

# **Critical Minerals Economic Impact Study**

## **Economic Impacts of New and Extended Critical Mineral Mines & Precious Metals Mines**

**Prepared for the Mining Association of British Columbia**

Mansfield Consulting Inc.  
[www.mansfieldconsulting.ca](http://www.mansfieldconsulting.ca)

December 2023

## TABLE OF CONTENTS

Executive Summary .....	i
1 Introduction.....	1
1.1 Study Purpose and Scope .....	1
1.2 About Mansfield Consulting Inc.....	1
1.3 Report Limitations .....	1
2 Mines Included in the Study .....	2
2.1 About Critical Minerals .....	2
2.2 Critical Mineral Mines Included in the Study .....	3
2.3 Other Proposed Critical Mineral Mines .....	4
2.4 Precious Metals Mines Included in the Study .....	4
2.5 Other Proposed Precious Metals Mines.....	4
3 Economic Impact Analysis .....	5
3.1 Overview .....	5
3.2 Input-Output Modelling.....	6
3.3 Limitations of Economic Impact Analysis.....	6
3.4 Near-Term and Long-Term Impacts.....	6
3.5 Geographic Reach of Economic Impacts.....	7
4 Near-Term Economic Impacts of Critical Mineral Mines.....	8
4.1 Average Cost For One Year of Development or Extension Activity.....	8
4.2 Average Impacts From One Year of Development or Extension Activity .....	9
4.3 Average Impacts From the Development or Extension of a Mine .....	10
4.4 Combined Impacts From the Development or Extension of All Critical Mineral Mines in the Study...	11
4.5 Comparisons With Other Industries and Events .....	12
5 Long-Term Economic Impacts of Critical Mineral Mines .....	13
5.1 Average Revenues From One Year of Operation.....	13
5.2 Average Impacts From One Year of Operation .....	14
5.3 Average Impacts From the Operation of a Mine Over Its Lifespan.....	15
5.4 Combined Impacts From the Operation of All Critical Mineral Mines in the Study Over Their Lifespans .....	16
5.5 Comparisons With Other Industries .....	17
6 Near-Term Economic Impacts of Precious Metals Mines.....	18
6.1 Average Cost For One Year of Development Activity.....	18
6.2 Average Impacts From One Year of Development Activity.....	19
6.3 Average Impacts From the Development of a Mine.....	20

6.4	Combined Impacts From the Development of All Precious Metals Mines in the Study .....	21
6.5	Comparisons With Other Industries and Events .....	22
7	Long-Term Economic Impacts of Precious Metals Mines.....	23
7.1	Average Revenues From One Year of Operation.....	23
7.2	Average Impacts From One Year of Operation .....	24
7.3	Average Impacts From the Operation of a Mine Over Its Lifespan.....	25
7.4	Combined Impacts From the Operation of All Precious Metals Mines in the Study Over Their Lifespans .....	26
7.5	Comparisons with Other Industries .....	27
	Appendix A – Canada’s Critical Minerals List.....	28
	Appendix B – Data Sources.....	29
	Appendix C – Input-Output Modelling Technical Constraints .....	30
	Appendix D – Mansfield Consulting Inc. ....	31

## EXECUTIVE SUMMARY

### Study Purpose and Scope

The purpose of the study was to quantify the potential economic impacts that would be created by proposed critical mineral mines and extensions to existing critical mineral mines in British Columbia (“BC”). In addition, the study quantified the potential economic impacts that would be created by proposed precious metals mines in BC.

***Critical Mineral Mines*** Critical mineral mines produce at least one of the thirty-one minerals listed on the Government of Canada’s critical mineral list. The study included fourteen proposed new critical mineral mines and two existing critical mineral mines for which major extensions have been proposed.

***Precious Metals Mines*** Precious metals mines produce minerals of high economic value, such as gold and silver. The study included five proposed new precious metals mines.

Table A contains a list of the critical mineral mines and precious metals mines that were included in the study.

**Table A. Critical Mineral Mines and Precious Metals Mines Included in the Study**

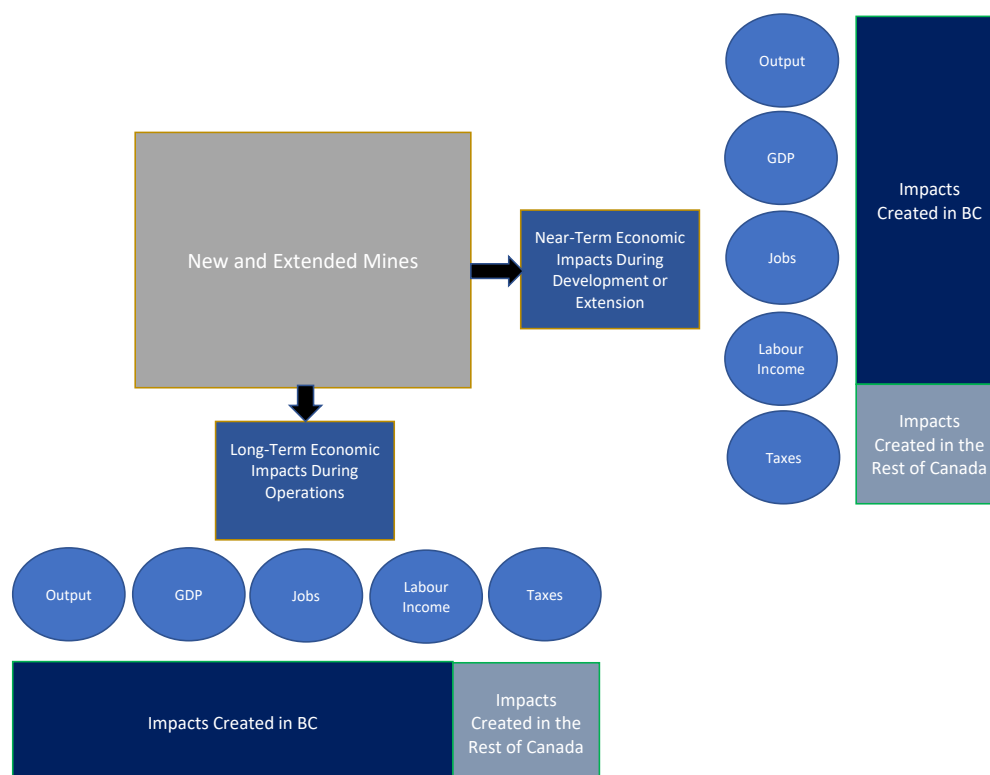
Critical Mineral Mines	Principal Critical Minerals	Precious Metals Mines	Principal Precious Metals
Aley	Niobium	Cariboo Gold	Gold
Baptiste	Nickel/Cobalt	Eskay Creek	Gold
Ootsa	Copper/Molybdenum	New Polaris Gold	Gold
Berg	Copper/Molybdenum	Premier and Red Mountain	Gold
Galore Creek	Copper	Spanish Mountain Gold	Gold
Highland Valley Copper	Copper		
Ingerbelle	Copper		
KSM	Copper		
Kutcho	Copper/Zinc		
Kwanika-Stardust	Copper		
North Island	Copper		
Red Chris	Copper		
Shaft Creek	Copper/Molybdenum		
Turnagain	Nickel		
Wicheeda	Rare Earths		
Yellowhead	Copper		

## Near-Term and Long-Term Impacts

The economic impacts created by mines consist of both near-term and long-term impacts. Near-term impacts are created by the activities required to develop a new mine or extend the life of an existing mine beyond its planned date of closure. Long-term impacts are created by a mine's ongoing operations after the development or extension activities are completed.

## Geographic Reach of Economic Impacts

There are three categories of impacts that are estimated through economic impact analysis: direct impacts, indirect impacts, and induced impacts.<sup>1</sup> Direct impacts occur at “front-end” businesses that initially receive operating revenues and incur expenditures and are created where those businesses have their operations.<sup>2</sup> Indirect impacts occur at suppliers, through company spending on goods and services, and are created where suppliers have their operations. Induced impacts occur in the general economy through the spending of company and supplier employees and are created where employees spend their income. For new and extended mines in BC, all direct impacts are defined to be created within BC, while indirect and induced impacts are created both in BC and in provinces across Canada. The following figure illustrates the geographic reach of the economic impacts created by new and extended mines in BC.



<sup>1</sup> The sum of direct impacts, indirect impacts and induced impacts is referred to as total impacts.

<sup>2</sup> Please note that only a portion of direct impacts occur at the mine site. During the development or extension of a mine, direct impacts also occur where the mine owner and other businesses that receive a portion of the initial spending on the project are located. During the operation of a mine, direct impacts also occur where the mine owner and other businesses that may receive a portion of the mine revenues are located.

### Near-Term Impacts of Critical Mineral Mines

*Average Impacts From One Year of Development or Extension Activity.* The sixteen critical mineral mines in the study had a combined \$36.576 billion in total development or extension costs that were projected to be incurred over a combined 48 years of development or extension activity. As displayed in Table B, this results in an average cost of \$0.762 billion for one year of development or extension activity at a critical mineral mine.

**Table B. Critical Mineral Mines — Average Cost For One Year of Development or Extension Activity**

Critical Mineral Mines	
Combined Total Development or Extension Costs for all Critical Mineral Mines in the Study (2023 millions)	\$36,576
Combined Years of Development or Extension Activity for all Critical Mineral Mines in the Study	48.0
Average Cost For One Year of Development or Extension Activity at a Critical Mineral Mine (2023 millions)	\$762

The estimated average economic impacts arising from one year of development or extension activity at a critical mineral mine (\$0.762 billion in spending over one year) are summarized in Table C and include:

- Total economic output of \$1.666 billion.
- Total GDP of \$0.797 billion.
- Total labour income of \$0.491 billion.
- Total employment of 6,290 jobs (one job represents one year of employment for one person).
- Total tax revenues of \$0.226 billion.

**Table C. Critical Mineral Mines — Average Economic Impacts From One Year of Development or Extension Activity** (Impacts Over 1.0 Years of Development or Extension Activity)

Within BC Impacts							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$762	\$298	\$220	2,091	\$46	\$30	\$1
Indirect	\$362	\$196	\$126	1,709	\$27	\$17	\$3
Induced	\$239	\$155	\$62	1,309	\$26	\$29	\$6
<b>Total</b>	<b>\$1,364</b>	<b>\$649</b>	<b>\$409</b>	<b>5,109</b>	<b>\$100</b>	<b>\$76</b>	<b>\$10</b>
Impacts in Other Regions in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$0	\$0	\$0	0	\$0	\$0	\$0
Indirect	\$188	\$88	\$52	677	\$12	\$8	\$1
Induced	\$114	\$60	\$30	503	\$9	\$9	\$2
<b>Total</b>	<b>\$302</b>	<b>\$148</b>	<b>\$82</b>	<b>1,180</b>	<b>\$21</b>	<b>\$16</b>	<b>\$3</b>
Total Impacts in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$762	\$298	\$220	2,091	\$46	\$30	\$1
Indirect	\$551	\$284	\$178	2,386	\$39	\$25	\$4
Induced	\$353	\$215	\$93	1,812	\$35	\$38	\$8
<b>Total</b>	<b>\$1,666</b>	<b>\$797</b>	<b>\$491</b>	<b>6,290</b>	<b>\$121</b>	<b>\$92</b>	<b>\$13</b>

*Average Impacts From the Development or Extension of a Mine.* The sixteen critical mineral mines in the study averaged 3.0 years in projected development or extension activity per mine. As displayed in Table D, this results in an average total cost of \$2.286 billion to develop or extend a critical mineral mine.

**Table D. Critical Mineral Mines — Average Total Cost to Develop or Extend a Mine**

Critical Mineral Mines	
Average Cost per Year of Development or Extension Activity (2023 millions)	\$762
Average Years of Development or Extension Activity per Mine	3.0
Average Total Cost to Develop or Extend a Critical Mineral Mine (2023 millions)	\$2,286

The estimated average economic impacts arising from the development or extension of a critical mineral mine (\$2.286 billion in total spending over 3.0 years) are summarized in Table E and include:

- Total economic output of \$4.998 billion per mine.
- Total GDP of \$2.391 billion per mine.
- Total labour income of \$1.473 billion per mine.
- Total employment of 18,869 jobs per mine (6,290 jobs annually).
- Total tax revenues of \$0.679 billion per mine.

**Table E. Critical Mineral Mines — Average Economic Impacts from the Development or Extension of a Mine**  
(Total Impacts Over 3.0 Years of Development or Extension)

Within BC Impacts							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$2,286	\$893	\$661	6,274	\$138	\$89	\$4
Indirect	\$1,087	\$587	\$379	5,127	\$82	\$52	\$9
Induced	\$718	\$466	\$187	3,927	\$79	\$87	\$17
<b>Total</b>	<b>\$4,091</b>	<b>\$1,946</b>	<b>\$1,227</b>	<b>15,328</b>	<b>\$299</b>	<b>\$228</b>	<b>\$30</b>
Impacts in Other Regions in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$0	\$0	\$0	0	\$0	\$0	\$0
Indirect	\$565	\$265	\$155	2,032	\$36	\$23	\$3
Induced	\$342	\$180	\$91	1,509	\$27	\$26	\$7
<b>Total</b>	<b>\$907</b>	<b>\$445</b>	<b>\$246</b>	<b>3,541</b>	<b>\$63</b>	<b>\$49</b>	<b>\$10</b>
Total Impacts in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$2,286	\$893	\$661	6,274	\$138	\$89	\$4
Indirect	\$1,652	\$852	\$534	7,159	\$118	\$75	\$12
Induced	\$1,060	\$646	\$278	5,436	\$106	\$113	\$24
<b>Total</b>	<b>\$4,998</b>	<b>\$2,391</b>	<b>\$1,473</b>	<b>18,869</b>	<b>\$362</b>	<b>\$277</b>	<b>\$40</b>

*Combined Impacts From the Development or Extension of All Critical Mineral Mines in the Study.* The combined estimated economic impacts from the development or extension of all sixteen critical mineral mines included in the study are sixteen times the average impacts from the development or extension of one mine that are displayed in Table E (please see Section 4.4 for additional details).

## Long-Term Impacts of Critical Mineral Mines

*Average Impacts From One Year of Operation.* The sixteen critical mineral mines in the study had a combined \$403.127 billion in total revenues that were projected to be received over a combined 385 years of operation. As displayed in Table F, this results in an average revenue of \$1.045 billion from one year of operation at a critical mineral mine.

**Table F. Critical Mineral Mines — Average Revenues From One Year of Operation**

Critical Mineral Mines	
Combined Total Revenues for All Critical Mineral Mines in the Study (2023 millions)	\$403,127
Combined Years of Operation for All Critical Mineral Mines in the Study	385
Average Revenues From One Year of Operation at a Critical Mineral Mine (2023 millions)	\$1,045

The estimated average economic impacts arising from one year of operation at a critical mineral mine (\$1.045 billion in revenues over one year) are summarized in Table G and include:

- Total economic output of \$2.053 billion.
- Total GDP of \$1.033 billion.
- Total labour income of \$0.477 billion.
- Total employment of 5,590 jobs.
- Total tax revenues of \$0.401 billion.

**Table G. Critical Mineral Mines — Average Economic Impacts From One Year of Operation**  
(Impacts Over 1.0 Years of Operation)

Within BC Impacts							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$1,045	\$477	\$201	1,239	\$89	\$136	\$6
Indirect	\$414	\$234	\$124	1,813	\$32	\$24	\$6
Induced	\$213	\$139	\$55	1,169	\$24	\$26	\$5
<b>Total</b>	<b>\$1,673</b>	<b>\$850</b>	<b>\$381</b>	<b>4,221</b>	<b>\$145</b>	<b>\$186</b>	<b>\$18</b>
Impacts in Other Regions in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$0	\$0	\$0	0	\$0	\$0	\$0
Indirect	\$265	\$122	\$65	849	\$17	\$11	\$2
Induced	\$116	\$61	\$31	521	\$10	\$9	\$2
<b>Total</b>	<b>\$381</b>	<b>\$183</b>	<b>\$96</b>	<b>1,370</b>	<b>\$27</b>	<b>\$20</b>	<b>\$4</b>
Total Impacts in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$1,045	\$477	\$201	1,239	\$89	\$136	\$6
Indirect	\$679	\$357	\$189	2,662	\$49	\$35	\$9
Induced	\$329	\$200	\$87	1,689	\$34	\$35	\$7
<b>Total</b>	<b>\$2,053</b>	<b>\$1,033</b>	<b>\$477</b>	<b>5,590</b>	<b>\$172</b>	<b>\$207</b>	<b>\$22</b>



*Average Impacts From the Operation of a Mine Over Its Lifespan.* The sixteen critical mineral mines in the study averaged 24.1 years of projected operational life (mine lifespan). As displayed in Table H, this results in average total revenues of \$25.195 billion over the lifespan of a critical mineral mine.

**Table H. Critical Mineral Mines — Average Total Revenues Over the Lifespan of a Mine**

Critical Mineral Mines	
Average Revenues per Year of Operation (2023 millions)	\$1,045
Average Years of Operation per Mine (Mine Lifespan)	24.1
Average Total Revenues Over the Lifespan of a Critical Mineral Mine (2023 millions)	\$25,195

The estimated average economic impacts arising from the operation of a critical mineral mine over its lifespan (\$25.195 billion in total revenues over 24.1 years) are summarized in Table I and include:

- Total economic output of \$49.484 billion per mine.
- Total GDP of \$24.893 billion per mine.
- Total labour income of \$11.489 billion per mine.
- Total employment of 134,721 jobs per mine (5,590 jobs annually).
- Total tax revenues of \$9.659 billion mine.

**Table I. Critical Mineral Mines — Average Economic Impacts From the Operation of a Mine Over Its Lifespan**  
(Total Impacts Over 24.1 Years of Operation)

Within BC Impacts							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$25,195	\$11,489	\$4,838	29,857	\$2,146	\$3,280	\$153
Indirect	\$9,977	\$5,644	\$2,998	43,689	\$774	\$574	\$155
Induced	\$5,140	\$3,351	\$1,335	28,169	\$578	\$637	\$129
<b>Total</b>	<b>\$40,312</b>	<b>\$20,484</b>	<b>\$9,171</b>	<b>101,715</b>	<b>\$3,498</b>	<b>\$4,491</b>	<b>\$437</b>
Impacts in Other Regions in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$0	\$0	\$0	0	\$0	\$0	\$0
Indirect	\$6,375	\$2,948	\$1,562	20,459	\$408	\$277	\$56
Induced	\$2,797	\$1,461	\$756	12,547	\$235	\$214	\$43
<b>Total</b>	<b>\$9,172</b>	<b>\$4,409</b>	<b>\$2,318</b>	<b>33,006</b>	<b>\$643</b>	<b>\$491</b>	<b>\$99</b>
Total Impacts in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$25,195	\$11,489	\$4,838	29,857	\$2,146	\$3,280	\$153
Indirect	\$16,352	\$8,592	\$4,560	64,148	\$1,182	\$851	\$211
Induced	\$7,937	\$4,812	\$2,091	40,716	\$813	\$851	\$172
<b>Total</b>	<b>\$49,484</b>	<b>\$24,893</b>	<b>\$11,489</b>	<b>134,721</b>	<b>\$4,141</b>	<b>\$4,982</b>	<b>\$536</b>

*Combined Impacts From the Operation of All Critical Mineral Mines in the Study Over Their Lifespans.*

The combined estimated economic impacts from the operation of all sixteen critical mineral mines included in the study over their lifespans are sixteen times the average impacts from the operation of one mine that are displayed in Table I (please see Section 5.4 for additional details).

### Near-Term Impacts of Precious Metals Mines

*Average Impacts From One Year of Development Activity.* The five precious metals mines in the study had a combined \$1.937 billion in total development costs that were projected to be incurred over a combined 14 years of development activity. As displayed in Table J, this results in an average cost of \$0.138 billion for one year of development activity at a precious metals mine.

**Table J. Precious Metals Mines — Average Cost For One Year of Development Activity**

Precious Metals Mines	
Combined Total Development Costs for all Precious Metals Mines in the Study (2023 millions)	\$1,937
Combined Years of Development Activity for all Precious Metals Mines in the Study	14
Average Cost For One Year of Development Activity at a Precious Metals Mine (2023 millions)	\$138

The estimated average economic impacts arising from one year of development activity at a precious metals mine (\$0.138 billion in spending over one year) are summarized in Table K and include:

- Total economic output of \$0.303 billion.
- Total GDP of \$0.144 billion.
- Total labour income of \$0.089 billion.
- Total employment of 1,141 jobs.
- Total tax revenues of \$0.041 billion.

**Table K. Precious Metals Mines — Average Economic Impacts From One Year of Development Activity**

*(Impacts Over 1.0 Years of Development Activity)*

Within BC Impacts							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$138	\$53	\$39	377	\$8.2	\$5.4	\$0.3
Indirect	\$66	\$36	\$23	311	\$5.0	\$3.2	\$0.5
Induced	\$43	\$28	\$11	236	\$4.7	\$5.2	\$1.0
<b>Total</b>	<b>\$248</b>	<b>\$117</b>	<b>\$74</b>	<b>924</b>	<b>\$17.9</b>	<b>\$13.7</b>	<b>\$1.8</b>
Impacts in Other Regions in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$0	\$0	\$0	0	\$0.0	\$0.0	\$0.0
Indirect	\$35	\$16	\$10	125	\$2.2	\$1.4	\$0.2
Induced	\$21	\$11	\$5	92	\$1.7	\$1.6	\$0.4
<b>Total</b>	<b>\$56</b>	<b>\$27</b>	<b>\$15</b>	<b>217</b>	<b>\$3.9</b>	<b>\$3.0</b>	<b>\$0.6</b>
Total Impacts in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$138	\$53	\$39	377	\$8.2	\$5.4	\$0.3
Indirect	\$101	\$52	\$33	436	\$7.2	\$4.5	\$0.7
Induced	\$64	\$39	\$17	327	\$6.4	\$6.8	\$1.4
<b>Total</b>	<b>\$303</b>	<b>\$144</b>	<b>\$89</b>	<b>1,141</b>	<b>\$21.8</b>	<b>\$16.7</b>	<b>\$2.5</b>

*Average Impacts From the Development of a Mine.* The five precious metals mines in the study averaged 2.8 years in projected development activity per mine. As displayed in Table L, this results in an average total cost of \$0.387 billion to develop a precious metals mine.

**Table L. Precious Metals Mines — Average Total Cost to Develop a Mine**

Precious Metals Mines	
Average Cost per Year of Development Activity(2023 millions)	\$138
Average Years of Development Activity per Mine	2.8
Average Total Cost to Develop a Precious Metals Mine (2023 millions)	\$387

The estimated average economic impacts arising from the development of a precious metals mine (\$0.387 billion in total spending over 2.8 years) are summarized in Table M and include:

- Total economic output of \$0.849 billion per mine.
- Total GDP of \$0.402 billion per mine.
- Total labour income of \$0.248 billion per mine.
- Total employment of 3,194 jobs per mine (1,141 jobs annually).
- Total tax revenues of \$0.115 billion per mine.

**Table M. Precious Metals Mines — Average Economic Impacts from the Development of a Mine**

*(Total Impacts Over 2.8 Years of Development)*

Within BC Impacts							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$387	\$148	\$110	1,055	\$23	\$15	\$1
Indirect	\$185	\$100	\$64	871	\$14	\$9	\$1
Induced	\$121	\$78	\$32	660	\$13	\$15	\$3
<b>Total</b>	<b>\$694</b>	<b>\$326</b>	<b>\$206</b>	<b>2,587</b>	<b>\$50</b>	<b>\$38</b>	<b>\$5</b>
Impacts in Other Regions in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$0	\$0	\$0	0	\$0	\$0	\$0
Indirect	\$97	\$46	\$27	351	\$6	\$4	\$1
Induced	\$58	\$31	\$15	256	\$5	\$4	\$1
<b>Total</b>	<b>\$155</b>	<b>\$76</b>	<b>\$42</b>	<b>607</b>	<b>\$11</b>	<b>\$8</b>	<b>\$2</b>
Total Impacts in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$387	\$148	\$110	1,055	\$23	\$15	\$1
Indirect	\$283	\$145	\$91	1,222	\$20	\$13	\$2
Induced	\$179	\$109	\$47	917	\$18	\$19	\$4
<b>Total</b>	<b>\$849</b>	<b>\$402</b>	<b>\$248</b>	<b>3,194</b>	<b>\$61</b>	<b>\$47</b>	<b>\$7</b>

*Combined Impacts From the Development of All Precious Metals Mines in the Study.* The combined estimated economic impacts from the development of all five precious metals mines included in the study are five times the average impacts from the development of one mine that are displayed in Table M (please see Section 6.4 for additional details).

## Long-Term Impacts of Precious Metals Mines

*Average Impacts From One Year of Operation.* The five precious metals mines in the study had a combined \$16.285 billion in total revenues that were projected to be received over a combined 49 years of operation. As displayed in Table N, this results in an average revenue of \$0.332 billion from one year of operation at a precious metals mine.

**Table N. Precious Metals Mines — Average Revenues From One Year of Operation**

Precious Metals Mines	
Combined Total Revenues for All Precious Metals Mines in the Study (2023 millions)	\$16,285
Combined Years of Operation for All Precious Metals Mines in the Study	49
Average Revenues From One Year of Operation at a Precious Metals Mine (2023 millions)	\$332

The estimated average economic impacts arising from one year of operation at a precious metals mine (\$0.332 billion in revenues over one year) are summarized in Table O and include:

- Total economic output of \$0.603 billion.
- Total GDP of \$0.374 billion.
- Total labour income of \$0.164 billion.
- Total employment of 1,961 jobs.
- Total tax revenues of \$0.109 billion.

**Table O. Precious Metals Mines — Average Economic Impacts From One Year of Operation**

*(Impacts Over 1.0 Years of Operation)*

Within BC Impacts							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$332	\$219	\$83	584	\$27.4	\$32.8	\$0.0
Indirect	\$106	\$59	\$36	575	\$8.3	\$5.7	\$1.3
Induced	\$82	\$53	\$21	448	\$9.2	\$10.2	\$2.1
<b>Total</b>	<b>\$520</b>	<b>\$331</b>	<b>\$140</b>	<b>1,607</b>	<b>\$44.9</b>	<b>\$48.7</b>	<b>\$3.4</b>
Impacts in Other Regions in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$0	\$0	\$0	0	\$0.0	\$0.0	\$0.0
Indirect	\$47	\$24	\$14	197	\$3.3	\$2.1	\$0.4
Induced	\$36	\$19	\$10	156	\$2.9	\$2.6	\$0.6
<b>Total</b>	<b>\$83</b>	<b>\$42</b>	<b>\$23</b>	<b>353</b>	<b>\$6.2</b>	<b>\$4.6</b>	<b>\$0.9</b>
Total Impacts in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$332	\$219	\$83	584	\$27.4	\$32.8	\$0.0
Indirect	\$153	\$83	\$50	772	\$11.6	\$7.8	\$1.7
Induced	\$118	\$72	\$31	605	\$12.1	\$12.7	\$2.6
<b>Total</b>	<b>\$603</b>	<b>\$374</b>	<b>\$164</b>	<b>1,961</b>	<b>\$51.1</b>	<b>\$53.4</b>	<b>\$4.3</b>

*Average Impacts From the Operation of a Mine Over Its Lifespan.* The five precious metals mines in the study averaged 9.8 years of projected operational life (mine lifespan). As displayed in Table P, this results in average total revenues of \$0.3257 billion over the lifespan of a precious metals mine.

**Table P. Precious Metals Mines — Average Total Revenues Over the Lifespan of a Mine**

Precious Metals Mines	
Average Revenues per Year of Operation (2023 millions)	\$332
Average Years of Operation per Mine (Mine Lifespan)	9.8
Average Total Revenues Over the Lifespan of a Precious Metals Mine (2023 millions)	\$3,257

The estimated average economic impacts arising from the operation of a precious metals mine over its lifespan (\$3.257 billion in total revenues over 9.8 years) are summarized in Table Q and include:

- Total economic output of \$5.908 billion per mine.
- Total GDP of \$3.661 billion per mine.
- Total labour income of \$1.602 billion per mine.
- Total employment of 19,213 jobs per mine (1,961 jobs annually).
- Total tax revenues of \$1.066 billion per mine.

**Table Q. Precious Metals Mines — Average Economic Impacts From the Operation of a Mine Over Its Lifespan** (Total Impacts Over 9.8 Years of Operation)

Within BC Impacts							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$3,257	\$2,146	\$814	5,719	\$269	\$322	\$0
Indirect	\$1,036	\$580	\$352	5,638	\$82	\$56	\$13
Induced	\$804	\$521	\$208	4,394	\$90	\$100	\$20
<b>Total</b>	<b>\$5,097</b>	<b>\$3,247</b>	<b>\$1,374</b>	<b>15,751</b>	<b>\$441</b>	<b>\$477</b>	<b>\$33</b>
Impacts in Other Regions in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$0	\$0	\$0	0	\$0	\$0	\$0
Indirect	\$462	\$231	\$134	1,931	\$32	\$20	\$4
Induced	\$348	\$182	\$94	1,531	\$28	\$25	\$6
<b>Total</b>	<b>\$811</b>	<b>\$414</b>	<b>\$228</b>	<b>3,462</b>	<b>\$60</b>	<b>\$45</b>	<b>\$9</b>
Total Impacts in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$3,257	\$2,146	\$814	5,719	\$269	\$322	\$0
Indirect	\$1,498	\$811	\$485	7,569	\$114	\$77	\$16
Induced	\$1,153	\$704	\$303	5,924	\$118	\$125	\$26
<b>Total</b>	<b>\$5,908</b>	<b>\$3,661</b>	<b>\$1,602</b>	<b>19,213</b>	<b>\$501</b>	<b>\$523</b>	<b>\$42</b>

*Combined Impacts From the Operation of All Precious Metals Mines in the Study Over Their Lifespans.*

The combined estimated economic impacts from the operation of all five precious metals mines included in the study are five times the average impacts from the operation of one mine that are displayed in Table Q (please see Section 7.4 for additional details).

# 1 INTRODUCTION

## 1.1 Study Purpose and Scope

The Mining Association of British Columbia (“MABC”) engaged Mansfield Consulting Inc. to quantify the potential economic impacts that would be created by proposed critical mineral mines and extensions to existing critical mineral mines in British Columbia (“BC”). In addition, the study quantified the potential economic impacts that would be created by proposed precious metals mines in BC.

*Critical Mineral Mines* Critical mineral mines produce at least one of the thirty-one minerals listed on the Government of Canada’s critical mineral list. The study included fourteen proposed new critical mineral mines and two existing critical mineral mines for which major extensions have been proposed.

*Precious Metals Mines.* Precious metals mines produce minerals of high economic value, such as gold and silver. The study included five proposed new precious metals mines.

## 1.2 About Mansfield Consulting Inc.

Mansfield Consulting Inc. provides specialized consulting services on economic and statistical issues. Mansfield Consulting Inc. was founded by Ed Mansfield Ph.D., who has more than thirty years of experience providing consulting services to public and private companies, professional associations, industry organizations, and government agencies. For more information on Mansfield Consulting Inc. please see Appendix D.

## 1.3 Report Limitations

This report is provided for information purposes and is intended for general guidance only. It should not be regarded as a substitute for business or investment advice.

In preparing the report, Mansfield Consulting Inc. has relied upon information and data obtained from the Mining Association of British Columbia and public sources believed to be accurate. The accuracy and reliability of the findings and opinions expressed in the report are conditional upon the completeness, accuracy, and fair presentation of the information underlying them. As a result, we caution readers not to rely upon any findings or opinions for business or investment purposes and disclaim any liability to any party that relies upon them as such.

The findings and opinions expressed in the report constitute judgments as of the date of the report and are subject to change without notice. Mansfield Consulting Inc. is under no obligation to advise of any change brought to its attention that would subsequently alter those findings or opinions.

The analysis presented in this report is based upon projections founded on past events giving an expectation of certain future events. Future events are not guaranteed to follow past patterns and results may vary, even significantly. We express no assurance as to whether the projections underlying the analysis, findings, or opinions will be achieved.

Before taking any particular course of action, all readers and interested parties should contact their own business and professional advisors to discuss matters in the context of their particular situation.

## 2 MINES INCLUDED IN THE STUDY

### 2.1 About Critical Minerals

The Government of Canada, in consultation with provincial, territorial, and industry experts, has identified thirty-one minerals that it has designated as being “critical.” To be designated as critical, a mineral must be:<sup>3</sup>

- Essential to Canada’s economic security and its supply is threatened; or
- Required for Canada’s national transition to a low-carbon economy; or
- A sustainable source of highly strategic critical minerals for Canada’s partners and allies.

Many critical minerals are found in abundance in BC. As a result, there are opportunities for developing new critical mineral mines, as well as extending the life of existing critical mineral mines beyond their planned dates of closure.

The thirty-one critical minerals are listed in Table 1.

**Table 1. Minerals on Canada’s Critical Minerals List**

Aluminum	Gallium	Molybdenum	Tellurium
Antimony	Germanium	Nickel	Tin
Bismuth	Graphite	Niobium	Titanium
Cesium	Helium	Platinum group metals	Tungsten
Chromium	Indium	Potash	Uranium
Cobalt	Lithium	Rare earth elements	Vanadium
Copper	Magnesium	Scandium	Zinc
Fluorspar	Manganese	Tantalum	

<sup>3</sup> <https://www.canada.ca/en/campaign/critical-minerals-in-canada/canadian-critical-minerals-strategy.html#a3>

## 2.2 Critical Mineral Mines Included in the Study

There were fourteen new critical mineral mines and two extended critical mineral mines included in the study. Data for the mines were obtained from technical reports, preliminary economic assessments, and feasibility studies that were published by mine owners and/or made available through the SEDAR website.<sup>4</sup> Only publicly available data were used for the study.<sup>5</sup> Table 2 displays the critical mineral mines that were included in the study.

**Table 2. Critical Mineral Mines Included in the Study**

Name	Owner	Principal Critical Minerals	Category
Aley	Taseko Mines Limited	Niobium	New
Baptiste	FPX Nickel Corporation	Nickel/Cobalt	New
Ootsa	Surge Copper Corp	Copper/Molybdenum	New
Berg	Surge Copper Corp	Copper/Molybdenum	New
Galore Creek	Galore Creek Mining Corporation	Copper	New
Highland Valley Copper	Teck Resources Limited	Copper	Extended
Ingerbelle	Copper Mountain Mining Corporation	Copper	New
KSM	Seabridge Gold Inc.	Copper	New
Kutcho	Kutcho Copper Corp.	Copper/Zinc	New
Kwanika-Stardust	Northwest Copper Corp	Copper	New
North Island	NorthIsle Copper and Gold Inc.	Copper	New
Red Chris	Newmont Corporation, Imperial Metals	Copper	Extended
Shaft Creek	Copper Fox Metals Inc.	Copper/Molybdenum	New
Turnagain	Gigametals Corporation	Nickel	New
Wicheeda	Defense Metals Corporation	Rare Earths	New
Yellowhead	Taseko Mines Limited	Copper	New

<sup>4</sup> SEDAR (the System for Electronic Document Analysis and Retrieval) is the system used for electronically filing most securities-related information with the Canadian securities regulatory authorities.

<sup>5</sup> The data sources are listed in Appendix B. Data collection occurred from June 2023 through September 2023.



## 2.3 Other Proposed Critical Mineral Mines

In addition to the sixteen mines included in the study, there are other critical mineral projects proposed for BC for which data was not available at the time of the study.<sup>6</sup> Those proposed projects include the Silvertip Mine and the Huckleberry Mine.

The Silvertip Mine is a major zinc-lead-silver project that is owned by Coeur Mining Inc. and is located just south of the Yukon border. Coeur suspended mining and processing activities at Silvertip in early 2020 and has since commenced evaluation of a larger potential expansion and restart of the project.

The Huckleberry Mine is an open-pit copper mine that is owned by Huckleberry Mines Ltd., a subsidiary of Imperial Metals Corporation, and is located near the town of Houston. Huckleberry operations ceased in August 2016 and the mine remains on care and maintenance status. Site personnel continue to focus on exploration, water management, snow removal, maintenance of site infrastructure and equipment, mine permit compliance, and environmental compliance monitoring.

## 2.4 Precious Metals Mines Included in the Study

There were five new precious metals mines included in the study. Data for the mines were obtained from technical reports, preliminary economic assessments, and feasibility studies that were published by the mine owners and/or made available through the SEDAR website. Only publicly available data were used for the study.<sup>7</sup> Table 3 displays the precious metals mines that were included in the study.

**Table 3. Precious Metals Mines Included in the Study**

Name	Owner	Principal Precious Metals	Category
Cariboo Gold	Osisko Development Corp.	Gold	New
Eskay Creek	Skeena Resources Limited	Gold	New
New Polaris Gold	Canagold Resources Ltd.	Gold	New
Premier and Red Mountain	Ascot Resources Limited	Gold	New
Spanish Mountain Gold	Spanish Mountain Gold Ltd.	Gold	New

## 2.5 Other Proposed Precious Metals Mines

In addition to the five mines included in the study, there are other precious metals projects proposed for BC for which data was not available at the time of the study. An example of those additional projects is the Bralorne project, which is a gold project owned by Talisker Resources Ltd. in South-Central BC.

<sup>6</sup> Prefeasibility studies and/or feasibility studies were not available at of the time of the study.

<sup>7</sup> The data sources are listed in Appendix B.

## 3 ECONOMIC IMPACT ANALYSIS

### 3.1 Overview

The goal of an economic impact analysis is to estimate the economic contributions that an industry, business, or project makes to a region. In general, economic impacts are viewed as consisting of well-established, quantitative measures of economic activity. The most common of these measures are economic output, GDP, employment income, employment, and government tax revenue:

- **Economic Output** is the total gross value of goods and services produced by a given industry, business, or project. This is the broadest measure of economic activity. *For example: a bakery buys flour and other ingredients for \$1.00 and uses them to produce a loaf of bread, which is then sold for \$1.50. The economic output generated is \$1.50, as that is the gross value of the goods produced.*
- **Gross Domestic Product (GDP)**, or value-added, refers to the incremental value of a good or service over the cost of inputs used to produce it. As a result, GDP is equivalent to the unduplicated value of goods and services produced by a given industry, business, or project. *For example: a bakery buys flour and other ingredients for \$1.00 and uses them to produce a loaf of bread, which is then sold for \$1.50. The GDP generated by the bakery is \$0.50, which represents the value added by the bakery to the ingredients.*
- **Labour income** is the total amount of wages and salaries paid to staff and employees.
- **Employment** is measured as the number of additional jobs<sup>8</sup> created by an industry, business, or project. *Please note that one job is equivalent to one person-year of employment.*
- **Government Tax Revenues** are the total amount of tax revenues generated by a given industry, business, or project for federal, provincial, and local governments.<sup>9</sup>

Economic impacts may be estimated at the direct, indirect, and induced levels.

- **Direct impacts** are changes that occur in “front-end” businesses that initially receive operating revenues and incur expenditures. *During the development or extension of a mine, direct impacts occur with the mine owner and with other businesses that receive a portion of the initial spending on the project (for example, engineering companies engaged to help develop the project). During the operation of a mine, direct impacts occur with the mine owner and with other businesses that may receive a portion of the mine revenues.*
- **Indirect impacts** are changes that occur with suppliers of the front-end businesses.
- **Induced impacts** are changes that occur in the general economy through the spending by employees of front-end businesses and suppliers.

The sum of direct impacts, indirect impacts and induced impacts is referred to as total impacts.

---

<sup>8</sup> In this report, employment is measured in terms of jobs, which aligns with the employment economic impact statistics currently reported by Statistics Canada. Statistics Canada’s employment economic impact statistics were previously reported in terms of full-time equivalents (FTEs). Statistics Canada reports that, on average, employees in mining work about ten percent more hours per year than an FTE; consequently, one direct job in mining would equate to about 1.1 direct FTEs.

<sup>9</sup> Please note that government revenues are estimated using Statistics Canada input-output multipliers and include taxes on products, taxes on production, personal income taxes, and corporate income taxes.

## 3.2 Input-Output Modelling

The estimates of the economic impacts for the study were developed using an input-output modelling approach based on economic impact statistics known as “economic impact multipliers” that are published by Statistics Canada. Input-output modelling is a widely used method, which facilitates comparisons between reported results for different industries, businesses, and projects.<sup>10</sup>

## 3.3 Limitations of Economic Impact Analysis<sup>11</sup>

While an economic impact analysis provides useful insights, it is important to bear in mind its key features and limitations. First, economic impact analysis produces estimates, not precise totals. Consequently, to borrow a concept from statistical sampling, the results of an economic impact analysis should be viewed as coming with a “margin of imprecision.”<sup>12</sup> While economic impact analysis has been shown to provide reliable approximations of economic effects, those approximations should not be considered as being exact or, in some sense, audited.

Second, economic impact analysis does not address all economic effects that an industry, business, or project may create. For example, economic impact analysis does not report on such things as the economic effects of community reinvigoration or improvements in service delivery. Consequently, when assessing the overall economic effect of an industry, business, or project, it may be appropriate to augment the results of an economic impact analysis with other types of complementary analysis.

## 3.4 Near-Term and Long-Term Impacts

The economic impacts created by mines consist of both near-term and long-term impacts. Near-term impacts are created by the activities required to develop a new mine or extend the life of an existing mine beyond its planned date of closure. Long-term impacts are created by a mine’s ongoing operations after the development or extension activities are completed.

---

<sup>10</sup> The specific economic impact multipliers used in the study are from Statistics Canada, Table 36-10-0595-01, Input-output multipliers, provincial and territorial, detailed level. Provincial multipliers for BC. Release date: 2022-12-13. Downloaded from: <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3610059501>. Please note that due to reporting lags Statistics Canada’s economic impact multipliers normally reflect the structure of the economy as it existed a few years before the date of the economic impact analysis. The analysis used Statistics Canada multipliers for 2019, as they were the most recent multipliers available at the time of the study.

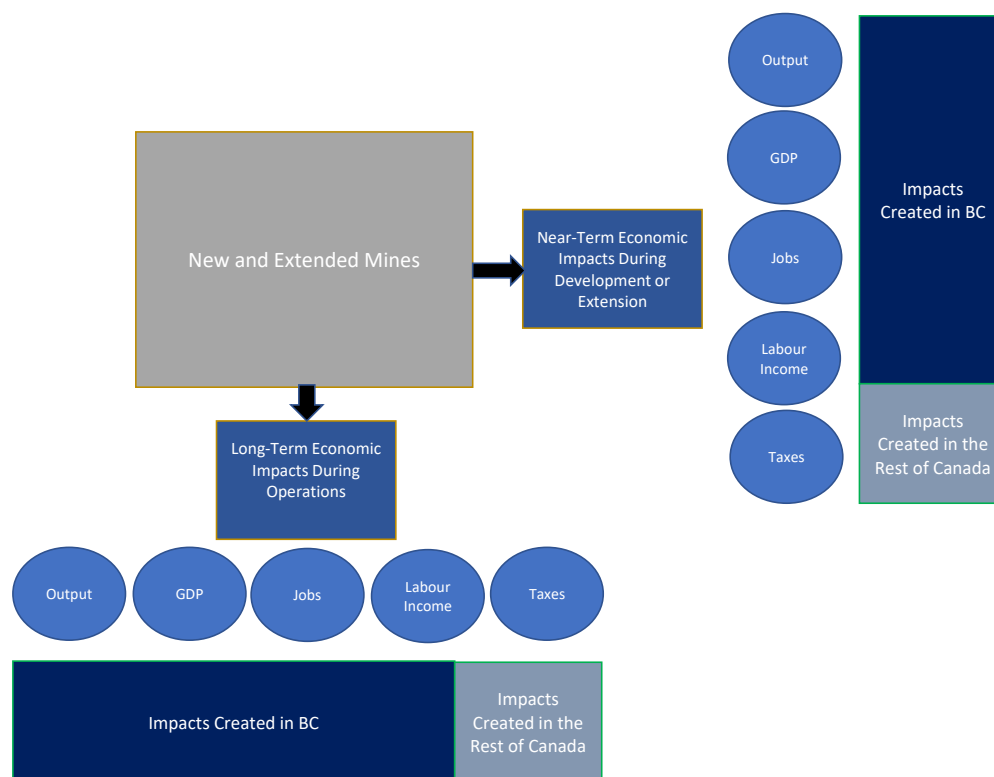
<sup>11</sup> Additional technical constraints involved with input-output modelling are described in Appendix C.

<sup>12</sup> A statistical sample has an associated “margin of error” that can be calculated using statistical theory. The use of the term “margin of imprecision” in this report is intended to reflect the fact that the results of an economic impact analysis come with a level of uncertainty. However, unlike a statistical sample, the uncertainty in an economic impact analysis cannot be calculated from theory.

### 3.5 Geographic Reach of Economic Impacts

As noted earlier, there are three levels of impacts that may be estimated through economic impact analysis: direct impacts, indirect impacts, and induced impacts. Direct impacts occur at “front-end” businesses that initially receive operating revenues and incur expenditures and are created where those businesses have their operations.<sup>13</sup> Indirect impacts occur at suppliers, through company spending on goods and services, and are created where suppliers have their operations. Induced impacts occur in the general economy through the spending of company and supplier employees and are created where employees spend their income. For new and extended mines in BC, all direct impacts are defined to be created within BC, while indirect and induced impacts are created both in BC and in provinces across Canada. The following figure illustrates the geographic reach of the economic impacts created by new and extended mines in BC.

Figure 1. Geographic Reach of Economic Impacts Created by BC Mines



<sup>13</sup> Please note that only a portion of direct impacts occur at the mine site. During the development or extension of a mine, direct impacts also occur where the mine owner and other businesses that receive a portion of the initial spending on the project are located. During the operation of a mine, direct impacts also occur where the mine owner and other businesses that may receive a portion of the mine revenues are located.

## 4 NEAR-TERM ECONOMIC IMPACTS OF CRITICAL MINERAL MINES

### 4.1 Average Cost For One Year of Development or Extension Activity

As noted earlier, development or extension costs for the critical mineral mines were obtained from public sources. To express the development or extension costs on a common basis, we converted all costs to Canadian currency and restated them in 2023 dollars.<sup>14</sup>

The sixteen critical mineral mines in the study had a combined \$36.576 billion in total development or extension costs that were projected to be incurred over a combined 48 years of development or extension activity. As displayed in Table 4, this results in an average cost of \$0.762 billion for one year of development or extension activity at a critical mineral mine.

**Table 4. Critical Mineral Mines — Average Cost For One Year of Development or Extension Activity**

Critical Mineral Mines	
Combined Total Development or Extension Costs for all Critical Mineral Mines in the Study (2023 millions)	\$36,576
Combined Years of Development or Extension Activity for all Critical Mineral Mines in the Study	48.0
Average Cost For One Year of Development or Extension Activity at a Critical Mineral Mine (2023 millions)	\$762

<sup>14</sup> To convert USD to CAD we assumed a current exchange rate of \$1.00 US = \$1.33 CAD. To express costs in 2023 dollars, we used the BC CPI to adjust for inflation.

## 4.2 Average Impacts From One Year of Development or Extension Activity

The estimated average economic impacts arising from one year of development or extension activity at a critical mineral mine (\$0.762 billion in spending over one year) are summarized in Table 5 and include:

- Total economic output of \$1.666 billion.
- Total GDP of \$0.797 billion.
- Total labour income of \$0.491 billion.
- Total employment of 6,290 jobs.<sup>15</sup>
- Total tax revenues of \$0.226 billion.

Approximately 82 percent of the total impacts would be expected to occur in BC, with the remaining 18 percent occurring in other regions across Canada.

**Table 5. Critical Mineral Mines — Average Economic Impacts From One Year of Development or Extension Activity** (Impacts Over 1.0 Years of Development or Extension Activity)

Within BC Impacts							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$762	\$298	\$220	2,091	\$46	\$30	\$1
Indirect	\$362	\$196	\$126	1,709	\$27	\$17	\$3
Induced	\$239	\$155	\$62	1,309	\$26	\$29	\$6
<b>Total</b>	<b>\$1,364</b>	<b>\$649</b>	<b>\$409</b>	<b>5,109</b>	<b>\$100</b>	<b>\$76</b>	<b>\$10</b>
Impacts in Other Regions in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$0	\$0	\$0	0	\$0	\$0	\$0
Indirect	\$188	\$88	\$52	677	\$12	\$8	\$1
Induced	\$114	\$60	\$30	503	\$9	\$9	\$2
<b>Total</b>	<b>\$302</b>	<b>\$148</b>	<b>\$82</b>	<b>1,180</b>	<b>\$21</b>	<b>\$16</b>	<b>\$3</b>
Total Impacts in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$762	\$298	\$220	2,091	\$46	\$30	\$1
Indirect	\$551	\$284	\$178	2,386	\$39	\$25	\$4
Induced	\$353	\$215	\$93	1,812	\$35	\$38	\$8
<b>Total</b>	<b>\$1,666</b>	<b>\$797</b>	<b>\$491</b>	<b>6,290</b>	<b>\$121</b>	<b>\$92</b>	<b>\$13</b>

<sup>15</sup> Please note that one job represents one year of employment for one person.

### 4.3 Average Impacts From the Development or Extension of a Mine

The sixteen critical mineral mines in the study averaged 3.0 years in projected development or extension activity per mine. As displayed in Table 6, this results in an average total cost of \$2.286 billion to develop or extend a critical mineral mine.

**Table 6. Critical Mineral Mines — Average Total Cost to Develop or Extend a Mine**

Critical Mineral Mines	
Average Cost per Year of Development or Extension Activity (2023 millions)	\$762
Average Years of Development or Extension Activity per Mine	3.0
Average Total Cost to Develop or Extend a Critical Mineral Mine (2023 millions)	\$2,286

The estimated average economic impacts arising from the development or extension of a critical mineral mine (\$2.286 billion in total spending over 3.0 years) are summarized in Table 7 and include:

- Total economic output of \$4.998 billion per mine.
- Total GDP of \$2.391 billion per mine.
- Total labour income of \$1.473 billion per mine.
- Total employment of 18,869 jobs per mine (6,290 jobs annually).
- Total tax revenues of \$0.679 billion per mine.

**Table 7. Critical Mineral Mines — Average Economic Impacts from the Development or Extension of a Mine (Total Impacts Over 3.0 Years of Development or Extension Activity)**

Within BC Impacts							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$2,286	\$893	\$661	6,274	\$138	\$89	\$4
Indirect	\$1,087	\$587	\$379	5,127	\$82	\$52	\$9
Induced	\$718	\$466	\$187	3,927	\$79	\$87	\$17
<b>Total</b>	<b>\$4,091</b>	<b>\$1,946</b>	<b>\$1,227</b>	<b>15,328</b>	<b>\$299</b>	<b>\$228</b>	<b>\$30</b>
Impacts in Other Regions in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$0	\$0	\$0	0	\$0	\$0	\$0
Indirect	\$565	\$265	\$155	2,032	\$36	\$23	\$3
Induced	\$342	\$180	\$91	1,509	\$27	\$26	\$7
<b>Total</b>	<b>\$907</b>	<b>\$445</b>	<b>\$246</b>	<b>3,541</b>	<b>\$63</b>	<b>\$49</b>	<b>\$10</b>
Total Impacts in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$2,286	\$893	\$661	6,274	\$138	\$89	\$4
Indirect	\$1,652	\$852	\$534	7,159	\$118	\$75	\$12
Induced	\$1,060	\$646	\$278	5,436	\$106	\$113	\$24
<b>Total</b>	<b>\$4,998</b>	<b>\$2,391</b>	<b>\$1,473</b>	<b>18,869</b>	<b>\$362</b>	<b>\$277</b>	<b>\$40</b>

#### 4.4 Combined Impacts From the Development or Extension of All Critical Mineral Mines in the Study

The combined estimated economic impacts from the development or extension of all sixteen critical mineral mines included in the study are sixteen times the average impacts from the development or extension of one mine that are displayed in Table 7 and include:

- Total economic output of \$79.968 billion.
- Total GDP of \$38.254 billion.
- Total labour income of \$23.559 billion.
- Total employment of 301,909 jobs.
- Total tax revenues of \$10.862 billion.

The combined estimated economic impacts from the development or extension of all sixteen critical mineral mines in the study are summarized in Table 8.

**Table 8. Critical Mineral Mines — Combined Economic Impacts from the Development or Extension of All Mines in the Study** (Total Impacts Over 48.0 Years of Development or Extension)

Within BC Impacts							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$36,576	\$14,292	\$10,574	100,389	\$2,202	\$1,431	\$70
Indirect	\$17,385	\$9,385	\$6,059	82,026	\$1,309	\$834	\$137
Induced	\$11,491	\$7,457	\$2,997	62,838	\$1,265	\$1,390	\$276
<b>Total</b>	<b>\$65,452</b>	<b>\$31,134</b>	<b>\$19,630</b>	<b>245,253</b>	<b>\$4,775</b>	<b>\$3,655</b>	<b>\$483</b>
Impacts in Other Regions in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$0	\$0	\$0	0	\$0	\$0	\$0
Indirect	\$9,041	\$4,246	\$2,480	32,525	\$573	\$362	\$62
Induced	\$5,475	\$2,874	\$1,449	24,131	\$438	\$413	\$102
<b>Total</b>	<b>\$14,516</b>	<b>\$7,119</b>	<b>\$3,929</b>	<b>56,656</b>	<b>\$1,011</b>	<b>\$775</b>	<b>\$164</b>
Total Impacts in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$36,576	\$14,292	\$10,574	100,389	\$2,202	\$1,431	\$70
Indirect	\$26,426	\$13,631	\$8,539	114,552	\$1,881	\$1,196	\$198
Induced	\$16,965	\$10,331	\$4,446	86,969	\$1,703	\$1,804	\$378
<b>Total</b>	<b>\$79,968</b>	<b>\$38,254</b>	<b>\$23,559</b>	<b>301,909</b>	<b>\$5,786</b>	<b>\$4,430</b>	<b>\$647</b>



## 4.5 Comparisons With Other Industries and Events

To provide perspective on the magnitude of the combined near-term economic impacts of the critical mineral mines in the study, it is helpful to compare them with the economic impacts created by other important BC industries and events. Two such industries and events are the BC motion picture industry and the 2010 Vancouver Winter Olympic and Paralympic Games (the “Vancouver Olympics”).

The BC motion picture industry hit a pre-COVID high of 411 productions in 2019/20, which produced an estimated \$2.411 billion in total GDP in BC.<sup>16</sup> Converted to 2023 dollars, that equates to approximately \$2.695 billion.

Over the eight years leading up to and including the Olympic year (2003 through 2010) the Vancouver Olympics were estimated to have created \$2.300 billion in total GDP in BC.<sup>17</sup> Converted to 2023 dollars, that equates to approximately \$3.000 billion.

Table 9 compares the combined near-term GDP impacts of the critical mineral mines included in the study with those of the BC motion picture industry and the Vancouver Olympics. As displayed in the table, the near-term GDP impacts of the critical mineral mines in the study are approximately twelve times those of the BC motion picture industry and approximately ten times those produced by the Vancouver Olympics.

**Table 9. Comparison of Near-Term GDP Impacts**

Industry/Activity	Estimated Total GDP in BC (2023 millions)	Critical Minerals Mines in the Study Combined Estimated Near-Term GDP in BC (2023 millions)
BC Motion Picture Industry in 2019/20	\$2,695	\$31,134
Vancouver Olympics from 2003 through 2010 (8 years)	\$3,000	\$31,134

<sup>16</sup> Creative BC CIERA model.

<sup>17</sup> The Games Effect. Prepared by PwC LLP for the Government of Canada and the Government of BC.

## 5 LONG-TERM ECONOMIC IMPACTS OF CRITICAL MINERAL MINES

### 5.1 Average Revenues From One Year of Operation

As noted earlier, projected revenues from mine operations for the critical mineral mines were obtained from public sources. To express the projected revenues on a common basis, we converted all revenues to Canadian currency and restated them in 2023 dollars.<sup>18</sup>

The sixteen critical mineral mines in the study had a combined \$403.127 billion in total revenues that were projected to be received over a combined 385 years of operation. As displayed in Table 10, this results in an average revenue of \$1.045 billion from one year of operation at a critical mineral mine.

**Table 10. Critical Mineral Mines — Average Revenues From One Year of Operation**

Critical Mineral Mines	
Combined Total Revenues for All Critical Mineral Mines in the Study (2023 millions)	\$403,127
Combined Years of Operation for All Critical Mineral Mines in the Study	385
Average Revenues From One Year of Operation at a Critical Mineral Mine (2023 millions)	\$1,045

<sup>18</sup> To convert USD to CAD we assumed a current exchange rate of \$1.00 US = \$1.33 CAD. To express costs in 2023 dollars, we used the BC CPI to adjust for inflation.

## 5.2 Average Impacts From One Year of Operation

The estimated average economic impacts arising from one year of operation at a critical mineral mine (\$1.045 billion in revenues over one year) are summarized in Table 11 and include:

- Total economic output of \$2.053 billion.
- Total GDP of \$1.033 billion.
- Total labour income of \$0.477 billion.
- Total employment of 5,590 jobs.
- Total tax revenues of \$0.401 billion.

Approximately 80 percent of the total impacts would be expected to occur in BC, with the remaining 20 percent occurring in other regions across Canada.

**Table 11. Critical Mineral Mines — Average Economic Impacts From One Year of Operation**  
(Impacts Over 1.0 Years of Operation)

Within BC Impacts							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$1,045	\$477	\$201	1,239	\$89	\$136	\$6
Indirect	\$414	\$234	\$124	1,813	\$32	\$24	\$6
Induced	\$213	\$139	\$55	1,169	\$24	\$26	\$5
<b>Total</b>	<b>\$1,673</b>	<b>\$850</b>	<b>\$381</b>	<b>4,221</b>	<b>\$145</b>	<b>\$186</b>	<b>\$18</b>
Impacts in Other Regions in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$0	\$0	\$0	0	\$0	\$0	\$0
Indirect	\$265	\$122	\$65	849	\$17	\$11	\$2
Induced	\$116	\$61	\$31	521	\$10	\$9	\$2
<b>Total</b>	<b>\$381</b>	<b>\$183</b>	<b>\$96</b>	<b>1,370</b>	<b>\$27</b>	<b>\$20</b>	<b>\$4</b>
Total Impacts in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$1,045	\$477	\$201	1,239	\$89	\$136	\$6
Indirect	\$679	\$357	\$189	2,662	\$49	\$35	\$9
Induced	\$329	\$200	\$87	1,689	\$34	\$35	\$7
<b>Total</b>	<b>\$2,053</b>	<b>\$1,033</b>	<b>\$477</b>	<b>5,590</b>	<b>\$172</b>	<b>\$207</b>	<b>\$22</b>

### 5.3 Average Impacts From the Operation of a Mine Over Its Lifespan

The sixteen critical mineral mines in the study averaged 24.1 years of projected operational life (mine lifespan). As displayed in Table 12, results in average total revenues of \$25.195 billion over the lifespan of a critical mineral mine.

**Table 12. Critical Mineral Mines — Average Total Revenues Over the Lifespan of a Mine**

Critical Mineral Mines	
Average Revenues per Year of Operation (2023 millions)	\$1,045
Average Years of Operation per Mine (Mine Lifespan)	24.1
Average Total Revenues Over the Lifespan of a Critical Mineral Mine (2023 millions)	\$25,195

The estimated average economic impacts arising from the operation of a critical mineral mine over its lifespan (\$25.195 billion in total revenues over 24.1 years) are summarized in Table 13 and include:

- Total economic output of \$49.484 billion per mine.
- Total GDP of \$24.893 billion per mine.
- Total labour income of \$11.489 billion per mine.
- Total employment of 134,721 jobs per mine (5,590 jobs annually).
- Total tax revenues of \$9.659 billion mine.

**Table 13. Critical Mineral Mines — Average Economic Impacts From the Operation of a Mine Over Its Lifespan (Total Impacts Over 24.1 Years of Operation)**

Within BC Impacts							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$25,195	\$11,489	\$4,838	29,857	\$2,146	\$3,280	\$153
Indirect	\$9,977	\$5,644	\$2,998	43,689	\$774	\$574	\$155
Induced	\$5,140	\$3,351	\$1,335	28,169	\$578	\$637	\$129
<b>Total</b>	<b>\$40,312</b>	<b>\$20,484</b>	<b>\$9,171</b>	<b>101,715</b>	<b>\$3,498</b>	<b>\$4,491</b>	<b>\$437</b>
Impacts in Other Regions in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$0	\$0	\$0	0	\$0	\$0	\$0
Indirect	\$6,375	\$2,948	\$1,562	20,459	\$408	\$277	\$56
Induced	\$2,797	\$1,461	\$756	12,547	\$235	\$214	\$43
<b>Total</b>	<b>\$9,172</b>	<b>\$4,409</b>	<b>\$2,318</b>	<b>33,006</b>	<b>\$643</b>	<b>\$491</b>	<b>\$99</b>
Total Impacts in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$25,195	\$11,489	\$4,838	29,857	\$2,146	\$3,280	\$153
Indirect	\$16,352	\$8,592	\$4,560	64,148	\$1,182	\$851	\$211
Induced	\$7,937	\$4,812	\$2,091	40,716	\$813	\$851	\$172
<b>Total</b>	<b>\$49,484</b>	<b>\$24,893</b>	<b>\$11,489</b>	<b>134,721</b>	<b>\$4,141</b>	<b>\$4,982</b>	<b>\$536</b>

## 5.4 Combined Impacts From the Operation of All Critical Mineral Mines in the Study Over Their Lifespans

The combined estimated economic impacts from the operation of all sixteen critical mineral mines included in the study over their lifespans are sixteen times the average impacts from the operation of one mine that are displayed in Table 13 and include:

- Total economic output of \$791.741 billion.
- Total GDP of \$398.289 billion.
- Total labour income of \$183.826 billion.
- Total employment of 2,155,519 jobs.
- Total tax revenues of \$154.549 billion.

The combined estimated economic impacts from the operation of all sixteen critical mineral mines in the study over their lifespans are summarized in Table 14

**Table 14. Critical Mineral Mines — Combined Economic Impacts From the Operation of All Sixteen Critical Mineral Mines in the Study Over Their Lifespans** (Total Impacts Over 385.0 Years of Operation)

Within BC Impacts							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$403,127	\$183,826	\$77,400	477,705	\$34,343	\$52,479	\$2,453
Indirect	\$159,638	\$90,300	\$47,972	699,022	\$12,378	\$9,177	\$2,476
Induced	\$82,238	\$53,616	\$21,366	450,696	\$9,252	\$10,194	\$2,067
<b>Total</b>	<b>\$645,003</b>	<b>\$327,742</b>	<b>\$146,738</b>	<b>1,627,423</b>	<b>\$55,973</b>	<b>\$71,850</b>	<b>\$6,996</b>
Impacts in Other Regions in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$0	\$0	\$0	0	\$0	\$0	\$0
Indirect	\$101,991	\$47,166	\$24,994	327,339	\$6,527	\$4,438	\$901
Induced	\$44,747	\$23,381	\$12,094	200,757	\$3,759	\$3,420	\$685
<b>Total</b>	<b>\$146,738</b>	<b>\$70,547</b>	<b>\$37,088</b>	<b>528,096</b>	<b>\$10,286</b>	<b>\$7,858</b>	<b>\$1,586</b>
Total Impacts in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$403,127	\$183,826	\$77,400	477,705	\$34,343	\$52,479	\$2,453
Indirect	\$261,629	\$137,466	\$72,966	1,026,361	\$18,905	\$13,615	\$3,377
Induced	\$126,985	\$76,997	\$33,460	651,453	\$13,011	\$13,614	\$2,752
<b>Total</b>	<b>\$791,741</b>	<b>\$398,289</b>	<b>\$183,826</b>	<b>2,155,519</b>	<b>\$66,259</b>	<b>\$79,708</b>	<b>\$8,582</b>

## 5.5 Comparisons With Other Industries

To provide perspective on the magnitude of the combined long-term economic impacts of the critical mineral mines in the study, it is helpful to compare them with the economic impacts created by other important BC industries. Five such industries are wood product manufacturing, crop and animal production, telecommunications, air, rail and water transportation, and the residential building construction industry.

Table 15 compares the combined long-term direct GDP impacts of the critical mineral mines in the study with the direct annual GDP of the five other industries. As displayed in the table, the combined direct GDP created by the operations of critical mineral mines is about seventy-nine times the annual direct GDP of the wood product manufacturing industry, about fifty-three times the annual direct GDP of the crop and animal production industry, about thirty-three times the annual direct GDP of the telecommunications industry, about thirty-one times the combined annual direct GDP of the air, rail and water transportation industries, and about seventeen times the annual direct GDP of the residential building construction industry.<sup>19</sup>

**Table 15. Comparison of Long-Term GDP Impacts**

Industry/Activity	Estimated Direct GDP in BC (2023 millions)	Critical Minerals Mines in the Study Combined Estimated Long-Term Direct GDP in BC (2023 millions)
Wood Product Manufacturing	\$2,326	\$183,826
Crop and Animal Production	\$3,479	\$183,826
Telecommunications	\$5,589	\$183,826
Air Transportation, Rail Transportation, and Water Transportation (combined)	\$5,835	\$183,826
Residential Building Construction	\$10,829	\$183,826

<sup>19</sup> The direct GDP for the comparison industries is published by BC Stats and Statistics Canada. Indirect and Induced GDP figures are not reported. We have adjusted the direct GDP for 2019 to 2023 dollars using the BC CPI.

## 6 NEAR-TERM ECONOMIC IMPACTS OF PRECIOUS METALS MINES

### 6.1 Average Cost For One Year of Development Activity

As noted earlier, development costs for the precious metals mines were obtained from public sources. To express the development costs of precious metals mines on a common basis, we converted all costs to Canadian currency and restated them in 2023 dollars.<sup>20</sup>

The five precious metals mines in the study had a combined \$1.937 billion in total development costs that were projected to be incurred over a combined 14 years of development activity. As displayed in Table 16, this results in an average cost of \$0.138 billion for one year of development activity at a precious metals mine.

**Table 16. Precious Metals Mines — Average Cost For One Year of Development Activity**

Precious Metals Mines	
Combined Total Development Costs for all Precious Metals Mines in the Study (2023 millions)	\$1,937
Combined Years of Development Activity for all Precious Metals Mines in the Study	14
Average Cost For One Year of Development Activity at a Precious Metals Mine (2023 millions)	\$138

<sup>20</sup> To convert USD to CAD we assumed a current exchange rate of \$1.00 US = \$1.33 CAD. To express costs in 2023 dollars, we used the BC CPI to adjust for inflation.

## 6.2 Average Impacts From One Year of Development Activity

The estimated average economic impacts arising from one year of development activity at a precious metals mine (\$0.138 billion in spending over one year) are summarized in Table 17 and include:

- Total economic output of \$0.303 billion.
- Total GDP of \$0.144 billion.
- Total labour income of \$0.089 billion.
- Total employment of 1,141 jobs.
- Total tax revenues of \$0.041 billion.

Approximately 82 percent of the total impacts would be expected to occur in BC, with the remaining 18 percent occurring in other regions across Canada.

**Table 17. Precious Metals Mines — Average Economic Impacts From One Year of Development Activity**  
(Impacts Over 1.0 Years of Development Activity)

Within BC Impacts							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$138	\$53	\$39	377	\$8.2	\$5.4	\$0.3
Indirect	\$66	\$36	\$23	311	\$5.0	\$3.2	\$0.5
Induced	\$43	\$28	\$11	236	\$4.7	\$5.2	\$1.0
<b>Total</b>	<b>\$248</b>	<b>\$117</b>	<b>\$74</b>	<b>924</b>	<b>\$17.9</b>	<b>\$13.7</b>	<b>\$1.8</b>
Impacts in Other Regions in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$0	\$0	\$0	0	\$0.0	\$0.0	\$0.0
Indirect	\$35	\$16	\$10	125	\$2.2	\$1.4	\$0.2
Induced	\$21	\$11	\$5	92	\$1.7	\$1.6	\$0.4
<b>Total</b>	<b>\$56</b>	<b>\$27</b>	<b>\$15</b>	<b>217</b>	<b>\$3.9</b>	<b>\$3.0</b>	<b>\$0.6</b>
Total Impacts in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$138	\$53	\$39	377	\$8.2	\$5.4	\$0.3
Indirect	\$101	\$52	\$33	436	\$7.2	\$4.5	\$0.7
Induced	\$64	\$39	\$17	327	\$6.4	\$6.8	\$1.4
<b>Total</b>	<b>\$303</b>	<b>\$144</b>	<b>\$89</b>	<b>1,141</b>	<b>\$21.8</b>	<b>\$16.7</b>	<b>\$2.5</b>



### 6.3 Average Impacts From the Development of a Mine

The five precious metals mines in the study averaged 2.8 years in projected development activity per mine. As displayed in Table 18 this results in an average total cost of \$0.387 billion to develop a precious metals mine.

**Table 18. Precious Metals Mines — Average Total Cost to Develop a Mine**

Precious Metals Mines	
Average Cost per Year of Development Activity(2023 millions)	\$138
Average Years of Development Activity per Mine	2.8
Average Total Cost to Develop a Precious Metals Mine (2023 millions)	\$387

The estimated average economic impacts arising from the development of a precious metals mine (\$0.387 billion in total spending over 2.8 years) are summarized in Table 19 and include:

- Total economic output of \$0.849 billion per mine.
- Total GDP of \$0.402 billion per mine.
- Total labour income of \$0.248 billion per mine.
- Total employment of 3,194 jobs per mine (1,141 jobs annually).
- Total tax revenues of \$0.115 billion per mine.

**Table 19. Precious Metals Mines — Average Economic Impacts from the Development of a Mine**

*(Total Impacts Over 2.8 Years of Development)*

Within BC Impacts							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$387	\$148	\$110	1,055	\$23	\$15	\$1
Indirect	\$185	\$100	\$64	871	\$14	\$9	\$1
Induced	\$121	\$78	\$32	660	\$13	\$15	\$3
<b>Total</b>	<b>\$694</b>	<b>\$326</b>	<b>\$206</b>	<b>2,587</b>	<b>\$50</b>	<b>\$38</b>	<b>\$5</b>
Impacts in Other Regions in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$0	\$0	\$0	0	\$0	\$0	\$0
Indirect	\$97	\$46	\$27	351	\$6	\$4	\$1
Induced	\$58	\$31	\$15	256	\$5	\$4	\$1
<b>Total</b>	<b>\$155</b>	<b>\$76</b>	<b>\$42</b>	<b>607</b>	<b>\$11</b>	<b>\$8</b>	<b>\$2</b>
Total Impacts in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$387	\$148	\$110	1,055	\$23	\$15	\$1
Indirect	\$283	\$145	\$91	1,222	\$20	\$13	\$2
Induced	\$179	\$109	\$47	917	\$18	\$19	\$4
<b>Total</b>	<b>\$849</b>	<b>\$402</b>	<b>\$248</b>	<b>3,194</b>	<b>\$61</b>	<b>\$47</b>	<b>\$7</b>

## 6.4 Combined Impacts From the Development of All Precious Metals Mines in the Study

The combined estimated economic impacts from the development of all five precious metals mines included in the study are five times the average impacts from the development of one mine that are displayed in Table 19 and include:

- Total economic output of \$4.245 billion.
- Total GDP of \$2.012 billion.
- Total labour income of \$1.241 billion.
- Total employment of 15,970 jobs.
- Total tax revenues of \$0.573 billion.

The combined estimated economic impacts from the development of all five precious metals mines in the study are summarized in Table 20.

**Table 20. Precious Metals Mines — Combined Economic Impacts from the Development or Extension of All Five Precious Metals Mines in the Study** (Total Impacts Over 14.0 Years of Development or Extension)

Within BC Impacts							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$1,937	\$741	\$551	5,275	\$115	\$75	\$4
Indirect	\$926	\$499	\$322	4,355	\$70	\$44	\$7
Induced	\$604	\$392	\$158	3,302	\$66	\$73	\$14
<b>Total</b>	<b>\$3,468</b>	<b>\$1,631</b>	<b>\$1,031</b>	<b>12,933</b>	<b>\$251</b>	<b>\$192</b>	<b>\$26</b>
Impacts in Other Regions in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$0	\$0	\$0	0	\$0	\$0	\$0
Indirect	\$487	\$228	\$134	1,755	\$31	\$19	\$3
Induced	\$290	\$153	\$77	1,282	\$23	\$22	\$5
<b>Total</b>	<b>\$777</b>	<b>\$380</b>	<b>\$211</b>	<b>3,037</b>	<b>\$54</b>	<b>\$41</b>	<b>\$9</b>
Total Impacts in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$1,937	\$741	\$551	5,275	\$115	\$75	\$4
Indirect	\$1,413	\$727	\$456	6,110	\$100	\$64	\$10
Induced	\$894	\$545	\$234	4,584	\$90	\$95	\$20
<b>Total</b>	<b>\$4,245</b>	<b>\$2,012</b>	<b>\$1,241</b>	<b>15,970</b>	<b>\$305</b>	<b>\$234</b>	<b>\$34</b>

## 6.5 Comparisons With Other Industries and Events

To provide perspective on the magnitude of the combined near-term economic impacts of the precious metals mines in the study, it is helpful to compare them with the economic impacts created by other important BC industries and events. Two such industries and events are the BC motion picture industry and the Vancouver Olympics.

Table 21 compares the near-term GDP impacts of the precious mines with those of the BC motion picture industry and the Vancouver Olympics. As displayed in the table, the near-term GDP impacts of the precious metals mines included in the study are approximately sixty percent of those of the BC motion picture industry and approximately fifty percent of those produced by the Vancouver Olympics.

**Table 21. Comparison of Near-Term GDP Impacts**

Industry/Activity	Estimated Total GDP in BC (2023 millions)	Precious Metals Mines in the Study Combined Near-Term Estimated Total GDP in BC (2023 millions)
BC Motion Picture Industry in 2019/20	\$2,695	\$1,631
Vancouver Olympics from 2003 through 2010 (8 years)	\$3,000	\$1,631

## 7 LONG-TERM ECONOMIC IMPACTS OF PRECIOUS METALS MINES

### 7.1 Average Revenues From One Year of Operation

As noted earlier, projected revenues from mine operations for the precious metals mines were obtained from public sources. To express the projected revenues on a common basis, we converted all revenues to Canadian currency and restated them in 2023 dollars.<sup>21</sup>

The five precious metals mines in the study had a combined \$16.285 billion in total revenues that were projected to be received over a combined 49 years of operation. As displayed in Table 22 this results in an average revenue of \$0.332 billion from one year of operation at a precious metals mine.

**Table 22. Precious Metals Mines — Average Revenues From One Year of Operation**

Precious Metals Mines	
Combined Total Revenues for All Precious Metals Mines in the Study (2023 millions)	\$16,285
Combined Years of Operation for All Precious Metals Mines in the Study	49
Average Revenues From One Year of Operation at a Precious Metals Mine (2023 millions)	\$332

<sup>21</sup> To convert USD to CAD we assumed a current exchange rate of \$1.00 US = \$1.33 CAD. To express costs in 2023 dollars, we used the BC CPI to adjust for inflation.

## 7.2 Average Impacts From One Year of Operation

The estimated average economic impacts arising from one year of operation at a precious metals mine (\$0.332 billion in revenues over one year) are summarized in Table 23 and include:

- Total economic output of \$0.603 billion.
- Total GDP of \$0.374 billion.
- Total labour income of \$0.164 billion.
- Total employment of 1,961 jobs.
- Total tax revenues of \$0.109 billion.

Approximately 80 percent of the impacts would be expected to occur in BC, with the remaining 20 percent occurring in other regions across Canada.

**Table 23. Precious Metals Mines — Average Economic Impacts From One Year of Operation**  
(Impacts Over 1.0 Years of Operation)

Within BC Impacts							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$332	\$219	\$83	584	\$27.4	\$32.8	\$0.0
Indirect	\$106	\$59	\$36	575	\$8.3	\$5.7	\$1.3
Induced	\$82	\$53	\$21	448	\$9.2	\$10.2	\$2.1
<b>Total</b>	<b>\$520</b>	<b>\$331</b>	<b>\$140</b>	<b>1,607</b>	<b>\$44.9</b>	<b>\$48.7</b>	<b>\$3.4</b>
Impacts in Other Regions in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$0	\$0	\$0	0	\$0.0	\$0.0	\$0.0
Indirect	\$47	\$24	\$14	197	\$3.3	\$2.1	\$0.4
Induced	\$36	\$19	\$10	156	\$2.9	\$2.6	\$0.6
<b>Total</b>	<b>\$83</b>	<b>\$42</b>	<b>\$23</b>	<b>353</b>	<b>\$6.2</b>	<b>\$4.6</b>	<b>\$0.9</b>
Total Impacts in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$332	\$219	\$83	584	\$27.4	\$32.8	\$0.0
Indirect	\$153	\$83	\$50	772	\$11.6	\$7.8	\$1.7
Induced	\$118	\$72	\$31	605	\$12.1	\$12.7	\$2.6
<b>Total</b>	<b>\$603</b>	<b>\$374</b>	<b>\$164</b>	<b>1,961</b>	<b>\$51.1</b>	<b>\$53.4</b>	<b>\$4.3</b>

### 7.3 Average Impacts From the Operation of a Mine Over Its Lifespan

The five precious metals mines in the study averaged 9.8 years of projected operational life (mine lifespan). As displayed in Table 24, this results in average total revenues of \$0.3257 billion over the lifespan of a precious metals mine.

**Table 24. Precious Metals Mines — Average Total Revenues Over the Lifespan of a Mine**

Precious Metals Mines	
Average Revenues per Year of Operation (2023 millions)	\$332
Average Years of Operation per Mine (Mine Lifespan)	9.8
Average Total Revenues Over the Lifespan of a Precious Metals Mine (2023 millions)	\$3,257

The estimated average economic impacts arising from the operation of a precious metals mine over its lifespan (\$3.257 billion in total revenues over 9.8 years) are summarized in Table 25 and include:

- Total economic output of \$5.908 billion per mine.
- Total GDP of \$3.661 billion per mine.
- Total labour income of \$1.602 billion per mine.
- Total employment of 19,213 jobs per mine (1,961 jobs annually).
- Total tax revenues of \$1.066 billion per mine.

**Table 25. Precious Metals Mines — Average Economic Impacts From the Operation of a Mine Over Its Lifespan (Total Impacts Over 9.8 Years of Operation)**

Within BC Impacts							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$3,257	\$2,146	\$814	5,719	\$269	\$322	\$0
Indirect	\$1,036	\$580	\$352	5,638	\$82	\$56	\$13
Induced	\$804	\$521	\$208	4,394	\$90	\$100	\$20
<b>Total</b>	<b>\$5,097</b>	<b>\$3,247</b>	<b>\$1,374</b>	<b>15,751</b>	<b>\$441</b>	<b>\$477</b>	<b>\$33</b>
Impacts in Other Regions in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$0	\$0	\$0	0	\$0	\$0	\$0
Indirect	\$462	\$231	\$134	1,931	\$32	\$20	\$4
Induced	\$348	\$182	\$94	1,531	\$28	\$25	\$6
<b>Total</b>	<b>\$811</b>	<b>\$414</b>	<b>\$228</b>	<b>3,462</b>	<b>\$60</b>	<b>\$45</b>	<b>\$9</b>
Total Impacts in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$3,257	\$2,146	\$814	5,719	\$269	\$322	\$0
Indirect	\$1,498	\$811	\$485	7,569	\$114	\$77	\$16
Induced	\$1,153	\$704	\$303	5,924	\$118	\$125	\$26
<b>Total</b>	<b>\$5,908</b>	<b>\$3,661</b>	<b>\$1,602</b>	<b>19,213</b>	<b>\$501</b>	<b>\$523</b>	<b>\$42</b>

## 7.4 Combined Impacts From the Operation of All Precious Metals Mines in the Study Over Their Lifespans

The combined estimated economic impacts from the operation of all five precious metals mines included in the study are five times the average impacts from the operation of one mine that are displayed in Table 25 and include:

- Total economic output of \$29.541 billion.
- Total GDP of \$18.304 billion.
- Total labour income of \$8.012 billion.
- Total employment of 96,065 jobs.
- Total tax revenues of \$5.331 billion.

The combined estimated long-term economic impacts from the operation of all five precious metals mines in the study are summarized in Table 26.

**Table 26. Precious Metals Mines — Combined Economic Impacts from the Operation of All Five Precious Metals Mines in the Study Over Their Lifespans** (Total Impacts Over 49.0 Years of Operation)

Within BC Impacts							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$16,285	\$10,732	\$4,071	28,596	\$1,343	\$1,608	\$1
Indirect	\$5,179	\$2,899	\$1,759	28,189	\$409	\$281	\$64
Induced	\$4,022	\$2,606	\$1,042	21,968	\$450	\$498	\$102
<b>Total</b>	<b>\$25,486</b>	<b>\$16,236</b>	<b>\$6,872</b>	<b>78,754</b>	<b>\$2,203</b>	<b>\$2,387</b>	<b>\$167</b>
Impacts in Other Regions in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$0	\$0	\$0	0	\$0	\$0	\$0
Indirect	\$2,312	\$1,156	\$668	9,657	\$160	\$102	\$18
Induced	\$1,742	\$912	\$472	7,654	\$142	\$125	\$28
<b>Total</b>	<b>\$4,055</b>	<b>\$2,068</b>	<b>\$1,140</b>	<b>17,311</b>	<b>\$302</b>	<b>\$227</b>	<b>\$46</b>
Total Impacts in Canada							
	Output (millions)	GDP (millions)	Labour Income (millions)	Jobs	Federal Tax (millions)	Provincial Tax (millions)	Municipal Tax (millions)
Direct	\$16,285	\$10,732	\$4,071	28,596	\$1,343	\$1,608	\$1
Indirect	\$7,491	\$4,055	\$2,426	37,846	\$569	\$383	\$82
Induced	\$5,765	\$3,518	\$1,515	29,622	\$592	\$623	\$130
<b>Total</b>	<b>\$29,541</b>	<b>\$18,304</b>	<b>\$8,012</b>	<b>96,065</b>	<b>\$2,505</b>	<b>\$2,614</b>	<b>\$213</b>

## 7.5 Comparisons with Other Industries

To provide perspective on the magnitude of the combined long-term economic impacts of the precious metals mines, it is helpful to compare them with the annual economic impacts created by other important BC industries. Five such industries are wood product manufacturing, crop and animal production, telecommunications, air, rail and water transportation, and the residential building construction industry.

Table 27 compares the combined long-term direct GDP impacts of the precious metals mines with the direct annual GDP of the five other industries. As displayed in the table, the combined direct GDP created by the operations of precious metals mines is about five times the annual direct GDP of the wood product manufacturing industry, about three times the annual direct GDP of the crop and animal production industry, about two times the annual direct GDP of the telecommunications industry, about two times the combined annual direct GDP of the air, rail and water transportation industries, and about the same size as the annual direct GDP of the residential building construction industry.<sup>22</sup>

**Table 27. Comparison of Long-Term GDP Impacts**

Industry/Activity	Estimated Direct GDP in BC (2023 millions)	Precious Metals Mines in the Study Combined Estimated Long-Term Direct GDP in BC (2023 millions)
Wood Product Manufacturing	\$2,326	\$10,732
Crop and Animal Production	\$3,479	\$10,732
Telecommunications	\$5,589	\$10,732
Air Transportation, Rail Transportation, and Water Transportation (combined)	\$5,835	\$10,732
Residential Building Construction	\$10,829	\$10,732

<sup>22</sup> The direct GDP for the comparison industries is published by BC Stats and Statistics Canada. Indirect and Induced GDP figures are not reported. We have adjusted the direct GDP for 2019 to 2023 dollars using the BC CPI.



## APPENDIX A – CANADA’S CRITICAL MINERALS LIST

Canada’s Critical Minerals List identifies thirty-one minerals and metals considered essential for the sustainable economic success of Canada and its trading partners.<sup>23</sup> The thirty-one critical minerals are shown in Table A1.

**Table A1. Minerals on Canada’s Critical Minerals List**

Aluminum	Gallium	Molybdenum	Tellurium
Antimony	Germanium	Nickel	Tin
Bismuth	Graphite	Niobium	Titanium
Cesium	Helium	Platinum group metals	Tungsten
Chromium	Indium	Potash	Uranium
Cobalt	Lithium	Rare earth elements	Vanadium
Copper	Magnesium	Scandium	Zinc
Fluorspar	Manganese	Tantalum	

<sup>23</sup> <https://www.canada.ca/en/campaign/critical-minerals-in-canada/critical-minerals-an-opportunity-for-canada.html>

## APPENDIX B – DATA SOURCES

Table B1 displays the data sources for new mines and extended mines.

**Table B1. Data Sources for New Mines and Extended Mines**

Name	Data Source	Approximate Date of Data Source	Consultants /Companies
Aley	Technical Report on Mineral Reserves	December 2017	Taseko
Baptiste	Preliminary Economic Assessment NI 43-101 Technical Report	March 2021	BBA et al.
Ootsa	Preliminary Economic Assessment NI 43-101 Technical Report	March 2016	P&E Mining Consultants Inc.
Berg	Preliminary Economic Assessment NI 43-101 Technical Report	June 2023	Surge Copper Corp
Galore Creek	Pre-Feasibility Study NI 43-101 Technical Report	July 2011	AMEC Americas Limited
Ingerbelle	Life of Mine Plan and 65 KT/D Expansion Study Update	September 2022	Copper Mountain Mining Corporation
KSM	Preliminary Economic Assessment NI 43-101 Technical Report	August 2022	Tetra Tech et al.
Kutcho	NI 43-101 Technical Report – Feasibility Study	December 2021	CSA Global Consultants Canada Limited
Kwanika-Stardust	Preliminary Economic Assessment NI 43-101 Technical Report	February 2023	Ausenco Engineering Canada Inc.
North Island	Preliminary Economic Assessment NI 43-101 Technical Report	March 2021	M3
Shaft Creek	Preliminary Economic Assessment NI 43-101 Technical Report	September 2021	Tetra Tech Canada Inc.
Turnagain	Preliminary Economic Assessment NI 43-101 Technical Report	February 2021	Hatch
Wicheeda	Preliminary Economic Assessment NI 43-101 Technical Report	January 2022	SRK Consulting (Canada) Inc.
Yellowhead	Technical Report on Mineral Reserves	January 2020	Taseko
Cariboo Gold	NI 43-101 Technical Report – Feasibility Study	January 2023	BBA et al.
Eskay Creek	NI 43-101 Technical Report and Feasibility Study	September 2022	Ausenco Engineering Canada Inc.
Premier and Red Mountain	Feasibility Study NI 43-101 Technical Report	May 2020	Sacre-Davey Engineering Inc.
New Polaris Gold	Preliminary Economic Assessment NI 43-101 Technical Report	February 2019	Canarc Gold/Silver
Spanish Mountain Gold	Preliminary Economic Assessment NI 43-101 Technical Report	December 2019	Spanish Mountain Gold Ltd
Red Chris	NI 43-101 Technical Report	June 2021	Red Chris
Highland Valley Copper	HVC 2040 Project – Project Description Addendum	June 2021	Teck Highland Valley Copper

## APPENDIX C – INPUT-OUTPUT MODELLING TECHNICAL CONSTRAINTS

There are certain technical constraints involved with input-output modelling which may influence the results for very large operations or industries, businesses, or projects. The technical constraints include:

- *Lack of supply-side constraints.* It is assumed that extra output can be produced in one area without taking resources away from other activities. The actual impact is likely to be dependent on the extent to which the economy is acting at or near capacity.
- *Fixed prices.* Constraints on the availability of inputs (such as skilled labour) require prices to act as a rationing device. In assessments using multipliers and models, in which factors of production are assumed to be limitless, this rationing response is assumed not to occur. Consequently, prices are assumed to be unaffected by demand and any crowding-out effects are not captured.
- *Fixed ratios for intermediate inputs and production.* Assessments using multipliers and models implicitly assume there is a fixed input structure in each industry and fixed ratios for production. As such, the analysis describes average effects, not marginal effects. For example, increased demand for a product is assumed to imply an equal increase in production for that product. In reality, however, it may be more efficient to increase imports or divert some exports to local consumption rather than increasing local production by the full amount.

## APPENDIX D – MANSFIELD CONSULTING INC.

Ed Mansfield is the founder and president of Mansfield Consulting Inc. Ed has more than 30 years of experience in providing consulting services to public and private companies, professional associations, industry organizations, and government agencies. Before founding Mansfield Consulting Inc. Ed led economics and research practices at four major accounting and business consulting firms. Ed has Ph.D. and M.S. degrees in Applied Mathematics from the University of Washington, and a B.Sc. in Mathematics and Statistics from the University of BC.

Mansfield Consulting Inc. has collaborated with clients from across Canada and the United States and has provided professional insight and advice to business and industry leaders. The firm has assisted with the development of public policy and has worked with senior leadership at all levels of government. For more information on Mansfield Consulting Inc., please see our website at: [www.mansfieldconsulting.ca](http://www.mansfieldconsulting.ca).