

IRRIGATION INVESTMENT OPPORTUNITY

CANADIAN PRAIRIES

LAKE DIEFENBAKER, SASKATCHEWAN



- 500,000 irrigable acres to develop
- high quality water available
- irrigable land under \$500/acre
- 2,200 CHU 9 years out of 10; 115 frost-free days
- potatoes, beans, corn, alfalfa & many more crops

CONTACT:

Saskatchewan Agriculture

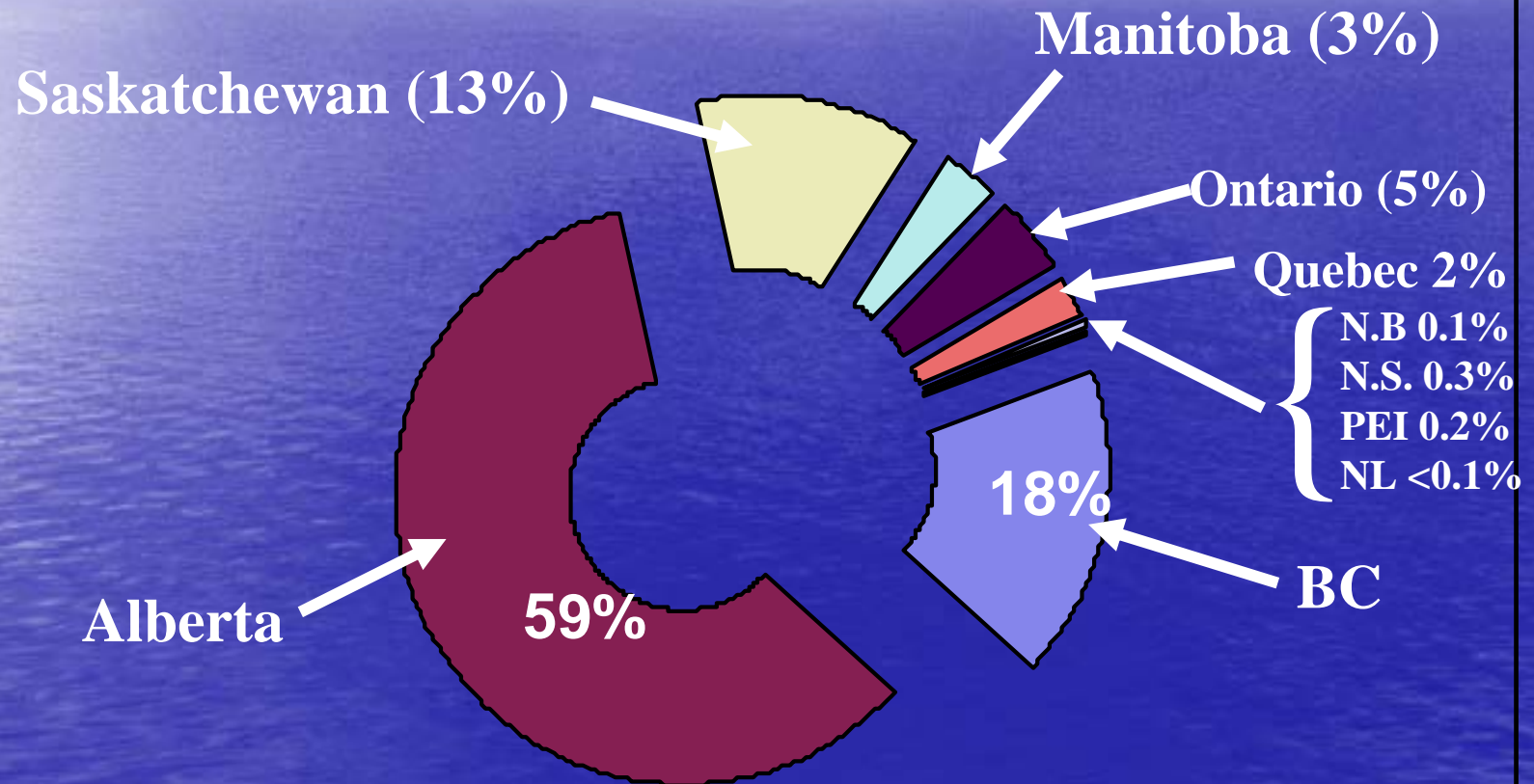
Irrigation Branch

(306) 867-5500

www.irrigationsaskatchewan.com



Irrigated Area in Canada



Agriculture and
Agri-Food Canada

Agriculture et
Agroalimentaire Canada

Prairie Farm Rehabilitation
Administration

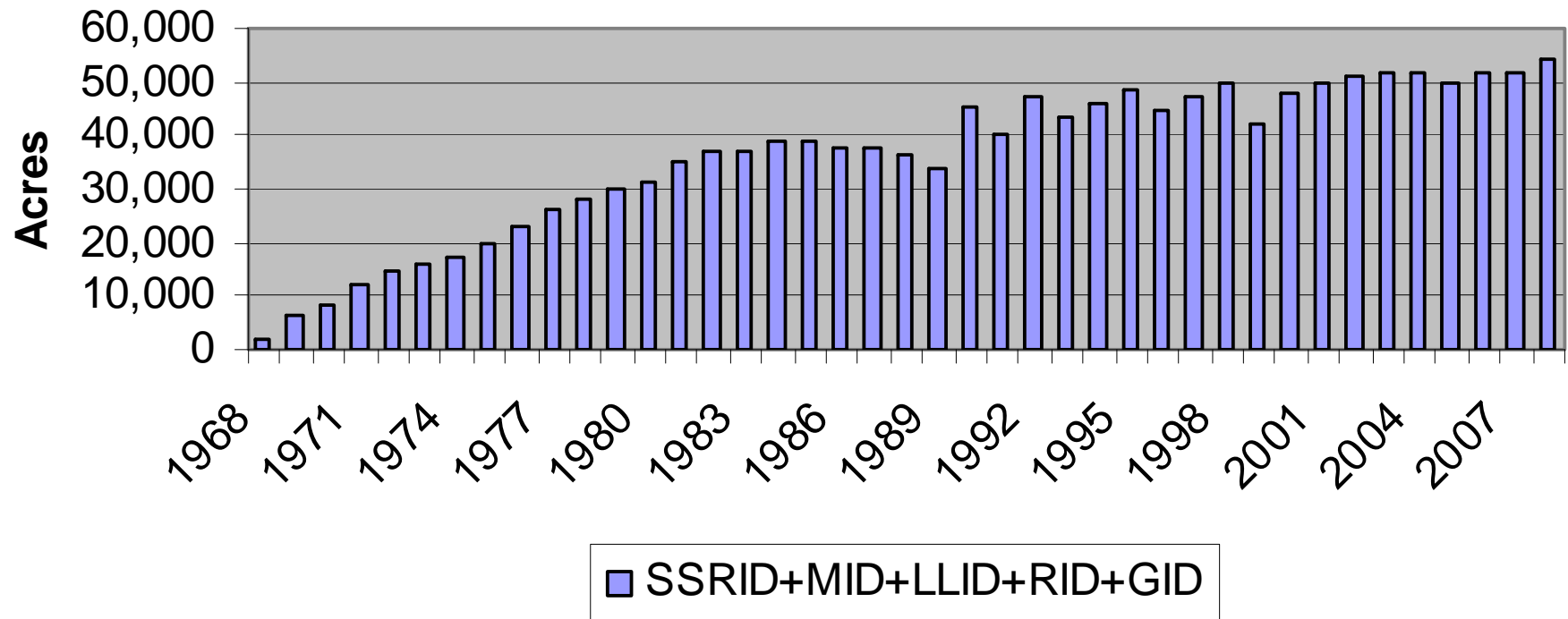
Administration du rétablissement
agricole des Prairies

Canada's Irrigation Potential

Province	Irrigated Area (Ha)	Potential Area	Potential % increase
BC	121,408	182,113	150%
Alberta	728,450	1,011,736	139%
Saskatchewan	80,939	404,694	500%
Manitoba	30,352	60,704	200%
Ontario	60,704	202,347	333%
Quebec	25,000	35,000	140%
New Brunswick	500	575	115%
Nova Scotia	3,642	7,285	200%
PEI	2,023	4,047	200%
Newfoundland	45	136	300%
CANADA	1,053,065	1,908,637	181%

Lake Diefenbaker Irrigation District Expansion

**LAKE DIEFENBAKER
IRRIGATION DISTRICT ACRES**



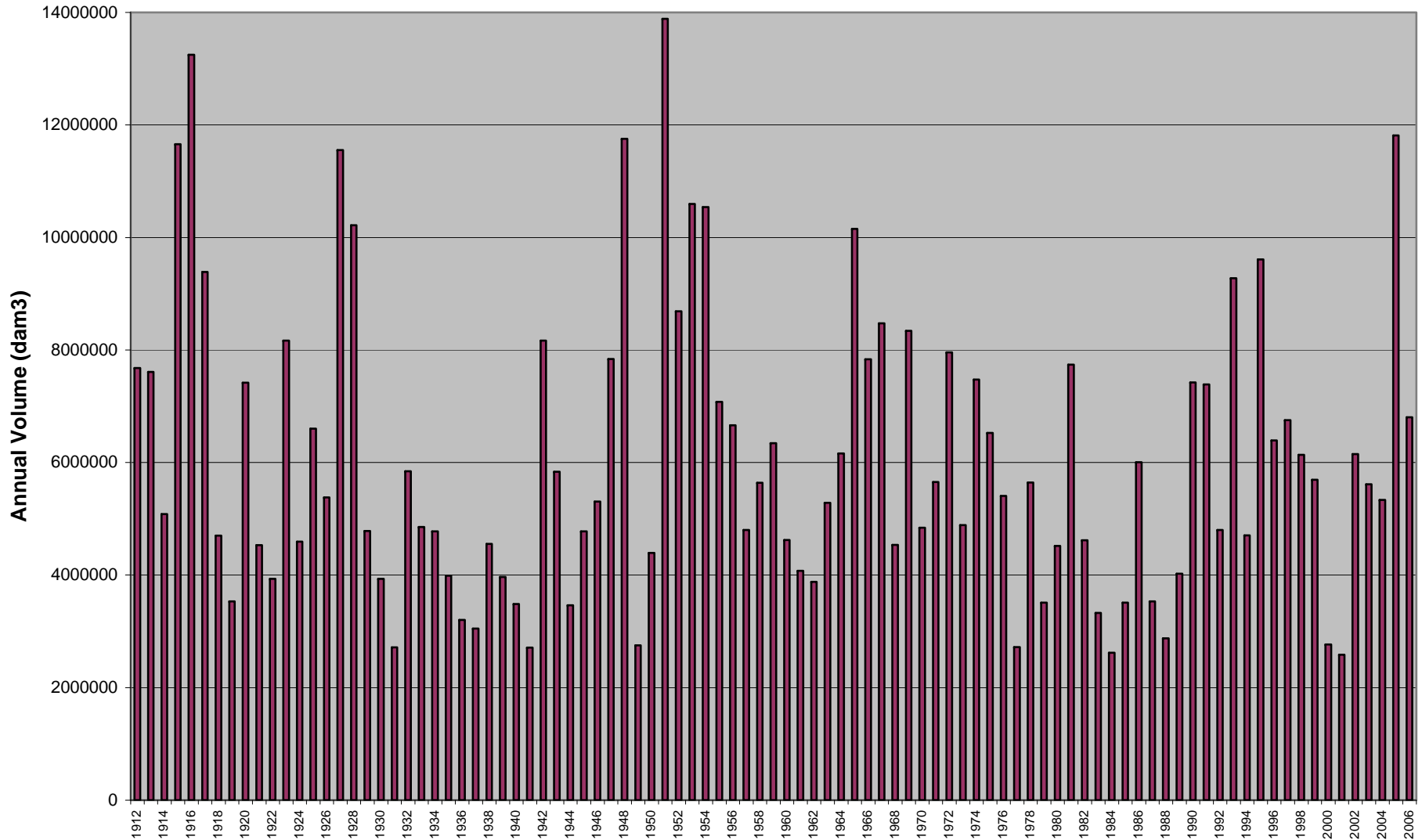
Lake Diefenbaker Gardiner Dam



- 9.4 million dam³ total storage
- 64m high dam x 5000m wide
- 225km long lake with 800km shoreline
- 45% of SK population's drinking water source

Lake Diefenbaker Net Annual Inflow 1912 - 2006

(Alberta at "Maximum" Level of Development)



Water Supply (CSWSEP)

Lake Diefenbaker Water Supply Study

Water supply analysis was completed for the Westside irrigation project study (SWA April 2006)

- Inflows corrected to theoretical maximum level of development in Alberta

Lake Diefenbaker:

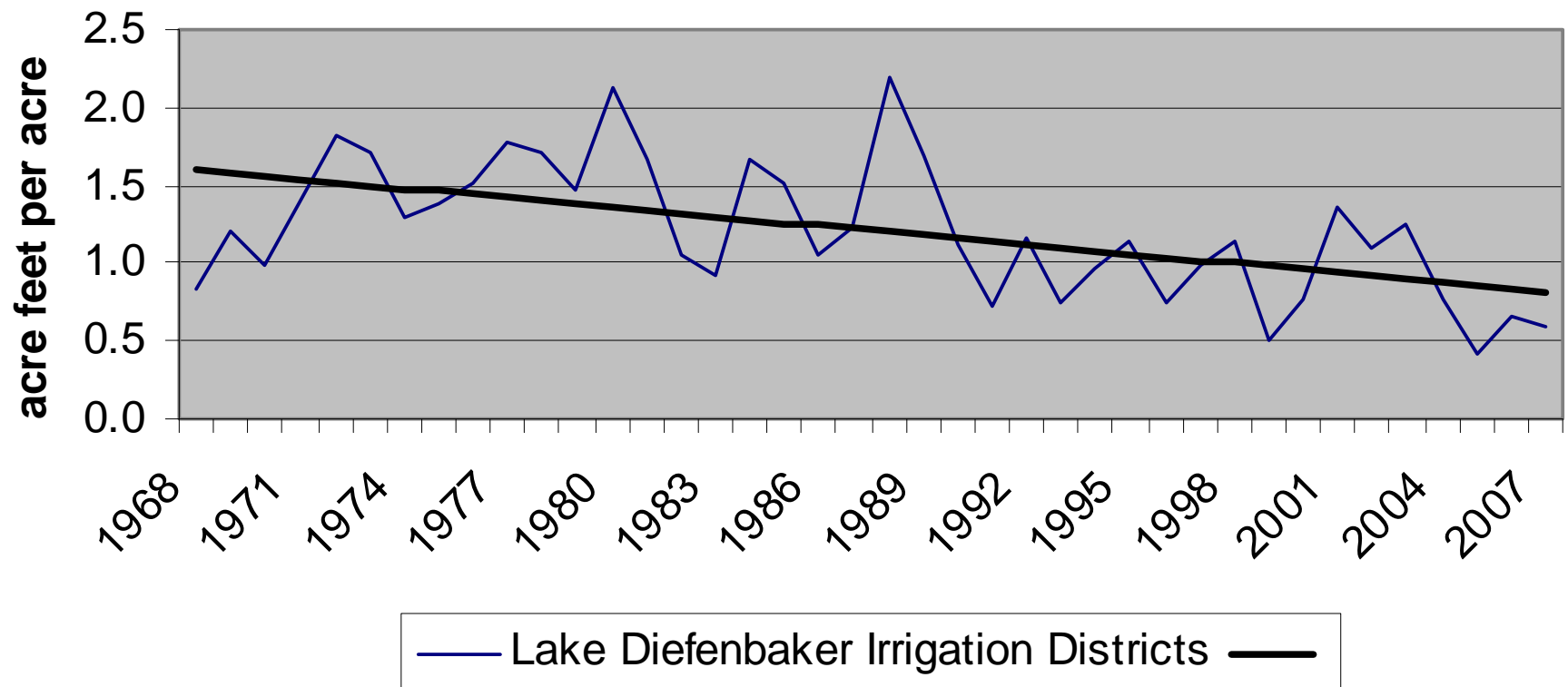
Surface area	43,000 ha (106,000 acres)
Useable storage	4,300,000 dam ³ (3,500,000 ac. ft.)
Average inflow	5,800,000 dam ³ (4,700,000 ac. ft.)
South Sask. River releases	50 m ³ /sec (1,280,000 ac. ft.)
Qu'Appelle River releases	270,000 dam ³ /year
Average evaporation losses	270,000 dam ³ /year (219,000 ac. ft.)

Water Supply - Conclusions

- Study concluded that 740,000 dam³ (600,000 ac ft) is available if irrigation water shortages in at least 10% of the years is acceptable
- No allocation to irrigation without a provincial water management strategy

Irrigation Water Use

Lake Diefenbaker Irrigation Districts Water Use





Low pressure centre pivots

Climate for Cropping

Saskatchewan Accumulated Corn Heat Units 90% Confidence for Grain Production

Note: Local topography, soil type, and surrounding vegetation can significantly alter microclimates. The daily CHU's were calculated by the following equation:

$$CHU = [1.8(T_{min}-4.4) + 3.3(T_{max}-10) - 0.084(T_{max}-10)^2] / 2$$

The seasonal CHU was calculated by a sum of all the daily CHU from May 15 until the first -3°C frost. Data from 1980-2000 was used. The 9/10 CHU is the third lowest seasonal CHU.

For further information contact Korvin Offert, (306) 778-5041.

Legend

• Weather Station

Corn Heat Units

1,400 - 1,799

1,800 - 1,899

1,900 - 1,999

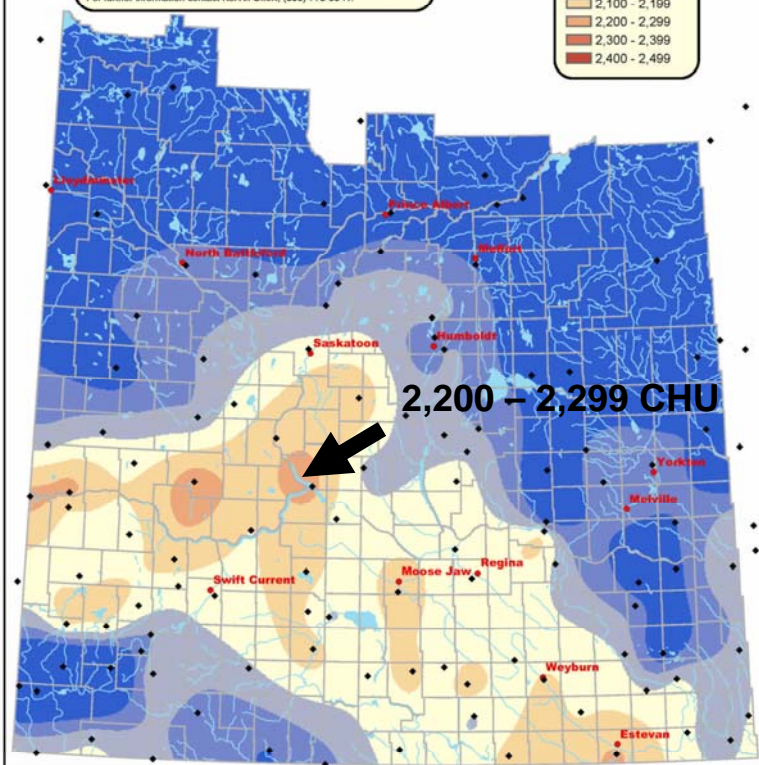
2,000 - 2,099

2,100 - 2,199

2,200 - 2,299

2,300 - 2,399

2,400 - 2,499



Saskatchewan Accumulated Corn Heat Units Average for Silage Production

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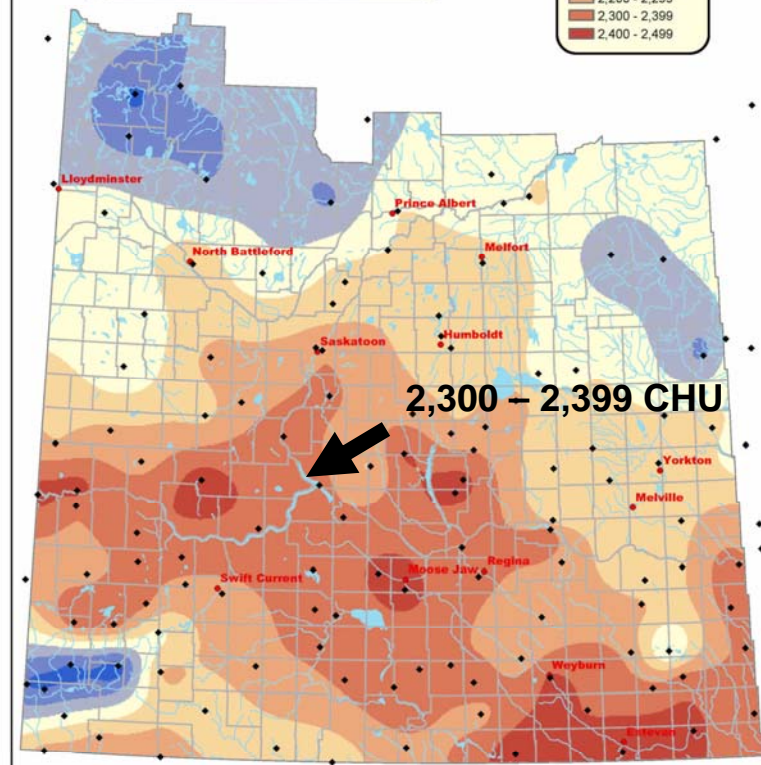
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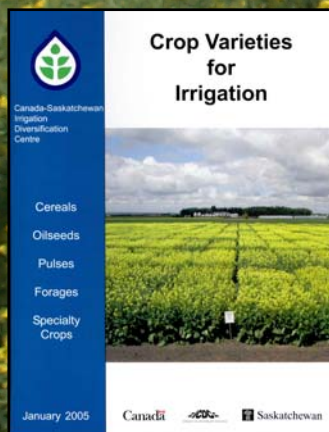
Crop Rotation: Forages 14%



Crop Rotation: Cereals 30%



Crop Rotation Oilseeds 34%



Crop Rotation: Pulses 12%



Crop Rotation: Vegetables 9%

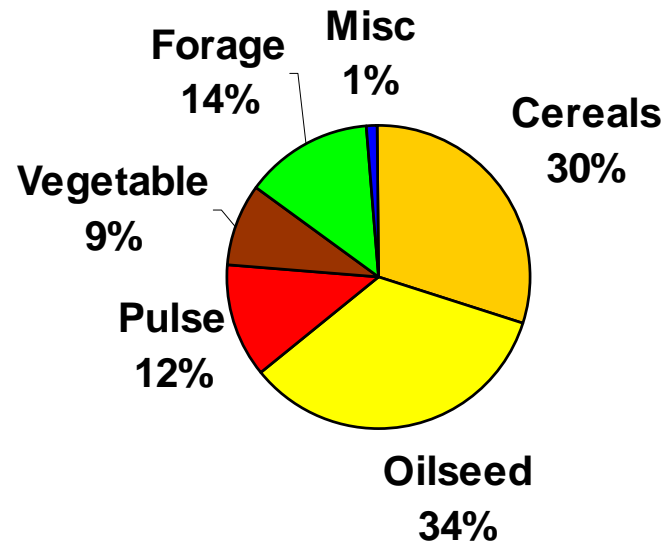


Crop Rotation: Misc. 1%



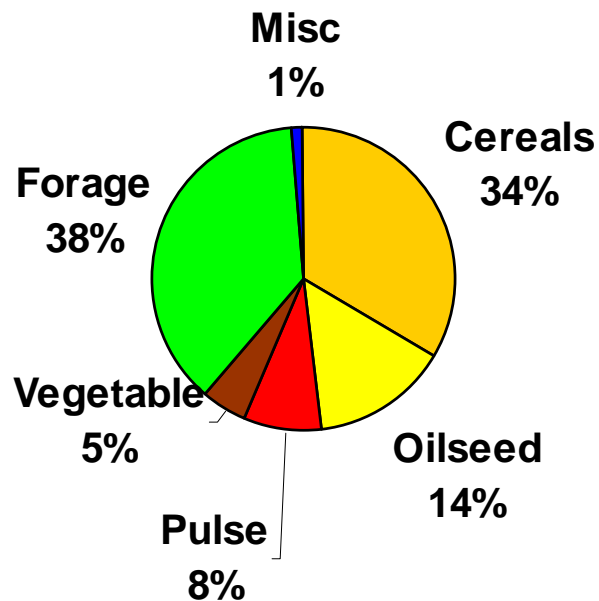
Irrigated Crop Rotation

**LAKE DIEFENBAKER IRRIGATION
CROP MIX 2008**



Irrigated Crop Rotation

**ALBERTA IRRIGATION
CROP MIX 2008**



Irrigated Crop Budgets

ECONOMICS

ESTABLISHED PASTURE

UNIT	\$/ac	My Farm \$/ac
lb	\$45.10	
lb	\$8.22	
lb	\$3.18	
lb	\$1.30	
	\$1.00	
	\$0.00	
inches	\$14.77	
	\$10.38	
charge	\$22.42	
	\$9.20	
\$/hd	\$0.00	
\$/hd	\$0.00	
\$/hd	\$0.00	
\$/hd	\$7.50	
\$/hd	\$7.50	
\$/hd	\$5.00	
\$/hd	\$3.88	
\$/hd	\$139.44	
\$/hd	\$28.71	
\$/hd	\$7.18	
\$/hd	\$23.88	
\$/hd	\$19.88	
\$/hd	\$100.74	
\$/hd	\$240.18	
	2.5	
	115	
Cash Cost \$/hd/day	\$0.49	
Total Cost \$/hd/day	\$0.84	
Average Daily Gain lb	2	2.5
Total Cost per lb of Gain (\$/ADG)	\$0.42	\$0.33
SPECIALIZED EQUIPMENT		
Cross Fencing	\$1.08	
Permanent Fencing	\$2.99	
Water Supply	\$3.09	
0	\$0.00	
0	\$0.00	
TOTAL	\$7.16	

* Varies significantly based on individual's utilization of owned equipment & buildings.

MORE INFORMATION:

Call an Irrigation Agrologist at (306) 867-5500 or check our website: www.irrigationsaskatchewan.com. Call the SAF Ag Knowledge Centre.

AGRONOMICS

CATTLE ASSUMPTIONS:

Stocking Rate	2.5	hd/ac
Days Grazing	115	days
Weight to Pasture	600	lb/hd
ADG	2.0 to 2.5	lb/hd
Weight off Pasture	830	lb/hd

This budget includes seeding year costs (p. 24) spread over 7 years of production. Pastures frequently need to be renovated or rotated out after 7 years in production.

LIVESTOCK

Steers	2 to 2.5 /ac
Cow-calf (1400 lb cow)	1.0 /ac
Cow-calf (1100 lb cow)	1.5 /ac
Ewes	6 - 8 /ac

Estimates of stocking rate are based on a limited amount of information and producer experience. These may change as more information becomes available.

FERTILIZATION:

Fertility in an established irrigated pasture relies on fertilizer inputs combined with cycling of nutrients through manure and urine. Fertilizer inputs are based on soil test results and crop removal. Soil test results and crop removal will be required.

IRRIGATION:

Frequent light irrigation is required starting in early May. Grass roots are concentrated in the top foot of soil. A combined total of 24" of rain and irrigation is required. Irrigation should continue into September.

WATERING FACILITY

Use water troughs, not bowls, to allow adequate access for a large number of stock. Do not allow direct access to a water source as the animals will contaminate it.

PASTURE MANAGEMENT:

Do not overgraze. By maintaining the pasture in a vegetative stage, digestibility and ADG can be kept at a high level. Use at least four paddocks to allow rapid harvest (one week) and an adequate regrowth period (3 weeks). Avoid grazing when the ground is wet. Fencing and irrigated pasture must take into account either movement of a pivot or other sprinkler irrigation system.

ECONOMICS

CROP: SEED POTATO

ITEM	#	UNIT	\$/ac	My Farm \$/ac
Seed			\$611.00	
Seed treatment/loc			\$70.20	
Fertilizer: N	150	lb	\$60.96	
P	90	lb	\$24.67	
K	150	lb	\$31.83	
Herbicide			\$107.89	
Insecticide			\$22.00	
Fungicide			\$100.20	
Equipment fuel			\$100.00	
Equipment repair			\$80.00	
Custom work			\$56.00	
Irrigation power *			\$0.00	
Irrigation repair *			\$0.00	
Irrigation service/water charge *			\$0.00	
Crop insurance	14	tons	\$96.26	
Hail insurance			\$0.00	
Hired labour	30	hr/ac	\$360.00	
Other			\$12.00	
Storage O & M			\$71.00	
Farm overhead			\$9.20	
Operating int.	5.7	%	\$41.68	
Land Rental			\$235.00	
Specialized Equipment			\$311.06	
Land Rental Rate			\$235.00	
TOTAL NON CASH COSTS			\$559.16	
TOTAL COSTS			\$2,424.05	
RETURNS	LO	AV	HI	
YIELD ton/ac	10	12	14	
PRICE \$/ton			\$300	
GROSS	\$3,000	\$3,600	\$4,200	
RETURN TO LABOUR & MGT	\$576	\$1,176	\$1,776	
SPECIALIZED EQUIPMENT			\$/acre	
Potato Field Equipment			\$130.38	
Potato Storage/Handling			\$60.18	
Potato Storage Facility			\$120.51	
0			\$0.00	
0			\$0.00	
0			\$0.00	
0			\$0.00	
TOTAL			\$311.06	

* Provided by landowner.

MORE INFORMATION:

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AGRONOMICS

This potato budget is based on 500 acre potato farm that rents land.

VARIETY SELECTION

Choose varieties based on the intended market. Seed cost is based on Elite I or Elite II.

SEEDING:

Plant population	21760.0 plants/acre
Weight of Seed Piece	60.0 grams
Seeding Rate	1.3 tons/ac

FERTILIZATION:

Soil test and tissue test to ensure adequate fertility for yield & quality of this high value crop. Fertilization with 28.0.0 is often the method of fertilizing during the season.

IRRIGATION:

Approx average crop water use per week in inches: June 75, 1.00, 1.25, 1.50, July 1.50, 1.50, 1.50, 1.50, Aug 1.50, 1.00, 75. Maintain soil above 70% available moisture. Use a soil probe to check moisture status. Irrigate by crop stage. Planting-emerge (1.5-2.5 weeks). Irrigate for tuber initiation (2.5-3.5 weeks). Irrigate for tuber bulking (3.5-4.5 weeks). Irrigate for tuber maturation (4.5-5.5 weeks). Irrigate for tuber curing (5.5-6.5 weeks). Irrigate for tuber storage (6.5-7.5 weeks). Irrigate for tuber marketing (7.5-8.5 weeks). Irrigate for tuber processing (8.5-9.5 weeks). Irrigate for tuber consumption (9.5-10.5 weeks). Irrigate for tuber disposal (10.5-11.5 weeks). Irrigate for tuber composting (11.5-12.5 weeks). Irrigate for tuber recycling (12.5-13.5 weeks). Irrigate for tuber reuse (13.5-14.5 weeks). Irrigate for tuber disposal (14.5-15.5 weeks). Irrigate for tuber recycling (15.5-16.5 weeks). Irrigate for tuber reuse (16.5-17.5 weeks). 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Irrigated Crop Budgets 2008

Crop	Gross \$/ac	Rotation %	Contribution \$/ac	Contribution %
VEGETABLE Seed Potato	\$3,600	9%	\$324	39%
PULSE Dry Bean	\$750	12%	\$90	11%
OILSEED Canola	\$600	34%	\$204	24%
CEREAL Durum	\$595	30%	\$179	21%
FORAGE Alfalfa	\$270	14%	\$38	5%
Irrigation Output (\$/ac)			\$834	

Irrigation: \$800 x 100,000 acres = \$80,000,000/year around Lake Diefenbaker

Cost of Irrigation \$/ac for 12" 2007

SSRID

- Energy: \$3.50/ac ft
- On-farm: \$10.00
- O&M: \$12.13
- IRF: \$1.40
- Admin: \$3.12
- SIPA: \$0.40
- ICDC: \$0.35
- TOTAL: \$30.90**

RID

- Energy: \$27.79
- O&M: \$10.43
- IRF: \$13.00
- Admin: \$1.75
- Econ Dev: \$1.00
- SIPA: \$0.40
- ICDC: \$0.35
- TOTAL: \$54.72**

LLID

- Energy: \$28.14
- O&M: \$18.98
- IRF: \$10.00
- Admin: \$0.25
- SIPA: \$0.40
- ICDC: \$0.35
- TOTAL: \$58.12**



On-Farm Irrigation Cost 2008

Quarter section pivot (133ac)

- Request for Technical Assistance \$250
- Irrigation Certification \$1,300
- Centre pivot \$60,000
- Pivot pad \$1,200
- Mainline (10") \$7,200
- Trenching/lay pipe & wire \$2,600
- Wiring \$4,000
- Fittings \$1,500
- * Intake well/screen \$1,500
- * Turbine pump/motor (30hp) \$10,000
- Powerline (\$25,000/mile)

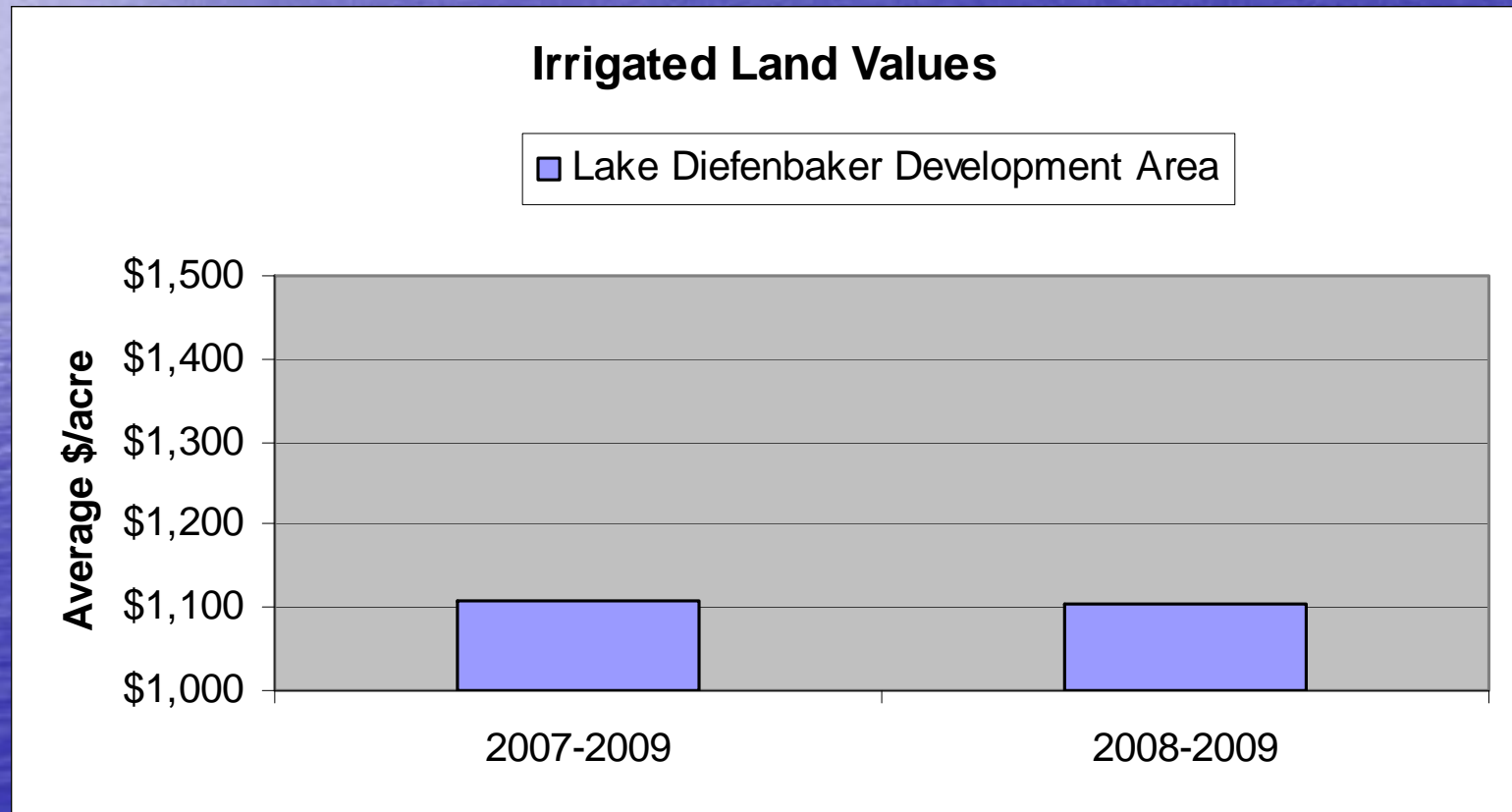
TOTAL **\$89,550

*** Not required for pressurized mainline districts**

**** 2008 costs; add GST & PST**

Irrigated Land Values

Average \$/acre for Cultivated Irrigated Land



Source: Farm Credit Canada

The Irrigation Act, 1996

Irrigation Certification

- Soil/Water compatibility
- Environmental sustainability

Irrigation Districts

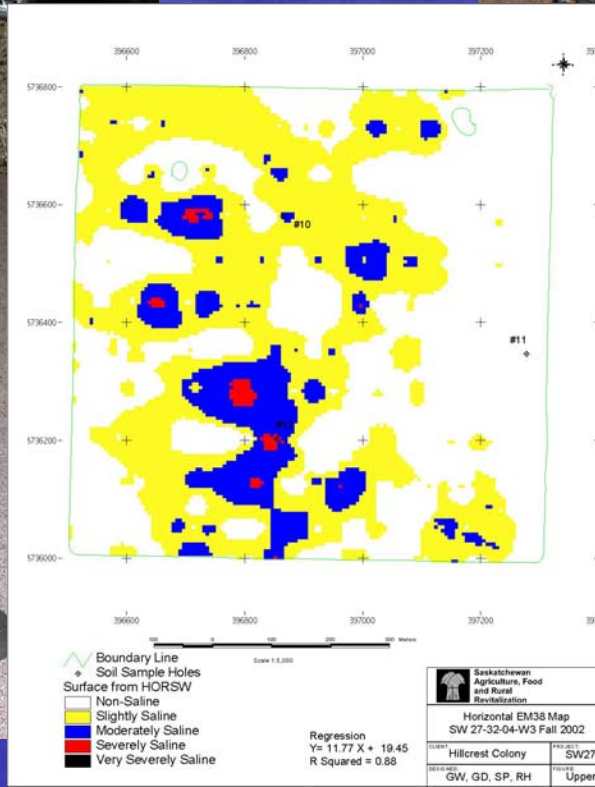
- Incorporated under the Act
- Pay 100% of operation, maintenance and administration costs plus Irrigation Replacement Fund contributions

Irrigation Crop Diversification Corp.

- R&D
- Education

Irrigation Certification

Environmental Sustainability



Irrigation R&D Support

The Canada Saskatchewan Irrigation Diversification Centre (CSIDC)

Agriculture and Agri-Food Canada
Saskatchewan Ministry of Agriculture
University of Saskatchewan

Irrigation Crop Diversification Corporation (ICDC)
Saskatchewan Irrigation Projects Association (SIPA)

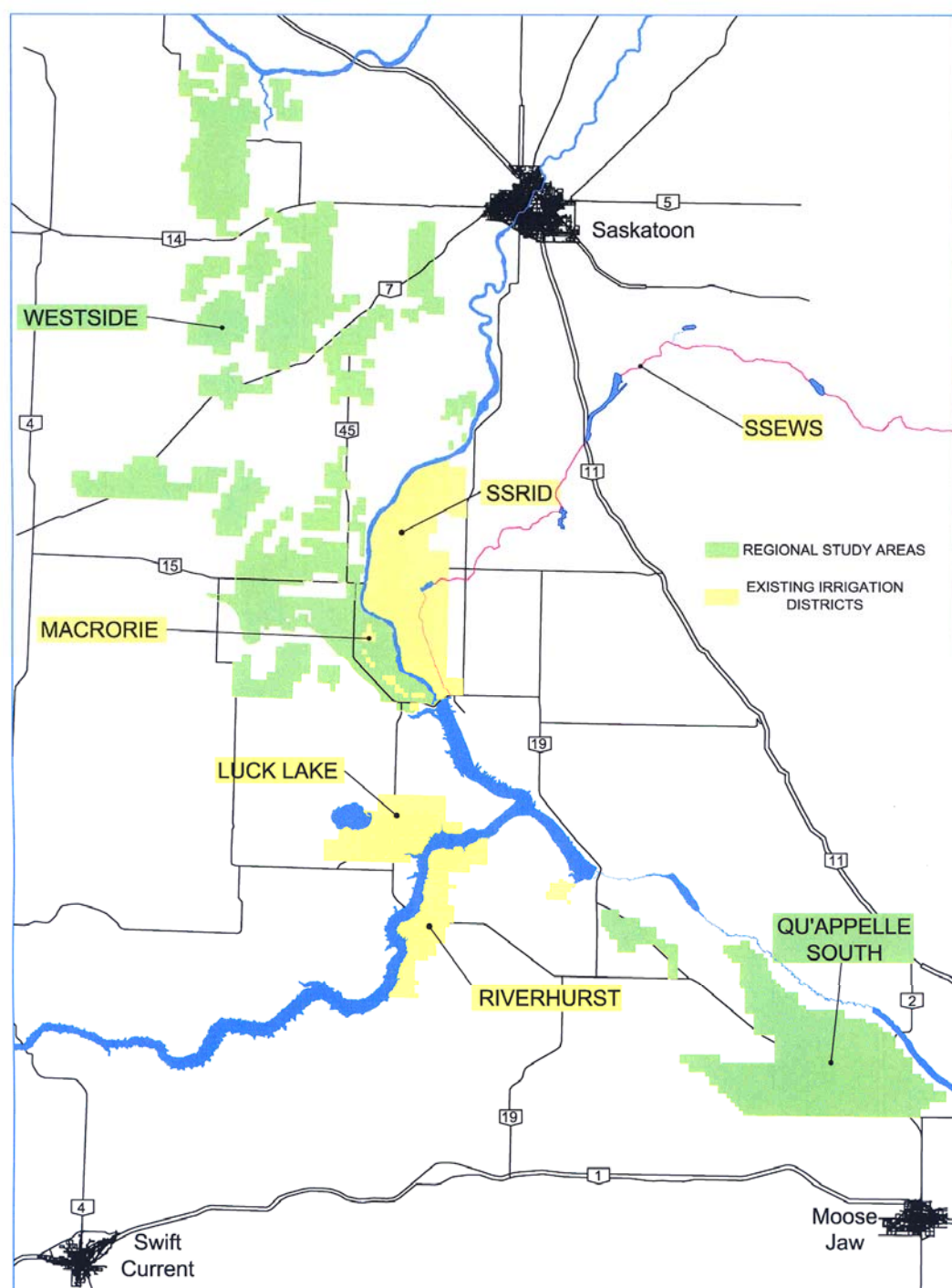


The Canada Saskatchewan Water Supply Expansion Program (CSWSEP)

- Five irrigation studies were commissioned
- Three Irrigation Districts examined infill and expansion
- Two regional studies investigated the feasibility of constructing new multi-purpose projects
- Lake Diefenbaker would supply 94% of the irrigated acres

Lake Diefenbaker supplies water directly to 100,000 acres of irrigation.

Potential for expansion of an additional 500,000 acres based on suitable soils and economic feasibility.



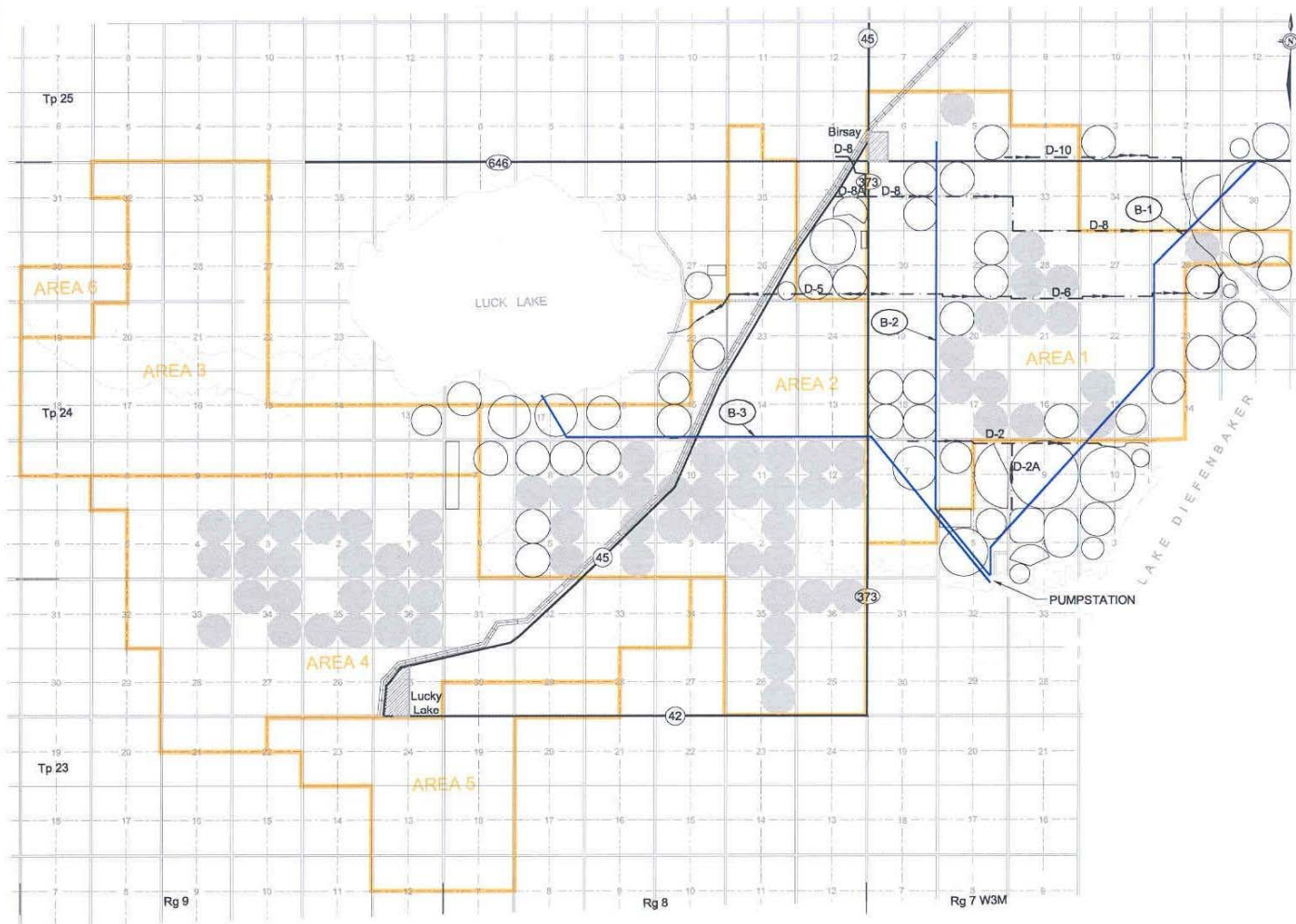
Luck Lake Irrigation Project

- Construction costs of \$38 million
- Pressurized pipeline delivery system
- Project completed in 1989
- Water delivered to 9,045 acres in 2007
- Built by Sask Water now owned and operated by Saskatchewan Agriculture
- Provides water to Ducks Unlimited's Luck Lake Heritage Marsh, Regional pipelines, communities and hog barns

Luck Lake Irrigation District

- Existing Development of 9,045 acres
- Pressurized pipeline delivery systems
- Expansion requires phased addition of pipelines and pumps
- Infill and expansion potential of 9,668 acres
- Total infrastructure costs of \$19,470,000

Luck Lake Irrigation District



LEGEND

- EXPANSION REGION
- EXISTING PIVOT
- NEW PIVOT
- EXISTING MAINLINE
- EXISTING DRAINAGE DITCH

REFERENCE

BASEMAP PROVIDED BY SASKWATER, 1998.

PROJECT				LUCK LAKE IRRIGATION DISTRICT CANADA-SASKATCHEWAN WATER SUPPLY EXPANSION PROGRAM, BIRSAY, SK			
TITLE				LAYOUT SCENARIO 2, ALTERNATIVE 4 INFRASTRUCTURE REQUIREMENTS			
 Golder Associates Calgary, Alberta		PROJECT 05-1328-020.1000		FILE No.			
		DESIGN	CY	10/11/05	SCALE	AS SHOWN	REV. 1
		CADD	DW	12/11/05			
		CHECK	DB	27/04/06			
		REVIEW	LS	27/04/06			

FIGURE: 19

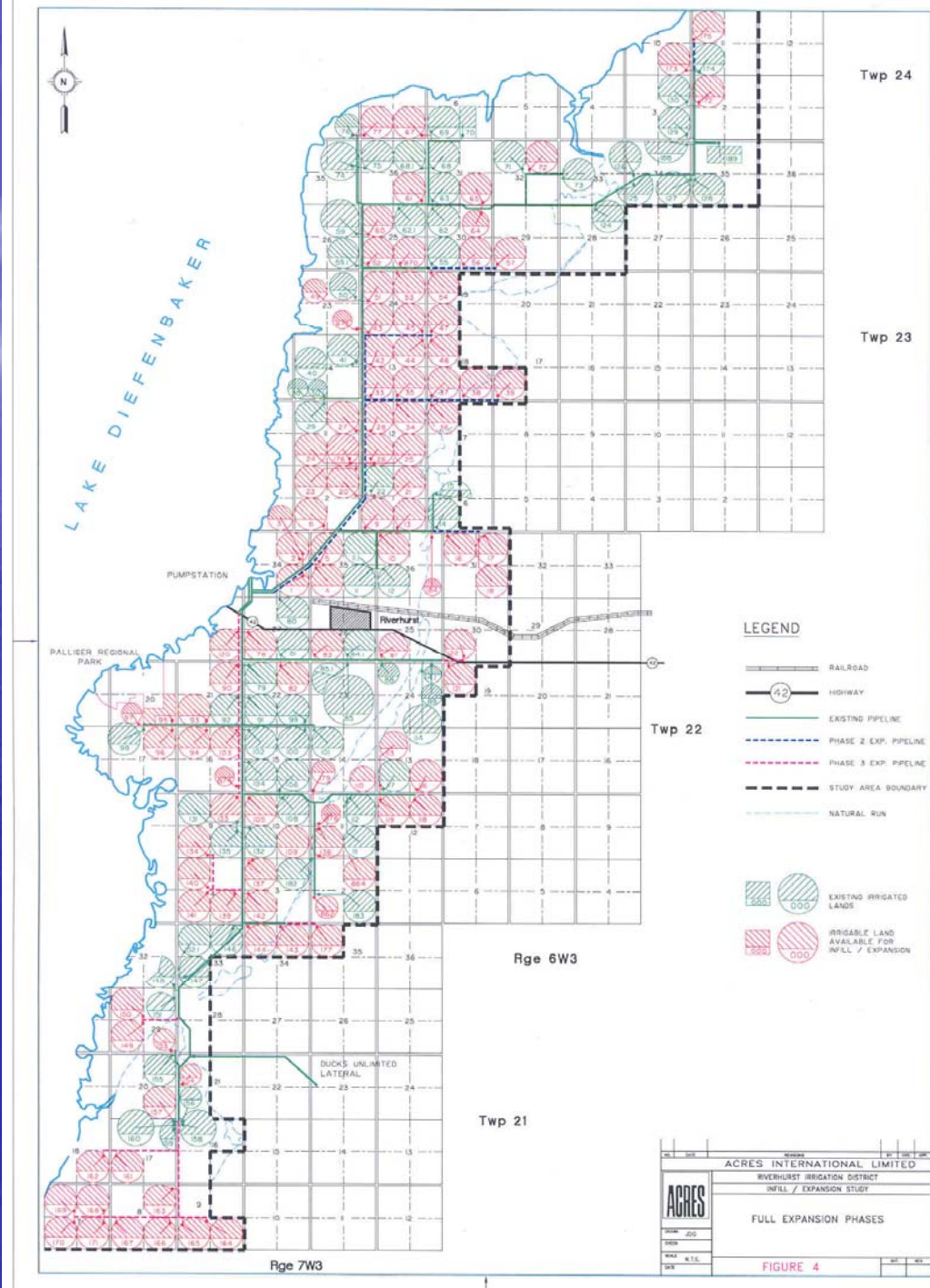
Riverhurst Irrigation Project

- Construction costs of \$52 million
- Pressurized pipeline delivery system
- Project completed in 1991
- Water delivered to 10,100 acres in 2007
- Built by Sask Water now owned and operated by Saskatchewan Agriculture
- Provides water to Ducks Unlimited's Thunder Creek Heritage Marsh, Regional Park, marina, Village of Riverhurst, golf course

Riverhurst Irrigation District

- Existing Development of 10,230 acres
- Pressurized pipeline delivery systems
- Expansion requires phased addition of pipelines and pumps
- Infill and expansion potential of 10,880 acres
- Total infrastructure costs of \$22,170,000

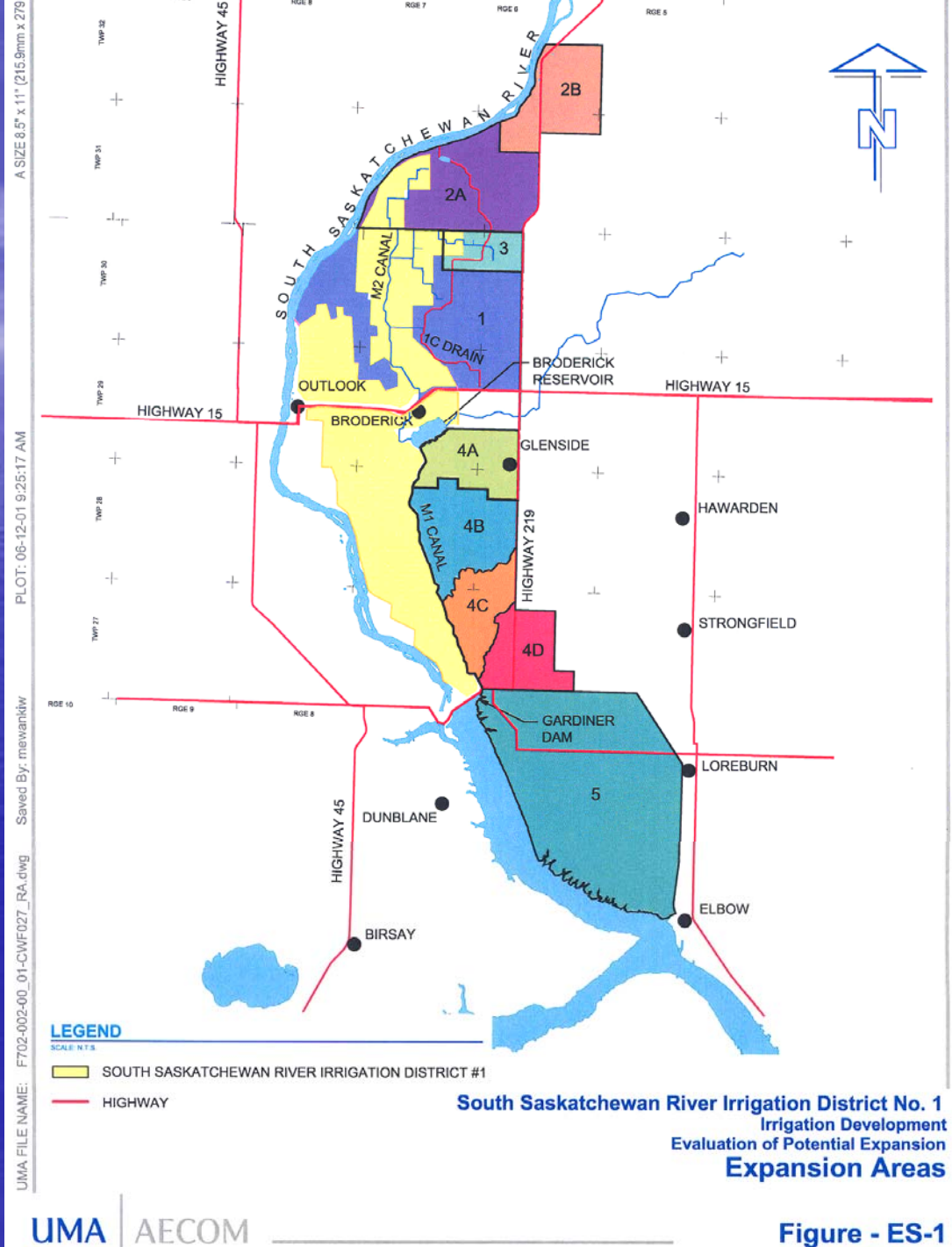
Riverhurst Irrigation District



South Sask. River Irrigation District

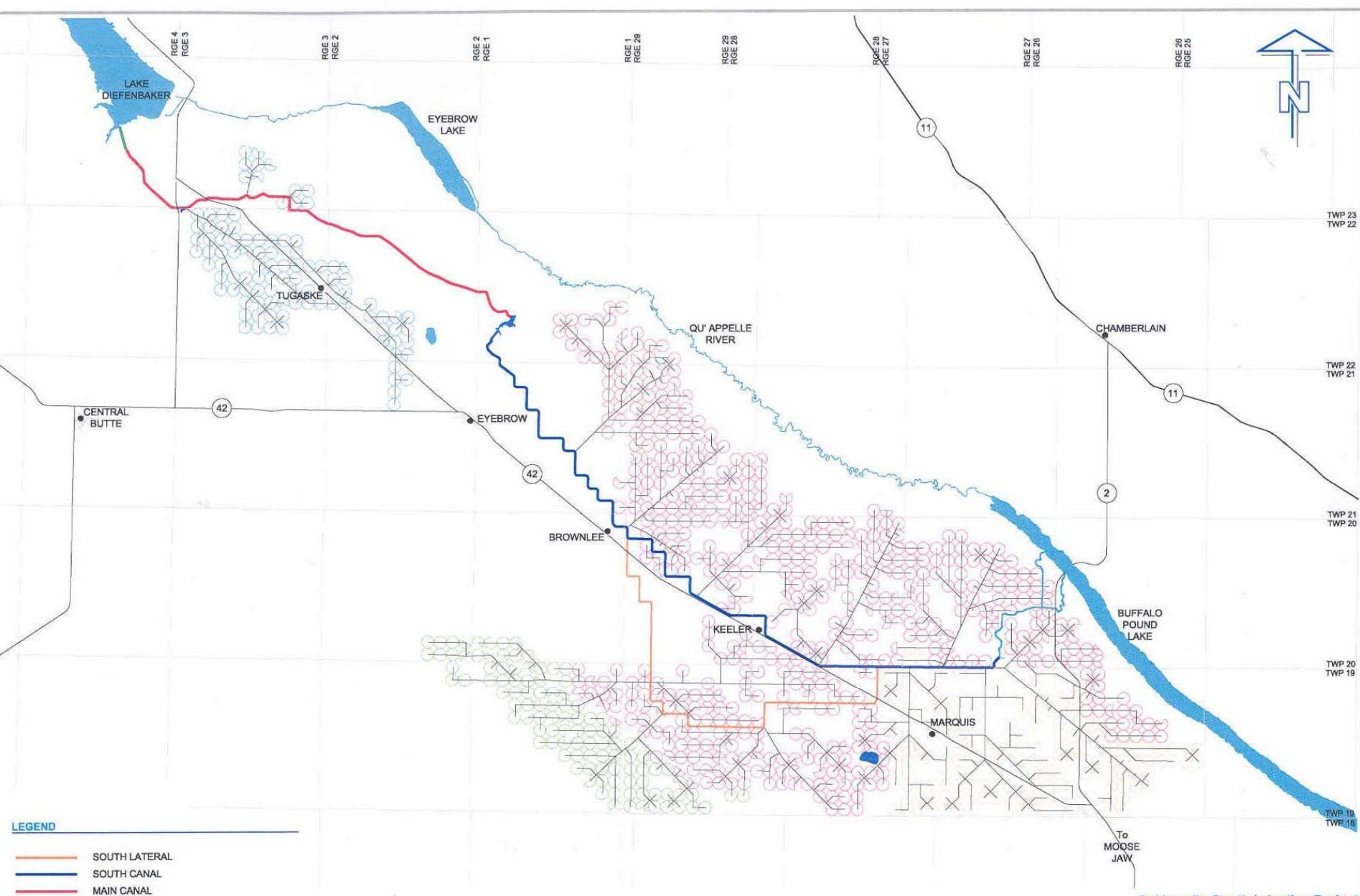
- Existing Development of 35,475 acres including 4,192 acres of flood
- Gravity canal and pipeline delivery systems
- Expansion requires phased addition of pipelines and pumps
- Infill and expansion potential of 28,350 acres
- Total infrastructure costs of \$58,259,000

South Saskatchewan River Irrigation District



Qu'Appelle South Irrigation Project

- Total Development of 110,570 acres
- Combination of open canal and reservoirs supplying modules of pressurized pipeline delivery systems
- Potential to supply Buffalo Pound Lake with high quality water for Regina & Moose Jaw plus recreational lakes downstream
- Total infrastructure costs of \$558,000,000
- Total on-farm investment of \$100,300,000

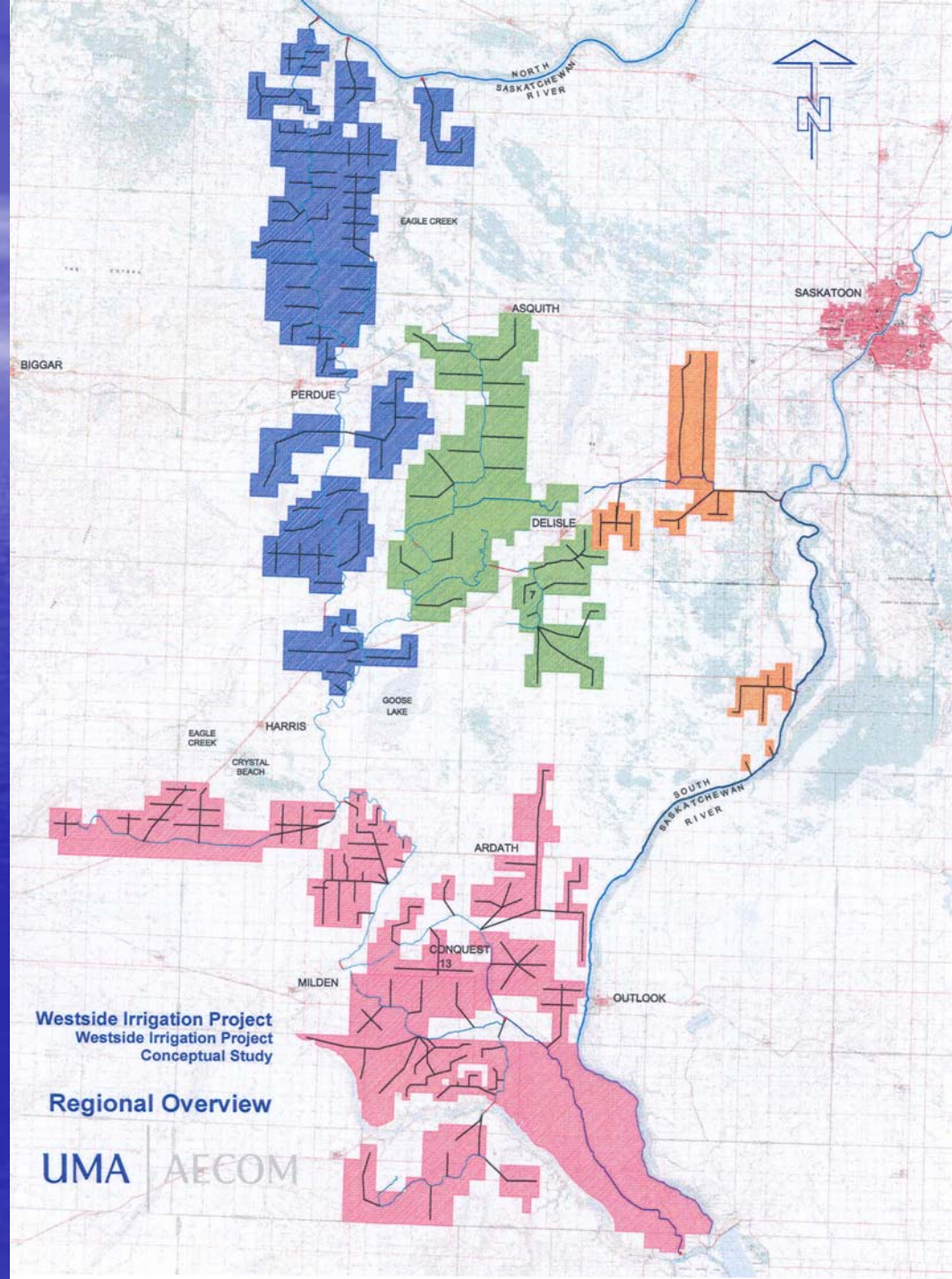


Qu'Appelle South Irrigation Project
Irrigation Development
Conceptual Study
Option 2A
110,500 Acres
Figure 6.6

Westside Irrigation Project

- Total Development of 375,000 acres
 - Lake Diefenbaker = 331,742 acres
 - South Sask River = 25,529 acres
 - North Sask River = 17,670 acres
- Combination of open canal and reservoirs supplying modules of pressurized pipeline delivery systems in 5,000 to 10,000 ac. blocks
- Total infrastructure costs of \$2 Billion
- Total on-farm investment of \$420 Million

Westside Irrigation Project



Development Summary (CSWSEP)

Irrigation Expansion Potential ('000 acres)

District / Region Expansion	Existing Total	Infill	Expansion	Total
Luck Lake I.D.	9	4	5	18
Riverhurst I.D.	10	4	7	21
S. Sask River I.D.	35	10	18	63
Qu'Appelle South	nil	n/a	110	110
Westside	nil	n/a	375	375
Total	54	18	516	587

Cost Summary (CSWSEP)

Irrigation Expansion Costs

District / Region Expansion	Expansion Area ('000 acres)	Infrastructure Cost (million \$)	Average cost /acre
Luck Lake I.D.	10	26	2,700
Riverhurst I.D.	11	37	3,455
S. Sask River I.D.	28	58	2,055
Qu'Appelle South	110	558	5,046
Westside	375	1,967	5,300
Total	534	2,645	4,955

IRRIGATION INVESTMENT OPPORTUNITY

CANADIAN PRAIRIES

LAKE DIEFENBAKER, SASKATCHEWAN

- 500,000 irrigable acres to develop
- high quality water available
- irrigable land under \$500/acre
- 2,200 CHU 9 years out of 10; 115 frost-free days
- potatoes, beans, corn, alfalfa & many more crops

CONTACT:
Saskatchewan Agriculture
Irrigation Branch
(306) 867-5500

www.irrigationsaskatchewan.com

