
Project:	Calgary Airport to Banff Passenger Rail		
Our reference:	514100783 – version f	Client:	Liricon Capital & Plenary
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Subject:	Calgary Airport to Banff Passenger Rail – economic benefit analysis		

Executive summary

This document provides a high-level summary of key potential economic benefits associated with the Calgary Airport Banff Passenger Rail Project (CABR) to the province of Alberta. The purpose of this document is to review and provide additional context to previous work undertaken, revisiting key assumptions and metrics, and articulating the project benefits (where possible to do so) relative to its costs.

Key findings are as follows:

- The construction of CABR will support c.9,880 job years, generating approximately \$241m of Gross Value Added (GVA)¹ per annum (p.a.) in Alberta. Assuming a three-year construction period, this results in approximately \$694m in GVA overall.
- The operation of CABR is estimated to support 400 direct FTE jobs. It is anticipated that 290 of these will be net additional (or “new”) jobs in the province, which combined with 200 jobs in the supply chain would generate an additional \$69.5m of GVA p.a. to Alberta, and \$2.2bn over fifty years.
- Transport user benefits of \$1.6bn, with an estimated annual ridership of 2.9m by the year 2035.
- Overall, additional visitors as a result of CABR will support an additional 22,000 FTE jobs and \$2.0bn in GVA.
- An uplift in land value of at least \$604m for commercial and residential units surrounding the proposed stations².
- Supporting modal shift from private vehicles to public transport, thereby reducing greenhouse gas emissions.
- An improved perception of Banff, Calgary (and Alberta) as a place to visit, live, work and host events.
- CABR will support plans to expand and develop activity at Calgary International Airport (YYC), maximising its potential as a leading airport and as a location for Transit-Oriented Development (TOD).

Taking into account these benefits, CABR could potentially support at least an additional 22,500 jobs in Alberta and total economic benefits of \$6.4bn (plus an additional \$694m in GVA in construction benefits³). Relative to the current estimated costs of the project (\$2.0bn), this represents a Benefit: Cost Ratio (BCR)⁴ of 2.8 and a Net Present Social Value⁵ of \$4.1bn (all 2020\$).

Comparing the benefits of CABR to the Government of Alberta’s anticipated annual performance-based payment of \$30m (starting in the first year of operation, 2026), this results in economic benefit to Alberta of over six times (6.9) their contribution, over fifty years.

Considering the revised Liricon Capital & Plenary projections for ridership, operating and capital costs (which are currently being reviewed by an independent ridership and revenue consultant) this could result in an increased NPSV of \$12.5bn and a BCR of 3.4.

¹ Gross value added (GVA) (sometimes referred to as ‘output’) is the measure of the total value of goods and services produced in an economy by one individual producer, industry, sector or region.

² This figure excludes (i) potential land value uplift at Calgary International Airport YYC, and (ii) potential land value uplift for lands between 400m and 1500m away from key stations, which are expected to be significant.

³ Consistent with standard methodologies, construction benefits have not been included in the Benefit Cost Ratio.

⁴ Benefit Cost Ratio (BCR) is an indicator used for project investment and is defined as present value of net benefits divided by the costs.

⁵ Net Present Social Value is the difference between the present value of costs and the present value of benefits to society over a period of time.

1 Purpose of this document and project background

1.1 Purpose of this document

The purpose of this document is to review and provide additional context to previous work undertaken, revisiting key assumptions and metrics, and articulating the project benefits (where possible to do so) relative to its costs in a clear and accessible format. It is not the purpose of this document to provide full quality assurance of previous work, but rather to summarize key economic benefits quantified to date, and suggest areas for further refining the analysis. The principal focus is on the economic benefits to Alberta at a provincial level, as this document may be used to provide additional information to the Government of Alberta.

The document covers the following elements:

- Quantified economic benefits of CABR
 - Economic benefits of the construction and operation of the rail line.
 - Transport benefits.
 - Tourism benefits.
 - The economic benefits associated with an increase in property values surrounding the proposed stations, commonly referred to as land value uplift (LVU).
- Further benefits
 - Environmental benefits.
 - Perception of Alberta and the CABR corridor as a place to visit, live and work.
 - The impact on the Calgary International Airport (YYC).

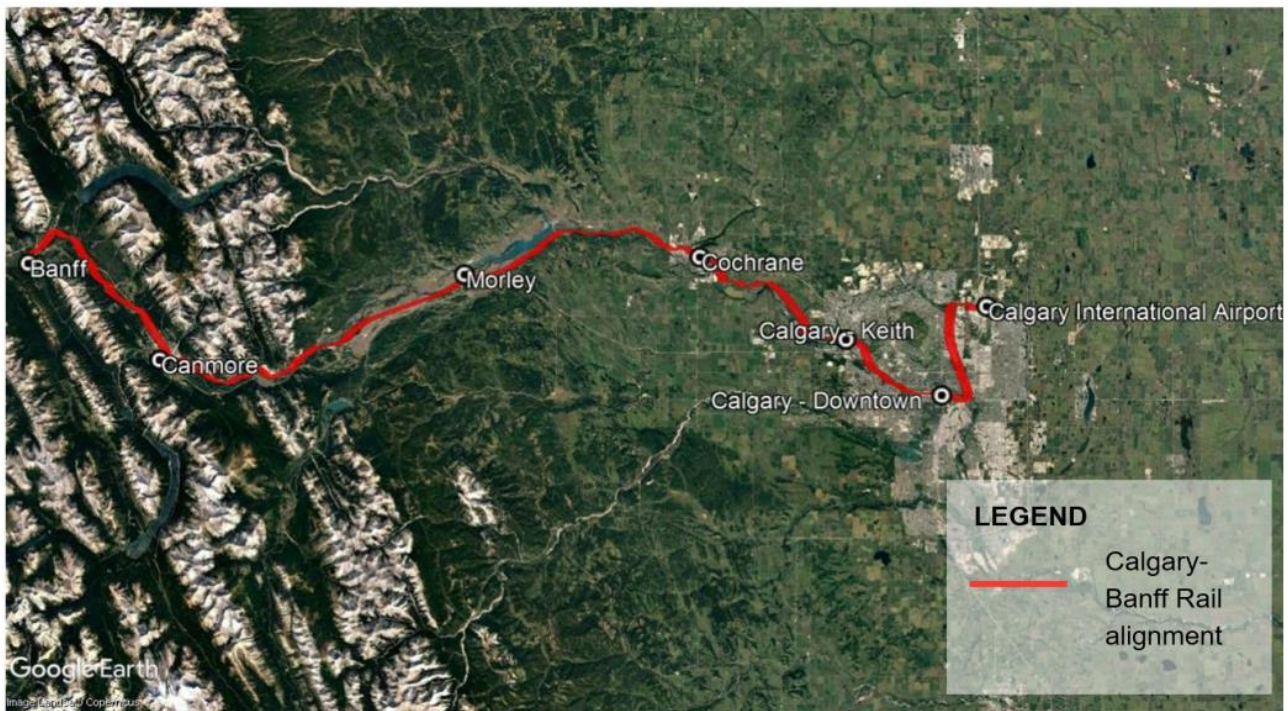
1.2 Project background

CABR is a proposed 150km passenger rail system that would provide a direct service between Calgary International Airport and the town of Banff, via downtown Calgary. Development of CABR would provide a mass transit option to access Calgary International Airport as well as Banff National Park and the Bow Valley communities, helping to address increasing congestion associated with visitation to Banff (a town of c. 8,000 permanent residents which attracts in excess of 4 million visitors annually⁶). Banff's most recent Long Term Transportation Study (2016) states that 93% of Banff's visitors arrive in a personal vehicle⁷ and the town's congestion threshold of approximately 24,000 vehicles per day is regularly exceeded in the summer months⁸. CABR is proposed to run on a dedicated track within the Canadian Pacific Railway (CP) right-of-way and includes seven proposed stations at Calgary International Airport (YYC), Calgary-Downtown, Calgary-Keith, Cochrane, Morley, Canmore, and Banff. A map of the proposed CABR corridor is shown in Figure 2.1 below.

⁶ Town of Banff <https://banff.ca/252/Learn-About-Banff>

⁷ Stantec (2016) 'Banff Long-term Transportation Study'

⁸ Pre-pandemic figures from 2019 demonstrate that the congestion threshold was exceeded every day from June 8 – September 8 (Town of Banff, 2019 Traffic Data).

Figure 1.1: CABR alignment

Source: Unsolicited Proposal from Liricon Capital LTD to Develop the Calgary Airport-Banff Passenger Rail System. Liricon Capital LTD. May 4, 2021

1.3 Previous studies and analysis

A number of key documents and studies relating to the potential impact and benefits of CABR have already been produced. In 2018, CPCS completed the Calgary-Bow Valley Mass Transit Feasibility Study which was motivated by the desire to identify strategies to address increasing congestion associated with visitation to Banff National Park. The study reviewed bus service and passenger rail service options. CPCS subsequently completed an update to the 2018 study entitled Calgary-Banff Rail Study.

The CPCS studies were used as the basis for WSP to undertake a Strategic Impact Assessment (SIA), which was completed in November 2020 and concluded that CABR has estimated benefits of \$1,128.68m and a Benefit-Cost Ratio (BCR) of 0.74 (with estimated total cost of \$1,532.52m). Following the completion of the 2020 SIA, Liricon Capital Ltd. (Liricon) submitted an Unsolicited Proposal (USP) to the Government of Alberta for the project. The Liricon USP proposed refined and adjusted project assumptions from the updated CPCS work. As such, WSP was retained to update the Cost-Benefit Analysis (CBA) to reflect the latest changes to project assumptions and estimates – the revision (May 2021) valued the total economic benefits of \$1.75 billion in present value (discounted 2020 \$). This resulted in a BCR of 1.13 and a Net Present Value (NPV) of \$200.2m.

2 Economic impacts of CABR

2.1 Overview

The following section presents the results of the valuation exercise of this study and the various methodologies and assumptions employed, before concluding with a summary of benefits and presenting a Benefit: Cost Ratio (BCR).

2.2 Key assumptions and limitations

The following table sets out the key assumptions used in this analysis. Assumptions specific to particular calculations are set out separately in the relevant sub-sections of this chapter.

Table 2.1: Key values and assumptions used

Assumption	Value	Source / rationale
Appraisal period	50 years	The original analysis by WSP used a 30-year appraisal period, later increased to 35 in the revised analysis (which included 35 years of operations beyond the Project completion, when benefits start to accrue). However, given the majority of the infrastructure related to CABR is new and employs a fairly straightforward process ⁹ , it is reasonable to assume the life of the asset will be longer – as such, the benefits quantified in this analysis have used a longer period of 50 years. For comparison, the UK default period is 60 years, the US uses 50 years for major structures (such as rail lines), New Zealand 40-60 years, Sweden 60 years and Australia recommends the expected lifetime of the asset (10-50 years) ¹⁰ .
Ramp up period	Three years	A three-year operational ramp-up period is assumed for the purposes of this analysis with the first year (2026) operating at 85%, second year (2027) operating at 90%, and third year (2028) operating at 95%, with full service utilization of 100% occurring in 2029. This is based on information from Liricon Capital & Plenary.
Levels of ridership	2035 annual ridership of 2,905,000	Draft For Discussion Memo: Calgary-Banff Passenger Rail Cost-Benefit Analysis Update, prepared by WSP, May 20, 2021. We are aware of an ongoing commission for CABR which revisits the ridership numbers, currently being undertaken by an independent ridership and revenue consultant, and future economic analysis should account for the results of this work.
Base year	2020	To be comparable with benefits quantified in previous studies (principally work undertaken by WSP), monetized benefits are presented in 2020 values.
Construction cost	\$1,543m	Liricon Capital & Plenary (2021) 'Enhanced Unsolicited Proposal: Calgary Airport to Banff Passenger Rail System'
Operational cost	\$24.5 m	The CPCS Study estimates annual operating costs in 2030 (expressed in 2020\$) to be \$24.5m under the base ridership scenario.
Current estimated costs of CABR	\$2.01bn	The sum of the construction costs (\$1.54bn) and operational costs over a 50-year operational period (\$1.38bn).

Our review has included (and is reliant on the details and data included in) the following documents:

- Calgary-Banff Rail Strategic Impact Assessment, prepared by WSP, November 2020 (referred to as "WSP SIA").
- Calgary-Banff Rail Strategic Impact Assessment Technical Appendix on Land Value Uplift, prepared by WSP, November 2020.
- Calgary-Banff Rail Study, prepared by CPCS, July 16, 2021 (also the revised version of this document (March 11, 2022)).
- Draft For Discussion Memo: Calgary-Banff Passenger Rail Cost-Benefit Analysis Update, prepared by WSP, May 20, 2021 (referred to as "WSP Memo").
- Unsolicited Proposal from Liricon Capital LTD to Develop the Calgary Airport-Banff Passenger Rail System. Liricon Capital LTD. May 4, 2021.
- Calgary in the New Economy, Calgary Economic Development. December 13, 2018.
- "Calgary-Banff Rail On Track for Economic Growth", Calgary Economic Development. March 19, 2019.

⁹ Unsolicited Proposal from Liricon Capital LTD to Develop the Calgary Airport-Banff Passenger Rail System. Liricon Capital LTD. May 4, 2021

¹⁰ UK Department for Transport and the Institute for Transport Studies (2021) 'Residual Values and Appraisal Period in Multimodal Transport Appraisal'

We have further used principles, guidance and references from the following documents: HM Treasury Green Book; Department for Transport's Wider Economic Benefit Transport Appraisal Guidance (WebTAG); and Department for Levelling Up, Housing and Communities (DLUHC) appraisal guidance, all of which are acknowledged as international best practice in the assessment of the impacts of transport projects.

2.2.1.1 Limitations

- The original CPCS Calgary-Banff Rail Study does not provide in detail a comprehensive methodology or list of assumptions used in their transport/ridership model to enable a complete analysis of the validity of the modelling techniques used to generate ridership figures. Mott MacDonald's scope has not included estimating or verifying levels of ridership (there is an ongoing commission which revisits the ridership numbers, currently being undertaken by an independent ridership and revenue consultant). For the purposes of this study, we are using the ridership levels set out in WSP's Memo (2021).
- Mott MacDonald has not had access to the economic models used by WSP which quantify transportation and LVU benefits. The text provided in their reporting suggests appropriate methods have been employed, however it is difficult to verify this. As we have used WSP's results and have been conservative in the calculation of additional benefits, in order to minimize the potential risk of double counting.
- As construction is several years away, the construction and operation/maintenance costs used in this document are the best estimations at this time, but subject to change as the project is further refined and developed.

2.3 Benefits from operation of CABR

2.3.1 Construction benefits

Assuming that the total construction cost of CABR is \$1.54bn¹¹, Liricon Capital & Plenary estimate that 40% of this will be spent on labour. As such, approximately \$617m of the total construction cost will be spent on salaries.

Dividing this figure by the average annual salary figure in Alberta for 2020 (\$62,450¹²), the direct salary expenditure will support approximately **9,883 direct job years**.

Table 2.2: Construction jobs – calculation

	Value	Formula	Source
Construction cost	\$1,543,000,000	(a)	Liricon Capital & Plenary (2021) 'Enhanced Unsolicited Proposal: Calgary Airport to Banff Passenger Rail System'
Proportion of cost spent on salaries	40.00%	(b)	Information from Liricon Capital & Plenary
Salary expenditure	\$617,200,000	(c)=(a)*(b)	Calculation
Average mean salary for Alberta	\$62,450	(d)	Statistics Canada. Table 14-10-0204-01 Average weekly earnings by industry, annual.
Direct job years supported	9,883	(e)=(c)/(d)	Calculation

Recognizing that construction jobs are temporary, and that one full-time equivalent (FTE) job has the equivalent economic benefit of 10 job-years, the 9,883 job-years are equivalent to 988 FTE jobs being

¹¹ Liricon Capital & Plenary (November 30, 2021) 'Enhanced Unsolicited Proposal: Calgary Airport to Banff Passenger Rail System'

¹² Statistics Canada. Table 14-10-0204-01 Average weekly earnings by industry, annual.

created from the construction¹³. Using a multiplier of 1.7¹⁴ to also estimate the resulting indirect and induced jobs, this would result in 1,700 FTE jobs in total.

We therefore estimate that in total, 1,700 FTE jobs and approximately \$241m pa in GVA could be delivered by the construction of CABR (assuming an average GVA per worker of \$142,060 per annum in Alberta). Assuming a three-year construction period, this results in approximately \$694m in GVA overall.

Table 2.3: Economic contribution of job years

	Value	Formula	Source
1 FTE=10 employment years	10	(f)	Best Practice Assumption - one FTE job is equal in regeneration effect to 10 job-years.
Direct jobs supported	988	(g)=(e)/(f)	Calculation
Leakage	0.00%	(h)	Assuming 0% - leakage unlikely to be significant, given the Alberta construction industry is relatively self-contained, and construction is anticipated to be relatively straightforward with no major new alignment (therefore limited need for specialized construction services ¹⁵)
Net direct FTEs	988	(i)= (g)-(g*(h))	Calculation
Multiplier of 1.723	0.723	(j)	Statistics Canada, Table 36-10-0113-01 Input-output multipliers, provincial and territorial, summary level. Non-residential building industry within the province of Alberta
Indirect & induced jobs (Composite multiplier of 1.723)	715	(k)=(j)*(i)	Calculation
Total jobs	1,703	(l)=(k)+(i)	Calculation
Average GVA per worker, Alberta	\$142,060	(m)	OECD. Stat. Regional Economy: Regional GVA per worker. Uplifted to 2020 prices. Converted to CAD from USD (conversion rate of 1.2957, Bank of Canada)
Total Gross Value Added (GVA) supported	\$241,905,257	(n)= (l)*(m)	Calculation

2.3.2 Operation benefits

There will be 400 FTEs at CABR (estimation provided by Liricon Capital & Plenary, 2022). In order to estimate the net benefit to Alberta (and so that these benefits can be included in the BCR calculation), we have applied additionality factors of 15% deadweight and 15% displacement, resulting in 289 net additional FTEs at CABR¹⁶. Using a multiplier of 1.692 for indirect and induced jobs (transportation industry multiplier within the province of Alberta), this gives a total of **489 net additional jobs** overall. Again, assuming an annual average GVA per worker of \$142,060 in Alberta, CABR will support **\$69m of GVA p.a.**

¹³ The 10:1 ratio is taken from a number of sources, including UK Department for Transport Appraisal Guidance (TAG) on supplementary economic modelling, Paragraph 4.2.6 of TAG Unit M5.3. This in turn is based on a PwC evaluation of regional distribution of economic benefits.

¹⁴ Statistics Canada, Table 36-10-0113-01 Input-output multipliers, provincial and territorial, summary level. 1.723 is the total multiplier in the non-residential building construction industry, within the province of Alberta.

¹⁵ WSP (2021) 'Calgary – Banff Passenger Rail Cost-Benefit Analysis Update'

¹⁶ Additionality factors applied- 15% deadweight (based on guidance from HM Treasury Green Book) and 15% displacement (assumed to be low as CABR is providing a new service). Leakage has not been applied as it is unlikely to be significant, given the likely labour market is assumed to be self-contained within Alberta. Deadweight refers to output that would have occurred without the intervention, displacement is the proportion of intervention outputs accounted for by reduced outputs elsewhere in the target area.

Table 2.4: Operational benefits - calculation

	Value	Formula	Source
Net additional FTEs at CABR	289	(a)	Calculation based on 400 gross FTE jobs (Liricon Capital & Plenary) and applying additionality factors of 15% displacement and 20% deadweight.
Multiplier of 1.692	0.692	(b)	Statistics Canada, Table 36-10-0113-01 Input-output multipliers, provincial and territorial, summary level. Transportation industry within the province of Alberta
Indirect & induced jobs (multiplier of 1.692)	200	(c)=(a)*(b)	Calculation
Total jobs	489	(d)=(a)+(c)	Calculation
Average GVA per worker p.a., Alberta	\$142,060	(e)	OECD. Stat. Regional Economy: Regional GVA per worker. Uplifted to 2020 prices. Converted to CAD from USD (conversion rate of 1.2957, Bank of Canada)
Total Gross Value Added (GVA) supported p.a.	\$69,465,862	(f) = (e)*(d)	Calculation

When profiled over the 50-year appraisal period and discounted at a nominal rate of 3.5% (used by Government of Alberta), this results in a NPV of \$2.2bn.

For comparison, using a 3.5% real discount rate (used in previous economic analysis for CABR, as well as the Canada Infrastructure Bank (CIB) and Alberta Transportation) results in a NPV of \$1.4bn over fifty years.

2.4 Transport benefits

The transport user benefits of CABR were originally assessed in detail as part of the analysis in the WSP SIA (2020). While there is not a comprehensive methodology or list of assumptions set out in their report to enable a detailed analysis of the validity of the modelling techniques used to generate the figures, the information available suggests the approach used is reasonable.

The transport benefits of CABR were assessed over a thirty-year appraisal period (increased to thirty-five years in the revised analysis in the later WSP Memo) which could be considered too short an appraisal period for a project that includes the delivery of a series of new railway stations across a key route in Alberta. Appraisal periods are conventionally dictated by the anticipated lifetime of the asset being delivered. New passenger railway stations are expected to have a usable life of longer than thirty years, in some instances this can extend to sixty or seventy years. This suggests that a longer appraisal period would be more appropriate when considering transport benefits.

The analysis of the ridership levels of CABR is currently being updated by an independent ridership and revenue consultant, who will report following the publication of this document. Accordingly, this analysis has used the results of the revised WSP work, set out in the WSP Memo, which values the transport user benefits at \$1.12bn¹⁷ (2020 \$, using a 3.5% real discount rate), amending this figure to account for a nominal discount rate of 3.5% (used by Government of Alberta) to give a figure of approximately \$1.59bn in transport user benefits¹⁸.

2.5 Tourism benefits

In addition to the benefits incurred by people making the change from private vehicles to rail (i.e., modal shift), it is likely there will be a number of additional visitors (people who would otherwise not have visited

¹⁷ Draft For Discussion Memo: Calgary-Banff Passenger Rail Cost-Benefit Analysis Update, prepared by WSP, May 20, 2021

¹⁸ The analysis of the ridership levels of CABR is currently being updated by an independent ridership and revenue consultant, which will allow for a full update to transportation modelling and calibration of user benefits once this is completed. In the interim, we have estimated the transport user benefits with a nominal discount rate using the results presented in WSP's analysis.

Alberta if CABR did not exist). There are a number of reasons for this – firstly, it is likely that CABR would be a visitor attraction in its own right (as visitors would be able to enjoy the view and not have to concentrate on driving, in addition to a segment of tourists that seek out prominent global rail destinations specifically), secondly Banff's reputation for high visitor numbers and difficulties with parking might attract people if an alternate method of transport existed, thirdly it may encourage people to visit in the winter months and shoulder seasons when road conditions can be more difficult (which might otherwise have deterred visitors who do not want to drive).

The WSP CBA report estimated the potential tourism benefits of CABR, however these figures were not updated in the revised WSP Memo, which included an uplift to annual ridership figures to 2,905,000 trips in the year 2035. Using the assumption from Calgary Economic Development that 5.0% of the total ridership is additional, this would mean an additional 145,250 trips in the year 2035. These figures refer to total trips, rather than individual visitors - assuming the majority of passengers (80%) will make a return journey and approximately 20% will continue their journey elsewhere (and therefore not make a return trip), this results in 101,675 additional visitors in the year 2035.

Applying gradual ramp up period of passenger use up to 2035 (derived from WSP's analysis) and a conservative annual increase of 1% to ridership numbers thereafter, this means that over the course of fifty-year appraisal period there will be an **additional 5.0 million visitors to this region of Alberta** as a result of CABR.

The visitor economy in Alberta is significant, with 34.6m visits in 2019¹⁹. Information from Statistics Canada indicates that approximately 84,600 people in Alberta are employed in the visitor economy²⁰, indicating that 409 visitors support one job in the province.

Applying this proportion to the estimated number of additional visitors to Alberta as a result of CABR (5,028,476) means that 12,744 net direct jobs would be created over the course of the appraisal period. Using a multiplier rate of 1.727, this means **21,560 jobs additional to Alberta**.

Table 2.5: Tourism benefits - calculation

	Value	Formula	Source
Visitor numbers - Alberta total (2019)	34,600,000	(a)	Government of Alberta, Tourism in Alberta 2019
Visitor economy jobs	84,600	(b)	Statistics Canada. Table 24-10-0042-01 Provincial and territorial gross domestic product (GDP) and employment generated by tourism and related measures
Number of visitors that support one job	409	(c)=(a)/(b)	Calculation
Number of additional visitors to Alberta as a result CABR	5,262,459	(d)	Derived from CPCS and WSP analysis
Tourism jobs supported by the CABR	12,882	(e)= (d)/(c)	Calculation
Multiplier of 1.727	0.727	(f)	Statistics Canada, Table 36-10-0113-01 Input-output multipliers, provincial and territorial, summary level. Average for the Accommodation and food services and Arts, entertainment and recreation industries
Indirect & induced jobs	9,268	(g)= (e)*(f)	Calculation
Total jobs	22,150	(h)=(e)+(g)	Calculation

¹⁹ Alberta Government (2022) 'Tourism in Alberta 2019'.

²⁰ Statistics Canada. Table 24-10-0042-01 Provincial and territorial gross domestic product (GDP) and employment generated by tourism and related measures

	Value	Formula	Source
Average GVA per worker, Alberta	\$142,060	(i)	OECD. Stat. Regional Economy: Regional GVA per worker. Uplifted to 2020 prices. Converted to CAD from USD (conversion rate of 1.2957, Bank of Canada)
Total GVA	\$3,146,592,327	(j)=(h)*(i)	Calculation

When profiled over the 50-year appraisal period and discounted at a nominal rate of 3.5%, this results in a NPV of \$2.0bn.

Using the 3.5% real discount rate results in a NPV of \$1.2bn over fifty years.

2.6 Land value uplift

Whilst the primary benefits of this project are those impacting the transport network and its users, the increased accessibility as a result of CABR is anticipated to result in an increase in land values in the areas in the immediate vicinity of each new station.

The original WSP CBA analysis of Land Value Uplift (LVU) applied benchmarked uplifts to residential and commercial land values to sites within 400m of key stations along the line and included within the analysis stations in Banff, Canmore, Cochrane, Keith, and Downtown Calgary. The analysis included impacts to both existing properties and future developments, as well as taking into account the conditions of the property markets surrounding the stations. The total net additional LVU impact reported was \$379.39m in present value terms.

We note that the WSP CBA analysis did not attempt to determine LVU associated with the station at Morley (due to adjacent properties being First Nation Reserve lands and not fee simple) or the station at YYC (due to the majority of adjacent properties being airport land, making its usage and value more challenging to assess).

In the LVU appendix of the main WSP CBA document, it is explained that “to arrive at net land value uplift, all other benefits estimated through the different CBA components are subtracted from the total land value uplift”, which is to say that the sum of the benefits used within the CBA calculation (primarily transport user benefits) are subtracted from the overall total land value impact to identify the net additional LVU impact (\$373.39m). It is assumed, though not explicitly stated, that this has been done to be cautious and to avoid the potential for double-counting economic benefits. The update provided in the WSP Memo increased the value to \$428.48m (2020 \$).

For the purposes of Mott MacDonald’s analysis, the \$428.48m figure has been used as the LVU benefit, as there is nothing to suggest any significant errors in previous work (adjusted to \$604.0m using a nominal rate of 3.5%)²¹. Nevertheless, the approach does appear cautious, and as CABR is further developed, more detailed analysis could include the following which would all be expected to show material additional LVU benefit:

- A reconsideration of the study area radius. There is evidence to support expanding the study area around the stations, from a radius of 400m to 1,500m²², as it is anticipated that material LVU benefit will extend to such additional lands.
- Detailed consultation with the relevant planning authorities to establish the level of dependency of potential sites on CABR, and the number of additional jobs, GVA and tax benefits (both during construction and operation) that these developments would support (as well as accounting for other factors such as deadweight, displacement and leakage to refine the analysis).

²¹ Mott MacDonald has not had access to the original WSP calculations, however by disaggregating the results presented in the WSP analysis we have estimated the result for a nominal discount rate.

²² University of Leeds Institute for Transport Studies (2017) “Land value uplift, valuation of streets and multi-sectoral projects”

- Inclusion of LVU benefits to the land surrounding Calgary International Airport – YYC. Consultation with airport authorities and information on planned development (including the emerging Master Plan) would inform this analysis.
- Inclusion of LVU benefits to the land surrounding the planned station in Morley, which, depending on location, may result in benefits accruing to the operational performance of the existing casino as well as supporting other existing and potential developments. Consultation with the Stoney Nakoda, the Alberta Indigenous Opportunities Corporation and with the Township of Morley would inform this analysis.

2.7 Summary of benefits

A summary of the discounted net additional benefits is provided in Table 2.6 below.

There are two key metrics that can be used to assess the Value for Money (VfM) of CABR - the calculation of a BCR, which shows the ratio of net benefits to costs; and the NPSV, which represents the present value of net benefits less the present value of costs. Both metrics have been used to assess the VfM of this project.

The construction of CABR will support c.9,880 job years, generating approximately \$241m of GVA per annum (p.a.) in Alberta. It is standard practice in economic appraisal not to include construction benefits in a BCR calculation as these benefits are temporary.

As stated above, we have adopted an appraisal period of 50 years in the quantification of operational and tourism-related benefits. We have presented the results using a nominal discount rate of 3.5% (used by Government of Alberta), in addition to a 3.5% real discount rate (used in previous economic analysis for CABR, as well as CIB and Alberta Transportation). All values are presented in 2020 \$.

We have also shown a sensitivity analysis, which reflects Liricon Capital & Plenary's revised ridership, operating cost and capital cost projections. These projections are currently being reviewed by an independent ridership and revenue consultant as part of their analysis, but compare higher for both costs and benefits, resulting in a BCR of 3.3 and a NPSV of \$12.1bn using the nominal discount rate.

Table 2.6: Value for Money assessment for CABR (2020 \$)

	3.5% real discount rate		3.5% nominal discount rate	
	<i>Core analysis</i>	<i>Sensitivity analysis</i>	<i>Core analysis</i>	<i>Sensitivity analysis</i>
Benefits	\$ billion	\$ billion	\$ billion	\$ billion
Operational benefits	\$1.38	\$1.51	\$2.20	\$2.39
Transport benefits ²³	\$1.12	\$4.54	\$1.59	\$6.43
Tourism benefits	\$1.20	\$4.91	\$2.02	\$8.25
LVU	\$0.43	\$0.43	\$0.60	\$0.60
Total Benefits for BCR [A]	\$4.13	\$11.38	\$6.41	\$17.68
Total Cost [B]	\$2.01	\$3.84	\$2.31	\$5.23
BCR calculation [C]=[A]/[B]	2.1	3.0	2.8	3.4
Net present social value [D]=[A]-[B]	\$2.12	\$7.54	\$4.11	\$12.45

2.7.1 Benefit to Government of Alberta

We have estimated the potential economic benefit to the province of Alberta, based on the Government of Alberta's anticipated contribution of an annual performance-based payment of \$30 million (2021\$) starting in

²³ The analysis of the ridership levels of CABR is currently being updated by an independent ridership and revenue consultant, which will allow for a full update to transportation modelling and calibration of user benefits once this is completed. In the interim, we have estimated an increase in transportation benefits as a proportional uplift based on the benefits per passenger based on WSP's analysis.

the first year of operation (2026). Again assuming a 50-year appraisal period, this results in \$934m (using a 3.5% nominal discount rate). As the benefits in this analysis are all provincial-level benefits, comparing the benefits in Table 2.6 (for the core analysis) to this contribution results in economic benefit to Alberta of more than six times (6.9) the contribution.

3 Further benefits

The section below summarizes the potential benefits of CABR not included in the BCR calculation.

3.1 Environmental benefits

CPCS (2022) have provided an estimation of the potential reduction in Greenhouse Gases (GHGs) as a result of CABR. This estimation is based on relative change in vehicle kilometers travelled (VKT) between modes in the year 2035, particularly the reduction in VKT by auto and bus due to the diverted travel demand. Three alternative scenarios (low, medium and high) are presented against the core business as usual/ base case scenario.

Assuming the use of diesel rolling stock, the train service could reduce GHG emissions by 600-900 tonnes per year under the base and high scenarios in 2035. Under the low scenario, there would be a net increase in GHG emissions. If a low-carbon hydrogen fuel is used (e.g., blue or green hydrogen), it would be expected to result in a higher number of GHG emissions reductions per year (8,785 tonnes per year in the 2035 base scenario)²⁴.

3.2 Perception of the area to visit, live and work

Further benefits of CABR are likely to include an improved perception of Banff, Calgary (and Alberta in general) as a place to visit, live and work.

Banff is developing a growing reputation for crowds and congestion - in the last decade, the number of people enjoying Banff has increased by 25%, from about three million to four million people a year²⁵. This is leading to more vehicle congestion, degrading the ecosystem and visitor experience, and contributing to climate change (although Banff National Park is the sixth most visited National Park in North America, its total gross transportation greenhouse gas emissions (GHG) is five times higher than the highest emissions National Park in the U.S.). According to a 2019 survey, 30% of visitors cut their trip to Banff National Park short due to congestion, 20% of visitors will not return due to congestion, and 38% of visitors believe that local authorities should do more to address congestion²⁶. If Banff's reputation as a world-leading visitor destination is to be maintained in the long term, adequate transport provision is fundamental to protect the visitor experience - engagement with stakeholders such as Canadian Rocky Mountain Resorts has confirmed this.

Stakeholders in Calgary have highlighted the potential for CABR to benefit the city in numerous ways. This includes increasing overall visitation through induced trips as well as attracting, enhancing, and promoting the Calgary experience, and brand Calgary as the ultimate host city^{27,28}. This has been expressed by stakeholders including Tourism Calgary and Calgary Economic Development. In addition, a modern transit system will accelerate urbanization and connectivity in Calgary (particularly between the city's downtown and

²⁴ Calgary-Banff Rail Study, prepared by CPCS, March 11, 2022

²⁵ Canadian Geographic (2021) 'Smother Nature: The struggle to protect Banff National Park'

²⁶ Banff National Park Net Zero 2035

²⁷ Calgary Economic Development (2019)

²⁸ A host city is defined as a city which has the space, facilities and means to accommodate large-scale events, such as the Olympics.

around the airport), supporting not only the visitor economy but incentivizing redevelopment and boosting tax revenue (according to Calgary Municipal Land Corporation).

CABR would also benefit those living and working along the proposed route, including in smaller settlements outside the main centers of Banff and Calgary. Benefits include increased access to employment, education and services, helping make the area attractive for out-of-province talent and businesses. Moreover, from a labor mobility perspective, CABR has the potential to alleviate demand and housing affordability pressures in the Bow Valley as well as connect communities along the study corridor with major employment centers.

3.3 Impact on Calgary Airport - YYC

CABR is anticipated to have a particularly positive impact on operations at Calgary International Airport (YYC). Pre COVID19, YYC was the fourth-busiest airport in Canada in terms of the total number of passengers served (c. 18 million in 2019). Of these, the majority (70%) were travellers bound for domestic destinations, with 20% travelling to the United States and the remaining 10% was traffic to other international destinations. In 2019, YYC's cargo operations grew significantly with 155,820 tonnes of cargo moving through the airport, an increase of 6.7% over the previous year. Cargo is seen as a growth area with increased diversification of the regional economy and land use opportunities.

The airport currently contributes more than \$8 billion to the city's GDP (about 10% of the economy) and supports nearly 50,000 jobs of which approximately 14,500 are direct employees²⁹. The Airport Authority supplies free parking to employees with other employers at the airport also typically offering free or subsidized parking. These surface parking lots often require bus shuttles to the place of employment and utilize substantial amounts of land surrounding the airport (which do not generate revenue as parking is free).

The airport authority has recently launched an update to the Airport Master Plan which will provide a refresh on the 20-year outlook for the facility. It is expected that this will provide plans for the large amount of land available for development surrounding YYC and envisioning its surrounding area as a “second node” complementing the Downtown Calgary Business District. As a non-share capital corporation which holds a long-term ground lease from the Federal Government, Calgary Airport Authority cannot invest itself in ancillary non aviation businesses but can grant leases to allow others to do so. Consultation with YYC highlighted that projects such as CABR can act as catalysts and influence the nature of development on airport, including opportunities for TOD (Transit-Oriented Development) in specific areas on the Airport Campus. It is anticipated that CABR would have a positive economic impact at both local and provincial levels.

4 Conclusions and next steps

This document provides an updated assessment, based on existing and new inputs, of the potential benefits of CABR, using data as of April 2022. The key findings are as follows:

- The construction of CABR will support c.9,880 job years, generating approximately \$241m of Gross Value Added (GVA) per annum (p.a.) in Alberta. Assuming a three-year construction period, this results in approximately \$694m in GVA overall.
- The operation of CABR is estimated to support 400 direct FTE jobs. It is anticipated that 290 of these will be net additional (or “new”) jobs in the province, which combined with 200 jobs in the supply chain would generate an additional \$69.5m of GVA p.a. to Alberta.
- Transport user benefits of \$1.6bn, with an estimated annual ridership of 2.9m by the year 2035.
- Overall, additional visitors as a result of CABR will support an additional 22,000 FTE jobs and \$2.0bn in GVA.

²⁹ Figures are pre COVID19.

- An uplift in land value of at least \$604m for commercial and residential units surrounding the proposed stations.
- Supporting modal shift from private vehicles to public transport, thereby reducing greenhouse gas emissions.
- An improved perception of Banff, Calgary (and Alberta) as a place to visit, live, work and host events.
- CABR will support plans to expand and develop activity at Calgary International Airport (YYC), maximising its potential as a leading airport and as a location for Transit-Oriented Development (TOD).

Taking into account these benefits, CABR could potentially support at least an additional 22,500 jobs and associated \$6.4bn worth of benefits in Alberta. Relative to the current estimated costs of the project (\$2.0bn), this represents a BCR of 2.8 and a Net Present Social Value of \$4.1bn (2020 \$).

Comparing the benefits of CABR to the Government of Alberta's anticipated annual performance-based payment of \$30m (starting in the first year of operation, 2026), this results in economic benefit to Alberta of over six times (6.9) their contribution, over a fifty-year appraisal period.

Considering the revised Liricon Capital & Plenary projections for ridership, operating and capital costs (which are currently being reviewed by an independent consultant) this could result in an increased NPSV of \$12.45bn and a BCR of 3.4.

As the CABR project develops and information is refined, the following activities should be considered.

- A labour market assessment to understand whether the job opportunities created by CABR (both during the construction and operational phases) are likely to be filled by local residents and businesses. This would include an analysis of employment/unemployment statistics and skills and qualifications data, mapped against the opportunities created by CABR. This will show whether the local labour market has sufficient skills and capacity to meet the opportunities created.
- This analysis has focussed on the benefits at a provincial/Alberta level. Future analysis may consider the benefits at lower level, for example the benefits to Calgary, Banff or key stakeholders such as YYC.
- A refinement of the CABR's benefits might also be considered once the independent ridership and revenue consultant has published their revised ridership figures and there is more certainty around the project's construction and operation costs.

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