

**ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT
RESPONSE TO NRCB AND AEP SUPPLEMENTAL INFORMATION REQUEST 1, JULY 28, 2018**

Appendix IR17-1 Revised Volume 3A, Sections 17.4 through 17.6
May 2019

**APPENDIX IR17-1 REVISED VOLUME 3A, SECTIONS 17.4
THROUGH 17.6**

This appendix is a revision to Volume 3A, Section 17.4 through Section 17.6. The revisions are noted by strikethrough of outdated text and red for new numbers and text. This Appendix is not an errata, rather it is a revision based on updated costing numbers, received from Alberta Transportation after submission of the EIA, for the construction and operation of the Project.

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17.4 ASSESSMENT OF RESIDUAL ENVIRONMENTAL EFFECTS ON EMPLOYMENT AND ECONOMY

The assessment of potential effects on employment and economy during project construction and operations considers changes in the provincial economy, regional labour force, and regional business. This section describes the analytical methods and assumptions used to assess potential effects of the Project, identifies project components, physical activities and mechanisms that might contribute to these effects and applicable mitigation measures, and characterizes residual effects using the criteria outlined in Table 17-5.

17.4.1 Change in Provincial Economy

17.4.1.1 Analytical Assessment Techniques

Project effects on the economy of Canada and Alberta are estimated using national and provincial multipliers taken from the Statistics Canada Interprovincial Input-Output Model (SCIPIOM). These multipliers are used to:

- estimate changes in economic output due to Project expenditures (capital expenditures [CAPEX] and operational expenditures [OPEX])
- predict changes in government revenues.

To estimate economic output and government revenue during construction, cost estimates for the Project were reviewed and categorized based on an Input-Output Industry Classification (IOIC) as per detailed listings provided by Statistics Canada. The costs, as categorized, were then applied against SCIPIOM national and provincial multipliers, and summed to estimate total

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(for the duration of construction) GDP and government revenue. IOICs used in the analysis include:

- BS23C100 – Transportation engineering construction
- BS23E000 – Other activities of the construction industry
- BS23C500 – Other engineering construction
- BS23B000 – Non-residential building construction
- BS541300 – Architectural, engineering and related services
- BS212310 – Stone mining and quarrying
- BS327300 – Cement and concrete product manufacturing
- BS3A0 – Manufacturing
- MS333900 – Other general-purpose machinery manufacturing
- BS335300 – Electrical equipment manufacturing

Annual estimates of GDP and government revenue during dry operations were derived by applying total OPEX estimates against the IOIC BS221300 – Water, Sewage and Other Systems, which concurs with NAICS 22131 [2012] – Water Supply and Irrigation Systems.

17.4.1.2 Assumptions

The following assumptions were used in assessing a change in the provincial economy:

- All dollar figures are expressed in nominal 2017 Canadian dollars (\$).
- Cost estimates considered the conceptual designs presented in Stantec (2017). Additional topographical data, subsurface soils investigations, and hydrological assessments are required to better establish conceptual designs.
- Expenditure data does not include escalation, contingency, or allowance for funds used during construction.
- The spending breakdown assumes availability of Alberta goods and services providers, and successful award of project-related contracts.
- Cost estimates are considered Class ~~D~~ B (accurate to within ~~±50~~ 15%).

17.4.1.3 Project Mechanisms

Project spending would affect local and regional labour forces (see Section 17.4.3), populations (see Section 17.4.4) and businesses (see Section 17.4.5) and contribute to municipal, provincial and federal tax revenue. Provincial and federal GDP would also be affected.

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17.4.1.4 Mitigation

Project effects on the provincial economy are expected to be positive in direction with the addition of direct, indirect, and induced employment income and GDP. As such, no mitigation measures are proposed to address adverse effects. Alberta transportation will adhere to government procurement policies and procedure with respect to labour, and goods and services.

17.4.1.5 Residual Effects

Construction

Project ~~construction cost~~ CAPEX, exclusive of land and contingency, is estimated at ~~\$249~~ 280 million, of which 80% (~~\$199~~ 224 million) is expected to occur in the LAA. This estimate does not include the cost of land required for the Project or contingency. Remaining expenditures (~~\$50~~ 56 million) are expected to occur in the rest of Alberta. Table 17-14 shows estimated total capital costs for the Project. Of total capital expenditures, direct labour is estimated at ~~23%~~ 24% (approximately \$47 ~~67~~ million).

Table 17-14 Estimated Construction Spending in Alberta and Canada

Location	Estimate (Millions \$)	Percent of Total (%)
LAA	199 224	80
Other parts of Alberta	50 56	20
Total	249 280	100

SOURCE: Data provided by Alberta Transportation.

~~The estimated capital construction costs~~ CAPEX, including a breakdown by major types of goods and services that would be procured during construction, and the distribution of costs between the LAA and other parts of Alberta are listed in Table 17-15. Effects of Project spending on regional labour force and regional businesses in the LAA are assessed in Section 17.4.3 and Section 17.4.4.

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Table 17-15 Estimated Construction Spending Breakdown

Construction Costs		Sourced Within Canada		Total Project Expenditures (Canada)
		LAA	Other Alberta	
		Estimate (Millions \$)	Estimate (Millions \$)	
Goods	Concrete or aggregate	71 69	18 17	89 87
	Machinery or equipment	8	2	10
	Other goods	12 18	3 5	14 23
Services	Construction services	85 89	21 22	106 111
	Professional or e-Engineering services	23 40	6 10	29 50
Total		199 224	50 56	249 280
NOTE: Totals may not sum due to rounding Expenditures do not include provisions for escalation, contingency, or allowance for funds used during construction.				
SOURCE: Data from Alberta Transportation.				

Estimated construction employment (direct, indirect and induced) is summarized in Table 17-16. Within Canada direct employment is estimated at ~~775~~ 900 PYs (~~500~~ 610 PYs through direct construction employment and ~~275~~ 290 PYs through other direct employment [e.g., contractors]) with indirect and induced employment at ~~575~~ 670 PYs and ~~375~~ 445 PYs respectively. The Project's direct workforce is estimated to peak at 450 persons during construction. All direct employment would occur in the LAA. Approximately 62% of indirect employment and 57% of induced employment is estimated to occur within Alberta. Remaining indirect and induced employment is expected to occur in other parts of Canada.

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Table 17-16 Estimated Construction Employment in Alberta and Canada

Category	Alberta	Other Canada	Total Canada
	Estimate (PYs)	Estimate (PYs)	Estimate (PYs)
Direct construction employment	500 610	0	500 610
Other direct employment	275 290	0	275 290
Indirect employment	355 415	220 255	575 670
Induced employment	215 255	160 190	375 445
Total employment	1,345 1570	380 445	1,725 2015

SOURCE: Estimate based on SCIPOM–IOIC provincial multiplier analysis and Alberta Transportation construction cost estimates.

Total annual labour income in Canada associated with Project employment is estimated at \$119 139 million (see Table 17-17).

Table 17-17 Estimated Annual Labour Income in Alberta and Canada, Construction

Category	Alberta	Other Canada	Total Canada
	Estimate (millions \$)	Estimate (millions \$)	Estimate (millions \$)
Direct	57 67	0	57 67
Indirect	27 31	14 16	41 47
Induced	12 15	8 10	21 25
Total	113	26	139

SOURCE: Estimate based on SCIPOM–OIC provincial multiplier analysis and Alberta Transportation construction cost estimates.

Direct construction labour costs represent the largest Canadian expenditure item, accounting for 20 24% of total estimated expenditures in Canada. In addition, all the expenditure items identified as “services” in Table 17-15 also include a large labour content, considered “indirect” labour (i.e., the labour component of supplied goods and services). Expenditures on goods and services would account for 60% of total estimated Canadian expenditures, with overhead costs and miscellaneous expenditures accounting for the remaining 20% of estimated Canadian expenditures.

Project construction would generate an estimated \$393 450 million in economic output in Alberta, and \$84 92 million in economic output in other parts of Canada. Project construction is

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predicted to contribute an estimated ~~\$248~~ **248** million to Alberta's GDP, with an additional ~~\$42~~ **47** million in GDP accruing to other parts of Canada (see Table 17-18).

Table 17-18 Gross Domestic Product, Alberta and Canada

Category	Alberta	Other Canada	Total Canada
	Estimate (Millions \$)	Estimate (Millions \$)	Estimate (Millions \$)
Direct	138 153	0	138 153
Indirect	51 60	26 28	77 88
Induced	29 35	16 19	45 54
Total	248	47	295

SOURCE: Estimate based on SCPIOM-IOIC provincial multiplier analysis and Alberta Transportation construction cost estimates.

Dry Operations

The Project would have a negligible effect on the provincial economy given the relatively small annual expenditure (\$1.8 million) and workforce involved (6 persons). A similar magnitude of spin-off benefits (i.e., indirect and induced economic effects) would also occur. The Alberta Government expects to bear the cost of dry operations of the facility (subject to available federal funding). Because the facility would become the property of the Government of Alberta, it would be exempt from paying property taxes. However, the local government can apply for a grant in place of property tax. Therefore, the Project would either directly or indirectly pay for potential local infrastructure costs (e.g., local road maintenance) associated with the Project.

Summary

Project residual effects on the provincial economy are expected to be positive in direction with the addition of direct, indirect, and induced employment income and GDP, but low in magnitude relative to the LAA's economy. Project effects are expected throughout the LAA and would be associated with project construction. Therefore, effects are expected to be short-term in duration and occur as a regular event. Effects on the provincial economy would be substantially reduced once project construction is complete and dry operations begin. The economy in the LAA, though still recovering from effects of lowered oil prices, is considered resilient. Timing is not applicable because effects from project activities would be similar regardless of season or other timing considerations.

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17.4.2 Change in Regional Labour Force

17.4.2.1 Analytical Assessment Techniques

Direct employment estimates for Alberta and the LAA were provided by Alberta Transportation. Indirect and induced employment within Alberta was calculated using provincial multipliers for select IOICs from the SCIPOM (see Section 17.4.2). Using existing labour force characteristics, indirect and induced employment for the LAA were calculated by multiplying provincial employment estimates by SCIPOM IOIC provincial multipliers and derived adjustment factors (calculated by dividing the LAA basic to non-basic industry ratio by the Alberta basic to non-basic ratio). Adjustment factors are summarized in Table 17-19.

Table 17-19 Adjustment Factors, Indirect and Induced

Location	Basic to Non-Basic Ratio	Adjustment Factor (% of Alberta Ratio)
LAA	0.68	82%
Alberta	0.83	100%

SOURCE: Estimate based on existing characteristics from Statistics Canada (see Section 17.2.2.3) using methods described above.

To determine the number of project positions that could be filled by LAA residents during construction and dry operations (i.e., available labour force), existing LAA characteristics were compared with labour requirements for the Project. To calculate the available labour force, the existing LAA unemployment rate is multiplied by the labour force size for relevant occupations (e.g., trades, transport and equipment operation). Because unemployment rates are likely to vary by occupation, this is considered an approximation of the available labour force in the LAA.

17.4.2.2 Assumptions

The following assumptions were used in assessing the change in regional labour force:

- 80% of the construction workforce would be hired from the LAA with the remaining 20% hired from other parts of Alberta
- 100% of the dry operations workforce would be hired from the LAA

To facilitate a conservative approach, peak workforce estimates and conservative (i.e., understated) local hire estimates were used. Peak workforce estimates were assumed to apply at the start of each Project phase (e.g., construction and dry operations) and be sustained for the duration of that phase regardless of actual fluctuations in project employment.

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Together, these estimates understate local hiring, reducing the likelihood that beneficial effects of the Project are overstated.

17.4.2.3 Project Mechanisms

The Project’s workforce is estimated to peak at 360 persons during construction with an additional 155 persons directly employed through contractors retained by the Project. A peak dry operations workforce of 6 persons is estimated. Based on these estimates, project construction, ramp-up and ramp-down (both representing periods of pronounced changes in demand for labour), would have the greatest effect on the regional labour force. During ramp-up, Project demand for qualified labour from the LAA could decrease the number of unemployed persons in the LAA, but also contribute to labour shortages, increase costs for regional businesses (assessed in Section 17.4.3) and stimulate in-migration.

During ramp-down, Project demand for qualified labour would decrease as the Project transitions to dry operations. To the extent that construction workers are unable to secure further employment, ramp-down could result in an increase in the number of unemployed persons in the LAA. Effects would be less pronounced during dry operations as the relatively small peak workforce of six persons would be met and sustained for the duration of dry operations, resulting in little fluctuation in labour demand. Project mechanisms for change in regional labour force by phase are summarized in Table 17-20.

Table 17-20 Project Mechanisms, Change in Regional Labour Force

Phase	Mechanism
Construction	<ul style="list-style-type: none"> • Project contractors and sub-contractors would hire construction trades and related workers from within the LAA, and would also bring in workers from outside the LAA to meet labour requirements. • Local suppliers to the Project would create additional indirect jobs, and spending by the direct and indirect workforce would result in induced employment. • Project labour demands may cause shortages of skilled workers and competition with current employers in other sectors such as services, rural industries, and local government.
Dry operations	<ul style="list-style-type: none"> • Alberta Environment and Parks would hire workers to operate the Project. • Local suppliers to the Project would create additional indirect jobs, and spending by the direct and indirect workforce would result in induced employment.

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17.4.2.4 Mitigation

Project effects on the regional labour force during are expected to be positive in direction with the addition of direct, indirect and induced employment. As such, no mitigation measures are proposed to address adverse effects. Alberta transportation will adhere to government procurement policies and procedure with respect to labour, and goods and services.

17.4.2.5 Residual Effects

Construction

Project construction would require a direct workforce of 360 persons (~~360~~ 610 PYs) with an additional 155 persons (~~455~~ 290 PYs) directly employed through contractors retained by the Project. Alberta Transportation estimates that approximately 80% of direct employment (412 persons, ~~412~~ 724 PYs) would be satisfied by current LAA residents with the remaining 20% (103 persons, ~~403~~ 180 PYs) hired from elsewhere in Alberta. Based on the Project's design, demand for skilled labour would be greatest among occupations in trades, transport and equipment operators.

In 2011, there were approximately 91,125 persons employed in trades, transport and equipment operation and related occupations in the LAA. Assuming a similar number of persons are employed in these occupations at the onset of construction and that 6% (the unemployment rate of the LAA in 2011) of these persons are unemployed, approximately 5,467 persons could be available to work on the Project. As the estimated available supply of skilled labour in these occupations exceeds the project demand, direct employment with the Project is not expected to contribute to labour shortages in the LAA.

In addition to direct employment, local suppliers to the Project would create indirect jobs, while spending by the direct and indirect workforce would result in induced employment. Applying adjustment factors listed in Table 17-19, it is estimated at ~~220~~ 156 indirect and ~~425~~ 96 induced jobs (~~220~~ 275 PYs and ~~425~~ 170 PYs, respectively) would be created in the LAA from the Project. Table 17-21 summarizes estimated direct, indirect, and induced employment in the LAA during construction.

Once construction of the Project is complete, a loss of direct employment is expected. Skill sets required for dry operations would differ from those required during construction. Although construction workers are not expected to transition to dry operations, the contractual, short-term nature of their employment is known and would be anticipated (this type of employment aligns with current conditions and trends among construction-related occupations). Skills, experience and labour income gained by construction workers during their employment with the Project would further offset adverse effects as these benefits could improve qualifications and reduce financial barriers to employment on future projects in the LAA.

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Table 17-21 Project Construction Employment Effects, LAA

Employment	Employment Effects in the LAA	
	Jobs	Person Years
Direct	360 288	360 490
Direct – Contract	155 124	155 234
Indirect	220 156	220 275
Induced	125 96	125 170
Total	860 664	860 1,169
SOURCE: Estimate based on SCPIOM-IOIC provincial multiplier analysis and Alberta Transportation construction cost estimates.		

Summary

Project residual effects on the regional labour force are expected to be positive during construction with the addition of direct, indirect, and induced employment, but low in magnitude relative to the LAA labour force. Project effects are expected throughout the LAA, and because they are associated with Project construction, would be short-term in duration and occur as a regular event (albeit with fluctuations in demand for labour). Effects are reversible once construction is complete. Within the context of the LAA (an available labour force of 5,467 persons with construction-related skills and training), project effects (i.e., increased demand for labour) occur within a resilient context. Timing is not applicable because effects from project activities would be similar regardless of season or other timing considerations.

Dry Operations

Dry operations would require a direct workforce of 6 persons (6 PYs). Alberta Environment and Parks estimates that 100% of direct employment would be satisfied by current LAA residents. Based on the Project’s design, demand for skilled labour would be greatest among occupations in management, business, and natural and applied science.

Similar to the analysis completed for project construction, in 2011, there were approximately 282,390 persons within the LAA employed in occupations related to management, business, finance, administration, and natural and applied sciences. This translates to a labour force of 19,943 persons available to work on the Project assuming a 6% unemployment rate. As the estimated available supply of skilled labour in the LAA exceeds project demand, direct employment with the Project is not expected to contribute to labour shortages in the LAA.

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In addition to direct employment, local suppliers to the Project would create indirect jobs, and spending by the direct and indirect workforce would result in induced employment. Applying adjustment factors identified in Table 17-19, it is estimated at three indirect and two induced jobs (three PYs and two PYs respectively) would be created in the LAA due to the Project. Table 17-22 summarizes estimated direct, indirect, and induced employment in the LAA during dry operations.

Table 17-22 Project Dry Operations Employment Effects, LAA

Employment	Employment Effects in the LAA	
	Jobs	Person Years
Direct	6	6
Direct – Contract	-	-
Indirect	3	3
Induced	2	2
Total	11	11

SOURCE: Estimate based on SCIPOM–IOIC provincial multiplier analysis and Alberta Transportation construction cost estimates.

Summary

Project residual effects on the regional labour force during dry operations are expected to be positive in direction with the addition of direct, indirect and induced employment, but low in magnitude relative to the LAA labour force. Project effects are expected throughout the LAA, and be long-term in duration (during dry operations) and occur as a regular event. Effects are reversible following decommissioning. Within the context of the LAA (an available labour force of 19,943 persons with operation-relevant skills and training), Project effects (i.e., increased demand for labour) occur within a resilient context. Timing is not applicable because effects from project activities would be similar regardless of season or other timing considerations.

17.4.3 Change in Regional Economy

17.4.3.1 Analytical Assessment Techniques

Project expenditures during construction and dry operations were provided by Alberta Transportation. For construction-related expenditures, a detailed, project-specific cost estimate was applied against ten IOICs to determine direct employment and labour income. Direct employment and labour income (direct, indirect and induced) during dry operations was estimated by multiplying total expenditures against IOIC BS221300 – Water, Sewage and Other Systems. Indirect and induced employment was estimated using the same methods as that of direct employment, but with a local adjustment factor (see Table 17-19).



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17.4.3.2 Assumptions

The following assumptions were used in assessing a change in the regional economy:

- Capital expenditures are estimated at \$~~249~~ 280 million (~~total~~ exclusive of escalation and land costs; see Table 17-15).
- Operational expenditures (dry operations) are estimated at \$1.8 million annually.
- Cost estimates (construction and dry operations) are considered Class ~~D~~ B (accurate to within ~~±50~~15%).
- 80% of construction expenditures would occur in the LAA with the remaining 20% occurring within the rest of Alberta.
- 100% of operational expenditures would occur in the LAA.

17.4.3.3 Project Mechanisms

Project spending can benefit and adversely affect regional businesses. Benefits typically relate to increased revenues, which can increase the capacity of local businesses by supporting capital investment and hiring. Adverse effects relate to increased demand for labour, goods, and services, which can increase operational costs (and therefore decrease revenues) through wage inflation and employee turnover. Increased competition for labour can also decrease the capacity of local businesses through labour shortages. Project spending can also adversely affect the affordability of accommodations through the in-migration of workers to the LAA in search of Project employment. Project mechanisms for change in regional economy by phase are summarized in Table 17-23.

Table 17-23 Project Mechanisms, Change in Regional Economy

Phase	Mechanism
Construction	<ul style="list-style-type: none"> • 83% of Project expenditures on goods and services would occur in the LAA with the remaining 17% occurring within the rest of Alberta. • The direct and indirect workforce would spend a proportion of their earnings in LAA. • Competition for the local labour force may drive wage costs up or make it difficult for some businesses to maintain the desired workforce level. • Effects on regional businesses would likely be felt most during ramp-up to peak construction and ramp-down to dry operations. During ramp-up, increased Project spending and employment would occur. Once construction is complete and the Project transitions to dry operations (i.e., ramp-down), Project spending would decrease and loss of direct employment is expected.
Dry operations	<ul style="list-style-type: none"> • During dry operations, local businesses would benefit from project-related spending (i.e., direct spending and spending associated with indirect and induced economic activity).

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17.4.3.4 Mitigation

See Table 17-24 for proposed mitigation measures to address adverse effects on change in regional labour force.

Table 17-24 Mitigation Proposed for Changes in Regional Businesses

Mitigation/Mitigation Mechanism	Rationale for Selection	Expected Success/Risks and Uncertainty	Timing	Management or Compensation Plans
<p><u>Mitigation Measure</u> Alberta transportation will adhere to government procurement policies and procedure with respect to labour, and goods and services.</p> <p><u>Mitigation Mechanism</u> Reduces the possibility that the Project would contribute to wage inflation in the LAA.</p>	<p>Economic theory regarding labour shortages and surpluses is well understood. Wages would increase in labour markets with excess demand (shortage) and decrease in labour markets with excess supply (surplus).</p> <p>The mitigation measure represents the extent to which Alberta Transportation and construction contractors can manage the Project's contribution to wage inflation due to increased demand for labour.</p>	<p><u>Expected Success</u> Unknown. Alberta Transportation and construction contractors can control wages paid to workers directly employed by the Project, but the degree to which the mitigation reduces competition among local employers for labour and to what extent project contributions to wage inflation are reduced is unknown (as wage inflation is subject to numerous other macroeconomic factors).</p> <p><u>Risk and Uncertainty</u> Moderate risk that this measure would not be successful because fair wage rates for construction workers within Western Canada would likely exceed average labour rates in the LAA.</p>	<p><u>Project Phase</u> All phases.</p> <p><u>Effectiveness</u> Immediately.</p>	<p>Part of project planning and procurement processes.</p>

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17.4.3.5 Residual Effects

Construction

Alberta Transportation estimates LAA capital expenditures (CAPEX), **net of contingency, escalation, and land cost**, at ~~\$199~~ **\$224** million, (see Table 17-25) with labour representing approximately ~~20~~ **24%** (~~\$39~~ **\$54** million). LAA expenditures accounts for approximately 80% of total Project CAPEX of ~~\$249~~ **\$280** million. In addition to direct CAPEX, indirect and induced economic activity would result in increased spending in the LAA (indirect and induced spending is not quantified in this assessment).

Given existing conditions and the breakdown of CAPEX by goods and services, LAA businesses are well positioned to benefit from project spending. Of CAPEX occurring in the LAA, construction services account for the greatest percentage (~~43~~ **40%**) of CAPEX with purchases of concrete/aggregate (goods) accounting for the second-greatest percentage (~~36~~ **31%**).

In 2011, the LAA labour force employment in construction (56,575 persons) was second only to health care and social assistance, accounting for 9% of employment among basic industries. The high degree of existing employment in construction-based industries suggests that this industry is well developed and that demand for construction-related goods and services by the Project can be accommodated by LAA businesses. Similar comparisons can be made between CAPEX in machinery/equipment and professional/engineering services and the LAA's manufacturing and professional, scientific, and technical services industries.

The degree to which local and regional businesses would benefit from local CAPEX depends on their capability and capacity to satisfy project work orders, and where applicable, their willingness to secure additional workers and resources or undertake capital investment (e.g., acquire new equipment or modify existing equipment to fulfill work requirements). Alberta Transportation's purchasing and contracting policies would also determine the extent to which local businesses would benefit for CAPEX. Currently, Alberta Transportation contracts prequalified engineering construction companies to construct major developments.

Table 17-25 Estimated CAPEX of Goods and Services, LAA

Cost Item		Expenditure (\$ millions)	Percent (%) of LAA CAPEX
Goods	Concrete and aggregate	71 69	36 31
	Machinery and equipment	8	4
	Other goods	11 18	6 8
Services	Construction services	85 89	43 40
	Professional and Engineering services	23 40	11 18
Total		199 224	100



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Table 17-25 Estimated CAPEX of Goods and Services, LAA

Cost Item	Expenditure (\$ millions)	Percent (%) of LAA CAPEX
<p>NOTE: Totals may not sum due to rounding Expenditures do not include provisions for escalation, contingency, or allowance for funds used during construction.</p>		
<p>SOURCE: Data provided by Alberta Transportation</p>		

Adverse effects of Project spending relate to increased operational costs due to wage inflation and employee turnover. Increased competition for labour, leading to wage inflation, could also decrease the capacity of local businesses through labour shortages. During construction the average annual wage of direct full-time workers is estimated at ~~\$73,000~~ 74,600/PY. When compared to existing conditions (see Section 17.2.2.5), project construction wages are less than mean employment income (\$138,473). Recognizing that wages and salaries represent 97% of employment income, average direct full-time construction wages are roughly 60% that of mean LAA wages. Compared to provincial averages, direct full-time construction wages (average) are roughly 1.1 times that of mean provincial wages (\$66,661).

Since the average direct project construction wage is a measure of mean (and therefore accounts for wages less than and greater than ~~\$73,000~~ 74,600/PY), its comparison with mean LAA wages is more appropriate and, in this case, less than existing conditions. This combined with proposed mitigation to pay construction workers wages that are consistent with the western Canadian labour market (see Table 17-24) means that minor wage differences between direct project construction wages (average) and existing conditions are not expected to place upward pressure on LAA wages. As such, project-influenced employee turnover (due to workers seeking higher paying wages with the Project) is expected to be negligible during construction. Given the existing labour force characteristics (i.e., a LAA labour force of 677,560 persons with an estimated 91,125 persons available to work on the Project), negligible effects are expected in terms of increased competition for labour.

Wages earned by indirect and induced workers are estimated at \$75,000 and ~~\$57,000~~ 58,000 respectively. As estimated direct and indirect wages are very similar, the conclusions provided for direct project wages also apply to indirect wages. One exception is that the potential labour force available for indirect employment is larger than that for direct employment, and it includes additional occupations such as manufacturing and utilities (see Table 17-10). Having a larger available labour force further reduces potential adverse effects on regional businesses resulting from indirect economic activity. Estimated induced wages are less than median and mean LAA wages and therefore, are not expected to contribute to wage inflation, employee turnover or increased competition for labour.

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VOLUME 3A: EFFECTS ASSESSMENT (CONSTRUCTION AND DRY OPERATIONS)**

Assessment of Potential Effects on Employment and Economy
March 2018

Summary

CAPEX as well as indirect and induced economic activity are predicted to have beneficial and adverse effects. Given mitigation measures, existing labour force characteristics (e.g., size and the available labour force for direct and indirect employment), and estimated wages to be paid to direct, indirect and induced workers, effects (positive and adverse) are expected to be low in magnitude, extend to the LAA, and occur within a resilient socio-economic context. Effects are considered short-term because they would occur for the duration of construction and be reversible once construction is complete. Effects would occur as a regular event (albeit with fluctuation based on the timing of Project expenditures). Timing is not applicable because effects from Project activities would be similar regardless of season or other timing considerations.

Dry Operations

During dry operations, annual Project expenditures (OPEX) are estimated at \$1.8 million with labour representing roughly 24% (\$440,000) of total expenditures (see Table 17-26). Alberta Transportation expects that 100% of OPEX expenditures would occur in the LAA. Based on this cost estimate and the composition of OPEX expenditures for the water, sewage, and other systems IOIC industry (IOIC 2009 concordance with NAICS 22131 [2012] – Water Supply and Irrigation Systems), approximately \$600,000 annually (32% of OPEX) would be spent on petroleum and petroleum products and \$600,000 annually (32% of OPEX) on management-related activities (i.e., overhead). Another \$600,000 is estimated to be spent annually on repair and maintenance services and other goods and services.

Table 17-26 Estimated OPEX of Goods and Services, LAA

Cost Item	Expenditure (\$ millions)	Percent (%) of LAA OPEX
Petroleum and petroleum products	0.6	34
Other purchased goods	0.4	20
Repair and maintenance	0.1	7
Other purchased services	0.1	7
Overhead	0.6	32
Total	1.8	100

SOURCE: Total OPEX (\$) provided by Alberta Transportation with percent of OPEX (%) modified from CANSIM Table 381-0033 Supply and use tables, detail level, provincial and territorial. Alberta – Water, Sewage and Other Systems [BS221300] (Statistics Canada 2016).

Similar to the assessment of project construction, LAA businesses are well positioned to benefit from project spending during dry operations with non-basic industries accounting for roughly



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60% of the employed LAA labour force. Several LAA businesses operate in industries likely to provide goods and services to the Project such as wholesale and retail trade, other services (e.g., those providing repair and maintenance services or professional, scientific and technical services). These businesses are well established and positioned to benefit from OPEX (see Table 17-10 and Section 17.2.2.7).

As with construction, the degree to which local and regional businesses would benefit from local OPEX depends on the capability and capacity of local businesses to satisfy project work orders and, where applicable, their willingness to secure additional workers and resources, or undertake capital investment (e.g., acquire new or modify existing equipment needed to fulfill work-order requirements). It would also depend on Alberta Transportation's purchasing and contracting policies.

Direct employment during dry operations is estimated at 6 PYs, each with an annual wage of \$72,245. This wage is less than the LAA mean existing wage of \$138,473. Based on this level of employment and compensation, and given existing conditions (an existing labour force of 677,460 persons with 19,943 persons available to work on the Project), the Project is expected to negligibly affect wage inflation, employee turnover and increased completion for labour. Similarly, indirect and induced employment is estimated at 3 PYs and 2 PYs regardless of estimated wages (indirect: \$77,387, induced \$59,375). Given existing conditions and the available indirect and induced labour force (see above), indirect and induced business economic activity is expected to negligibly affect wage inflation, employee turnover and increased completion for labour.

Summary

OPEX as well as indirect and induced economic activity are predicted to have beneficial and adverse effects. Given proposed mitigation, existing labour force characteristics (e.g., labour force size, and the available labour force for direct and indirect employment), and estimated wages to be paid to direct, indirect and induced workers, effects (positive and adverse) are expected to be negligible to low in magnitude and extend to the LAA. Effects would occur within a resilient socio-economic context, last for the duration of dry operations (long-term), and be reversible following decommissioning. Effects would occur as a regular event. Timing is not applicable because effects from project activities would be similar regardless of season or other timing considerations.

17.4.4 Summary of Project Residual Effects

Table 17-27 summarizes the residual environmental effects on employment and economy during construction and dry operations.

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Table 17-27 Project Residual Effects on Employment and Economy during Construction and Dry Operations

Residual Effect	Residual Effects Characterization								
	Project Phase	Timing	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Ecological and Socio-economic Context
Change in provincial economy	C	N/A	P	L	LAA	ST	C	R	R
	D	N/A	P	L	LAA	LT	C	R	R
Change in regional labour force	C	N/A	P	L	LAA	ST	R	R	R
	D	N/A	P	L	LAA	LT	R	R	R
Change in regional economy	C	N/A	P/A	L	LAA	ST	R	R	R
	D	N/A	P/A	N-L	LAA	LT	R	R	R
<p>KEY</p> <p>See Table 17-5 for detailed definitions</p> <p>Project Phase C: Construction D: Dry Operations</p> <p>Timing Consideration S: Seasonality T: Time of day R: Regulatory</p> <p>Direction: P: Positive A: Adverse N: Neutral</p> <p>Magnitude: N: Negligible L: Low M: Moderate H: High</p> <p>Geographic Extent: PDA: Project Development Area LAA: Local Assessment Area</p> <p>Duration: ST: Short-term; MT: Medium-term LT: Long-term</p> <p>N/A: Not applicable</p> <p>Frequency: S: Single event IR: Irregular event R: Regular event C: Continuous</p> <p>Reversibility: R: Reversible I: Irreversible</p> <p>Ecological/Socio-Economic Context: R: Resilient NR: Not Resilient</p>									

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17.5 DETERMINATION OF SIGNIFICANCE

Construction and dry operation of the Project is predicted to have a generally positive effect on employment and economy in the LAA and Alberta. Though there is potential that local businesses could be adversely affected through competition for, and cost of, labour, the workforce requirements during construction and dry operations can easily be met by the available workforce of LAA communities. The Project represents only a small fraction of the GDP generated in the LAA, and therefore, is not expected to result in adverse effects that are distinguishable from current trends and conditions. In consideration of proposed mitigation measures, adverse residual effects on employment and economy due to construction and dry operations are predicted to be not significant.

17.6 PREDICTION CONFIDENCE

There is a moderate degree of confidence in the assessment of adverse effects on labour and economy. Statistics Canada's Census of Population (Census) data, which is collected every five years, is the most comprehensive demographic information on LAA/RAA communities. With the exception of 2016 Census population counts, the 2011 Census and 2011 National Household Survey (NHS) are the most recent surveys of the Canadian population with published data (labour and Indigenous-specific information gathered during the 2016 Census is expected to become available November 29, 2017). Because Census information presented in this section is approximately five years old, it would not reflect the most recent changes in the demographic composition of communities within the LAA/RAA.

Regarding the analysis of economic impacts, the assessment is based on preliminary estimates of the Project's cost and labour requirements (these estimates are accurate to within ± 15 50%); however, because of the relatively modest size of the Project relative to the overall economy and labour force in the LAA, conclusions would be applicable regardless of actual Project cost. Inherent uncertainties associated with the availability of information, data analyses, and interpretation of data and information are addressed by taking a conservative approach that reduces the potential to underestimate the significance of an effect. By applying a conservative approach, assumptions err on the side of overstating an effect.

