

## Technical Appendix to Economic Impact Analysis

**Table A.1. Discounted Value of Total Economic Impacts on Sales of All Industries in Saskatchewan from Capital Investment Phase of Lake Diefenbaker Irrigation Development and Associated Infrastructure, Total for 40 Year Period, Million Dollars**

Investment Type	Direct	Indirect	Induced	Total
<b>Net Present value at 1% Discount Rate</b>				
Off-farm Water Supply	\$2,636	\$3,310	\$709	\$6,655
On-farm Investment	\$284	\$103	\$93	\$480
Farm Level Forward Linkages	\$423	\$425	\$96	\$944
Non-farm Level Forward Linkages	\$219	\$195	\$40	\$454
Total Project Operations and Maintenance	\$3,562	\$4,033	\$938	\$8,532
<b>Net Present value at 3% Discount Rate</b>				
Off-farm Water Supply	\$2,250	\$2,826	\$605	\$5,681
On-farm Investment	\$205	\$74	\$67	\$346
Farm Level Forward Linkages	\$336	\$346	\$77	\$759
Non-farm Level Forward Linkages	\$186	\$167	\$34	\$387
Total Project Operations and Maintenance	\$2,977	\$3,413	\$783	\$7,173
<b>Net Present value at 5% Discount Rate</b>				
Off-farm Water Supply	\$1,945	\$2,443	\$523	\$4,911
On-farm Investment	\$154	\$56	\$50	\$260
Farm Level Forward Linkages	\$277	\$291	\$64	\$631
Non-farm Level Forward Linkages	\$160	\$145	\$30	\$335
Total Project Operations and Maintenance	\$2,536	\$2,935	\$667	\$6,138

**Table A.2. Discounted Value of Total Economic Impacts on Gross Domestic Product of Saskatchewan from Capital Investment Phase of Lake Diefenbaker Irrigation Development and Associated Infrastructure, Total for 40 Year Period, Million Dollars**

<b>Investment Type</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
<b>Net Present value at 1% Discount Rate</b>				
Off-farm Water Supply	\$93	\$1,351	\$504	\$1,855
On-farm Investment	\$83	\$53	\$54	\$190
Farm Level Forward Linkages	\$22	\$164	\$66	\$252
Non-farm Level Forward Linkages	\$8	\$87	\$23	\$119
Total Project Operations and Maintenance	\$206	\$1,655	\$554	\$2,416
<b>Net Present value at 3% Discount Rate</b>				
Off-farm Water Supply	\$79	\$1,153	\$431	\$1,583
On-farm Investment	\$60	\$38	\$39	\$137
Farm Level Forward Linkages	\$16	\$132	\$54	\$202
Non-farm Level Forward Linkages	\$7	\$74	\$20	\$101
Total Project Operations and Maintenance	\$162	\$1,367	\$464	\$2,024
<b>Net Present value at 5% Discount Rate</b>				
Off-farm Water Supply	\$69	\$997	\$372	\$1,369
On-farm Investment	\$45	\$29	\$29	\$25
Farm Level Forward Linkages	\$12	\$110	\$46	\$168
Non-farm Level Forward Linkages	\$6	\$65	\$17	\$88
Total Project Operations and Maintenance	\$132	\$1,201	\$396	\$1,728

**Table A.3. Discounted Value of Total Economic Impacts on Household income in Saskatchewan from Capital Investment Phase of Lake Diefenbaker Irrigation Development and Associated Infrastructure, Total for 40 Year Period, Million Dollars**

<b>Investment Type</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
<b>Net Present value at 1% Discount Rate</b>				
Off-farm Water Supply	\$0	\$800	\$227	\$1,027
On-farm Investment	\$64	\$30	\$30	\$124
Farm Level Forward Linkages	\$7	\$100	\$31	\$138
Non-farm Level Forward Linkages	\$0	\$50	\$14	\$64
Total Project Operations and Maintenance	\$71	\$980	\$302	\$1,353
<b>Net Present value at 3% Discount Rate</b>				
Off-farm Water Supply	\$0	\$683	\$194	\$877
On-farm Investment	\$46	\$22	\$21	\$89
Farm Level Forward Linkages	\$5	\$81	\$25	\$111
Non-farm Level Forward Linkages	\$0	\$39	\$11	\$50
Total Project Operations and Maintenance	\$51	\$824	\$251	\$1,126
<b>Net Present value at 5% Discount Rate</b>				
Off-farm Water Supply	\$0	\$590	\$168	\$758
On-farm Investment	\$35	\$16	\$16	\$67
Farm Level Forward Linkages	\$4	\$68	\$21	\$92
Non-farm Level Forward Linkages	\$0	\$34	\$10	\$43
Total Project Operations and Maintenance	\$39	\$708	\$214	\$960

**Table A.4. Discounted Value of Total Economic Impacts on Sales of All Industries in Saskatchewan from Operations Phase of Lake Diefenbaker Irrigation Development and Associated Activities, Total for 40 Year Period, Million Dollars**

Type of Operations	Direct	Indirect	Induced	Total
<b>Net Present value at 1% Discount Rate</b>				
Off-farm Water Supply	\$32	\$39	\$8	\$79
On-farm Investment	\$4,399	\$1,449	\$2,224	\$8,071
Farm Level Forward Linkages	\$7,958	\$6,559	\$2,864	\$17,381
Non-farm Level Forward Linkages	\$17,172	\$1,012	\$1,692	\$19,875
Total Project Operations and Maintenance	\$29,561	\$9,058	\$6,787	\$45,406
<b>Net Present value at 3% Discount Rate</b>				
Off-farm Water Supply	\$20	\$23	\$5	\$48
On-farm Investment	\$2,654	\$875	\$1,341	\$4,870
Farm Level Forward Linkages	\$4,838	\$3,959	\$1,736	\$10,532
Non-farm Level Forward Linkages	\$11,263	\$640	\$1,099	\$13,002
Total Project Operations and Maintenance	\$18,774	\$5,498	\$4,180	\$28,452
<b>Net Present value at 5% Discount Rate</b>				
Off-farm Water Supply	\$12	\$15	\$3	\$30
On-farm Investment	\$1,666	\$550	\$842	\$3,057
Farm Level Forward Linkages	\$3,072	\$2,493	\$1,098	\$6,663
Non-farm Level Forward Linkages	\$7,764	\$423	\$750	\$8,937
Total Project Operations and Maintenance	\$12,514	\$3,481	\$2,692	\$18,687

**Table A.5. Discounted Value of Total Economic Impacts on Gross Domestic Product of Saskatchewan from Operations Phase of Lake Diefenbaker Irrigation Development and Associated Activities, Total for 40 Year Period, Million Dollars**

Type of Operations	Direct	Indirect	Induced	Total
<b>Net Present value at 1% Discount Rate</b>				
Off-farm Water Supply	\$3	\$19	\$4	\$27
On-farm Investment	\$2,575	\$725	\$1,310	\$4,610
Farm Level Forward Linkages	\$2,610	\$2,566	\$1,660	\$6,835
Non-farm Level Forward Linkages	\$12,594	\$521	\$1,336	\$14,451
Total Project Operations and Maintenance	\$17,782	\$3,832	\$4,310	\$25,923
<b>Net Present value at 3% Discount Rate</b>				
Off-farm Water Supply	\$2	\$12	\$3	\$16
On-farm Investment	\$2,575	\$725	\$1,310	\$4,610
Farm Level Forward Linkages	\$1,604	\$1,556	\$1,006	\$4,165
Non-farm Level Forward Linkages	\$8,381	\$333	\$875	\$9,589
Total Project Operations and Maintenance	\$11,539	\$2,338	\$2,673	\$16,549
<b>Net Present value at 5% Discount Rate</b>				
Off-farm Water Supply	\$1	\$8	\$2	\$10
On-farm Investment	\$973	\$275	\$495	\$1,743
Farm Level Forward Linkages	\$1,032	\$985	\$636	\$2,652
Non-farm Level Forward Linkages	\$5,867	\$222	\$602	\$6,692
Total Project Operations and Maintenance	\$7,873	\$1,490	\$1,735	\$11,097

**Table A.6. Total Economic Impacts on Household Income in Saskatchewan from Operations Phase of Lake Diefenbaker Irrigation Development and Associated Activities, Total for 40 Year Period, Million Dollars**

Type of Operations	Direct	Indirect	Induced	Total
	<b>Nominal Value Total</b>			
Off-farm Water Supply Operations	\$1	\$10	\$3	\$14
On-farm Production	\$2,465	\$399	\$938	\$3,793
Farm Level Forward Linkages Operations	\$2,415	\$1,392	\$1,197	\$5,003
Non-farm Level Forward Linkages Operations	\$1,816	\$288	\$685	\$2,789
Total Project Operations and Maintenance	\$6,696	\$2,089	\$2,823	\$11,600
	<b>Net Present value at 1% Discount Rate</b>			
Off-farm Water Supply	\$0	\$8	\$2	\$11
On-farm Investment	\$1,885	\$305	\$718	\$2,902
Farm Level Forward Linkages	\$1,849	\$1,067	\$917	\$3,833
Non-farm Level Forward Linkages	\$1,438	\$226	\$541	\$2,205
Total Project Operations and Maintenance	\$5,173	\$1,606	\$2,179	\$8,951
	<b>Net Present value at 3% Discount Rate</b>			
Off-farm Water Supply	\$0	\$5	\$1	\$7
On-farm Investment	\$1,137	\$17	\$40	\$165
Farm Level Forward Linkages	\$1,120	\$647	\$556	\$2,323
Non-farm Level Forward Linkages	\$937	\$143	\$352	\$1,432
Total Project Operations and Maintenance	\$3,194	\$981	\$1,343	\$5,512
	<b>Net Present value at 5% Discount Rate</b>			
Off-farm Water Supply	\$0	\$3	\$1	\$4
On-farm Investment	\$714	\$116	\$273	\$1,099
Farm Level Forward Linkages	\$708	\$410	\$352	\$1,470
Non-farm Level Forward Linkages	\$641	\$95	\$240	\$977
Total Project Operations and Maintenance	\$2,063	\$625	\$865	\$3,550

**Table A.7. Cost Benefit Analysis of Irrigation Development Costs and Benefits for Direct and Total Benefits (including Indirect and Induced Effects) for a Lake Diefenbaker Agricultural Irrigation Scenario and Combined Lake Diefenbaker Agricultural Irrigation and Agricultural Value Added Development Scenario at a 1% Discount Rate for A 40 Year Period and a 40 Year Irrigation Adoption Assumption as Compared to Dryland Agriculture**

<b>CBA of the Project Based On Irrigated Agriculture</b>			
<b>Costs</b>	<b>Direct</b>	<b>Indirect Induced</b>	<b>Total</b>
Regional Water Works			
Capital	\$2,636		\$2,636
Operating	\$32		\$32
<b>Total Costs</b>	<b>\$2,668</b>		<b>\$2,668</b>
<b>Benefits</b>			
Regional Water Works			
Capital		\$4,019	\$4,019
Operating		\$3,673	\$3,673
On Farm Investments			
Capital	\$284	\$196	\$480
Operating	\$4,399	\$3,673	\$8,072
<b>Total Benefits</b>	<b>\$4,467</b>		<b>\$16,244</b>
<b>Cost Benefit Ratio</b>	<b>1.76</b>		<b>6.09</b>
<b>CBA of the Project with Full Development and Benefits</b>			
<b>Costs</b>	<b>Direct</b>	<b>Indirect Induced</b>	<b>Total</b>
Regional Water Works			
Capital	\$2,636		\$2,636
Operating	\$32		\$32
<b>Total Costs</b>	<b>\$2,668</b>		<b>\$2,668</b>
<b>Benefits</b>			
Regional Water Works			
Capital		\$4,019	\$4,019
Operating		\$3,673	\$3,673
On Farm Investments			
Capital	\$284	\$196	\$480
O&M	\$4,399	\$3,673	\$8,072
Farm Level Forward Linkages			
Capital	\$423	\$521	\$944
O&M	\$7,958	\$9,423	\$17,381
Non-farm Level Forward Linkages			\$0
Capital	\$219	\$236	\$454
O&M	\$17,172	\$2,703	\$19,875
<b>Total Benefits</b>	<b>\$30,454</b>		<b>\$60,234</b>
<b>Cost Benefit Ratio</b>	<b>11.41</b>		<b>22.58</b>

**Table A.8. Cost Benefit Analysis of Irrigation Development Costs and Benefits for Direct and Total Benefits (including Indirect and Induced Effects) for a Lake Diefenbaker Agricultural Irrigation Scenario and Combined Lake Diefenbaker Agricultural Irrigation and Agricultural Value Added Development Scenario at a 3% Discount Rate for A 40 Year Period and a 40 Year Irrigation Adoption Assumption as Compared to Dryland Agriculture**

<b>CBA of the Project Based On Irrigated Agriculture</b>			
<b>Costs</b>	<b>Direct</b>	<b>Indirect Induced</b>	<b>Total</b>
Regional Water Works			
Capital	\$2,250		\$2,250
Operating	\$20		\$20
<b>Total Costs</b>	<b>\$2,270</b>		<b>\$2,270</b>
<b>Benefits</b>			
Regional Water Works			
Capital		\$3,432	\$3,432
Operating		\$2,217	\$2,217
On Farm Investments			
Capital	\$205	\$141	\$346
Operating	\$2,654	\$2,217	\$4,871
<b>Total Benefits</b>	<b>\$2,859</b>		<b>\$10,865</b>
<b>Cost Benefit Ratio</b>	<b>1.26</b>		<b>4.79</b>
<b>CBA of the Project with Full Development and Benefits</b>			
<b>Costs</b>	<b>Direct</b>	<b>Indirect Induced</b>	<b>Total</b>
Regional Water Works			
Capital	\$2,250		\$2,250
Operating	\$20		\$20
<b>Total Costs</b>	<b>\$2,270</b>		<b>\$2,270</b>
<b>Benefits</b>			
Regional Water Works			
Capital		\$3,432	\$3,432
Operating		\$2,217	\$2,217
On Farm Investments			
Capital	\$205	\$141	\$346
O&M	\$2,654	\$2,217	\$4,871
Farm Level Forward Linkages			
Capital	\$336	\$423	\$759
O&M	\$4,838	\$5,695	\$10,532
Non-farm Level Forward Linkages			
Capital	\$186	\$201	\$387
O&M	\$11,263	\$1,739	\$13,002
<b>Total Benefits</b>	<b>\$19,481</b>		<b>\$40,085</b>
<b>Cost Benefit Ratio</b>	<b>8.58</b>		<b>17.66</b>



**Table A.9. Cost Benefit Analysis of Irrigation Development Costs and Benefits for Direct and Total Benefits (including Indirect and Induced Effects) for a Lake Diefenbaker Agricultural Irrigation Scenario and Combined Lake Diefenbaker Agricultural Irrigation and Agricultural Value Added Development Scenario at a 5% Discount Rate for A 40 Year Period and a 40 Year Irrigation Adoption Assumption as Compared to Dryland Agriculture**

<b>CBA of the Project Based On Irrigated Agriculture</b>			
<b>Costs</b>	<b>Direct</b>	<b>Indirect Induced</b>	<b>Total</b>
Regional Water Works			
Capital	\$1,945		\$1,945
Operating	\$12		\$12
<b>Total Costs</b>	<b>\$1,958</b>		<b>\$1,958</b>
<b>Benefits</b>			
Regional Water Works			
Capital		\$2,966	\$2,966
Operating		\$1,392	\$1,392
On Farm Investments			
Capital	\$154	\$106	\$260
Operating	\$1,666	\$1,392	\$3,058
<b>Total Benefits</b>	<b>\$1,820</b>		<b>\$7,676</b>
<b>Cost Benefit Ratio</b>	<b>0.93</b>		<b>3.92</b>
<b>CBA of the Project with Full Development and Benefits</b>			
<b>Costs</b>	<b>Direct</b>	<b>Indirect Induced</b>	<b>Total</b>
Regional Water Works			
Capital	\$1,945		\$1,945
Operating	\$12		\$12
<b>Total Costs</b>	<b>\$1,958</b>		<b>\$1,958</b>
<b>Benefits</b>			
Regional Water Works			
Capital		\$2,966	\$2,966
Operating		\$1,392	\$1,392
On Farm Investments			
Capital	\$154	\$106	\$260
O&M	\$1,666	\$1,392	\$3,058
Farm Level Forward Linkages			
Capital	\$277	\$355	\$631
O&M	\$3,072	\$3,591	\$6,663
Non-farm Level Forward Linkages			
Capital	\$160	\$175	\$335
O&M	\$7,764	\$1,172	\$8,937
<b>Total Benefits</b>	<b>\$12,093</b>		<b>\$28,157</b>
<b>Cost Benefit Ratio</b>	<b>6.69</b>		<b>14.38</b>

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