopping malls in Calgary, benefiting both shoppers and employees in the commercial sector.

The Downtown Core stations link the central business district, facilitating easy commutes for professionals. Those downtown stations are also integrated with

adjacent sidewalks to enhance accessibility, security, and affordability. This pedestrian-friendly design minimizes the system's footprint and contributes to its sustainability.

A unique feature is the **Free Fare Zone**, allowing free travel within the downtown core. The City and Toronto-Dominion Bank (TD) entered into a five-year agreement to sponsor this Free Fare Zone beginning in December 2022. This agreement will give TD a significant presence in the downtown area while generating extra non-fare revenue for Calgary Transit.

Furthermore, the CTrain system relies on a well-coordinated **feeder network** to support its accessibility. In most of the stations, both free parking and reserved parking services are offered. Every station is served by multiple bus routes that connect nearby communities and employment hubs, allowing passengers to easily transfer between buses and trains. To minimize walking distances for passengers, bus stops are positioned as close as possible to station entrances. Over **50%** of users travel to and from the CTrain by bus.[I]

Figure 20: Calgary Airport Transit Bus. Source: The City of Calgary

For example, while CTrain does not directly reach the airport, CTrain extends its connectivity by linking to the Calgary International Airport via the bus services, which integrate with LRT stations along key points of the network. Passengers can easily transfer from the Blue Line at stations like Saddletowne to the Airport Route 100, which provides a direct bus connection to the airport. The Airport Route 300 offers a rapid

bus service that connects the downtown core to the airport, with stops at major LRT stations, including City Hall and Victoria Park/Stampede. This seamless integration ensures efficient travel between the LRT system and the airport, making it convenient for both residents and visitors to access the airport through public transportation.

Figure 21: A 4-car CTrain on the Red Line crosses a bridge. Source: Calgary Herald

The original CTrain system was initially designed with 3-car trains in mind, but with the foresight to expand to accommodate 5-car trains in the future. Today, the design focus shifted to ensure the system could handle **4-car trains**. The lengthening of 4-car trains increased the maximum capacity of each train from 600 to **800** passengers.

With stations spaced an average of **1.5 to 2 km** apart, the CTrain system strikes a balance between minimizing stops and maximizing speed while covering key areas of the city. This approach not only reduces travel time but also limits the amount of infrastructure needed, keeping the system cost-effective and accessible.[li]

Additionally, CTrain offers service for 20 hours, beginning at 4:00 am and ending at 1:00 am. During morning peak times, the frequency increases to about every 4-7 minutes. The frequency changes to 10 minutes at noon; on weekends and late evenings, the frequency changes to every 15 minutes.

Calgary Transit has implemented comprehensive safety measures. A coordinated response involving the Calgary Police Service and community social service partners

enhances safety across the transit system. A total of 14 **peace officers** were deployed in 2023 and an additional 26 officers will join this year, with officers patrolling 24/7 to prevent disorder and respond to emergencies. New security guards have been deployed to select stations, acting as a visible deterrent and resolving issues in real time. The CTrain system also benefits from advanced surveillance with over 1,600 CCTV cameras monitored around the clock. Lighting upgrades on CTrain platforms improve visibility and security camera footage quality, using energy-efficient LED lights. Additionally, the Calgary Transit Watch service allows customers to report safety concerns easily via text or platform help phones.[lii]

12.3 Operational Performance

According to the *2023 Annual Status Update Report*, the whole Calgary Transit system showed significant recovery from the pandemic, with ridership now surpassing 2019 levels and overall system ridership approaching 90 million annual trips—85% of pre-pandemic figures. The report indicated that the growth in CTrain ridership, especially during weekday mid-day and evening travel, has played a crucial role in this recovery.[liii]

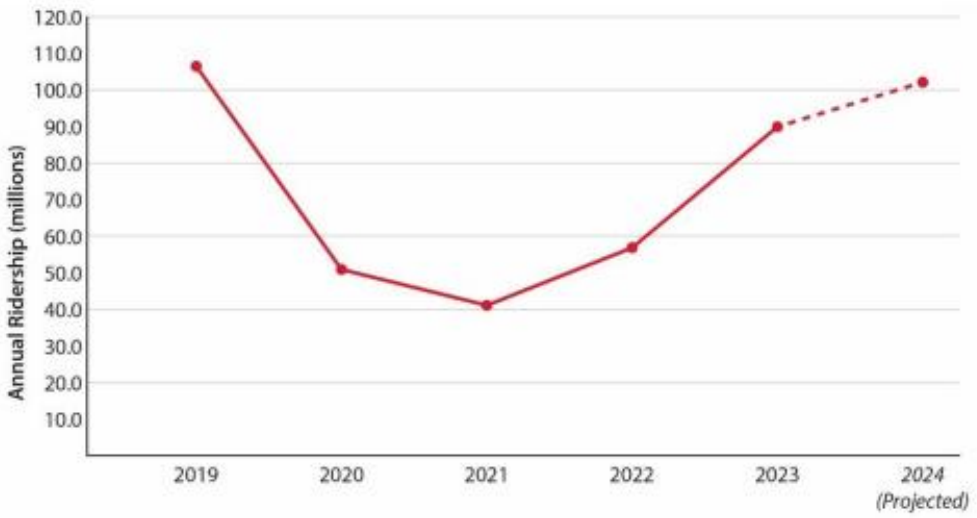


Figure 22: Calgary Transit Annual Ridership (Regular Transit) – 2019-202. Source: Calgary Transit

Calgary Transit website provides Yearly Ridership Dashboard, offering a more specific breakdown of CTrain ridership. In the first quarter of 2024, the CTrain has seen over 25 million trips recorded (a 21% increase compared to the same period last year), indicating its significant role in the city's public transit system.[liv]

Notably, a February survey revealed improvements in safety perceptions, with 72% of respondents feeling safe riding the CTrain during the day, up from 67% in May 2023. However, safety concerns remain, as 49% of those surveyed avoid using transit due to such worries, although respondents generally feel safer on buses.[lv]

In 2023, Calgary Transit's total revenue increased by $26.1 million but still only reached 77% of the budget target. This shortfall is partly due to a shift from higher-priced fare products, like Adult Monthly Passes, to subsidized fares. Sales of Adult Monthly Passes were only 80% of 2019 levels.[lvi]

Fares & Passes	Type	Age/Eligibility	Price
Cash Fares (Valid for 90 min)	Adult	Ages 18 and older	$3.70
	Youth	Ages 13-17*	$2.50
	Children	Ages 12 and under	Free
	Tickets (Cash fares in books of 10)	-	$37.00 (Adult)
		-	$25.00 (Youth)
Passes	Day Pass	-	$11.60 (Adult)
		-	$8.50 (Youth)
	Monthly Pass	-	$115.00 (Adult)
		-	$82.00 (Youth)
		-	$84.00 (Youth, effective Sept 2024)
	Weekend Group Day Pass	Maximum 2 adults + up to 5 over age 12	$16.00
	Low Income Monthly Pass	Based on income	Variable
	Regular Seniors Annual Transit Pass	Ages 65 and older	$154.50
	Low Income Seniors Annual Transit Pass	Ages 65 and older	$31.00

**Note: Youth fares also apply to students aged 18 to 21 attending high school full time (School ID required).*

Figure 23: Calgary Transit Fare and Passes. Source: Calgary Transit

Similarly, the UPass is offered for eligible students. It is a discounted transit pass available to full-time students at participating five major post-secondary institutions in Calgary, including SAIT, University of Calgary, Mount Royal University, Alberta University of the Arts, and St. Mary's University. It offers unlimited access to Calgary

Transit services, including both buses and the CTrain, throughout the academic semester. The cost of the UPass is included in student fees, providing significant savings compared to purchasing monthly passes individually.[lvii]

Additionally, Calgary Transit has implemented a self-serve fare system where over 70% of riders use prepaid fares, such as tickets and monthly passes, enhancing convenience while reducing fare collection infrastructure and costs. Transit security personnel conduct random fare inspections to discourage fare evasion, which remains below 2% annually.[lviii]

Its operational costs include employee wages (both operators and mechanics), fuel and oil, electricity to power CTrains, and materials and supplies. The costs are funded through a mix of transit fares, municipal tax support, and non-fare revenue streams such as advertising and parking. Grants from the Province of Alberta have also been critical, especially in supporting subsidized fare programs for low-income riders.[lix]

12.4 Governance and Strategic Factors

The governance of Calgary's CTrain system is primarily managed by Calgary Transit, which is a division of the City of Calgary's Transportation Department. Strategic oversight is provided by the City Council, which approves significant projects like the expansions of the Red, Blue, and upcoming Green Line. Calgary Transit operates the system, including planning, maintenance, and service delivery, ensuring it meets the city's transportation goals.

12.4.1 Strategic Planning

The CTrain network was strategically planned in the late 1960s to provide a cost-effective and sustainable transit solution. After thorough evaluations, the city selected LRT over a bus-based system due to its capacity to transport large passenger volumes efficiently while supporting TOD. This decision was critical as Calgary was expanding rapidly in **a radial pattern**, with new residential areas developing around the downtown core. Major transportation corridors were identified for the LRT, with stations integrated into the city's broader land use and transportation strategies.[lx]

During this process, the strategic integration of Calgary's LRT system with **land use**

South LRT corridors, focused on reurbanizing underutilized areas surrounding the stations. By tying land use to existing transit infrastructure, Calgary aims to create vibrant, walkable communities and employment hubs that are connected to the city's transportation network. This approach not only optimizes the value of the LRT system but also aligns with Calgary's goal of becoming a more sustainable city.[lxi]

Their planning process involved extensive stakeholder engagement, urban design, and strategic frameworks for redevelopment. For example, the Fish Creek Station Area Plan used a collaborative charrette process to explore intensification opportunities around the station. Such efforts have been instrumental in developing cohesive, transit-oriented neighborhoods that reduce reliance on cars and improve infrastructure efficiency, driving Calgary's long-term growth and sustainability goals.[lxii]

Calgary's CTrain system also exemplifies strategic urban transit planning in its efficient capital utilization.

In order to maximize the length of the system with the funds available, CTrain was based on a more affordable **surface-running design**, common in European cities.[lxiii]This design was less expensive to build than fully underground or elevated systems, like those in Toronto. Running trains at street level in dedicated lanes avoided the high costs of tunneling and elevated tracks, offering extensive service at a lower capital cost. It also provided energy efficiency, easier construction, and better integration with existing infrastructure. Using an existing downtown avenue, the CTrain maintains steady movement through optimized signal timing while operating alongside regular traffic.

Another of the key strategies that contribute to the system's cost efficiency is its incremental expansion model. By extending the lines over time and focusing on critical areas first, Calgary Transit has been able to manage costs effectively, avoiding the pitfalls of large-scale, all-at-once construction projects. This phased approach allows the city to adapt to budgetary changes and demand fluctuations, resulting in an affordable and flexible transit system that meets the growing needs of Calgary's population without overshooting financial limits.

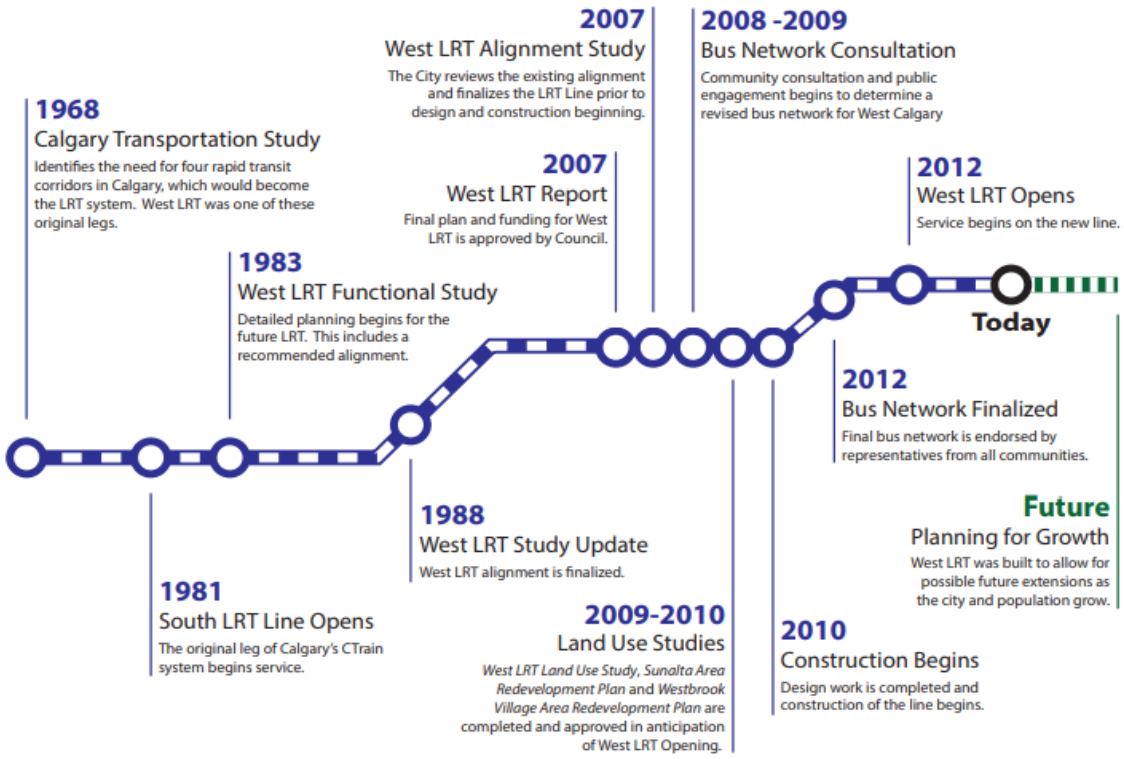


Figure 24: The phased-development of Calgary CTrain. Source: STRATEGIC DEVELOPMENT OF CALGARY'S CTRAIN SYSTEM

12.4.2 Key Benefits and Challenges

After the system began operations, CTrain demonstrated several key strengths for the area across suburban, urban, and rural areas, including:

- **Enhanced Connectivity and Convenience:** CTrain offers efficient and reliable transportation options, reducing travel time and costs for residents. This convenience makes the system a preferred choice for daily commutes, indirectly supporting local businesses and economies by increasing access to different parts of the city.
- **Sustainable Urban Development:** By promoting Transit-Oriented Development (TOD), CTrain encourages higher density, mixed-use development near stations. This results in more walkable communities, reduced reliance on cars, and lower greenhouse gas emissions, contributing to a more sustainable urban environment.
- **Increased Property Values:** Station area development, characterized by mixed land use and a variety of activity opportunities (such as grocery stores and

restaurants), enhances the attractiveness of nearby properties. This, in turn, boosts residential property values, providing economic benefits to homeowners and the local economy.

- **Economic Opportunities:** The development around CTrain stations creates economic opportunities. For example, phase 1 of the Green Line will significantly boost Calgary's economy by creating an estimated 20,000 direct and indirect jobs. During peak construction, approximately 1,000 workers will be needed daily. Additionally, the Green Line will enhance connectivity, providing access to 162,400 jobs within walking distance of its stations. This not only creates jobs but also enhances the overall economic vitality of the area.[lxiv]
- **Environmental and Health Benefits:** CTrain has enhanced Calgary's transportation network by moving more people, emitting fewer greenhouse gases, and using less energy and resources. Transit users typically walk more than drivers, providing a net health benefit to individuals and the community. Annually, the LRT will reduce greenhouse gases by 15,000 tonnes, with LRT being 58 times more energy efficient than cars at full capacity.[lxv]

12.4.3 Building the Future

Figure 26: Station rendering of passenger shelters, canopy and platform. Source: Calgary Transit

The Green Line represents Calgary's most substantial infrastructure investment and its next significant LRT expansion. Construction of Phase 1 is set to begin in late 2024 and will take approximately six years. This phase spans 10 km from Lynnwood/Millican

in the southeast to Eau Claire at the north end of downtown, featuring seven new stations. It will connect to the existing Red and Blue LRT lines and two rapid bus routes, enhancing connectivity across the city. The Green Line will introduce modern low-floor trains to improve accessibility and station integration and is expected to serve up to 32,000 daily riders, offering direct access to 162,400 jobs in downtown and southeast industrial areas.[lxvi]

Due to the project's size and cost, the Green Line will be built in phases as funding permits. The complete vision will eventually connect communities between Seton and 160 Avenue N, adding **29 stations** and **46 km** of track to the existing LRT system. The full Green Line will link key destinations like the South Health Campus and integrate with a future rail connection to the Calgary International Airport.[lxvii]

The planned stations for the Green Line are designed with a focus on functionality and aesthetics. All stations will feature 90-metre platforms, providing ample boarding space. Platforms will be 31 cm high and will be either center-loading or side-loading. Safety features will include heated shelters, glass walls for visibility, open spaces with plenty of lighting, and CCTV cameras. Some stations will also have plazas and spaces for gatherings or special events, and pathways and cycle networks will connect to several stations, enhancing accessibility and community integration.[lxviii]

Figure 27: Example of a ground-level station canopy. Source: Calgary Transit

The construction of the Green Line faces significant challenges due to a political standoff and funding withdrawal. Alberta's government has pulled $1.53 billion in

funding, claiming past mismanagement. This follows Calgary's investment of over $1.4 billion, including land acquisition, utility work, and a new fleet of light rail vehicles. The uncertainties extend to technical issues, like the incompatibility of pre-purchased vehicles with new proposed alignments and existing contractual commitments. Consequently, Calgary is now evaluating the costs of winding down the project and potentially shifting its execution and associated risks to the provincial government. [lxix]

Future extensions are planned for Red and Blue lines, though funding and construction timelines are not yet established. The Red Line will extend south to include Silverado and 210 Avenue S. The Blue Line will extend 7.5 km northeast to 96 Avenue, Country Hills, 128 Avenue N., and Stoney, while also extending west to 85 Street.

12.5 Leading Practices and Lessons Learned

The Calgary CTrain system demonstrates several leading practices and valuable lessons that can guide CBRM:

- **Strong Connectivity and Feeder Network:** The Calgary CTrain system is supported by a well-coordinated feeder network, including parking lots and multiple bus routes that connect nearby communities and employment hubs to its stations, allowing easy transfer between buses and trains. This network ensures efficient and reliable transportation, reducing travel time and costs for residents and facilitating daily commutes. Investment in a comprehensive feeder network that supports the main transit lines, enhancing overall connectivity and accessibility for residents has been a key success factor.
- **Sustainable Urban Development:** Land use planning for sustainable urban development is evident in Calgary's TOD. The CTrain encourages higher density, mixed-use development near stations, reducing car reliance and fostering walkable communities. This approach aligns with Calgary's long-term sustainability goals, supporting urban growth and environmental health. CBRM should implement TOD principles to create vibrant, walkable communities around transit hubs, reducing car dependence and promoting sustainable urban growth.
- **Phased Expansion:** CTrain's phased expansion model has been effective. By investing incrementally and focusing on critical areas first, Calgary managed to control costs while adapting to budget changes and demand fluctuations.

CBRM can also adopt a phased approach to transit expansion, allowing for financial sustainability and adaptability to changing budgetary and demand conditions.

- **Cost-Effective Design:** CTrain's surface-running design has proven to be cost-effective. Avoiding the high costs associated with tunneling and elevated tracks, this design provides extensive service at a lower capital cost. CBRM can consider more affordable design options to maximize the length of the transit system while staying within budget.
- **Comprehensive Safety Measures:** Calgary Transit has implemented extensive safety protocols, including increased peace officer patrols, station security guards, over 1,600 CCTV cameras, and improved lighting. Responding to security concerns enhances both perceived and actual safety. CBRM should prioritize safety in transit planning by implementing comprehensive security measures to create a secure environment and build public confidence in the transit system.

13 Buffalo, NY: Buffalo Metro Rail

13.1 Local Context

Buffalo is the second largest city in New York State. It had a population of 278,000 as of the 2020 Census, with its broader metropolitan area encompassing over 1.1 million people. Historically, Buffalo was a major industrial hub, particularly in manufacturing, transportation, and rail. While the decline of traditional industries like steel has impacted its economy, the city has transitioned toward a more diversified economy featuring healthcare, education, and green energy industries. For instance, Tesla's Gigafactory 2, which produces photovoltaic cells, is a key component of Buffalo's modern industry. Buffalo is also home to several higher education institutions, including the University at Buffalo, Buffalo State College and some private institutions.

Buffalo Metro Rail system was conceived to address the city's shifting population dynamics and declining downtown core. Buffalo Metro Rail was introduced in 1985 to provide a modern transit option for Buffalo's downtown core and surrounding areas. It was part of broader **urban revitalization** efforts.

Figure 28: Buffalo's Metro Rail. Source: The Urban Phoenix

Buffalo is a rare example of a city whose LRT investment met with underwhelming success. While the Metro Rail remains a vital system for residents, students, and workers, it suffered from expensive, outdated technology and a falling population. By analyzing Buffalo's Metro Rail system, CBRM can better understand the importance of

investing in modern technology and aligning public transit with population needs to ensure a successful and sustainable transportation solution.

13.2 Overview of Infrastructure and Service

Throughout the early 20th century, Buffalo was an industrial powerhouse, supported by an extensive streetcar network that connected the downtown area to various parts of the city. By the 1960s and 1970s, with downtown Buffalo continuing to lose business and population, the city sought to revitalize its core, and the decision was finally made to build a light rail rapid transit system. The construction began in 1978, and Buffalo Metro Rail opened in 1985.[lxx]

The project cost $530 million, with the Federal Government covering 80% of the expenses and New York State funding the majority of the remaining costs.[lxxi] Of this cost, about $2.05 million was for the relocation of families and businesses (purchased for the right-of-way) to suitable equivalent facilities. The cost of Buffalo's LRT was among the highest for U.S. systems. These elevated costs were largely due to the extensive below-ground segments, which are significantly more expensive to build compared to surface-level construction.

Buffalo Metro Rail has a single line that runs **10.3 km** along Main Street, serving **13 stations** between downtown and Canalside. The full ride takes about 22 minutes. This route was chosen due to its importance in linking the city's educational institutions and business hubs. Though initially planned as part of a larger system, suburban growth stagnation halted future expansions.[lxxii]

Buffalo Metro Rail system more closely resembles a subway than an LRT since it runs underground for 8.7 km of the total 10.3 km (five stations above-ground and eight underground). It starts on the surface downtown, entering a tunnel near the northern end of the Central Business District (CBD), continuing underground.[lxxiii]

Buffalo Metro Rail serves several key stations that provide access to important educational institutions, medical facilities, and cultural landmarks.

Figure 29: Buffalo LRT system. Source: Niagara Frontier Transportation Authority

University Station is a major stop that connects riders to the University at Buffalo's South Campus, making it a crucial link for students and faculty. Humboldt-Hospital Station is another key stop, providing access to Canisius College and the Buffalo Niagara Medical Campus, which includes prominent hospitals such as Buffalo General Medical Center and Roswell Park Comprehensive Cancer Center. Allen-Medical Campus Station also offers convenient access to the heart of the medical corridor, serving healthcare professionals, researchers, and patients. The system also connects cultural and recreational venues, enhancing its significance as a transportation backbone for the city.

Figure 30: The Free Fare Zone in the winter. Source: Photography of Buffalo

Notably, the portion of the rail in the CBD operates as a **fare-free zone**, covering the section near the Buffalo River to where the rail goes underground into a subway. This zone is traffic-free, with only emergency vehicles allowed, aiming to create a safer and more pleasant shopping and walking environment. Significant landmarks and attractions within this zone include the theater district and the Arena, which host live performances and sports events. However, the initial vision of this area as a bustling open-air shopping destination did not fully materialize due to Buffalo's harsh winter weather and the decline of retail presence over time.[lxxiv]

Moreover, Buffalo Metro Rail schedule is from 5 am to 1 am during weekdays, 7 am to 1 am on Saturdays, and 9:30 am to 7 pm on Sundays. Trains run at around 10-minute intervals during rush hour and every 20 minutes at other times.

The fleet consisted of 27 cars, built by Tokyu Car Corporation of Japan. Trains are typically two cars long, though for special events or rush hour, three-car trains are used. It has the capacity to serve approximately 2,600 passengers per trip under normal conditions and up to 2,700 passengers per trip during high-demand periods.

The underground section has full metro standard is completely accessible to persons with disabilities; the stops along the surface segment, however, feature small ramps to allow boarding at the front door of the train; otherwise, passengers need to climb up some steps to access the trains.[lxxv]

> "The safety and well-being of our employees, customers, and the public is an essential element of running an effective and efficient transportation authority." --- *Safety Mission Statement of Niagara Frontier Transportation Authority (NFTA)*

Buffalo Metro Rail also implements safety measures to protect passengers and ensure efficient operations. The Transit Authority Police Department (TAPD) patrols stations, trains, and surrounding areas to prevent crime and respond to incidents. Emergency equipment such as intercoms, phones, braking systems, fire extinguishers, and first-aid kits are in place throughout the system. CCTV cameras monitor activities, and public announcement systems provide timely information on service changes, delays, and emergencies. In 2022, Metro Rail recorded historically low numbers of preventable collisions, injuries, and lost time cases, highlighting the effectiveness of these initiatives.[lxxvi]

13.3 Operational Performance

Based on the figure on from the *Niagara Frontier Transportation Authority-Metro (Metro) 2023 Performance Report*, Buffalo Metro Rail's ridership has seen a significant fluctuation over the past few years.

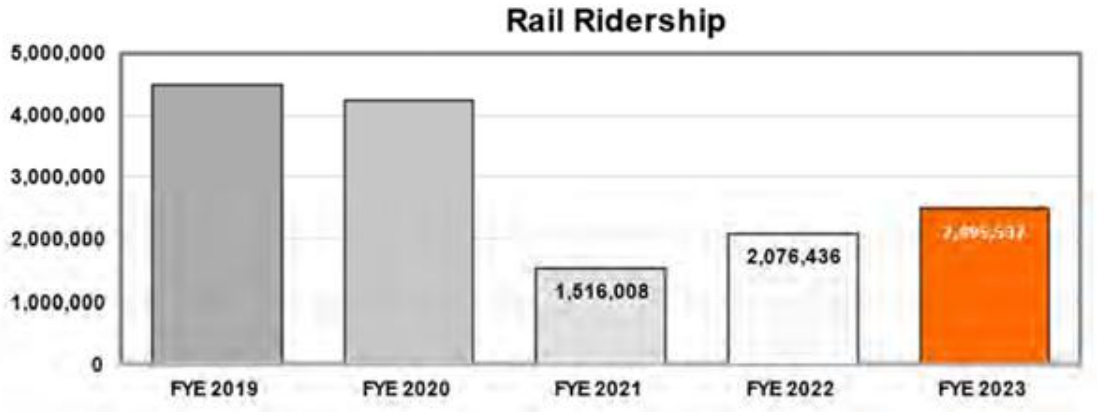


Figure 31: Rail Ridership in 2023. Niagara Frontier Transportation Authority

Before the pandemic, ridership was reaching nearly 4.9 million trips (2019). However, during the COVID-19 pandemic, ridership fell sharply to approximately 1.5 million trips—a decrease of over 60% compared to pre-pandemic levels. Since then, ridership has shown a gradual recovery, increasing to 2.5 million in 2023. While this is a positive upward trend, ridership is still significantly below pre-pandemic numbers.[lxxvii]

The proportion of riders using the light rail once accounted for 25% of the Niagara Frontier Transportation Authority's (NFTA) overall bus and rail network, but today that figure has dropped to under 17%. Several factors likely contributed to this decline in ridership. The broader trend of declining transit ridership across the U.S. has also impacted the light rail system, with rising car ownership and the increasing popularity of ride-hailing services like Uber and Lyft playing key roles in this downward shift. [lxxviii]

As noted, this line network connects major city nodes like the Buffalo Niagara Medical Campus, the KeyBank Center and cultural districts, mainly serving urban neighborhoods, college campuses and areas where car ownership isn't as high. Such a route enables daily commutes to work, schools, and essential daily services. For visitors to Buffalo, riding the Metro Rail is also a convenient experience, especially for exploring downtown attractions.

Figure 32: NFTA Bus. Source: Spectrum News

Additionally, the Buffalo Metro has connections with at least one bus line at most of its stations, seamlessly integrating with Buffalo's NFTA bus system. This intermodal

connectivity enhances the overall public transportation network, playing a central role in reducing reliance on cars and improving accessibility throughout the city. This is especially beneficial for students, tourists, and those without reliable transportation, fostering a more connected and accessible urban environment.[lxxix]

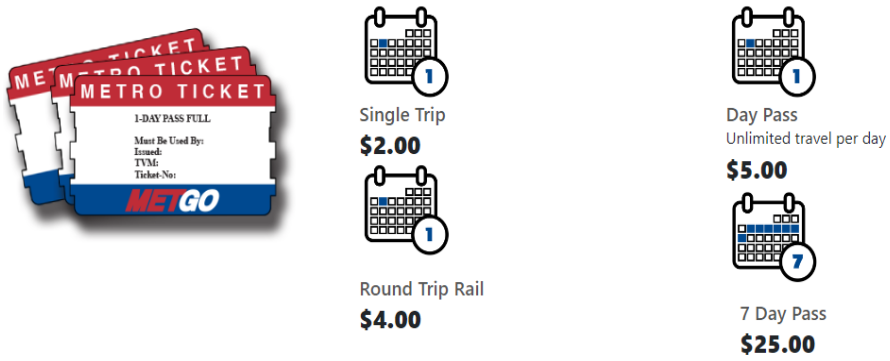
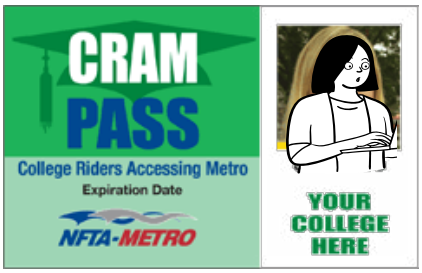


Figure 33: NFTA Fare Structure. Source: Niagara Frontier Transportation Authority

Buffalo Metro Rail fare structure offers various options for different needs. Regular fares for riders aged 10-64 are $2 for a single ride, with fare caps of $5 per day, $25 per week, and $75 per month, after which rides are free. Reduced fares for qualifying individuals are $1 per ride, with free rides after spending $2.50 per day, $12.50 per week, or $37.50 per month. Children nine and under ride free with a paid fare, up to three children per fare. MetGo cards can be purchased and reloaded at Metro Rail stations, various transportation centers, and retail partners. Cash is accepted on buses and at ticket vending machines but doesn't qualify for fare capping or reduced-fare discounts.[lxxx]



The NFTA Metro also offers the College/University Transit Pass Program, a discounted transit passes available for students at UB Medical School, Bryant & Stratton, Villa Maria College, and Erie Community College. This program gives students unlimited access to the Metro Bus and Rail system seven days a week, making it easier for them to commute to school, work, and other activities. The passes are customized with a student's photo, name, and school logo and are non-transferable. Participating colleges are invoiced each semester based on student enrollment data.[lxxxi]

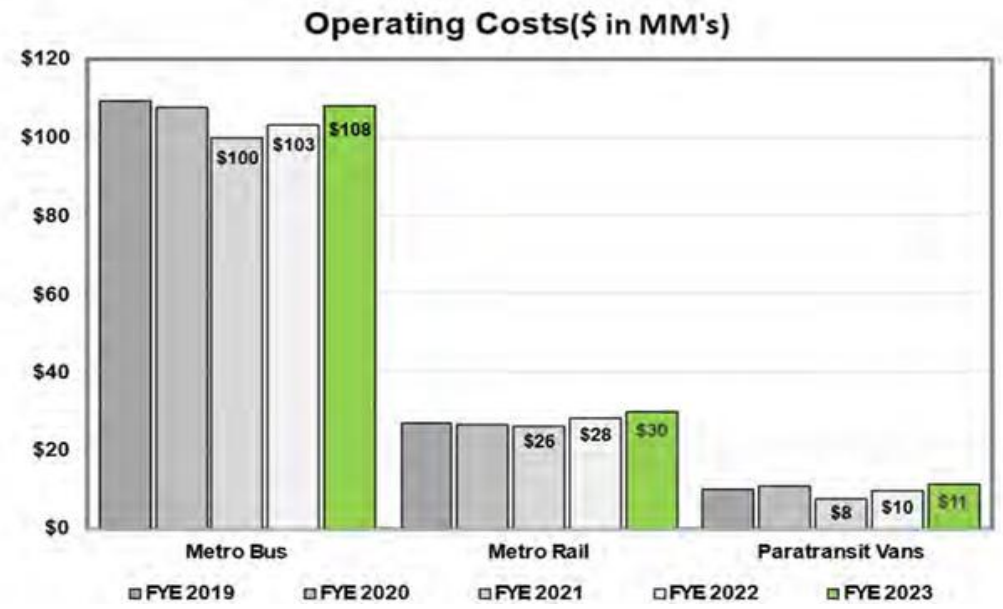


Figure 34: Operating Costs in millions. Source: Niagara Frontier Transportation Authority

In 2023 the operating expenses of Buffalo Metro Rail were $30 million, with labour accounting for around 70% of these expenses highlighting the importance of human resources in the system's day-to-day operations.[lxxxii]

It is worthwhile to note the revenue structure of Buffalo's public transit system is predominantly sustained by operating assistance from local, state, and federal government sources, complemented by passenger fares and other income streams such as advertising fees and miscellaneous revenues. Passenger fares, although a direct source of income, contribute only about 13% to the total revenue. This indicates a heavy reliance on government subsidies, which can provide stable funding but also expose the system to potential shifts in policy or budgetary constraints at different government levels.[lxxxiii]

13.4 Governance and Strategic Factors

The governance of Buffalo Metro Rail is overseen by the Niagara Frontier Transportation Authority (NFTA), which is responsible for the operation, maintenance, and strategic direction of the public transit system in the Buffalo-Niagara region. As planning evolved, NFTA was created in 1967 to bring all modes of public transportation in the Buffalo metro area under one roof, including 61 bus lines, the Port of Buffalo and the two international airports in the region. The NFTA is a public benefit corporation

established by New York State, managed by a board of commissioners appointed by the governor. This board sets policies, approves budgets, and ensures that the system aligns with regional transportation needs. This governance structure ensures that the Metro Rail operates as part of an integrated network of bus and rail services, addressing both urban transit and broader regional mobility needs.

13.4.1 Strategic Planning

Strategic planning for Buffalo Metro Rail focuses on both expansion and revitalization.

The historical context of Buffalo adds a base layer to the strategic planning behind the Metro Rail. Initially emerging from an intricate plan in the 1970s, the goal was to revitalize Buffalo's urban core and foster economic growth by integrating the city with its suburbs through an extensive rail network. Although the ambitious plan was scaled back due to economic constraints and changing federal funding priorities, the resulting light rail system still managed to transform the transit landscape. Buffalo's transition from an industrial hub to a service-based economy necessitated improved connectivity, which the Metro Rail provided by linking key locations such as the Buffalo Niagara Medical Campus, residential zones, and major recreational and cultural sites.

Additionally, Buffalo Metro Rail boasts one of the highest per-mile ridership rates in the country, attributable to effective planning that considered the commuting needs of its population. One of the fundamental success factors is the alignment between residential neighborhoods and significant economic centers. Buffalo Metro Rail successfully connects key urban areas despite the limited reach. The flat fare system, offering $2 per ride with daily and monthly passes keeping transit affordable, further encourages usage across diverse user demographics.[lxxxiv]

The system has seen a revival in recent years, especially with support from state funding programs such as the Buffalo Billion initiative, which is expected to fuel expansions that could further boost ridership and economic activity.

13.4.2 Key Benefits and Challenges

Buffalo, once a thriving industrial hub, has experienced a steady decrease in population since the 1950s, which has directly impacted the demand for public transportation services. From a peak of around 580,000 residents in 1950, Buffalo's population dropped to around 255,000 by 2020.[lxxxv] This shrinking population has reduced the potential ridership for the Metro Rail, undermining its financial

sustainability and creating challenges in securing both federal and state funding. As a result, the Metro Rail's capacity and infrastructure were originally designed for a much larger population, leaving the system underutilized. Furthermore, the suburbanization of the region, with many people moving to areas outside the city core, has further diminished the Metro Rail's reach and relevance.

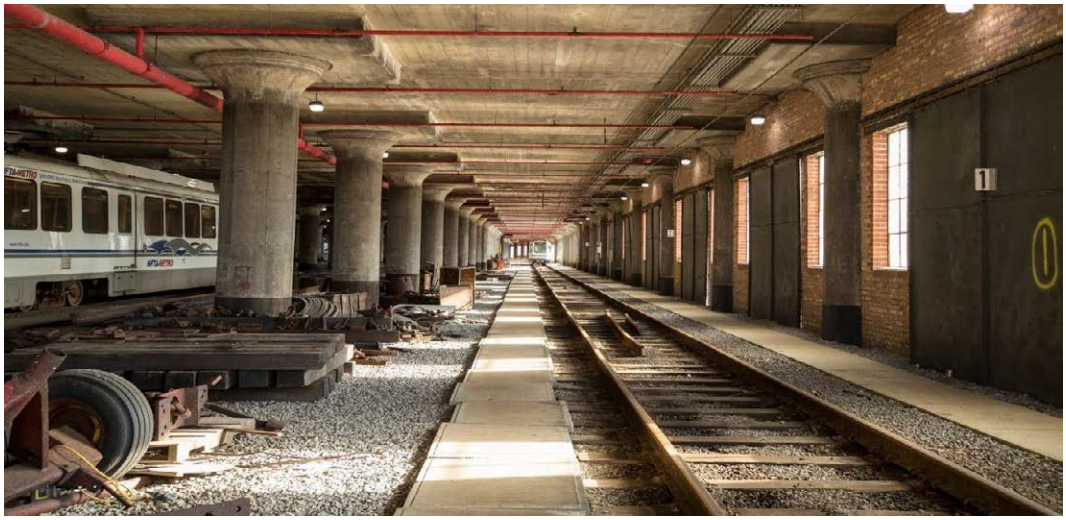


Figure 35: Buffalo's historic DL&W Terminal. Source: Niagara Frontier Transportation Authority

With this in mind, Buffalo Metro Rail has faced several challenges particularly in expanding its transit services. One major setback occurred in early 2020 when the Federal Transit Administration (FTA) excluded the planned extension from its New Starts program, which denied the NFTA crucial funding for the Project Development phase. Without federal support, the NFTA was forced to revise its proposal, reapplying with a new plan. This involved reducing the cost of the project by approximately $200 million by shortening the underground construction and moving most of the work to street level. This strategy aimed to minimize both expenses and disruptions to local communities and businesses. [lxxxvi]

In addition to the federal funding issues, state-level funding for Buffalo Metro Rail has been challenging. Buffalo's unique position as the only city in Upstate New York with a rapid rail system isn't accounted for in the state's funding model. This leaves NFTA's funding on par with cities that only operate bus systems, hindering the rail's ability to expand and improve. [lxxxvii]

Beyond the funding issues, the Buffalo Metro Rail system has been navigating difficulties related to its design and ridership. Originally constructed with the hope of driving economic growth along Main Street, the system has struggled to achieve this objective for decades. Only recently has some revitalization begun to take hold in the downtown area, largely driven by investments from educational institutions and local businesses. However, these developments have been offset by other city decisions, such as reintroducing cars to Main Street, which has negatively impacted the Metro Rail's reliability, since the reconstruction efforts have caused disruptions. [lxxxviii]

Figure 36: Buffalo's Metro Rail. Source: The Urban Phoenix

Nevertheless, even in Buffalo, property values are higher within walking distance of the stations. A study by a University at Buffalo urban planning researcher has found that houses located within a half-mile radius (0.8 km) of Buffalo's light rail stations are assessed at $1,300 to $3,000 more than similar properties that are not within walking distance of the stations. This trend underscores the economic benefit of the transit system, as accessibility to reliable public transportation is a highly desirable feature for both residential and commercial properties. The increased property values near stations indicate a recognition of the convenience and connectivity offered by the Metro Rail, enhancing the appeal of these areas for residents, businesses, and investors alike. Consequently, this has spurred additional economic development and investment in neighborhoods close to the rail line, contributing to the overall revitalization efforts in Buffalo. [lxxxix]

13.4.3 Building the Future

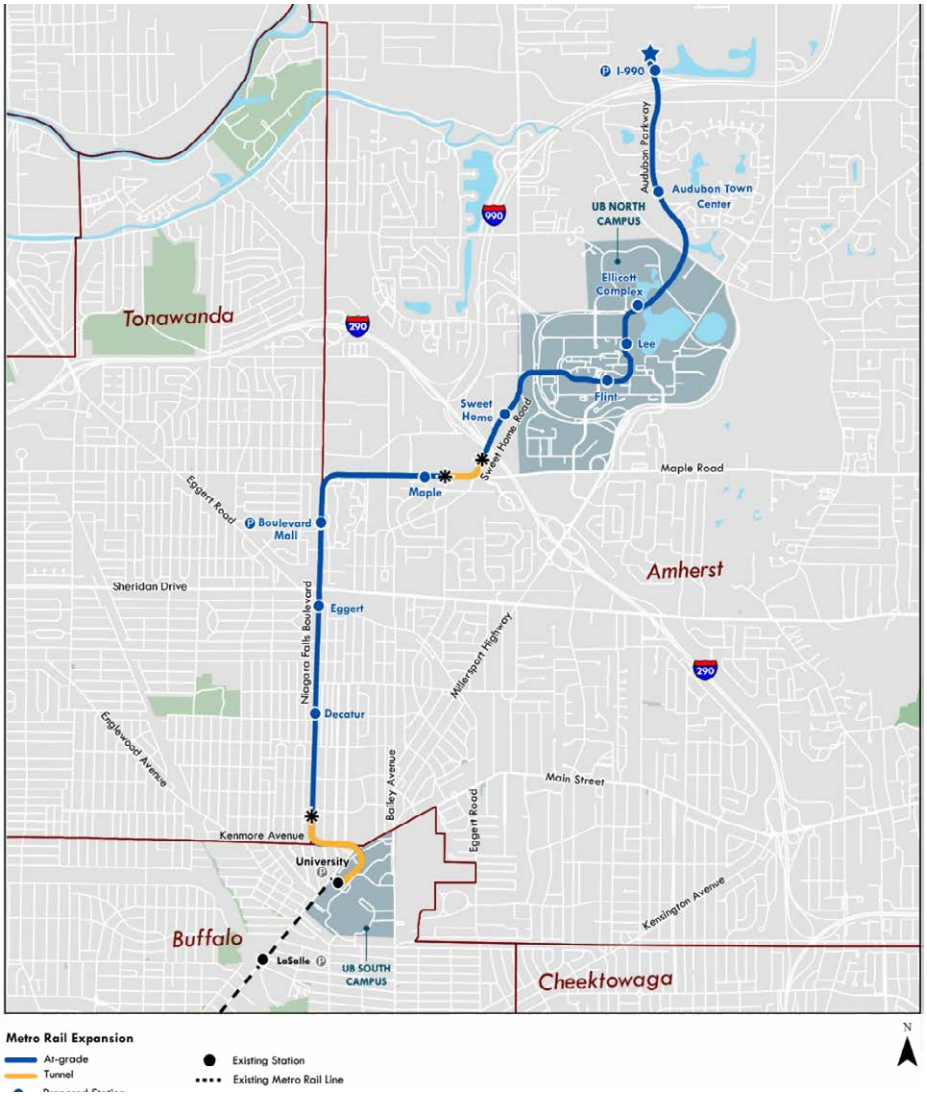


Figure 37: Proposed expansion plan. Source: Niagara Frontier Transportation Authority

In 2017, Phase Two of the Buffalo Billion program was announced, allocating $215 million towards revitalization and smart growth initiatives, with $5 million designated for environmental reviews and preliminary engineering for the rail extension. The proposed expansion will extend Metro Rail by 6.5 miles to SUNY UB North Campus and beyond, establishing ten new stations, including three on the North Campus, and ultimately be expanded to traverse Niagara Falls Blvd.

This extension will connect high-density job and residential centers, significantly benefiting over 30,000 students and 14,000 employees across the three SUNY UB

campuses by reducing commute times between campuses to under 20 minutes, thereby increasing ridership to an estimated 45,000 daily commuters.

The $1.2 billion expansion plan aims to boost ridership and serve as an economic development tool, attracting younger generations to more affordable cities where car ownership is optional. With most of the new route being at grade, it is expected that the new stations will stimulate commercial activity in surrounding areas. The extension is projected to attract over $1.7 billion in investment, with an expected increase in property values by $310 million.

While CRT and the NFTA are ready to extend the light metro further north, to the suburb of Amherst, and northeast to the **Buffalo Niagara International Airport**, the FTA has suggested the agency consider buses instead. [xc]

13.5 Leading Practices and Lessons Learned

The Buffalo Metro Rail system demonstrates several leading practices and valuable lessons that can guide CBRM:

- **Adapting to Changing Demographics and Technology:** Buffalo Metro Rail has faced challenges due to population decline and outdated technology, though ongoing investments and modernization efforts are trying to address these issues. For CBRM, staying adaptive to demographic shifts and technological advancements is essential, and planning for future upgrades will keep the transit system efficient and relevant.
- **Strategic Funding Sources**: Maintaining the Metro Rail is essential to accessing additional federal funding and ensuring system efficiency. An important lesson is that prioritizing the securing of consistent funding for both the construction and maintenance of the transit system will help ensure long-term sustainable operations.
- **Integration of Different Transit Modes:** Buffalo Metro Rail integrates seamlessly with the city's bus system, with the aim to enhance overall connectivity and reducing car dependency. This intermodal connectivity ensures that transit options are accessible for more residents. Buffalo highlights a best practice where developing a comprehensive transportation network that integrates various transit modes will improve accessibility and convenience for riders.

- **Consideration of Weather Conditions:** The weather conditions could impact the usability of the station, especially during non-summer months. Buffalo's fare-free zone was intended to be a bustling open-air shopping destination, but harsh winter weather and the decline of retail presence hindered this vision. It is important to consider local weather conditions in the planning of stations and zones to help ensure that the system remains practical and attractive year-round, preventing weather related issues from affecting usability and ridership.

14 Lund, Sweden: Lund Tramway

14.1 Local Context

Lund is a municipality in southern Sweden, with a population of 94,000 as of 2020. The city is renowned for its vibrant research community, housing Lund University, one of Scandinavia's largest institutions of higher education. Lund has experienced significant growth in both population and economic activity, driven largely by its status as a center for innovation, research, and education. This growth, coupled with the city's vision for sustainable urban development, created a pressing need for modern and efficient public transportation to accommodate increasing demand while reducing reliance on private cars.[xci]

The introduction of the Lundalänken Lund Tramway in 2020 was a response to these challenges, aimed at enhancing public mobility, minimizing traffic congestion, and supporting Lund's long-term urban development goals. The Lund Tramway falls under the broader Skånetrafiken public transport system, and it is Sweden's fourth tramway city, following Stockholm, Göteborg and Norrköping.

Figure 38: The first of the Lund CAF Urbos 100 trams approaches the city terminus. Source: The International Light Rail Magazine

The overall impact of the Lund Tramway has been profound. Not only has the LRT reduced congestion by offering a reliable alternative to car travel, but it has also contributed to Lund's environmental objectives by cutting emissions and promoting a shift toward public transportation. The Lund Tramway has played a key role in attracting investments to the city, particularly in the research-intensive area. It provides a good model for how medium-sized cities can integrate sustainable transport solutions into their long-term development strategies.

14.2 Overview of Infrastructure and Service

Lund's rapid urban development, along with the establishment of the Lund University and the increasing presence of global research facilities, required a robust transportation network to accommodate both local residents and visiting scientists. As early as the 1990s, local stakeholders identified the need for a high-capacity, environmentally friendly transit system. Early steps toward this goal were made in 2003 when the **Lundalänken Bus Rapid Transit** (BRT) was developed with the foresight of potentially converting it into a tramway. This BRT route also lays the groundwork for the future light rail system that would enhance mobility in the city.

Formal planning for the LRT began in 2010, and this project was officially approved in December 2015. The project had a total cost of SEK 1.495 billion (CAD $215.9 million), funded by local, regional, and national governments. Lund secured 40% of the project's initial budget through a national program for sustainable urban development, totaling SEK 298 million (CAD $43.4 million). This allowed the city council to approve the project's start. Additional funding of SEK 74.5 million (CAD $10.8 million) from the Sverigeförhandlingen program later increased the government's total contribution to 50%. The project's costs included SEK 890 million (CAD $128.5 million) for infrastructure, SEK 310 million (CAD $44.8 million)) for the depot, and SEK 295 million (CAD 42.6 million) for rolling stock.[xcii]

By May 2016, Swedish construction giant Skanska was contracted to build the LRT line, including infrastructure and electrification. Construction began in February 2017, with infrastructure completed by the end of 2019.

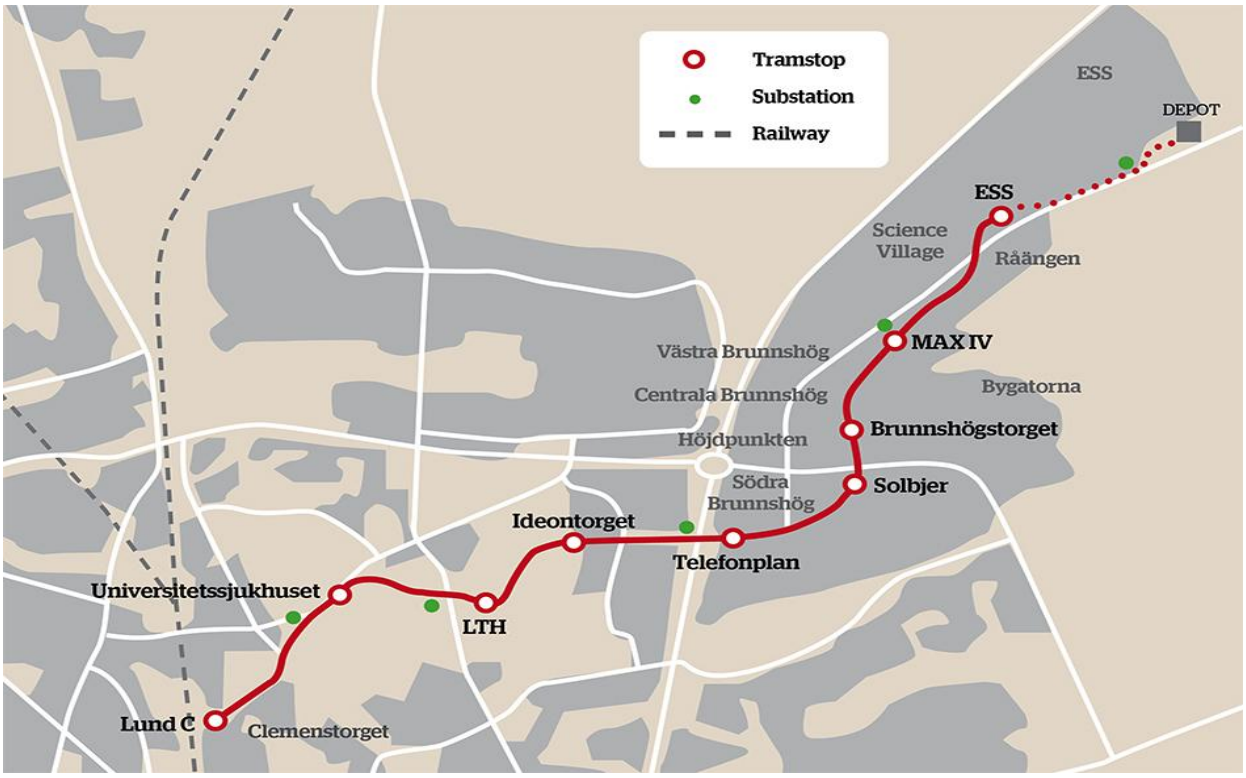


Figure 39: The Network. Source: Robert Schwandl.

The Lund Tramway inaugurated in December 2020, offering passenger service along with 9 stops featuring a 5.2 km route that runs from Lund Central Station (Lund C) to the European Spallation Source (ESS). The full ride is in 14.5 min. The route largely follows the path of the former Lundalänken busway, with minor extensions at both ends.[xciii]

This modern double-track tramway connects key locations in the city, including one hospital, Lund University, and the Ideon and Medicon Village areas. It continues to Brunnshög, Lund's primary growth area, and connects to major research facilities like ESS and the Science Village. Specifically, popularly known *as Knowledge Corridor*, the route between Lund C and ESS is one of busiest commuter routes in Lund. Lund C is the third biggest station in Sweden; 40,000 people commute back and forth to Lund everyday. Most of them continue on their way from the medieval city centre to the hospital, the University, the Science Park and the research plants. [xciv]

The tramway uses 7 modern and low-floor access trains. Each has a length of approximately 30m and breadth of 2.65m. The tram has six doors on each side and offer a passenger capacity of 200.[xcv]

The Lund Tramway boasts excellent intermodal connectivity, enhancing the efficiency of the city's existing transportation network. Lund has also made sure that people entering the city via the central train station have clear information and pathways as they move from train to bus or bike.

Figure 40: Ample bicycle parking in Lund next to a stop. Source: Lund Municipality.

The Lund Tramway is integrated with the city's bus system, ensuring smooth transitions between different modes of public transport. Several tram stops are co-located with bus stops, making it convenient for passengers to switch between trams and buses without long walking distances. This is particularly beneficial at key interchange points such as Lund C Station, where regional trains, buses, and trams converge, creating a hub for seamless transfers. Furthermore, the tram system is well-connected to Lund's extensive cycling infrastructure. Lund is a highly cycle-friendly city, and many tram stations feature bike parking facilities, allowing commuters to combine cycling and public transport. This multimodal integration fosters sustainable urban mobility, reducing the need for car use and promoting eco-friendly transportation alternatives.[xcvi]

Figure 41: The tramway with existing models. Source: Lund Municipality.

The Lund Tramway operates on a frequent schedule, making it a highly accessible option for commuters and residents. During weekdays, trams run every 15 minutes between 6 am and 8 pm, ensuring frequent service during peak hours. Early morning and late evening services operate every 20 minutes, with a slight reduction in frequency after 8 pm, running every 23 minutes until 1 am. Weekend services maintain a steady frequency of 15 to 20 minutes throughout most of the day, with more frequent trams between 10 am and 6 pm.

It is important to note that as part of the construction, rerouting pipes and wires was critical to accommodate the new tramway. According to Skanska, this complex task was executed in stages to minimize disruptions to essential city systems. Ensuring the city's infrastructure functioned seamlessly across all transportation modes, including for pedestrians and cyclists, was a top priority for them. The work on these reroutings began above ground at the end of 2017. The project's planning and execution were carefully managed to limit the impact on the residents of Lund. [xcvii]

In addition, the tramway enhances the city's sustainable urban development goals, incorporating new pedestrian and cycling paths alongside the tram lines. The surrounding area has been landscaped with 300 new trees and 40,000 square meters of grass, blending urban transport with green space.

14.3 Operational Performance

At its opening, ridership was predicted to be around 40,000 passengers per day. There is currently no available performance ridership data because the tramway is still in its early operational stages, and a comprehensive shift share analysis is underway. However, the Lund Tramway is becoming an essential part of everyday commuting. The Lund Tramway serves a rapidly growing population, particularly in the northeast of the city. As noted above, this stretch connects key points of interest, including Lund University, hospital, and major research hubs like Medicon Village and MAX IV, facilitating easy movement for a variety of users. Students, commuters, scientists, and professionals represent the core user groups benefiting from the Lund Tramway's strategic route. Students, particularly those attending Lund University, use the tramway to travel conveniently between the main campus and key academic and research centres like Ideon Science Park and Medicon Village. The tramway also serves as a critical transportation link for scientists and researchers traveling to major research hubs, such as the MAX IV Laboratory and the European Spallation Source (ESS). As these facilities are expected to bring thousands of visiting scientists annually, the tram plays an essential role in connecting the city's scientific community.[xcviii]

The fare structure for the Lund Tramway is integrated with the Skånetrafiken public transport system, allowing seamless travel across buses, trains, and trams in the Skåne region. Its fare structure uses a zonal fare model, with most of Lund falling within Zone 1:

- **Single Tickets:** A single ticket for one zone costs 27 SEK for adults (3.20 CAD) and 17 SEK for children/students ($2.00 CAD). These tickets are valid for one hour from activation.
- **24-Hour Passes:** This pass costs 70 SEK for adults ($8.30 CAD) and 45 SEK for children/students ($5.30 CAD), allowing unlimited travel within all zones for 24 hours.
- **30-Day Passes:** A monthly pass for unlimited travel within one zone costs 700 SEK for adults ($83 CAD) and 500 SEK for children/students ($59 CAD). There are also options for multiple zones which increase in price accordingly.

Figure 42: The tramway ticket machines. Source: Lund Municipality.

Passengers can purchase tickets through the Skånetrafiken app, which is available for both Android and iOS devices, making it convenient to buy and validate tickets on the go. Tickets can also be bought at ticket machines located at tram stops, Skånetrafiken customer centers, or through authorized resellers like convenience stores. Additionally, contactless payments and travel cards[5] are accepted, providing further flexibility. With contactless payments, passengers simply tap their card or mobile device on the reader on board the tram. [xcix]

Specific and detailed financial data on the Lund Tramway, including operating costs and revenue sources, is not readily available in public records.

14.4 Governance and Strategic Factors

The governance of the Lund Tramway primarily falls under the Lund Municipality, which is responsible for overseeing the project and its operations. Jointly owned by the Lund Municipality and the Skåne region, the tramway infrastructure is managed by the city, while the depot and rolling stock are under the regional administration's purview. Operations were entrusted to Nettbuss, the city's bus operator, starting in February 2018, integrating bus and tram services to enhance operational efficiency and safety

[5] Jojo travel cards are rechargeable smart cards used for convenient payment on Skånetrafiken's public transport in the Skåne region. They can be loaded with cash value or various travel passes, offering flexible and cost-efficient travel options. Cards can be easily reloaded through the Skånetrafiken app, online, at ticket machines, or customer service centers. Widely accepted on trams, buses, and trains, Jojo cards provide a hassle-free, environmentally friendly alternative to paper tickets for regular commuters.

compliance. As of 2023, a new long-term operating contract will be set to be awarded following a tender process.[c]

14.4.1 Strategic Planning

The Lund Tramway aligns with the municipality's focus on sustainable development based upon major infrastructure projects.

The strategic planning for the Lund Tramway is a part of a comprehensive **urban renewal and development project**, which includes housing and offices for approximately 50,000 people in north-eastern Lund.[ci]

> "The project is a part of a comprehensive urban renewal and development project, which includes housing and offices for approximately 50,000 people in north-eastern Lund." --- *Lund City Council*

Lund is one of the fastest-growing regions in Sweden. Over the past 50 years, the city's population has doubled, and it is currently projected to increase by 1,000 inhabitants annually. With the expansion of key research institutions like ESS, Lund expects to attract thousands of scientists annually starting in 2023. This rapid urbanization has led to city planning focused on inward development through densification, creating distinct zones, meeting points, and connected neighborhoods.

In addition to serving research establishments, the Lund Tramway is a strategic regional investment in environmental sustainability and climate-smart urbanization. Lund's city planning is deeply rooted in its commitment to sustainability, evidenced by its recognition as the global winner of the *2022 One Planet City Challenge*.[cii]

The city's strategic plan emphasizes environmentally friendly transport, with the tramway playing a pivotal role. As part of the effort to reduce car dependency, the tramway supports the transition to fossil-free public transport by 2030. This aligns with Lund's vision of creating a connected, climate-smart city by reducing carbon emissions and promoting eco-friendly mobility options, highlighting the city's leadership in sustainable urban development. [ciii]

14.4.2 Key Benefits and Challenges

The construction of the Lund Tramway system faced several challenges, particularly during the COVID-19 pandemic and in addressing environmental concerns. The vehicle construction had been progressing steadily at CAF's facility in Zaragoza, Spain. However, the onset of the pandemic caused a halt in operations when Spain entered lockdown in March 2020. This delay lasted for about a month before work resumed in late April, affecting the overall project timeline and creating logistical challenges for the delivery of the vehicles.[civ]

In constructing the Lund LRT, another challenge was building the tramway through a bustling city center with narrow streets. The logistical complexity of maintaining pedestrian and vehicular access while managing a large construction site was compounded by the need to mitigate ground-borne vibrations, especially in sensitive areas. For example, the tramway route began in Lund's medieval city center, where historic buildings were vulnerable to structural damage from vibrations. Ensuring that these buildings were not adversely affected by the vibrations from the tram required specialized infrastructure. The most significant vibration-related challenge came at the other end of the line, near the Max IV research facility, which houses a particle accelerator highly sensitive to even the smallest vibrations.

Figure 43: New housing area Solbjer – with tramway service. Source: Lund Municipality.

The operation of Lund Tramway has significantly boosted economic and urban development, particularly in the Brunnshög district. According to the International Light Rail Magazine, several developers in Lund have noted that without the tramway, they would not have considered investing in the area. This underscores the importance of fixed rail infrastructure in fostering investor confidence. Along the tram route, property values have risen by an average of 25%, reflecting the enhanced desirability of areas with reliable, permanent public transport links. [cv]

Approximately 30% of the city's projected growth over the next three decades is planned along the tram corridor, with expectations of 40,000 new residents and workplaces. The tramway has already begun creating a positive feedback loop: the initial development spurred by the new infrastructure has made the area more attractive for sustainable growth, which in turn fuels further investment and expansion. This "virtuous cycle" positions the tramway as a cornerstone for Lund's long-term goals of sustainable urban development and reducing carbon emissions.[cvi]

In addition to driving economic growth, the tramway has also strengthened Lund's environmental sustainability efforts. The shift to electric public transportation supports Lund's commitment to becoming carbon-neutral by 2030 and fossil-fuel-free by 2045. By providing an attractive and efficient public transit option, the tramway encourages residents to choose more environmentally friendly modes of transportation, which not only decreases traffic congestion but also contributes to better air quality and lower carbon emissions in the urban area.

It complements Lund's broader sustainability initiatives, such as its focus on promoting cycling and walking. The interconnected network of trams, bike lanes, and pedestrian pathways supports a holistic approach to reducing the city's carbon footprint. By incorporating green infrastructure into the city's public transportation system, Lund is creating an urban environment that fosters sustainable living and encourages citizens to adopt eco-friendly habits.[cvii]

14.4.3 Building the Future

In the future, there may be expansions of the tram network to other parts of Lund or nearby cities, depending on demand and the city's continued growth.

The proposed future plan involves extending the tramway to neighboring towns such as Staffanstorp and Dalby, as well as new developments to the North and East of the current endpoint at the ESS. By connecting key locales and making public transport more accessible, Lund aims to accommodate its growing population while

maintaining its commitment to sustainability. Additionally, future enhancements for the tramway include the development of the main boulevard in the planned area of Västerbro. The Västerbro area is expected to become a crucial urban development zone, and incorporating light rail capabilities into its main boulevard will facilitate seamless connectivity with the existing tram network.[cviii]

As Lund grows rapidly, the capacity of public transport will be crucial in handling its increasing population.

14.5 Leading Practices and Lessons Learned

The Lund Tramway system demonstrates several leading practices and valuable lessons that can guide CBRM:

- **Strategic Integration with Urban Planning:** The Lund Tramway is integrated into the city's broader sustainable urban development strategy. The tramway not only enhances public transportation but also aligns with key urban planning goals such as inward development, creating distinct zones, and supporting new growth areas. This synergy has led to a well-connected, climate-smart city. A key takeaway is that new transit projects should be closely tied to urban development plans, promoting coordinated growth and efficient land use. Strategic integration can amplify the benefits of transit investments and foster sustainable city development.
- **Multimodal Connectivity:** The Lund Tramway is designed to integrate seamlessly with other modes of transportation, including buses and cycling. Intermodal connections are smooth, with several tram stops co-located with bus stops and ample bicycle parking facilities at tram stations. Prioritizing multimodal connectivity in transportation planning will help ensure that the modes of public transport work synergistically. Facilitating easy transfers can increase public transit usage and reduce dependence on private cars.
- **Leveraging Existing BRT Routes for LRT Development:** The existing Lundalänken BRT route with the foresight of potentially converting it into this LRT system. This preparatory step provided a clear transit corridor, which facilitated the smoother transition and integration when upgrading to the tramway. A key takeaway is acknowledging the potential to utilize existing BRT routes as a foundation for future LRT expansions.

- **Strong Investment in Sustainable Infrastructure:** Lund has prioritized investments in environmentally friendly infrastructure, evidenced by the tramway's role in reducing carbon emissions and promoting eco-friendly mobility. Lund's proactive approach of investing in transit solutions that contribute to long-term sustainability goals offers an important lesson. Emphasizing green infrastructure can enhance environmental performance and attract environmentally conscious investments.

15 Implications and Conclusion

These case studies reveal that LRT systems have the potential to significantly reshape urban development and regional connectivity. Each city used the LRT system as a tool to address specific urban challenges, such as managing rapid population growth, reducing carbon emissions, or enhancing economic attractiveness. The implications of these projects extend beyond transportation improvements; they have served as catalysts for sustainable urban planning, attracting investment and promoting environmentally conscious development. For example, cities like Waterloo and Lund have leveraged their LRT systems to promote growth corridors, focusing on transit-oriented development to drive housing and commercial investment. In Edmonton and Calgary, LRT has helped manage suburban sprawl by providing efficient alternatives to car travel, while Buffalo's transit investment has played the role in reviving a declining downtown core.

However, LRTs also pose challenges such as high upfront costs, disruption during construction, and the need for extensive planning to integrate with existing urban structures. Cities that successfully implement LRT projects, like those discussed, show that long-term benefits—such as economic growth, environmental sustainability, and improved quality of life—often outweigh these initial challenges. Thus, for CBRM, a careful balance of vision, planning, and community engagement is key to maximizing the positive impacts of such infrastructure investments.

Appendix A: Secondary Research Search Terms

The following search terms guided information gathering for this case study analyses. Each search term included customization according to the jurisdiction being examined.

- Light Rail System
- Electric Light Rail Implementation
- Urban Light Rail Networks
- Commuter Rail Infrastructure
- Ridership Data
- Public Transit
- Light Rail Connectivity with Bus Systems
- Light Rail Economic Impact
- Suburban Light Rail Expansion
- Electric Rail Sustainability Practices
- Urban Mobility via Light Rail
- Electric Rail Service Frequencies
- Capital Costs of Light Rail
- Light Rail User Demographics
- Electric Rail System Governance
- Electric Rail Transit Integration; and
- Light Rail Accessibility Features

Appendix B: Stakeholders Engagement Findings

DMDE Engineering has engaged ATN Strategies to facilitate conversations with key stakeholders, rights holders, and potential partners to inform the feasibility study and to aid in the development of the business case for an electric GO Train system in Cape Breton Regional Municipality (CBRM). As part of a more comprehensive study building on the encouraging findings of the Pre-Feasibility Study prepared by DMDE Engineering, these engagements aimed to gather the perspectives and insights of key informants relative to advancing a Go Train in CBRM.

An inventory of potential key informants has been compiled collaboratively by ATN and DMDE Engineering teams. ATN Strategies engaged key partners and stakeholders in bilateral and small-group interviews. This document summarizes the insights generated through these conversations. The insights are organized around themes and capture perceptions about the project, its benefits, opportunities, and potential challenges.

16 Methodology

ATN worked collaboratively with DMDE Engineering project team to identify and engage with a variety of stakeholders, including:

- Municipal officials
- Business leaders
- Economic development and business support organizations
- Federal and provincial officials
- Community and environmental organizations
- Post-secondary education leaders; and
- Elected officials.

Other relevant stakeholders were engaged based on interviewee recommendations and their knowledge of light rail transit systems. Eight bi-lateral interviews and three small group interviews were conducted virtually and in-person.

The insights gathered from all the sessions are thematically organized and summarized in the following section. A register of all key informants consulted for this Business Case is presented in Appendix A.

17 Findings

This section summarizes input from community leaders, transportation experts and provincial officials to provide a comprehensive overview of stakeholders' perspectives on the proposed Light Rail Transit (LRT) system's potential. Findings are organized under key themes that emerged from the discussions. Topics include support for the proposed project, perceived benefits of the project, and challenges and considerations as the proposal advances.

17.1 Community Support for the Light Rail Transit System in CBRM

Overall, stakeholders expressed a strong desire for the LRT system, highlighting the community's broad support for improved transportation infrastructure. This support arises from the need for more efficient and reliable public transit options that can alleviate traffic congestion while reducing the community's reliance on personal vehicles. The proposed LRT is seen as a transformative project that has the potential to modernize CBRM's public transport network, aligning with regional development and sustainability goals. Further, this proposed project is considered by some to be an opportunity to transform the narrative of the region from a mining and heavy industrial economy- to a region that embodies environmental sustainability and modernization.

Despite the enthusiasm, several discussions underscored possible financial concerns among community members. Some participants expressed hesitation about the project's overall cost along with potential municipal tax implications. This concern over financial sustainability is pivotal in gaining and retaining political and public support. Stakeholders emphasized the necessity of mitigating these concerns by securing substantial federal and provincial funding. Key Informants believe that demonstrating a clear investment strategy, which includes external public sector funders, is essential to reassure residents and local stakeholders. This approach would alleviate fears about local tax increases and make the LRT project more palatable to the community.

Community members also stressed the importance of ensuring that the economic benefits of the LRT, such as workforce development, increased regional connectivity and potential boosts to local businesses, are communicated effectively. Stakeholders highlighted the importance of transparency and ongoing communication about how the LRT will be funded and the long-term financial

implications for the municipality. This transparency is viewed as key to building a broad base of sustained support across diverse community groups.

17.2 Anticipated Benefits of an LRT System in CBRM

The proposed LRT system in CBRM is expected to bring significant benefits to the region. Stakeholders have identified a range of potential benefits, including:

- **Economic Development and Impact:** During stakeholder consultations, the proposed Light Rail Transit (LRT) system in CBRM emerged as a potential catalyst for economic growth. Stakeholders emphasized that the LRT could significantly enhance regional economic activity by improving access to employment hubs and key retail locations. This improved access is anticipated to invigorate local businesses by increasing foot traffic, drawing more visitors, and facilitating easier movement for both employees and consumers, which could stimulate retail and service sectors across the region.

"It would be beneficial for the students in the area, first and foremost, but I think it would translate to the businesses as well. When students are able to get around, it helps people get to their jobs and more."

    - Additionally, the potential for increased tourism was highlighted, as the LRT could simplify travel for tourists by providing a reliable transit option that aligns with modern urban experiences expected by visitors. Enhanced connectivity facilitated by the LRT may place Cape Breton as a more attractive and accessible destination, potentially boosting the tourism sector's contribution to the local economy.
    - Despite this optimism, some stakeholders expressed caution about the extent of economic benefits, pointing to existing labor market constraints in the region. Stakeholders noted the importance of aligning LRT development with broader workforce strategies to ensure that increased accessibility leads to tangible employment growth rather than merely displacing existing economic activities. It is important to acknowledge that these concerns are not exclusive to the LRT project.
- **Housing and Urban Development:** Stakeholders indicated that the LRT system is expected to positively impact housing supply and development in CBRM. By enhancing connectivity between less densely populated areas and urban centers, the LRT could alleviate existing housing pressures and catalyze residential dispersion. The improved transit links provided by the LRT are

anticipated to make living in outlying areas more feasible for individuals who work or study in urban centers, thereby widening the region's housing market and reducing congestion in high-density areas.

- LRT hubs could also spur densification in select neighborhoods. Connectivity could also stimulate new residential and mixed-use developments, particularly in underserved areas. With easier access to urban amenities and employment centers, these areas may attract developers seeking to capitalize on increased accessibility and demand for housing. Local planners and stakeholders see the potential for transit-oriented development that integrates housing, retail, and commercial spaces within proximity to LRT stations, fostering vibrant, sustainable communities and potentially addressing regional housing shortages.

"There's a shortage of housing everywhere in the community, but of course a lot of people want to live close to downtown... I think it could help with housing because then people can transit back and forth."

- **Public Transit and Connectivity Enhancements:** The LRT system is seen by stakeholders as a critical upgrade to the current public transportation system in CBRM, which many perceive as lacking in both coverage and efficiency. This upgrade is especially perceived to be important in high-demand corridors, such as the route from Sydney to Glace Bay. These areas experience significant transit needs, particularly from student populations and local commuters, highlighting the necessity for a reliable and efficient transportation solution.
  - Stakeholders emphasized the importance of not only establishing new LRT routes in these high-traffic areas but also ensuring that the new system integrates seamlessly with the existing bus services. Such integration would facilitate a cohesive public transport network that allows passengers to switch easily between different modes of transportation. This synergy is seen as crucial for maximizing convenience and coverage, ensuring that users can travel smoothly across the region without significant delays or additional costs.

- **Environmental and Social Benefits:** Stakeholder feedback strongly highlights the environmental benefits anticipated from the introduction of the LRT system in CBRM. One of the primary advantages is the use of trains powered by green energy, which helps reduce greenhouse gas emissions. This cleaner mode of

public transportation is expected to significantly cut vehicular emissions compared to cars and buses running on fossil fuels. . This shift is expected to result in improved air quality and contribute to broader sustainability goals, as the region aims to align with initiatives to combat climate change and reduce its carbon footprint. The LRT system provides an opportunity to move away from a heavily car-dependent municipality toward a more environmentally responsible model of urban mobility.

"What a story to be told about changing, about using that rail, to change the future, right? for the community in a more sustainable way."

- Social inclusivity also emerges as a crucial benefit of the LRT, with stakeholders emphasizing the need to enhance accessibility for vulnerable groups, particularly students, seniors and economically disadvantaged individuals. Improved accessibility is seen as a pivotal factor for these groups, who often face significant challenges with existing transportation modes due to financial constraints or a lack of mobility options. The introduction of the LRT, along with accessible terminals and trains, has the potential to enhance the transit experience through frequent stops and more comprehensive routes. This could foster greater independence and significantly improve the quality of life for its users. .
- To maximize the social impact, stakeholders suggested accessible fare structures. This includes providing affordable fares and students passes. Stakeholders further suggested integrating the LRT fare into the existing transit fare system for a seamless integration of the public transportation network.

"It should probably all be run by one organization, the buses and the trains, and that way your bus pass will get you on the train. If you went on the train, your train pass would get you on a bus."

- The introduction of the LRT is also anticipated to enhance safety through the reduced reliance on personal vehicles. This shift away from personal vehicles may lead to fewer traffic accidents as public transit systems typically have lower accident rates compared to road-based vehicle travel.

17.3 Anticipated Challenges and Other Considerations

Despite the enthusiasm about the LRT project, stakeholders mentioned a few areas that deserve a closer look as the project progresses. These include:

- **Funding Challenges:** One of the potential challenges identified is the potential financial burden associated with both capital expenditures (CAPEX) and operational expenditures (OPEX). The LRT project may compete for funding with other major municipal initiatives. This competition for resources underscores the need for a strategic financial plan that identifies multiple funding sources, including federal and provincial grants, public-private partnerships, and possibly innovative financing mechanisms to ensure the project's viability without compromising other essential services.
- **Community Buy-In and Cultural Shift:** Participants mentioned the need to secure community buy-in in order to overcome the deep-rooted car culture which dominates current transportation preferences. A portion of the population lack access to personal vehicles and find public transit more affordable . Changing public perception about public transit and gaining widespread support for the LRT will necessitate public awareness campaigns, outreach programs, and incentives to illustrate the benefits of public transit (e.g., reduced environmental impact, increased accessibility, and economic growth opportunities).
- **Immigration and Labor Market Challenges:** Some participants initially expressed concerns about the local labor market's capacity to recruit and train a sufficiently skilled workforce for constructing and operating the LRT. However, given the LRT project's 2.5 to 3-year timeline to become operational, these challenges are expected to be mitigated by anticipated relaxations in federal immigration policies, which could increase the availability of international students and temporary workers. There is an opportunity to enhance the local talent pool, thereby supporting the project's workforce needs. Additionally, stakeholders noted that establishing partnerships with educational institutions and leveraging government-supported training programs will ensure readiness and operational capacity for the LRT, aligning with the expected increase in labor resources. Furthermore, the long-term demand for the LRT is anticipated to remain strong, as public transportation currently serves a significant number of international students, whose numbers are poised to stabilize or grow with policy adjustments.

17.4 Key Takeaways

Community and Regional Support

- Strong community support exists for the LRT, driven by the potential for improved public transit to reduce reliance on personal vehicles.
- The LRT is seen as an opportunity to transform CBRM's identity from a historically industrial region to one aligned with environmental sustainability.

Economic and Urban Development Benefits

- The LRT is expected to act as a catalyst for economic growth by improving access to retail and employment hubs, potentially invigorating local businesses and increasing tourism.
- Enhanced connectivity may spur residential and mixed-use developments, alleviating housing pressures and supporting transit-oriented community growth.

Public Transit and Connectivity Enhancements

- Stakeholders view the LRT as a critical upgrade needed for the current and future transportation infrastructure, particularly in high-demand corridors.
- Integration with existing bus services is essential to create a cohesive and efficient public transit network.

Environmental and Social Benefits

- The LRT could significantly reduce vehicular emissions, contributing to improved air quality and alignment with climate change initiatives.
- Enhancing accessibility for students and seniors, the LRT is expected to provide a more inclusive transportation option, with affordable fares.
- The LRT is also expected to help reduce road accidents by reducing the number of personal vehicles on the road. This improvement will be particularly beneficial on major streets and highways, such as Kings Road and the Glace Bay Highway.

Challenges and Considerations

- Funding is a substantial challenge with competing municipal priorities, requiring a strategic financial plan involving multiple funding sources.
- Achieving community buy-in and shifting away from a car-dependent culture will require robust public awareness and incentive programs.
- The local labor market may face challenges in recruiting a skilled workforce for the LRT's operations, necessitating partnerships with educational institutions and government training programs.
- Monitoring immigration policies to anticipate population growth and demand for the LRT is crucial.

End Notes

[i] Government of Canada, Statistics Canada, "Profile Table, Census Profile, 2021 Census of Population - Waterloo, Regional Municipality (RM) [Census Division], Ontario," November 15, 2023, https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/details/page.cfm?Lang=E&SearchText=Waterloo&DGUIDlist=2021A00033530&GENDERlist=1,2,3&STATISTIClist=1&HEADERlist=0.

[ii] "Transportation and Transit," n.d., https://www.regionofwaterloo.ca/en/exploring-the-region/transportation-and-transit.aspx.

[iii] "ION Light Rail, We Choo-choo-choose You! | Waterloo News," Waterloo News, November 12, 2021, https://uwaterloo.ca/news/ion-light-rail-we-choo-choo-choose-you.

[iv] "Waterloo Region's Rapid Transit System to Shape Growth, Development," *Metro Magazine*, October 13, 2014, https://www.metro-magazine.com/10037764/waterloo-regions-rapid-transit-system-to-shape-growth-development.

[v] "ION Light Rail," n.d., https://pub-hamilton.escribemeetings.com/filestream.ashx?DocumentId=124532

[vi] Margaret Ellis-Young and Brian Doucet, "From 'Big Small Town' to 'Small Big City': Resident Experiences of Gentrification Along Waterloo Region's LRT Corridor," *Journal of Planning Education and Research* 44, no. 1 (February 15, 2021): 416–30, https://doi.org/10.1177/0739456x21993914.

[vii] "ION Station and Train Features," n.d., https://www.grt.ca/en/about-grt/ion-station-and-train-features.aspx.

[viii] "Light Rail," n.d., https://www.keolisna.com/ca/light-rail.

[ix] "ION Station and Train Features," n.d., https://www.grt.ca/en/about-grt/ion-station-and-train-features.aspx.

[x] "Performance Measures," n.d., https://www.grt.ca/en/about-grt/performance-measures.aspx.

[xi] Bill Jackson, "GRT Ridership Sets a Record in 2023," *Waterloo Chronicle*, March 1, 2024, https://www.therecord.com/news/grt-ridership-sets-a-record-in-2023/article_8f0f3d26-aebf-5446-aad1-c158413abf5a.html.

[xii] "City of Cambridge Transportation Master Plan," August 2017, https://www.cambridge.ca/en/learn-about/resources/Transportation/TTR_CambridgeTMP_Appendix-B_Phase1_NeedsOpportunities_Final_2020-03-04.pdf.

[xiii] "University + College Students," n.d., https://grt.ca/en/fares-passes/university--college-students.aspx#Conestoga-College-students.

[xiv] "ION Light Rail," n.d., https://pub-hamilton.escribemeetings.com/filestream.ashx?DocumentId=124532

[xv] Bill Jackson, "GRT Ridership Sets a Record in 2023," *Waterloo Chronicle*, March 1, 2024, https://www.therecord.com/news/grt-ridership-sets-a-record-in-2023/article_8f0f3d26-aebf-5446-aad1-c158413abf5a.html.

[xvi] "Stage 2 ION: Light Rail Transit," *Region of Waterloo*, November 2015, https://www.regionofwaterloo.ca/en/living-here/resources/Stage2ION/PCC1/DOCS_ADMIN-2175743-v1-PCC_No__1_Summary_Report-With_Post-It_Note_Comments.pdf.

[xvii] Margaret Ellis-Young and Brian Doucet, "From 'Big Small Town' to 'Small Big City': Resident Experiences of Gentrification Along Waterloo Region's LRT Corridor," *Journal of Planning Education and Research* 44, no. 1 (February 15, 2021): 416–30, https://doi.org/10.1177/0739456x21993914.

[xviii] Ryan Flanagan, "Ion Construction Costs Run $50 Million Over Budget," *Kitchener*, December 11, 2017, https://kitchener.ctvnews.ca/ion-construction-costs-run-50-million-over-budget-1.3716861.

[xix] "The ION Story," *Region of Waterloo*, 2016, https://ehq-production-canada.s3.ca-central-1.amazonaws.com/92afd86ac6268748400f7fcadb6d46a0843b5213/original/1701273206/eb2a060f927db69474f9ea0efdc14562_ION-Story-Fall-2016-access.pdf?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA4KKNQAKIOR7VAOP4%2F20240904%2Fca-central-1%2Fs3%2Faws4_request&X-Amz-Date=20240904T182138Z&X-Amz-Expires=300&X-Amz-SignedHeaders=host&X-Amz-Signature=b4245f866c82889536a86d25d24b74b066e0467d781c746e7e5f42ef835950be.

[xx] Justine Fraser, "More Service Coming for LRT Riders During Peak Times in 2024," CityNews Kitchener, December 4, 2023, https://kitchener.citynews.ca/2023/12/01/more-service-coming-for-lrt-riders-during-peak-times-in-2024/.

[xxi] "Stage 2 ION," n.d., https://www.regionofwaterloo.ca/en/exploring-the-region/stage2ion.aspx.

[xxii] J. J. Bakker, "Edmonton's Light Rail Transit From Concept to Operations," *Transportation Research Record*, vol. 817, 1981, https://onlinepubs.trb.org/Onlinepubs/trr/1981/817/817-002.pdf.

[xxiii] J. J. Bakker, "Edmonton's Light Rail Transit From Concept to Operations," *Transportation Research Record*, vol. 817, 1981, https://onlinepubs.trb.org/Onlinepubs/trr/1981/817/817-002.pdf.

[xxiv] J. J. Bakker, "Edmonton's Light Rail Transit From Concept to Operations," *Transportation Research Record*, vol. 817, 1981, https://onlinepubs.trb.org/Onlinepubs/trr/1981/817/817-002.pdf.

[xxv] Jacob Dawang, "Jacob Dawang - Land Use and Growth Around Edmonton's LRT Stations," Jacob Dawang, n.d., https://www.jacobdawang.com/blog/2024/all-lrt-stops/.

[xxvi] "Cost for Edmonton Capital Line LRT South Extension Balloons by $242 Million, Council Approves in Secret," Edmontonjournal, June 11, 2024, https://edmontonjournal.com/news/local-news/edmonton-capital-line-lrt-south-240-million.

[xxvii] "LRT Stops and Stations | City of Edmonton," n.d., https://www.edmonton.ca/ets/lrt-station-locations.

[xxviii] "Downtown Pedways | City of Edmonton," n.d., https://www.edmonton.ca/programs_services/downtown-pedways.

[xxix] "LRT Design Guideline for ETS Edmonton Transit Service," *City of Edmonton*, 2011, https://www.edmonton.ca/public-files/assets/document?path=LRT_design_guidlines_2011.pdf.

[xxx] "LRT Design Guideline for ETS Edmonton Transit Service," *City of Edmonton*, 2011, https://www.edmonton.ca/public-files/assets/document?path=LRT_design_guidlines_2011.pdf.

[xxxi] "Transit Safety and Security | City of Edmonton," n.d., https://www.edmonton.ca/ets/safety-and-security.

[xxxii] "LRT Stops and Stations | City of Edmonton," n.d., https://www.edmonton.ca/ets/lrt-station-locations.

[xxxiii] Wikipedia contributors, "List of North American Light Rail Systems," Wikipedia, September 18, 2024, https://en.wikipedia.org/wiki/List_of_North_American_light_rail_systems.

[xxxiv] Andre Corbould, Eddie Robar, and Edmonton Transit Service, "Edmonton Transit Service 2023/2024 Annual Service Plan," 2023, https://www.edmonton.ca/sites/default/files/public-files/2023-2024-Edmonton-Transit-Service-Annual-Service-Plan.pdf?cb=1726753758.

[xxxv] Natasha Riebe, "Edmonton Transit Revenues Down as LRT Ridership Struggles to Rebound Post-pandemic," *CBC*, May 24, 2024, https://www.cbc.ca/news/canada/edmonton/edmonton-transit-revenues-down-as-lrt-ridership-struggles-to-rebound-post-pandemic-1.7213364.

[xxxvi] "News Release - Transit Ridership up 130 per Cent," City of Edmonton, n.d., https://myemail-api.constantcontact.com/News-Release---Transit-ridership-up-130-per-cent.html?soid=1127191170163&aid=QyyF6IB-2Hw.

[xxxvii] "Fares and Passes | City of Edmonton," n.d., https://www.edmonton.ca/ets/fares-passes.

[xxxviii] "Arc by CRP," MyArc.ca, n.d., https://www.myarc.ca/features/fare-rates.

[xxxix] "Fares and Passes | City of Edmonton," n.d., https://www.edmonton.ca/ets/fares-passes.

[xl] "Universal Transit Pass (U-Pass) | City of Edmonton," n.d., https://www.edmonton.ca/ets/universal-transit-pass-upass.

[xli] Natasha Riebe, "Edmonton Transit Revenues Down as LRT Ridership Struggles to Rebound Post-pandemic," *CBC*, May 24, 2024, https://www.cbc.ca/news/canada/edmonton/edmonton-transit-revenues-down-as-lrt-ridership-struggles-to-rebound-post-pandemic-1.7213364.

[xlii] "Building LRT | City of Edmonton," n.d., https://www.edmonton.ca/projects_plans/transit/lrt-network-plan.

[xliii] "Transit Oriented Development Guidelines | City of Edmonton," n.d., https://www.edmonton.ca/city_government/urban_planning_and_design/tod-guidelines.

[xliv] Jacob Dawang, "Jacob Dawang - Land Use and Growth Around Edmonton's LRT Stations," Jacob Dawang, n.d., https://www.jacobdawang.com/blog/2024/all-lrt-stops/.

[xlv] "2024 Mid-Season LRT Construction Update | City of Edmonton," n.d., https://www.edmonton.ca/projects_plans/transit/lrt-construction-update.

[xlvi] Darcy Ropchan, "Edmonton City Council Votes Against ETS Fare Hike to Cover Deficit," CityNews Edmonton, August 29, 2024, https://edmonton.citynews.ca/2024/08/28/edmonton-city-council-votes-against-ets-fare-hike-to-cover-deficit/.

[xlvii] Neil McKendrick et al., "Calgary's CTrain – Effective Capital Utilization," December 1, 2005, https://www.calgarytransit.com/content/dam/transit/about-calgary-transit/reports/lrt/calgary_ctrain_effective_capital_utilization_trb_paper.pdf.

[xlviii] City Of Calgary, "Calgary's Light Rail Transit System: Past, Present and Future," Calgary's Light Rail Transit System: Past, Present and Future, April 6, 2023, https://newsroom.calgary.ca/calgarys-light-rail-transit-system-past-present-and-future/.

[xlix] "RouteAhead Calgary Transit's 30-Year Strategic Plan," *Calgary Transit*, July 2023, https://hdp-ca-prod-app-cgy-engage-files.s3.ca-central-1.amazonaws.com/8116/8978/3969/RouteAhead_Council_Approved_July_2023.pdf.

[l] Richard White, "Calgary Light Rapid Transit Station Design Review — Every Day Tourist," Every Day Tourist, January 19, 2024, https://everydaytourist.ca/city-planning-101/calgary-lrt-station-design-good-amp-bad.

[li] Neil McKendrick et al., "Calgary's CTrain – Effective Capital Utilization," December 1, 2005, https://www.calgarytransit.com/content/dam/transit/about-calgary-transit/reports/lrt/calgary_ctrain_effective_capital_utilization_trb_paper.pdf.

[lii] "Safety on Transit," n.d., https://www.calgarytransit.com/rider-information/safety-on-transit.html#:~:text=Calgary%20Transit%20Watch%20service&text=Text%2074100%20or%20use%20the,%2C%20broken%20glass%2C%20or%20harassment.

[liii] Calgary Transit, "RouteAhead Annual Status Update 2023," 2024, https://www.calgarytransit.com/content/dam/transit/plans---projects/2023%20RouteAhead%20Annual%20Status%20Update.pdf.

[liv] "Yearly Ridership (Current Year Is Year-to-date) | Open Calgary," n.d., https://data.calgary.ca/Transportation-Transit/Yearly-Ridership-current-year-is-year-to-date-/n9it-gzsq.

[lv] Jennifer Ivanov, "Calgary Transit Sees Record-breaking Ridership in 1st Quarter of 2024," *Global News*, May 9, 2024, https://globalnews.ca/news/10485794/calgary-transit-ridership-up/#:~:text=A%20survey%20by%20Calgary%20Transit,the%20survey%20was%20last%20conducted.

[lvi] Calgary Transit, "RouteAhead Annual Status Update 2023," 2024, https://www.calgarytransit.com/content/dam/transit/plans---projects/2023%20RouteAhead%20Annual%20Status%20Update.pdf.

[lvii]"UPass," n.d., https://www.calgarytransit.com/fares---passes/passes/upass.html.

[lviii] Calgary Transit, "RouteAhead Annual Status Update 2023," 2024, https://www.calgarytransit.com/content/dam/transit/plans---projects/2023%20RouteAhead%20Annual%20Status%20Update.pdf.

[lix] "RouteAhead Calgary Transit's 30-Year Strategic Plan," *Calgary Transit*, July 2023, https://hdp-ca-prod-app-cgy-engage-files.s3.ca-central-1.amazonaws.com/8116/8978/3969/RouteAhead_Council_Approved_July_2023.pdf.

[lx] Urban Strategies, "Calgary LRT & Station Area Planning - Urban Strategies," January 23, 2024, https://www.urbanstrategies.com/project/calgary-lrt-station-area-planning/.

[lxi] Neil McKendrick et al., "Calgary's CTrain – Effective Capital Utilization," December 1, 2005, https://www.calgarytransit.com/content/dam/transit/about-calgary-transit/reports/lrt/calgary_ctrain_effective_capital_utilization_trb_paper.pdf.

[lxii] Neil McKendrick et al., "Calgary's CTrain – Effective Capital Utilization," December 1, 2005, https://www.calgarytransit.com/content/dam/transit/about-calgary-transit/reports/lrt/calgary_ctrain_effective_capital_utilization_trb_paper.pdf.

[lxiii] Neil McKendrick et al., "Calgary's CTrain – Effective Capital Utilization," December 1, 2005, https://www.calgarytransit.com/content/dam/transit/about-calgary-transit/reports/lrt/calgary_ctrain_effective_capital_utilization_trb_paper.pdf.

[lxiv] "Benefits," https://www.calgary.ca, n.d., https://www.calgary.ca/green-line/about/benefits.html.

[lxv] "Benefits," https://www.calgary.ca, n.d., https://www.calgary.ca/green-line/about/benefits.html.

[lxvi] "Green Line," n.d., https://www.calgarytransit.com/content/transit/en/home/plans---projects/lrt/green-line.html.

[lxvii] "Green Line," n.d., https://www.calgarytransit.com/content/transit/en/home/plans---projects/lrt/green-line.html.

[lxviii] "Stations," https://www.calgary.ca, n.d., https://www.calgary.ca/green-line/stations.html.

[lxix] CityNews Halifax, "Calgary Green Line LRT in Political Crossfire, as Alberta Minister Blames NDP Leader," September 5, 2024, https://halifax.citynews.ca/2024/09/04/calgary-green-line-lrt-in-political-crossfire-as-alberta-minister-blames-ndp-leader/.

[lxx] "nycsubway.org: Buffalo, New York," n.d., https://www.nycsubway.org/wiki/Buffalo,_New_York.

[lxxi] "NEW BUFFALO RAPID-TRANSIT LINE IS IMPERILED," *New York Times*, June 1986, https://www.nytimes.com/1986/06/01/nyregion/new-buffalo-rapid-transit-line-is-imperiled.html.

[lxxii] Mario Metros, "Metro of Buffalo," December 6, 2018, https://mapa-metro.com/en/united-states/buffalo/buffalo-metro-rail-map.htm.

[lxxiii] "Light Rail Lessons From Buffalo - Hamilton Light Rail Initiative," n.d., http://hamiltonlightrail.ca/light_rail_lessons_from_buffalo.

[lxxiv] "The Free Fare Zone," subway.buffalonet.org, n.d., http://subway.buffalonet.org/pedmall.html.

[lxxv] Wikipedia contributors, "Buffalo Metro Rail," Wikipedia, September 18, 2024, https://en.wikipedia.org/wiki/Buffalo_Metro_Rail.

[lxxvi] Niagara Frontier Transportation Authority, "FY 2023 NFTA Performance," March 31, 2023, https://metro.nfta.com/media/asejsxyn/2023-nfta-performance-report.pdf.

[lxxvii] Niagara Frontier Transportation Authority, "FY 2023 NFTA Performance," March 31, 2023, https://metro.nfta.com/media/asejsxyn/2023-nfta-performance-report.pdf.

[lxxviii] Arian Horbovetz, "Buffalo's Metro Rail: What Transit Should Be," The Urban Phoenix, December 6, 2018, https://theurbanphoenix.com/2018/12/06/buffalohardworkingrail/.

[lxxix] Mario Metros, "Metro of Buffalo," December 6, 2018, https://mapa-metro.com/en/united-states/buffalo/buffalo-metro-rail-map.htm.

[lxxx] "Fare Info - Metro Bus & Rail," n.d., https://metro.nfta.com/fares/fare-info.

[lxxxi] "CRAM Pass Program - Metro Bus & Rail," n.d., https://metro.nfta.com/programs/cram-pass-program.

[lxxxii] Niagara Frontier Transportation Authority, "FY 2023 NFTA Performance," March 31, 2023, https://metro.nfta.com/media/asejsxyn/2023-nfta-performance-report.pdf.

[lxxxiii] Niagara Frontier Transportation Authority, "FY 2023 NFTA Performance," March 31, 2023, https://metro.nfta.com/media/asejsxyn/2023-nfta-performance-report.pdf.

[lxxxiv] Niagara Frontier Transportation Authority, "FY 2023 NFTA Performance," March 31, 2023, https://metro.nfta.com/media/asejsxyn/2023-nfta-performance-report.pdf.

[lxxxv] City Journal, "Can Buffalo Ever Come Back? | Buffalo Economy & Finance Articles," March 23, 2023, https://www.city-journal.org/article/can-buffalo-ever-come-back.

[lxxxvi] Niagara Frontier Transportation Authority, "FY 2023 NFTA Performance," March 31, 2023, https://metro.nfta.com/media/asejsxyn/2023-nfta-performance-report.pdf.

[lxxxvii] Thomas Bardenett, "The Buffalo Metro: Finishing Phase One — Thomas Bardenett," Thomas Bardenett, May 21, 2020, https://www.thomasbardenett.com/blog/2020/5/4/the-buffalo-metro-finishing-phase-one.

[lxxxviii] Thomas Bardenett, "The Buffalo Metro: Finishing Phase One — Thomas Bardenett," Thomas Bardenett, May 21, 2020, https://www.thomasbardenett.com/blog/2020/5/4/the-buffalo-metro-finishing-phase-one.

[lxxxix] "Light Rail Lessons From Buffalo - Hamilton Light Rail Initiative," n.d., http://hamiltonlightrail.ca/light_rail_lessons_from_buffalo.

[xc] Niagara Frontier Transportation Authority, "FY 2023 NFTA Performance," March 31, 2023, https://metro.nfta.com/media/asejsxyn/2023-nfta-performance-report.pdf.

[xci] "Lund (Municipality, Skåne, Sweden) - Population Statistics, Charts, Map and Location," n.d., https://www.citypopulation.de/en/sweden/admin/sk%C3%A5ne/1281__lund/.

[xcii] Editor, "Lund: A New Model for Sustainability - the International Light Rail Magazine," The International Light Rail Magazine, March 1, 2021, http://www.tautonline.com/lund-new-model-sustainability/.

[xciii] Global Railway Review, "Lund Tramway: Comfortable Public Transport Made Available," December 9, 2020, https://www.globalrailwayreview.com/article/114491/lund-tramway-comfortable-public-transport/.

[xciv] Global Railway Review, "Lund Tramway: Comfortable Public Transport Made Available," December 9, 2020, https://www.globalrailwayreview.com/article/114491/lund-tramway-comfortable-public-transport/.

[xcv] Editor, "Lund: Sweden's Newest Tramway City - the International Light Rail Magazine," The International Light Rail Magazine, December 23, 2020, http://www.tautonline.com/lund-swedens-newest-tramway-city/.

[xcvi] "Fostering Passenger Intermodality in London, Bremen and Lund | Green Best Practice Community," n.d., https://greenbestpractice.jrc.ec.europa.eu/node/644.

[xcvii] "Tramway in Lund," Skanska, n.d., https://group.skanska.com/projects/218898/Tramway-in-Lund.

[xcviii] Editor, "Lund: A New Model for Sustainability - the International Light Rail Magazine," The International Light Rail Magazine, March 1, 2021, http://www.tautonline.com/lund-new-model-sustainability/.

[xcix] "Så Köper Du Biljett," Skånetrafiken, n.d., https://www.skanetrafiken.se/biljetter/kopbiljett/.

[c] Editorial, UTM, "Lund in Sweden: Europe's Newest Tramway System Virtually Inaugurated! - Urban Transport Magazine," Urban Transport Magazine, August 3, 2022, https://www.urban-

transport-magazine.com/en/lund-in-sweden-europes-newest-tramway-system-virtually-inaugurated/.

[ci] Praveen, "Lund Tramway, Scania," *Railway Technology*, February 17, 2016, https://www.railway-technology.com/projects/lund-tramway-scania/?cf-view&cf-closed.

[cii] "Lund - Global Winner of the 2022 One Planet City Challenge," WWF, n.d., https://wwf.panda.org/wwf_news/?7647966/Lund---Global-Winner-of-the-2022-One-Planet-City-Challenge.

[ciii] Praveen, "Lund Tramway, Scania," *Railway Technology*, February 17, 2016, https://www.railway-technology.com/projects/lund-tramway-scania/?cf-view&cf-closed.

[civ] Editorial, UTM, "Lund in Sweden: Europe's Newest Tramway System Virtually Inaugurated! - Urban Transport Magazine," Urban Transport Magazine, August 3, 2022, https://www.urban-transport-magazine.com/en/lund-in-sweden-europes-newest-tramway-system-virtually-inaugurated/.

[cv] Editor, "Lund: A New Model for Sustainability - the International Light Rail Magazine," The International Light Rail Magazine, March 1, 2021, http://www.tautonline.com/lund-new-model-sustainability/.

[cvi] Editor, "Lund: A New Model for Sustainability - the International Light Rail Magazine," The International Light Rail Magazine, March 1, 2021, http://www.tautonline.com/lund-new-model-sustainability/.

[cvii] Editor, "Lund: A New Model for Sustainability - the International Light Rail Magazine," The International Light Rail Magazine, March 1, 2021, http://www.tautonline.com/lund-new-model-sustainability/.

[cviii] "Tramway Plans in Lund | Spårvagnsstäderna," n.d., https://www.sparvagnsstaderna.se/en/node/141.

Integrating Bus Services with Go Train

Cape Breton University

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1 Introduction

1.1 Background

Transit Cape Breton has experienced significant ridership growth in recent years, outpacing the growth of most urban transit operators in Canada, largely due to substantial growth in the student population at Cape Breton University (CBU). Much of the growth at CBU is attributed to the influx of international students who rely on the public transit system to travel between their residences to the University, which is situated roughly 8 to 10 kilometres from the neighbouring communities of Sydney, Glace Bay, and New Waterford.

In 2023 CBU initiated a Prefeasibility Study for an Electric Light Rail Transit System for the Cape Breton Regional Municipality (CBRM), utilizing dormant rail corridors to connect these suburban centres and other key communities with the University. The proposed LRT system is envisioned to act as a trunk service with local bus interfaces at each of the 5 suggested terminal sites in Phase 1.

The presence of this LRT system is anticipated to alleviate the crowding issues being experienced by the Transit Cape Breton bus network, enabling a restructuring of the bus network to focus more on local service and feeder routes connecting with the LRT, rather than providing a high level of service destined to Cape Breton University. The LRT, in its ultimate form, is also anticipated to serve as the prime service connecting the communities of Sydney, Glace Bay, New Waterford, and North Sydney in future phases.

Building on the findings of the pre-feasibility study for the proposed LRT network, CBU is currently in the process of evaluating the feasibility of the LRT through a more detailed investigation, including additional design effort, service planning, stakeholder engagement, and refined cost estimates.

1.2 Purpose

To understand the potential impacts (both positive and negative) of the proposed LRT service on Transit Cape Breton's bus network, the Project Team was tasked with reviewing the prefeasibility concept for the LRT system and service and identifying a range of options to restructure the bus network to complement the LRT. The investigation included development of high-level bus network concepts, establishing a range of evaluation criteria, and undertaking a comparative assessment of the modified networks to identify a preliminary preferred network concept to support the LRT Feasibility Study.

2 Base Case Transit Service Plan

As part of CBRM's recently completed Transit Operational Review Comprehensive Report, a plan was proposed to expand the existing bus network in three phases being implemented as funding is available, with the final phase expected to be implemented in the longer term. The plan includes increased frequency on routes serving busier

corridors, re-routing and extending existing routes to provide more or better coverage, and new routes where there is expected demand.

2.1 Bus Service Plan (Transit Operational Review Comprehensive Report)

2.1.1 Route Network

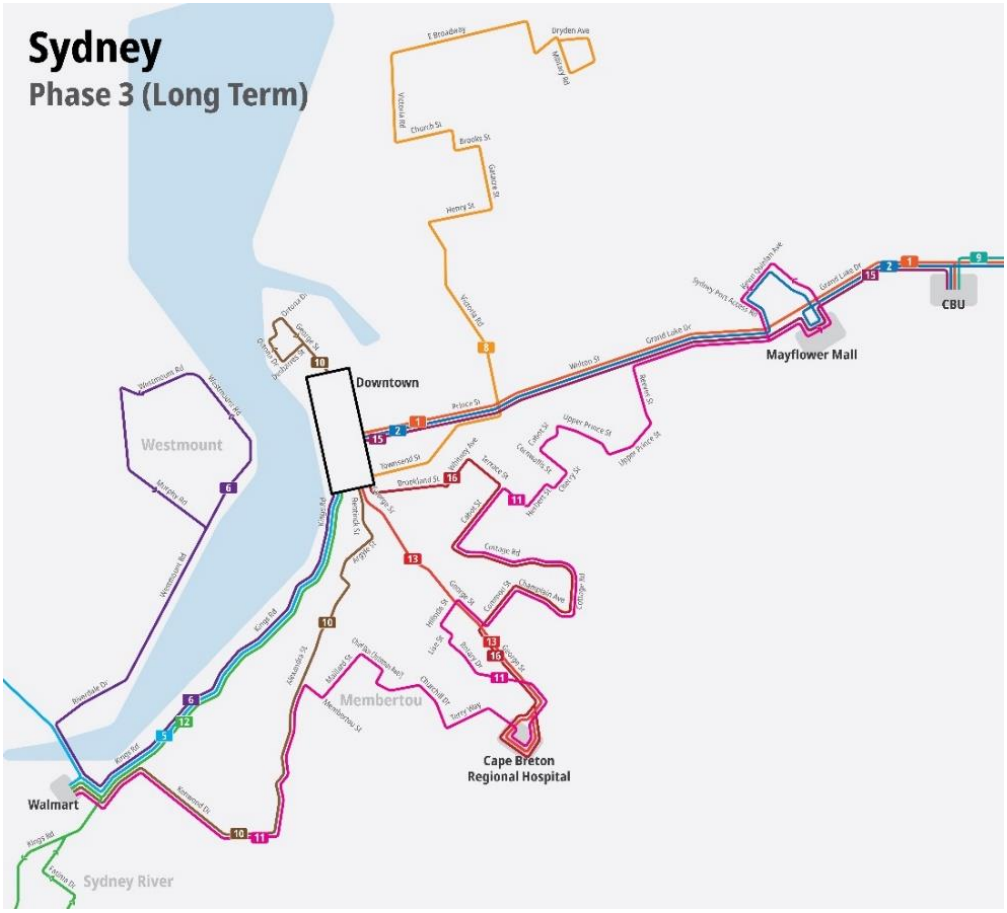
In 2024, HDR completed a comprehensive Transit Operational Review for Cape Breton Regional Municipality. This report proposes a phased approach for transit network improvements, as outlined below:

Table 1: Proposed Phasing Approach

Phase	Timeframe	Description
Phase 0	Immediate	• Addressing immediate schedule and capacity issues
Phase 1	Short Term	• Reconfiguring one-way loops to provide two-way service
Phase 2	Medium Term	• Expanding service coverage • Improving regional connections between communities
Phase 3	Long Term	• Improving and expanding the network

The Phase 3 (long-term) scenario was selected as the base bus network for the CBRM Go Train Feasibility Study. **Figure 1** shows the long-term route network in Sydney and its immediate surroundings.

Figure 1: Long-term route network in Sydney and surrounding areas.



The long-term proposed plan is designed around a hub in Downtown Sydney with routes extending outwards on both local roads serving neighbourhoods in the Sydney area, and on major arterials that connect to neighbouring municipalities. The two major corridors, Grand Lake Road and Kings Road, have several routes providing service for a higher level of combined service along the corridors. It is generally expected that connections will be made between bus routes at the Downtown Sydney hub.

2.1.2 Service Characteristics

Most routes proposed in the long-term service plan (Phase 3) would operate at 30-minute headways during most times of the day, with 60-minute service later in the evening. Some routes that are expected to have lower ridership would operate at 30- to 60-minute headways throughout the day. Routes that overlap along the main Sydney to CBU corridor, including Routes 1, 2, and 15, would combine to provide 6 trips per hour along this corridor, or an average of a 10-minute combined headway.

The bus network features some long regional routes that connect municipalities across Cape Breton, and some local routes that connect a small neighbourhood or minor arterial corridor to the closest municipality's main transit hub. Route 2 is one of the main routes of the network, travelling 40 kilometres round-trip to connect Sydney to Glace Bay. Other regional connector routes include Route 9 to New Waterford, Route 5 to North Sydney, and Route 1

to Glace Bay via Dominion. Other local neighbourhood routes generally have a round-trip time of 25 to 40 minutes.

2.1.3 Capital and Operating Costs

The operating costs associated with the Phase 3 service plan is $10.7 million annual revenue hours, or a 102% increase over the base service network (before September 2023). This service plan would require 25 buses in operation during the peak period, which would require a fleet of 33 buses to maintain a 25% spare ratio. CB Transit's current fleet it 28 for buses used on fixed routes, and this is planned to be maintained until at least 2040 with existing diesel buses being replaced by Battery Electric buses (BEBs).

2.2 LRT Service Plan (CBRM Electric Go Train Prefeasibility Study)

The concept of the Cape Breton Light Rail Transit (LRT) system, also referred to as the Go Train, initially emerged as a safe and reliable transportation solution for students commuting from Downtown Sydney to Cape Breton University (CBU). However, as the prefeasibility study progressed, it became evident that the Go Train could provide substantial benefits to the broader community, including workers, shoppers, and seniors.

2.2.1 Route Network

The CBRM Electric Go Train Prefeasibility Study developed a phased plan for four (4) rail routes:

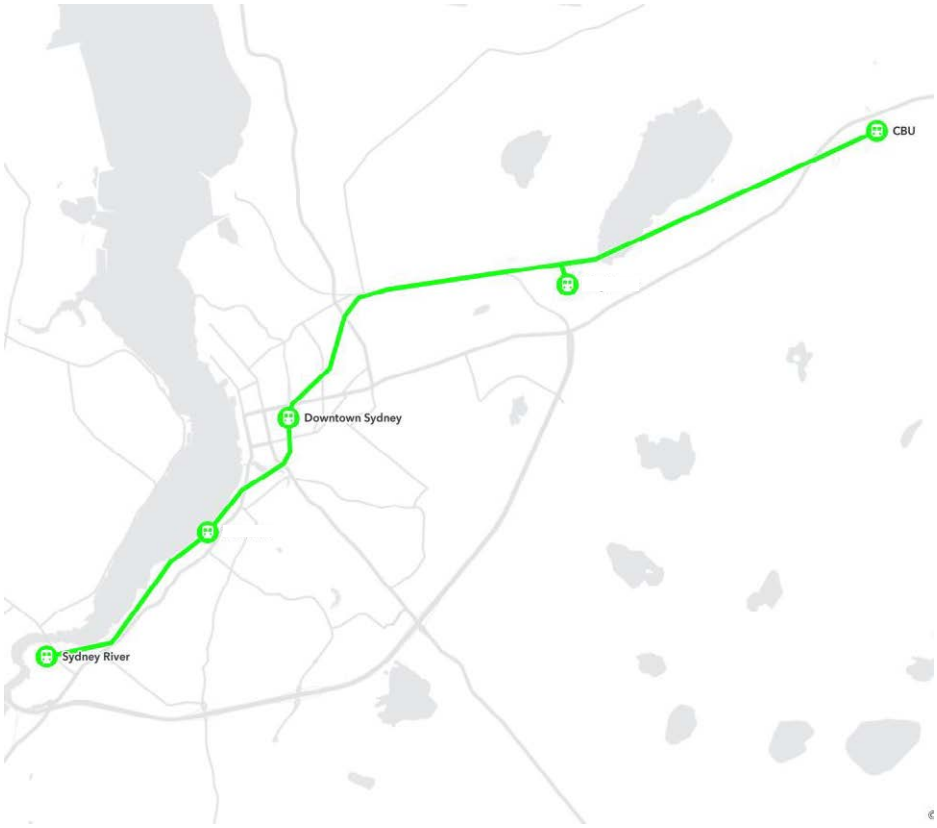
1. **Phase 1:** Sydney River Walmart through Sydney to CBU.
2. **Phase 2 (divided into two sub-phases):**
    - Phase 2A: Grand Lake to New Waterford, using the existing Sydney Coal Railway.
        - Features: Fully operational rail line with one satellite terminal and parking facilities in New Waterford.
    - Phase 2B: Grand Lake to Glace Bay, utilizing the old Devco railbed.
        - Features: Former railway line would require rebuilding. A satellite terminal with parking facilities would be established in Glace Bay.
3. **Phase 3:** Sydney River Walmart to North Sydney, terminating at the Marine Atlantic Terminal.
    - Features: Uses the existing CN mainline with a satellite terminal near the Marine Atlantic Ferry Terminal, which services Newfoundland.
4. **Phase 4:** Future extension from CBU to Sydney Airport.
    - Features: Greenfield line requiring new infrastructure, including earthworks, culverts, rail beds, and rail lines. A satellite terminal would be established at Sydney Airport.

While the broader vision includes multiple phases, this report focuses solely on Phase 1, in which LRT establishes the initial connection between Sydney River Walmart, Downtown Sydney, and CBU, laying the foundation for the Go Train service.

The bus service planning outlined in this report involves modifying routes to align with the new LRT line, ensuring efficient connections, and minimizing duplication. Buses will act as feeders for the train network, serving local areas to reduce the need for long inter-community trips. For example, in Sydney, bus routes will prioritize the immediate vicinity rather than extending to farther areas like Glace Bay. This integration will enable the creation of additional routes within the city, ultimately enhancing service levels.

The **Figure 2** illustrates the Phase 1 LRT routing and station locations.

Figure 2: Phase 1 LRT Routing and Station Locations



2.2.2 Service Characteristics

The proposed Phase 1 LRT route spans 14.96 km (two-way) and includes the following service details:

- LRT Span of Hours: 7:00 – 23:00
- LRT Headway: 20 minutes
- LRT Speed: 64 KPH – 96 KPH
- LRT Terminals/Stops: 5 terminals/stops

3 Transit Service Plan – Alternatives Development and Evaluation

The Transit Service Plan focuses on developing and evaluating alternatives that align with the ultimate transit Cape Breton vision. Key objectives include:

- **Preparation of a Bus Network Scenario:** Design a bus network that complements the ultimate transit network, ensuring seamless integration with the LRT.
- **Service Duplication Analysis:** Identify existing bus routes that overlap with the LRT service and reallocate excess bus services away from the LRT corridor to optimize efficiency, while maintaining parallel local bus service where demand requires.
- **Bus Route Realignment**: Adjust bus routes to facilitate efficient passenger transfers at the proposed LRT stations, where appropriate.
- **Infrastructure Requirements:** Determine the necessary bus infrastructure at proposed LRT stations, including platforms, layover spaces, and e-bus charging facilities.
- **Staffing Needs Assessment:** Identify changes to staffing requirements based on the proposed bus service plans.
- **Cost Implications:** Evaluate the capital and operating cost impacts of the proposed bus service plans to ensure financial feasibility.

This approach ensures that the bus network complements the LRT system and delivers a cohesive, efficient regional transit solution.

3.1 Bus Network Development Principles

To support the integration of the LRT system and enhance overall transit efficiency, the following principles guide the development of the bus network:

- **Redirect Key Routes as Feeder Lines:** Reconfigure existing bus routes to function as feeder lines connecting riders to the nearest LRT stations, maximizing system integration.
- **Simplify Routes Near LRT Stations:** Adjust bus routes to avoid duplicating the LRT corridor by reducing or eliminating parallel bus services.
- **Optimize Route Endpoints to Anchor at LRT Stations:** Where possible, align the start or end of bus routes with LRT stations to create natural transfer points and improve accessibility to the LRT system.
- **Add Connections for Outlying Areas:** Establish direct links to LRT stations for areas further from the LRT network but with notable ridership demand, ensuring equitable access.

3.2 Evaluation Criteria

To effectively compare the alternative transit network concepts, a combination of quantitative and qualitative evaluation criteria was developed. These criteria are tailored to assess the high-level service concepts and focus on characteristics that can be reasonably measured or predicted at this preliminary stage of network development. The evaluation criteria are as follows:

3.2.1 Quantitative Criteria

- Peak Bus Fleet Requirement:
  - Measures the number of buses required to deliver the peak-period service for each network scenario.
  - Assesses the difference in fleet size compared to the current operation, which directly affects capital costs.
  - Provides an estimate of additional vehicles needed, if any, and can be translated into financial terms using a per-vehicle cost.
- Annual Service Hours:
  - Calculates the total hours required to operate the bus network over an entire year, encompassing all routes and service periods (AM peak, mid-day, PM peak, evening, and late-night).
- Bus Bay Needs: Evaluate the necessity for new bus bays[1] to support the proposed service changes.

3.2.2 Qualitative Criteria

- Integration with the LRT System:
  - Evaluates how well the bus network leverages the LRT to shorten route lengths and improve operational efficiency.
  - Considers the degree to which the LRT serves as a backbone, reducing the need for longer bus routes.
- Service Frequency along Key Corridors (Alignment with Existing and Future Passenger Demand):
  - Assesses how well the network design aligns with observed passenger demand patterns, particularly along high-traffic corridors such as Sydney River–Downtown Sydney and Downtown Sydney–CBU.
- Service Flexibility:

[1] Bus bays refer to designated spaces within a bus terminal where buses stop to load and unload passengers. Each bay is typically assigned to specific routes or services, or they may serve all routes for unloading purposes, to streamline operations and improve passenger wayfinding.

    - Assesses the ability to adjust service levels on individual corridors to respond to varying passenger demand.
    - Considers whether the network can accommodate changes in ridership patterns without significant operational disruptions.
- Access to Key Destinations:
    - Examines whether the network maintains direct or seamless connections to critical locations, including:
        - Downtown Sydney
        - Cape Breton University (CBU)
        - Nova Scotia Community College (NSCC)
- Transferless Connections:
    - Assesses the extent to which passengers can travel between major corridors (e.g., Kings Road and Grand Lake) without requiring transfers.
- Passenger Experience
    - the comfort and convenience of passengers, including factors such as shelter, seating, and accessibility.
- Seamless Connections with LRT
    - Examines how efficiently the network integrates with LRT services to facilitate smooth passenger transfers.

3.3 Preliminary Transit Network Alternative Development

3.4 Bus Network Route Alternatives

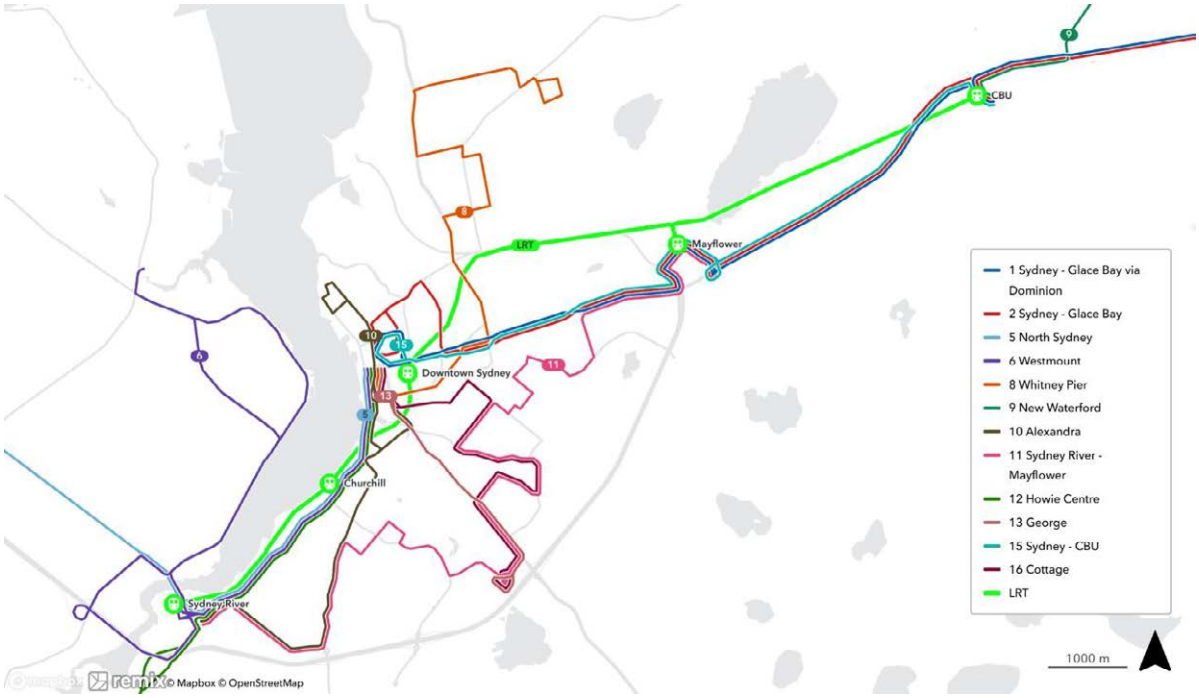
It should be noted that all route alternatives in the section below are conceptual at this stage, with the assumption that the Go Rail service will be operational.

3.4.1 Base Case (Business as Usual)

In the base case scenario, the existing bus network remains unchanged. All current routes are maintained, and no adjustments are made to service frequency, routing, or terminations. This serves as a baseline for comparison with the proposed alternatives.

The **Figure 3** illustrates Base Case (Business as Usual) transit network.

Figure 3: Base Case Transit Network



3.4.2 Option 1 – Removing Duplication

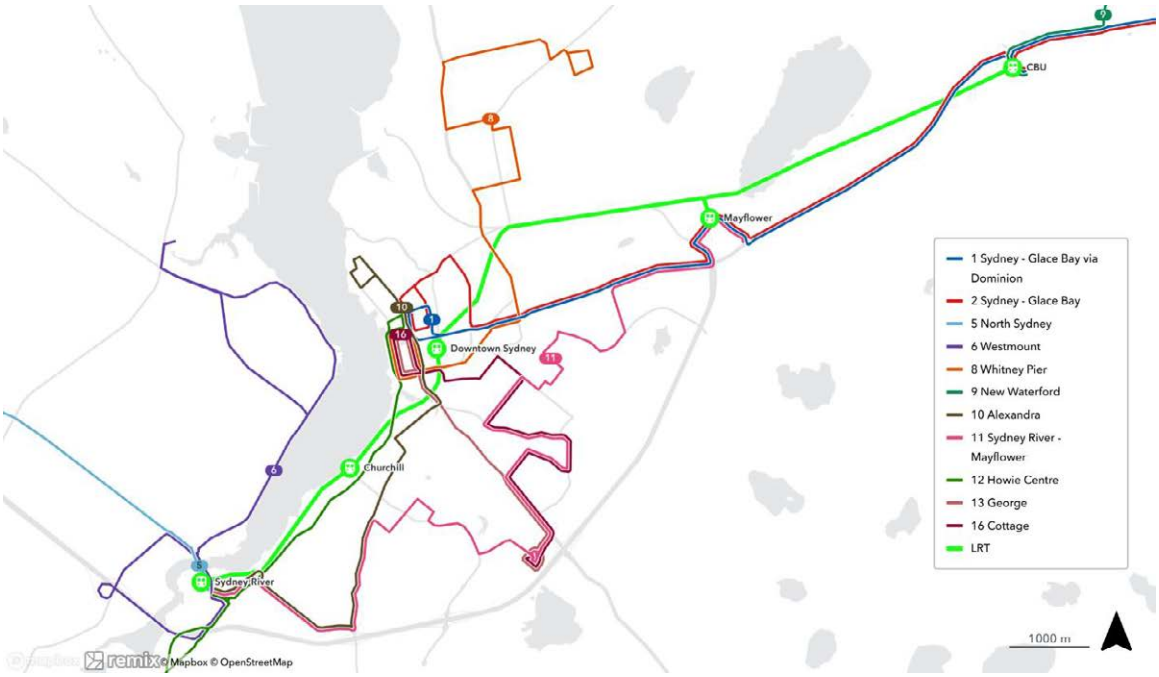
This option focuses on reducing redundancy within the existing bus network by streamlining routes in key corridors. The goal is to create a more efficient system with fewer overlapping routes, which should result in reduced operational costs. Key highlights of this option include:

- **Route Removal:** Reduces overlap by keeping only one route per major corridor:
  - Kings Road: Retains Route 12 as the only bus service
  - Grand Lake Corridor: Retains Routes 1 and 2 as the only bus service, removing Route 15[2] from the corridor.
- **Terminations at Key Hubs:**
  - Routes 5 and 6 now terminate at Sydney River Station (LRT transfer hub).

The **Figure 4** shows Option 1 – Removing duplication Network.

[2] Route 15 is not currently in operation but was part of the long-term service plan developed in the Transit Operational Review for Cape Breton Regional Municipality Report.

Figure 4: Option 1 – Removing duplication



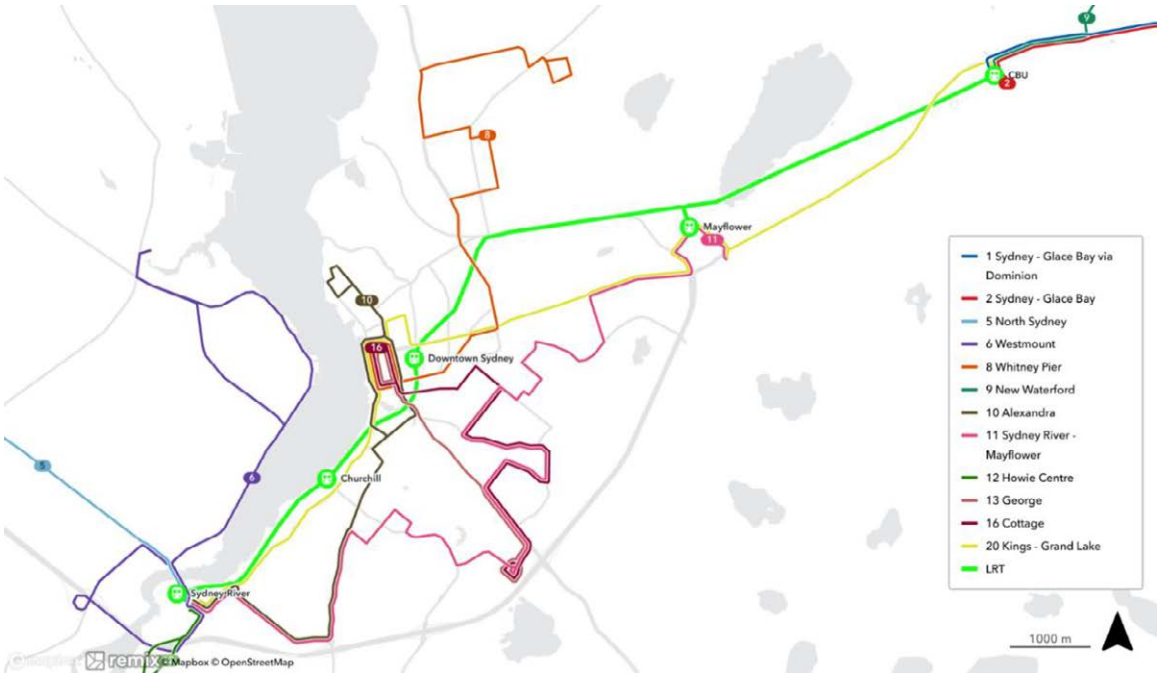
3.4.3 Option 2 – One route parallel with LRT

This option introduces a new, dedicated bus route parallel to the LRT in both the Kings Road and Grand Lake corridors. The new Route 20 aims to improve accessibility by covering areas that are not directly served by the LRT and ensuring better connectivity for passengers. Key highlights of this option include:

- New Route: Adds Route 20 along Kings Road and Grand Lake corridors, running parallel to the LRT
- Removal/Shortening of Existing Routes: All bus routes currently operating on Kings Road and Grand Lake corridors are removed and replaced by Route 20.
- Routes 5, 6, and 12 terminate at Sydney River Station (LRT transfer hub).
- Routes 1 and 2 terminate at Cape Breton University (CBU).

The **Figure 5** shows Option 2 – One route parallel with LRT.

Figure 5: Option 2 – One route parallel with LRT



3.5 Downtown Routing (Bus Network at Sydney Station)

Sydney Station is the primary LRT station in the downtown area. It was reviewed separately when routing buses to ensure optimal connectivity. Two alternatives were considered, each of which can integrate seamlessly with either Option 1 or Option 2.

3.5.1 Option A - On-street Connections:

In this option, existing routing is maintained while enhancing connections to the LRT. Key considerations include:

- **Maintaining Existing Route Layout:** Current bus routes in the downtown area will be retained, ensuring that all access points are within 300 meters of the station.
- **Improved On-Street Connectivity:** Additional on-street bus stops may be added at key points to enhance accessibility and strengthen connections with the LRT and other bus routes.

The **Figure 6** illustrates Option A, showcasing bus routing around Downtown Sydney and its on-street connections.

Figure 6: Option A – Downtown Sydney On-street Connections

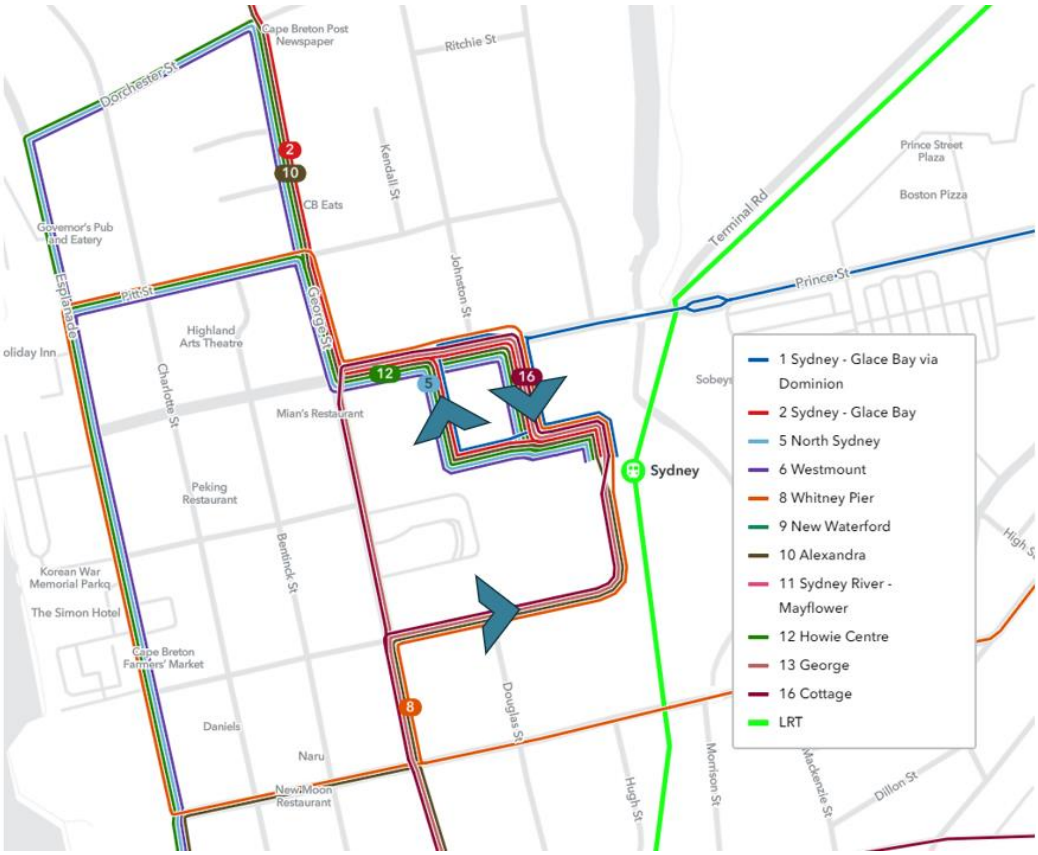
3.5.2 Option B - Transit Hub:

This option proposes a more centralized approach with Sydney Station as a dedicated transit hub, offering a seamless integration with the bus network. Key considerations include:

- **Centralized Transit Hub:** Sydney Station will serve as the core downtown transit hub, fully integrated with the bus network and providing centralized access to the LRT.
- **Enhanced Passenger Experience:** The hub will be designed to support efficient transfers, allowing passengers to easily switch between bus routes and the LRT, improving overall transit access in the downtown area.
- **Traffic Impacts:** The increased activity around Sydney Station, particularly on Prince Street, may lead to higher bus and passenger volumes, potentially causing traffic congestion during peak hours. This could result in slower vehicle speeds, increased delays for general traffic, and higher potential for conflicts between buses, pedestrians, and other road users. Mitigation strategies, such as signal optimization or improved pedestrian crossings, may be required to minimize disruptions to traffic flow on the surrounding streets.

The **Figure 7** illustrates Option B, showcasing bus routing around LRT Sydney Terminal.

Figure 7: Option B – Transit Hub



4 Stakeholder Engagement Summary

The proposed bus network alternatives and their comparative assessments were shared with Transit Cape Breton to gather their insights. Key feedback points included:

- Significant Demand Between CBU and Downtown Sydney: The route between Cape Breton University (CBU) and Downtown Sydney experiences higher passenger volumes compared to the segment between Downtown Sydney and Sydney River. This is primarily due to the large number of students commuting to and from these two areas, as well as the presence of CBU campuses in Downtown Sydney. As a

result, Option 2, which features a single route covering the corridor with 30-minute service frequency, does not adequately address these travel patterns.

- Need for a Downtown Transit Hub: Transit Cape Breton highlighted the operational importance of establishing a dedicated transit hub in Downtown Sydney. Such a facility would enhance service reliability, provide operators with essential amenities, and improve overall network efficiency.

5 Recommended Network and Downtown Options

The evaluation of the alternative transit network concepts, as well as feedback from Transit Cape Breton lead to the following recommendations:

Network Recommendation: Option 1 – Removing Duplication

Option 1 is the recommended network design, offering the most significant operational efficiencies and alignment with service priorities. Key benefits include:

- **Operational Efficiency:** Option 1 reduces annual service hours and peak bus fleet requirements by six, achieving the largest resource savings while maintaining service coverage.
- **Service Flexibility:** This option provides the flexibility to reallocate resources to enhance other critical service areas, supporting network resiliency.
- **Improved Passenger Experience:** Option 1 features shorter routes and less complex operations, creating a more reliable service for riders.
- **Service Frequency:** While frequencies are reduced to 60 minutes between Sydney River and Downtown Sydney, the design effectively addresses service duplication, concentrating resources where they are most needed.

Downtown Recommendation: Option B – Transit Hub

Option B: Transit Hub is recommended for Downtown Sydney, offering significant benefits over the base case and on-street connections. Key strengths include:

- **Seamless LRT Integration:** This option ensures efficient connections between the bus and LRT networks, improving operational flow and reducing transfer complexities.
- **Enhanced Passenger Experience:** A centralized hub provides better amenities, shelter, and accessibility, making transit more appealing for riders.
- **Operational and Service Reliability:** The hub consolidates services, reducing street congestion and ensuring more predictable transit operations.

What We Heard:

CBU Light Rail Transit Study

atn strategies

Cape Breton University

1 Introduction

DMDE Engineering has engaged ATN Strategies to facilitate conversations with key stakeholders, rights holders, and potential partners to inform the feasibility study and to aid in the development of the business case for an electric GO Train system in Cape Breton Regional Municipality (CBRM). As part of a more comprehensive study building on the encouraging findings of the Pre-Feasibility Study prepared by DMDE Engineering, these engagements aimed to gather the perspectives and insights of key informants relative to advancing a Go Train in CBRM.

An inventory of potential key informants has been compiled collaboratively by ATN and DMDE Engineering teams. ATN Strategies engaged key partners and stakeholders in bilateral and small-group interviews. This document summarizes the insights generated through these conversations. The insights are organized around themes and capture perceptions about the project, its benefits, opportunities, and potential challenges.

2 Methodology

ATN worked collaboratively with DMDE Engineering project team to identify and engage with a variety of stakeholders, including:

- Municipal officials
- Business leaders
- Economic development and business support organizations
- Federal and provincial officials
- Community and environmental organizations
- Post-secondary education leaders; and
- Elected officials.

Other relevant stakeholders were engaged based on interviewee recommendations and their knowledge of light rail transit systems. Eight bi-lateral interviews and three small group interviews were conducted virtually and in-person.

The insights gathered from all the sessions are thematically organized and summarized in the following section. A register of all key informants consulted for this Business Case is presented in Appendix A.

3 Findings

This section summarizes input from community leaders, transportation experts and provincial officials to provide a comprehensive overview of stakeholders' perspectives on the proposed Light Rail Transit (LRT) system's potential. Findings are organized under key themes that emerged from the discussions. Topics include support for the proposed project, perceived benefits of the project, and challenges and considerations as the proposal advances.

3.1 Community Support for the Light Rail Transit System in CBRM

Overall, stakeholders expressed a strong desire for the LRT system, highlighting the community's broad support for improved transportation infrastructure. This support arises from the need for more efficient and reliable public transit options that can alleviate traffic congestion while reducing the community's reliance on personal vehicles. The proposed LRT is seen as a transformative project that has the potential to modernize CBRM's public transport network, aligning with regional development and sustainability goals. Further, this proposed project is considered by some to be an opportunity to transform the narrative of the region from a mining and heavy industrial economy- to a region that embodies environmental sustainability and modernization.

Despite the enthusiasm, several discussions underscored possible financial concerns among community members. Some participants expressed hesitation about the project's overall cost along with potential municipal tax implications. This concern over financial sustainability is pivotal in gaining and retaining political and public support. Stakeholders emphasized the necessity of mitigating these concerns by securing substantial federal and provincial funding. Key Informants believe that demonstrating a clear investment strategy, which includes external public sector funders, is essential to reassure residents and local stakeholders. This approach would alleviate fears about local tax increases and make the LRT project more palatable to the community.

Community members also stressed the importance of ensuring that the economic benefits of the LRT, such as workforce development, increased regional connectivity and potential boosts to local businesses, are communicated effectively. Stakeholders highlighted the importance of transparency and ongoing communication about how the LRT will be funded and the long-term financial

implications for the municipality. This transparency is viewed as key to building a broad base of sustained support across diverse community groups.

3.2 Anticipated Benefits of an LRT System in CBRM

The proposed LRT system in CBRM is expected to bring significant benefits to the region. Stakeholders have identified a range of potential benefits, including:

- **Economic Development and Impact:** During stakeholder consultations, the proposed Light Rail Transit (LRT) system in CBRM emerged as a potential catalyst for economic growth. Stakeholders emphasized that the LRT could significantly enhance regional economic activity by improving access to employment hubs and key retail locations. This improved access is anticipated to invigorate local businesses by increasing foot traffic, drawing more visitors, and facilitating easier movement for both employees and consumers, which could stimulate retail and service sectors across the region.

"It would be beneficial for the students in the area, first and foremost, but I think it would translate to the businesses as well. When students are able to get around, it helps people get to their jobs and more."

    - Additionally, the potential for increased tourism was highlighted, as the LRT could simplify travel for tourists by providing a reliable transit option that aligns with modern urban experiences expected by visitors. Enhanced connectivity facilitated by the LRT may place Cape Breton as a more attractive and accessible destination, potentially boosting the tourism sector's contribution to the local economy.
    - Despite this optimism, some stakeholders expressed caution about the extent of economic benefits, pointing to existing labor market constraints in the region. Stakeholders noted the importance of aligning LRT development with broader workforce strategies to ensure that increased accessibility leads to tangible employment growth rather than merely displacing existing economic activities. It is important to acknowledge that these concerns are not exclusive to the LRT project.
- **Housing and Urban Development:** Stakeholders indicated that the LRT system is expected to positively impact housing supply and development in CBRM. By enhancing connectivity between less densely populated areas and urban centers, the LRT could alleviate existing housing pressures and catalyze residential dispersion. The improved transit links provided by the LRT are

anticipated to make living in outlying areas more feasible for individuals who work or study in urban centers, thereby widening the region's housing market and reducing congestion in high-density areas.

- LRT hubs could also spur densification in select neighborhoods. Connectivity could also stimulate new residential and mixed-use developments, particularly in underserved areas. With easier access to urban amenities and employment centers, these areas may attract developers seeking to capitalize on increased accessibility and demand for housing. Local planners and stakeholders see the potential for transit-oriented development that integrates housing, retail, and commercial spaces within proximity to LRT stations, fostering vibrant, sustainable communities and potentially addressing regional housing shortages.

"There's a shortage of housing everywhere in the community, but of course a lot of people want to live close to downtown... I think it could help with housing because then people can transit back and forth."

- **Public Transit and Connectivity Enhancements:** The LRT system is seen by stakeholders as a critical upgrade to the current public transportation system in CBRM, which many perceive as lacking in both coverage and efficiency. This upgrade is especially perceived to be important in high-demand corridors, such as the route from Sydney to Glace Bay. These areas experience significant transit needs, particularly from student populations and local commuters, highlighting the necessity for a reliable and efficient transportation solution.
  - Stakeholders emphasized the importance of not only establishing new LRT routes in these high-traffic areas but also ensuring that the new system integrates seamlessly with the existing bus services. Such integration would facilitate a cohesive public transport network that allows passengers to switch easily between different modes of transportation. This synergy is seen as crucial for maximizing convenience and coverage, ensuring that users can travel smoothly across the region without significant delays or additional costs.

- **Environmental and Social Benefits:** Stakeholder feedback strongly highlights the environmental benefits anticipated from the introduction of the LRT system in CBRM. One of the primary advantages is the use of trains powered by green energy, which helps reduce greenhouse gas emissions. This cleaner mode of

public transportation is expected to significantly cut vehicular emissions compared to cars and buses running on fossil fuels. . This shift is expected to result in improved air quality and contribute to broader sustainability goals, as the region aims to align with initiatives to combat climate change and reduce its carbon footprint. The LRT system provides an opportunity to move away from a heavily car-dependent municipality toward a more environmentally responsible model of urban mobility.

"What a story to be told about changing, about using that rail, to change the future, right? for the community in a more sustainable way."

- Social inclusivity also emerges as a crucial benefit of the LRT, with stakeholders emphasizing the need to enhance accessibility for vulnerable groups, particularly students, seniors and economically disadvantaged individuals. Improved accessibility is seen as a pivotal factor for these groups, who often face significant challenges with existing transportation modes due to financial constraints or a lack of mobility options. The introduction of the LRT, along with accessible terminals and trains, has the potential to enhance the transit experience through frequent stops and more comprehensive routes. This could foster greater independence and significantly improve the quality of life for its users. .
- To maximize the social impact, stakeholders suggested accessible fare structures. This includes providing affordable fares and students passes. Stakeholders further suggested integrating the LRT fare into the existing transit fare system for a seamless integration of the public transportation network.

"It should probably all be run by one organization, the buses and the trains, and that way your bus pass will get you on the train. If you went on the train, your train pass would get you on a bus."

- The introduction of the LRT is also anticipated to enhance safety through the reduced reliance on personal vehicles. This shift away from personal vehicles may lead to fewer traffic accidents as public transit systems typically have lower accident rates compared to road-based vehicle travel.

3.3 Anticipated Challenges and Other Considerations

Despite the enthusiasm about the LRT project, stakeholders mentioned a few areas that deserve a closer look as the project progresses. These include:

- **Funding Challenges:** One of the potential challenges identified is the potential financial burden associated with both capital expenditures (CAPEX) and operational expenditures (OPEX). The LRT project may compete for funding with other major municipal initiatives. This competition for resources underscores the need for a strategic financial plan that identifies multiple funding sources, including federal and provincial grants, public-private partnerships, and possibly innovative financing mechanisms to ensure the project's viability without compromising other essential services.
- **Community Buy-In and Cultural Shift:** Participants mentioned the need to secure community buy-in in order to overcome the deep-rooted car culture which dominates current transportation preferences. A portion of the population lack access to personal vehicles and find public transit more affordable . Changing public perception about public transit and gaining widespread support for the LRT will necessitate public awareness campaigns, outreach programs, and incentives to illustrate the benefits of public transit (e.g., reduced environmental impact, increased accessibility, and economic growth opportunities).
- **Immigration and Labor Market Challenges:** Some participants initially expressed concerns about the local labor market's capacity to recruit and train a sufficiently skilled workforce for constructing and operating the LRT. However, given the LRT project's 2.5 to 3-year timeline to become operational, these challenges are expected to be mitigated by anticipated relaxations in federal immigration policies, which could increase the availability of international students and temporary workers. There is an opportunity to enhance the local talent pool, thereby supporting the project's workforce needs. Additionally, stakeholders noted that establishing partnerships with educational institutions and leveraging government-supported training programs will ensure readiness and operational capacity for the LRT, aligning with the expected increase in labor resources. Furthermore, the long-term demand for the LRT is anticipated to remain strong, as public transportation currently serves a significant number of international students, whose numbers are poised to stabilize or grow with policy adjustments.

3.4 Key Takeaways

Community and Regional Support

- Strong community support exists for the LRT, driven by the potential for improved public transit to reduce reliance on personal vehicles.
- The LRT is seen as an opportunity to transform CBRM's identity from a historically industrial region to one aligned with environmental sustainability.

Economic and Urban Development Benefits

- The LRT is expected to act as a catalyst for economic growth by improving access to retail and employment hubs, potentially invigorating local businesses and increasing tourism.
- Enhanced connectivity may spur residential and mixed-use developments, alleviating housing pressures and supporting transit-oriented community growth.

Public Transit and Connectivity Enhancements

- Stakeholders view the LRT as a critical upgrade needed for the current and future transportation infrastructure, particularly in high-demand corridors.
- Integration with existing bus services is essential to create a cohesive and efficient public transit network.

Environmental and Social Benefits

- The LRT could significantly reduce vehicular emissions, contributing to improved air quality and alignment with climate change initiatives.
- Enhancing accessibility for students and seniors, the LRT is expected to provide a more inclusive transportation option, with affordable fares.
- The LRT is also expected to help reduce road accidents by reducing the number of personal vehicles on the road. This improvement will be particularly beneficial on major streets and highways, such as Kings Road and the Glace Bay Highway.

Challenges and Considerations

- Funding is a substantial challenge with competing municipal priorities, requiring a strategic financial plan involving multiple funding sources.
- Achieving community buy-in and shifting away from a car-dependent culture will require robust public awareness and incentive programs.
- The local labor market may face challenges in recruiting a skilled workforce for the LRT's operations, necessitating partnerships with educational institutions and government training programs.
- Monitoring immigration policies to anticipate population growth and demand for the LRT is crucial.

Passenger Terminals - Main and Satellite Stations

Trifos

Cape Breton University

CBRM ELECTRIC GO TRAIN
MAIN TERMINAL AND STATIONS

DESIGN REPORT

December 16, 2024

Table of Contents

I. GENERAL DESIGN PRINCIPLES

A. INTRODUCTION

The proposed stations design for the Cape Breton Regional Municipality (CBRM) Electric Go Train System envisions the construction of one (1) main terminal and nine (9) satellite terminals. The focus of the terminal design(s) shall be to support a safe, reliable, inclusive, and seamless customer experience through a highly-functional and thoughtfully-addressed, customer-experience design solution. The end goal is to provide well-connected, convenient, and friction-free movement experience for the commuting public.

The building(s) and site design shall be designed to shorten travel distances and provide clear, direct transfers between various transit modes (bus, taxis, and passenger vehicles) to the Electric Go Train transfer.

The buildings' infrastructure (mechanical, electrical, plumbing, security, and landscape systems) will be seamlessly integrated in a unified, consistent manner at all sites.

The buildings will present a cohesive, consistent, and predictive design from end to end so as to enhance ease of navigation for all customers.

Consistent design treatments in architectural massing, building skin, and material selections will provide visual cues to support wayfinding and accessibility The buildings will project a visual composition of order, comfort, and security with balanced, clutter-free spaces that are distinct and easily understood by all users.

B. ACCESSIBILITY/SAFETY

The terminals and stations will be designed to meet the diverse needs of all commuters regardless of age, gender, income, and transit-system familiarity,

Stations will be universally accessible for wheelchair users, visually impaired, and hearing impaired. The design will create a sense of safety by conforming to Crime Prevention Through Environmental Design Principles. Window transparency and openness, along the façades facing public spaces shall be supported by enhanced lighting, shall be incorporated in the designs. Placement of intercoms, fare payment, vending, and transaction areas will be placed in open spatial areas. Reliability will be promoted via robust building systems that will be easily maintained for years to come.

Environmental sustainability will be promoted via low- or zero-carbon footprint, renewable energy photovoltaics, non-fossil fuel mechanical infrastructure, and EV charging stations. The building(s) will minimize energy use, maximize daylighting, manage stormwater, and reduce greenhouse gas (GHG) emissions.

II. ARCHITECTURAL VISION AND DESIGN APPROACH

The proposed architecture of the transit stations is firmly rooted in the style known as Maritime Vernacular Architecture. Simple in design with minor ornamentation, this style evokes the steep-rooted, simple wood-barn buildings, influenced by the building traditions of Scotland. Simple rectangular blocks with symmetrically-located doors and windows.

II. ARCHITECTURAL VISION AND DESIGN APPROACH (Cont'd)

The proposed stations feature sloped metal roofs with solar panels; anti-graffiti coated, wood-look, metal (non-combustible) siding; and high-efficiency, insulated; glass curtain walls with anti-bird collision frit patterning. The interior layouts have a high vaulted ceiling and open waiting area, with staff operational and ticketing services on one end and public amenities (vending and washrooms) on the opposite end. The stations will typically include station attendant booth, fare devices, retail vending, and closed-circuit camera surveillance.

The "unpaid" zone will be separated from the "paid" zone by fare threshold turnstile gate devices. The unpaid zone will feature mapping, fare purchasing, and assistance. The paid zone will feature access to washrooms, retail vending, seating, etc.

The Go Train exterior platform will have covered overhangs, trip-confirmation signs, seating, advertising, and public address (PA) information.

Each station will have fire- and life-safety such as emergency smoke ventilation, sprinkler system, non-combustible materials, and rapid-evacuation mechanisms.

All of the stations will have a harmonized and consistent design language, detail, and civic quality. A recognizable rhythm and proportion of floor, wall, ceiling treatments, furnishings, and signage shall ensure the customer experience will be connected, convenient, and friction free. Sustainable, recyclable, robust, and high-quality materials will be used on plazas, flooring, walls, and ceiling treatments. The building will be designed in compliance with CSA S478 Guidance on Durability in Buildings, Long Life Category.

In summary, the passenger experience will prioritize safety and orientation through open, clear views; maximized pedestrian flow through; comfort and protection form rain, snow, wind, and sun; and universal accessibility regardless of body size, posture, or mobility.

III. STATION AND TERMINAL GROSS CONSTRUCTION COST

A. METHODOLOGY

The proposed edifices were evaluated for costing utilizing a square-foot elemental cost approach. The scope includes substructure, structure, building envelope, interior partitions, doors, fittings, equipment finishes, mechanical and electrical systems, and Contractor's general requirements and fee.

The evaluation assumes a design service life of 50 to 99 years. Major infrastructure components are to be designed and constructed so as to be readily replaceable (minimal disruption for replacement).

The proposed building construction costs include all materials, labour, equipment, overheads, general conditions, plus mark-ups and Contractor's profit. Costs for parking, road ways, concrete light rail train platform works, site landscaping, fencing, and underground site services are included as an allowance.

Underground, substructure work for non-typical foundations for poor soil stability, bath tubbing for high groundwater, remediation of contaminated soils are not included in the estimates.

III. ARCHITECTURAL VISION AND DESIGN APPROACH (Cont'd)

A. METHODOLOGY (Cont'd)

The costs, outlined in the Station and Terminal Gross Construction Cost, are for building construction costs only. Development or "soft costs" are indicated as an allowance in addition to the building construction cost in the building costs. These soft costs would include some or all of the following:

- Land costs;
- Legal fees;
- Architectural and Engineering fees;
- Testing fees (soil, concrete, and environments);
- Commissioning fees;
- Surveying;
- Government or certification program fees (Zero-Carbon Performance for LEED Standards);
- Special equipment or furnishings;
- Marketing and advertising;
- Insurance and bond costs;
- Broker commissions; and
- Value-added taxes.

III. ARCHITECTURAL VISION AND DESIGN APPROACH (Cont'd)

B. BUILDING GROSS CONSTRUCTION COST(S)

STATION AND TERMINAL GROSS CONSTRUCTION COST				
Station Terminal Building Description	**Building Elements**	**Satellite Terminal Station 1,500 S.F.**	**Main Terminal 3,650 S.F.**	**Percentage of Total**
1. Conventional reinforced concrete foundations, slab, radon pit, insulations, and vapour barrier.	1. Concrete Substructure	43,650	104,025	3%
2. Rigid steel superstructure with steel purlins, girts, and cross bracing.	2. Steel Substructure	203,700	485,450	14%
3. Composite insulated metal roof with composite, insulated metal clad wing walls, curtainwall glass, and aluminum entries.	3. Exterior Enclosure	276,450	658,825	19%
4. Pressed steel doors, frames, and institutional hardware. Abuse-resistant gypsum and heavy-duty metal studs.	4. Partitions and Doors	58,200	138,700	4%
5. Long-life, durable finishes with feature ceilings, protective wall-claddings, terrazzo floors, and fire-resistant rated finishes.	5. Finishes	101,850	242,725	7%
6. Security turnstiles, wayfinding, benches, furnishings, POS ticketing, and bike racks.	6. Fittings & Equipment	101,850	242,725	7%
7. Heat-pump systems, energy recovery, low-flow fixtures, sprinkler distribution, control systems, and smoke evacuation.	7. Mechanical Systems	261,900	624,150	18%
8. Integrated lighting, fire alarm, security, CCTV, smoke detection, PA system, and signage.	8. Electrical Systems	261,900	624,150	18%
9. Site overheads, bonding, security, insurance, foreman, and safety.	9. General Requirements & General Conditions Fees	145,500	346,750	10%
	Gross Building Construction Cost	1,455,000 ($970/S.F.)	3,467,500 ($950/S.F.)	100%

III. ARCHITECTURAL VISION AND DESIGN APPROACH (Cont'd)

C. SATELLITE TERMINAL - SOFT AND HARD CONSTRUCTION COST:

1.	Satellite Terminal Building Cost (1,500 S.F. x $970/S.F.)	$ 1,455,000
2.	Site Works Allowance (1 acre)	600,000
3.	Platform Works Allowance	400,000
4.	Contingency (Design and Construction Contingency of 20%)	491,000
5.	Escalation (1 year +/- 10%)	294,600
6.	Soft Costs (25%)	810,150
	Total Satellite Terminal Soft and Hard Construction Cost	$ 4,050,750

The satellite terminal projected cost of $4,050,750 compares to listed Altus 2024 Cost Report average light rail train stop, at grade, per unit cost of $1.2 million to $6.1 million.

D. MAIN TERMINAL - SOFT AND HARD CONSTRUCTION COST:

1.	Main Terminal Building Cost (3,650 S.F. x $950/S.F.)	$ 3,467,500
2.	Site Works Allowance (2 acres)	1,500,000
3.	Platform Works Allowance	600,000
4.	Contingency (Design and Construction Contingency of 20%)	1,113,500
5.	Escalation (1 year +/- 10%)	668,100
6.	Soft Costs (25%)	1,837,275
	Total Main Terminal Soft and Hard Construction Cost	$ 9,186,375

The main terminal projected cost of $9,186,375 compares to listed Altus 2024 Cost Report average light rail train station, at grade, per unit cost of $5.5 million to $41.9 million.

E. COST COMMENTARY:

The building(s) development- and infrastructure-costs outlined above are to be considered Class D (+/- 30%) accuracy. Cost predictability for the current Cape Breton unionized labour market is difficult given the current, high volume of local institutional construction. Factors such as the shortage of unionized labour, and the decreasing Canadian Dollar compared to US Dollar value on building systems (mechanical and electrical equipment, architectural components, etc.) affect costing. Any future development phases shall have to allow for iterative cost estimating/quantity survey studies.

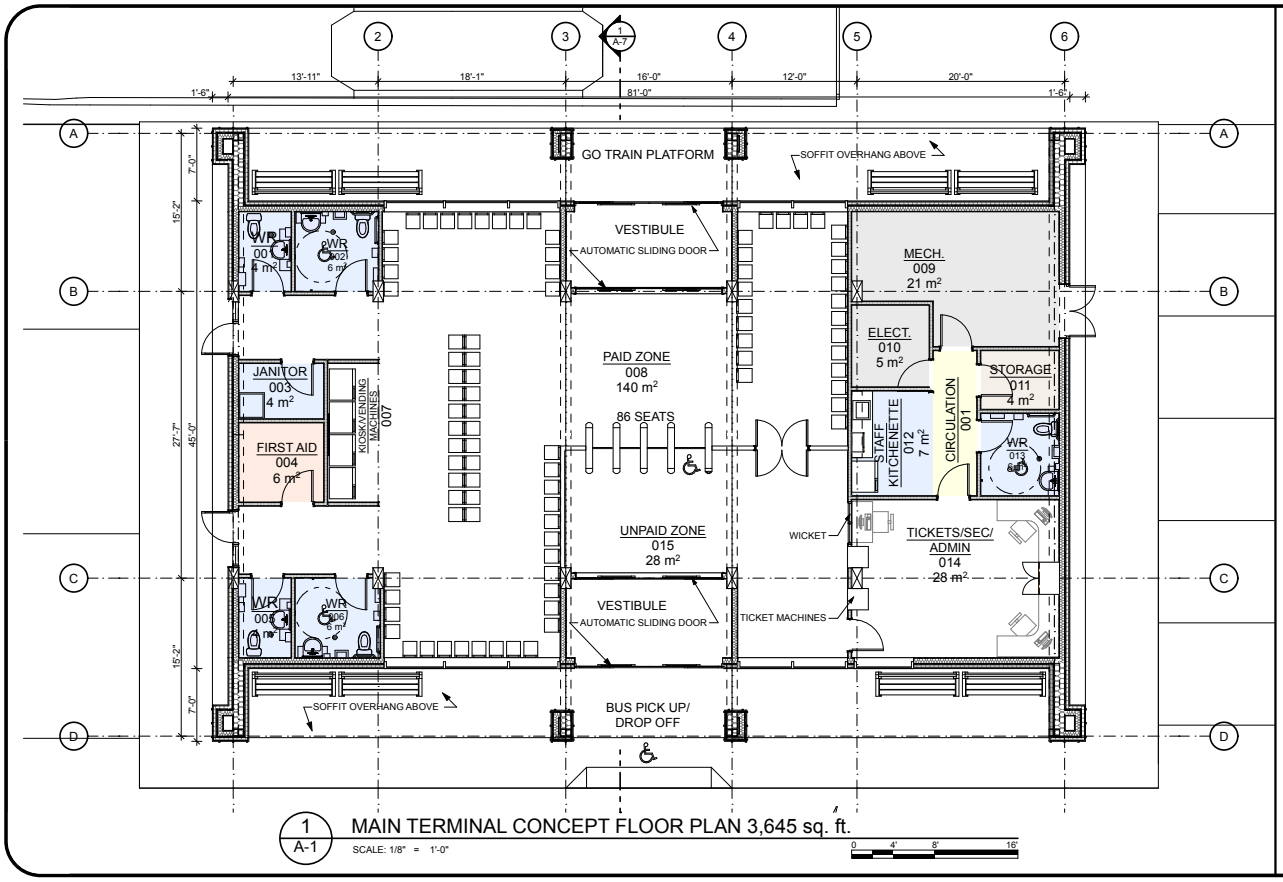
IV. APPENDIX A - ARCHITECTURAL CONCEPT DRAWINGS AND RENDERINGS

A. APPENDIX A-1 - MAIN TERMINAL CONCEPT FLOOR PLAN

B. APPENDIX A-2 - MAIN TERMINAL CONCEPT RENDERING VIEW

C. APPENDIX A-3 - SATELLITE TERMINAL CONCEPT FLOOR PLAN

D. APPENDIX A-4 - SATELLITE TERMINAL CONCEPT RENDERING VIEW



1 / A-1 MAIN TERMINAL CONCEPT FLOOR PLAN 3,645 sq. ft.

SCALE: 1/8" = 1'-0"

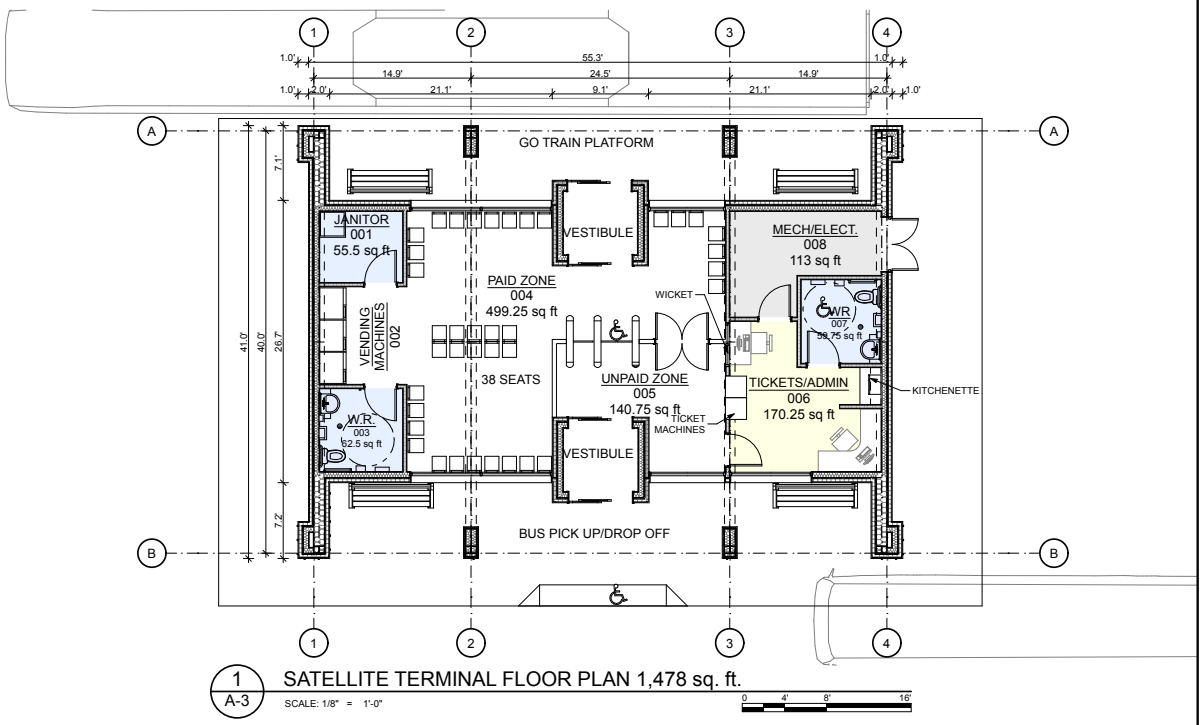
0 4' 8' 16'

DMDE FEASIBILITY STUDY (LIGHT RAIL TRAIN)
CBRM, NOVA SCOTIA
MAIN TERMINAL CONCEPT FLOOR PLAN
Print Date: 2024-12-16
TDC No. 24-012

SHEET A-1

DMDE FEASIBILITY STUDY (LIGHT RAIL TRAIN)
CBRM, NOVA SCOTIA
MAIN TERMINAL CONCEPT RENDERING VIEW
Print Date: 2024-12-16
TDC No. 24-012

SHEET A-2



1 / A-3 SATELLITE TERMINAL FLOOR PLAN 1,478 sq. ft.

SCALE: 1/8" = 1'-0"

DMDE FEASIBILITY STUDY (LIGHT RAIL TRAIN)
CBRM, NOVA SCOTIA
SATELLITE TERMINAL CONCEPT FLOOR PLAN
Print Date: 2024-12-16
TDC No. 24-012

SHEET
A-3

DMDE FEASIBILITY STUDY (LIGHT RAIL TRAIN)
CBRM, NOVA SCOTIA
SATELITE TERMINAL CONCEPT RENDERING VIEW
Print Date: 12/16/2024
TDC No. 24-012

SHEET
A-4

CBRM Go-Train Regulatory Review

McINNES COOPER

Cape Breton University

MCINNES COOPER

REGULATORY OVERVIEW

TO: Kent MacIntyre, CBU

FROM: McInnes Cooper (Ian Parker/Jane O'Neill, KC)

DATE: January 5, 2024

RE: **Regulatory Overview CBU Rail Line Development**

SUMMARY AND LIMITATIONS

The constitutional issues around railways are complex and the authority over railways is distributed between the federal government and the provinces. Some railways are federally regulated, while others are provincially regulated.

The proposed CBU Rail Line will be one operating solely within the Province of Nova Scotia. It should therefore be solely provincially regulated; however, issues may arise over the course of the project over which Canada may claim to have jurisdiction.

Section 92(10) of the ***Constitution Act, 1867*** gives the provinces exclusive jurisdiction over "local works and undertakings" but with exceptions. Railways "connecting the Province with any other Province" or "extending beyond the Limits of the Province" are under federal jurisdiction.

Further, any works declared to be for the "general Advantage of Canada" or for the "Advantage of Two or more of the Provinces" are also subject to federal jurisdiction.

Accordingly, railways that are solely within a Province can be provincially regulated. In 2001, the ***Railways Act***, S.N.S. 1993, c. 11, came into force, giving Nova Scotia the authority to regulate the safety of railways under provincial authority. The constitutional limits of the Province's authority over railways and the specific constitutional validity of the ***Railways Act*** has not been tested.

For the purposes of this overview, we are treating the project as a railway solely within the Province and assuming that no aspect of the project is for the "general Advantage of Canada" within the meaning of section 92 of the ***Constitution.***[1] If, however, at any stage, the Federal government attempts to assert authority over any aspect of the project, we will provide a thorough,

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[1] The ***Canada Transportation Act***, S.C. 1996, c. 10 deems railways that are "owned, controlled, leased or operated by a person who operates a railway within the legislative authority of Parliament" to be for the "general advantage of Canada". If any part of the railway fits within the definition above, CBU Rail will have to comply with Part III of the ***Canada Transportation Act***.

constitutional analysis of which level of government may exercise jurisdiction over the project or any parts of the project.

As for the municipality, the ***Railways Act*** specifically excludes the application of the ***Municipal Government Act*** to the land occupied by the railway. This means that any construction, alteration, or operation of a railway should not require approvals from the municipality nor changes to zoning or bylaw.

Unfortunately, the regulatory regime in Nova Scotia contains several gaps, the legislation and regulations are not well drafted, and the regime has not yet been used except to discontinue the Sydney Subdivision. The CBU Rail project provides an opportunity to engage with government to set up a workable regime; the support of government in amending regulations and enacting new regulations is likely necessary moving forward.

After enacting the ***Railways Act***, Nova Scotia adopted existing federal regulations and operating rules; however, licensing and oversight is now within the power of the Minister of Transportation and Infrastructure Renewal ("Transport Minister") and the Nova Scotia Utility and Review Board ("NSUARB"). Whenever a federal regulation, rule or standard refers to "the Minister", it is to be read to refer the provincial Transport Minister.

There are currently three short-line railways in Nova Scotia, none of which have been subject to the licensing process in Nova Scotia.

1) The Windsor-Hantsport Railway is non-operational. The company owns 34 km of track from Windsor to New Minas.

2) The Sydney Coal Railway is owned by Nova Scotia Power. It is classified as an industrial railway and currently falls outside provincial legislation. It appears to operate voluntarily under the federal regime. In 2020, the legislature passed an ***Act to Amend the Railways Act***, S.N.S. 2020, c. 17 ("***Railways Act 2020***") to bring the Sydney Coal Railway under the provincial regime. The Act has not yet been proclaimed so it is not in force.

3) The Cape Breton and Central Nova Scotia Railway ("CBCNS"), a NS company currently owned by CN and Genesee &Wyoming, acquired the Truro-Sydney line in 1993 at which time CBCNS entered into an operating agreement with the Province. In 2015, CBCNS discontinued the portion between St. Peter's Junction and Sydney (Mile 17.02 and 113.9, referred to as the Sydney Subdivision). The Province has subsidized insurance and other expenses for the discontinued line since that time, but not those related to maintenance or repair.

This report is meant to provide an overview of the regulatory regime affecting the development and operation of a passenger railway in Cape Breton, assumed to be wholly within the Province and not for the "general Advantage of Canada".

First, it will highlight gaps in the process that need the Province's attention. Second, it will set out the existing rules and regulations the Province has in place. Third, it will outline the licencing approval process before the NSUARB.

LEGISLATIVE GAPS IN NOVA SCOTIA'S REGULATORY REGIME

There are currently three major regulatory gaps in Nova Scotia's regulations of railways. First, there is no approval process in the Province for construction and alteration of railway lines; second, the Sydney Coal Railway is not regulated by either Canada or Nova Scotia; and third, there is no approval process in the Province for crossings.

No approval process for construction or alteration of railways

While Nova Scotia is responsible for licensing and operational oversight of railways within the Province, it does not currently have any approval process for the construction and alteration of railway lines.

The ***Railways Act***, as originally drafted, required a permit for construction and alteration of a railway line from the NSUARB. The permit requirement was removed in 2001 by the ***Transportation Amendments (2001) Act*** and nothing was put in its place. The Province, however (perhaps by oversight), kept the requirements in the ***Railway Notification and Licence Regulations*** to:

- obtain a licence before carrying out construction if an operating licence was not previously held by the railway company; and

- provide public notice in the newspaper of proposed construction or alteration of railway lines.

At the same time, the Province incorporated the Federal ***Notice of Railway Works Regulations***, which requires notice of any construction or alteration to specific stakeholders, including the municipality, abutting landowners and federal Director of the regional Railway Safety Directorate.

While the Province has clearly removed itself as the authority over construction and alteration of railways, it not clear that the Federal Government regime applies. As noted above, this will be dependent on whether the railway, or any part of it, can be classified as one for the "general Advantage of Canada". Since the railway will operate wholly within the Province, in our opinion, it is to be provincially regulated.

The Sydney Coal Railway is not regulated

The Sydney Coal Railway is unlicensed and is not under either provincial or federal authority. Until 2018, the operator, Logistec Stevedoring Nova Scotia Inc. (carrying on business as Sydney Coal Railway), had a federal license to operate, however, that was cancelled when Logistec's contract with Nova Scotia Power ended. The Sydney Coal Railway is currently not licensed nor is it subject to either Provincial or Federal authority.

In practice, the Province has categorized the Sydney Coal Railway as an "industrial railway", excluding it from the ***Railways Act***. Arguably, it does not meet the definition of "industrial railway"; however, it has been treated as exempt since the ***Railways Act*** came into force.

The amendments to the ***Railways Act 2020*** are clearly meant to bring the Sydney Coal Railway under Provincial authority, but until the Act is proclaimed, there may be uncertainty.

In our opinion, the Sydney Coal Railway is within Provincial jurisdiction under the ***Constitution*** as it is a short-line railway solely within the Province. To date, however, the Province has simply

not exercised any authority over it. This means that the Sydney Coal Railway is currently unregulated.

In our opinion, any part of the Sydney Coal Railway that may be used for CBU Rail will no longer meet the definition of an "industrial railway" and should therefore be governed by the ***Railways Act*** going forward. To avoid future challenges, CBU should raise this issue with the Province.

No approval process for crossings

In the original ***Railways Act***, the NSUARB had to approve crossings. This provision was repealed in 2001 and nothing was put in its place.

Section 12 of the ***Railways Act*** provides that "utility crossings" and "road crossings" have the same meaning as in the ***Canada Transportation Act***, which provide:

> **road crossing** means the part of a road that passes across, over or under a railway line, and includes a structure supporting or protecting that part of the road or facilitating the crossing;
>
> **utility crossing** means the part of a utility line that passes over or under a railway line, and includes a structure supporting or protecting that part of the utility line or facilitating the crossing;

Further, the ***Railways Act*** provides that every decision, order, rule, regulation, and direction made by the Canadian Transportation Agency in relation to road crossings and utility crossings continues to apply to those crossings, even though the crossings have passed from Federal to Provincial jurisdiction, until the decisions, orders, rules, regulations, or directions are revoked or amended by the Canadian Transportation Agency or under the ***Railways Act***.

The ***Railways Act*** allows the Province to enter into any agreement with Canada relating to crossings but it does not appear that it has done so. The Province has specifically provided in the ***Railways Act*** that it may make regulations relating to crossings. Nova Scotia has not put anything in place to deal with crossings. It appears that the Province intended all crossings to comply with Federal requirements because when it passed the ***Railway Safety Regulations***, it incorporated the Federal regulations in place at that time. It retained the authority, however, to pass regulations relating to crossings. It has not done so.

In 2014, Canada enacted the ***Grade Crossing Regulations*** and set up a regime for upgrading, abandoning, and cost-sharing for crossings. The Canadian Transportation Agency oversees this regime. Arguably, these ***Grade Crossing Regulations*** are simply an amendment to the regulations that were in place when the Province passed the ***Railway Safety Regulations*** in 2001. We will need to clarify this with the Province.

To address the legislative gaps, CBU may want to ask government to proclaim the ***Railways Act 2020***, fix the ***Railway Notification and Licence Regulations***, and enact any other regulations CBU thinks would assist the project (including regulations relating to crossings).

Please note that while the Nova Scotia ***Railways Act*** came into force in 2001, it has not yet been considered by the NSUARB, except when CBSNS applied to discontinue the Sydney Subdivision.

This project will be new ground for the Province and the NSUARB.

EXISTING RULES AND REGULATIONS IN NOVA SCOTIA

Nova Scotia
Railways Act, SNS 1993, c 11
Discontinuance of Services and Abandonment, Regulations Respecting, NS Reg 55/2016
Private Railway Crossing Fees Regulations, NS Reg 23/2011
Railway Notification and Licence Regulations, NS Reg 146/2001
Railway Safety Regulations, NS Reg 144/2001

KEY DEFINITIONS

"**industrial railway**" means a railway that (i) transports only goods or commodities that are manufactured, refined or otherwise produced, processed or handled by the person who operates the railway or on whose behalf the railway is operated, and (ii) is operated wholly or in part within the confines of the industrial site on which goods or commodities are manufactured, refined or otherwise produced, processed or handled, and is not operated for the purposes of transporting goods or commodities for a toll or a fee or of being a common carrier;	This is the provision that purports to "exempt" the Sydney Coal Railway from the ***Railways Act.*** In our opinion, if any part of the Sydney Coal Railway is used for the project, it will no longer meet this definition and will no longer be exempt.
"**railway**" means a railway, or any part thereof, and includes all railway lines, stations, depots, wharves, rolling stock, equipment, stores, real and personal property and works connected with a railway and any bridge, tunnel or other structure and any crossings used by a railway;	Section 22 requires the safe operation of the "railway" in accordance with the regulations and industry standards. The definition encompasses all of the defined structures and equipment so gives the Minister authority over everything within the definition.
"**railway company**" means a corporation that operates or intends to operate a railway and is entitled to carry on business in the Province;	The entity that undertakes the CBU Rail project will be considered to be a "railway company" and must be registered under the ***Corporations Act.***
"**railway line**" means the land, bed, road, structures and track on which a railway may be operated, and includes any part thereof;	Section 9 of the Act states that no person shall construct or alter a railway line except in accordance with the regulations. There is a legislative gap here. While the Province has the authority under section 48(1)(d) to enact

	regulations respecting construction or alteration of railway lines, the Province has not done so. Section 10 requires a railway company "applying to construct or alter a railway line" to provide public notice in the newspaper. There is a legislative gap here. The is no requirement to "apply" to construct or alter a railway line.
"**railway service**" means the public carriage of passengers or freight on a railway and includes any service offered by a railway company in connection with such carriage;	Section 14 states that no person can operate a railway service without a licence and must follow the regulations and rules approved by the Minister.
"**right of way**" means the land occupied by a railway but does not include land that is not contiguous to a railway line.	Section 51 provides the ***Municipal Government Act*** does not apply to the right of way.

FEDERAL RULES AND STANDARDS ADOPTED IN NOVA SCOTIA

To operate the railway service, the railway company must comply with all safety regulations in place in Nova Scotia. The ***Nova Scotia Safety Regulations*** incorporate specific provisions, regulations, orders, rules, and standards that operate federally as they are amended from time to time. Nova Scotia has adopted the following:

Rules and Standards
1. Canadian Rail Operating Rules
2. Rules For Protection of Track Units and Track Work
3. Railway Employee Radio Communication Rule
4. Railway Freight and Passenger Train Brake Rules
5. Railway Freight Car Inspection and Safety Rules
6. Railway Locomotive Inspection and Safety Rules
7. Railway Signal and Traffic Control Systems Standards,
8. Rules Respecting Track Safety
9. Standards Respecting Pipeline Crossings under Railways
10. Standard Respecting Railway Clearance
11. Railway Passenger Handling Safety Rules
12. Rules for the Control and Prevention of Fires on Railway Rights-of-Way
13. Rule Respecting Mandatory Off-Duty Time for Railway Operating Employees Working in Covered Service,
14. Rules for the Installation, Inspection and Testing of Air Reservoirs (other than on locomotives)
15. Railway Passenger Car Inspection and Safety Rules, TC O-0.12

Regulations made pursuant to Railway Safety Act (Canada)
1. Ammonium Nitrate Storage Facilities Regulations
2. Anhydrous Ammonia Bulk Storage Regulations,
3. Caboose-less train operations of CN&CP Rail,
4. Chlorine Tank Car Unloading Facilities Regulations,
5. Flammable Liquids Bulk Storage Regulations
6. Handling of Carloads of Explosives on Railway Trackage Regulations,

7. Heating and Power Boilers Regulations,
8. Highway Crossings Protective Devices Regulations
9. Liquified Petroleum Gases Bulk Storage Regulations
10. Locomotive Lights and Lamps Regulations,
11. Mining Near Lines of Railways Regulations
12. Notice of Railway Works Regulations
13. Railway Employee Qualification Standards Regulations
14. Railway Engine Bell and Whistle Regulations
15. Railway Grade Separations Regulations
16. Railway-Highway Crossing at Grade Regulations
17. Railway Prevention of Electric Sparks Regulations
18. Specification 112 and 114 Tank Cars Regulations
19. Wire Crossings and Proximities Regulations

Regulation made under the Canadian Transportation Accident Investigation and Safety Board Act
Transportation Safety Board Regulations

LICENSING REQUIREMENTS UNDER THE *RAILWAYS ACT*

The ***Nova Scotia Railway Notification and Licence Regulations*** set out the licencing requirements.

Section 3 states a railway company must obtain a licence before it carries out any "construction" if it has not previously held an operating licence. Also, any "new owner" of a railway line or railway service must obtain a licence. This means that before any construction or alteration of the rail line can begin, CBU will have to provide public notice, participate in a public hearing before the NSUARB, and satisfy it that CBU meets all requirements for a licence.

As noted above, however, the Province no longer requires a railway company to apply to the NSUARB for a permit to construct or alter any part of a railway line. The effect is that public notice is required, but approval of the actual construction or alteration is not required.

The Regulation does not define "construction" for licencing purposes; however, it does define it for purposes of the public notice requirement. This definition captures new railway lines meant for passengers, alterations to lines that require the acquisition of land, public road crossings, and the construction of tunnels or bridges. Any work CBU must do to existing lines and the construction of new lines will trigger the licence requirement.

As the Regulations currently read, the railway company will not be permitted to do any construction or alteration unless it is first licensed by the NSUARB. This requires the railway company to satisfy the NSUARB it meets the following criteria at a public hearing:

- The railway company must have the permission of the owner of the railway line.
- The railway company must demonstrate it meets all prescribed safety standards.
- The railway company must demonstrate it has obtained all prescribed insurance coverage.
- The railway company must demonstrate it has the financial viability to operate.
- The railway and the railway service must be inspected by a railway inspector.
- Any newly constructed or altered railway line and its connections must be inspected by a railway inspector.

The Provincial Regulations provide that before applying for a licence, the railway company must provide notice of such by publication once a week for 3 weeks in a newspaper having general circulation in the area. The contents of the notice are not specified.

Any person who is directly affected may object in writing to an application on the grounds that the intended operation of the railway line, or proposed construction or alteration, is or **may be unsafe** for the carriage of passengers or freight, to employees of the railway, or to adjacent property.

What is "unsafe" for adjacent landowners has not been considered by the NSUARB and will be an issue that will have to be argued before the NSUARB in response to objections.

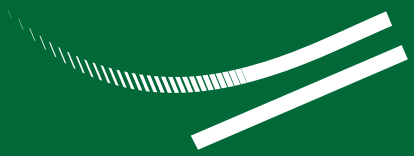
The Federal Regulations, called the ***Notice of Railway Works Regulations***, which have been adopted in Nova Scotia, also require public notice and participation.

This notice must be given 60 days before commencing any construction or alteration of a railway line. This notice must contain drawings, plans (including elevations and proposed structures), and a description of any potential safety impacts to persons or property.

This notice must be given directly to the municipality, abutting landowners, any railway company whose line is to be crossed, the authority having responsibility for any road that will be crossed, and the federal “Director of the regional Railway Safety Directorate”.

Nova Scotia has adopted these Federal Notice Regulations, but has not adopted any parts of the federal ***Railway Safety Act*** or the ***Canadian Transportation Act*** dealing with approvals or objections to alteration or construction. Accordingly, there is currently no mechanism for any of these parties to whom notice is required to be given, to object. Nova Scotia has also omitted any mechanism for adjudication of any of these objections.

Environmental Regulatory Roadmap



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CONSULTING

Cape Breton University

Table 1: **Legislative and Regulatory Compliance and Permitting Assessment**

Legislation or other Requirement	Agency/ Stakeholder	Permits, Licenses, Approvals	Trigger	Applicable to Project	Permitting Path	Estimated Time Frame*	Estimated Total Cost	Risks
Province of Nova Scotia – Key Acts and Regulations								
Environmental Act– Activities Designation Regulations	Nova Scotia Environment and Climate Change (NSECC)	Water Alteration Notification Water Approval for Watercourse Alteration	Constructing or modifying a single culvert or other single closed-bottom structure for the purpose of a road, or railbed requires notification to NSECC. Otherwise, altering or alternating flow to a watercourse, requires an approval from NSECC.	Likely Water notifications are likely to be required if watercourse crossings along the railbed require upgrades. Water approvals are likely to be required for new watercourse crossings or other activities if watercourses are present in the undeveloped track and stations footprint.	Conduct desktop screening and watercourse assessments for areas where work will be required in, and near, watercourses. Prepare and submit water notification and water approval applications as required.	Notification: 1 month Application: 2 - 4 months	Notification: $2,000 - $5,000 per watercourse Approval for Alteration: $5,000 - $20,000 per watercourse	If field assessments are required, the applicable survey window is between June 1 and September 30.
Environmental Act– Contaminated Sites Regulations	Nova Scotia Environment and Climate Change (NSECC)	Compliance with the Act	If contaminants are discovered during construction activities, such as excavation or grading, the site would need to be assessed and managed according to the	Likely If contaminated soils are encountered or the project overlaps with a contaminated site, compliance with the regulations is required.	Conduct a Phase I Environmental Site Assessment (ESA) to identify potential contaminated sites within the Project footprint. If necessary, conduct a Phase II ESA to identify and characterize contamination.	Phase 1 ESA: 1 -2 months Phase 2 ESA: 2-3 months	Phase 1 ESA: $5,000 – $10-000 Phase 2 ESA: $25,000 – $50-000	

Legislation or other Requirement	Agency/ Stakeholder	Permits, Licenses, Approvals	Trigger	Applicable to Project	Permitting Path	Estimated Time Frame*	Estimated Total Cost	Risks
			Contaminated Sites Regulations.		If a project activity results in the accidental release of a contaminated substance into the environment, notification and compliance with the Contaminated Sites Regulations is required.			
Environmental Act– Activities Designation Regulations	Nova Scotia Environment and Climate Change (NSECC)	Wetland Alteration Approval	Alterations (e.g., infilling) to a wetland require approval	Possible A wetland alteration approval would be required if work activities will occur in the undeveloped track and stations footprint where if wetlands are present. If wetlands will be infilled, compensation would be required which is typically completed by contracting Ducks Unlimited; although the proponent can undertake the work independently.	Conduct desktop screening and wetland identification and delineation in the field. Prepare and submit wetland alteration applications. If required, develop compensation and follow-up monitoring plan either independently or subcontract Ducks Unlimited.	Alteration Application: 2 - 4 months Compensation Plan: 2 - 4 months, with work follow-up work extending up to 5 years	Alteration Application: $10,000 - $20,000 per wetland within the undisturbed project footprint. Compensation Plan: $10,000 - $25,000 plus approximately $3.25/$m^2$ of wetland created.	If field assessments are required, the applicable survey window is between June 1 and September 30.

Legislation or other Requirement	Agency/ Stakeholder	Permits, Licenses, Approvals	Trigger	Applicable to Project	Permitting Path	Estimated Time Frame*	Estimated Total Cost	Risks
Crown Lands Act	Nova Scotia Department of Natural Resources and Renewables (NSNRR)	Crown Lands Application	Crown Lands Lease due to exploration and/or construction occurring on Crown Lands.	Unlikely Not anticipated to be required unless project footprint crosses crown lands.	Application for a Crown Lands lease to be filed for Project components occurring on Crown lands.	Lease Application: 1-4 months	$5,000 - $10,000	
Endangered Species Act, S.N.S 1998, c. 11 (ESA),	Nova Scotia Department of Natural Resources and Renewables (NSNRR)	Endangered Species Permit	The presence of species at risk (SAR) or potential habitat for SAR within the project footprint could require an Endangered Species Permit if SAR listed under the Nova Scotia Endangered Species Act (NSESA) will be directly impacted by the project.	Unlikely An Endangered Species Permit is not anticipated to be required as the majority of the Project footprint is occurring on previously disturbed lands. However, compliance with legislation is required. –	Consult with Nova Scotia Department of Natural Resources and Renewables (NSNRR) and Atlantic Canada Conservation Data Centre (ACCDC) to confirm if species at risk are known to be present within the project area. If species are identified as potentially being present, conduct baseline surveys to identify presence/absence. If SAR are present, an Endangered Species Permit, development of mitigation measures and additional regulatory consultation will be required.	Identification of absence/presence: 1-3 months Endangered Species Permit: 1-3 months	$10,000 – $30,0000	If required, baseline surveys will need to be conducted within appropriate survey windows and could delay obtaining the permit.

Legislation or other Requirement	Agency/ Stakeholder	Permits, Licenses, Approvals	Trigger	Applicable to Project	Permitting Path	Estimated Time Frame*	Estimated Total Cost	Risks
Environment Act – Air Quality Regulations	Nova Scotia Environment and Climate Change (NSECC)	Compliance legislation Reporting and monitoring to be determined by the Minister or an Administrator	All operations in Nova Scotia are required to meet noise and emissions limits and c with legislation is required.	Unlikely Additional monitoring and reporting under the regulation is typically only required for point sources of air contaminants. Compliance with legislation is required.	Permit is not required, however compliance with the criteria for ambient air quality throughout the Province are prescribed in Schedule A of the regulations.	N/A	N/A	
Environment Act, the Activities Designation Regulations	Nova Scotia Environment and Climate Change (NSECC)	Surface Water Withdrawal Approval	A surface water withdrawal approval will be required if there is a need require more than 23,000 litres per day of surface water or groundwater for use during construction and/or operation.	Unlikely Based on our current understanding of the project, large volumes of water are not anticipated to be needed for construction.	If large volumes of water are required for the project, a water withdrawal approval permit will be required. Prepare and submit a completed application form and supporting documentation to NSECC.	Surface Water Withdrawal Permit: 6-12 months	$10,000-$30,000	If required, additional time and costs could be required for monitoring, contingency and conservation plans based on the nature of the water withdrawal and water resources available.

Legislation or other Requirement	Agency/ Stakeholder	Permits, Licenses, Approvals	Trigger	Applicable to Project	Permitting Path	Estimated Time Frame*	Estimated Total Cost	Risks
Environmental Act– Environmental Assessment Regulations	Nova Scotia Environment and Climate Change (NSECC)	Environmental Assessment (EA)	Projects that disrupt 2 ha or more of any wetland will require an Environmental Assessment. Additionally, although unlikely, the Minister may require a project to undertake an Environmental Assessment at their discretion.	Unlikely Based on the current layout, the Project footprint is unlikely to disrupt 2 ha of wetlands. The footprint generally occupies previously disturbed areas, minimizing new impacts to the environment.	Desktop screening to identify if wetlands are present within the footprint of the Project. Follow up studies may be recommended to confirm the presence or absence of wetlands within the project footprint. If an EA is required, baseline environmental surveys, an assessment of potential effects, public engagement and Indigenous consultation would need to be required and included within an EA registration document.	<u>Wetland survey:</u> 1-2 months <u>Environmental Assessment</u>: 6-12 months If the minister requests additional information, more time may be required.	<u>Wetland survey:</u> $10,000 - $30,000 <u>Environmental Assessment</u>: $100,000 to $250,000	The level of effort for public engagement and Indigenous consultation are difficult to predict. Public perception of a Project can extend regulatory approval timelines. .
Special Places Protection Act	NS Communities, Culture, Tourism and Heritage (NSCCTH)	Archaeological Research Impact Assessment (ARIA)	An ARIA under a Heritage permit is typically only required as part of an Environmental Assessment; however, although unlikely, it can be required	Unlikely Not anticipated to be required due to previous disturbance of the soil within the footprint.	If required, a permit would be required for a qualified archaeologist to conduct an ARIA to mitigate the potential risk of significant archaeological or historical remains from accidental or unknowing disturbance.	<u>ARIA:</u> 2-6 months.	<u>ARIA:</u> $20,000 - $100,000	

Legislation or other Requirement	Agency/ Stakeholder	Permits, Licenses, Approvals	Trigger	Applicable to Project	Permitting Path	Estimated Time Frame*	Estimated Total Cost	Risks
			through other environmental permitting processes upon request by a permitting authority and NSCCTH.					
Federal Government of Canada – Key Acts and Regulations								
Impact Assessment Act	Impact Assessment Agency of Canada (the Agency)	Impact Assessment	An Impact Assessment is required for designated projects under the Physical Activities Regulations (e.g., a railway project exceeding 50 km or 50 ha in area).	Unlikely Current Project design does not, involve the expansion or construction of a new railway line with a total or more of 50 km or an area of 50 ha.	The Impact Assessment follows similar processes as the NSEA; however as it is typically triggered for larger, more complex projects the assessment reflects the complexities.	<u>Impact Assessment:</u> 2-5 years or more.	<u>n/a</u>	Indigenous/ Public Consultation required for both IA and EE. Typically led by Federal Government. Levels of effort are difficult to predict. Public perception of a Project can extend regulatory approval timelines.

Legislation or other Requirement	Agency/ Stakeholder	Permits, Licenses, Approvals	Trigger	Applicable to Project	Permitting Path	Estimated Time Frame*	Estimated Total Cost	Risks
Impact Assessment Act	Impact Assessment Agency of Canada (the Agency)	Section 82 Environmental Evaluation (EE)	Required for projects that occur on Federal lands or receive Federal funding.	Likely Anticipated to be required if project receives funding from the Federal Government.	The completion of a Section 82 Environmental Evaluation typically involves completing a higher level environmental screening of the project and potential effects. Each funding department has individual screening templates.	Environmental Evaluation: 1-4 months	$15,000 to $60,000	See Above
Fisheries Act	Fisheries and Oceans Canada (DFO)	Request for Review (RFR) Fisheries Act Authorization (FAA)	A RFR is required for physical works in waters containing fish and fish habitat. The RFR will identify impacts to fish and the if habitat are likely and if a FAA will be required.	RFR: Likely If work, including culvert replacements and upgrades will be required in waters containing fish and fish habitat, it is anticipated that a RFR will be required. FAA: Unlikely Based on the current project description, significant and permanent impacts to fish and fish habitat are not anticipated and a FAA will not be required.	RFR: Conduct field and desktop assessments for watercourse containing fish habitat. Prepare and submit a RFR to DFO. DFO will determine if an authorization is required under the Fisheries Act. FAA: If the RFR determines that an authorization is required, an application must be made on a designated form, accompanied by an offsetting plan.	RFR: 2-6 months. FAA: 12- 24 months following the RFR	RFR: $5,000-$20,000. FAA: $75,000 - $200,000	If a FAA is required, loss of fish habitat must be offset by restoring or enhancing a greater amount of fish habitat elsewhere at a cost to the proponent. DFO typically requires and leads consultation with First Nations, in

Legislation or other Requirement	Agency/ Stakeholder	Permits, Licenses, Approvals	Trigger	Applicable to Project	Permitting Path	Estimated Time Frame*	Estimated Total Cost	Risks
								addition to the requirement for the proponent to also consult with First Nations before hand.
Species at Risk Act (SARA)	Environment and Climate Change Canada (ECCC) / Canadian Wildlife Service (CWS)	Authorization for species at risk	The presence of species at risk (SAR) or potential habitat for SAR within the project footprint could require an authorization for species at risk or additional protection measures if species at risk are present and there is potential harm to species at risk or their habitats	Unlikely The authorization for species at risk will only be required if species at risk, or their habitat are identified on-site. Even if the authorization is not required, additional protection measures outlined by ECCC-CWS may be stipulated.	Consult with ECCC-CWS, NSDNRR and Atlantic Canada Conservation Data Centre to confirm if species at risk are known to be present within the project area. If species are identified as potentially being present, conduct baseline surveys to identify presence/ absence. Prepare and submit applications for an authorization for SAR if SAR are present.	2-8 months	$10,000 - $50,000	

Legislation or other Requirement	Agency/ Stakeholder	Permits, Licenses, Approvals	Trigger	Applicable to Project	Permitting Path	Estimated Time Frame*	Estimated Total Cost	Risks
Migratory Birds Convention Act (MBCA) Migratory Birds Regulations	Environment and Climate Change Canada (ECCC) / Canadian Wildlife Service (CWS)	Compliance with the Act	The project can not result in harm to migratory birds or their nests.	Although the project is occurring on previously disturbed lands, potential still exists for destruction or harm to migratory birds and/or their nests. The primary method of mitigation is conducting relevant work outside of the migratory bird nesting window for the region (April 8 and August 28). Otherwise, additional mitigative measures may be mandated by CWS and ECCC.	Avoid ground disturbance during the migratory bird breeding period (April 8 to August 28). If unplanned clearing is required between April 8 to August 28, clearing may be permitted following a baseline avian survey and area search by a qualified professional. There is a process for exemption which is rarely granted. The best strategy is to avoid any clearing or ground disturbance during the breeding and nesting period of April 8 to August 28.	N/A	Avian Baseline surveys (as required) $3,000-$15,000	For Project works that would cause the unavoidable destruction or harm to migratory birds and/or their nests, or for work conducted between April 8 and August 28 in Zone C3 that may disturb or harass migratory birds

Legislation or other Requirement	Agency/ Stakeholder	Permits, Licenses, Approvals	Trigger	Applicable to Project	Permitting Path	Estimated Time Frame*	Estimated Total Cost	Risks
Environmental Emergency Regulations - Canadian Environmental Protection Act	Environment and Climate Change Canada (ECCC) / Canadian Wildlife Service (CWS)	Environmental Emergency Plan	Notification to Environment and Climate Change Canada. is required for projects that require regulated substances at or above certain quantities. For higher-risk facilities, an environmental emergency plan must also be prepared and implemented.	Unlikely Based on our current understanding of the Project it is not anticipated that controlled substances listed under Schedule 1 of the Regulation will be present onsite.	If applicable, develop and submit an Environmental Emergency Plan to the government within six months of when the substance will be required. The owner must submit notice to the Minister within 12 months that the plan has been implemented.	12-18 months	If applicable, $20,000 - $50,000 (excluding monitoring and contingency requirements under the plan).	
Canadian Navigable Waters Act	Transport Canada via its Navigation Protection Program (NPP)	Application for Approval of Works	Projects in, on, over, under, through or across navigable waters that are listed in the Schedule of the Canadian Navigable Waters Act and may interfere with navigation.	Possible If alterations and upgrades are required for sections of the railway the cross navigable waters (e.g., Wentworth Creek, Muggah Creek and Grand Lake), an approval of works may be required.	An application for an Approval of works typically includes a full project description of the project in the water including figures and construction/operation methods	2-4 Months.	$10,000 - $50,000	

Notes:* Estimated time frame is approximate and includes assessment, permit preparation and estimated regulatory review time.

Real Property Due Diligence Report

McINNES COOPER

Cape Breton University

MCINNES COOPER

PRELIMINARY REAL PROPERTY DUE DILIGENCE REPORT

TO: Cape Breton University

ATTENTION: Kent MacIntyre

FROM: McInnes Cooper (Ian Parker/Kyle Peck)

DATE: January 2, 2024

FILE: 241900

RE: **Real Property Due Diligence Re Phase 1 – CBU Rail Line Development**

A. BACKGROUND

Cape Breton University ("CBU") is conducting a preliminary analysis of the construction of a passenger rail line in the Cape Breton Regional Municipality (the "Project"). You have asked that we conduct a preliminary review of the existing properties along the intended route for "Phase 1" of the Project, as identified on the map provided by DMDE Engineering Limited bearing project number 60720761, sheets 1-3.[1]

The following title summary has been prepared by McInnes Cooper for CBU in connection with Phase 1 of the Project. This report is for the sole and exclusive benefit of CBU and may not be relied upon by any other party without the express written consent of McInnes Cooper.

B. COMMENTS & QUALIFICATIONS

General

The contents of this report are based on information which is available through public registries, including the registered and recorded information contained on the parcel register maintained by Nova Scotia's real property database known as "Property Online".

This report is intended primarily as a high-level summary of information, and is intended to flag any material issues that we have identified to date. It should not be treated as a substitute for specific legal advice concerning particular matters or concerns. This report should not be regarded, or relied upon, as being comprehensive or equivalent to a formal legal opinion concerning any matter referred to herein. For the purposes of this report and our work in connection with it, we do not purport to be experts with respect to, or generally familiar with, any laws other than the laws of the Province of Nova Scotia and the laws of Canada applicable therein. The accuracy of this report necessarily depends on the documents delivered to us and the replies to enquiries received by us, being true, complete, accurate and not

[1] A copy of these maps is attached as an enclosure hereto.

misleading, and on the disclosed documents being legally binding and effective, all of which we have assumed to be the case.

Mapping

We've provided mapping obtained from Property Online for each parcel. This mapping is a helpful tool to orient the analysis, however, you should be aware these maps are not official surveys. The mapping database provides the following disclaimer:

> *The Provincial mapping is a graphical representation of property boundaries which approximate the size, configuration and location of parcels. Care has been taken to ensure the best possible quality, however, this map is not a land survey and is not intended to be used for legal descriptions or to calculate exact dimensions or area. The Provincial mapping is not conclusive as to the location, boundaries or extent of a parcel [Land Registration Act subsection 21(2)]. THIS IS NOT AN OFFICIAL RECORD.*

Real Property

For parcels registered under the land registration system, the Province of Nova Scotia guarantees title in the manner provided in the *Land Registration Act* (Nova Scotia). This guarantee is subject to certain limitations. The Province of Nova Scotia guarantees the interests of individuals and enterprises in a parcel of land (title), however, it does not guarantee the extent of those interests (boundaries). If the parcel is not the subject of a current survey plan, a qualified land surveyor is required to determine the exact location of property boundaries. Also, please note that title remains subject to other unrecorded or "overriding interests" which we are unable to detect. As a result, this report and the guarantee of title from the Province of Nova Scotia are subject to such overriding interests which are more specifically set forth in subsection 73(1) of the *Land Registration Act.*

C. SUMMARY OF PROPERTIES AFFECTED BY PHASE 1

In conducting our review, we have provided a summary of title for each property along the path of Phase 1 of the Project, which is set out in detail in section Section D below.

A summary of the entities associated with the properties that fall directly along the Phase 1 path is set out in the chart directly below. These are the entities with whom we will likely need to consult with and/or obtain their consent:

Stakeholder	Capacity	PID No(s) Affected	Title Item Reference (Section D)
3294807 Nova Scotia Company	Easement Holder	15878937 15862840 15875875 15867237 15850274	24 27 28 29 30

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		15832066 15902349	31 33
3318778 Nova Scotia Limited	Restrictive Covenant Holder[2]	15878937 15894793 15862766 15862840 15875875 15867237 15850274 15832066 15902331 15902349	24 25 26 27 28 29 30 31 32 33
B.B. Maxwells Restaurant Limited	Landowner Restrictive Covenant Holder	15878937 15894793 15862766 15862840 15875875 15867237 15850274 15832066 15902331 15902349	24 25 26 27 28 29 30 31 32 33
B&T Battery & Auto Real Estate Limited	Landowner Easement Holder	15878937 15894793 15862766	24 25 26

[2] Please note that consultation/consent is only required from restrictive covenant holders if the Project contravenes said covenants. Otherwise, consultation is unnecessary.

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		15862840	27
		15875875	28
		15867237	29
		15850274	30
		15832066	31
		15902331	32
		15902349	33
Build Nova Scotia	Landowner	15878937	24
	Easement Holder	15894793	25
	Restrictive Covenant Holder	15862766	26
		15862840	27
		15875875	28
		15867237	29
		15850274	30
		15832066	31
		15902331	32
		15902349	33
Cape Breton & Central Nova Scotia Railway Ltd.	Landowner	15642309	35
		15642010	37
		15642002	40
		15641996	43
		15641996	45
Cape Breton Development Corporation	Easement Holder	15713431	7
		15793847	8
		15793805	18
		15793771	19
		1228380	20

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		15518004 15821275	21 23
Cape Breton Regional Municipality	Landowner Easement Holder Restrictive Covenant Holder	15608102 15713423 15626997 15697816 15713449 15821267 15697824 15826738 15820863 15878937 15894793 15862766 15862840 15875875 15867237 15850274 15832066 15902331 15902349	2 5 6 9 10 11 15 17 22 24 25 26 27 28 29 30 31 32 33
Canadian National Railway Company	Landowner Easement Holder Option Holder	15649668 15641996	34 45
Canadian Tire Real Estate Limited	Easement Holder Restrictive Covenant Holder	15889595	16

Dawn Slade & Dale McPhail	Restrictive Covenant Holder	15878937 15894793 15862766 15862840 15875875 15867237 15850274 15832066 15902331 15902349	24 25 26 27 28 29 30 31 32 33
D.M. Rogers Transport Limited	Landowner Easement Holder Restrictive Covenant Holder	15878937 15894793 15862766 15862840 15875875 15867237 15850274 15832066 15902331 15902349	24 25 26 27 28 29 30 31 32 33
Emera Utility Services	Security Holder	15697816	9
Harbourside Commercial Park Inc.	Restrictive Covenant Holder	15878937 15894793 15862766 15862840 15875875 15867237	24 25 26 27 28 29

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		15850274 15832066 15902331 15902349	30 31 32 33
Home Depot Holdings Ltd.	Easement Holder Restrictive Covenant Holder	15889595 15826738	16 17
Montez (Mayflower) Inc. Hoopp Realty Inc.	Landowner Easement Holder Debenture Holder	15826019 15889595 15826738	12 16 17
Noreen Googoo	Restrictive Covenant Holder	15878937 15894793 15862766 15862840 15875875 15867237 15850274 15832066 15902331 15902349	24 25 26 27 28 29 30 31 32 33
Nova Scotia Power Incorporated	Landowner Easement Holder	15869068 15608102 15713431 15793847 15793805 15793771 1228380	1 2 7 8 18 19 20

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		15850274 15832066 15902331 15902349	30 31 32 33
Home Depot Holdings Ltd.	Easement Holder Restrictive Covenant Holder	15889595 15826738	16 17
Montez (Mayflower) Inc. Hoopp Realty Inc.	Landowner Easement Holder Debenture Holder	15826019 15889595 15826738	12 16 17
Noreen Googoo	Restrictive Covenant Holder	15878937 15894793 15862766 15862840 15875875 15867237 15850274 15832066 15902331 15902349	24 25 26 27 28 29 30 31 32 33
Nova Scotia Power Incorporated	Landowner Easement Holder	15869068 15608102 15713431 15793847 15793805 15793771 1228380	1 2 7 8 18 19 20

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		15518004	21
		15820863	22
		15821275	23
		15894793	25
		15862766	26
		15862840	27
		15875875	28
		15867237	29
		15850274	30
		15832066	31
		15902331	32
		15902349	33
		15641996	45
Royal Bank of Canada	Mortgagee	15850274	30
SLA-MAC Construction Limited	Landowner	15878937	24
	Easement Holder	15894793	25
		15862766	26
		15862840	27
		15875875	28
		15867237	29
		15850274	30
		15832066	31
		15902331	32
		15902349	33
Sydney Credit Union	Mortgagee	15867237	29
Sydney Utilities Limited	Easement Holder	15713431	7
		15793847	8

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		15821275	23
The Province of Nova Scotia (various branches)	Landowner Easement Holder Administrator of Public Roads	15759582 15712755 15713423 15626997 15821242 15821259 15820863 15705791 15706518 157101555 15710163 15705536 15705585	3 4 5 6 13 14 22 36 38 39 41 42 44
The Government of Canada (various branches)	Administrator of Canadian Railways Lease Holder	15862766 15867237 15832066 15641996	26 29 31 45
Wal-Mart Canada Corporation	Landowner Easement Holder Restrictive Covenant Holder	15826019 15889595 15826738	12 16 17

The degree of consultation required will depend on how the Project impacts each entity's rights.

Please note that we have only reviewed properties directly along the path of Phase 1 of the Project, we have not accounted for any buffer zone on either side of the rail line. We do understand that the Project may require 50 feet on either side of the rail line, and if you would like us to incorporate this additional width into our review we can do so.

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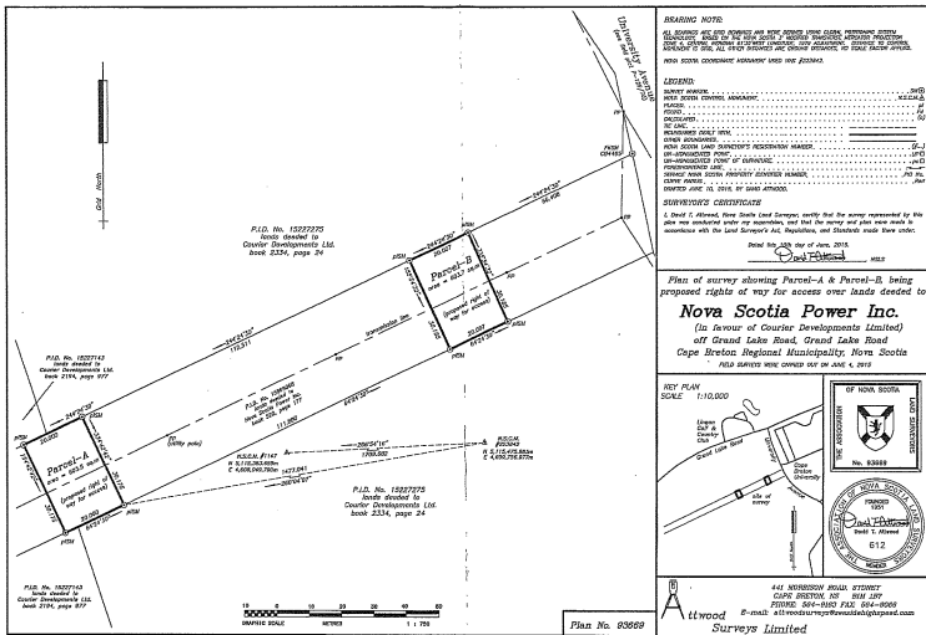
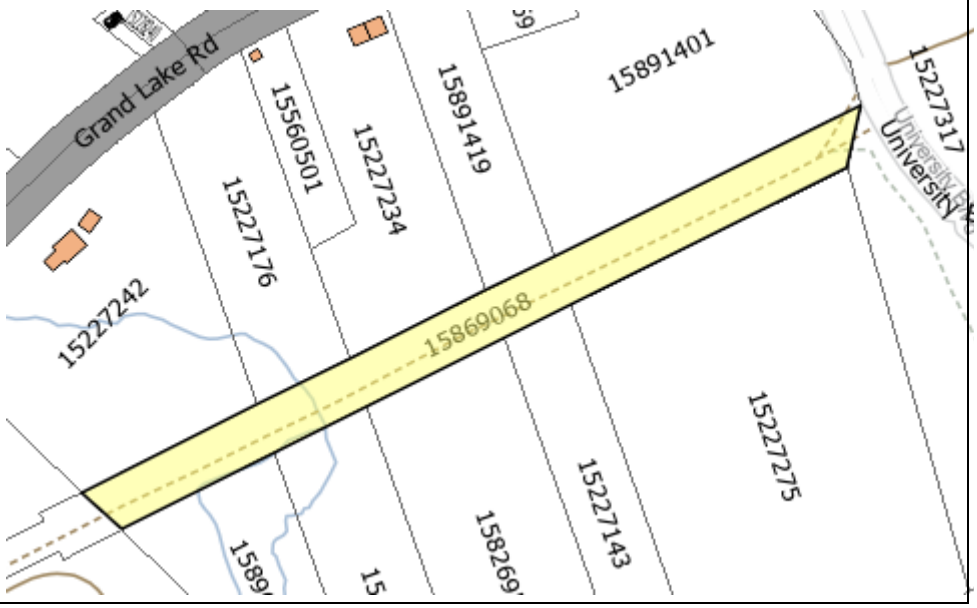
D. TITLE REVIEW

In the chart below, we've listed the parcels in the order they appear, beginning at the University starting at "4A – Small Terminal + Parking Lot" on the DMDE map, and heading Southwest ending at "3A – Small Terminal + Existing Parking Lot". We've provided specific comments with respect to each parcel as applicable.

For any parcels that are not migrated (designated non-LR below) our ability to review is limited without ordering a full formal title search. As such, all information provided below, including ownership, access, benefits, burdens and recorded interests on unmigrated parcels is subject to a title search.

1.	**Property:**	**PID 15869068**
	Registered Owner:	Nova Scotia Power Inc. ("**NSPI")**
	Area (POL):	3.80 acres
	LR Status:	Non-LR
	Access:	As this property is not migrated, it has not received a formal designation with respect to access. However, it is our preliminary view that it would have public access via University Blvd.
	Benefits:	Nil.
	Burdens:	Easement agreement dated September 22, 2015, between NSPI and Courier Developments Limited (the "Grantee") recorded on October 2, 2015, as instrument number 107875081. This easement provides the Grantee, their heirs, successors and assigns an easement in perpetuity to enter and cross a portion of the property with or without vehicles to access the Grantee's land and maintain and repair driveways within the easement. The easement area is shown as follows:

1.	Property:	PID 15869068
		
	Recorded Interests:	Nil.
	Comments:	The easement would pose a significant issue if the benefitted property were still owned by Courier Developments Limited, however, the lands were purchased in December of 2021 by The Board of Governors of Cape Breton University (the "Board"). The Board should consider releasing this easement, or it can consent to the encumbrance of the rail line. Further discussion is required.
	Mapping:	

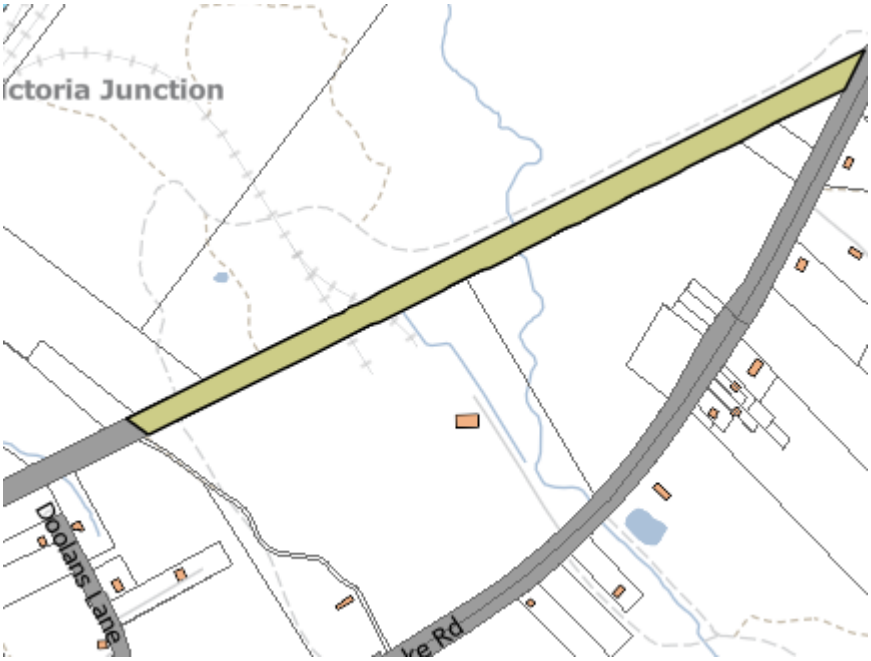
2.	Property:	PID 15608102
	Registered Owner:	Cape Breton Regional Municipality ("**CBRM**")
	Area (POL):	1.87 acres
	LR Status:	LR
	Access:	Public
	Benefits:	Nil.
	Burdens:	Subject to an easement in favour of NSPI found in a deed recorded on January 8, 1990, at Book 1640 Page 66 Document Number 33. It is described as follows: *The above described Lot #3 includes Lot #1, as dated September 29, 1989, and record in Book 1625, page 307, and that portion of the old Cape Breton Tramways Company Limited right-of-wat and often referred to as the old S&L Railway line and sometimes referred to as the Nova Scotia Power Corporation line, which lands would be included when the southwestern and south-eastern boundary of Lot #1 are extended southerly to the south of the right-of-way.*
	Recorded Interests:	Nil.
	Comments:	The following notice is on the parcel register: *THE PDCA FOR THIS PARCEL IS CONSISTENT WITH THE DESCRIPTION FOUND IN THE ENABLING INSTRUMENT REGISTERED AS DOCUMENT NO. 84845495 ON APRIL 18TH, 2006, WHICH DESCRIBES A 66 FOOT STRIP OF LAND. THE PDCA DIFFERS FROM THE PROVINCIAL PROPERTY ON LINE MAPPING, AS WELL AS PLAN M1166, WHICH SHOWS THAT A PORTION OF PID NO. 15608102 WIDENS BY 16.5 FEET ON EITHER SIDE. I HAVE BEEN UNABLE TO LOCATE AN ENABLING INSTRUMENT IN THE PROPERTY ON LINE DATA BASE WHICH WOULD ACCOUNT FOR THE 16.5 FOOT WIDENING.* This note reflects uncertainty regarding the width of the parcel or a portion thereof (a possible 16.5-foot discrepancy). As such, a survey would be required to determine the actual boundaries of the parcel.

2.	Property:	PID 15608102
	Mapping:	

3.	Property:	PID 15759582
	Registered Owner:	Road Parcel – Owner Undetermined. This is a public highway (Grand Lake Road) and as such it would be governed by the Province of Nova Scotia (the "**Province**").
	Area (POL):	Unavailable
	LR Status:	Non-LR
	Access:	Public Road
	Benefits:	Nil.
	Burdens:	Nil.
	Recorded Interests:	Nil.
	Comments:	To cross a public highway by rail, a license agreement with the Province would be required. An easement cannot be obtained over a public highway pursuant to the *Public Highways Act* (Nova Scotia).

3.	Property:	PID 15759582
	Mapping:	

4.	Property:	PID 15712755
	Registered Owner:	Road Parcel – Owner Undetermined. This also forms part of Grand Lake Road and would be governed by the Province.
	Area (POL):	Unavailable
	LR Status:	Non-LR
	Access:	Public Road
	Benefits:	Nil.
	Burdens:	Nil.
	Recorded Interests:	Nil.
	Comments:	To cross a public highway by rail, a license agreement with the Province would be required. An easement cannot be obtained over a public highway pursuant to the *Public Highways Act* (Nova Scotia).
	Mapping:	

5.	Property:	PID 15713423
	Registered Owner:	Road Parcel – Owner Unknown. This is classified as “Arbitrary Road Parcel”. Unlike the PIDs above, this does not form part of Grand Lake Road. Given that this wouldn’t be maintained by the Province, ownership of it is unclear. It is likely that consent would need to be obtained from CBRM and the Province.
	Area (POL):	Unavailable
	LR Status:	Non-LR
	Access:	Arbitrary Road Parcel
	Benefits:	Nil.
	Burdens:	Nil.
	Recorded Interests:	Nil.
	Comments:	Consent from CBRM and Province likely required.
	Mapping:	

6.	Property:	PID 15626997
	Registered Owner:	Road Parcel – Owner Unknown. This is classified as “Standard Road Parcel”. Unlike the PIDs above, this does not form part of Grand Lake Road. Given that this wouldn’t be maintained by the Province, ownership of it is unclear. It is likely that consent would need to be obtained from CBRM and the Province.

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6.	Property:	PID 15626997
	Area (POL):	Unavailable
	LR Status:	Non-LR
	Access:	Unavailable
	Benefits:	Nil.
	Burdens:	Nil.
	Recorded Interests:	Nil.
	Comments:	Consent from CBRM and Province likely required.
	Mapping:	

7.	Property:	PID 15713431
	Registered Owner:	NSPI
	Area (POL):	14.11 acres
	LR Status:	LR
	Access:	Other – Access if over other lands of the registered owner
	Benefits:	Easement over several parcels per an agreement registered on December 31, 2001, in Book 2241 at Page 205 as Document No. 10154 wherein Cape Breton Development Corporation ("**CBDC**") provided an easement to 510845 N.B. Incorporated. This is a right of way over the lands for any purpose.

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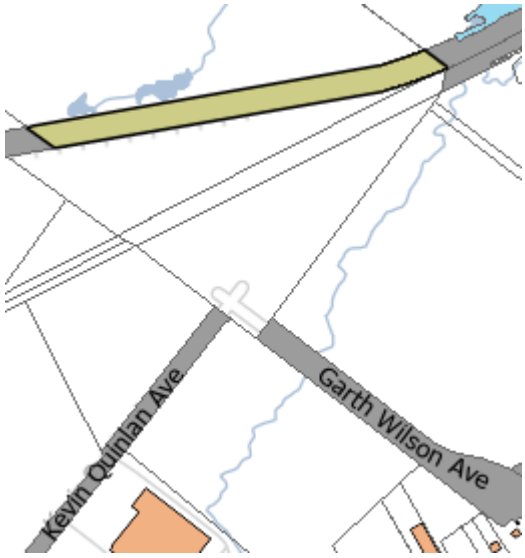
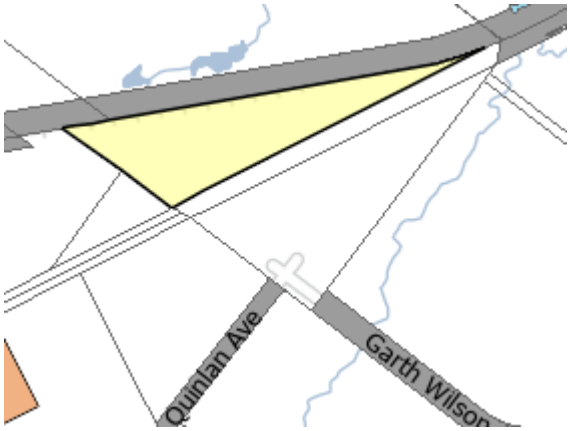
7.	Property:	PID 15713431
	Burdens:	Easement in favour of CBDC registered on October 15, 2002, in Book 2294 Page 275 as Document No. 8642. This provides a right of way for access in favour of CBDC in relation to the removal of coal bins from the International Pier at Sydney and the silos at Phalen Colliery in New Waterford. Easement in favour of Sydney Utilities Limited recorded on January 15, 2010, as Document No. 95113875.
	Recorded Interests:	Nil.
	Comments:	We will need to make sure the Project does not interfere with easement rights.
	Mapping:	

8.	Property:	PID 15793847
	Registered Owner:	NSPI
	Area (POL):	3.48 acres
	LR Status:	LR
	Access:	Other – Access if over other lands of the registered owner
	Benefits:	Easement over several parcels per an agreement registered on December 31, 2001, in Book 2241 at Page 205 as Document No. 10154 wherein Cape Breton Development Corporation ("**CBDC**") provided an easement to 510845 N.B. Incorporated. This is a right of way over the lands for any purpose.

8.	Property:	PID 15793847
	Burdens:	Easement in favour of CBDC registered on October 15, 2002, in Book 2294 Page 275 as Document No. 8642. This provides a right of way for access in favour of CBDC in relation to the removal of coal bins from the International Pier at Sydney and the silos at Phalen Colliery in New Waterford. Easement in favour of Sydney Utilities Limited recorded on January 15, 2010, as Document No. 95113875.
	Recorded Interests:	Nil.
	Comments:	We will need to make sure the Project does not interfere with easement rights.
	Mapping:	

9.	Property:	PID 15697816
	Registered Owner:	CBRM
	Area (POL):	4.5 acres
	LR Status:	Non-LR
	Access:	Unavailable
	Benefits:	Nil.
	Burdens:	Nil.

9.	Property:	PID 15697816
	Recorded Interests:	Notice of security interest in against debtor 3986250 Canada Inc. in favour of Emera Utility Services Incorporated pursuant to a notice registered on February 24, 2011, as Document Number 97833819. The security interest is described as follows: Description of Collateral: All railway track infrastructure owned by 3986250 Canada Inc. ("SCR") situate at the Railway Maintenance Centre site at Victoria Junction and on railway corridors leading from the International Pier, Sydney, to the Nova Scotia Power Incorporated power generating facility at Lingan, said lands being conveyed by deeds to Emera Utility Services Incorporated (formerly 510845 N.B. Inc.) ("EUS") by Cape Breton Development Corporation dated December 18, 2001, and recorded on December 31, 2001, at the Registry of Deeds for Cape Breton County in Book 2241 at Page 137 and Book 2241 at Page 199, a portion of said lands including the Railway Maintenance Centre site being demised by EUS to SCR by lease made as of December 31, 2002 and registered at the Registry of Deeds for Cape Breton County including, but not limited to, rails, ties and switches, the buildings known as the Rail Maintenance Center Building, Boiler Storage Building, sanding shed, and all storage buildings at the Rail Maintenance Center site.
	Comments:	This parcel does not form part of the main track it is a parcel intended for a new siding and terminal "1D" near Wal-Mart on Spar Road. If the security interest listed above is still applicable, we would need the consent of the security holder (Emera).
	Mapping:	

10.	Property:	PID 15713449
	Registered Owner:	CBRM
	Area (POL):	2 acres
	LR Status:	Non-LR
	Access:	Unavailable
	Benefits:	Nil
	Burdens:	Nil.

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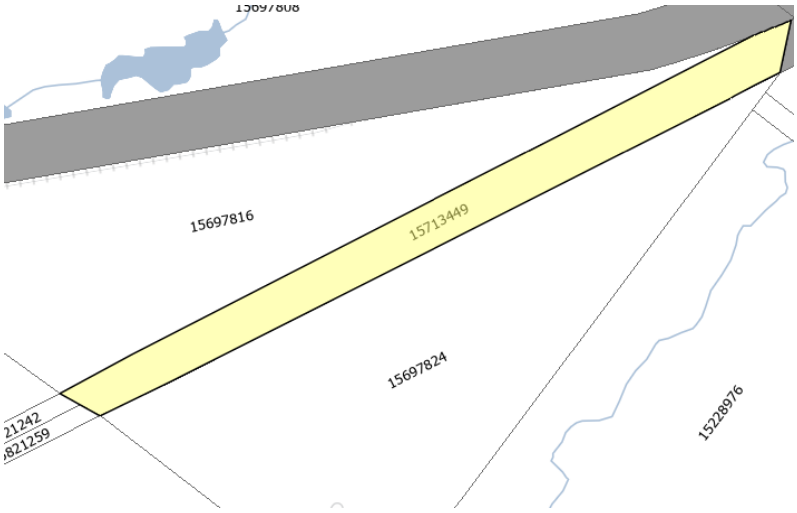
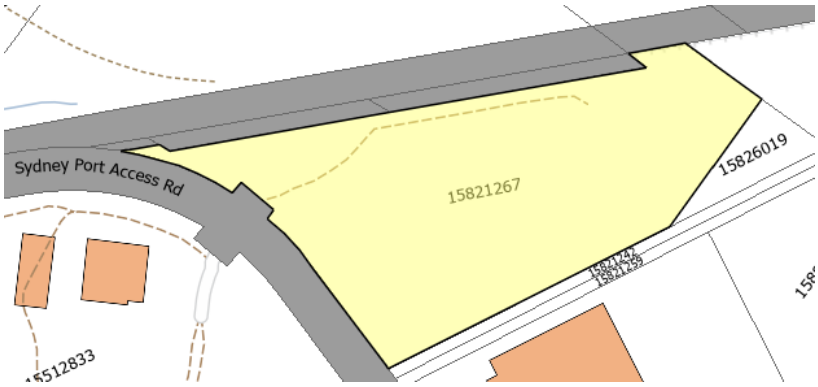
10.	Property:	PID 15713449
	Recorded Interests:	Nil.
	Comments:	Nil.
	Mapping:	

11.	Property:	PID 15821267
	Registered Owner:	CBRM
	Area (POL):	20 acres
	LR Status:	Non-LR
	Access:	Unavailable
	Benefits:	Nil.
	Burdens:	Nil.
	Recorded Interests:	Nil.
	Comments:	This parcel could be a viable option for new siding and terminal “1D” if negotiations with private parties such as Wal-Mart Canada Corporation (“**Wal-Mart**”) are unsuccessful.

11.	Property:	PID 15821267
	Mapping:	

12.	Property:	PID 15826019
	Registered Owner:	MONTEZ (MAYFLOWER) INC. HOOPP REALTY INC. ("**MONTEZ**")
	Area (POL):	5420 square feet
	LR Status:	LR
	Access:	No Access
	Benefits:	Reciprocal easement and operating agreement between Burnac Corporation (predecessor in title to Montez) and Wal-Mart registered on September 26, 2006, as Document No. 86224814. This agreement provides several reciprocal rights and obligations between the two parties with respect to easements, parking and maintenance.[3]
	Burdens:	Subject to restriction agreement between Burnac (predecessor in title to Montez) and Home Depot registered on January 25, 2005, at Book 2453 Page 417 Document No. 81261076 ("**Home Depot Agreement**").[4] This agreement provides numerous rights and obligations to the landowner and Home Depot including easements, development restrictions, maintenance obligations etc. Reciprocal easement and operating agreement between Burnac Corporation (predecessor in title to Montez) and Wal-Mart registered on September 26, 2006, as Document No. 86224814. This agreement provides several reciprocal rights and obligations between the two parties with respect to easements, parking and maintenance.
	Recorded Interests:	Nil.
	Comments:	Use of this parcel would likely require the consent of both the owner and Wal-Mart under the reciprocal easement agreement.

[3] A copy of this agreement is attached as an enclosure hereto.
[4] A copy of this agreement is attached as an enclosure hereto.

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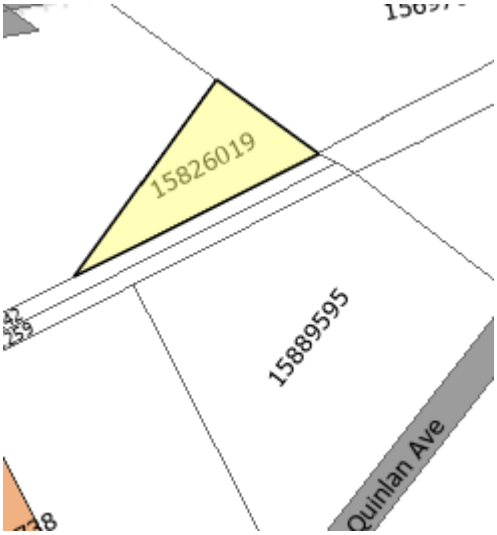
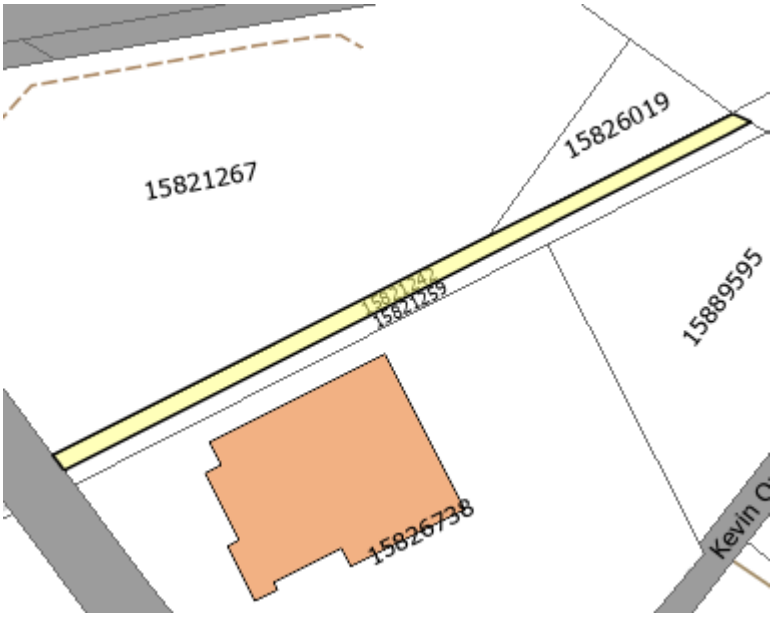
12.	Property:	PID 15826019
	Mapping:	

13.	Property:	PID 15821242
	Registered Owner:	Public Works
	Area (POL):	1.20 acres
	LR Status:	Non-LR
	Access:	Unavailable
	Benefits:	Nil.
	Burdens:	Nil.
	Recorded Interests:	Nil.
	Comments:	Title to this parcel follows the same path as PID 15713449 at item 10, except that CBRM obtained a Crown Grant for PID 15713449 in 2021. If necessary, CBRM could likely obtain another Crown Grant for this parcel as well.

13.	Property:	PID 15821242
	Mapping:	

14.	Property:	PID 15821259
	Registered Owner:	Owner Unknown
	Area (POL):	1.4 acres
	LR Status:	Non-LR
	Access:	Unavailable
	Benefits:	Nil.
	Burdens:	Nil.
	Recorded Interests:	Nil.
	Comments:	There is very little information about this parcel available online. If crossing this parcel is necessary, expropriation may be required.

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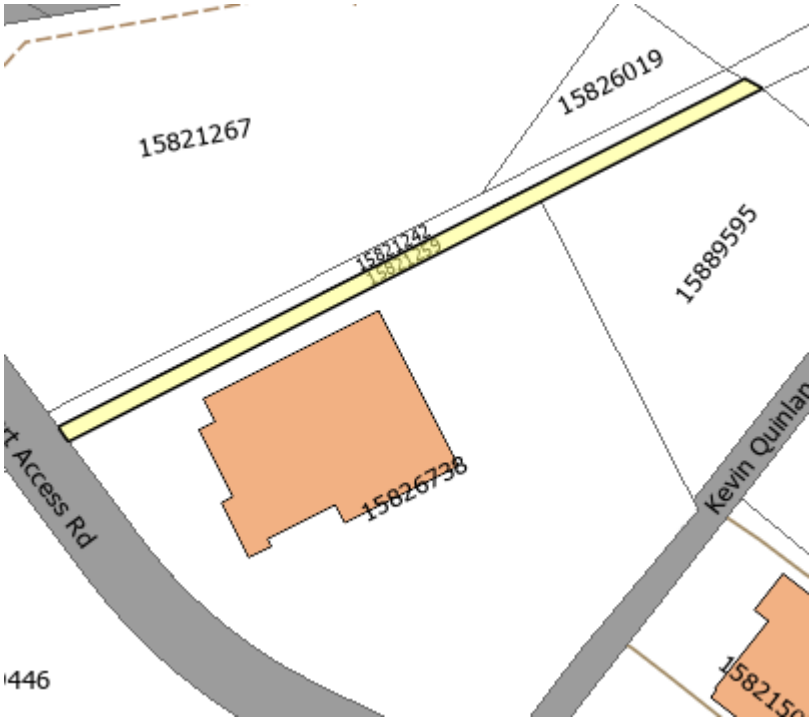
14.	Property:	PID 15821259
	Mapping:	

15.	Property:	PID 15697824
	Registered Owner:	CBRM
	Area (POL):	4.40 acres
	LR Status:	Non-LR
	Access:	Unavailable
	Benefits:	Nil.
	Burdens:	Nil.
	Recorded Interests:	Nil.
	Comments:	This lot is contiguous with PID 15228976, which was listed publicly for sale on December 21, 2023. Purchasing PID 15228976 would provide CBU unrestricted access to this parcel via Grand Lake Road and Garth Wilson Drive.

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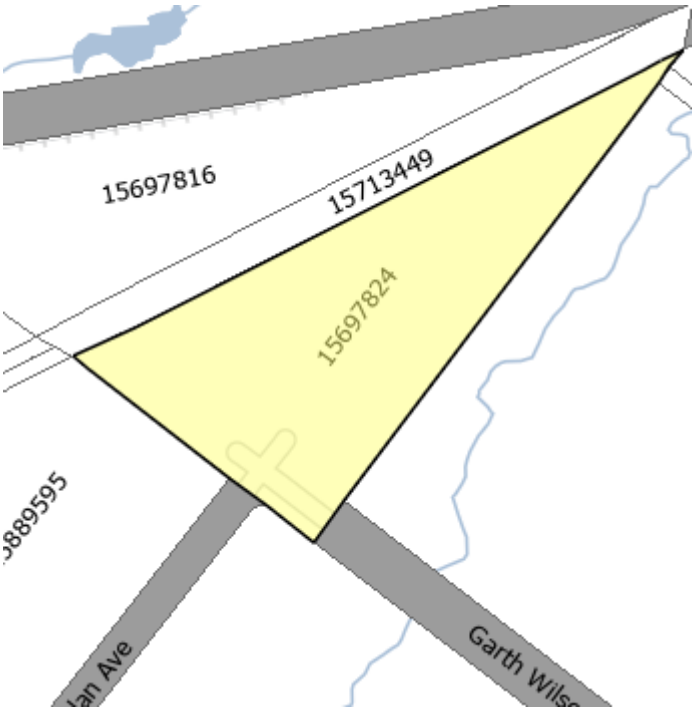
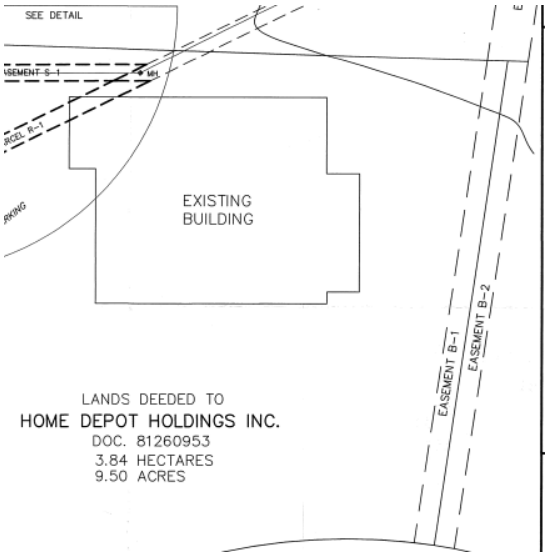
15.	Property:	PID 15697824
	Mapping:	

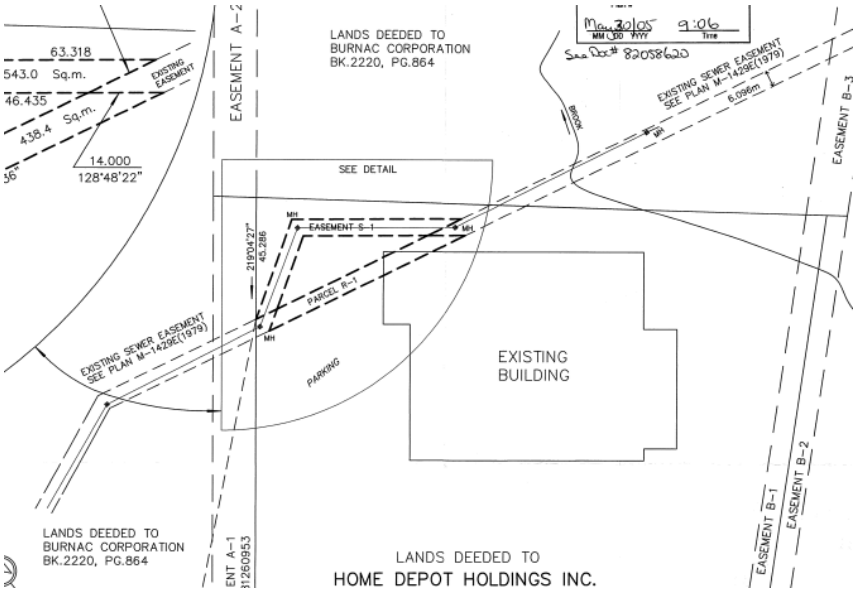
16.	Property:	PID 15889595
	Registered Owner:	Montez
	Area (POL):	4.40 acres
	LR Status:	LR
	Access:	Public[5]
	Benefits:	Easement via a warranty deed between Burnac Corporation (predecessor in title to Montez) and Home Depot Holdings Ltd ("**Home Depot**"). This easement provides access to this parcel over two points on the Home Depot parcel. This easement is marked "B-1" on the following:

[5] This is based on our review. The appropriate forms have not been filed by the landowner's counsel to update access.

16.	Property:	PID 15889595



It also benefits from a sewer easement over the Home Depot parcel as follows:



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16.	Property:	PID 15889595
	Burdens:	This parcel is subject to the same reciprocal operating agreement with Wal-Mart reference on PID 15826019 at item 11. Subject to the Home Depot Agreement. This agreement provides numerous rights and obligations to the landowner and Home Depot including easements, development restrictions, maintenance obligations etc. Subject to a restriction agreement between Burnac and Canadian Tire Real Estate Limited ("**Canadian Tire**") recorded on February 6, 2006, as Document No. 84275461 (the "**Canadian Tire Agreement**").[6] This agreement provides numerous rights and obligations to the landowner and Canadian Tire including easements, development restrictions, maintenance obligations etc.
	Recorded Interests:	Subject to a debenture in favour of Montez (Mayflower) Inc. recorded on December 6, 2007, as Document No. 89488028. Subject to a debenture in favour of Hoopp Realty Inc. recorded on December 6, 2007 as Document No. 89488036.
	Comments:	Section 2.1 of the Home Depot restriction agreement states that the Common Roadway (as defined in the Home Depot Agreement) are for the sole and exclusive use of all Owners and Occupants of the Shopping Centres and their Permittees. As such, even thought Home Depot does not own this land their consent will likely be required to use this parcel for any portion of the Project. Further, Section 5.2 of the Home Depot Agreement places restrictions on development within the Shopping Centre. Based on our review, a rail line or terminal should not contravene any of these restrictions (i.e. strip club, massage parlour, pornographic video rents etc.), however, there are construction requirements with respect to height and size of buildings. This should be revisited as the plan for each parcel becomes clearer. Section 1.1 of the CT Agreement restricts the use and development of the lands. Based on our review of the restrictions, a rail line or terminal should not contravene any of these restrictions (i.e. automotive parts store, car wash, gas station, adult entertainment, auction etc.). Consent and non-disturbance agreement executed by the debenture holders is recommended. This would ensure that in the event of an enforcement action (foreclosure) the debenture holder would not be able to interrupt the Project.

[6] A copy of this agreement is attached as an enclosure hereto.

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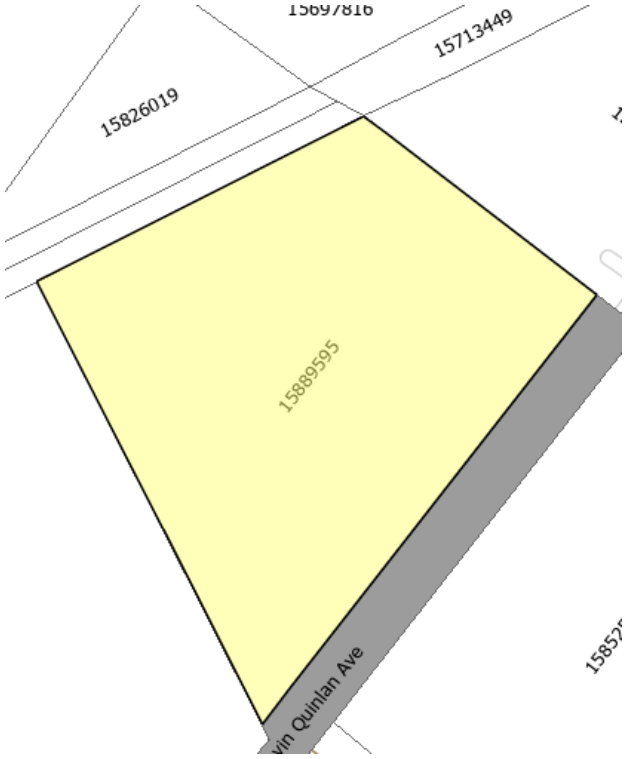
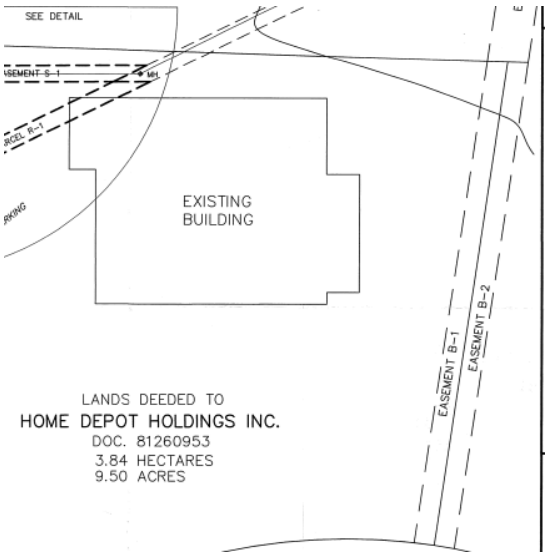
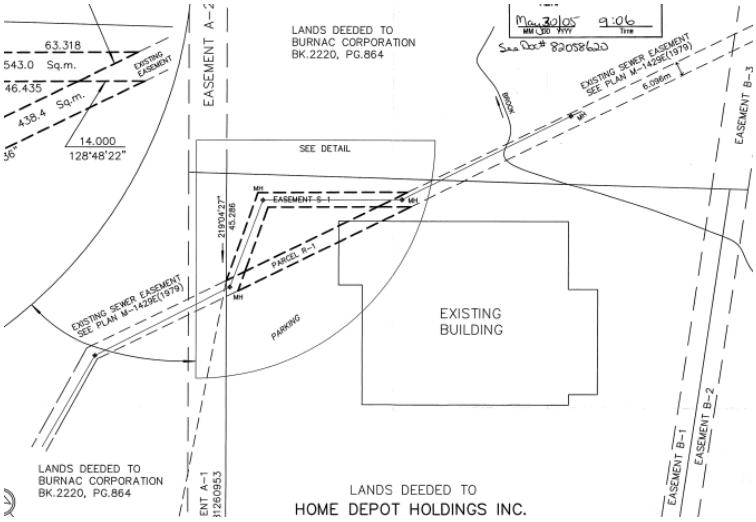
16.	Property:	PID 15889595
	Mapping:	

17.	Property:	PID 15826738
	Registered Owner:	Wal-Mart
	Area (POL):	6.93 acres
	LR Status:	LR
	Access:	Public[7]
	Benefits:	This parcel is subject to the same reciprocal operating agreement with Wal-Mart reference on PID 15826019 at item 11. Easement via a warranty deed between Burnac Corporation (predecessor in title to Montez) and Home Depot Holdings Ltd. This easement provides access to this parcel over two points on the Home Depot parcel. This easement is marked “B-1” on the following:

[7] This is based on our review. The appropriate forms have not been filed by the landowner’s counsel to update access.

17.	Property:	PID 15826738
		 It also benefits from a sewer easement over the Home Depot parcel as follows: 
	Burdens:	This parcel is subject to the same reciprocal operating agreement with Wal-Mart reference on PID 15826019 at item 11. Subject to the Home Depot Agreement. This agreement provides numerous rights and obligations to the landowner and Home Depot including easements, development restrictions, maintenance obligations etc. Subject to the easements referenced in the Burnac deed included above.

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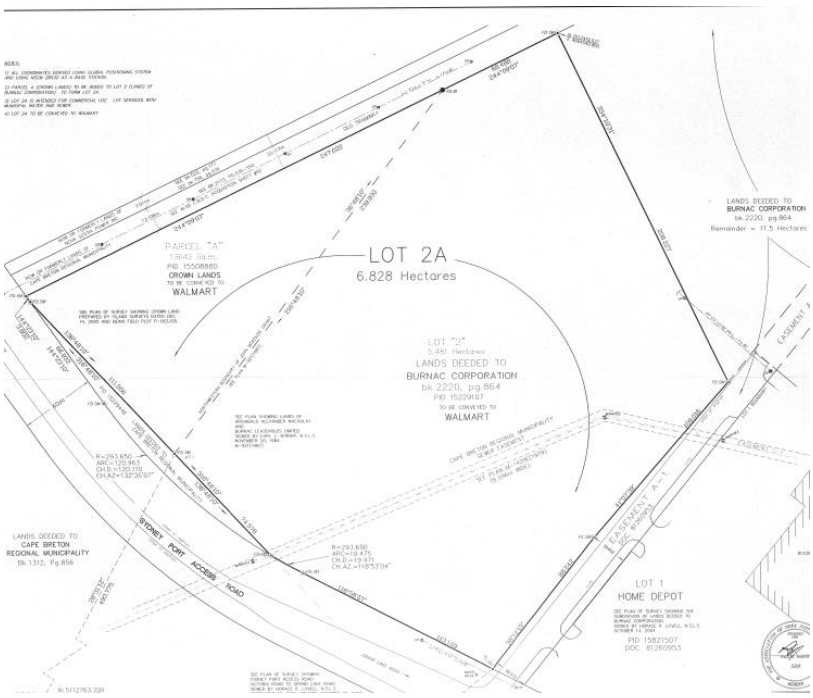
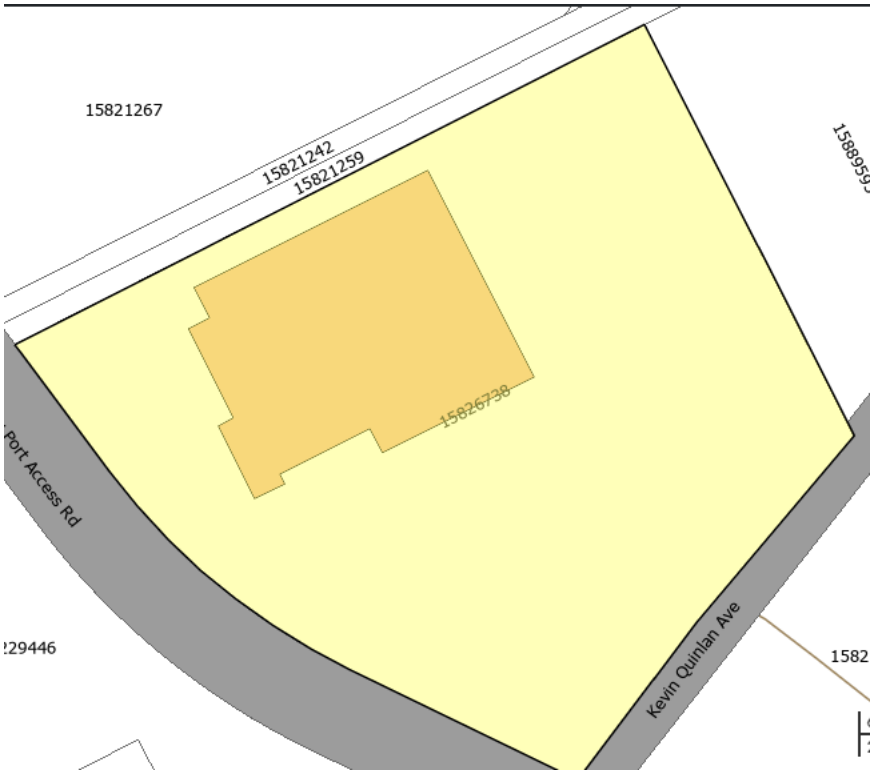
17.	Property:	PID 15826738
		Subject to a Sewer Easement in favour of CBRM show as follows: 
	Recorded Interests:	Nil.
	Comments:	Section 2.1 of the Home Depot restriction agreement states that the Common Roadway (as defined in the Home Depot Agreement) are for the sole and exclusive use of all Owners and Occupants of the Shopping Centres and their Permittees. As such, even thought Home Depot does not own this land their consent will likely be required to use this parcel for any portion of the Project. Further, Section 5.2 of the Home Depot Agreement places restrictions on development within the Shopping Centre. Based on our review, a rail line or terminal should not contravene any of these restrictions (i.e. strip club, massage parlour, pornographic video rents etc.), however, there are construction requirements with respect to height and size of buildings. This should be revisited as the plan for each parcel becomes clearer.

17.	Property:	PID 15826738
	Mapping:	

18.	Property:	PID 15793805
	Registered Owner:	NSPI
	Area (POL):	0.61 acres
	LR Status:	LR
	Access:	Other – Access if over other lands of the registered owner
	Benefits:	Easement over several parcels per an agreement registered on December 31, 2001, in Book 2241 at Page 205 as Document No. 10154 wherein Cape Breton Development Corporation ("**CBDC**") provided an easement to 510845 N.B. Incorporated. This is a right of way over the lands for any purpose.
	Burdens:	Easement in favour of CBDC registered on October 15, 2002, in Book 2294 Page 275 as Document No. 8642. This provides a right of way for access in favour of CBDC in relation to the removal of coal bins from the International Pier at Sydney and the silos at Phalen Colliery in New Waterford.
	Recorded Interests:	Nil.

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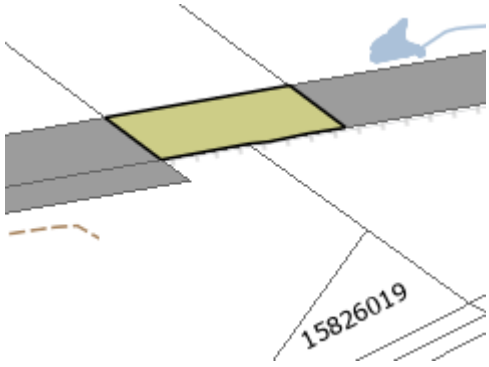
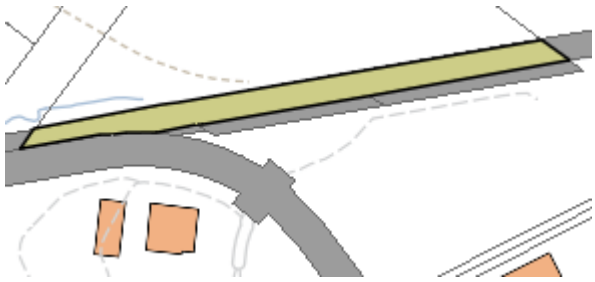
18.	Property:	PID 15793805
	Comments:	We will need to make sure the Project does not interfere with easement rights.
	Mapping:	

19.	Property:	PID 15793771
	Registered Owner:	NSPI
	Area (POL):	0.61 acres
	LR Status:	LR
	Access:	Other – Access if over other lands of the registered owner
	Benefits:	Easement over several parcels per an agreement registered on December 31, 2001, in Book 2241 at Page 205 as Document No. 10154 wherein Cape Breton Development Corporation ("**CBDC**") provided an easement to 510845 N.B. Incorporated. This is a right of way over the lands for any purpose.
	Burdens:	Nil.
	Recorded Interests:	Nil.
	Comments:	Nil.
	Mapping:	

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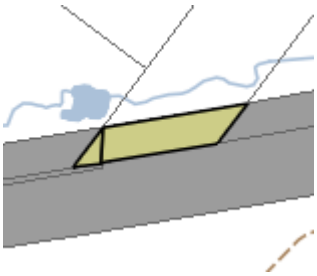
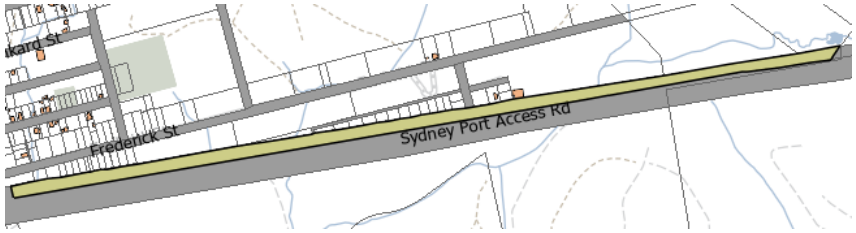
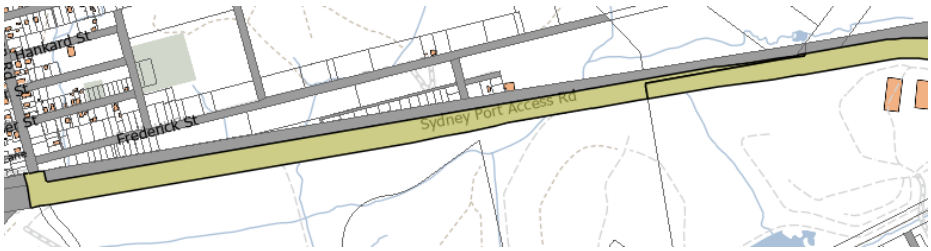
20.	Property:	PID 1228380
	Registered Owner:	NSPI
	Area (POL):	19400 square feet
	LR Status:	LR
	Access:	Other – Access if over other lands of the registered owner
	Benefits:	Easement over several parcels per an agreement registered on December 31, 2001, in Book 2241 at Page 205 as Document No. 10154 wherein Cape Breton Development Corporation ("**CBDC**") provided an easement to 510845 N.B. Incorporated. This is a right of way over the lands for any purpose.
	Burdens:	Easement in favour of CBDC registered on October 15, 2002, in Book 2294 Page 275 as Document No. 8642. This provides a right of way for access in favour of CBDC in relation to the removal of coal bins from the International Pier at Sydney and the silos at Phalen Colliery in New Waterford.
	Recorded Interests:	Nil.
	Comments:	Nil.
	Mapping:	

21.	Property:	PID 15518004
	Registered Owner:	NSPI
	Area (POL):	7.36 acres
	LR Status:	LR
	Access:	Other – Access if over other lands of the registered owner
	Benefits:	Easement granted by CBRM in favour of CBDC registered on April 9, 1999, at Book 2096 Page 38 Document No. 2384. This provides a right of way in favour of several parcels to access the parcel to construct a fence. It provides ancillary rights relating to the construction of said fence. Easement over several parcels per an agreement registered on

21.	Property:	PID 15518004
		December 31, 2001, in Book 2241 at Page 205 as Document No. 10154 wherein Cape Breton Development Corporation ("**CBDC**") provided an easement to 510845 N.B. Incorporated. This is a right of way over the lands for any purpose.
	Burdens:	Nil.
	Recorded Interests:	Nil.
	Comments:	Nil.
	Mapping:	

22.	Property:	PID 15820863
	Registered Owner:	CBRM – this parcel is Spar Road.
	Area (POL):	Unavailable
	LR Status:	Non-LR
	Access:	Unavailable
	Benefits:	Nil.
	Burdens:	An easement dated January 27, 1994, from Her Majesty the Queen to NSPI for the transmission line as shown on the plan of NSPI dated September 10, 1993, showing plan of Lots 19-C to 19-H, said plan recorded at the Registry of Deeds in Book 1840, Page 326, as M-3636. We were unable to locate a copy of this plan on the online registry system. Easement for pole and/or pipeline as referred to in the Deeds in Book 946, Page 536, and Book 1240, Page 882. Easement in favour of Seaboard Power Corporation Limited (now NSPI) for pole lines, transmission wires, transformers etc. A supplemental deed made on April 1, 1973, between Eastern Light & Power Company and Canada Permanent Trust Company and the Province and NSPI recorded on July 25, 1973.
	Recorded Interests:	Nil.

22.	Property:	PID 15820863
	Comments:	We will need to make sure the Project does not interfere with the easement rights listed above and/or obtain consent from easement holders. As this is a public road, regulatory approvals for crossings will be required. However, this is existing track, which should be helpful.
	Mapping:	

23.	Property:	PID 15821275
	Registered Owner:	NSPI
	Area (POL):	2.67 acres
	LR Status:	LR
	Access:	Other – access if over other lands of the registered owner
	Benefits:	Easement over several parcels per an agreement registered on December 31, 2001, in Book 2241 at Page 205 as Document No. 10154 wherein Cape Breton Development Corporation ("**CBDC**") provided an easement to 510845 N.B. Incorporated. This is a right of way over the lands for any purpose.
	Burdens:	Easement in favour of CBDC registered on October 15, 2002, in Book 2294 Page 275 as Document No. 8642. This provides a right of way for access in favour of CBDC in relation to the removal of coal bins from the International Pier at Sydney and the silos at Phalen Colliery in New Waterford. Easement in favour of Sydney Utilities Limited recorded on January 15, 2010, as Document No. 95113875.
	Recorded Interests:	Nil.
	Comments:	We will need to make sure the Project does not interfere with the easement rights listed above and/or obtain consent from easement holders. Survey work would be required to determine the location of these easements.

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23.	Property:	PID 15821275
	Mapping:	

24.	Property:	PID 15878937
	Registered Owner:	Build Nova Scotia
	Area (POL):	3.31 Hectares
	LR Status:	LR
	Access:	Public
	Benefits:	An easement granted by the Minister of Public Works and Mines under the Nova Scotia Water Act recorded on October 19, 1972, at Book 912 Page 44 Document No. 13249. This provided the right to Dominion Iron & Coal Company to divert river and water course for the purposes of smelting or ores and manufacturing iron and steel. This easement is arguably void as of 2022 as there is a provision that states the authorization shall expire 50 years from the date of authorization. An easement granted by Parkland Corporation recorded on August 23, 2023, as Document No. 122957468. This easement provides Build Nova Scotia an 8-foot-wide waterline easement over the adjacent property (owned by Parkland Corporation) shown as follows:

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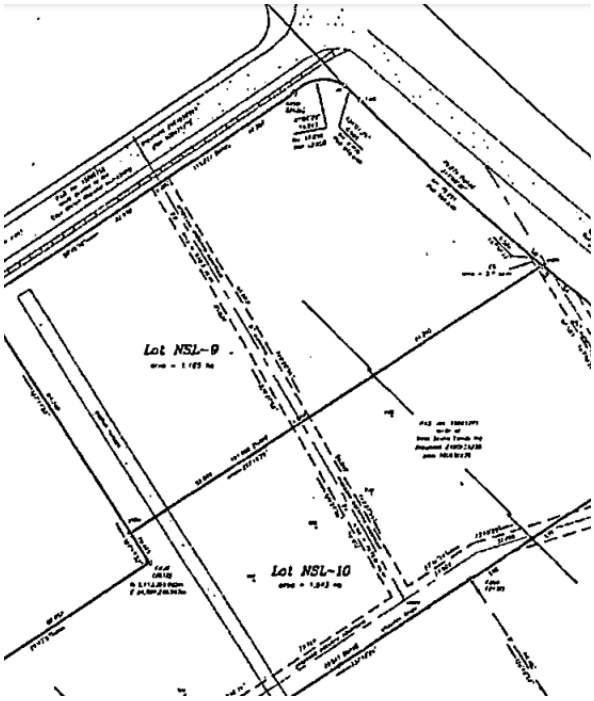
24.	Property:	PID 15878937
		
	Burdens:	Easement in favour of NSPI recorded on February 1, 1966, at Book 756 Page 562 Document No. 414. Provides the right to install, access and maintain transmission lines from the "No. 3 Power Plant of the Dominion Coal Corporation Limited". Subject to an easement in favour of NSPI recorded on August 9, 2004, at Book 2421 Page 820 Document No. 76057984. This provides a right of way for the power lines and poles formerly used by "Sysco" and assumed by NSPI. The easement states there is a sketch plan attached to show the location of the lines, but there is no schedule attached. Subject to an easement amending agreement (amending the 2004 agreement) between Sydney Steel Corporation and NSPI recorded on August 18, 2006, as Document No 85912286. This amends the boundaries of the original easement, but the schedule depicting its placement is still not attached. Subject to the restrictive covenants of the "Harbourside Commercial Park" imposed via a deed between Sydney Steel Corporation and Harbourside Commercial Park Inc. recorded May 3, 2011, as Document No. 98243984 (the "**Harbourside Restrictive Covenants**").[8] Easement agreement between Sydney Steel Corporation, Harbourside

[8] A copy of these restrictive covenants are attached as an enclosure hereto.

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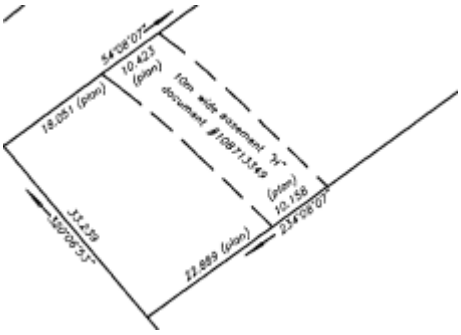
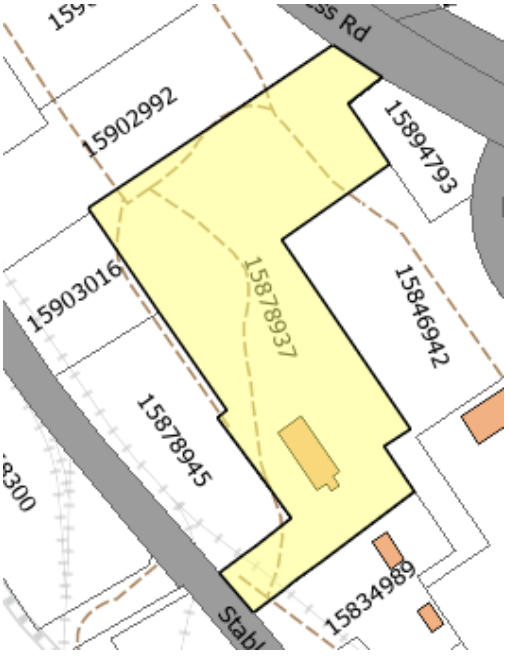
24.	Property:	PID 15878937
		Commercial Park Inc. and 3294807 Nova Scotia Company recorded on March 29, 2016, as Document No. 108713349. This provides a railway easement over the grantor lands as shown on a survey plan of Wayne Hardy dated January 30, 2010, as Plan No. 95384534. The easement is shown on a 2022 plan as follows: 
	Recorded Interests:	Nil.
	Comments:	We will need to review the restrictive covenants carefully in light of Project plans to ensure that we will not require a release of any covenant.
	Mapping:	

25.	Property:	PID 15894793
	Registered Owner:	B.B. Maxwells Restaurant Limited
	Area (POL):	0.40 hectares

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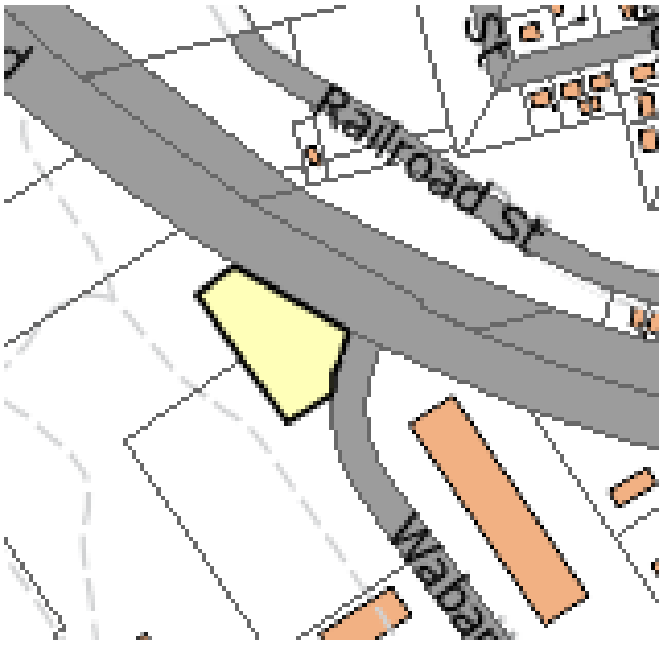
25.	Property:	PID 15894793
	LR Status:	LR
	Access:	Public
	Benefits:	An easement granted by the Minister of Public Works and Mines under the Nova Scotia Water Act recorded on October 19, 1972, at Book 912 Page 44 Document No. 13249. This provided the right to Dominion Iron & Coal Company to divert river and water course for the purposes of smelting or ores and manufacturing iron and steel. This easement is arguably void as of 2022 as there is a provision that states the authorization shall expire 50 years from the date of authorization.
	Burdens:	Easement in favour of NSPI recorded on February 1, 1966, at Book 756 Page 562 Document No. 414. Provides the right to install, access and maintain transmission lines from the “No. 3 Power Plant of the Dominion Coal Corporation Limited”. Subject to the restrictive covenants of the “Harbourside Commercial Park” imposed via a deed between Sydney Steel Corporation and Harbourside Commercial Park Inc. recorded May 3, 2011, as Document No. 98243984.
	Recorded Interests:	Nil.
	Comments:	We will need to review the restrictive covenants carefully in light of Project plans to ensure that we will not require a release of any covenant.
	Mapping:	

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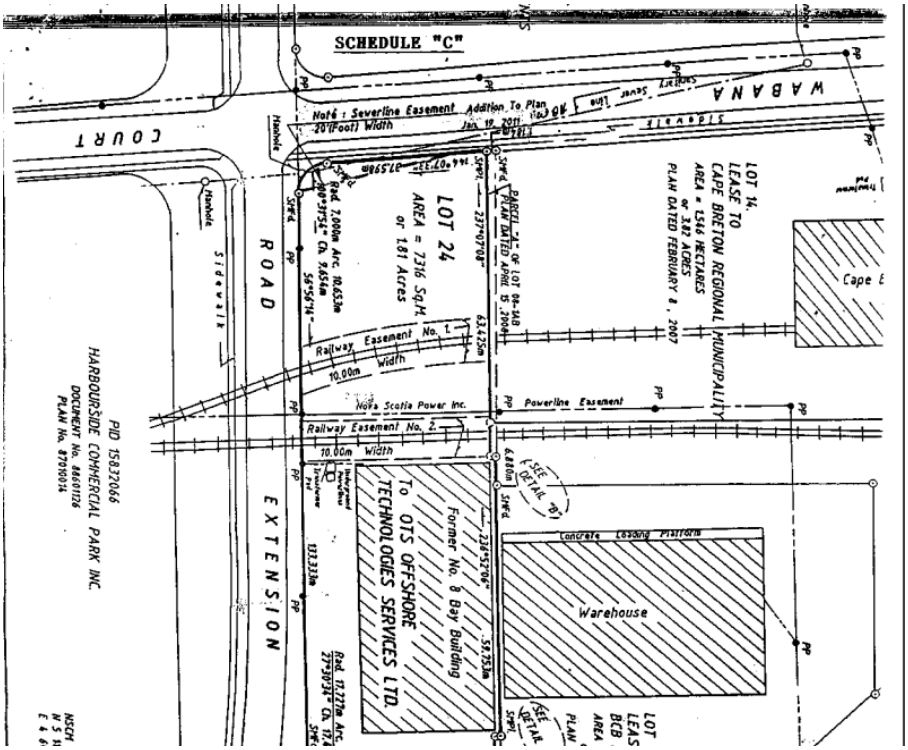
26.	Property:	PID 15862766
	Registered Owner:	CBRM – this parcel is “Wabana Court”
	Area (POL):	1.6 acres
	LR Status:	LR
	Access:	Public
	Benefits:	An easement granted by the Minister of Public Works and Mines under the Nova Scotia Water Act recorded on October 19, 1972, at Book 912 Page 44 Document No. 13249. This provided the right to Dominion Iron & Coal Company to divert river and water course for the purposes of smelting or ores and manufacturing iron and steel. This easement is arguably void as of 2022 as there is a provision that states the authorization shall expire 50 years from the date of authorization. A sewer line easement granted by Harbourside Commercial Park Inc. in favour of OTS Offshore Technologies Services Limited (“**OTS**”), via warranty deed recorded March 29, 2012, as Document No. 100376756. This provides a 20-foot-wide sewer easement shown as follows: 
	Burdens:	Easement in favour of NSPI recorded on February 1, 1966, at Book 756 Page 562 Document No. 414. Provides the right to install, access and maintain transmission lines from the “No. 3 Power Plant of the Dominion Coal Corporation Limited”. Easement granted by Dominion Steel and Coal Corporation in favour of

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26.	Property:	PID 15862766
		Her Majesty the Queen (now 32948901 Nova Scotia Company by virtue of its purchase of 660 Stable Drive, Sydney, PID 15833205) recorded on June 20, 1967, at Book 783 Page 541 Document No. 4390. This easement describes Her Majesty's purchase of certain "Bulk Handling Facilities" and this easement provides a right of way to Her Majesty for the purpose of enabling access to the land upon which the Bulk Handling Facilities are situate. Subject to an easement in favour of NSPI recorded on August 9, 2004, at Book 2421 Page 820 Document No. 76057984. This provides a right of way for the power lines and poles formerly used by "Sysco" and assumed by NSPI. The easement states there is a sketch plan attached to show the location of the lines, but there is no schedule attached. Subject to an easement in favour of NSPI pursuant to a deed recorded on January 10, 2005, at Book 2451 Page 397 Document No. 81192669. Reserves a right of way over existing powerline and telephone pole. Subject to an easement amending agreement (amending the 2004 agreement) between Sydney Steel Corporation and NSPI recorded on August 18, 2006, as Document No 85912286. This amends the boundaries of the original easement, but the schedule depicting its placement is still not attached. Subject to the restrictive covenants of the "Harbourside Commercial Park" imposed via a deed between Sydney Steel Corporation and Harbourside Commercial Park Inc. recorded May 3, 2011, as Document No. 98243984. Easement granted by Harbouside Commercial Park Inc. to OTS (now B&T Battery & Auto Real Estate Limited by virtue of its purchase of PID 15850274) recorded on March 29, 2012, as Document No. 100377978. This easement provides a right of way over the streets of Harbourside Commercial Park, of which Wabana Court is included.
	Recorded Interests:	Nil.
	Comments:	We will need to review the restrictive covenants carefully in light of Project plans to ensure that we will not require a release of any covenant.

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26.	Property:	PID 15862766
	Mapping:	

27.	Property:	PID 15862840
	Registered Owner:	Cape Breton Regional Municipality
	Area (POL):	19173.15 square meters
	LR Status:	LR
	Access:	Public
	Benefits:	An easement granted by the Minister of Public Works and Mines under the Nova Scotia Water Act recorded on October 19, 1972, at Book 912 Page 44 Document No. 13249. This provided the right to Dominion Iron & Coal Company to divert river and water course for the purposes of smelting or ores and manufacturing iron and steel. This easement is arguably void as of 2022 as there is a provision that states the authorization shall expire 50 years from the date of authorization. Easement agreement between OTS and Harbourside Commercial Park Inc. recorded on March 29, 2012, as Document No. 100377721. This provides the same railway easement listed above in item 24.

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27.	Property:	PID 15862840
		Easement agreement between Sydney Steel Corporation, Harbourside Commercial Park Inc. and CBRM providing the same railway easement listed above in item 25.
	Burdens:	Easement in favour of NSPI recorded on February 1, 1966, at Book 756 Page 562 Document No. 414. Provides the right to install, access and maintain transmission lines from the "No. 3 Power Plant of the Dominion Coal Corporation Limited". Subject to an easement in favour of NSPI recorded on August 9, 2004, at Book 2421 Page 820 Document No. 76057984. This provides a right of way for the power lines and poles formerly used by "Sysco" and assumed by NSPI. The easement states there is a sketch plan attached to show the location of the lines, but there is no schedule attached. Subject to an easement in favour of NSPI pursuant to a deed recorded on January 10, 2005, at Book 2451 Page 397 Document No. 81192669. Reserves a right of way over existing powerline and telephone pole. Subject to an easement amending agreement (amending the 2004 agreement) between Sydney Steel Corporation and NSPI recorded on August 18, 2006, as Document No 85912286. This amends the boundaries of the original easement, but the schedule depicting its placement is still not attached. Subject to the restrictive covenants of the "Harbourside Commercial Park" imposed via a deed between Sydney Steel Corporation and Harbourside Commercial Park Inc. recorded May 3, 2011, as Document No. 98243984. Subject to an easement agreement between Sydney Steel Corporation, Harbourside Commercial Park and 3294807 Nova Scotia Company recorded March 29, 2016, as Document No. 108713257. This provides the same railway easement listed above. Subject to an easement agreement between CBRM and Harbourside Commercial Park Inc. recorded on October 17, 2018, as Document No. 113431531. This provides the same railway easement listed above. Subject to an easement agreement between CBRM and SLA-MAC Construction Limited recorded on October 17, 2018, as Document Number 113431747. This provides an easement over a roadway. There is not plan attached to the easement. Subject to an easement agreement between CBRM and 3248461 Nova Scotia Limited recorded on October 17, 2018, as Document No. 113431838. This provides a right of way over the same roadway listed in the above easement.

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27.	Property:	PID 15862840
		Subject to an easement agreement between CBRM and D.M. Rogers Transport Limited recorded on October 17, 2018, as Document No. 113431929. This provides an easement over the same roadway listed in the easement above.
	Recorded Interests:	Nil.
	Comments:	We will need to review the restrictive covenants carefully in light of Project plans to ensure that we will not require a release of any covenant. The address for this parcel is listed as 715 Sydney Port Access Road (Spar).
	Mapping:	

28.	Property:	PID 15875875
	Registered Owner:	Sla-Mac Construction
	Area (POL):	3113.90 square meters
	LR Status:	LR
	Access:	Public

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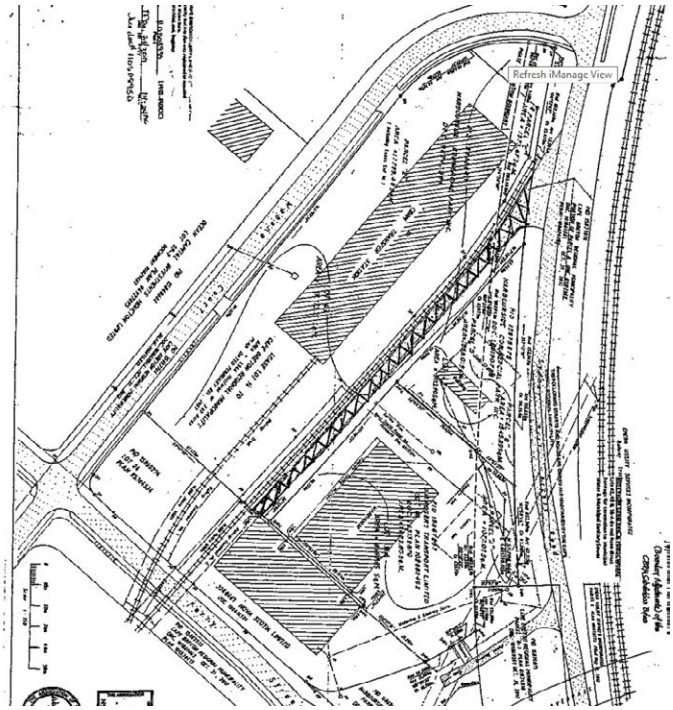
28.	Property:	PID 15875875
	Benefits:	An easement granted by the Minister of Public Works and Mines under the Nova Scotia Water Act recorded on October 19, 1972, at Book 912 Page 44 Document No. 13249. This provided the right to Dominion Iron & Coal Company to divert river and water course for the purposes of smelting or ores and manufacturing iron and steel. This easement is arguably void as of 2022 as there is a provision that states the authorization shall expire 50 years from the date of authorization. Easement agreement between OTS and Harbourside Commercial Park Inc. recorded on March 29, 2012, as Document No. 100377721. This provides the same railway easement listed above in item 24. Easement agreement between CBRM and Sla-Mac Construction Limited recorded on October 17, 2018, providing a right of way over PID 15862840. The easement is shown as the cross-hatched corridor as follows: 
	Burdens:	Easement in favour of NSPI recorded on February 1, 1966, at Book 756 Page 562 Document No. 414. Provides the right to install, access and maintain transmission lines from the “No. 3 Power Plant of the Dominion Coal Corporation Limited”. Subject to an easement in favour of NSPI recorded on August 9, 2004, at Book 2421 Page 820 Document No. 76057984. This provides a right of way for the power lines and poles formerly used by “Sysco” and assumed by NSPI. The easement states there is a sketch plan attached to show the location of the lines, but there is no schedule attached.

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28.	Property:	PID 15875875
		Subject to an easement in favour of NSPI pursuant to a deed recorded on January 10, 2005, at Book 2451 Page 397 Document No. 81192669. Reserves a right of way over existing powerline and telephone pole. Subject to an easement amending agreement (amending the 2004 agreement) between Sydney Steel Corporation and NSPI recorded on August 18, 2006, as Document No 85912286. This amends the boundaries of the original easement, but the schedule depicting its placement is still not attached. Subject to the restrictive covenants of the "Harbourside Commercial Park" imposed via a deed between Sydney Steel Corporation and Harbourside Commercial Park Inc. recorded May 3, 2011, as Document No. 98243984. Subject to an easement agreement between Sydney Steel Corporation, Harbourside Commercial Park and 3294807 Nova Scotia Company recorded March 29, 2016, as Document No. 108713257. This provides the same railway easement listed above. Subject to an easement agreement between CBRM and Harbourside Commercial Park Inc. recorded on October 17, 2018, as Document No. 113431531. This provides the same railway easement listed above.
	Recorded Interests:	Nil.
	Comments:	We will need to review the restrictive covenants carefully in light of Project plans to ensure that we will not require a release of any covenant.
	Mapping:	

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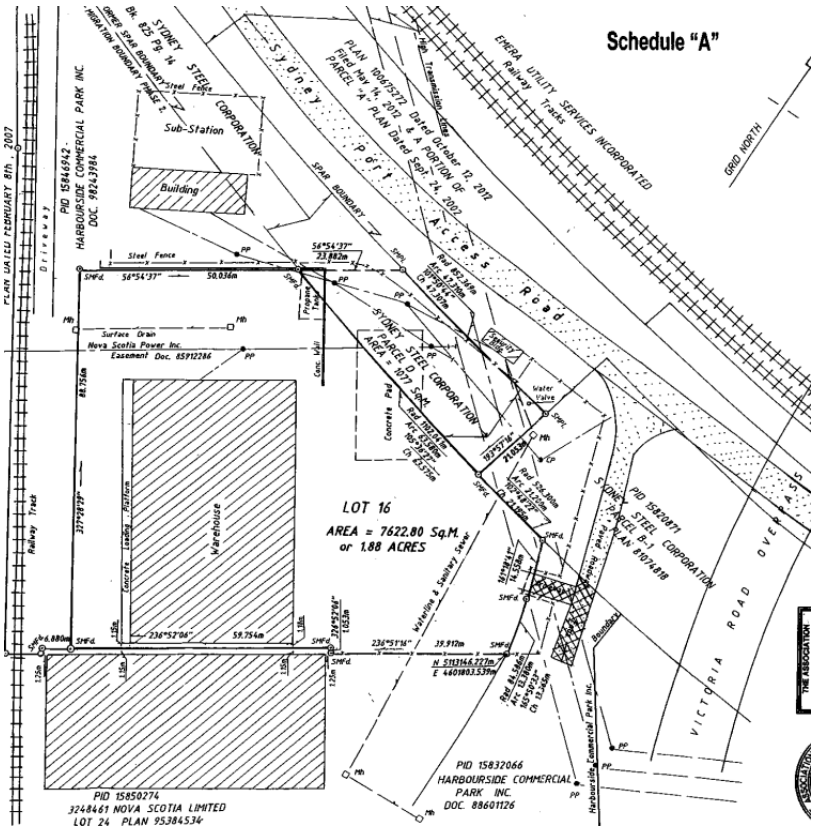
29.	Property:	PID 15867237
	Registered Owner:	D.M. Rogers Transport Limited
	Area (POL):	8699.85 square meters
	LR Status:	LR
	Access:	Public
	Benefits:	An easement granted by the Minister of Public Works and Mines under the Nova Scotia Water Act recorded on October 19, 1972, at Book 912 Page 44 Document No. 13249. This provided the right to Dominion Iron & Coal Company to divert river and water course for the purposes of smelting or ores and manufacturing iron and steel. This easement is arguably void as of 2022 as there is a provision that states the authorization shall expire 50 years from the date of authorization. Easement agreement between Harbourside Commercial Park Inc. and D.M. Rogers Transport Limited recorded on May 30, 2013, as Document No. 103140118 providing a right of way of PID 15832066 as shown below:  Easement agreement between CBRM and D.M. Rogers Transport Limited recorded on October 17, 2018, providing a right of way over PID

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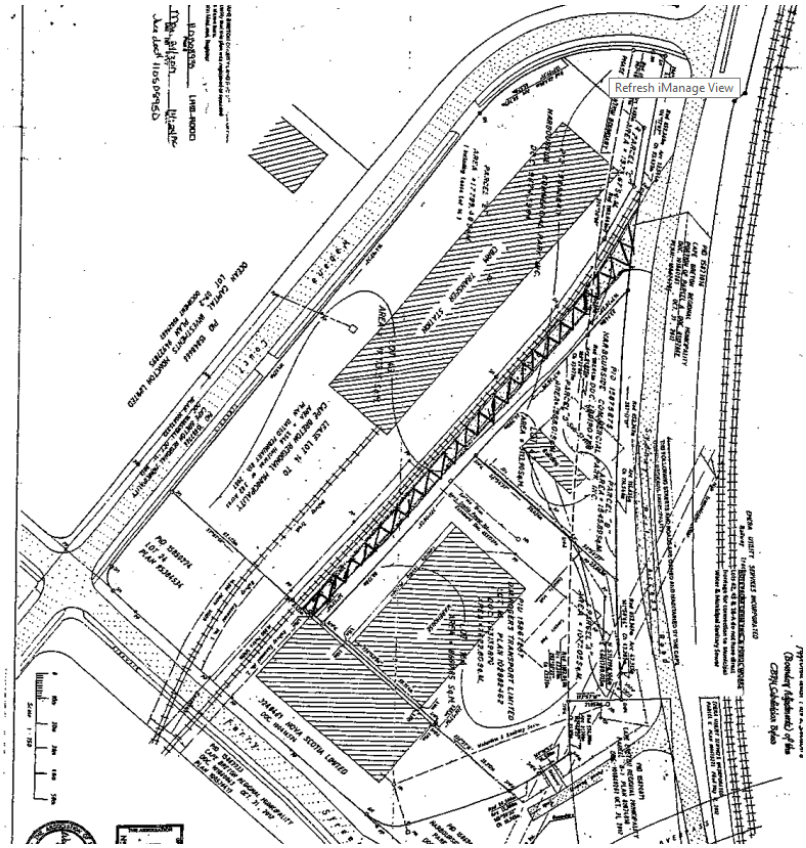
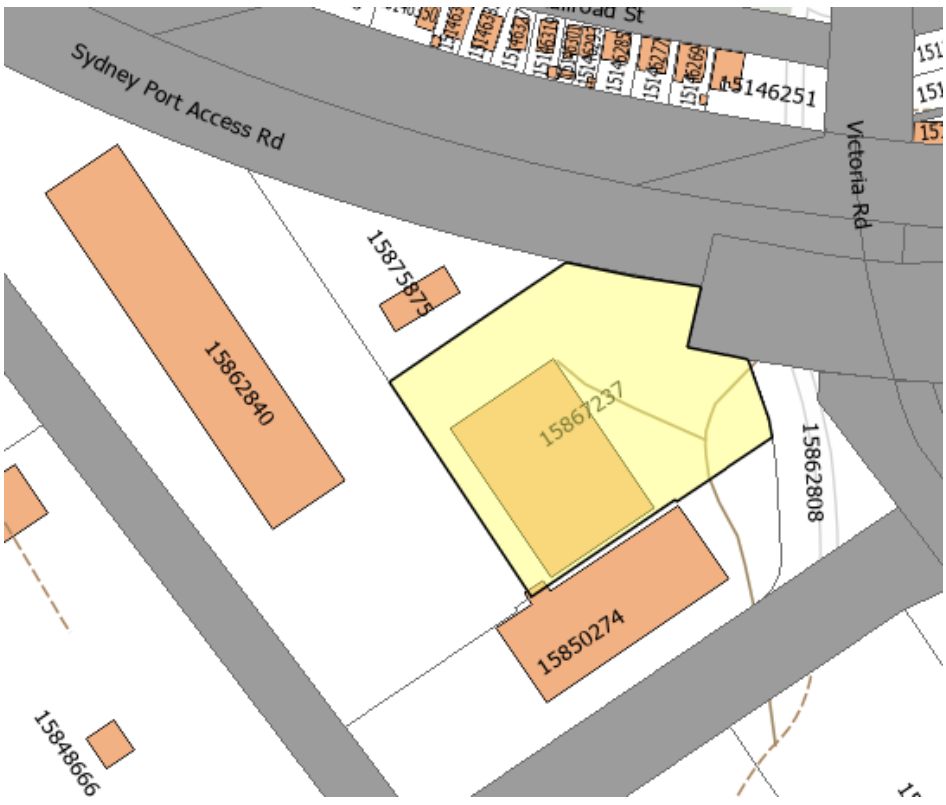
29.	Property:	PID 15867237
		15862840. The easement is shown as the cross-hatched corridor as follows: 
	Burdens:	Easement in favour of NSPI recorded on February 1, 1966, at Book 756 Page 562 Document No. 414. Provides the right to install, access and maintain transmission lines from the “No. 3 Power Plant of the Dominion Coal Corporation Limited”. Subject to an easement in favour of NSPI recorded on August 9, 2004, at Book 2421 Page 820 Document No. 76057984. This provides a right of way for the power lines and poles formerly used by “Sysco” and assumed by NSPI. The easement states there is a sketch plan attached to show the location of the lines, but there is no schedule attached. Subject to an easement in favour of NSPI pursuant to a deed recorded on January 10, 2005, at Book 2451 Page 397 Document No. 81192669. Reserves a right of way over existing powerline and telephone pole. Subject to an easement amending agreement (amending the 2004 agreement) between Sydney Steel Corporation and NSPI recorded on August 18, 2006, as Document No 85912286. This amends the boundaries of the original easement, but the schedule depicting its placement is still not attached.

29.	Property:	PID 15867237
		Subject to the restrictive covenants of the “Harbourside Commercial Park” imposed via a deed between Sydney Steel Corporation and Harbourside Commercial Park Inc. recorded May 3, 2011, as Document No. 98243984. Subject to an easement agreement between Sydney Steel Corporation, Harbourside Commercial Park and 3294807 Nova Scotia Company recorded March 29, 2016, as Document No. 108713257. This provides the same railway easement listed above.
	Recorded Interests:	Mortgage in favour of Sydney Credit Union recorded on May 30, 2013, as Document No. 103140217. Notice of lease between D.M. Rogers Transport Limited and Her Majesty the Queen recorded on May 2, 2014, as Document No. 104998480. Notice of lease between D.M. Rogers Transport Limited and His Majesty the King recorded on May 16, 2023, as Document No. 122449011.
	Comments:	A consent and non-disturbance agreement from Sydney Credit Union is recommended. Consent from the Crown as leaseholder likely required.
	Mapping:	

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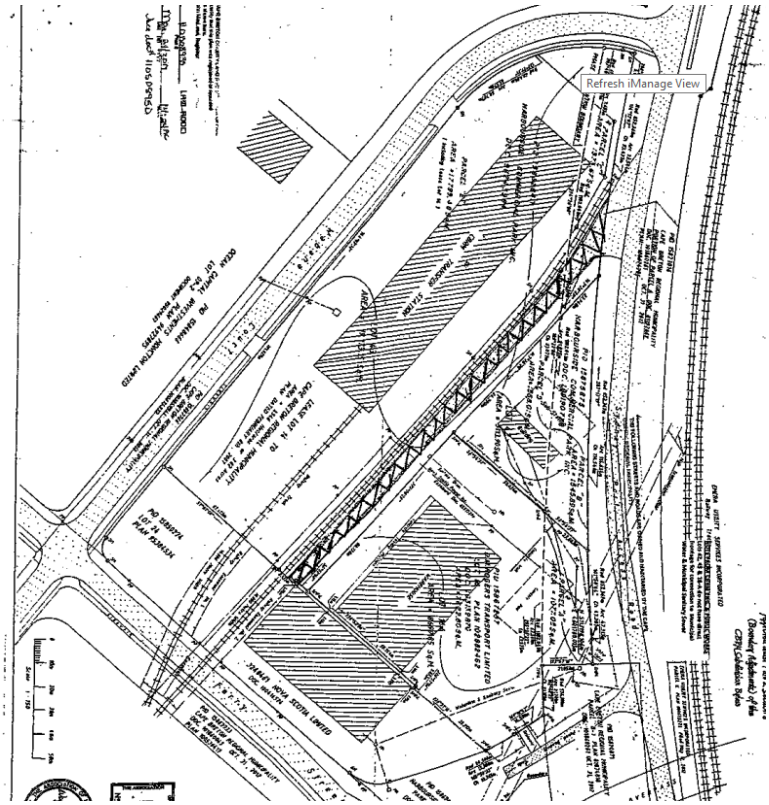
30.	Property:	PID 15850274
	Registered Owner:	B&T Battery & Auto Real Estate Limited
	Area (POL):	7316 square meters
	LR Status:	LR
	Access:	Public
	Benefits:	Easement agreement between Harbourside Commercial Park Inc. and OTS recorded on May 29, 2012, as Document No. 100377903 providing a right of way of PID(s) 15832066 and 15846942. There is no sketch attached to this easement to determine the location. Easement agreement between CBRM and OTS recorded on October 17, 2018, providing a right of way over PID 15862840. The easement is shown as the cross-hatched corridor as follows: 
	Burdens:	Subject to an easement in favour of NSPI recorded on August 9, 2004, at Book 2421 Page 820 Document No. 76057984. This provides a right of way for the power lines and poles formerly used by “Sysco” and assumed by NSPI. The easement states there is a sketch plan attached to show the location of the lines, but there is no schedule attached.

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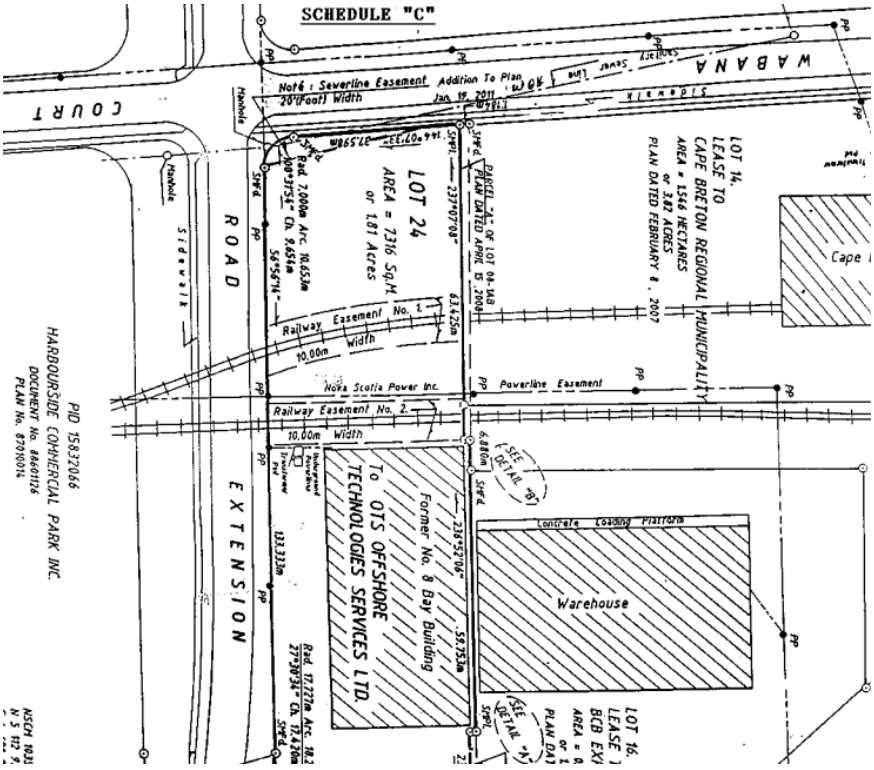
30.	Property:	PID 15850274
		Subject to an easement amending agreement (amending the 2004 agreement) between Sydney Steel Corporation and NSPI recorded on August 18, 2006, as Document No 85912286. This amends the boundaries of the original easement, but the schedule depicting its placement is still not attached. Subject to the restrictive covenants of the “Harbourside Commercial Park” imposed via a deed between Sydney Steel Corporation and Harbourside Commercial Park Inc. recorded August 17, 2007, as Document No. 88601126. Subject to a 20-foot-wide sewer line easement pursuant to a warranty deed between Harbourside Commercial Park Inc. and OTS recorded on March 29, 2012, as Document No. 100376731 shown as follows:  Subject to an easement agreement between OTS and Harbourside Commercial Park and 3294807 Nova Scotia Company recorded March 29, 2012, as Document No. 100377804. This provides the same railway easement listed above. The railway easement can also be seen on the image of the sewer line above. Subject to an easement agreement between Sydney Steel Corporation, Harbourside Commercial Park Inc and 3294807 Nova Scotia Company on March 29, 2016, as Document No. 108713380. This also provides a railway easement.

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30.	Property:	PID 15850274
	Recorded Interests:	Mortgage in favour of Royal Bank of Canada recorded on August 10, 2023, as Document No. 122880892. General assignment of rents and leases in favour of Royal Bank of Canada recorded on August 11, 2023, as Document No. 122890818.
	Comments:	Consent and non-disturbance agreement from Royal Bank of Canada is recommended.
	Mapping:	

31.	Property:	PID 15832066
	Registered Owner:	Build Nova Scotia
	Area (POL):	12.6 hectares
	LR Status:	LR
	Access:	Public
	Benefits:	An easement granted by the Minister of Public Works and Mines under the Nova Scotia Water Act recorded on October 19, 1972, at Book 912 Page 44 Document No. 13249. This provided the right to Dominion Iron & Coal Company to divert river and water course for the purposes of smelting or ores and manufacturing iron and steel. This easement is arguably void as of 2022 as there is a provision that states the authorization shall expire 50 years from the date of authorization.

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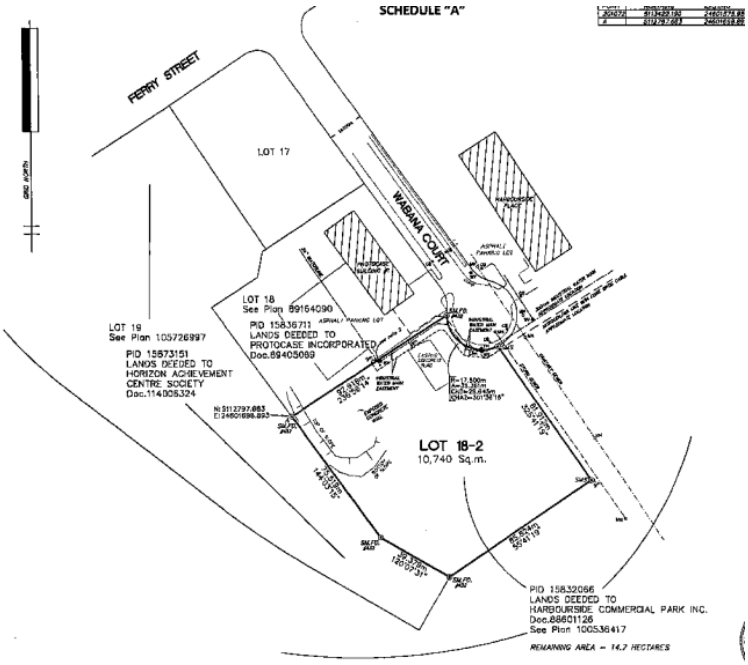
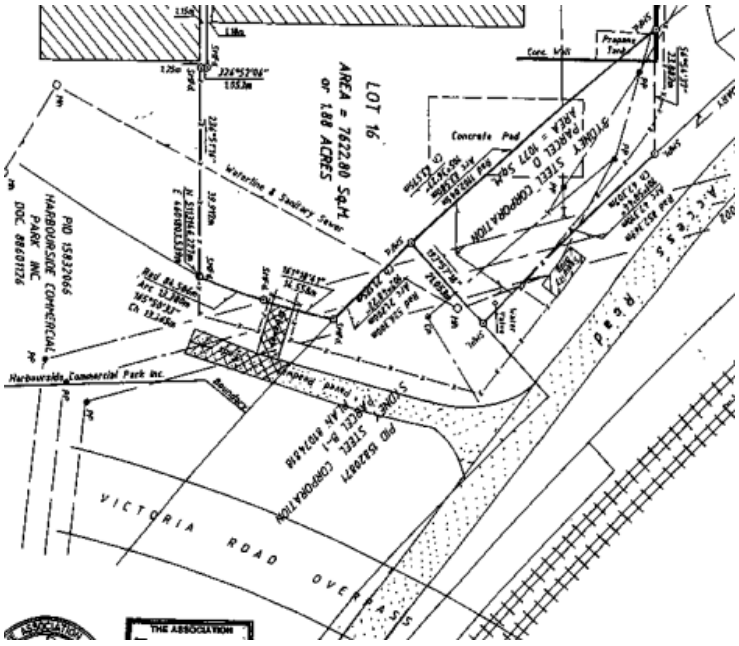
31.	Property:	PID 15832066
		A sewer line easement granted by Harbourside Commercial Park Inc. in favour of OTS Offshore Technologies Services Limited ("**OTS**"), via warranty deed recorded March 29, 2012, as Document No. 100376756. This provides a 20-foot-wide sewer easement shown at item 26 above. Easement agreement between OTS and Harbourside Commercial Park Inc. recorded on March 29, 2012, as Document No. 100377721. This provides the same railway easement listed above in item 24. Easement agreement between Protocase Incorporated and Harbourside Commercial Park Inc. recorded on May 29, 2020, as Document No. 116394157. This proved a 6-metre-wide waterline easement shown as follows: 
	Burdens:	Easement agreement between Sydney Steel Corporation and CBRM recorded on February 15, 2001, at Book 2184 Page 285 Document No. 926. This provides a sewer line easement. The agreement says a sketch of the easement is attached, but it is not. Subject to an easement in favour of NSPI recorded on August 9, 2004, at Book 2421 Page 820 Document No. 76057984. This provides a right of way for the power lines and poles formerly used by "Sysco" and assumed by NSPI. The easement states there is a sketch plan attached to show the location of the lines, but there is no schedule attached.

31.	Property:	PID 15832066
		Subject to an easement amending agreement (amending the 2004 agreement) between Sydney Steel Corporation and NSPI recorded on August 18, 2006, as Document No 85912286. This amends the boundaries of the original easement, but the schedule depicting its placement is still not attached. Subject to the restrictive covenants of the “Harbourside Commercial Park” imposed via a deed between Sydney Steel Corporation and Harbourside Commercial Park Inc. recorded August 17, 2007, as Document No. 88601126. Subject to a 6.5-metre-wide trenching easement via a deed between Harbourside Commercial Park Inc. and CBRM recorded on October 31, 2012, as Document No. 101860089. Subject to a CBRM water main easement as recorded on October 31, 2012, as Document No. 101860089. Subject to a 32-foot-wide easement in favour of Her Majesty the Queen recorded on October 31, 2012, as Document No. 101860089. Subject to an easement in favour of D.M. Rogers Transport Limited (PID 15867237) recorded on May 30, 2013, as Document No. 103140001. It provides an access easement over a driveway, which is shown in crosshatch as follows:  Subject to 5 different easements via a warranty deed between Harbourside Commercial Park Inc. and Pharmacy Wholesale Services

31.	Property:	PID 15832066
		Incorporated recorded on February 20, 2015, as Document No. 106673834. They are as follows: 1. CBRM sewer easement with an area of 535 square metres. 2. A 5-metre-wide easement for the right to repair and maintain a 2-inch water line. 3. 5-metre-wide easement for the right to repair and maintain underground electrical and telecommunications lines. 4. A 5-metre-wide easement for the right to repair and maintain a 6-inch domestic water line. Subject to an easement agreement between Sydney Steel Corporation, Harbourside Commercial Park Inc and 3294807 Nova Scotia Company on March 29, 2016, as Document No. 108713380. This provides a railway easement.
	Recorded Interests:	Option agreement in favour of Harbourside Commercial Park Inc. recorded on May 30, 2013, Document No. 103141041.
	Comments:	We think the option agreement has expired. Further investigation is required if a purchase of these lands is contemplated.
	Mapping:	

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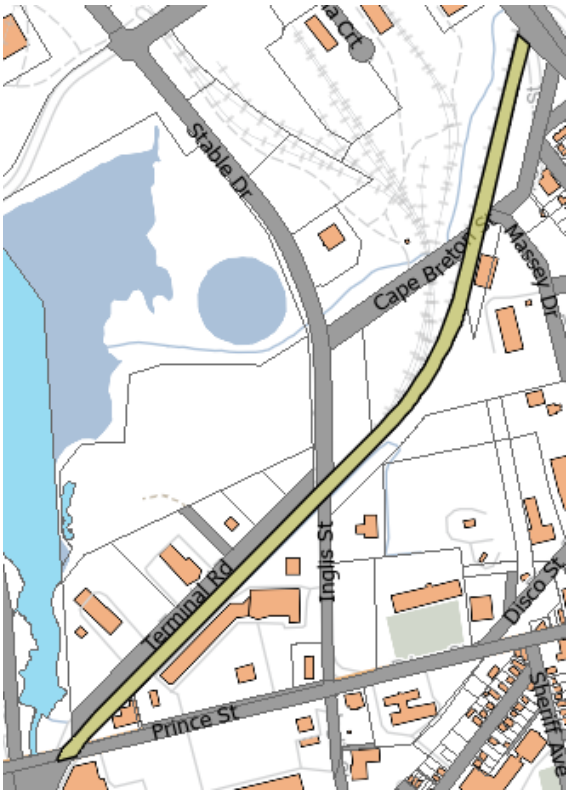
32.	Property:	PID 15902331
	Registered Owner:	Build Nova Scotia – this is “Cape Breton Street”
	Area (POL):	7101.90 square meters
	LR Status:	LR
	Access:	Public
	Benefits:	An easement granted by the Minister of Public Works and Mines under the Nova Scotia Water Act recorded on October 19, 1972, at Book 912 Page 44 Document No. 13249. This provided the right to Dominion Iron & Coal Company to divert river and water course for the purposes of smelting or ores and manufacturing iron and steel. This easement is arguably void as of 2022 as there is a provision that states the authorization shall expire 50 years from the date of authorization.
	Burdens:	Subject to an easement in favour of NSPI recorded on August 9, 2004, at Book 2421 Page 820 Document No. 76057984. This provides a right of way for the power lines and poles formerly used by “Sysco” and assumed by NSPI. The easement states there is a sketch plan attached to show the location of the lines, but there is no schedule attached. Subject to an easement amending agreement (amending the 2004 agreement) between Sydney Steel Corporation and NSPI recorded on August 18, 2006, as Document No 85912286. This amends the boundaries of the original easement, but the schedule depicting its placement is still not attached. Subject to the restrictive covenants of the “Harbourside Commercial Park” imposed via a deed between Sydney Steel Corporation and Harbourside Commercial Park Inc. recorded August 17, 2007, as Document No. 88601126. Subject to a 6.5-metre-wide trenching easement via a deed between Harbourside Commercial Park Inc. and CBRM recorded on October 31, 2012, as Document No. 101860089. Subject to an easement agreement between Sydney Steel Corporation, Harbourside Commercial Park Inc and 3294807 Nova Scotia Company on March 29, 2016, as Document No. 108713380. This provides a railway easement.
	Recorded Interests:	Nil.
	Comments:	This is a public road crossing so close regulatory review will be required.

32.	Property:	PID 15902331
	Mapping:	

33.	Property:	PID 15902349
	Registered Owner:	Build Nova Scotia
	Area (POL):	1.49 hectares
	LR Status:	LR
	Access:	No Access
	Benefits:	An easement granted by the Minister of Public Works and Mines under the Nova Scotia Water Act recorded on October 19, 1972, at Book 912 Page 44 Document No. 13249. This provided the right to Dominion Iron & Coal Company to divert river and water course for the purposes of smelting or ores and manufacturing iron and steel. This easement is arguably void as of 2022 as there is a provision that states the authorization shall expire 50 years from the date of authorization.
	Burdens:	Subject to an easement in favour of NSPI recorded on August 9, 2004, at Book 2421 Page 820 Document No. 76057984. This provides a right of way for the power lines and poles formerly used by “Sysco” and assumed by NSPI. The easement states there is a sketch plan attached to show the location of the lines, but there is no schedule attached. Subject to an easement amending agreement (amending the 2004 agreement) between Sydney Steel Corporation and NSPI recorded on August 18, 2006, as Document No 85912286. This amends the boundaries of the original easement, but the schedule depicting its placement is still not attached.

33.	Property:	PID 15902349
		Subject to the restrictive covenants of the “Harbourside Commercial Park” imposed via a deed between Sydney Steel Corporation and Harbourside Commercial Park Inc. recorded August 17, 2007, as Document No. 88601126. Subject to a 6.5-metre-wide trenching easement via a deed between Harbourside Commercial Park Inc. and CBRM recorded on October 31, 2012, as Document No. 101860089. Subject to an easement agreement between Sydney Steel Corporation, Harbourside Commercial Park Inc and 3294807 Nova Scotia Company on March 29, 2016, as Document No. 108713380. This provides a railway easement.
	Recorded Interests:	Nil.
	Comments:	Nil.
	Mapping:	

34.	Property:	PID 15649668
	Registered Owner:	Canadian National Railway Company
	Area (POL):	6.15 acres
	LR Status:	Non-LR
	Access:	Unavailable

34.	Property:	PID 15649668
	Benefits:	Nil.
	Burdens:	Nil.
	Recorded Interests:	Nil.
	Comments:	There is a survey plan from 1999 prepared by Verner Surveys Ltd. titled: Compiled Plan Showing Lands of H.M The Queen in Right of Canada (Canadian Government Railways) Showing Parcels 1,2 & 3, Sydney Cape Breton Regional Municipality. This plan might be useful to surveyors contracted by CBU with respect to the Project. This parcel crosses Prince Street so close regulatory review will be required.
	Mapping:	

42859012_3

35.	Property:	PID 15642309
	Registered Owner:	Cape Breton & Central Nova Scotia Railway Ltd.
	Area (POL):	35 acres
	LR Status:	Non-LR
	Access:	Unavailable.
	Benefits:	Unavailable.
	Burdens:	Unavailable.
	Recorded Interests:	Unavailable.
	Comments:	It appears there could be several easements and debentures affecting this parcel. We recommend a full title search for this parcel. This comment applies to all non-LR parcels with this registered owner. On the relevant portion of this parcel is shown in the mapping below. The parcel extends to the northern most tip of Sydney around Imperial Oil Ltd. and terminates near the Joan Harris Cruise Pavilion.
	Mapping:	

42859012_3

36.	Property:	PID 15705791
	Registered Owner:	Road Parcel – Owner Undetermined – This is “Townsend Street”
	Area (POL):	Unavailable
	LR Status:	Non-LR
	Access:	Unavailable, but this is a public road
	Benefits:	Nil.
	Burdens:	Nil.
	Recorded Interests:	Nil.
	Comments:	This is a public road crossing so careful regulatory review will be required.
	Mapping:	

37.	Property:	PID 15642010
	Registered Owner:	Cape Breton & Central Nova Scotia Railway Ltd.
	Area (POL):	34320 square feet
	LR Status:	Non-LR
	Access:	Unavailable.
	Benefits:	Unavailable.
	Burdens:	Unavailable
	Recorded Interests:	Unavailable.
	Comments:	It appears there could be several easements and debentures affecting this parcel. We recommend a full title search for this parcel. This comment applies to all non-LR parcels with this registered owner.

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37.	Property:	PID 15642010
	Mapping:	

38.	Property:	PID 15706518
	Registered Owner:	Road Parcel – Owner Undetermined – This forms half of “Brookland Street”
	Area (POL):	Unavailable
	LR Status:	Non-LR
	Access:	Unavailable, but this is a public road
	Benefits:	Nil.
	Burdens:	Nil.
	Recorded Interests:	Nil.
	Comments:	This is a public road crossing so careful regulatory review will be required.
	Mapping:	

39.	Property:	PID 157101555
	Registered Owner:	Road Parcel – Owner Undetermined – This forms half of “Brookland Street”
	Area (POL):	Unavailable
	LR Status:	Non-LR
	Access:	Unavailable, but this is a public road
	Benefits:	Nil.
	Burdens:	Nil.
	Recorded Interests:	Nil.
	Comments:	This is a public road crossing so careful regulatory review will be required.
	Mapping:	

40.	Property:	PID 15642002
	Registered Owner:	Cape Breton & Central Nova Scotia Railway Ltd.
	Area (POL):	33000 square feet
	LR Status:	Non-LR
	Access:	Unavailable.
	Benefits:	Unavailable.
	Burdens:	Unavailable.
	Recorded Interests:	Unavailable.
	Comments:	It appears there could be several easements and debentures affecting this parcel. We recommend a full title search for this parcel. This comment applies to all non-LR parcels with this registered owner.

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40.	Property:	PID 15642002
	Mapping:	

41.	Property:	PID 15710163
	Registered Owner:	Road Parcel – Owner Undetermined – This forms half of “George Street”
	Area (POL):	Unavailable
	LR Status:	Non-LR
	Access:	Unavailable, but this is a public road
	Benefits:	Nil.
	Burdens:	Nil.
	Recorded Interests:	Nil.
	Comments:	This is a public road crossing so careful regulatory review will be required.
	Mapping:	

42859012_3

42.	Property:	PID 15705536
	Registered Owner:	Road Parcel – Owner Undetermined – This forms half of “George Street”
	Area (POL):	Unavailable
	LR Status:	Non-LR
	Access:	Unavailable, but this is a public road
	Benefits:	Nil.
	Burdens:	Nil.
	Recorded Interests:	Nil.
	Comments:	This is a public road crossing so careful regulatory review will be required.
	Mapping:	

43.	Property:	PID 15641996
	Registered Owner:	Cape Breton & Central Nova Scotia Railway Ltd.
	Area (POL):	3.7 acres
	LR Status:	Non-LR
	Access:	Unavailable.
	Benefits:	Unavailable.
	Burdens:	Unavailable.

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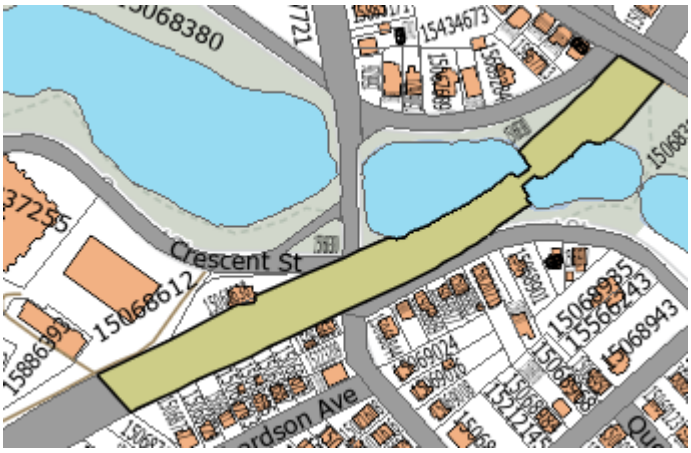
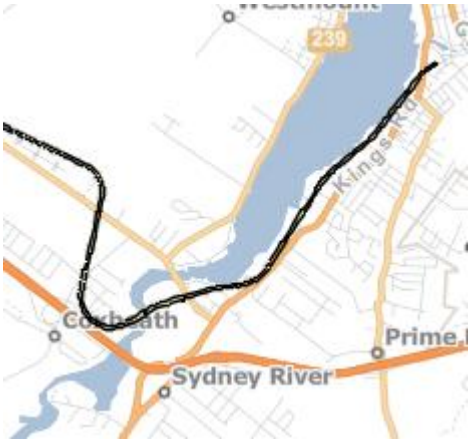
43.	Property:	PID 15641996
	Recorded Interests:	Unavailable.
	Comments:	It appears there could be several easements and debentures affecting this parcel. We recommend a full title search for this parcel. This comment applies to all non-LR parcels with this registered owner.
	Mapping:	

44.	Property:	PID 15705585
	Registered Owner:	Road Parcel – Owner Undetermined – This is “Kings Road”
	Area (POL):	Unavailable
	LR Status:	Non-LR
	Access:	Unavailable, but this is a public road
	Benefits:	Nil.
	Burdens:	Nil.
	Recorded Interests:	Nil.
	Comments:	This is a public road crossing so careful regulatory review will be required.

44.	Property:	PID 15705585
	Mapping:	

45.	Property:	PID 15641996
	Registered Owner:	Cape Breton & Central Nova Scotia Railway Ltd.
	Area (POL):	140 acres
	LR Status:	LR
	Access:	Other
	Benefits:	Nil.
	Burdens:	Subject to the right of Her Majesty the Queen in any watercourses or public roads that intersect the lands included in the parcel description. Subject to possible survey information which may conflict with the information shown on Plan No. M3490. Subject to a utility easement in favour of Canadian National Railway Company via a deed recorded on October 1, 1993, at Book 1820 Page 62 Document No. 10322. Subject to a utility easement in favour of NSPI recorded on January 17, 1995, at Book 1883 Page 709 Document No. 543. Subject to a 15 foot right of easement in favour of PIDs 15541386 and 15324908 to enter upon the land to construct or replace a water line and/or well thereon and thereunder and to carry out all such necessary excavation and work as may be required for the said water line and

45.	Property:	PID 15641996
		well, via an easement recorded on October 12, 1999, at Book 2121 Page 978 Document No. 7417.[9]
	Recorded Interests:	Right of First Refusal in favour of Canadian National Railway Company via a deed recorded on October 1, 1993, at Book 1820 Page 62 Document No. 10322.
	Comments:	This parcel runs from Wentworth Park to Upper North Sydney. It contains 1C – Small Terminal Access Nova Scotia and 3A – Small Terminal at Walmart + Existing Parking Lot.
	Mapping:	

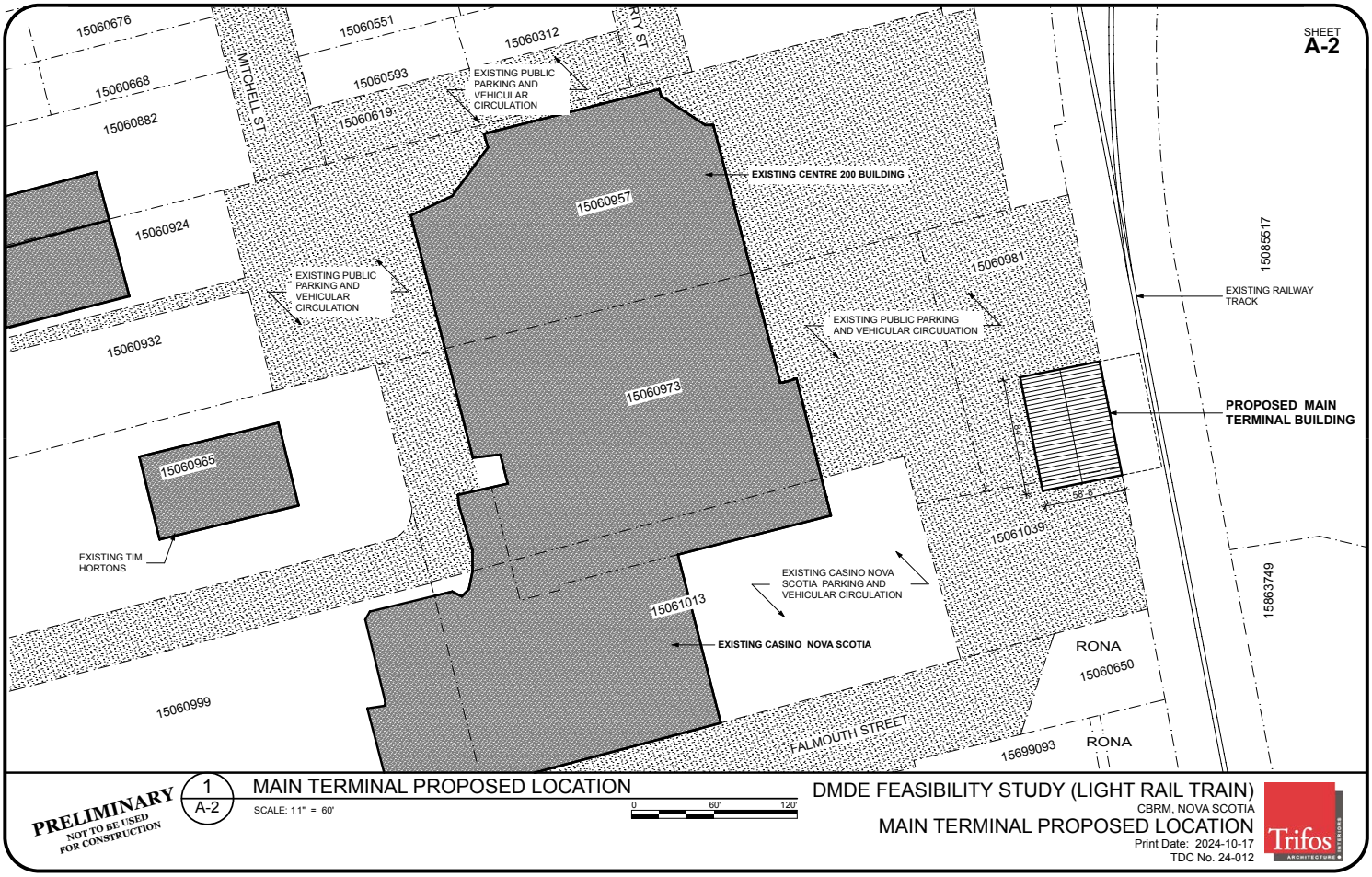
[9] The location of this easement is in Balls Creek therefore it does not affect Phase 1 of the Project.

Proposed Passenger Terminal

Sydney Hub Location

Trifos

Cape Breton University


SHEET
A-2
15060676
15060551
15060312
15060668
15060882
15060593
15060619
MITCHELL ST
RY ST
EXISTING PUBLIC PARKING AND VEHICULAR CIRCULATION
EXISTING CENTRE 200 BUILDING
15060957
15060924
15060981
15085517
EXISTING RAILWAY TRACK
EXISTING PUBLIC PARKING AND VEHICULAR CIRCULATION
EXISTING PUBLIC PARKING AND VEHICULAR CIRCULATION
15060932
15060973
PROPOSED MAIN TERMINAL BUILDING
84' 0"
68' 8"
15060965
15061039
EXISTING TIM HORTONS
EXISTING CASINO NOVA SCOTIA PARKING AND VEHICULAR CIRCULATION
15863749
15061013
EXISTING CASINO NOVA SCOTIA
RONA
15060650
15060999
FALMOUTH STREET
15699093
RONA
PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION
1
A-2
MAIN TERMINAL PROPOSED LOCATION
SCALE: 1" = 60'
0
60'
120'
DMDE FEASIBILITY STUDY (LIGHT RAIL TRAIN)
CBRM, NOVA SCOTIA
MAIN TERMINAL PROPOSED LOCATION
Print Date: 2024-10-17
TDC No. 24-012
Trifos
ARCHITECTURE

Adessia Train Specifications

ALSTOM

Cape Breton University

COMMUTER TRAINS

Adessia™ single-deck

PRODUCT SHEET

Serving metropolitan areas for more than 50 years, Alstom's Adessia single-deck provides reliable commuter cars for flexible operation in North America.

KEY BENEFITS

Proven solution: 1,400 Adessia cars sold in North America since 1999

Flexible train customisation for North American market with service-proven components

4 variants: non-motorised (coach, push-pull), electric propulsion (25 kV catenary or 750 V third rail), battery or hydrogen propulsion

Up to 10-car configuration

High- and low-level boarding

Up to 82 seats per trailer car and up to 71 seats per cab car

Various interior configuration: coach, sleeper, café, restaurant

Compliant with FRA and APTA for US market

GENERAL DESCRIPTION

Adessia single-deck solution is the latest evolution of the single-level car design, capitalising on over 50 years of experience by Alstom building commuter cars for its business partners in the United States and Canada. The Adessia cars are a market-leading economic and service-proven solution for North America networks. They offer the highest operational configurability and best-in-class passenger comfort, while significantly increasing transport capacity.

CUSTOMER BENEFITS

Flexible design for all operational needs
The Adessia solution offers a versatile range of commuter single and double deck cars for speeds up to 200 km/h (125 mph). The trains can have up to 10 cars and function as locomotive-hauled or electric multiple units. They are suitable for different services, including commuter, regional, and intercity.

Multiple capacity options
The Adessia solution offers up to 82 seats on single-deck cars and up to 142 seats on double-deck cars. Single-deck and double-deck cars can be coupled together to adapt the train capacity to network needs and infrastructure constraints.

High availability and reliability
The Adessia's stainless steel cars for North American market are fully compliant with FRA, APTA and ADA standards. The cars are offering high availability and reliability based on Alstom's expertise in maintenance supported by HealthHub and TSSSA as well as service-proven components.

Customisable passenger experience
The Adessia solution offers a range of passenger-centric solutions with elegant design, spacious interiors, and connectivity features. It provides comfortable seating, extra space for luggage, bicycles or strollers, and the latest train digital enhancements supported by cybersecurity integration.

Adessia/EN/07.2023 - Photo credits: ©ALSTOM 2023 A&CD – Adessia™

Adessia single-deck

TECHNICAL SPECIFICATIONS

Train configuration	2 to 10 cars
Track gauge	4’ 8.5”
Maximum speed in service	100 to 125 mph
Power supply type	Loco-hauled, third rail, catenary, traction battery, hydrogen fuel cell
Power supply voltage	750 V DC, 25 kV AC
Range	Depending on operational conditions, Battery: up to 60 miles Hydrogen: up to 600 miles
Car length	85’
Entrance height	8” to 51” (with vestibule)
Entrance doors	2 doors per car side
Interior configuration	Coach (transversal seating 1+2, 2+2, 2+3), sleeper, café, restaurant
Capacity	Trailer car: 82 seats per car Cab car: 71 seats per car
Carbody material	Stainless steel

FOR MORE INFORMATION:

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