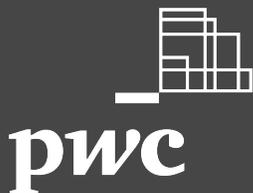


Economic Impact Analysis of Highway 3 Twinning in Alberta

**Report prepared by PwC for Highway 3 Twinning
Development Association**

December 1st, 2022



Disclaimer

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This report was developed in accordance with PwC’s agreement with H3TDA dated May 18, 2022 and is subject to the terms and conditions included therein. Our work was limited to the specific procedures and analysis described herein and was based only on the information made available at the time we prepared the report. Accordingly, changes in circumstances after the date of this Report could affect the findings outlined herein.

We are providing no opinion, attestation or other form of assurance with respect to our work and we did not verify or audit any information provided to us by H3TDA or from third parties.

This report has been prepared solely for the use and benefit of, and pursuant to a client relationship exclusively with Highway 3 Twinning Development Association (H3TDA). We understand that our deliverable will be shared among H3TDA’s staff and could also be shared with H3TDA’s stakeholders (e.g. government) and further that you may also wish to make our deliverable public. You may make our deliverable public, provided that the deliverable is published in its entirety, including relevant disclaimers.

Should you want to use excerpts from our deliverable or post your own statements describing our deliverable, you would need to concurrently provide a clear link to our entire deliverable and get PwC’s consent to release such excerpts or statements, which consent shall not be unreasonably withheld, delayed or conditioned. In that context, PwC will provide its comments to a draft statement produced by you within five working days of receiving such draft statement.

PwC accepts no duty of care, obligation or liability, if any, suffered by any third party that reads our deliverable, any excerpts from our deliverable or statements describing our deliverable. Further, no person or entity, other than H3TDA, shall place any reliance upon the accuracy or completeness of the statements made in our deliverable.

The analysis and observations presented in this document are based on information provided to us by H3TDA, which has not been verified by PwC.

All dollar values are in 2022 Canadian undiscounted dollars (“\$”), unless otherwise specified.

Limitations associated with this report are found in Appendix B and form an integral part of this report.



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Executive summary

Study context

Alberta Provincial Highway 3, also named Crowsnest Highway, is a major highway in Southern Alberta and part of Canada's National Highway System. The highway follows the alignment of the Canadian Pacific Railway, and sections of it make up the CANAMEX Corridor which is known for North-South Trade stretching from Canada through western United States to Mexico. The Highway 3 Twinning Development Association ("H3TDA" or "you") is a non-profit organization that has advocated for the twinning of Highway 3 for more than two decades. H3TDA strongly believes in the "potential benefits of the completion of the twinning of Highway 3 to ensure safety, tourism, supply chain movement, and economic growth in Alberta."

Within this context, H3TDA has engaged PricewaterhouseCoopers LLP ("PwC", "we", "us" or "our") to conduct a socio-economic analysis in relation to the twinning of the currently un-twinning sections of Highway 3 corridor. Our assessment is comprised of an estimate of the economic footprint associated with twinning as well as the identification and description of the wider socio-economic benefits from the twinning. For the purpose of the economic footprint estimate, the following proposed Highway 3 sections were included, per H3TDA's guidance:

- Highway 523 to west of Seven Persons
- West of Seven Persons to east of Burdett
- Fort Macleod bypass (including Stage 1A)
- Fort Macleod to Pincher Creek (including Piikani Nation)
- Pincher Creek to east of Highway 507
- East of Highway 507 to Sentinel

Summary of findings

The economic footprint of the twinning of Highway 3 has been modelled through an economic analysis framework that has utilized an Input-Output (I-O) modelling approach. The economic footprint of the proposed twinning has been modelled across two impact channels:

- Construction: One-off economic impact associated with the capital expenditures made to twin the highway.
- Annual Operating and Maintenance: Economic impacts associated with the operations and maintenance of the newly twinned Highway 3 sections. We have focused on the incremental annual impact of maintenance expenditures once completed (e.g. twinned solutions vs. existing).

Highlights of the economic footprint estimated for the proposed twinning of Highway 3 are as follows:

- The initial capital expenditures for the proposed Highway 3 twinning is estimated to facilitate \$1.5 billion in GDP for Alberta's economy throughout its construction period, as well as 12,481 jobs.
- Once constructed, the operating and maintenance expenditures associated with the newly twinned sections of Highway 3 are estimated to facilitate \$0.7 million in GDP and 6 jobs on an ongoing, annual basis (incremental to the existing operations and maintenance associated with these sections).

In addition, twinning the remaining sections of Highway 3 has the potential to result in a range of wider socio-economic benefits (many are related and enable each other), including:

- Improved regional economic outcomes for local businesses and residents as a result of:
 - Improved supply chain and transportation efficiencies for key economic sectors
 - Broadened labour catchment
 - Enhanced local tourism offering
- Improved road safety outcomes and collision reduction
- Enhanced network resilience and contingency
- Improved food security

It must be recognized that there are significant opportunities for growth in Southern Alberta, and that twinning is an important element in facilitating such growth. In the absence of twinning Highway 3, in addition to the impacts identified in the economic footprint estimate, the wider socio-economic benefits identified in this section may also be put at risk.

1. Introduction

1.1 Study background

Highway 3 is an interprovincial highway that runs from British Columbia's Fraser Valley to Southeast Alberta, just west of Medicine Hat. In 2021, Highway 3 saw a Weighted Average Annual Daily Traffic (WAADT) count of 6,814 and a Weighted Average Summer Daily Traffic (WASDT) of 7,724¹. The highway follows the alignment of the Canadian Pacific Railway, and sections of it make up the CANAMEX Corridor which is known for North-South Trade stretching from Canada through western United States to Mexico.

The Highway 3 Twinning Development Association ("H3TDA" or "you") is a non-profit organization that has advocated for the twinning of Highway 3 for more than two decades. H3TDA strongly believes in the "potential benefits of the completion of the twinning of Highway 3 to ensure safety, tourism, supply chain movement, and economic growth in Alberta."

As of February 2022, H3TDA has outlined the following sections as 'priority' areas for the twinning of Highway 3:

- Medicine Hat to Seven Persons (26 km)
- Pincher Station to Bellevue (36 km)
- Seven Persons to Burdett (46 km)
- Fort MacLeod Stage 1A

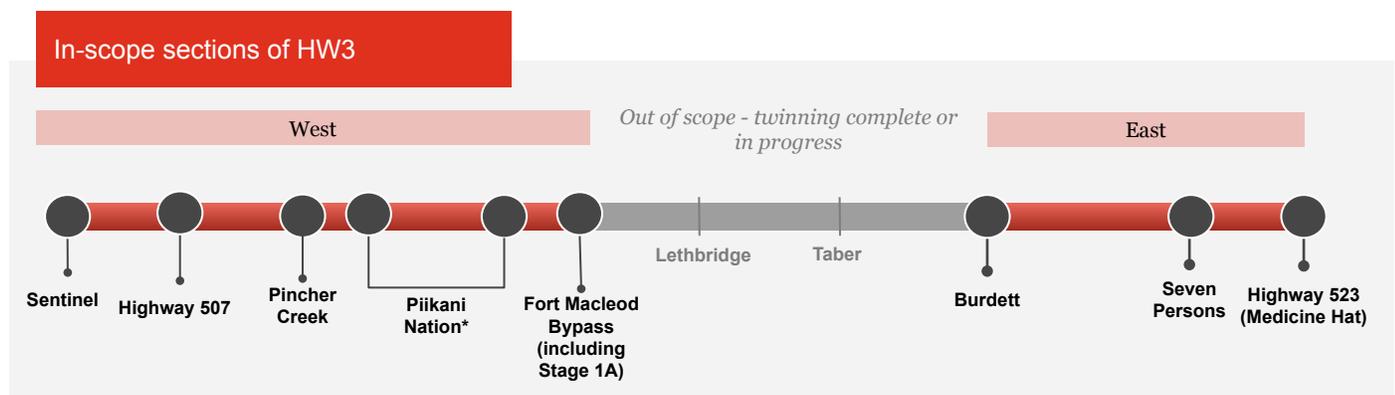
1.2 Study objectives

Within this context, H3TDA has engaged PricewaterhouseCoopers LLP ("PwC", "we", "us" or "our") to conduct a socio-economic analysis in relation to the twinning of the currently un-twinning sections of Highway 3 corridor, which runs from Medicine Hat AB to the BC border (the "twinning"). Our assessment is comprised of an estimate of the economic footprint associated with twinning as well as the identification and description of the wider socio-economic benefits from the twinning.

For the purpose of the economic footprint estimate, the following proposed Highway 3 sections ("in-scope sections") were included, per H3TDA's guidance (presented east to west):

- Highway 523 to west of Seven Persons
- West of Seven Persons to east of Burdett
- Fort Macleod bypass (including Stage 1A)
- Fort Macleod to Pincher Creek (including Piikani Nation)*
- Pincher Creek to east of Highway 507
- East of Highway 507 to Sentinel

Recognizing the differences in the economic makeup of different regions across Alberta, we have grouped, for the purpose of our assessment, the in-scope sections into two groups: (a) The Eastern portion includes any sections east of Burdett, and (b) the Western portion, which includes any sections West of Fort Macleod (including the bypass). A conceptual visual of the in-scope sections is shown below.

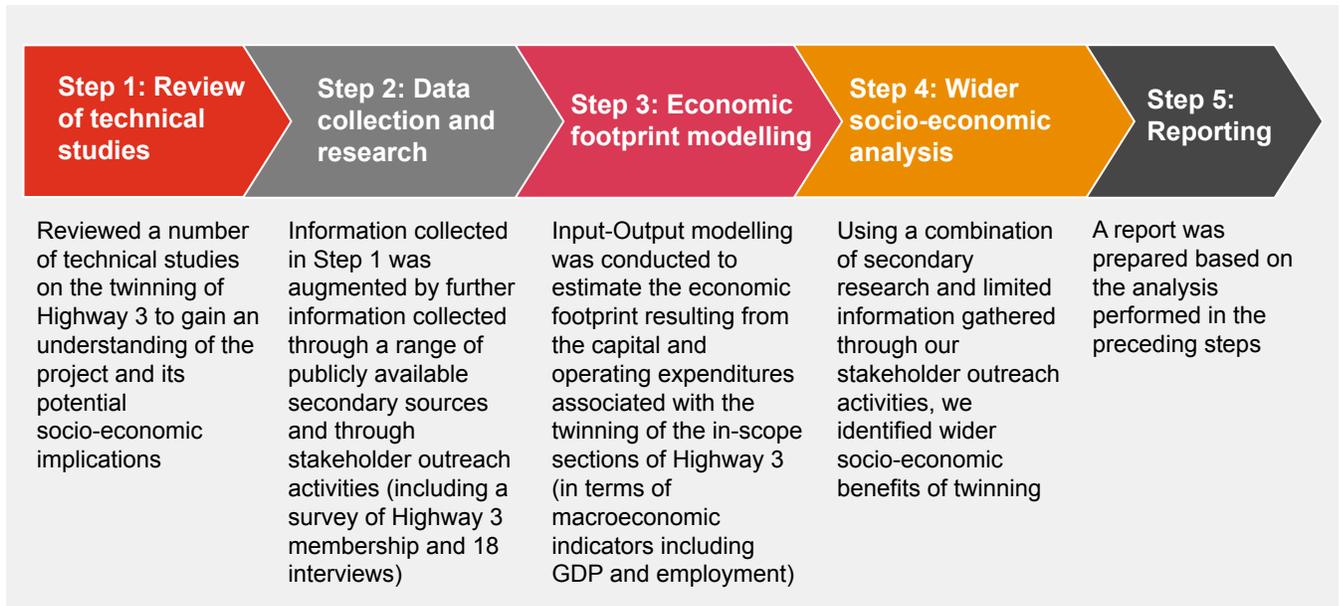


*The in-scope section of Highway 3 from Fort Macleod to Pincher Creek travels through Piikani 147 Reserve (Piikani Nation), a census subdivision within the Project Region. We understand that the Government of Alberta is further investigating this section of twinning for Highway 3, including a potential Functional Planning Study².

1. Introduction

1.3 Study approach

The following elements summarize the overall approach to completing this economic analysis:



1.4 Report structure

The remainder of this report is structured as follows:

- **Section 2:** An overview of Highway 3, an overview of the proposed project, and a summary of the economic profile of the project region.
- **Section 3:** Estimated economic footprint including direct, indirect and induced impacts of the Project
- **Section 4:** Discusses additional wider socio-economic impacts of the Project, including impacts to industry and the transportation system.
- **Appendices**



2. Highway 3 context

2.1 Overview of Highway 3

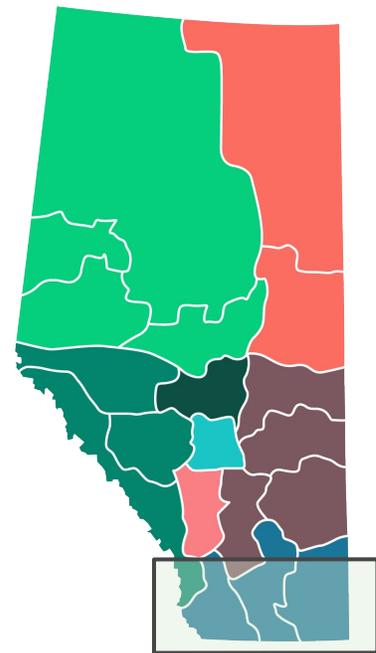
Alberta Provincial Highway 3, also named Crowsnest Highway, is a major highway in Southern Alberta and part of Canada's National Highway System. The highway begins in South-east Alberta, in Medicine Hat, where it peels off of the Trans-Canada Highway and travels southwest to provide an alternative East-West route across the province. Highway 3 continues into southern British Columbia to the municipality of Hope where it merges with Highway 1.

The 324-km highway meets up with multiple north-south routes in Alberta, including Highway 2, which heads north towards Calgary, and Highway 4 which connects with Montana at the Coutts border crossing. The Coutts border crossing is one of the busiest in Western Canada, and is the only 24-hour crossing in Alberta. Because of Highway 3's connection with both the Trans-Canada Highway and highways spanning the U.S.-Canada border, it is a key section of the CANAMEX Corridor connecting Canada to multiple trade and export routes in the United States and Mexico. Highway 3 also runs alongside the Canadian Pacific Railway's alignment, strengthening its role in domestic and international transportation of freight.

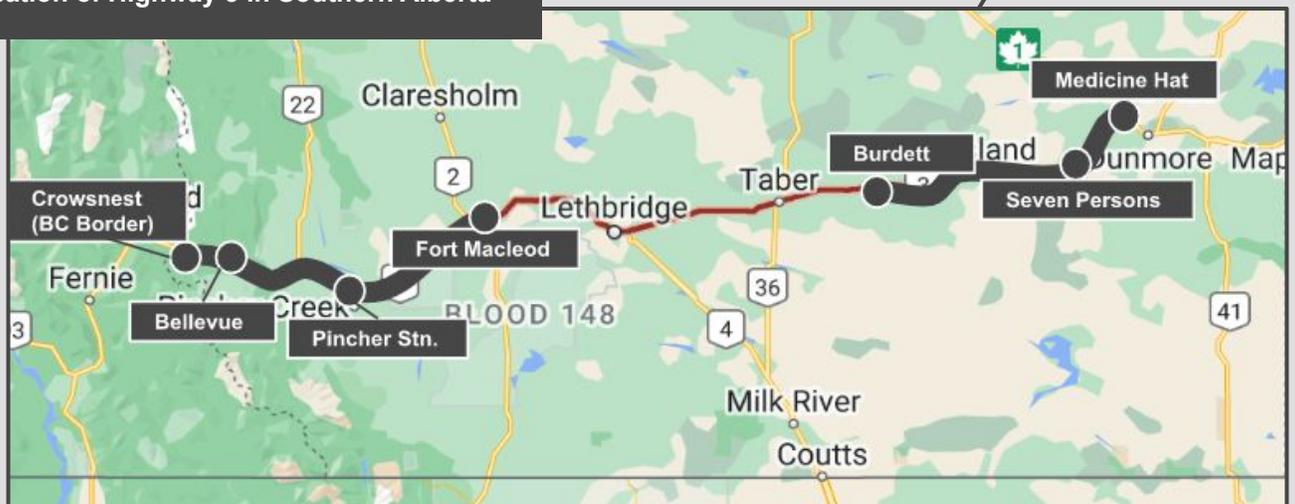
Highway 3 runs directly through the Lethbridge-Medicine Hat Economic Region in Alberta, which is composed of Census Divisions (CD) 1, 2 and 3 (as defined by Statistics Canada). Closer to the BC border and outside of the Lethbridge-Medicine Hat Economic Region, Highway 3 also runs through Crowsnest Pass, a specialized municipality within CD 15. Highway 3 is a two-lane road throughout Alberta, except between Fort MacLeod and Taber where it is a four-lane divided, or "twinning" highway.

In 2020, the section from Taber to Burdett was approved for twinning through funding from the provincial government. Construction was planned to begin in 2021 with a cost of approximately \$150 million for road work.

The figure below shows the sections of Highway 3 that are not currently twinned or in a planning or construction phase to be twinned in the near future.



Location of Highway 3 in Southern Alberta



Source of figures: Alberta Real Estate Association; Google Maps

Key	
Currently 2 lane (not twinned)	
Currently twinned or approved to be twinned	

2. Highway 3 context

2.2 Project overview

Characterization of the Project Region

The table below provides an overview of the specific Census Subdivisions (CSD) that Highway 3 runs through within the 4 CDs outlined on the previous page. Due to insufficient economic data applicable to the area directly along the Highway, the aggregation of in-scope communities within CD 1, 2, 3, and Crowsnest Pass (located in CD 15) is referred to in this report as the “Project Region”. We identified the Project Region in this way for the purposes of analyzing population, employment, commuter trends and key economic sectors in the areas most immediately surrounding the Highway.

CD 15, in which Crowsnest Pass is located, is a division that runs North-South along the BC border, reaching Central Alberta. CD 15 also includes the towns of Banff, Canmore and Jasper. To isolate the impacts of Highway 3 twinning in this Census Division, we have only included the specialized municipality of Crowsnest Pass in the Project Region, which sits at the most Southern part of CD 15 and shares a border with CD 3. A specialized municipality is a unique type of municipality where urban and rural communities are allowed to coexist in a single municipal government.³ Specialized municipalities only exist in Alberta, and are classified as census subdivisions in the Canadian Census.

Due to the size of CD 15, we have excluded all other census subdivisions to ensure our profile of the Project Region is focused on the area in and around Highway 3. Highway 1 (connecting to Calgary), Highway 16 (connecting to Edmonton) and Highway 11 (connecting to Red Deer) also run through CD 15, north of Highway 3. Although we do not anticipate that the twinning of Highway 3 would impact the populations in and around these other Highways to the same extent as those we’ve included within the Project Region, we do acknowledge that they may be indirectly impacted by the twinning of the Highway on a provincial level. This is also true for other subdivisions within CD 1, 2 and 3 not included in the Project Region.

Table 1: Project Region - In-Scope Census Subdivisions of Highway 3 in Southwestern Alberta

Census Division	In-Scope Census Subdivisions (CSD)	
	Municipal Districts (MD)	Select Cities (C), Towns (T), Villages (V), Reserves (R)
CD 1	<ul style="list-style-type: none"> Cypress County Forty Mile County No. 8 	<ul style="list-style-type: none"> Medicine Hat (C) Bow Island (T)
CD 2	<ul style="list-style-type: none"> Lethbridge County Taber MD 	<ul style="list-style-type: none"> Lethbridge (C) Coaldale (T) Coalhurst (T) Taber (T) Barnwell (V)
CD 3	<ul style="list-style-type: none"> Pincher Creek No. 9 Willow Creek No. 26 	<ul style="list-style-type: none"> Fort Macleod (T) Pincher Creek (T) Piikani 147 (R)
CD 15	<ul style="list-style-type: none"> Crowsnest Pass (specialized municipality) 	

Source: Statistics Canada 2021 Census Profiles

The Project is expected to affect the region along the newly twinned areas of the Highway, in which expansion of the road infrastructure is expected to take place. For the purpose of characterizing the Project Region, we have relied on the Statistics Canada Census data, which provides a snapshot of the region’s characteristics, including its industrial composition and labour force.

Section 3 of this report will explore the economic impacts in Alberta resulting from capital expenditures and annual operating and maintenance expenses for twinning the currently untwinned sections of Highway 3. These sections are located in CD 1, 3 and Crowsnest Pass. The untwinned, but approved section from Taber to Burdett (located in CD 2) is considered out of scope for the economic footprint estimate. However, it should be noted that it is expected that construction and maintenance of the highway will impact communities and areas beyond those it runs through, including CD 2. Impacts on a section-level, and a Canada-wide level are presented in Appendix A. A newly twinned Highway 3 is also expected to generate wider socio-economic impacts for Southwestern Alberta and Canada as a whole, which will be explored in Section 4 of this report.

2. Highway 3 context

2.3 Profile of the Project Region

This subsection provides information about the economic profile of Alberta and the Project Region. It includes an overview of the regional economic drivers, key industries, labour market characteristics and economic outlook of the Project Region in order to contextualize our economic analysis as it relates to the local population in the project region and the province as a whole. The information in this section was gathered through interviews with stakeholders in the region as well as secondary sources.

Population

The Project Region is most densely populated in the urban centres of Lethbridge and Medicine Hat. Between 2010 and 2021, the aggregate population of the census divisions surrounding Highway 3 grew from approximately 219,000 to just under 244,000 (11%). Within the Project Region during this time period, the most significant population growth was experienced by the City of Lethbridge (19%), the towns of Coaldale (19%) and Coalhurst (56%), the village of Barnwell (50%), and Piikani Nation (27%). Bow Island, Pincher Creek, Fort Macleod and Crowsnest Pass experienced negative population growth between 2010 and 2021.⁴

The total aggregate population of CD 1, 2, 3 and 15 is expected to experience population growth of approximately 25% between 2022 and 2046. Over the same time period, the population of Alberta is projected to grow by 42%.⁵ Alberta's growing population and related economic activity will put additional pressure on the major provincial highways, which will require additional investment in maintenance and increasing capacity.

Employment

The industries that employed the most people as of 2021 on a provincial level were health care and social assistance, retail trade and construction. As of September 2022, the Economic Region of Lethbridge-Medicine Hat, in which the majority of Highway 3 is located, had an unemployment rate of 3.3%. This was the lowest unemployment rate in the province, while other Alberta Economic Regions had unemployment rates ranging from 4.5% to 6.6%.⁶ A breakdown of the major employment industries in 2021 as a percentage of the labour force aggregated for the Project Region's Census Divisions and Alberta are displayed below.

Table 2: Percentage share of employment by industry in Project Region, by Census Division, 2021

Industry	CD 1*	CD 2*	CD 3*	Crowsnest Pass, Specialized municipality	Total Highway 3 Project Region**	Alberta
Agriculture; forestry; fishing and hunting	6.2%	6.8%	19.5%	2.1%	7.3%	2.9%
Mining; quarrying; and oil and gas extraction	4.7%	1.7%	4.0%	19.6%	3.2%	5.1%
Construction	9.1%	8.5%	9.4%	8.2%	8.8%	9.5%
Manufacturing	4.2%	8.3%	4.3%	2.9%	6.7%	5.3%
Retail trade	13.9%	11.3%	10.5%	8.4%	12.1%	11.4%
Health care and social assistance	15.3%	15.0%	12.9%	14.7%	15.1%	12.8%
All other industries	46.6%	48.5%	39.2%	44.2%	46.7%	53.1%

*Sum of the in-scope communities within the Census Division, listed in Table 1 on the previous page.

**Total of in-scope communities in CD 1, 2, 3, and Crowsnest Pass.

Source: Statistics Canada 2021 Census Profiles.

As shown in Table 2, the majority of employment in Crowsnest Pass is within the mining, quarrying and oil and gas industries, with relatively lower employment shares in manufacturing, and agriculture, forestry and fishing and hunting. The other census subdivisions that Highway 3 passes through within CD 1, 2 and 3 have employment in the agricultural sector higher than the provincial average, mostly driven by communities in CD 3. Finally, the total area of Highway 3 also has higher share of employment in the manufacturing sector than the provincial average, driven mostly by communities in CD 2.

2. Highway 3 context

Key economic sectors

Highway 3 spans nearly the entire width of the province, and as a result travels through many different geographical and economic landscapes in Southern Alberta. Stakeholder engagement underscored that the Project Region east of Lethbridge is most known for its agri-food and manufacturing activity, and therefore relies heavily on the highway for supply-chain connections, transporting inputs for processing, and ultimately interprovincial, national and international trade for transporting products to final markets and/or for further processing. The western portion of the highway, though still involved in agri-food and manufacturing, is more focused on mining and tourism offerings. Below we discuss the key industries of the Project Region that rely heavily on Highway 3 - there are opportunities for continued growth within the Project Region's key industries. The twinning of Highway 3 will be an important element in facilitating such growth.



Agri-food

Southern Alberta is widely known as Alberta's hub for primary agriculture and food processing activity. In 2020, Alberta's agricultural exports totalled over \$12.4 billion, \$6.7 billion of which were value-added products.⁷ Southern Alberta's rich soil makeup, climate, and vast irrigation network are the key drivers of its agricultural competitiveness. As of 2021, the census division of Forty Mile County No. 8 (located in the Project Region) had the largest area of cropland in the province, at 956,941 acres.

Highway 3 runs through three major Irrigation Districts (IDs) in Southern Alberta: St. Mary River, Taber, and Lethbridge Northern. Irrigation infrastructure provides water to farmers, food processors, intensive livestock operations, towns and villages, wildlife habitat, and recreation facilities throughout Alberta. Recently, the Government of Alberta, together with the Canada Infrastructure Bank (CIB), has been working to modernize irrigation infrastructure in Southern Alberta in order to increase primary crop production and water storage capacity. Additional irrigation is seeking to attract new or relocate existing food processors, including livestock producers, into/in the region. Value-added food processors have been attracted to Southern Alberta because of the availability of irrigation systems, which facilitate the production of a diverse range of crops both reliably and efficiently. Over the past decade, the number of acres used to produce speciality food-processing crops in Southern Alberta, specifically potatoes, sugar beets and dry beans, has increased.



Southern Alberta is now home to many large crop processing plants, including McCain Foods, Lamb-Weston, Lantic and recently, Cavendish Farms' frozen potato processing plant. In addition, Lethbridge is currently constructing a 268,000 square foot \$70.6 million Exhibition Agri-food hub and Trade Centre. The project is expected to be completed by 2023 and will be used to assist the incubation of local agricultural producers to scale their businesses and production nationally and internationally.⁸ As the number of irrigated acres increases with growing investments, crop producers will have further opportunities to diversify their crop mix in comparison to dryland production, and potentially increase output of speciality crops. In addition to crop processing, Southern Alberta is where large meat processors such as JBS Food Canada and Cargill have set up large processing plants. As a result of the investment by Government of Alberta and CIB, newly irrigated acres can also be utilized for grazing of cattle (as feedlots) between crop rotations or following harvest, creating opportunities for livestock output and beef processing activities.

The agricultural sector in Southern Alberta relies heavily on Highway 3 for transportation of farming inputs, raw goods, processed goods, labour, and equipment. It was noted through stakeholder engagement with a local industry participant that a single commodity farmed in Southern Alberta may be transported along Highway 3 more than 4 times before it is transported or exported to a retail or consumer end-market. A high proportion of such movement throughout the Project Region is local and seasonal, especially around harvesting and planting seasons. Thus any rate of expansion in agriculture activity will result in a significantly higher rate of increase in traffic volume on Highway 3.

2. Highway 3 context



Manufacturing

Southern Alberta is a strategic location for manufacturers due to its proximity to key transportation corridors and access to both domestic and global markets. The Project Region is home to a diverse array of manufacturing and processing facilities that have a growing reliance on Highway 3 for transportation of inputs and finished goods. Stakeholder engagement identified the presence of many growing businesses in the sectors of agri-food processing, manufacturing of modular buildings and homes, and tire manufacturing (among others) within the Project Region. Alberta also has strong international brand awareness, as it relates to its petrochemical manufacturing capabilities. Easy access to efficient and safe transportation corridors is an important factor for determining where these businesses choose to operate and establish facilities. It is also critical to the ability of established businesses to grow and attract additional investments and talent into the region. Stakeholder engagement revealed that the modular home manufacturing businesses within the Project Region face challenges related to transporting end-products on untwinned sections of Highway 3.



Energy & Mining

Alberta's GDP is primarily driven by oil and gas extraction, which employs around 6% of the province's labour force but directly accounts for 25% of its GDP, with a significantly higher share when all upstream and downstream industries are considered.⁹

In addition to oil and gas, Alberta has a growing amount of wind and solar generation occurring in the energy sector. Canada Energy Regulator estimates that by 2040 33%-42% of electricity in Alberta will be generated by solar and wind. This is in stark contrast with 2020, in which only 5.5% of electricity in Alberta was generated by solar and wind power.¹⁰ Increased efforts by both the federal and provincial governments to reduce dependence on greenhouse gases means more investment will be made in alternative energy sources, such as solar and wind.



Many wind projects are proposed for Southern Alberta in close proximity to Highway 3, including Buffalo Atlee Wind Farm (Jenner), Bull Trail Wind Farm (Irvine) and Tempest Wind Project (Warner County).¹¹ Wind turbines used for energy production can stand at over 175 metres high, with blades of between 50 to 100 metres. To minimize impacts to existing communities and to maximize energy output, wind turbines are often located in rural areas that have high quality wind conditions. These projects rely on Alberta's network of highways and roads for the transport of wind turbine components across and within the province. One stakeholder indicated that Highway 3 is often "one industry boom away" from facing severe congestion issues, whether it be in oil and gas, energy, or resource extraction, especially as machinery used in these sectors is getting larger over time.

Finally, the Western area of the Project Region (notably west of Pincher Creek) is significantly more rocky and mountainous than the East, and contains various mineral deposits. The communities in the western section of the Project Region rely heavily on tourism as an industry, but are also seeking to diversify their economies and increase activity in other sectors (notably resource extraction). Crowsnest Pass Chamber of Commerce representatives indicated that the majority of businesses in the region were in favour of bringing coal mining back to the region as an opportunity to diversify the economy and remove some burden off the (mostly) residential tax base in the area.¹² At this time, there are multiple steelmaking coal projects within Crowsnest Pass at various stages of development. Montem Resources, in particular, is currently pursuing 3 separate greenfield projects in Crowsnest Pass for steelmaking coal resources, as well as scoping the development of an open pit coal mine at Tent Mountain, located just South of Highway 3 and Crowsnest. Montem is also considering the development of a renewable energy complex at Tent Mountain, which would include Pumped Hydro Energy Storage, a Green Hydrogen Electrolyser, and an Offsite Wind Farm.¹³ The development and operation of mines and/or proposed infrastructure would benefit from access to a twinned road, both for the movement of equipment and eventually, mining outputs.

2. Highway 3 context



Tourism

Alberta is home to multiple provincial, national and international tourist destinations. The province has some of the most visited tourist and geotourist destinations in the country, including Calgary, Jasper and Banff National Park*. Alberta is also known internationally for having 6 UNESCO World Heritage Sites, 5 of which are located in Southwestern Alberta. Highway 3 acts as a key connection for tourists accessing these destinations to the North and the South, while also providing a route to access heritage stops directly along the Medicine Hat-Lethbridge-Crowsnest Pass corridor. These sites include the Frank Slide, the Burmis Tree, and Hillcrest Mine Disaster Cemetery, all located within Crowsnest Pass in the western section of the Project Region.

Stakeholder engagement underscored that Southern Alberta also attracts day-trip visitation from the United States and interior British Columbia who live close to the border, both due to proximity and Alberta's preferential sales tax rates. However, Highway 3 also connects with Highway 22 which connects southern BC to the City of Calgary. For some shoppers, visiting Calgary is more attractive than using Highway 3 to go to Lethbridge, even though Lethbridge is nearly 80 km closer to the BC border than Calgary. Highway 3 has been described as slow, frustrating, dangerous, and ultimately "not welcoming" to use, enticing users to choose a longer route and a different destination. As a result of the current conditions of the Highway and a potential worsening of congestion conditions, there is potential for the tourism (including day-trip visitation) offering to be weakened and future growth restricted.

Writing-On-Stone Provincial Park and UNESCO World Heritage Site, located approximately 100 km south of Lethbridge



*Geotourism is a growing section of tourism focused on the "distinctive geographical character of a place", including its environment, geological features, heritage, and culture (source: National Geographic). Many of the major tourist destinations in the Project Region, particularly those located in and around Crowsnest Pass, could be classified as geotourist destinations.

2. Highway 3 context

Commuter flows

A large number of Southern Alberta residents rely on Highway 3 for commuting to and from work. Table 3 shows the commuter flows for the Census Subdivisions (CSD) in the Project Region. A **positive commuter flow value suggests that more people work than live in that community, while a negative net commuter flow suggests that more people live than work in that community**, and therefore commute to work in a different census subdivision. For example, the net commuter flow for the City of Lethbridge indicates that 860 more people commute to Lethbridge from outside the City than leave Lethbridge for travel to work. The negative commuter flow for Coalhurst indicates that 405 more people leave the town to work elsewhere, than travel to Coalhurst for work from another place of residence. This analysis excludes people who work in the same community as they reside (and are not considered commuters).

Car travel is the predominant mode of commuting in the Project Region, with over 92% of the employed labour force using a car, truck, or van to commute to work.¹⁴ It is likely that the majority of the commuters in the Census Subdivisions below depend on Highway 3 for their daily drive to and from work, due to the communities' proximity to the roadway.

Stakeholder engagement underscored that a lot of commuters are travelling to manufacturing facilities outside of urban areas. In addition, many Crowsnest Pass residents travel into British Columbia for work due to the proximity to the border, suggested by their negative net commuter flow. The majority of the Crowsnest Pass tax base is residential, as there is little commercial and industrial activity.

Table 3: Commuter flows in Project Region, 2021

Community	Number of people:		Net commuter flow in 2021	Top place of work outside of community*
	Travelling to work in community	Leaving community for work		
Bow Island	390	95	295	Taber (MD)
Lethbridge	5,475	4,615	860	Lethbridge County; Coaldale
Coalhurst	400	805	-405	Lethbridge
Coaldale	1,600	2,025	-425	Lethbridge
Barnwell	95	200	-105	Taber
Medicine Hat	2,940	2,900	40	Cypress County; Redcliff
Forty Mile County No. 8	45	430	-385	Bow Island
Cypress County	2,080	1,640	440	Medicine Hat
Willow Creek No. 26	405	1,140	-735	Fort Macleod
Fort Macleod	810	185	625	Lethbridge
Lethbridge County	2,460	1,810	650	Lethbridge
Taber (MD)	715	1,005	-290	Taber
Taber	1,420	750	670	Taber (MD); Lethbridge
Pincher Creek No. 9	80	725	-645	Pincher Creek
Pincher Creek	780	165	615	Pincher Creek No. 9; Claresholm
Piikani 147	45	90	-45	Pincher Creek
Crowsnest Pass	260	610	-350	Sparwood (BC)

Source: Statistics Canada. Table 98-10-0459-01

As population grows, cost of living increases and labour shortages continue to hinder economic activity and growth in Alberta and across Canada, implications of commuter flows and broadening labour catchment should be a key consideration for any transportation infrastructure improvements. The current conditions of Highway 3 may be limiting the ability of the Project Region to attract the skill and labour it requires to facilitate its growth opportunities.

Collision rates on Highway 3

Collision data provided by the Government of Alberta revealed the following**:

- The highest collision rates (on a per vehicle kilometer basis) on Highway 3 among 8 “control” sections used by the Government of Alberta are found in the western portion of the Highway, from the B.C. border to Burmis, and from Burmis to west of Cowley. Both of these sections are untwinned
- As at 2018, collision rates on undivided sections of Highway 3 are approximately 1.5X higher than collision rates on divided sections of Highway 3 (on a per vehicle kilometer travelled basis)
- Between 2014 and 2018, the overall collision rate on Highway 3 increased by 15.7% (on a per vehicle kilometer basis)
- For Alberta provincial highways numbered 1-499, in 2018, the divided highway collision rate was lower than the divided sections of Highway 3 but higher than Highway 3 for undivided sections (on a per vehicle kilometer basis)

**If the top commuting destination is a municipal district, the top commuting destination among cities, towns, villages, and reserves is also included.

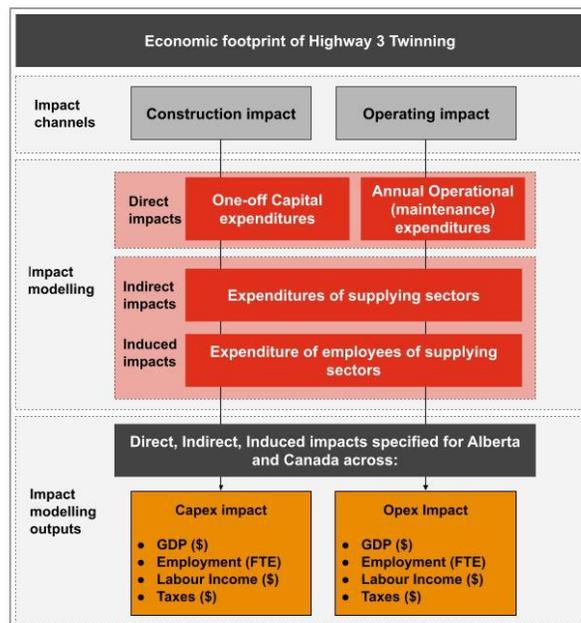
**2014-2018 was the most recent information available from Government of Alberta.

3. Economic footprint estimate

3.1 Economic modelling framework

The economic footprint of the twinning of Highway 3 has been modelled through the economic analysis framework, which has utilized an Input-Output (I-O) modelling approach. As shown in the figure below, the economic footprint of the proposed twinning has been modelled across two impact channels:

- **Construction:** One-off economic impact associated with the capital expenditures made to twin the highway.
- **Annual Operations and Maintenance:** Economic impacts associated with the operations and maintenance of the newly twinned Highway 3 sections. We have focused on the *incremental* annual impact of maintenance expenditures once completed (e.g. twinned solutions vs existing).



3.2 Direct, Indirect and Induced impacts

The economic footprint of the proposed Highway 3 twinning across the defined impact channels have been estimated at the **Direct, Indirect and Induced** levels. These impacts, individually and collectively, represent how the activities associated with the construction and operation of the newly twinned sections of the Highway ripple throughout Alberta and Canada's economy. The fundamental philosophy behind input-output analysis is that spending on goods and services has attendant impacts throughout the economy. For instance, twinning un-twinning sections of Highway 3 will generate demand for the inputs to this process, such as labour and raw materials, which in turn generates additional demand that extends beyond the initial spending.

Economic footprint is typically estimated at the Direct, Indirect and Induced levels based on capital and operating expenditures in Alberta.

- **Direct impacts** result from companies' spending on suppliers and employees.
- **Indirect impacts** arise from the activities of the firms providing inputs to a company's suppliers (in other words, the suppliers of its suppliers).
- **Induced impacts** are the result of consumer spending by employees of the businesses stimulated by direct and indirect expenditures.

The **total economic footprint** is equal to the sum of the Direct, Indirect, and Induced economic impacts.

The input-output model used for the purpose of this report estimates the relationship between a particular economic activity for a given good or service and the resulting impacts throughout the economy (i.e. including demand for other goods and services, and tax revenues). For the purpose of this report, economic impacts were estimated for the following **measures of economic activity**:

- **GDP (also known as value added)** - the value added to the economy, or the output valued at basic prices less intermediate consumption valued at purchasers' prices. GDP includes only final goods to avoid double counting of products sold during a certain accounting period.
- **Employment** - the number of jobs created or supported.
- **Labour Income** - the amount earned by the employment expected to be generated (including social benefits such as employer contributions towards pensions and employment insurance).
- **Taxes paid**, including:
 - **Taxes on Production and Products** – the amount of tax revenues generated from taxes on products and production (e.g. gas tax, sales taxes, and excise taxes) at the provincial and local level
 - **Personal income tax** - the amount of provincial tax revenues generated from taxes on the income of employees and self-employed individuals.
 - **Corporate income tax** - the amount of provincial tax revenues generated from taxes on the profits of corporations.

3. Economic footprint estimate

3.3 Economic modelling results

Capital expenditure footprint

The initial capital expenditures for the proposed Highway 3 twinning will generate economic and facilitate activity in transportation engineering construction and architecture, engineering and related services industries. The resulting economic footprint from total capital expenditures* by highway section is presented in the table below.

Table 4: Economic footprint of capital expenditures to twin Highway 3 by highway section - AB

*In 2022 \$CAD, cumulative***

	GDP (millions)	Labour income (millions)	Employment (Headcount)**	Tax revenue**** (millions)
Highway 523 to Seven Persons	\$93.2	\$56.2	798	\$19.2
Seven Persons to Burdett	\$155.4	\$93.7	1,330	\$31.9
Fort Macleod Bypass	\$388.5	\$234.4	3,324	\$79.8
Fort Macleod to Pincher Creek	\$116.9	\$70.7	1,000	\$24.1
Pincher Creek to Highway 507	\$233.1	\$140.6	1,994	\$47.9
Highway 507 to Sentinel	\$474.0	\$288.9	4,036	\$98.0
Total, capital expenditures	\$1,461.2	\$884.6	12,481	\$300.9

These results, broken down by direct, indirect and induced impacts, are presented in the table below.

Table 5: Total economic footprint of capital expenditures - Alberta

*In 2022 \$CAD, cumulative***

	GDP (millions)	Labour income (millions)	Employment (Headcount)**	Tax revenue**** (millions)
Direct	\$555.7	\$403.2	5,595	\$112.5
Indirect	\$619.3	\$363.4	4,575	\$116.1
Induced	\$286.2	\$118.0	2,312	\$72.4
Total, capital expenditures	\$1,461.2	\$884.6	12,481	\$300.9

Refer to **Appendix C** for provincial tax impacts resulting from capital expenditures.

*Total capital and operating expenditures are based on data provided by Alberta Transportation. It was assumed by PwC that for each expenditure category, 100% of direct spending will occur within Alberta.

**Due to rounding, the totals may not always add up to the sum of the items.

***Employment impacts associated with each expenditure category detail the number of jobs created based on labour productivity and related measures by business sector industry and by non-commercial activity consistent with the industry accounts. Therefore, employment cannot be expressed as person-years or FTE, as some employment may not be in a full-time capacity. The estimate of headcount (or total number of jobs) covers two main categories: employee jobs and self-employed jobs.

****Tax revenue figures presented are AB-based only and include the sum of corporate income tax, personal income tax as well as taxes on production and products.

3. Economic footprint estimate

Operating and maintenance expenditure footprint

The annual economic footprint resulting from incremental operating and maintenance expenditures* for each section is presented below.

Table 6: Economic footprint of annually operation and maintenance expenditures to twin Highway 3 by highway section - AB

*In 2022 \$CAD, per year***

	GDP (000's)	Labour income (000's)	Employment (Headcount)***	Tax revenue**** (000's)
Highway 523 to Seven Persons	\$121.7	\$71.8	1	\$24.7
Seven Persons to Burdett	\$180.2	\$106.3	2	\$36.6
Fort Macleod Bypass	\$72.1	\$42.5	1	\$14.6
Fort Macleod to Pincher Creek ¹⁵	-	-	-	-
Pincher Creek to Highway 507	\$157.7	\$93.0	1	\$32.0
Highway 507 to Sentinel	\$189.3	\$111.6	2	\$38.4
Total, annual operating and maintenance expenditures	\$721.0	\$425.3	6	\$146.2

Annual results broken down by direct, indirect, and induced impacts are presented in the table below.

Table 7: Annual economic footprint of operating and maintenance expenditures - Alberta

*In 2022 \$CAD, per year***

	GDP (000's)	Labour income (000's)	Employment (Headcount)***	Tax revenue**** (000's)
Direct	\$247.7	\$170.9	3	\$48.6
Indirect	\$336.0	\$197.8	2	\$62.9
Induced	\$137.3	\$56.6	1	\$34.7
Total, operating and maintenance expenditures	\$721.0	\$425.3	6	\$146.2

Refer to **Appendix C** for annual provincial tax impacts resulting from operating and maintenance expenditures.

*Total capital and operating expenditures are based on data provided by Alberta Transportation. It was assumed by PwC that for each expenditure category, 100% of direct spending will occur within Alberta.

**Due to rounding, the totals may not always add up to the sum of the items.

***Employment impacts associated with each expenditure category detail the number of jobs created based on labour productivity and related measures by business sector industry and by non-commercial activity consistent with the industry accounts. Therefore, employment cannot be expressed as person-years or FTE, as some employment may not be in a full-time capacity. The estimate of headcount (or total number of jobs) covers two main categories: employee jobs and self-employed jobs.

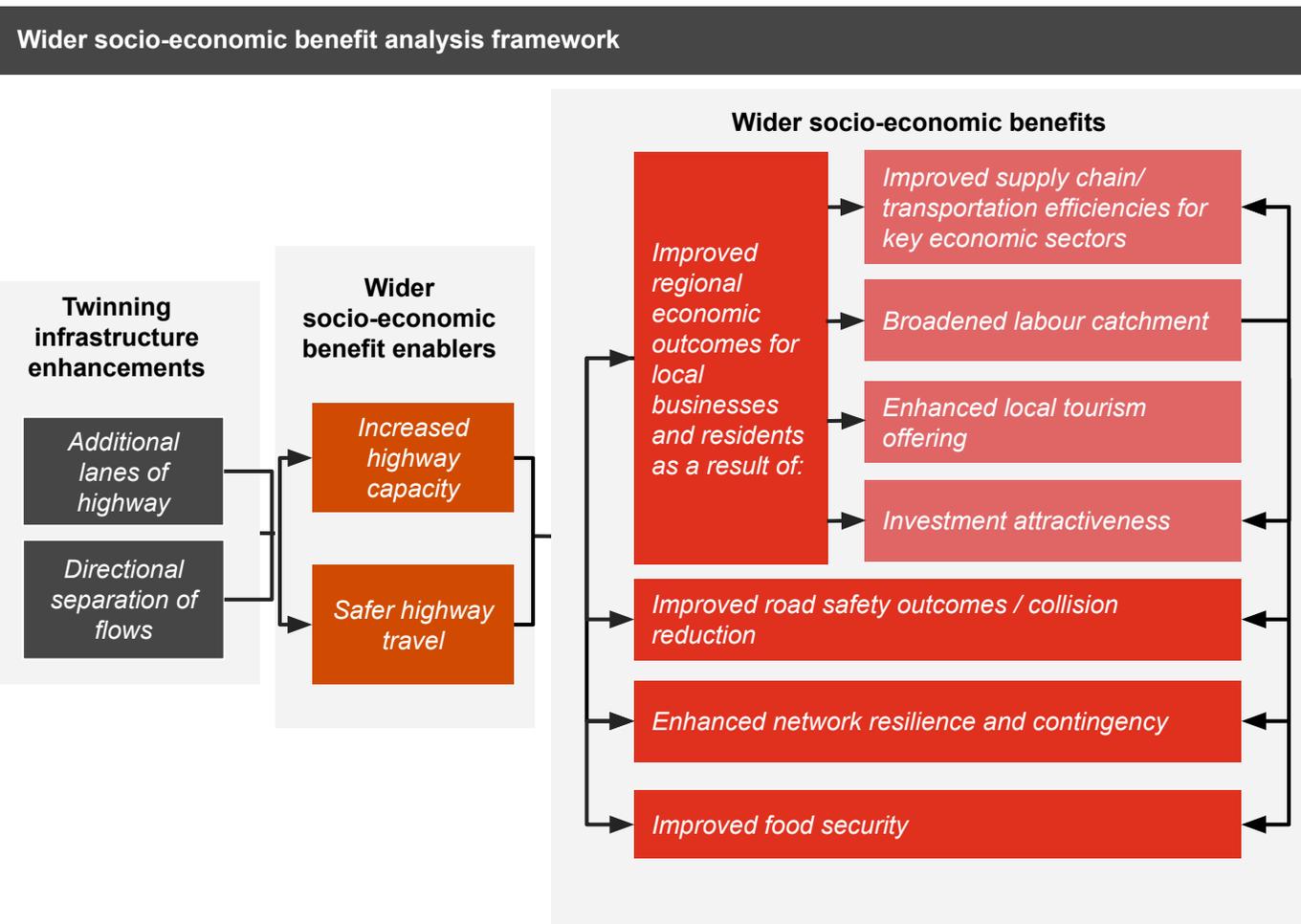
****Tax revenue figures presented are AB-based only and include the sum of corporate income tax, personal income tax as well as taxes on production and products.

4. Wider socio-economic benefits

4.1 Overview

Twinning the remaining sections of Highway 3 has the potential to result in a range of wider socio-economic benefits. These wider socio-economic benefits can materialize post-completion of the twinned Highway.

The figure below displays the framework for PwC's analysis of wider socio-economic benefits relating to the twinning of in-scope sections of Highway 3. We note that some of these benefits may impact industry, communities and citizens beyond the Project Region and even beyond the province of Alberta. It is also important to note that many of the wider socio-economic benefits are related to and enable each other. We have attempted to depict the direction of these relationships with arrows in the framework below.



The factors shown in the figure above are expanded upon in following pages. Given there are existing sections of Highway 3 that are already twinned, our discussion in this section focuses on the potential *incremental* benefits associated with twinning the untwinned sections that are in-scope for this analysis.

It must be recognized that the Project Region has significant opportunities for growth, and that twinning is an important element in facilitating such growth. In the absence of twinning Highway 3, in addition to the impacts identified in the economic footprint estimate, the wider socio-economic benefits identified in this section may also be put at risk.

4. Wider socio-economic benefits

4.2 Twinning infrastructure enhancements

Twinning Highway 3 results in two infrastructure enhancements to the road structure: **Additional lanes of highway**, and **directional separation of flows**.

Through the construction of an identical, parallel road alongside the existing road, each direction of traffic will receive at a minimum, an additional lane. Twinning may or may not include wider shoulders or passing lanes. For the purpose of this report, we are assuming that twinning represents the introduction of an additional lane directly beside the existing right-of-way. Secondly, our understanding is that the process of twinning Highway 3 will create a directional separation between traffic flows travelling east and west. The two sets of lanes will be separated by either a median or a strip of land.

Stakeholders indicated the importance of the timing of the Twinning of Highway 3, as the more time that goes on, the more expensive the above infrastructure enhancements will become. This includes cost of material, labour, and especially land prices, which will be necessary to extend the capacity of the roadway.

An example of a twinned road is showed in the figure to the right. This photo is of a 6 km stretch of the Trans Canada Highway in Yoho National Park, BC, which was twinned in 2019. The engineering firm that led this project found that there are associated costs of \$1.3 million in the event of motorist fatality, and \$100,000 per hour in network closure on this stretch of Highway.¹⁶



Source: McElhanney Consulting Services, Ltd.

4.3 Wider socio-economic benefit enablers

The wider socio-economic benefits resulting from twinning the remaining sections of Highway 3 can be traced back to two key ‘enablers’ resulting from infrastructure improvements: **increased highway capacity**, and **safer highway travel**. Both of these enablers are discussed below.

Increased highway capacity

Adding an additional lane in each direction, and twinning a highway in general, has potential to accommodate more vehicles safely and at a higher speed, and facilitate improved traffic flows. Having twice the capacity means that more vehicles can use the road. In addition, having a second lane allows for increased speed as vehicles are able to pass slower vehicles more easily and safely. In addition, a divided highway system is able to accommodate an increased volume of goods through the use of larger commercial vehicles. A divided highway is safer and more appropriate for the use of long combination vehicles (LCVs) and over dimensional commodities (such as mobile homes and wind turbines), as it is easier to pass with two lanes, and risk of head on collisions are reduced. LCVs are two 53 foot trailers behind a single power unit, and require a permit to be legally operated. Permitted LCVs in Alberta also have to meet certain operational requirements even when using two-lane highways, including restricted hours of operation and conditions when driving in adverse weather conditions.¹⁷ Ontario’s Ministry of Transportation has an LCV network of approved multi-lane, divided highways that permitted LCVs must use, and only under certain conditions.¹⁸ Long combination vehicles are often used to transport supply chain goods rather than raw materials.

Safer highway travel

Both additional lanes of highway and directional separation of flows contributes to safer highway travel. An additional lane along the same right-of-way provides drivers with a safe way to pass slow-moving vehicles if a passing lane is not available, particularly when going around large trucks or equipment that may have additional blind spots. In addition, the separation of traffic by a median or strip of land eliminates the risk of a head-on collision between two vehicles travelling opposite directions. These types of accidents can be very serious and/or fatal due to the force at which vehicles are impacted.

Increased capacity and safer travel increase the attractiveness of the Highway to users, and ultimately drive the creation of additional economic benefits, as discussed on subsequent pages.

4. Wider socio-economic benefits

4.4 Socio-economic benefits from Highway 3 twinning

This section discusses the socio-economic benefits that are associated with increased highway capacity and safer highway travel as a result of Highway 3 infrastructure enhancements. **These benefits risk not being realized if Highway 3 does not receive twinning infrastructure enhancements**, particularly while certain economic opportunities are available to the Project Region to capitalize on.



Improved regional economic outcomes for local businesses and residents

Improved regional economic outcomes for local businesses and residents are a result of the following three benefits: Supply chain and transportation efficiencies for key economic sectors, a broadened labour catchment, and an enhanced local tourism offering.

Supply chain and transportation efficiencies for key economic sectors

Twinning Highway 3 is an important element in capitalizing on the opportunities for expansion and leadership of the various sectors in Southern Alberta. Travel time efficiencies stemming from a twinned Highway 3 can benefit commercial drivers and the movement of goods within agriculture, manufacturing, energy and resources across the Project Region.

There are multiple ways the twinning of the remaining sections of Highway 3 will benefit the **agri-food sector** and in-turn the Project Region, the province of Alberta, and Canada overall. Stakeholder engagement underscored that Highway 3 can get especially congested during harvest time in the fall, and planting season in the spring. Increasing capacity will allow better flow of goods during these seasons, as well as reduce the obstructions and additional congestion that heavy farm equipment can have on regular traffic year-round. We also understand that traffic can be especially heavy around processing facilities in the region as raw goods are delivered and value-added products leave. These include Lantic's Sugar Beet Factory in Taber, and the three potato processing plants in the area (Lamb Weston-ConAgra, McCain Foods and Cavendish). Other facilities mentioned by stakeholders include those for canola seeds, pea protein, hydroponic lettuce, and onion production. Stakeholder engagement identified significant bottlenecks for the transportation of agri-goods from Taber to Medicine Hat, specifically between Burdett and Bow Island.

An agricultural product produced or brought into the Project Region is likely to travel along Highway 3 multiple times before reaching its final destination, or even its processing facility. For example, sugar beets are often transported to piling grounds or receiving stations prior to being transported for refining, while potatoes are shipped to cleaning and/or storage facilities before being processed into chips or french fries, or being sent to retail locations. Because of the multiple trips an agricultural product may take on the Highway, increased agricultural output at the farm-level has the potential to contribute to significant growth in traffic and even further congestion. This will be amplified even further as Alberta and Canada continue to pursue growth in the domestic production of value-added agriculture.

As the number of irrigated acres in Southern Alberta increases over time and projects, crop producers will be given opportunities to diversify their crop mix in comparison to dryland production, and potentially increase output of specialty crops (such as sugar beets and potatoes), attracting more processing activity and private investment to the area. This has potential to attract new economic activity to the region and address economic diversification issues facing Alberta. Stakeholders noted that as a result of the CIB and Government of Alberta irrigation investments, there is a potential for additional potato processing facilities to be attracted to the area. For affected irrigation districts that may face incremental growth in food processing from increased irrigation, there is potential for more pressure on roadways due to higher volumes of truck traffic, moving agricultural outputs, inputs, and machinery and equipment. Twinning the remaining areas of the highway, particularly those with the greatest bottlenecks for value-added agri-food products, will help to alleviate this pressure and ensure producers and processors are able to effectively capitalize on the various opportunities for Southern Alberta in the agri-food industry.

4. Wider socio-economic benefits

Supply chain and transportation efficiencies for key economic sectors (continued)

In addition to agri-food, twinning Highway 3 and the resulting supply chain and transportation efficiencies are expected to benefit the opportunities for **manufacturing** in the Project Region. More efficient transportation, particularly for manufactured goods that are oversized (ex. Modular homes), will enable local businesses to grow and get goods to consumers more safely and efficiently. Finally, the benefits resulting from twinning the rest of Highway 3 will facilitate the continued strength of the oil and gas sector in Alberta, and the growing role of **renewable energy** in the Project Region, by safely and effectively transporting goods for energy development projects and not hindering the delivery of necessary equipment. Ensuring the transportation of renewable energy equipment, such as solar panels or wind turbines, is as easy and seamless for consumers, can help facilitate a transition to greener energy sources. This includes equipment needed for other clean energy projects, like the proposed Tent Mountain renewable energy complex by Montem Resources, located in Crowsnest Pass. Alberta capitalizing on the growth of the renewable energy sector will also aid in diversifying both Alberta's economy and the economies of communities in the Project Region. It should be noted that improved supply-chain connectivity and westward connections beyond the Alberta border are dependent on associated BC upgrades that may or may not materialize. Additional implications for industry and economic sectors will be discussed under the investment attractiveness subheading.

Below are some key synthesized findings from stakeholder engagement with respect to industry, and the twinning of remaining sections of Highway 3:

- *“Twinning is the first step to creating the high value premiere food corridor where we aren't only growing the food, but also participating in the value-add processing. It is just one ingredient to get to the outcome of the corridor which increases our food security, and rural economic development.”*
- *“There has been increased traffic on Highway 3 and if it is intended to be a agri-food corridor and more traffic for manufacturing, supply chain, and energy infrastructure, there needs to be prioritization of twinning to increase safety, traffic flow and movement of goods to save on time and cost.”*

In addition to the above stakeholder sentiments expressed, approximately 49% of survey respondents indicated improving **supply-chain connections for agri-food and agriculture is the most important benefit** for sections east of Burdett. Another 33% indicated it was the second most important. Additional findings from stakeholder engagement are discussed in Appendix D.

It is important that the transportation network in Alberta supports the growth of industry, so that Alberta can continue to compete both domestically and on an international level. Within the Project Region, supply chain and transportation efficiencies experienced in the sectors identified above will benefit the regional economic outcomes for producers of raw agricultural products (farmers), as well as processing facilities that are able to have more efficient access to inputs. It will also benefit manufacturing businesses in the area by strengthening supply chain connections, and the ease at which new renewable energy projects can receive necessary inputs. Potential lower costs of transport as a result of faster and more efficient travel may also be passed onto consumers or improve profitability for shareholders. Finally, growth across all of these sectors can create additional employment opportunities for people both living in the Project Region and across Alberta. Without expansion of Highway 3, the various opportunities available to Alberta and the Project Region in these key economic sectors may be lost or not fully materialized.



4. Wider socio-economic benefits

Investment attractiveness

An improved supply chain connectivity, transportation efficiencies and additional growth of local businesses, are critical to increase the investment attractiveness of a region. As indicated previously, ongoing developments in the agri-food, manufacturing and energy sectors create significant economic opportunities for the Project Region. However, the current shape of Highway 3 may act as a barrier for investors. For example, engagement with stakeholders revealed that sugar beet producers in the region are interested in increasing their output, but there is currently not enough processing capacity to handle additional inputs.

The pressure for additional processing in the agricultural sector will only increase in the Project Region with additional investment in irrigation infrastructure and the resulting gains in productivity. However, it was indicated by stakeholders in the investment decision-making process, particularly in the Project Region, that investors strongly weigh the conditions of the transportation network. This is because an efficient transportation network is a key factor that drives the efficiency, and ultimately profitability of a business as the gateway to accessing final markets. In 2014, Canadian dairy company Saputo closed one of its facilities in Southern Alberta located in the Project Region.¹⁹ Since the closure, there have been efforts to find another business to take over the facility. Prospects for this space have been known to ask what the transportation connections are; site criteria for large industry always includes highway accessibility. If transportation connections or conditions (such as safety or speed) are not competitive with other locations, investment may be displaced elsewhere in Alberta or outside of the province.

The benefits resulting from twinning the remaining sections of Highway 3 will therefore increase the Project Region's attractiveness for investment, giving existing businesses the opportunity to grow, and providing the Region with the necessary conditions to attract new investors and businesses. This will lead to improved regional economic outcomes for local businesses, as well as residents. As sectors such as renewable energy and agri-food continue to grow, having a sufficient transportation network is a requirement to draw industry into the Region and capitalize on opportunities that risk being taken elsewhere under the current transportation network.

Broadened labour catchment

As indicated in Section 2, a large proportion of the labour force in the Project Region work in a different area than they live, and therefore have to commute for employment. The primary mode of transportation in the Project Region is personal vehicle, as there are currently no public transportation alternatives. Improving travel conditions, whether through a shorter commute time or reduced trip distance can entice individuals to work further away from their place of residence. A faster commute can improve labour mobility and open up a more expansive perspective on the size of workforce labour catchments, which is particularly important during a time of labour shortages and increasing housing prices. A faster commute will also be available by public transportation in the event that public transportation alternatives become available in the Region for travel between the communities. Enticing additional skilled labour to come and work in the Region will be needed to capitalize on the multiple opportunities available to the Project Region.

We understand that some facilities in the Project Region are facing pressures to limit production levels as a result of there not being enough employees to fulfill jobs. Reduced output can have negative effects on local businesses, and ultimately investment attractiveness. Improving the commuting conditions for commuters in terms of safety, time or car maintenance expenses may cause someone to consider a role further from their home, broadening the labour catchment area for local businesses and filling necessary positions.

Enhanced local tourism offering

Safer highway travel and increased capacity as a result of a fully-twinning Highway 3 has the potential to increase the desirability of tourism in the Project Region. Increasing capacity can improve travel times, making it more attractive for visitors to visit particular destinations along Highway 3 or in the nearby area. In addition, if the perception of a safer commute is improved, visitors may be more enticed to use Highway 3 to travel across Alberta, diverting spending to communities along the roadway that may have been lost to other provincial roads. As previously indicated, the Project Region already has multiple tourist destinations that could help to gain additional tax revenues in tourist spending if the transportation network does not hamper the desire for tourists or locals to visit.

4. Wider socio-economic benefits

4.4 Socio-economic benefits from Highway 3 twinning (continued)



Improved road safety outcomes and collision reduction

Twinning Highway 3 and providing improved conditions for driving has the potential to improve road safety outcomes and reduce the number of collisions in the Project Region.

Stakeholder engagement revealed that there are substantial safety issues with Highway 3 in the currently untwinned sections, with one particular stakeholder stating that *“today as it stands, there is a fatality problem”*. Accidents occur with commercial transportation operators (across industries) and the general public every year as a result of congestion near processing plants, as well as in passing attempts when a large vehicle is taking up most of the roadway. Heavy equipment and oversized loads (e.g. agricultural machinery, modular housing units, energy sector outputs including wind turbine components) in particular has been found to take up a considerable amount of highway (in terms of length and width), obstructing traffic in the opposite direction and increasing the risks associated with overtaking. Drivers get frustrated when they are unable to travel at faster speeds or get stuck behind large vehicles, and as a result make riskier driving maneuvers to pass. This puts drivers into a lane with oncoming traffic, increasing the probability of a serious head-on collision.²⁰

Collisions also generate costs for vehicle owners, businesses, and impose additional burden on the health care system when there are injuries or fatalities. It was also found that local residents in the Project Region have been negatively affected by accidents in the past, in occasions whereby volunteers have witnessed severe and traumatizing accidents and have assisted in cleaning up the accident. As population grows in the Project Region and traffic is expected to grow with increased irrigation and associated production activities, there is potential for collision rates to increase. Collisions are often accompanied by road closures, which can have additional negative impacts on businesses and movement of goods in the Region. Collision data provided by the Government of Alberta indicated that over 5 years up to 2018, the overall collision rate on Highway 3 increased by 16% (on a per vehicle kilometer basis), with a higher instance on the undivided portions of Highway 3*.

When asked to rank the relative significance of a range of benefits associated with twinning Highway 3, 56% of surveyed stakeholders indicated that **road safety and collision reduction is the most important**. When asked to rank the importance of benefits, 49% of stakeholders indicated that safety is the top priority for the twinning of Highway 3. Safety was the **majority choice** for sections west of Fort Macleod, and was tied for majority choice for sections east of Burdett (with improved supply chain connections for agriculture and agri-food). Below are some other key findings from stakeholder engagement with respect to the safety of Highway 3 and the need for twinning:

- *“Roads that address safety issues certainly are a benefit to surrounding communities and also improves the quality of life of the communities.”*
- *“I do anticipate that collisions will end up increasing as people get frustrated with backlogs of traffic and particularly large industrial traffic, RTMS and agriculture traffic, and will take greater risks and chances on trying to pass when unsafe to do so.”*
- *“Safety first. I have been involved in fatality accidents. Saves time, which is money and improves logistics.”*

A study conducted by the United States Department of Transportation (DOT) found that when **typical two-lane sections of rural roadways are converted to four-lane divided sections, it result in a crash per kilometre reduction of between 40% and 60%**.²¹ Another study published by the Transportation Research Record found that the conversion of two-lane roadways to four-lane divided roadways results in a reduction in **fatal and injury crashes of more than 63% on urban roadways and 45% on rural roadways**.²² These findings indicate the effectiveness of twinning in reducing collisions, and ultimately deaths and injuries.

Reducing the number of collisions occurring on Highway 3 can save various costs associated with an accident, including the value of a statistical life (fatality), injury, property damage, and travel distance and travel time costs resulting from road closures or detours following an accident. It also increases the availability of first-responders and health care resources required to attend the scene or provide care to those involved.

4. Wider socio-economic benefits

4.4 Socio-economic benefits from Highway 3 twinning (continued)



Enhanced network resilience and contingency

Travel network resilience is defined as “the ability of the system to maintain its demonstrated level of service or to restore itself to that level of service in a specified timeframe”²³, and is also often synonymous with reliability.²⁴ Resilience represents providing additional space for travel in the event of disruptions on the Highway. Improved traffic flow and network resilience, particularly along a major trade route, enables many wider socio-economic benefits.

In the event of a collision, Highway 3 can be very susceptible to congestion and even full blockages, as there are fewer lanes to use for diverting traffic. By increasing the number of lanes available for traffic flow, the network resiliency of Highway 3 can be significantly improved by providing additional contingency in the event of an accident or necessary road repairs. Additional lanes also make the overall Alberta network more resilient overall to increased traffic volumes. Resilience of Highway 3 ultimately strengthens the resiliency of the movement of goods, and supply chains for food, manufactured products, and other goods. Reliable movement of food, in particular, improves the stability of Alberta and Canada’s food supply, helping to address food insecurity and capitalize on the opportunity for agri-food exports outside of Alberta.

Furthermore, it has been noted by stakeholders that when other Highways in the province are facing construction or major accidents, Highway 3 can absorb a proportion of this traffic which puts additional pressure on the road. By increasing the number of lanes, Highway 3 will be more prepared to be a contingency road and absorb increased traffic volumes in the event of disruptions on other routes. Highway 3’s role as a contingency highway was highlighted during BC flood and mudslide events (and subsequent road repairs) in late 2021, which created significant disruptions and closures on Highways 1 and 5. The BC Ministry of Transportation stated that following the floodings, the commercial traffic volumes on Highway 3 quadrupled to more than 3,000 trucks a day, indicating its importance for supply-chain connections and movement of goods across Western Canada. During this time, **Highway 3 was the only connection for commercial traffic** between Western Canada and Vancouver. However, the additional volumes absorbed by Highway 3 were said to create bottlenecks and challenging driving conditions.²⁵ Twinning would therefore strengthen Highway 3’s position as a contingency Highway in the event of damage to other commercial trucking routes, enhancing the resiliency of Canadian supply-chain connections and ability to get Canadian product to export markets. The resiliency of Alberta and Western Canada’s highway network will become especially critical as the frequency and intensity of extreme weather events increase over time due to climate change.²⁶

Finally, depending on the amount of induced traffic as a result of increased capacity and safety, twinning Highway 3 can re-distribute traffic kilometres that were originally confined to 2 lanes across 4 lanes, potentially reducing the deterioration of a single lane as a result of vehicle traffic. This, combined with additional lanes for traffic diversion, may result in less disruptions for highway maintenance activities.

By enhancing network resiliency, the magnitude to which disruptions impact travel times is reduced. This in-turn can reduce the potential for negative impacts to businesses, individuals, and the overall economy when travel times increase unexpectedly on Highway 3. Network resiliency and contingency also increases the attractiveness of the transportation network in Southern Alberta, and consequently the Project Region, making it a more attractive investment option for business.

4. Wider socio-economic benefits

4.4 Socio-economic benefits from Highway 3 twinning (continued)



Improved food security

Food security is defined as “for all people, at all times, having physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life”.²⁷ A 2021 study by the University of Toronto found that Alberta has the highest food insecurity rate among Canadian provinces.²⁸ The strength of the agriculture sector in Alberta plays an important role in battling regional food insecurity, while the transportation system enables the movement of food across the province. Efficient transportation ensures food is able to reach consumers in a timely way while keeping prices low, addressing two pillars of food security: affordability and accessibility.

Furthermore, as food insecurity continues to be a growing concern country-wide and across the world, Alberta’s agri-food outputs can combat food insecurity beyond Alberta, enhance the on-shoring of Canadian value-added food production, and generate export revenues. A more resilient Highway 3 ultimately strengthens the resiliency of the movement of goods, and supply chains for food, manufactured products, and other goods. Reliable movement of agricultural production outputs, in particular, improves the stability of Alberta and Canada’s food supply to help address food insecurity, and makes value-added food production and agri-food exports outside of Alberta more attractive. The twinning of Highway 3 is a key element in optimizing the opportunities for Alberta’s agri-food sector and in-turn addressing food insecurity.



Appendices



Appendix A: Input-output modelling approach

In applying the Input-Output analysis, we made the following key assumptions:

- We have relied on Canada-wide multipliers to assess the economic footprint of the rest of Canada capital and operating expenditures. Furthermore, due to data limitations, we have assumed that all indirect and induced impacts associated with rest of Canada and outside of Canada initial expenditures would have no impact on the AB economy. In practice, we expect some indirect and induced impacts of such spending to occur within AB and consequently, the estimated AB economic impacts may be understated.
- We note that the implicit assumption behind this form of analysis is that there is sufficient supply of labour, capital and resources in the economy to fulfil the additional demand resulting from the proposed twinning project without reducing the availability of these inputs to other sectors of the economy. Further study would be required to test the validity of this assumption (e.g. a labour market study).
- We have relied on Alberta Transportation’s preliminary estimates for capital and operating and maintenance expenses. We did not verify or audit the data or the assumptions associated with it. The table below provides a breakdown of the proposed expenditure categories associated with twinning the remaining sections of the highway. It should be noted that a study is currently being conducted for the section from Fort Macleod to Pincher Creek and no estimates for annual operating and maintenance expenditures for this section have been provided. This section of Highway 3 runs through Piikani Nation Reserve. No timelines for completion of construction or operations of the newly twinned highways have been provided for this study. Right-of-way expenditures are not included in input-output modelling.

Section	Share of total CapEx	Share of annual OpEx
Hwy 523 to West of Seven Persons	6.4%	16.9%
West of Seven Persons to East of Burdett	10.7%	25.0%
Fort Macleod bypass (including Stage 1A)	26.7%	10.0%
Fort Macleod to Pincher Creek	8.0%	-
Pincher Creek to East of Highway 507	16.0%	21.9%
East of Highway 507 to Sentinel	32.1%	26.3%

- Anticipated capital and operating expenditures associated with Highway 3 are expected to be sourced both privately and publicly. For the purposes of our analysis, the source of funds is not considered.
- Sufficient inputs (e.g. labour, materials) are available to build and maintain the sections of Highway 3 to be twinned.
- We have modelled all impacts based on anticipated expenditures in 2022 \$CAD given inflation forecasts for extended time horizons are unable to fully capture future economic uncertainties.

Refer to **Appendix B** for further information on Report limitations.

Appendix B: Limitations

Data limitations and verification: PwC has relied on the information provided by Alberta Transportation regarding the estimates and allocations of capital and operating expenditures associated with twinning the in-scope sections of Highway 3.

PwC has relied upon the completeness, accuracy, and fair presentation of all information and data obtained from the Highway 3 Twinning Development Association (H3TDA) and the various sources set out in our report, which were not audited or otherwise verified.

The findings in this report are conditional upon such completeness, accuracy, and fair presentation, which have not been verified independently by PwC. Accordingly, we provide no opinion, attestation, or other form of assurance with respect to the results of this study.

Receipt of new data or facts: PwC reserves the right at its discretion to withdraw or revise this report, should we receive additional data or be made aware of facts existing at the date of the report that were not known to us when we prepared this report. The findings are as of November 2022, and PwC is under no obligation to advise any person of any change or matter brought to its attention after such date, which would affect our findings.

Input-Output analysis: Input-Output analysis does not address whether the inputs have been used in the most productive manner or whether the use of these inputs in this industry promotes economic growth more than their use in another industry or economic activity. Nor does Input-Output analysis evaluate whether these inputs might be employed elsewhere in the economy if they were not employed in this industry at the time of the analysis. Input-Output analysis calculates the direct, indirect, and induced economic impacts that can reasonably be expected to affect the economy based on historical relationships within the economy. This analysis does not take into account fundamental shifts in the relationships within the economy that may have taken place since the last estimation of multipliers by Statistics Canada in 2018, nor shifts that may take place in the future.

Use limitations: This report has been prepared solely for the use and benefit of, and pursuant to a client relationship exclusively with Highway 3 Twinning Development Association (H3TDA).

We understand that our deliverable will be shared among H3TDA's staff and could also be shared with H3TDA's stakeholders (e.g. government) and further that you may also wish to make our deliverable public. You may make our deliverable public, provided that the deliverable is published in its entirety, including relevant disclaimers.

Should you want to use excerpts from our deliverable or post your own statements describing our deliverable, you would need to concurrently provide a clear link to our entire deliverable and get PwC's consent to release such excerpts or statements, which consent shall not be unreasonably withheld, delayed or conditioned. In that context, PwC will provide its comments to a draft statement produced by you within five working days of receiving such draft statement.

PwC accepts no duty of care, obligation or liability, if any, suffered by any third party that reads our deliverable, any excerpts from our deliverable or statements describing our deliverable. Further, no person or entity, other than H3TDA, shall place any reliance upon the accuracy or completeness of the statements made in our deliverable.

This report and related analysis must be considered as a whole: Selecting only portions of the analysis or the factors considered by us, without considering all factors and analysis together, could create a misleading view of our findings. The preparation of our analysis is a complex process and is not necessarily susceptible to partial analysis or summary description. Any attempt to do so could lead to undue emphasis on any particular factor or analysis.

We note that significant deviations from the above-listed major assumptions may result in a significant change to our analysis findings.

Appendix C: Tax impacts of Highway 3 twinning expenditures, provincial

This appendix presents a breakdown of the estimated AB provincial and local tax impacts associated with capital and annual operating and maintenance expenditures for the twinning of remaining sections of Highway 3.

Tax impact of capital expenditures in Alberta

Table C-1: Total tax impacts of capital expenditures - AB (provincial)

*In 2022 \$CAD, cumulative**

	Corporate Income Taxes (millions)	Personal Income Taxes (millions)	Taxes on Production & Products** (millions)	Total Provincial Tax Revenue (millions)
Direct	\$6.5	\$100.8	\$5.0	\$112.5
Indirect	\$10.5	\$90.9	\$14.7	\$116.1
Induced	\$6.4	\$29.5	\$36.5	\$72.4
Total tax impacts, capital expenditures	\$23.4	\$221.3	\$56.2	\$300.9

Tax impact of operating and maintenance expenditures in Alberta

Table C-2: Annual tax impacts of operating and maintenance expenditures - AB (provincial)

*In 2022 \$CAD, per year**

	Corporate Income Taxes (000's)	Personal Income Taxes (000's)	Taxes on Production & Products** (000's)	Total Provincial Tax Revenue (000's)
Direct	\$3.3	\$42.8	\$2.6	\$48.6
Indirect	\$5.7	\$49.5	\$7.8	\$62.9
Induced	\$3.1	\$14.2	\$17.5	\$34.7
Total annual tax impacts, operating and maintenance expenditures	\$12.0	\$106.4	\$27.8	\$146.2

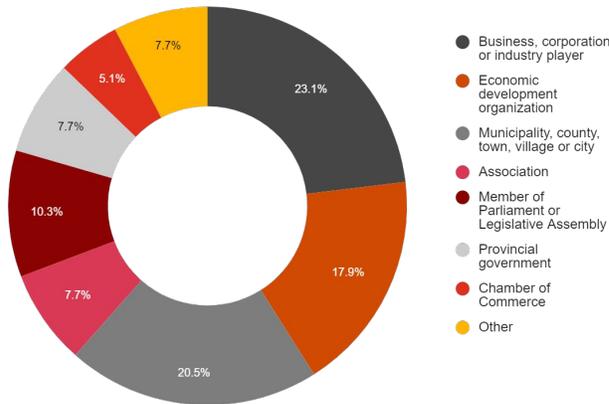
*Due to rounding, the totals may not always add up to the sum of the items.

**Taxes on production include provincial and local government taxes collected in Alberta.

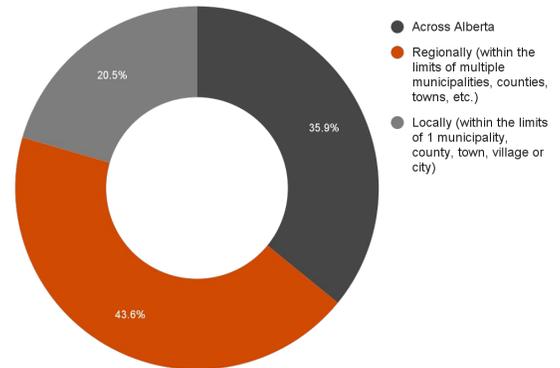
Appendix D: Stakeholder survey

This appendix summarizes the key findings from the stakeholder survey (as previously noted, these findings have informed analysis spanning Sections 2-4). The intent of the survey was to solicit the perspectives on the economic impacts of twinning the remaining Alberta sections of Highway 3 from local stakeholders familiar with the nuances of the Highway and the Project Region. The charts below display the characteristics of the 39 survey respondents. 100% of survey respondents indicated they were supportive of the full or partial twinning of Highway 3 in Alberta.

Survey responses: what best describes your organization?

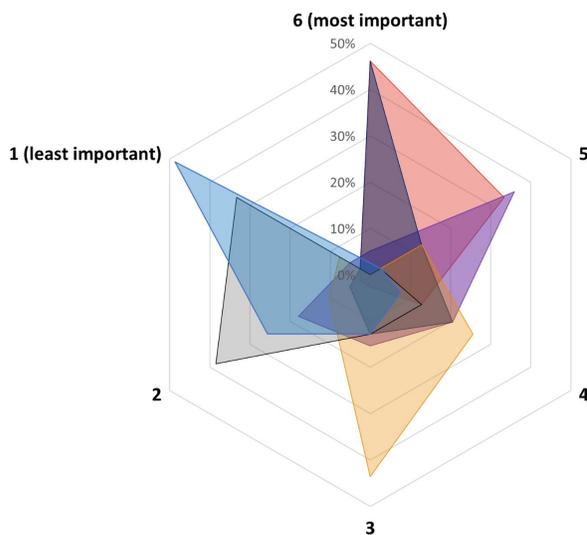


Survey responses: where does your organization operate or exist?

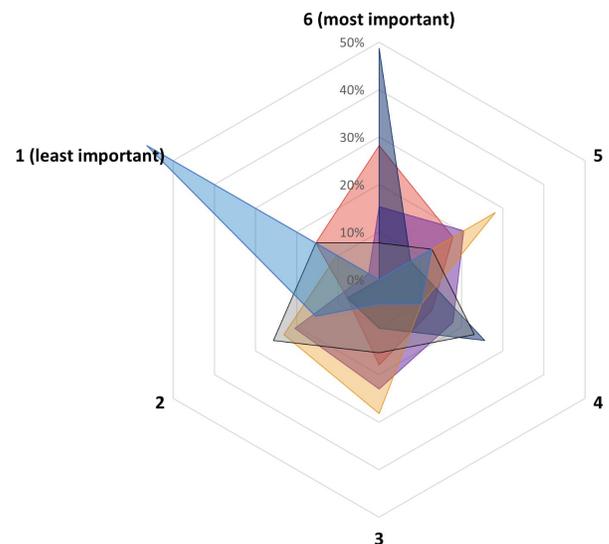


Stakeholders were asked to order the benefits resulting from twinning Highway 3 in order of importance for sections east of Burdett, and sections west of Fort Macleod. They were only able to assign one benefit to one number. As shown in the figures below, stakeholders felt that the most important benefits for sections east of Burdett is connections for agri-food and improved safety. Safety was seen as the primary benefit for sections west of Fort Macleod. Across all untwinned sections on the Highway, travel distance and time cost savings were seen as the least important benefit of Highway twinning.

East (east of Burdett)



West (west of Fort Macleod)



- Improved supply-chain connections for agriculture and agri-food
- Improved supply-chain connections for other industries (e.g. mining, manufacturing, energy)
- Road safety (collision reduction)
- Improved traffic flow and network resilience
- Tourism
- Travel distance and time cost savings

Appendix E: Data sources and endnotes

Footnote	Source or endnote
1	Alberta Highways 1 to 986 Traffic Volume, Vehicle Classification, Travel and ESAL Statistics Report 2021, Alberta Transportation.
2	Prairie Post (West Edition): https://www.pressreader.com/canada/prairie-post-west-edition/20220401/281487869864452 Medicine Hat News https://medicinehatnews.com/news/southern-alberta-news/2022/02/12/group-outlines-hwy-3-twinning-priorities/ Lethbridge Herald https://www.pressreader.com/canada/lethbridge-herald/20220212/281517934541056
3	Government of Alberta - Types of municipalities in Alberta.
4	Statistics Canada. Table 17-10-0142-01 Population estimates, July 1, by census subdivision, 2016 boundaries
5	Alberta Treasury Board and Finance, Population Projections by Census Division.
6	Alberta labour force statistics, Government of Alberta.
7	Invest Alberta.
8	Alberta Major Projects: https://majorprojects.alberta.ca/details/Lethbridge-District-Exhibition-Agri-food-Hub-and-Trade-Centre/4152
8	Statistics Canada. Table 36-10-0402-02 Gross domestic product (GDP) at basic prices, by industry, provinces and territories, growth rates (x 1,000,000)
10	Canada's Energy Future 2021 - Canada Energy Regulator.
11	Sorensen, J. ConstructConnect.com, Alberta's new wind infrastructure capacity leading Canada, July 29, 2022
12	Company wants to appeal decision that rejected proposed open-pit coal mine in Alberta, Global News / The Canadian Press. July 16, 2021.
13	Montem Resources. https://montemres.wpengine.com/projects/
14	Statistics Canada. Table 98-10-0458-01 Main mode of commuting by commuting duration, time leaving for work, age and gender: Canada, provinces and territories, census divisions and census subdivisions
15	Operating and maintenance expenses could not be provided by Alberta Transportation for the section between Fort Macleod and Pincher Creek.
16	YPT International Awards – Project of the Year TRANS-CANADA HIGHWAY TWINNING in Yoho National Park, BC. McElhanney Consulting Services, Ltd.
17	Attached Conditions for the Operation of Long Combination Vehicles, Version 5.3 - Government of Alberta
18	Long Combination Vehicle Program Conditions - Ontario Ministry of Transportation
19	Saputo Announces Plant Closures in Canada and the United States. Saputo Newsroom. 03/26/2014
20	Collision Probability vs. Collision Severity: How to Compare & Evaluate Conflicts. Transoft Solutions (ITS) Inc.

Appendix E: Data sources and endnotes

Footnote	Source or endnote
21	Council, Forrest M., and J. Richard Stewart. Safety effects of the conversion of rural two-lane roadways to four-lane roadways. No. Report No: FHWA-RD-99-206. Turner-Fairbank Highway Research Center, 2000.
22	Ahmed, Mohamed M., Mohamed Abdel-Aty, and Juneyoung Park. "Evaluation of the safety effectiveness of the conversion of two-lane roadways to four-lane divided roadways: Bayesian versus empirical Bayes." <i>Transportation research record</i> 2515.1 (2015): 41-49.
23	Ganin, A. A., Kitsak, M., Marchese, D., Keisler, J. M., Seager, T., & Linkov, I. (2017). Resilience and efficiency in transportation networks. <i>Science Advances</i> , 3(12). doi:10.1126/sciadv.1701079
24	D. Freckleton, K. Heaslip, W. Louisell, J. Collura, Evaluation of transportation network resiliency with consideration for disaster magnitude, paper presented at the 91st Annual Meeting of the Transportation Research Board, Washington, DC, 2012.
25	<i>Highway 3 struggles as the lone track for trucks between Western Canada and Metro Vancouver</i> . The Globe and Mail, Mike Hager and Anthony Davis. December 11, 2021.
26	Warren, F. and Lulham, N., editors (2021). <i>Canada in a Changing Climate: National Issues Report</i> ; Government of Canada, Ottawa, ON.
27	EC - FAO Food Security Programme. <i>An Introduction to the Basic Concepts of Food Security</i> .
28	Tarasuk, Valerie, Tim Li, and Andrée-Anne Fafard St-Germain. "Household food insecurity in Canada, 2021." (2016).

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