Phasing and Sequencing to Develop a Regional Passenger Rail System in Alberta

Final Report

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Executive Summary

This report presents a complete strategic assessment and execution plan for the reinstation of passenger rail service in the Calgary–Edmonton corridor, which is Canada's second-largest economic growth region and a transportation backbone for over 80% of Alberta's citizens and wealth. The client requested a phased, financially realistic, and politically feasible delivery strategy that maximizes early public value while reducing capital exposure and regulatory risks.

Through three deliverables, Phasing Framework Report, Cost Estimation Report, and Sequencing & Risk Assessment Report, the project has identified cost benchmark for project, analyzed intercity demand on the corridor, prepared alternative approaches for construction sequence and provided recommendation for implementation.

The financial analysis, based on cost benchmarking, puts the total capital needed at around CAD 3.4 billion. Additionally, a phased cost structure which allows early value generation to facilitate a gradual investment cycle is a significant advantage. Setting Calgary–Airdrie and Edmonton–Leduc connectivity as the top priority brings immediate benefits like high near-term ridership, low infrastructure complexity, and strong political feasibility.

1- Background, Context, and Methodology

1.1 Corridor Context and Strategic Importance

The Calgary-Edmonton corridor represents the economic backbone of Alberta, where more than 80% of the province's population resides and where most of its GDP is generated (Statistics Canada, 2021). With passenger rail service being discontinued in 1985, travel amongst these cities are practically dependent on:

- Roads that suffer from extreme congestion (up to 92,000 AADT)
- Short-distance flights that are not suitable for daily commuting due to their high cost
- Buses that have limited frequency and long travel times

The population in the region has already exceeded 4.2 million according to Alberta's demographic statistics (Statistics Canada, 2021) and expected to grow up to 6.9 million by 2051 (Government of Alberta, 2025). Although Alberta government is investing in enhancement of highways to decrease the congestion (Government of Alberta, 2025), sustainability of this solution will be challenged by increased traffic and pollution due to the lack of new modes.

1.2 Analytical Framework

In this report, an SCQ (Situation-Complication-Question) framework is applied to identify the requirements of reinstating regional railway into the corridor. Then, the findings are assessed and compared with MCDA (Multi Criteria Decision Analysis) framework, in terms of cost, demand, social benefit and environmental effect.

- **SCQ Framework**

- **Situation:** Calgary-Edmonton corridor is both economically and socially representing nearly 90% of Alberta region. Although these two cities have most of the population

and economic gravity in Alberta region, their interconnectivity is limited to highways and airlines.

- **Complication:** Due to increasing demand, lack of travel capacity increasingly imposes risk of delays due to congestion. Introducing passenger railway as an alternative requires nearly CAD 3.4 billion funding.
- **Question:** How can Alberta modernize railway in Calgary Edmonton corridor and offer feasible travel between cities that delivers early value by improving regional mobility, social interaction and reducing financial risks?

- **Multi Criteria Decision Analysis (MCDA)**

Key question described in SCQ framework identifies the possible solution alternatives. However, these possibilities would generate further questions like how many phases are required and where the stations would be for a feasible phasing. Although there are no certain answers to these questions, it is possible to compare results of MCDA evaluations and reach a feasible roadmap for the project.

For this study, following criteria have been used to assess the final recommendation:

- **Capital cost of the project** is benchmarked considering the Brightline project in Florida, USA (CPCS, 2018).
- **Demand & revenue potential** of the corridor is estimated according to the Gravity model analysis by Arduin & Fryer. (2021).
- **Social benefit of the project** is determined via PESTEL analysis for each town/city along the corridor.
- **Environmental impact** of the project is determined via PESTEL analysis for each town/city along the corridor.

In addition to deciding on the best alternative, these methodological approaches identify technical, environmental, operational, and financial risks and offer both quantitative and qualitative insight to structure best practices to mitigate them.

1.3 Key Assumptions

Station Types and Requirements

Main Stations: Stations that generate main demand as starting and ending points of the overall project. Edmonton and Calgary are main stations. As central locations, they will be serving most of the demand and stations should be iconic buildings as they will be the face of the project. The cost of the benchmark station is around USD 76 million (Hanks, 2019) which is around CAD 140 million.

Figure-1

Image of Miami Central Station, Brightline Project

Note: Adopted from Suffolk Construction. (2025)

Secondary Stations: Important stations to improve demand as connecting hub in between main stations. Airdrie, Red Deer and Leduc are the most suitable option for hub considerations. As central hubs, they do not need to be as big and prestigious as central stations, but they should have an above average station structure. Since secondary stations would be smaller and have a low requirement for design, we could estimate as CAD 50 million each.

Figure-2

Image of Boca Raton Station, Brightline Project

Note: Adopted from railway-technology (2024)

Tertiary Stations: Compliment Final Accessibility as local stations to support local communities. Crossfield, Carstairs, Didsbury, Olds, Bowden, Innisfail, Penhold, Blackfalds, Lacombe, Morningside, Ponoka, Maskwacis, Wetaskiwin, Millet, Nisku are possible options. These stations serve limited number of passengers and low-cost infill stations would suffice to establish connectivity through the corridor. Since secondary stations would be smaller and have minimum requirement for design, we could estimate as CAD 20 million each.

Figure-3

Sample image for tertiary stations

Note: Adopted from Perkinswill (2024)

1.4 Phasing Structure

Introducing phases to a project has several advantages. One of them is delivering value early and the ability to generate revenue. Another advantage is related to risk management strategy. Each phase could be considered as a pilot for remaining part of the project, to which the lessons learned could be applied as a risk mitigation strategy. Although dividing a project into phases could have advantages, increasing the number of phases could have negative effects on the resource optimization, testing and commissioning requirements and schedule integrity (Jordan & Riso, 2025).

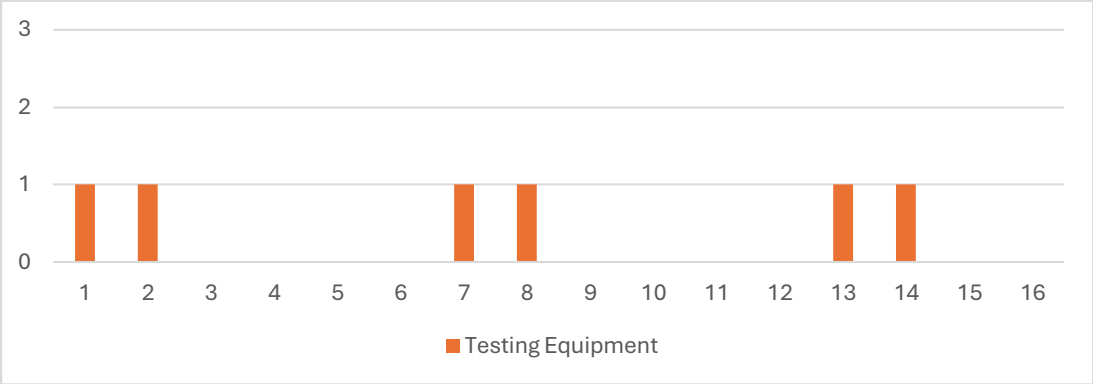
Accordingly, the decision to structure the passenger rail service project into three principal phases reflects mainly optimizing the resource allocation and reducing the schedule complexity. In comparison, increasing the number of phases with smaller increments would not necessarily reduce the risk further but would increase the number of testing, commissioning and certification processes. Considering the railway systems require integrated signaling and operational testing, each incremental task would add repeated verification cycles. Based on time requirements to start each testing or required duration for certification, the critical path of the overall project could be affected. To provide further details, if the testing process for whole project is 30 days, the test duration for any phase would not be significantly lower than 10 days. Therefore, dividing the project to 10 phases causes an additional 70 days to original duration.

Another important limitation to the number of phases is the resource allocation. Resources, human or non-human, to be used in testing and certification processes might require continuity rather than frequent entering and exiting from the project's inventory. Increasing the number of phases would cause a non-uniform distribution of resources, which could cause further increase in the cost of the project (Schwartz, 2024). For example, if one item of special equipment is needed for testing and the cost of bringing this equipment to site

requires additional expense, each phase could be considered as an additional cost to the project. Similarly, if this equipment constantly remains on site, there will be idle times for this equipment, which means inefficient project management. A sample resource allocation chart has been provided below for this hypothetical equipment assuming it is required for two weeks and idle for 4 weeks before the next phase.

Figure – 4

Resource projection for hypothetical equipment for increased phasing structure



1.5 Phasing Alternatives

Considering three station types, a three phased construction sequence is considered for further analysis of the alternatives.

1- **Alternative 1:** Focuses on early delivery of full corridor tracks and only stations in Calgary and Edmonton. Then it establishes the hub stations (Airdrie, Red Deer and Leduc) to increase the demand. Finally, it establishes full corridor connectivity by completing all other tertiary stations. Below table illustrates the sequence of Alternative-1:

Description	Description	Detail
Phase-1	Calgary - Edmonton	2 Main Stations 325 km track upgrade
Phase-2	Airdrie – Red Deer – Leduc &Nisku	3 Secondary Stations 1 Tertiary Station
Phase-3 Other Cities infill stations	Crossfield, Carstairs, Didsbury, Olds, Bowden, Innisfail, Penhold, Blackfalds, Lacombe, Morningside, Ponoka, Maskwacis, Wetaskiwin, Millet	14 Tertiary Stations

2- Alternative 2: Focuses on early delivery of hub connection to Red Deer. Due to bigger demand between Calgary and Red Deer, it starts with that portion. Then it establishes Edmonton connection to complete full corridor tracks. Finally, it establishes full corridor connectivity by completing all tertiary stations. Below table illustrates the sequence of Alternative-2:

Description	Description	Detail
Phase-1	Calgary – Red Deer	1 Main Station 1 Secondary Station 160 km track upgrade
Phase-2	Red Deer – Edmonton	1 Main Station 164 km track upgrade
Phase-3 Other Cities infill stations	Airdrie, Crossfield, Carstairs, Didsbury, Olds, Bowden, Innisfail, Penhold, Blackfalds, Lacombe, Morningside, Ponoka, Maskwacis, Wetaskiwin, Millet, Leduc, Nisku	2 Secondary Stations 15 Tertiary Stations

3- Alternative 3: Focuses on early delivery of hub connections close to Calgary and Edmonton to capture high demand. Then it completes central hub connection to Red Deer to establish full corridor track upgrade. Finally, it establishes full corridor connectivity by completing all tertiary stations. Below table illustrates the sequence of Alternative-3:

Description	Description	Detail
Phase-1	Calgary – Airdrie & Edmonton - Leduc	2 Main Stations 2 Secondary Stations 90 km track upgrade
Phase-2	Red Deer	1 Secondary Station 234 km track upgrade
Phase-3 Other Cities infill stations	Crossfield, Carstairs, Didsbury, Olds, Bowden, Innisfail, Penhold, Blackfalds, Lacombe, Morningside, Ponoka, Maskwacis, Wetaskiwin, Millet, Nisku	15 Tertiary Stations

4- Alternative 4: Focuses on a traditional two phased approach as Red Deer separates two phases. Starts with all stations and track upgrades for Calgary to Red Deer first, then it establishes full corridor connectivity by completing all stations and track upgrades for Red Deer to Edmonton. Below table illustrates the sequence of Alternative-4:

Description	Description	Detail
Phase-1	Calgary, Airdrie, Crossfield, Carstairs, Didsbury, Olds, Bowden, Innisfail, Penhold, Red Deer	1 Main Stations 2 Secondary Stations 7 Tertiary Stations 160 km track upgrade
Phase-2	Blackfalds, Lacombe, Morningside, Ponoka, Maskwacis, Wetaskiwin, Millet, Nisku, Leduc, Edmonton	1 Main Stations 1 Secondary Stations 8 Tertiary Stations 164 km track upgrade

2- Analysis of Findings

2.1 Cost Benchmarking:

As a similar project, Brightline commuter rail project in Florida, USA, costs 600M USD between Miami and West Palm Beach stations (phase-1) (CPCS, 2018). Phase-1 consists of 3 main stations (Miami center, Fort Lauderdale and West Palm), 2 infill stations (Aventura and Boca Raton) and upgrading nearly 105 km of tracks. Benchmarking this project, the steps below are carried out to determine a relevant cost estimation:

- 600M USD in 2018 is converted to CAD 1.075 billion in 2025 using the inflation rates for construction industry presented by Statistics Canada (2024)
- Scale the cost according to length of the benchmark project which is 105 km.
- Estimate approximate cost for 325 km Edmonton Calgary corridor as CAD 3.4 billion including full right of way modernization and station constructions.

In addition to the construction cost, further analysis has been done to identify locomotive type and technology which would affect the overall cost of the project. Shrestha at al. (2025) identified that it would require CAD 30 to 50 million per train set (2 locomotives

and 4 coaches) for Siemens Ventura, which has capability to travel with 200 km/h (Siemens Mobility, 2025). Considering 10 train-sets for the corridor operation, it would cost up to CAD 500 million.

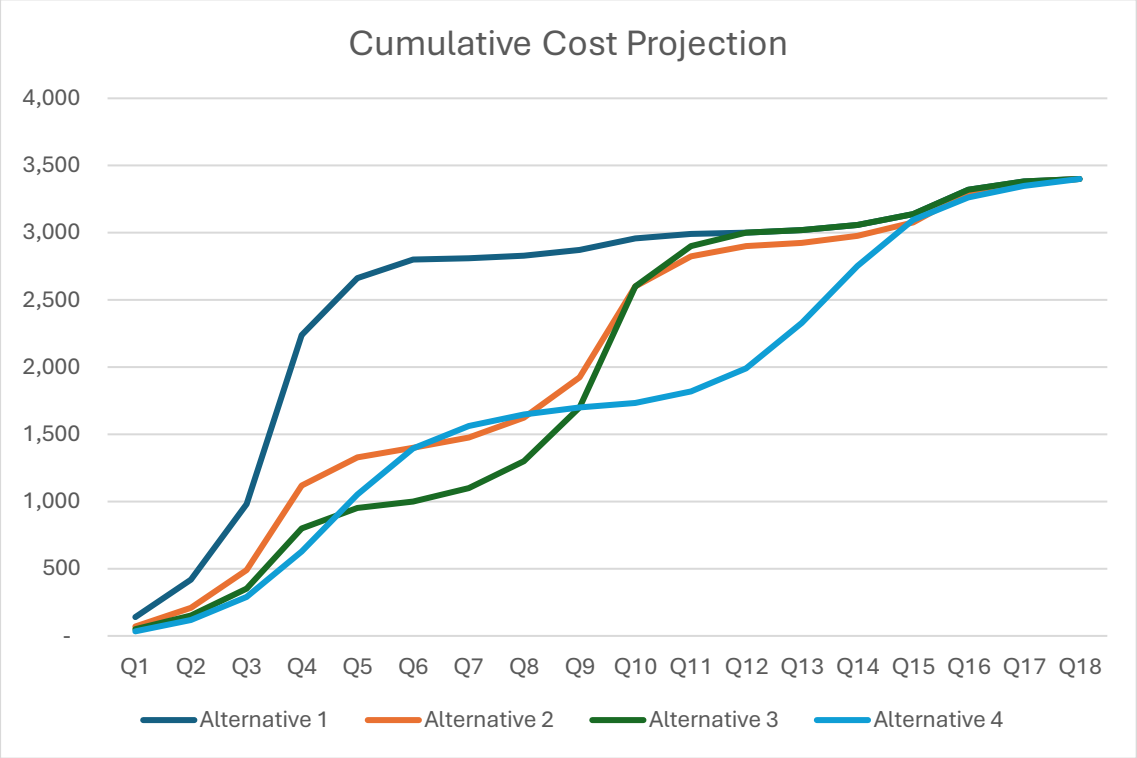
The benchmark project, BrightLine, is using Siemens SCB-40 diesel-electric locomotives which are not publicly listed for pricing. According to CPCS (2015), each locomotive could be up to USD 5 million, and each coach could cost averagely USD 2 million. Considering 10 train-sets would include 20 locomotives and 40 coaches, it is estimated that USD 90 million in 2015 value. Using the same present value conversion above, we can assume that today it would cost around CAD 150 million.

Another locomotive that could be considered is Bombardier ALP-45DP which is being used on the Montreal EXO and New Jersey Transit. According to GO Electrification (2021), bombardier locomotives could cost around CAD 10 million, and each passenger car is around CAD 3 million. Therefore, a similar 10 train-sets costs approximately CAD 350 million.

A standard S-Curve predicts that the projects will progress 5%, 10%, 20%, 45%, 15%, 5% within same duration intervals from a project's start until completion (RICS Practice Standards, 2011). Distributing each phase cost of each alternative according to these percentages, following S Curve for cumulative cost projection is prepared.

Figure-5

Cumulative Cost Projection Chart for Phasing Alternatives



The S Curve demonstrates the difference among the alternatives in terms of the rate of capital required to realize the project. Thus, it is seen that Alternative 3 has the minimum capital requirement until the end of the second phase (Q12). Accordingly, following table has been generated to implement a numerical compare among the phasing alternatives:

Phases	Alternative 1	Alternative 2	Alternative 3	Alternative 4*
Phase 1	2	7	9	6
Phase 2	4	7	8	7
Phase 3	6	7	7	8
Average	**4.0**	**7.0**	**8.0**	**7.0**

2.2 Demand Analysis

Arduin & Fryer (2022) calculated the passenger demand for regional rail within the region. The study identifies total ridership figures as 5.2 million per year. Accordingly, below intercity demands are calculated:

Figure – 6

Daily Intercity Demand Analysis for Calgary Edmonton corridor

	Ca	Ad	Cf	Cs	Db	O	Bo	In	Pe	Rd	Bf	La	Mo	Po	Ma	Ws	Mi	Le	Ni	Ed	**Total**
Calgary	-	3131	81	65	47	56	6	29	10	251	21	19	0	14	25	13	2	41	0	713	**4.524**
Airdrie	3131	-	58	17	9	8	1	3	1	23	2	2	0	1	2	1	0	3	0	50	**3.312**
Crossfield	81	58	-	3	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	3	**148**
Carstairs	65	17	3	-	6	2	0	0	0	3	0	0	0	0	0	0	0	0	0	4	**100**
Didsbury	47	9	1	6	-	5	0	1	0	4	0	0	0	0	0	0	0	0	0	5	**78**
Olds	56	8	1	2	5	-	1	3	1	11	1	1	0	0	0	0	0	1	0	10	**101**
Bowden	6	1	0	0	0	1	-	2	0	3	0	0	0	0	0	0	0	0	0	2	**15**
Innisfail	29	3	0	0	1	3	2	-	6	42	2	1	0	0	1	0	0	1	0	11	**102**
Penhold	10	1	0	0	0	1	0	6	-	74	1	1	0	0	0	0	0	0	0	6	**100**
Red Deer	251	23	1	3	4	11	3	42	74	-	134	49	0	14	15	6	1	13	0	186	**830**
Blackfalds	21	2	0	0	0	1	0	2	1	134	-	33	0	3	3	1	0	2	0	24	**227**
Lacombe	19	2	0	0	0	1	0	1	1	49	33	-	0	6	4	1	0	2	0	28	**147**
Morningside	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	**0**
Ponoka	14	1	0	0	0	0	0	0	0	14	3	6	0	-	20	4	0	4	0	41	**107**
Maskwacis	25	2	0	0	0	0	0	1	0	15	3	4	0	20	-	35	1	14	0	127	**247**
Wetaskiwin	13	1	0	0	0	0	0	0	0	6	1	1	0	4	35	-	4	18	0	120	**203**
Millet	2	0	0	0	0	0	0	0	0	1	0	0	0	0	1	4	-	9	0	31	**48**
Leduc	41	3	0	0	0	1	0	1	0	13	2	2	0	4	14	18	9	-	1	2215	**2.324**
Nisku	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-	3	**4**
Edmonton	713	50	3	4	5	10	2	11	6	186	24	28	0	41	127	120	31	2215	3	-	**3.579**
Total	**4.524**	**3.312**	**148**	**100**	**78**	**101**	**15**	**102**	**100**	**830**	**227**	**147**	**0**	**107**	**247**	**203**	**48**	**2.324**	**4**	**3.579**	**16.196**

Note: Table adapted from Arduin & Fryer (2022)

In order to estimate expected revenue, average ridership cost for competitor mode could be used. Regional railway service gains trend if ticket fare is comparatively more advantageous than bus fares or fuel cost for private vehicles. Travelling web pages (rome2rio, 2025) suggest that an average bus ticket between Calgary and Edmonton is CAD 50 and using personal vehicle could cost, considering an average 10L/100 km, around CAD 60.

Thus, full corridor ridership could be adjusted as CAD 40. However, as it is explained by Arduin et al. (2022), most of the passenger demand will occur between closest cities to Calgary and Edmonton. Considering the passenger distribution, price per km per passenger

could be used to estimate overall revenue. Since 325 km is CAD 40, ticket fare is CAD 0.13. Combining this information with distance and passenger demand, following table is estimated:

Figure – 7

Daily Revenue Estimation between cities according to travel distance

0,13	Ca	Ad	Cf	Cs	Db	O	Bo	In	Pe	Rd	Bf	La	Mo	Po	Ma	Ws	Mi	Le	Ni	Ed	Total
Calgary		14816	529	559	485,75	724,36	92,04	495,755	189,8	5224,063	486,759	469,3	0	395,304	773,175	431,63	70,694	1562,756	0	30022	**57.328**
Airdrie	14816		104	66	50	66	11	37	14	370	37	40	0	24	52	28	0	100	0	1869	**17.684**
Crossfield	529	104		6	4	6	0	0	0	14	0	0	0	0	0	0	0	0	0	107	**770**
Carstairs	559	66	6		10	9	0	0	0	37	0	0	0	0	0	0	0	0	0	134	**821**
Didsbury	486	50	4	10		13	0	7	0	42	0	0	0	0	0	0	0	0	0	159	**771**
Olds	724	66	6	9	13		2	12	6	87	10	12	0	0	0	0	0	25	0	292	**1.265**
Bowden	92	11	0	0	0	2		4	0	16	0	0	0	0	0	0	0	0	0	54	**179**
Innisfail	496	37	0	0	7	12	4		11	156	12	8	0	0	14	0	0	21	0	275	**1.053**
Penhold	190	14	0	0	0	6	0	11		136	4	6	0	0	0	0	0	0	0	139	**506**
Red Deer	5224	370	14	37	42	87	16	156	136		317	190	0	104	152	74	15	225	0	3961	**11.119**
Blackfalds	487	37	0	0	0	10	0	12	4	317		50	0	15	23	10	0	30	0	454	**1.450**
Lacombe	469	40	0	0	0	12	0	8	6	190	50		0	21	25	9	0	27	0	487	**1.344**
Morningside	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	**0**
Ponoka	395	24	0	0	0	0	0	0	0	104	15	21	0		54	20	0	40	0	569	**1.241**
Maskwacis	773	52	0	0	0	0	0	14	0	152	23	25	0	54		80	4	101	0	1420	**2.698**
Wetaskiwin	432	28	0	0	0	0	0	0	0	74	10	9	0	20	80		9	88	0	1069	**1.818**
Millet	71	0	0	0	0	0	0	0	0	15	0	0	0	0	4	9		25	0	210	**333**
Leduc	1563	100	0	0	0	25	0	21	0	225	30	27	0	40	101	88	25		1	8840	**11.085**
Nisku	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		9	**10**
Edmonton	30022	1869	107	134	159	292	54	275	139	3961	454	487	0	569	1420	1069	210	8840	9		**50.068**
Total	**57.328**	**17.684**	**770**	**821**	**771**	**1.265**	**179**	**1.053**	**506**	**11.119**	**1.450**	**1.344**	**0**	**1.241**	**2.698**	**1.818**	**333**	**11.085**	**10**	**50.068**	**161.540**

In accordance with above calculation, yearly revenue is estimated at approximately CAD 60 million.

Further analysis could be made for zoning approach in calculating the revenue. Dividing the corridor into 3 main zones:

- Zone-1: Calgary – Olds
- Zone-2: Olds – Maskwacis
- Zone-3: Maskwacis – Edmonton

Considering 1 zone for CAD 10, 2 zone for CAD 20 and 3 zone for CAD 40, it is possible to increase the revenue up to CAD 90 million per year. Below table illustrates zoning approach:

Figure - 8

Daily Revenue according to zoning approach

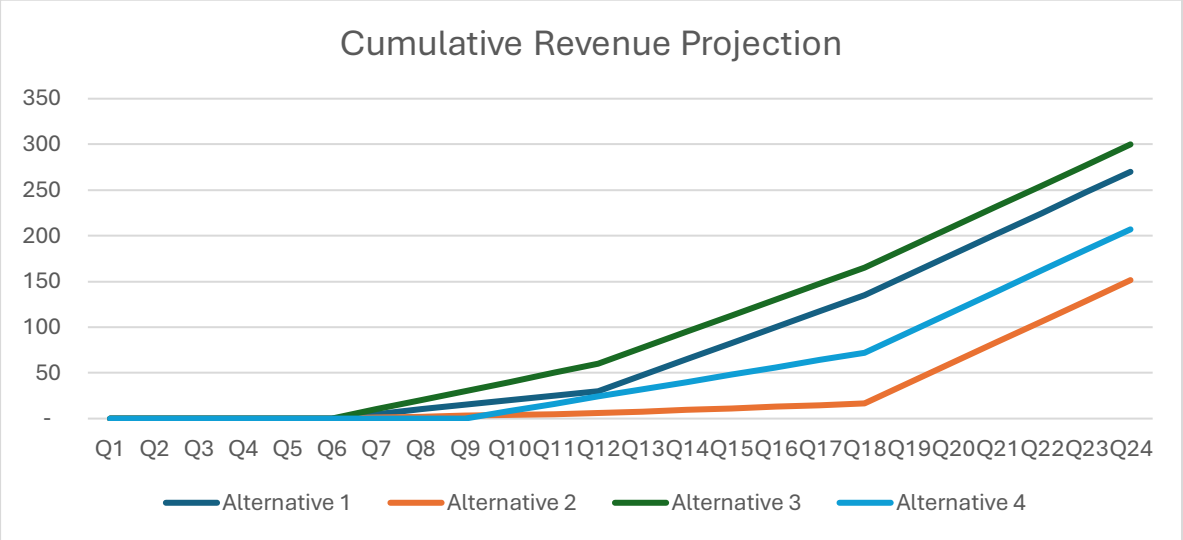
	Ca	Ad	Cf	Cs	Db	O	Bo	In	Pe	Rd	Bf	La	Mo	Po	Ma	Ws	Mi	Le	Ni	Ed	Total
Calgary		31310	810	650	470	1120	120	580	200	5020	420	380	0	280	500	520	80	1640	0	28520	72.620
Airdrie	31310		580	170	90	160	20	60	20	460	40	40	0	20	40	40	0	120	0	2000	35.170
Crossfield	810	580		30	10	20	0	0	0	20	0	0	0	0	0	0	0	0	0	120	1.590
Carstairs	650	170	30		60	40	0	0	0	60	0	0	0	0	0	0	0	0	0	160	1.170
Didsbury	470	90	10	60		100	0	20	0	80	0	0	0	0	0	0	0	0	0	200	1.030
Olds	1120	160	20	40	100		10	30	10	110	10	10	0	0	0	0	0	20	0	200	1.840
Bowden	120	20	0	0	0	10		20	0	30	0	0	0	0	0	0	0	0	0	40	240
Innisfail	580	60	0	0	20	30	20		60	420	20	10	0	0	10	0	0	20	0	220	1.470
Penhold	200	20	0	0	0	10	0	60		740	10	10	0	0	0	0	0	0	0	120	1.170
Red Deer	5020	460	20	60	80	110	30	420	740		1340	490	0	140	150	120	20	260	0	3720	13.180
Blackfalds	420	40	0	0	0	10	0	20	10	1340		330	0	30	30	20	0	40	0	480	2.770
Lacombe	380	40	0	0	0	10	0	10	10	490	330		0	60	40	20	0	40	0	560	1.990
Morningside	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0
Ponoka	280	20	0	0	0	0	0	0	0	140	30	60	0		200	80	0	80	0	820	1.710
Maskwacis	500	40	0	0	0	0	0	10	0	150	30	40	0	200		700	20	280	0	2540	4.510
Wetaskiwin	520	40	0	0	0	0	0	0	0	120	20	20	0	80	700		40	180	0	1200	2.920
Millet	80	0	0	0	0	0	0	0	0	20	0	0	0	0	20	40		90	0	310	560
Leduc	1640	120	0	0	0	20	0	20	0	260	40	40	0	80	280	180	90		10	22150	24.930
Nisku	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10		30	40
Edmonton	28520	2000	120	160	200	200	40	220	120	3720	480	560	0	820	2540	1200	310	22150	30		63.390
Total	**72.620**	**35.170**	**1.590**	**1.170**	**1.030**	**1.840**	**240**	**1.470**	**1.170**	**13.180**	**2.770**	**1.990**	**0**	**1.710**	**4.510**	**2.920**	**560**	**24.930**	**40**	**63.390**	**232.300**

Note: Blue – 1 Zone travel, Yellow – 2 Zone travel, Purple – 3 Zone travel

For the numerical assessment of the demand analysis, above daily demand estimations are distributed to quarterly implementations of different alternatives. Early collection of demand yields to higher result whereas the late collection yields to lower scores.

Figure – 9

Cumulative Revenue Projection Chart for Phasing Alternatives



The revenue projection has been prepared considering each phase will start generating revenue after the completion of the phase. Estimations have been cut in the 24th quarter, where it marks the 1,5 years after completion of all phases.

Phases	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Phase 1	5	2	9	3
Phase 2	6	3	9	5
Phase 3	7	5	9	6
Average	**6.0**	**3.3**	**9.0**	**4.7**

2.3 Social Benefit

Alberta Regional Rail targets all communities along the corridor. As per Arduin & Fryer (2022), following stations have been identified as possible demand locations: Calgary, Airdrie, Crossfield, Carstairs, Didsbury, Olds, Bowden, Innisfail, Penhold, Red Deer, Blackfalds, Lacombe, Morningside, Ponoka, Maskwacis, Wetaskiwin, Millet, Leduc, Nisku, Edmonton.

Conducting PESTEL analysis for each potential station location would provide structured approach for social and environmental effect of the passenger railway project (See Appendix-1 for detail).

Below table is prepared based on the PESTEL Analysis identifying the social aspects of each location:

Location	Social Detail	Importance
Calgary-1	High Population and demand	High Importance
Calgary-2	High Population and demand	High Importance
Airdrie	Young, growing families moving to Airdrie for affordability; high daily mobility demand	High Importance
Crossfield	May serve a few commuters or travelers but volumes small	Low Importance
Carstairs	May serve a few commuters or travelers but volumes small	Low Importance
Didsbury	May have occasional demand with unsteady ridership	Medium Importance
Olds	Student population + local service economy could yield stable ridership	High Importance
Bowden	May serve a few commuters or travelers but volumes small	Low Importance
Innisfail	May have demand from close communities	Medium Importance

Penhold	May serve a few commuters or travelers but volumes small	Low Importance
Red Deer	100k population, city holds social demand for mobility, intercity travel, and commuter/transfers is high	High Importance
Blackfalds	Some ridership potential (commuters to Red Deer or beyond)	Medium Importance
Lacombe	May benefit from regional rail for connectivity to Red Deer, Calgary, Edmonton, but ridership is likely to be lower compared to core segments	Medium Importance
Morningside	May serve a few commuters or travelers but volumes small	Low Importance
Ponoka	Community could benefit from rail connectivity to larger centers; modest ridership possible	Medium Importance
Maskwacis	Social benefits are high, access to regional services, jobs, education, and mobility equity. Rail can boost cultural tourism giving visitors access to explore Indigenous culture and history	High Importance
Wetaskiwin	Rail is crucial for overcoming the geographical isolation of nearby Indigenous communities, including Maskwacis, providing access to essential services and employment opportunities.	High Importance
Millet	May serve a few commuters or travelers but volumes small	Low Importance
Leduc	Providing faster, safer transit and reducing congestion, the service gives residents more time for rest or family, contributing to a better quality of life	High Importance
Nisku	Shift workers, industrial workers, airport staff, logistics personnel	High Importance
Edmonton	Large and diverse population; wide demographic and demand for mobility for work, education, services, leisure strong social demand for rail connectivity.	High Importance

In order to quantify the social impact of the phasing alternatives, a grading system could be utilized. Stations that have high importance are graded as 10 points; medium importance is graded as 6 and low importance is graded as 2. Average grade of the stations involved in a phase is then multiplied by the number of high importance stations in the phase. In order to give priority to early access of high important stations, each phase score is divided by 2 for phase 1, 6 for phase 2 and 10 for phase 3. Finally, the average of all phases demonstrates the final grade of the alternative. Below table demonstrates the phases and alternatives for the social impact. (See Appendix-B for detail)

Phases	Alternative 1	Alternative 2	Alternative 3	Alternative 4*
Phase 1	10 (10*2/2)	10 (10*2/2)	20 (10*4/2)	6 (6*4/4)
Phase 2	6.7 (10*4/6)	1.7 (10*1/6)	3.3 (10*2/6)	4.4 (7*5/8)
Phase 3	1.5 (5*3/10)	3.6 (6*6/10)	2 (5*4/10)	
Average	**6.1**	**5.1**	**8.4**	**5.2**

*Note: Alternative 4 has been divided by 4 and 8 as it has 2 phases for same time frame.

2.4 Environmental Impact

Last item to consider in MCDA is environmental effect of the alternatives. Current options for travelling between cities increasingly contribute to greenhouse gas emissions. Accordingly, introducing railway commute between cities is suggested to decrease the environmental impact of intercity travelers. In this report, station locations have been chosen from disturbed or treeless land that do not have an existing building. PESTEL report identifies not only the effect on GHG emissions but also the environmental impact that the construction of station would create depending on the location.

Location	Environmental Effect	Effect Category
Calgary-1	High GHG decrease, Minimal impact in terms of construction	High Positive Impact
Calgary-2	High GHG decrease, Minimal impact in terms of construction	High Positive Impact
Airdrie	High GHG decrease, Minimal impact in terms of construction	High Positive Impact
Crossfield	Low GHG decrease, Minimal impact in terms of construction	Low Positive Impact
Carstairs	Low GHG decrease, Minimal impact in terms of construction	Low Positive Impact
Didsbury	Low GHG decrease, Minimal impact in terms of construction	Low Positive Impact
Olds	Moderate GHG decrease, Minimal impact in terms of construction	Moderate Positive Impact
Bowden	Low GHG decrease, Minimal impact in terms of construction	Low Positive Impact
Innisfail	Moderate GHG decrease, Minimal impact in terms of construction	Moderate Positive Impact

Penhold	Low GHG decrease, Minimal impact in terms of construction	Low Positive Impact
Red Deer	High GHG decrease, Minimal impact in terms of construction	High Positive Impact
Blackfalds	High GHG decrease, Minimal impact in terms of construction	High Positive Impact
Lacombe	High GHG decrease, Minimal impact in terms of construction	High Positive Impact
Morningside	Low GHG decrease, Minimal impact in terms of construction	Low Positive Impact
Ponoka	Low GHG decrease, Minimal impact in terms of construction	Low Positive Impact
Maskwacis	Low GHG decrease, Moderate impact in terms of construction	Low Negative Impact
Wetaskiwin	Low GHG decrease, Moderate impact in terms of construction	Low Negative Impact
Millet	Low GHG decrease, Minimal impact in terms of construction	Low Positive Impact
Leduc	High GHG decrease, Minimal impact in terms of construction	High Positive Impact
Nisku	High GHG decrease, Minimal impact in terms of construction	High Positive Impact
Edmonton	High GHG decrease, Minimal impact in terms of construction	High Positive Impact

Similar to social impact, to quantify the environmental impact of the phasing alternatives, a grading system could be utilized. Stations that have high positive effects are graded as 10 points; Moderate positive impact is graded as 8 and low positive impact is graded as 6 and low negative effect is graded as 2. Average grade of the stations involved in a phase is then multiplied by the number of high positive effect stations in the phase. In order to give priority to early access positive effect stations, each phase score is divided by 2 for phase 1, 6 for phase 2 and 10 for phase 3. Finally, the average of all phases demonstrates the final grade of the alternative. Below table demonstrates the phases and alternatives for the Environmental impact. (See Appendix-C for details)

Phases	Alternative 1	Alternative 2	Alternative 3	Alternative 4*
Phase 1	10 (10*2/2)	10 (10*2/2)	20 (10*4/2)	6 (8*3/4)
Phase 2	6.7 (10*4/6)	1.7 (10*1/6)	3.3 (10*2/6)	4.4 (7*5/8)
Phase 3	1.2 (6*2/10)	3.5 (7*5/10)	1.2 (2*6/10)	
Average	**6.0**	**5.1**	**8.2**	**5.2**

*Note: Alternative 4 has been divided by 4 and 8 as it has 2 phases for same time frame.

3- Summary of Findings and Recommendation

3.1. Summary of Findings

In order to reach the most feasible recommendation, an importance factor is assumed for each aspect as a percentage. Thus, a general average figure has been reached for each alternative by multiplying the related aspect average and the importance factors. Following this method, below table consolidates the findings of the analysis for Cost Structure, Demand Capture, Social Impact and Environmental effects that have been demonstrated above.

Alternative	Cost Structure	Demand	Social benefit	Environmental Effect	Average Score
Importance	**30%**	**20%**	**30%**	**20%**	**100%**
Alt-1 (Full corridor first)	4.0	6.0	6.1	6.0	5.43
Alt-2 (Two halves to Red Deer)	7.0	3.3	5.1	5.1	5.31
Alt-3 (Metro-adjacent first: Calgary–Airdrie & Edmonton–Leduc)	8.0	9.0	8.4	8.2	**8.36**
Alt-4 (Calgary-Red Deer, then north)	7.0	4.7	5.2	5.2	5.64

As above table indicates, the best phasing alternative is identified as the Alternative – 3 (8.36), by which the project starts with Metro-adjacent stations first, then delivers early revenue from dense sub-corridors; least permitting friction early; strong environmental advantage by working in disturbed ROW / urban areas first. Thus, related construction sequence is established below for successful implementation.

3.2. Implementation Plan

Construction Sequence

Alternative 3 utilizes a metro-adjacent first delivery strategy, giving priority to urban edges with the highest ridership demand, and then moving to mid-corridor areas which are environmentally sensitive and have a lower density. The strategy deliberately selects:

- Early revenue generation
- Lower initial permitting risk
- Reduced early capital exposure
- Operational learning before full corridor deployment

PHASE 1 (Calgary → Airdrie & Edmonton → Leduc) - Duration: 12–18 Months

This phase establishes the initial revenue-generating backbone of the corridor by constructing the two densest commuter sub-segments:

- South Segment: Calgary → Airdrie
- North Segment: Edmonton → Leduc (Nisku + Airport feeder)

Key Deliverables of Phase 1

- Calgary Terminal Station
- Airdrie Commuter Station with Park-and-Ride
- Edmonton Terminal Station
- Leduc Station
- Nisku Feeder Stop
- Initial Operations Control Center
- Signaling, power, safety systems for both segments

PHASE 2 (Airdrie → Red Deer → Leduc) - Duration: 18–30 Months

Phase 2 completes the continuous corridor spine by linking:

- Southern commuter segment (Airdrie)

- Central regional hub (Red Deer)
- Northern commuter segment (Leduc)

PHASE 3 Tertiary Infill Stations - Duration: 12–24 Months

This phase includes all lower-demand communities:

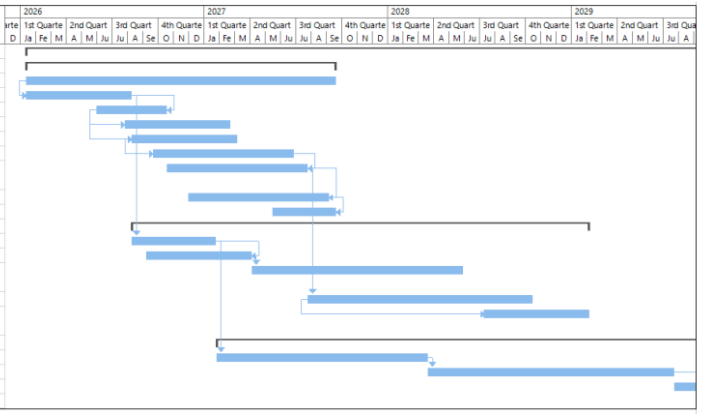
- Crossfield, Carstairs, Didsbury, Olds, Bowden, Innisfail, Penhold, Blackfalds, Lacombe, Morningside, Ponoka, Maskwacis, Wetaskiwin, Millet.

Although these stations are called tertiary stations, they are important because they enable overall corridor connectivity. Additionally, interconnectivity between these cities and towns could economically and socially improve the population in the corridor. Below Gantt chart represents the construction sequence of the activities in a Level 2 detail with indicative durations.

Figure – 10

Indicative (Level 2) Construction Sequence for Alternative-3

	Task Name	Duration	Start	Finish
1	**Calgary Edmonton Regional Rail Summary**	**1.190 days**	**1.12.2026**	**8.2.2030**
2	**PHASE 1 Calgary → Airdrie and Edmonton → Leduc**	**440 days**	**1.12.2026**	**9.17.2027**
3	Program Governance & Project Controls	440 days	1.12.2026	9.17.2027
4	Detailed Engineering & Design	150 days	1.12.2026	8.7.2026
5	Tendering & Contract Award	100 days	6.1.2026	10.16.2026
6	Long-Lead Materials & Systems Procurement	150 days	7.27.2026	2.19.2027
7	Utility Relocation & Early Works	150 days	8.10.2026	3.5.2027
8	Track, Earthworks & Civil Construction (Urban)	200 days	9.21.2026	6.25.2027
9	Metro Station Construction (Calgary, Airdrie, Edmonton, Leduc, Nisku)	200 days	10.19.202 6	7.23.2027
10	Systems Installation (Power, Signalling, Telecom)	200 days	11.30.2026	9.3.2027
11	Testing, Trial Operations & Safety Certification	90 days	5.17.2027	9.17.2027
12	**PHASE 2 Airdrie → Red Deer → Leduc**	**650 days**	**8.10.2026**	**2.2.2029**
13	Environmental, Wetlands & Design	120 days	8.10.2026	1.22.2027
14	Heavy Infrastructure & Procurement	150 days	9.7.2026	4.2.2027
15	Mass Earthworks, Embankments & Track Installation	300 days	4.5.2027	5.26.2028
16	Red Deer Hub Station + O&M Facility	320 days	7.26.2027	10.13.2028
17	End-to-End Corridor Testing & Federal Certification	150 days	7.10.2028	2.2.2029
18	**PHASE 3 - Tertiary Infill Stations**	**920 days**	**1.25.2027**	**8.2.2030**
19	Modular Infill Station Design	300 days	1.25.2027	3.17.2028
20	Tertiary Station Construction	350 days	3.20.2028	7.20.2029
21	Systems Integration at Infill Stops	150 days	7.23.2029	2.15.2030
22	Community Testing, Staff Training & Opening	120 days	2.18.2030	8.2.2030



3.3. Risk Analysis

The reinstatement of regional rail service in the Calgary-Edmonton corridor, dormant for nearly four decades, is crucial for addressing population growth and heavy traffic volumes on Highway 2. However, the project faces significant risks, including massive upfront capital costs, potential conflicts with freight rail operations, and political instability. Successfully mitigating these challenges requires adopting a phased approach, starting with cost-effective upgrades to existing infrastructure for early wins, while simultaneously planning for dedicated track infrastructure to ensure reliability. Furthermore, the project's success is dependent on financial innovations like Public-Private Partnerships and prioritizing equitable access through meaningful consultation with Indigenous communities and universal design. The resulting table details the principal risks and their respective mitigation strategies necessary to deliver a resilient and inclusive rail system.

Risk/Challenge	Mitigation	Source
Financial Risk & High Capital Costs Railway Construction deemed it too costly; it requires massive upfront capital expenditure.	Utilize innovative financing mechanisms, such as Tax Increment Financing (TIF), and secure federal and provincial funding, often through Public-Private Partnerships (PPPs), to bolster infrastructure investments and distribute risk.	(Monteros-Pollice et al., 2025)
Freight–Passenger Conflicts Shared tracks with major freight carriers lead to scheduling conflicts, delays, and unreliability.	Implement strategies for operational separation, such as creating dedicated passenger tracks, utilizing passing loops or sidings on existing lines, or employing time-table separation to protect passenger reliability.	(Ekanayake, 2025)
Exclusion of Indigenous Communities The exclusion of Indigenous communities from planning introduces social and legal risks, including opposition and project delays.	Prioritize Indigenous inclusion and early consultation with governance groups to ensure culturally respectful planning, co-design, and equitable access.	(Monteros-Pollice et al., 2025)

Ridership Uncertainty & Competition Competition with cars, buses, and short-haul flights make passenger attraction difficult.	Ensure the service is frequent, multimodal, and affordable to effectively attract ridership. Offer pilot services and phased deployment to confirm demand and engage in dynamic service adjustment based on observed trends.	(Monteros-Pollice et al., 2025)
Land Acquisition, Zoning, and Public Opposition Challenges in securing continuous Right-of-Way; potential for public opposition and noise pollution.	Implement a Transit-Oriented Development (TOD) strategy with coordinated zoning (such as T-MU-30 designations) to support density and spur economic growth around stations.	(Monteros-Pollice et al., 2025)
Infrastructure Gaps and Upgrade Costs Need to upgrade existing tracks to acceptable passenger standards and fill physical gaps between independent rail networks.	Implement phased upgrades starting with core intercity service and prioritize projects to fill the physical gaps between shortlines and major rail networks.	(Ekanayake, 2025)
Airport Integration Complexities Limited land available at YEG/YYC and necessary coordination with airport operations.	Establish rail–air intermodality by building direct access or shuttle services and ensuring coordination with airport authorities regarding schedules, security, and land use	(Ekanayake, 2025)
Political and Regulatory Instability Shifts in policy priorities may remove political or financial support, resulting in project derailment.	Secure commitment through collaborative governance and diversified funding sources (PPPs, provincial/federal grants) to derisk the project from short-term political changes	(Ekanayake, 2025)

Conclusion

In Conclusion, this report provides a comprehensive, evidence-based approach for reinstating regional passenger rail system into the Calgary Edmonton corridor. Following three deliverables as Phasing Framework, Cost Estimation, and Sequencing and Risk Assessment reports, this final analysis demonstrates that phased approach for this project could offer balanced economic feasibility and long-term value for Alberta's social demography.

The assessment points out that the corridor's continuous population growth, concentration of economic activities, and congested highway system have all come together to form a strong argument for the re-establishment of the rail service. The demand modelling shows that a regional travel service, connected with the urban transit networks in Calgary and Edmonton, would be able to attract more than five million riders annually. Moreover, the PESTEL analysis confirms that the corridor's municipalities, economic zones, and demographic structure are in a good place to back up high ridership and the initiatives of transit-oriented development.

The financial analysis, based on cost benchmarking, puts the total capital needed at around CAD 3.4 billion. Additionally, Phased cost structure which allows early value generation to facilitate a gradual investment cycle is a significant advantage.

The phasing alternatives point to the Metro-Adjacent First strategy as the one that is most viable and in line with the corporate strategy throughout the whole process. Setting Calgary–Airdrie and Edmonton–Leduc connectivity as the top priority brings immediate benefits like high near-term ridership, low infrastructure complexity, and strong political feasibility. Moreover, by this strategy the whole operational and financial basis is created, which is necessary for the expansion of the service to the mid-corridor communities and eventually to the complete full-corridor connectivity.

In the risk assessment, the most important challenges are pointed out such as the capital cost escalation, the interface of freight and passenger rail, environmental permitting, and the engagement of Indigenous peoples, but also the realistic mitigation strategies are presented. If these issues are taken care of in such a proactive way, then the overall implementation roadmap would be strengthened, and a more predictable project delivery timeline would be supported.

To sum up, this project is proof that the phased regional rail development is not only feasible but also a strategically beneficial option for Alberta. Recommended approach shows that the project is a win-win situation in terms of cost efficiency, demand capture, environmental protection, and stakeholder alignment. If the right governance structure is in place, there is a constant political backing, and there is an early investment in the segments with high value, then Alberta will have advanced to a modern and just rail system which will not only enhance the mobility of the regions, but also stimulate the economy and help the province to achieve its long-term development goals in a meaningful way.

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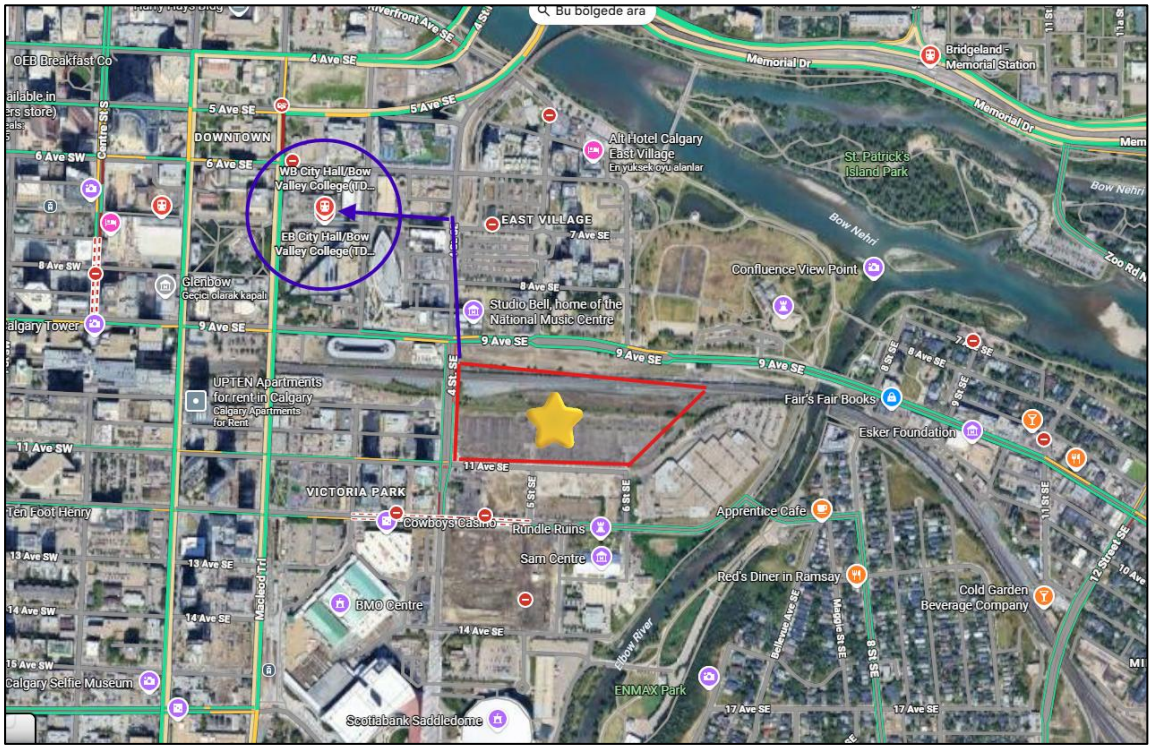
Appendix-A

PESTEL Analysis for the station locations on Calgary Edmonton corridor

1- Calgary:

Station Location:



Above station location offers both central location, easy access to public transit and offers usability of CPKC right of way within the city. Because railway connects to Banff in the west direction, this location could also offer logistic advantage for connecting regional rail to Banff. Since the Edmonton destination will be reached by travelling to east, repair and strengthening works could be necessary for the 185m-bridge over bow river.

In addition to the central station, a secondary station could be established near Calgary Airport, which would help increasing the passenger rail connectivity in the corridor:

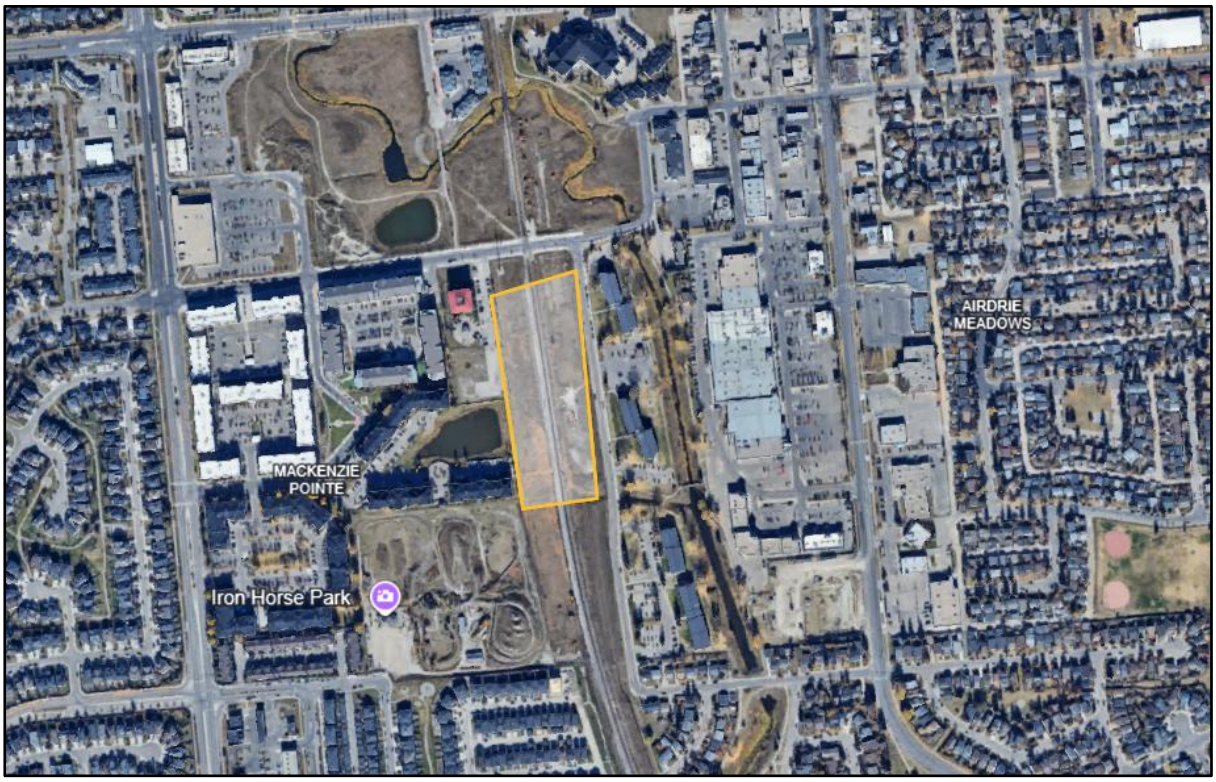
PESTEL Analysis for Calgary:

- **Political:** Calgary City Plan explicitly supports regional multimodal integration and dense terminal connectivity strong political will (City of Calgary, 2024).
- **Economic / Social:** Largest employment & residential base on corridor, the highest ridership multiplier; station is essential (City of Calgary, 2024).
- **Environmental / Legal:** Urban sitting constraints and approvals required, but city has experience with major infrastructure (City of Calgary, 2024).

2- Airdrie:

Airdrie is the closest city to Calgary and the demand between two cities is the highest in the corridor (Arduin et al., 2022). Although Al Abedy et al. (n.d.) identify the existing bus station as the south transit terminal, placing the station to a more central location would increase the accessibility of the station from throughout Airdrie. Accordingly, the location

below, which is between Airdrie meadows and Mackenzie Pointe, could be a better location for Airdrie station.

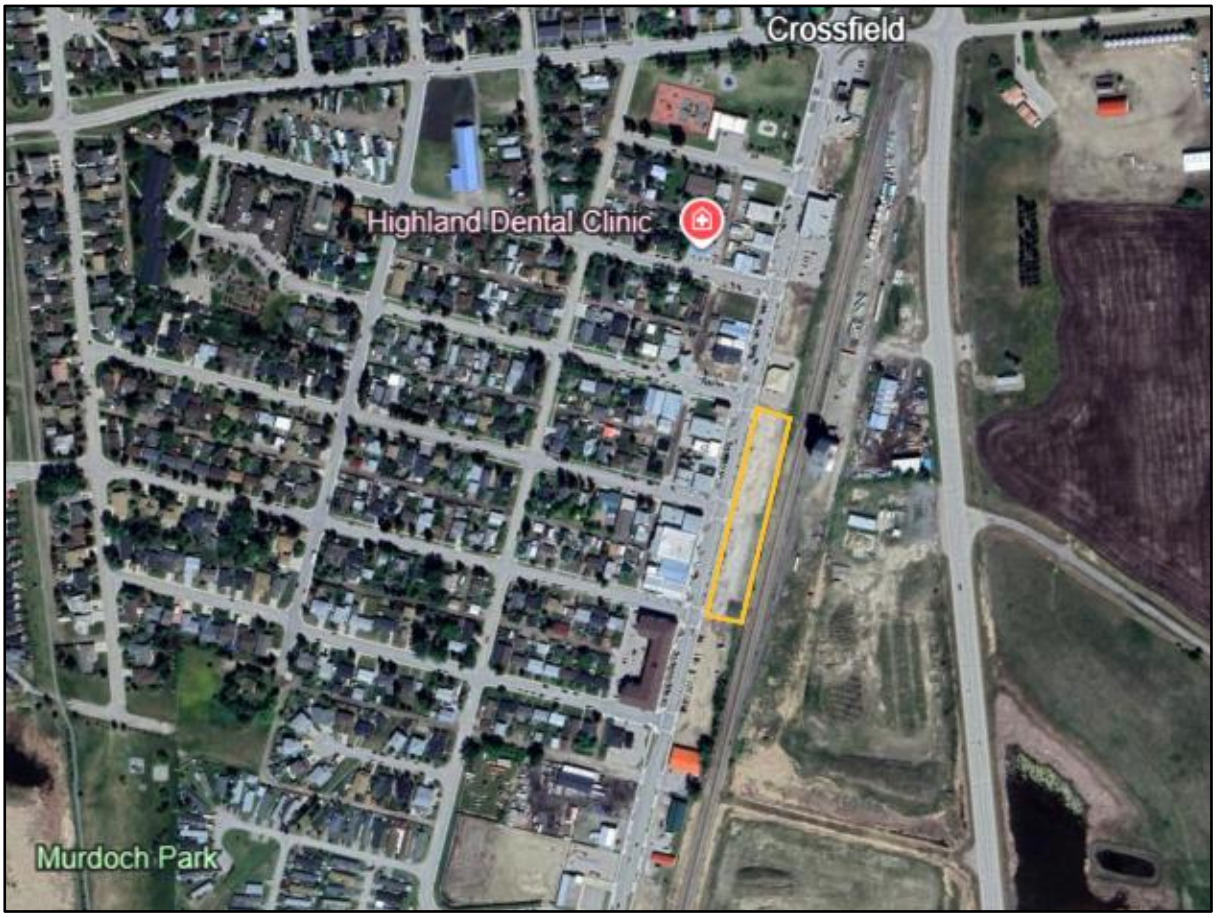


PESTEL Analysis for Airdrie:

- **Political:** 2024 municipal census shows rapid population growth (~85,805 in 2024); strong commuter base to Calgary and municipal planning for regional connections. Station would have strong park-and-ride potential. (City of Airdrie, 2024)
- **Economical:** One of Canada's fastest-growing municipalities; strong Calgary commuter base.
- **Social:** Young, growing families moving to Airdrie for affordability; high daily mobility demand.
- **Environmental:** Mostly greenfield expansion; minimal ecological impact within ROW.
- **Legal:** Low permitting complexity; municipal cooperation expected.

3- Crossfield:

Crossfield is a small town with around 5000 population. The town has limited local employment or economic hubs; likely low independent rail demand. Below highlighted area could serve as an infill station to serve this community.



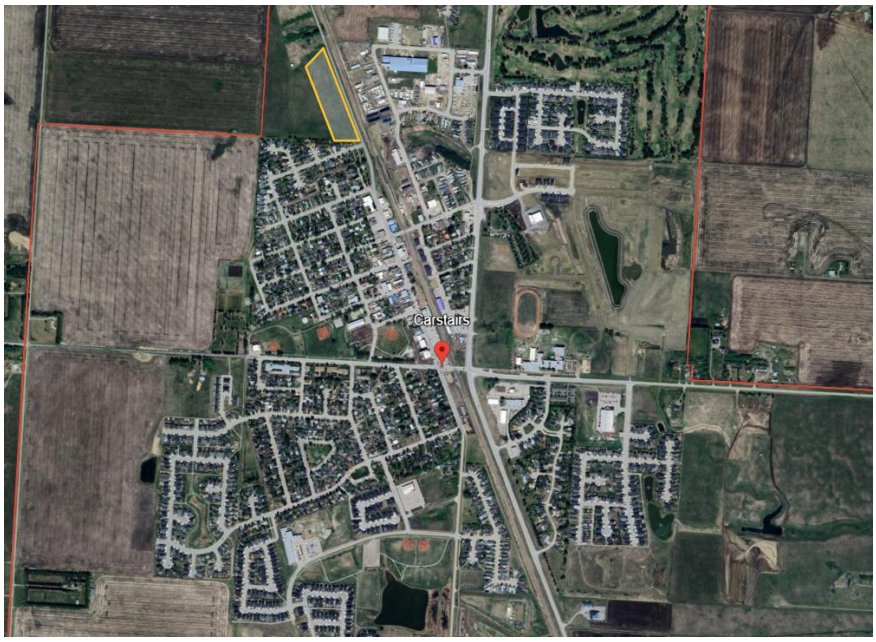
PESTEL Analysis for Crossfield:

- **Political:** Crossfield is a member of the Calgary Metropolitan Region Board. The town is within the Calgary-Edmonton Corridor and is growing as a result.
- **Economical:** The primary economic base of the Crossfield area is agriculture, agricultural services and natural gas processing. The Crossfield Gas Plant, south of the town and owned by TAQA North, has been in operation since 1965.

- **Social:** Community size and demographic imply low ridership potential; perhaps some commuting to nearby centers but unlikely large volumes.
- **Environmental:** Likely limited environmental constraints (small town, existing developed land), but since low demand, risk-benefit ratio is weak.
- **Legal:** Regulatory and permitting would be straightforward (small municipal jurisdiction).

4- Carstairs:

Carstairs is a low-density town, like Crossfield, with a population of 5,000 (Carstairs Town Council, 2025). Because the settlement is on the Ancient Trail, making the town important for first nations people.



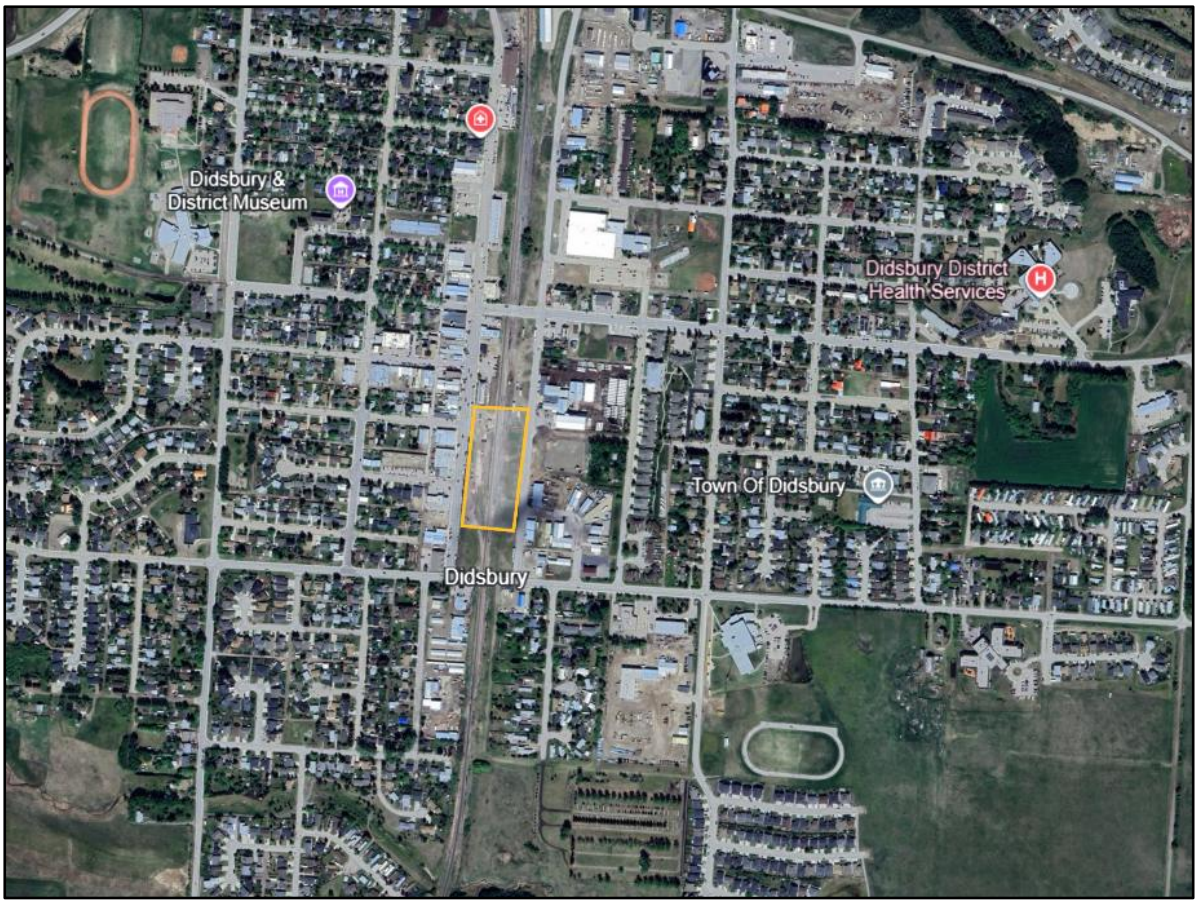
PESTEL Analysis for Crossfield:

- **Political:** Town governance typical for small Alberta town. The town is within the Calgary-Edmonton Corridor and is growing as a result.
- **Economical:** Small to moderate population. limited local economy, limited independent demand.

- **Social:** Carstairs is home to an 18-hole golf course, a Memorial Complex with abundant parks and playgrounds, and Tourist Information Center. It is celebrated each year with the CARA Rodeo in July, Beef & Barley Days, the High School Rodeo in September. Additional ceremonies are 4-H Calf Show and Sale, Bull-A-Rama, Horticultural Show, and Pumpkin Festival.
- **Environmental:** Likely limited environmental constraints (small town, existing developed land), but since low demand, risk-benefit ratio is weak.
- **Legal:** Regulatory and permitting would be straightforward (small municipal jurisdiction).

5- Didsbury:

Similar population to Crossfield and Carstairs, around 5,000. District museum, skating complex, golf club and several hotels have potential to attract more people into Didsbury. There is a convenient location at the center of the city to build a tertiary infill station.



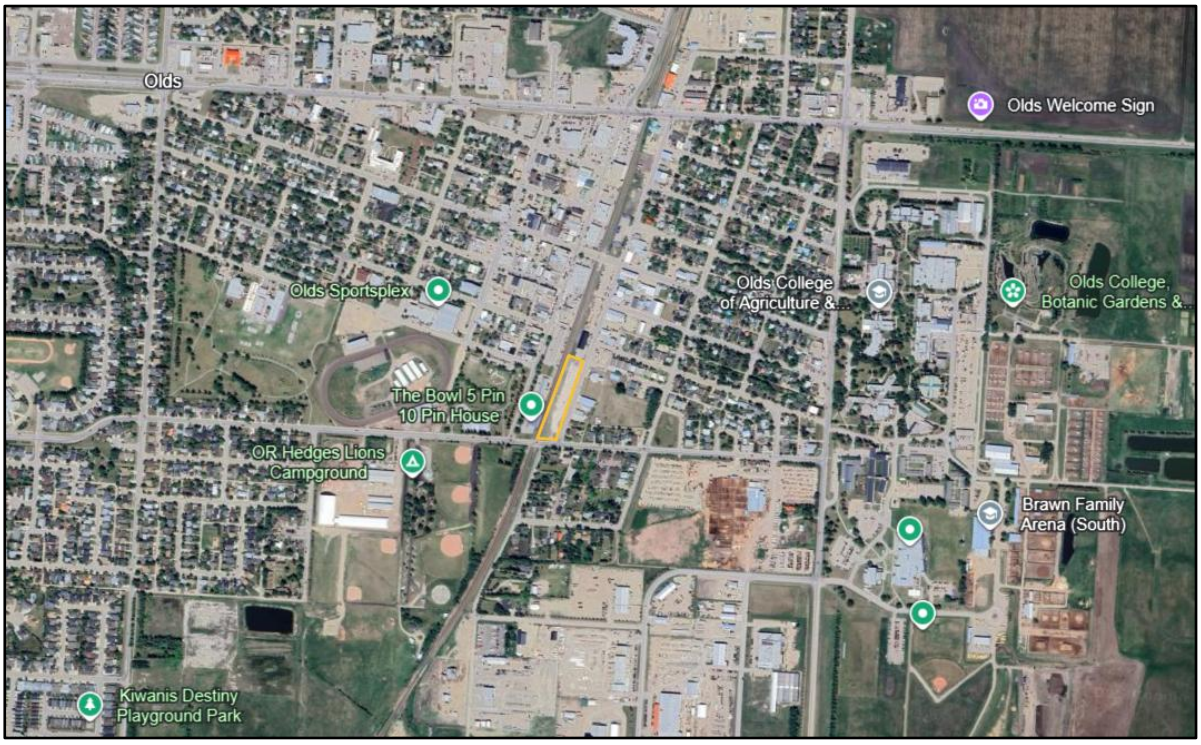
PESTEL Analysis for Didsbury:

- **Political:** Town is listed among rural corridor communities; no recent public rail-push found, so political support likely modest and reactive.
- **Economical:** Small town population (2023 municipal-affairs list indicates Didsbury among small towns); local economy modest; limited independent job base — ridership likely low.
- **Social:** May have occasional demand (tourism, regional services, weekend traffic), but stable ridership unlikely; demographic and density low.
- **Technological:** Technical feasibility for small station, minimal signaling integration, given proximity to corridor.
- **Environmental:** Rural environment, low ecological sensitivity if built within ROW, minimal environmental disruption anticipated.

- **Legal:** Straightforward planning/permitting, but economic/social justification is weak, making cost per user high.

6- Olds:

Bigger population than other towns, around 10,000. The city has a College of Agriculture since early 20th century, skating complex, golf club and premium franchise hotels, market leader retailers as Walmart. The city has higher potential to attract people from surrounding towns and cities. There is a convenient location at the center of the city to build a tertiary infill station.



PESTEL Analysis for Olds:

- **Political:** Olds is more significant than smaller towns, has municipal planning capacity; likely more open to regional connectivity to support education and services..
- **Economical:** Town population ~10,000 (2021 census) with modest growth; local economy modest; Also Olds hosts educational institutions (higher-education, colleges), which may generate regular commuter/students demand.

- **Social:** Student population + local service economy could yield stable ridership (commuting, periodic travel), increasing social benefit of a station.
- **Technological:** technical feasibility of building a modest station is good; possible park-and-ride or small terminal design.
- **Environmental:** Being rural/suburban, environmental issues manageable; building within existing ROW or near existing roads reduces ecological risk.
- **Legal:** Municipal authority exists, permitting easier than in dense urban areas; minimal regulatory hurdles for an infill station.

7- Bowden:

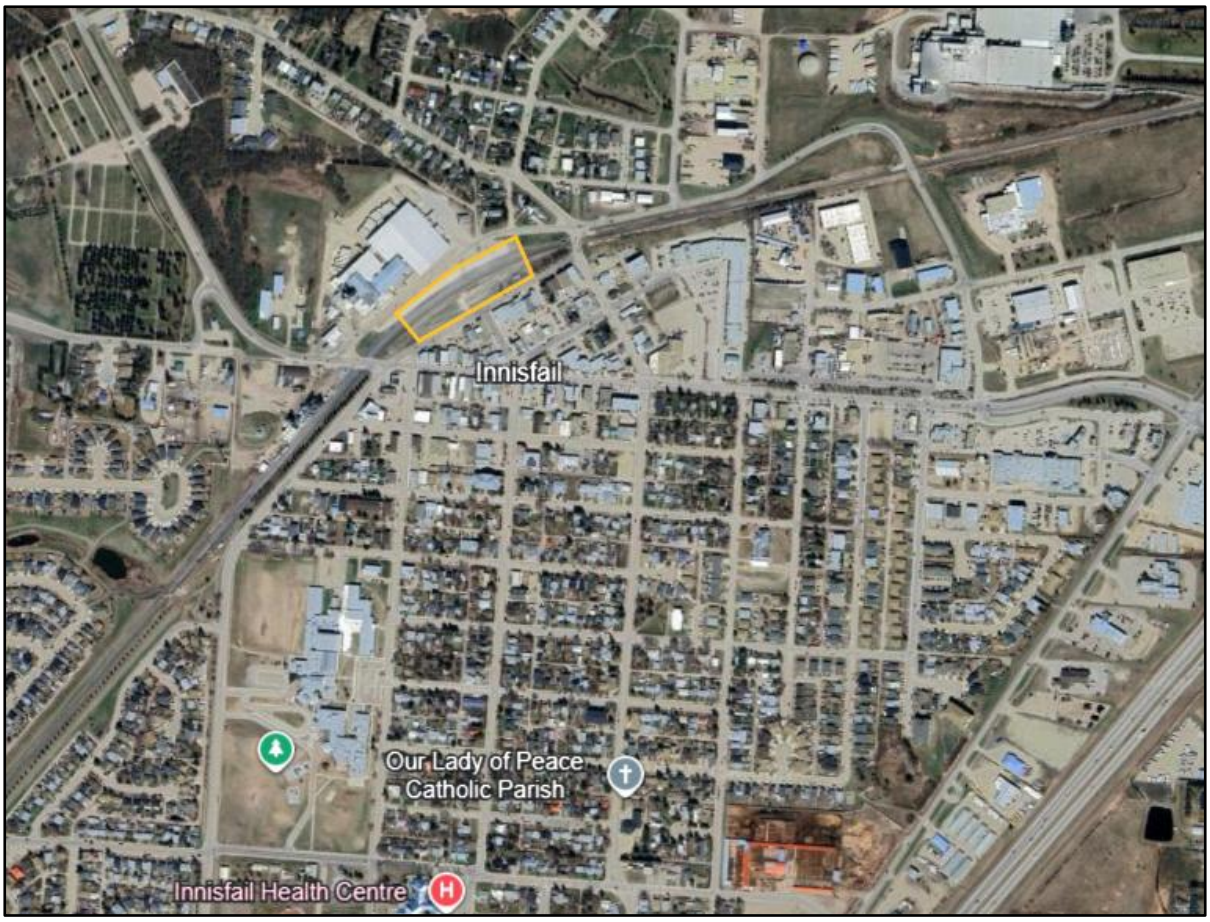
Very small population is compared to other towns, around 1,200. A large proportion of the working population commutes to other employment centers, including Red Deer and Calgary.

PESTEL Analysis for Bowden:

- **Political:** Bowden is an incorporated town per Alberta Municipal Affairs list. Likely low political push for stations, but possible local interest if residents demand connectivity.
- **Economical:** Population small (per 2023 towns list). Low employment base; limited local economy, not strong as independent demand center. Most of the community commutes to other cities for work, which may generate higher ridership than expected.
- **Social:** There is not high volume of travelers, town may serve a few commuters or travelers but volumes small.
- **Technological:** Technical feasibility exists (rail corridor proximity), but the low demand limits justification for infrastructure investment.
- **Environmental:** Rural environment and limited ecological constraints if built carefully.
- **Legal:** Permitting is manageable for small communities but cost per rider is likely high.

8- Innisfail:

Higher population is compared to other towns, around 8,000. Innisfail has a Historical Village museum, a downtown area with stores, golf course, aquatic center, camping site, and hotels. The Royal Canadian Mounted Police (RCMP) dog training facility is located 2 km south of Innisfail.



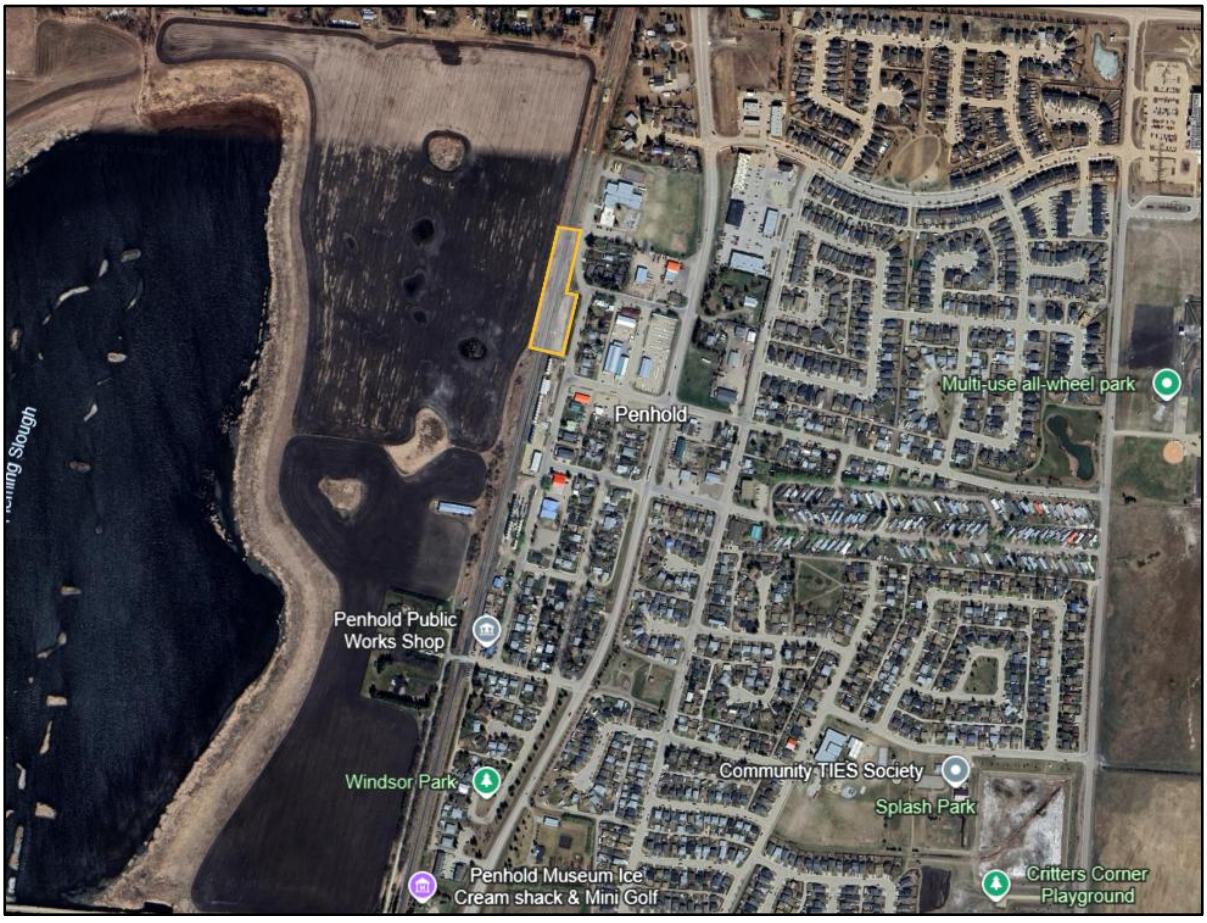
PESTEL Analysis for Innisfail:

- **Political:** Town is part of the highway/rail corridor; under the new federal riding reorganization, it is grouped with other corridor towns, which may give some political visibility (Bachusky, 2023).
- **Economical:** Recent municipal reports (Alberta Municipal Affairs, 2024) indicate modest population (~8–9k) and stable growth trends. Growth modest but consistent.
- **Social:** Small community; ridership is likely limited but may have demand from close communities (commuters, regional service users).
- **Technological:** Although the rail corridor passes through city, and this proximity is favorable for constructing a simple station/stop, there is only one location which would be suitable for station within the settlement boundaries. Other locations, either to north or south of the city, are relatively far for commuters to access.

- **Environmental:** Semi-rural environment: likely minimal environmental sensitivity if built within existing transportation corridors.
- **Legal:** Small town governance, permitting is simpler, but economic justification remains weak; station investment is likely hard to justify unless demand increases.

9- Penhold:

The city has smaller population compared to other cities, around 4,000. City has educational services up to 8th grade. Therefore, a stable ridership could be expected from both commuters and higher educational students. Apart from the ice cream and mini golf museum, the city does not have much to offer visitors.



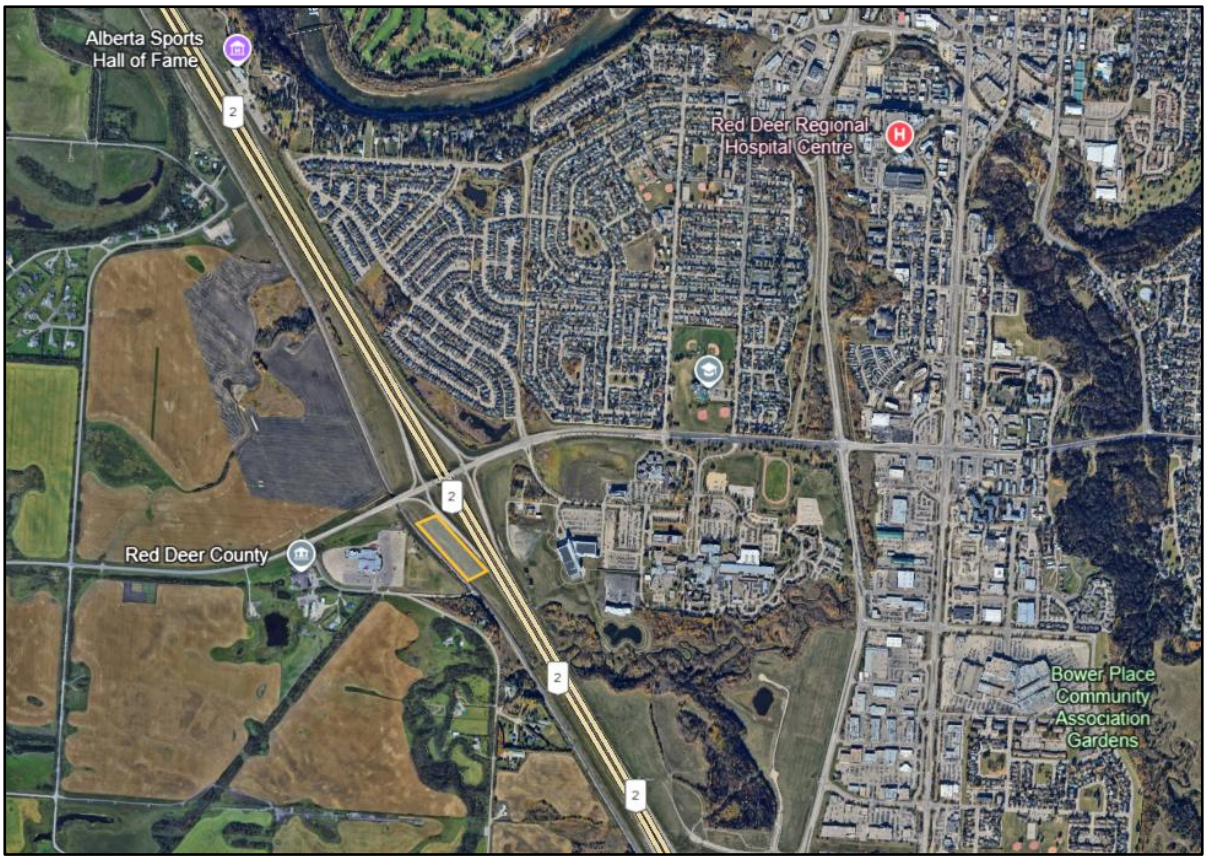
PESTEL Analysis for Penhold:

- **Political:** Small town status. Major political push is unlikely for rail, but local support is possible.

- **Economical:** Small population base; limited local economy. Penhold is not a major employment center; ridership demand is likely to be low.
- **Social:** Ridership potential is low; perhaps some commuters but there is a risk of financial loss.
- **Technological:** A feasible station is possible but cost per user is likely high.
- **Environmental:** Rural environment, minimal ecological constraints for simple station.
- **Legal:** Small town governance, permitting normal, but risk that station remains underused.

10- Red Deer:

Red Deer is a major regional city located in the Calgary–Edmonton corridor, strategically positioned as the midway point between Alberta's two largest metropolitan areas. The city's population was approximately 100,000. Red Deer is one of the three Census Metropolitan Areas (CMAs) located within the corridor. Red Deer is considered a logical anchor city and the most viable intermediate hub along the corridor, It is central to all major alignment options for regional rail.



PESTEL Analysis for Red Deer:

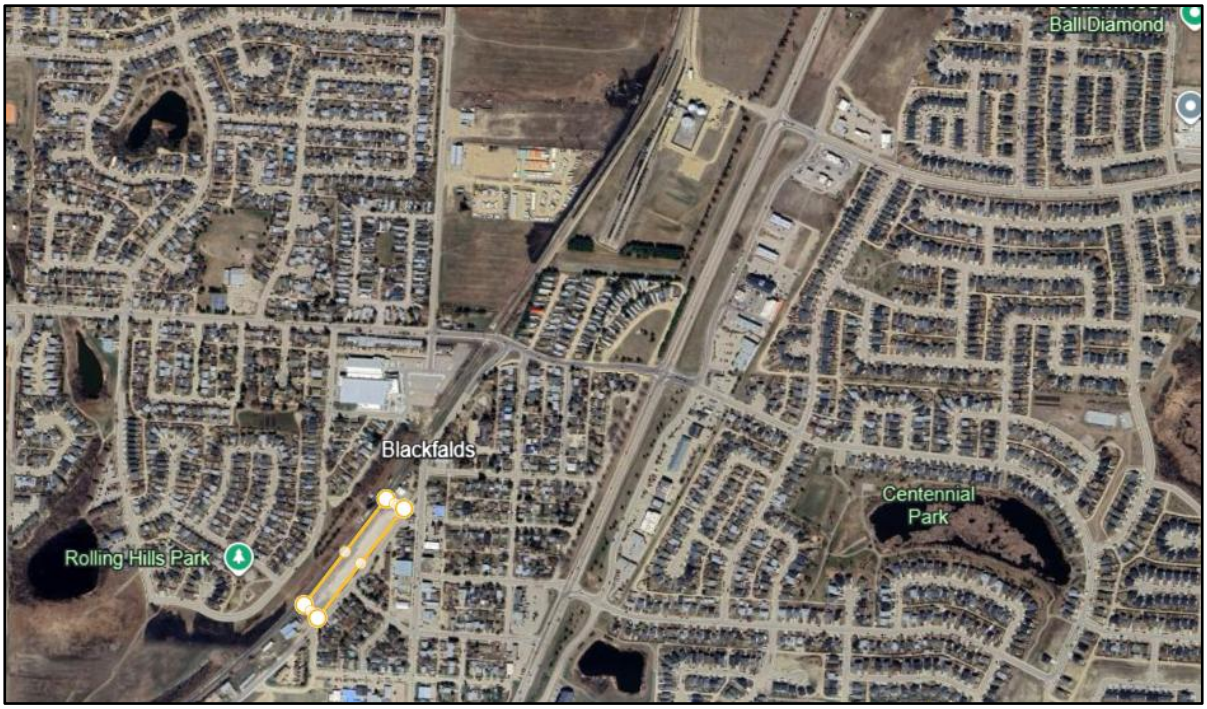
- **Political:** The Edmonton–Red Deer–Calgary axis is identified as the most vital corridor with the highest potential ridership and financial viability, placing Red Deer at the center of the proposed regional rail system.
- **Economical:** Significant economic base as an employment center, services, regional transfer hub; strong ridership potential from city population and surrounding rural catchment.
- **Social:** With more than 100k population, city holds social demand for mobility, intercity travel, and commuter/transfers is high; strong case for a major station/hub.
- **Technological:** CPKC right of way offers convenient locations for station establishment. More than one station could be possible according to local demand. Above image shows a location which is close to Red Deer Polytechnic whereas it is relatively distanced to city venter and other catchments, which might cause

accessibility problems within public. Therefore, two separate stations could be a considered to catch the demand for this city.

- **Environmental:** The city is urban/rural mix; thus, environmental constraints (river crossings, riparian zones) may require careful design, but manageable given prior infrastructure works. The shift of traffic from road to rail will reduce the number of private vehicles on the Queen Elizabeth II Highway, contributing to the realization of environmental and climate objectives in Alberta.
- **Legal:** The municipal government in Red Deer will play a critical role in station area planning, land development approvals, and ensuring local bylaws are respected. Municipal support is required to align city plans and zoning regulations to encourage and allocate land for station development.

11- Blackfalds:

The population of Blackfalds is more than 11,000. Blackfalds' proximity benefits from its location adjacent to Dow & NOVA Chemicals, as well as an Industrial/Business Park (Ekanayake et al., 2025).



PESTEL Analysis for Blackfalds:

- **Political:** Blackfalds is situated along the route prioritized for regional rail development, specifically the Highway 2A/CPKC corridor (Sun, n.d.).
- **Economical:** Population is moderate with more than 11,000. Increased rail mobility would improve access to job markets in the corridor, directly supporting the growth.
- **Social:** By increasing the available shared transportation modes, the regional rail is expected to decrease the reliance on private passenger vehicles, addressing the corridor's car-centric culture. Some ridership potential (commuters to Red Deer or beyond), but proximity to Red Deer may reduce demand for a separate stop.
- **Technological:** Technically feasible to construct a small station or park-and-ride, but question remains whether ridership justifies.
- **Environmental:** The rail service is a low-emission alternative to road transport, directly mitigating the GHG emissions currently generated by vehicles flowing through the area on Highway 2A (Ekanayake et al., 2025). The infrastructure should be planned to align with sustainable urban form and Transit-Oriented Development (TOD) principles, fostering compact growth and environmental sustainability.
- **Legal:** Permitting is not difficult, but successful implementation relies on the ability of municipal authorities to adjust land use policies and overcome regulatory complexities and land acquisition barriers.

12- Lacombe:

Lacombe is an intermediate city located approximately halfway along the Calgary–Edmonton corridor. It plays a role as a key regional center and is included in proposals for regional rail development utilizing the Highway 2A/CPKC alignment. City’s population is more than 11,000. The average age of the population is 40.5 years, with 18.8% of the population aged 65 years and over (Khan et al., 2024).

PESTEL Analysis for Lacombe:

- **Political:** Holds town classification in Alberta; this implies municipality with some growth and local governance.
- **Economical:** economic base is mainly service and small-business oriented; limited industrial/employment demand compared to major hubs. Passenger rail development could attract business and facilities development and improve Lacombe's growth. Rail services provide a crucial low-cost alternative to personal vehicle dependence, offering residents the opportunity to potentially remove the need for a second vehicle and its associated costs.
- **Social:** Community may benefit from regional rail for connectivity to Red Deer, Calgary, Edmonton, but ridership is likely to be lower compared to core segments.
- **Technological:** As a smaller stop, Lacombe would require minor infrastructure.

- **Environmental:** Supporting a modal shift from high-emission private vehicles to rail is expected to contribute to GHG reductions and support environmental and climate objectives. Given rural/suburban character, environmental impact is likely manageable if station sits within already disturbed land or existing ROW.
- **Legal:** Permitting and local approvals manageable; but low ridership potential yields weak return on investment.

13- Morningside:

Morningside is a small, unincorporated place characterized by high vulnerability to socio-economic challenges, making it a focus area for improving equitable access along the corridor (Khan et al., 2024). The population of Morningside was approximately 120.

PESTEL Analysis for Morningside:

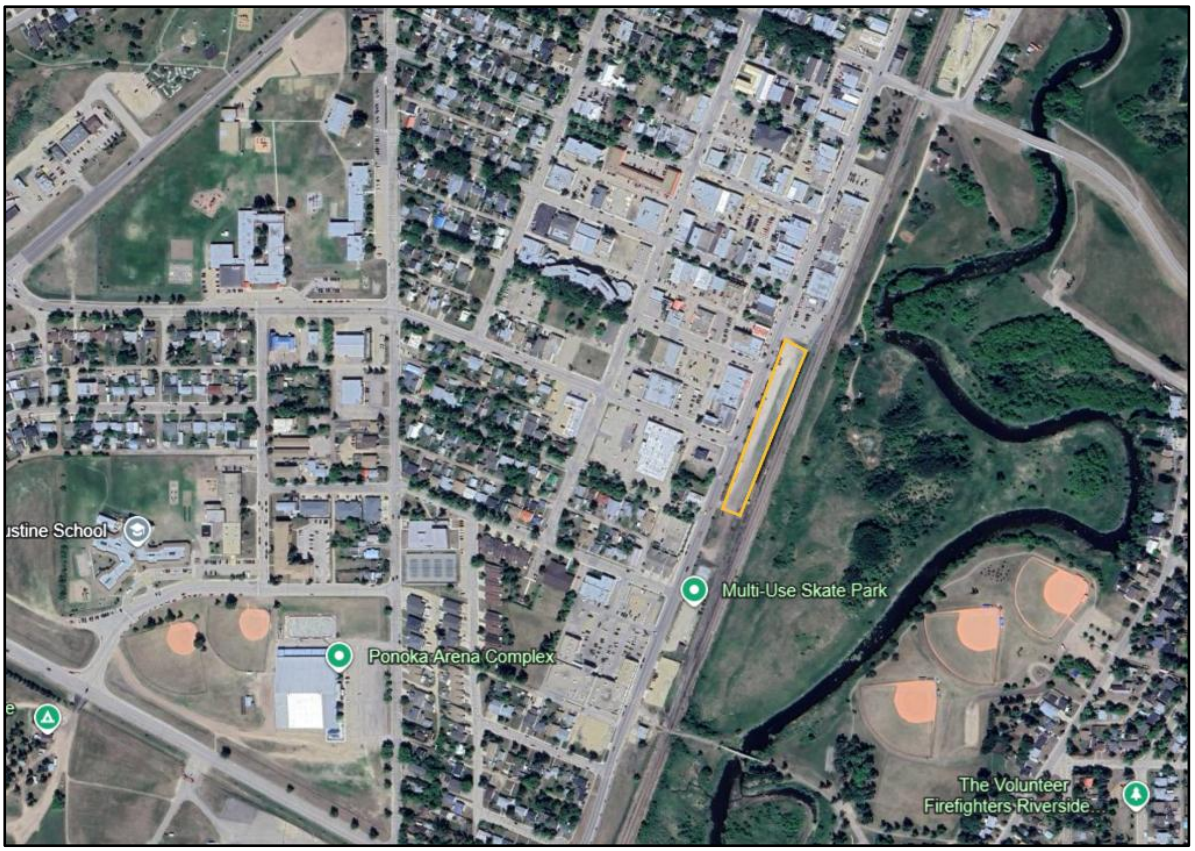
- **Political:** The initiation of regional rail service directly addresses the high level of transportation inequity experienced by small, rural places like Morningside. The

overall objective is to improve equity between urban and rural communities regarding access to employment and government services (Khan et al., 2024). Policy efforts support using transportation infrastructure as a catalyst for land use change. Since Morningside is in Lacombe County, which has reviewed municipal development plans to recommend exploring smaller dwelling sizes for affordability, rail could align with these local growth strategies (Khan et al., 2024).

- **Economical:** Local population small relative to towns/cities; may offer some commuter demand but not heavy ridership. Rail service provides residents (who face a high unemployment rate of 25%) with access to new job markets in the major cities, enabling movement within the corridor to improve personal income.
- **Social:** Could serve as local access point, improving convenience for nearby residents, but social benefit limited in scope. Morningside holds the highest community vulnerability factor among its counterparts, meaning social benefits delivered by the rail project would have a maximized positive impact (Khan et al., 2024). Improved regional connectivity allows residents access to a wider set of services, including health and wellness facilities in larger neighboring municipalities.
- **Technological:** As a smaller stop, Morningside would require minor infrastructure. Ridership is predicted to be too low to generate a return on investment.
- **Environmental:** Given rural/suburban character, environmental impact is likely manageable if station sits within already disturbed land or existing ROW. The introduction of passenger rail service promotes a mode shift from private vehicles to rail, which is a low-emission alternative that helps achieve provincial environmental goals.
- **Legal:** Permitting simpler than for large towns, but classification of stop as “station” may raise questions about cost-benefit.

14- Ponoka:

Ponoka had a population more than 8,000, reflecting a consistent upward growth trend over the last two decades (Bhandari, n.d.). Ponoka (meaning elk in Blackfoot) is in a territory that was occupied and stewarded by the Cree people for thousands of years. The community has a "Poor accessibility" rating, indicating zero modes of shared transportation are available to residents. This results in a high reliance on private vehicles, demonstrated by the ratio of registered passenger vehicles exceeding the population (114% vehicle coverage in 2020) (Khan et al., 2024).



PESTEL Analysis for Ponoka:

- **Political:** Settlement has town status, which implies modest municipal governance capacity. Implementing a stop in Ponoka aligns with the initiative's goal of serving marginalized and indigenous communities that are often underserved by major

infrastructure projects. Future plans would require cooperation with corresponding indigenous communities.

- **Economical:** Local economy in Ponoka is modest; demand for ridership would likely be limited. Population is small relative to towns/cities; may offer some commuter demand. Enhanced mobility expands job opportunities for Ponoka residents by linking them efficiently to the larger labor markets in Calgary and Edmonton
- **Social:** The reintroduction of regional rail service in Alberta is important for addressing the lack of transportation alternatives and improving connectivity for rural and Indigenous communities. Community could benefit from rail connectivity to larger centers; modest ridership possible (commuters, medical/education access, weekend travel).
- **Technological:** Station technically feasible; simple stop with limited infrastructure may suffice. The development of the rail stop would serve as an innovation catalyst for Ponoka, necessitating and driving the development of new local transportation options.
- **Environmental:** Town is mostly rural environment; it implies minimal ecological constraints if station built carefully within corridor. A collaboration with indigenous communities would be necessary.
- **Legal:** Approvals are manageable as Ponoka is rather a small town; but full station may not justify costs considering population and demand. Shared ownership with existing indigenous communities would be required to legally establish and operate the station.

15- Maskwacis:

Maskwacis is an unincorporated community of significant interest in regional rail planning, primarily due to its status as a concentration of Indigenous communities along the

proposed rail corridor. The community consists of two Cree First Nations communities, one on the Ermineskin 138 reserve to the north and the other on the Samson 137 reserve to the south. It also consists of an adjacent hamlet within Ponoka County. The community also serves three more nearby First Nations reserves including Samson 137A to the south, Louis Bull 138B to the northwest, and Montana 139 to the south.

PESTEL Analysis for Maskwacis:

- **Political:** Governance is Indigenous; any station development requires meaningful consultation, partnership, and community consent. Institutional complexity is high. Political policy is mandated to prioritize meaningful consultation and accommodation of Indigenous interests, particularly concerning land use and treaty rights (Khan et al., 2024). The development process must adhere to principles of reconciliation and respect for traditional knowledge.

- **Economical:** Economic conditions in many Indigenous communities in Alberta are challenging; independent demand may be modest but social benefit (mobility, access to jobs/education) can be significant. With an unemployment rate of 83.3%, rail connections are critical to allowing residents to commute to established job markets in Red Deer, Edmonton, and Calgary, helping to decrease unemployment and raise personal income.
- **Social:** Social benefit potential is high, improved access to regional services, jobs, education, and mobility equity; could support community resilience. Rail can boost cultural tourism and community connections, giving visitors access to explore Indigenous culture and history (Bhandari, n.d.).
- **Technological:** Technically feasible if alignment passes near community and land access is negotiated; may require sensitive design to respect local land rights and community values. Since the community is distributed to large areas rather than a close town settlement, finding a location of a station could be challenging. Above location suggestion is selected by considering equal distance to both settlement centers.
- **Environmental:** Environmental sensitivities may be higher depending on local land use, wildlife corridors, watercourses that requires careful environmental and Indigenous impact assessment.
- **Legal:** Regulatory process more complex, indigenous consultation, possible impact and benefit agreements, and compliance with provincial/federal Indigenous & environmental laws.

16- Wetaskiwin:

Wetaskiwin had a population of approximately 13,000. In addition to its relatively high population compared to nearby communities, Wetaskiwin is also critical due to its proximity to Maskwacis, an area suffering from high isolation and lack of services.

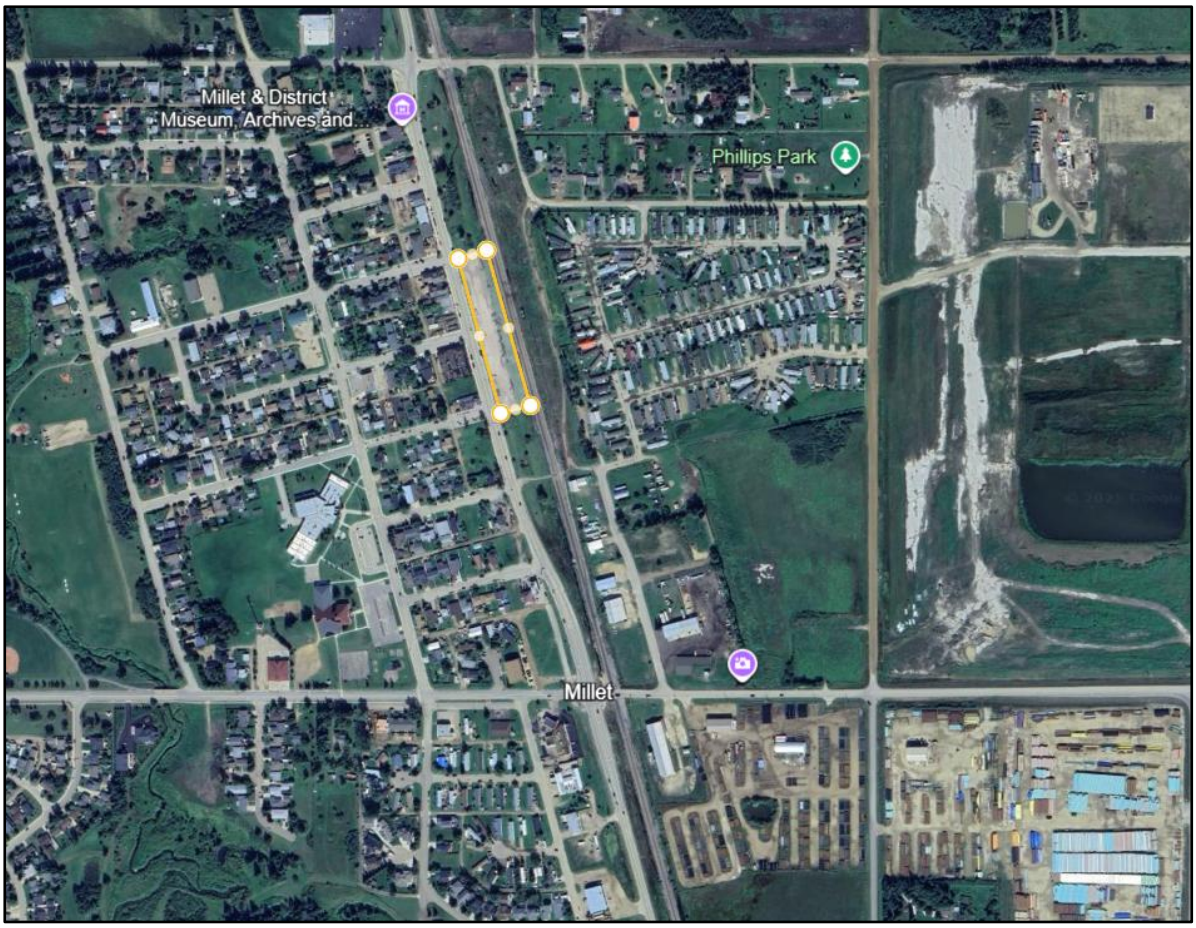
PESTEL Analysis for Wetaskiwin:

- **Political:** Municipal governance can support infrastructure. Being located in the corridor between the business hub (Calgary) and the governmental hub (Edmonton) ensures Wetaskiwin's consideration in the overall Alberta Passenger Rail Master Plan (Shrestha et al., 2025).
- **Economical:** Population size larger than many small towns on corridor, providing moderate local demand base. The availability of frequent and affordable rail transit allows Wetaskiwin residents to forego the need for a second vehicle, reducing expenses related to fuel, insurance, and maintenance. The rail service directly increases accessibility to new job markets in the larger urban centers, which helps Wetaskiwin residents improve their personal income and access better employment opportunities.

- **Social:** Rail is crucial for overcoming the geographical isolation of nearby Indigenous communities, including Maskwacis, providing access to essential services (like healthcare and education) and employment opportunities. City offers moderate ridership potential: commuters to Edmonton / Leduc / Red Deer, regional travelers; population sufficiently large to justify station.
- **Technological:** Corridor passes near or through area; station infrastructure is feasible. Although the regional airport does not offer commercial flights now, introduction of rail connectivity may result in innovative transportation options to utilize contemporary airline services within the region.
- **Environmental:** Given semi-urban setting of the city, environmental constraints are likely to be manageable and impact mitigation possible.
- **Legal:** Permitting is under city jurisdiction; thus, it is expected to be feasible with standard approvals, where no major legal hurdles are expected.

17- Millet:

Millet is a small town located within the Calgary–Edmonton corridor, situated between Wetaskiwin and Leduc along the Highway 2A route, which is part of the regional rail proposal (Sun, n.d.). The town's population is close to 2,000. Town has only one school, which serves until 8th grade. High school service is provided by Wetaskiwin Composite High School.



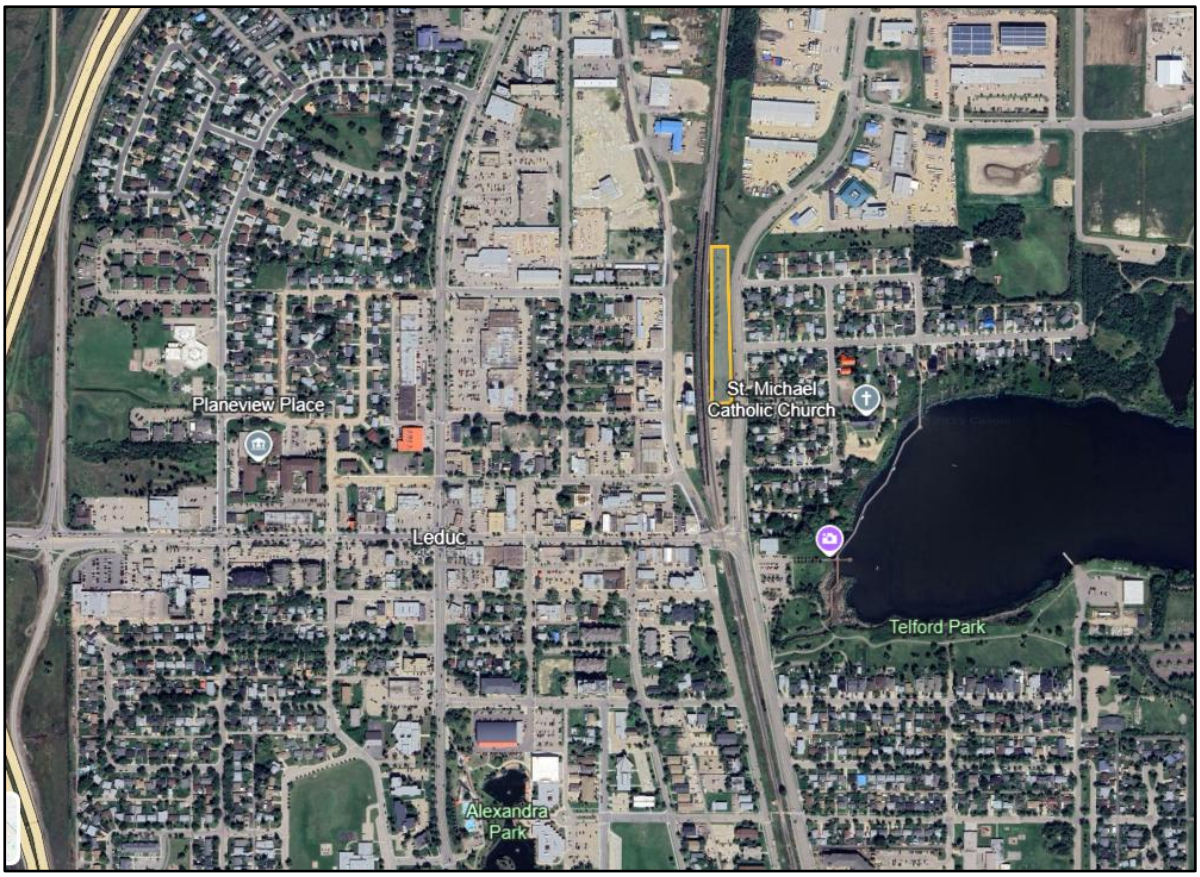
PESTEL Analysis for Millet:

- **Political:** The presence of a rail station would support policies encouraging TOD principles, fostering urbanization and community development around transit nodes. The inclusion of smaller communities like Millet aligns with the "Rail for All: Connecting Communities" initiative. Because the settlement has town classification (or village/town list per Alberta Municipal Affairs) suggests local governance but small size.
- **Economical:** Relatively small population and limited local economy; ridership demand is expected to be low. However, improved mobility through rail links allows Millet residents to commute to job markets in Leduc and Edmonton, providing access to better employment opportunities without having to relocate.

- **Social:** Millet has a significantly high ratio of registered passenger vehicles (184% of the population) (Khan et al., 2024), indicating heavy reliance on private transport. Rail development would encourage a mode shift to shared transportation options. Considering the small population, rail could serve to a limited number of local residents.
- **Technological:** Technically feasible to build a simple stop along corridor; small platform might suffice. To maximize service and accessibility, the rail stop would ideally be part of an integrated transportation pathway, connecting local feeder transit options (which would need to be developed) to the train station.
- **Environmental:** By drawing commuters away from personal passenger vehicles on Highway 2A, the rail project promotes a desirable modal shift, directly contributing to the reduction of GHG emissions and carbon output in the corridor. Environmental impact is expected to be minimal with careful sitting in existing corridor.
- **Legal:** Permitting is straightforward; thus, no major legal hurdles are expected.

18- Leduc:

Leduc is a city with more than 40,000 residents. It is a suburban area situated south of Edmonton, often grouped with the neighboring unincorporated community of Nisku due to their proximity to the international airport. The area is identified as a vital connection point for Edmonton commuters. Leduc has "Good accessibility" with two modes of shared transportation: local buses and on-demand buses. Its reliance on personal passenger vehicles is relatively moderate for the corridor, with a registered vehicle-to-population ratio of 55% (Khan et al., 2024).



PESTEL Analysis for Leduc:

- **Political:** Leduc is a city with active municipal and county governance; part of larger Edmonton metropolitan region; supportive of economic and infrastructure growth. Due to its proximity to Edmonton airport, it is possible to get support due to rail-air connectivity. Leduc is recommended as a priority connection point to Edmonton City to reduce pressure on Highway 2 south of Edmonton.
- **Economical:** Passenger rail improves commute times and expenses, allowing Leduc residents to access new job markets and better employment opportunities in Edmonton. The oil and gas industry is the base of Leduc's economy. The Leduc Business Park, in the northern portion of the city, contains more than 1,400 businesses. With affordable rail commute option, the area has potential to attract more businesses.

- **Social:** Although rated for "Good accessibility," Leduc relies heavily on personal vehicles. Rail offers a safe, reliable, low-cost alternative to private automobiles, addressing transportation affordability (Khan et al., 2024). City offers strong combination of resident population, industrial workforce, airport travelers and commuters, addressing high ridership from diverse user groups (workers, travelers, residents). By providing faster, safer transit and reducing congestion, the service gives residents more time for rest or family, contributing to a better quality of life.
- **Technological:** Corridor and existing transport infrastructure (road, rail, proximity to airport and industrial park) make station very feasible; opportunity for intermodal integration (bus, airport shuttle, logistics). The Leduc to Edmonton stretch on Highway 2 experiences high traffic volumes (64,490 vehicles in 2023) (Sun, 2024), making the adoption of high-capacity rail technology essential for effective congestion relief.
- **Environmental:** Rail service is a low-emission alternative that can draw commuters off the congested Highway 2. The Wetaskiwin-Leduc section on Highway 2A contributes significant GHG emissions. City is mostly urban/industrial area: environmental constraints exist (industrial pollution, noise), but building a station / terminal here likely fits within existing disturbed land and transport infrastructure; making ecological impact manageable.
- **Legal:** Municipal and county regulatory frameworks are supportive of development. However, fewer hurdles are expected compared to greenfield rural stations because economic justification is strong.

19- Nisku:

Nisku is an unincorporated community situated in the Calgary–Edmonton corridor, strategically located just south of Edmonton. It is often analyzed together with the nearby city

of Leduc due to its proximity to a key piece of regional infrastructure. Nisku functions as a crucial suburban/logistics-oriented hub adjacent to the Edmonton International Airport (YEG) and the Nisku Industrial Business Park. It is identified as a vital connection point for commuters traveling toward Edmonton. Although the proposed station location is nearly 5km from the Leduc city center, industry commuters and airport users are likely to generate high volume ridership. Nisku is a high-potential station or stop for industrial workers/airport staff, possibly one of the highest-value non-urban stops in the corridor.

PESTEL Analysis for Nisku:

- **Political:** Nisku is an unincorporated hamlet within Leduc County. Governance is arranged via county structures. Accordingly, decisions need county-level coordination rather than local municipal council.
- **Economical:** Nisku Business Park hosts hundreds of businesses, including energy, logistics, manufacturing, and industrial firms. It holds high employment density and thousands of workers commute there.

- **Social:** Great potential for ridership: shift workers, industrial workers, airport staff, logistics personnel. Also, station could serve freight logistics if rail freight/passenger interface is considered.
- **Technological:** Rail corridor passes near / through Nisku. Thus, building a stop or small station with access to industrial park is technically feasible.
- **Environmental:** Nisku is industrial zone, meaning the land is already disturbed; environmental constraints are less than in greenfield or ecologically sensitive zones; but industrial pollution or land contamination needs due diligence.
- **Legal:** Regulatory decisions are managed via county. Station planning must be coordinated with industrial park governance and provincial regulations (transport, environmental). Legal requirements are expected to be more complex than in a rural city.

20- Edmonton:

Edmonton is the governmental hub and one of the two largest cities in the Calgary–Edmonton corridor, situated at the northern terminus of the proposed regional rail line. The city has a strong focus on sustainability and integrates innovative solutions into its transportation strategy, such as the Hydrogen Bus Program launched in 2023. The Edmonton Metropolitan Area's population is around 1.42 million (Ekanayake et al., 2025). By 2051, the Edmonton–Calgary corridor is expected to be home to 81% of Albertans. (Okereka, n.d.). Edmonton demonstrates the lowest percentage of registered passenger vehicles over the total population in the corridor at 42%. The section of Highway 2 near Edmonton experiences extremely high traffic volumes, reaching 92,532 vehicles in 2022. The Leduc to Edmonton stretch saw a weighted Annual Average Daily Traffic (WAADT) of up to 86,990 vehicles (Al Abedy et al., n.d.).

PESTEL Analysis for Edmonton:

- **Political:** Capital city, robust municipal governance, transit-infrastructure experience, strong policy support for regional connectivity. As the capital and governmental hub, Edmonton is central to the Edmonton–Red Deer–Calgary axis, the most vital corridor prioritized in the Passenger Rail Master Plan. The project's success is tied to the political decision to formally introduce a dedicated provincial rail corporation (like a Crown Corporation akin to Ontario's Metrolinx) to manage planning and operations effectively and consistently (Shrestha et al., 2025).
- **Economical:** Dense population and employment base; major anchor for intercity travel; high potential ridership.

- **Social:** Large and diverse population; wide demographic and demand for mobility for work, education, services, leisure strong social demand for rail connectivity.
- **Technological:** Existing transit infrastructure (LRT, buses), road networks, and urban fabric supportive of terminal station; intermodal integration feasible.
- **Environmental:** Urban environment: environmental constraints related to sitting, community impact, land-use planning — but manageable given planning capacity.
- **Legal:** Regulatory and planning capacity high; track record of transit/infrastructure approvals; favorable for station development.

Appendix-B

Social Evaluation Details

Social scoring according to PESTEL analysis

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Calgary	10,00	10,00	10,00	10,00
Airdrie	10,00	10,00	10,00	10,00
Crossfield	2,00	2,00	2,00	2,00
Carstairs	2,00	2,00	2,00	2,00
Didsbury	6,00	6,00	6,00	6,00
Olds	10,00	10,00	10,00	10,00
Bowden	2,00	2,00	2,00	2,00
Innisfail	6,00	6,00	6,00	6,00
Penhold	2,00	2,00	2,00	2,00
Red Deer	10,00	10,00	10,00	10,00
Blackfalds	6,00	6,00	6,00	6,00
Lacombe	6,00	6,00	6,00	6,00
Morningside	2,00	2,00	2,00	2,00
Ponoka	6,00	6,00	6,00	6,00
Maskwacis	10,00	10,00	10,00	10,00
Wetaskiwin	10,00	10,00	10,00	10,00
Millet	2,00	2,00	2,00	2,00
Leduc	10,00	10,00	10,00	10,00
Nisku	10,00	10,00	10,00	10,00
Edmonton	10,00	10,00	10,00	10,00

Average scoring of phases

Phases	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Phase 1	10	10	10	6
Phase 2	10	10	10	7
Phase 3	5	6	5	
Average	**8.3**	**8.7**	**8.3**	**6.5**

Number of high impact stations in the phase

Phases	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Phase 1	2	2	4	4
Phase 2	4	1	2	5
Phase 3	3	6	3	

Appendix-C

Environmental Evaluation Details

Environmental scoring according to PESTEL analysis

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Calgary	10,00	10,00	10,00	10,00
Airdrie	10,00	10,00	10,00	10,00
Crossfield	6,00	6,00	6,00	6,00
Carstairs	6,00	6,00	6,00	6,00
Didsbury	6,00	6,00	6,00	6,00
Olds	8,00	8,00	8,00	8,00
Bowden	6,00	6,00	6,00	6,00
Innisfail	8,00	8,00	8,00	8,00
Penhold	6,00	6,00	6,00	6,00
Red Deer	10,00	10,00	10,00	10,00
Blackfalds	10,00	10,00	10,00	10,00
Lacombe	10,00	10,00	10,00	10,00
Morningside	6,00	6,00	6,00	6,00
Ponoka	6,00	6,00	6,00	6,00
Maskwacis	2,00	2,00	2,00	2,00
Wetaskiwin	2,00	2,00	2,00	2,00
Millet	6,00	6,00	6,00	6,00
Leduc	10,00	10,00	10,00	10,00
Nisku	10,00	10,00	10,00	10,00
Edmonton	10,00	10,00	10,00	10,00

Average scoring of phases

Phases	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Phase 1	10.0	10.0	10.0	7.6
Phase 2	10.0	10.0	10.0	7.2
Phase 3	6.3	6.9	6.3	
Average	**8.8**	**9.0**	**8.8**	**7.4**

Number of high impact stations in the phase

Phases	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Phase 1	2	2	4	3
Phase 2	4	1	2	5
Phase 3	2	5	2	