

IRRIGATION INVESTMENT OPPORTUNITY CANADIAN PRAIRIES LAKE DIEFENBAKER, SASKATCHEWAN

- 500,000 irrigable acres to develop
- high quality water available
- irrigable land under \$500/acre
- 2200 CHU 9 years out of 10; 115 frost-free days
- potatoes, beans, corn, alfalfa & many more crops

CONTACT:

Saskatchewan Agriculture

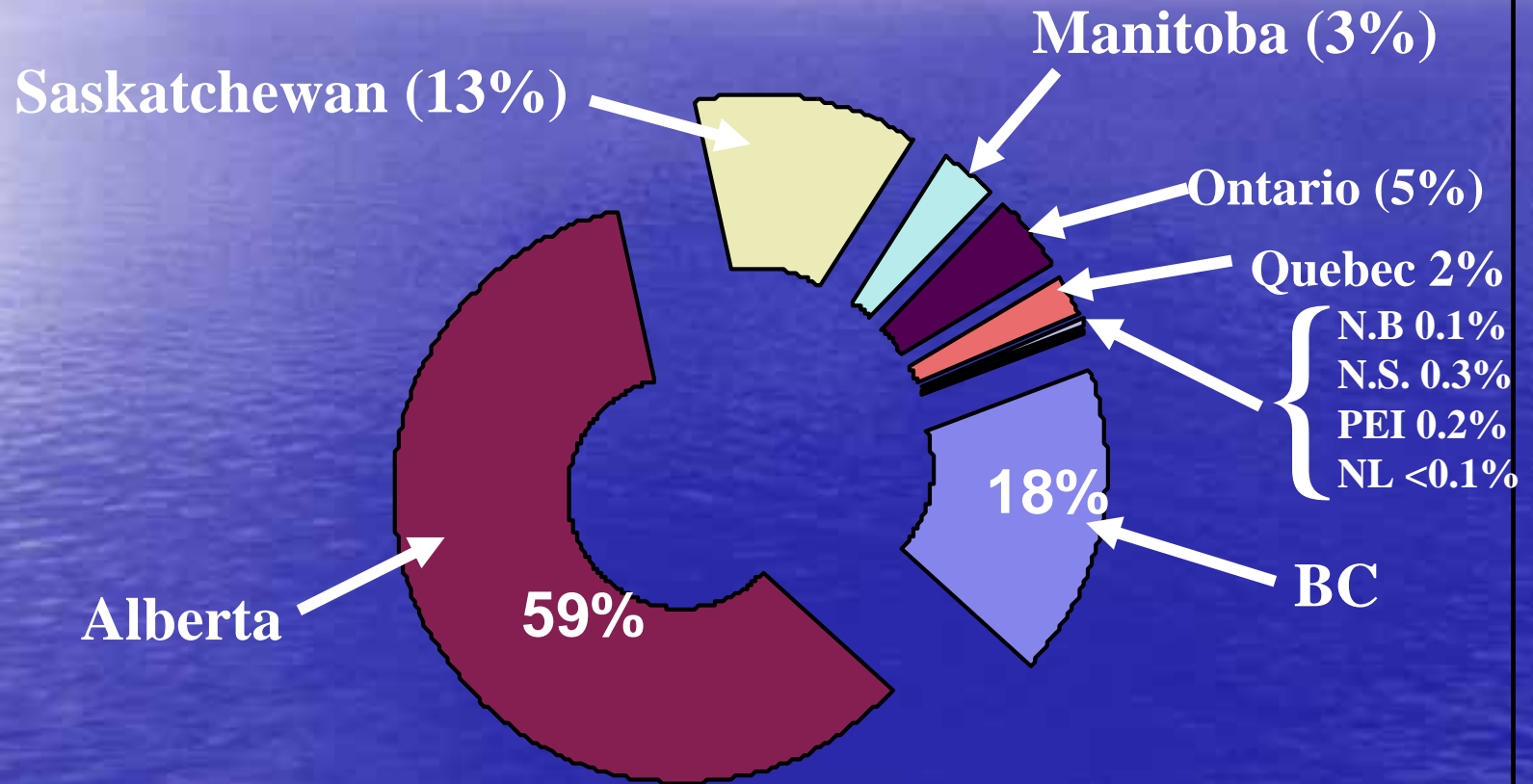
Irrigation Branch

(306) 867-5500

www.irrigationsaskatchewan.com



Irrigated Area in Canada



Agriculture and
Agri-Food Canada

Agriculture et
Agroalimentaire Canada

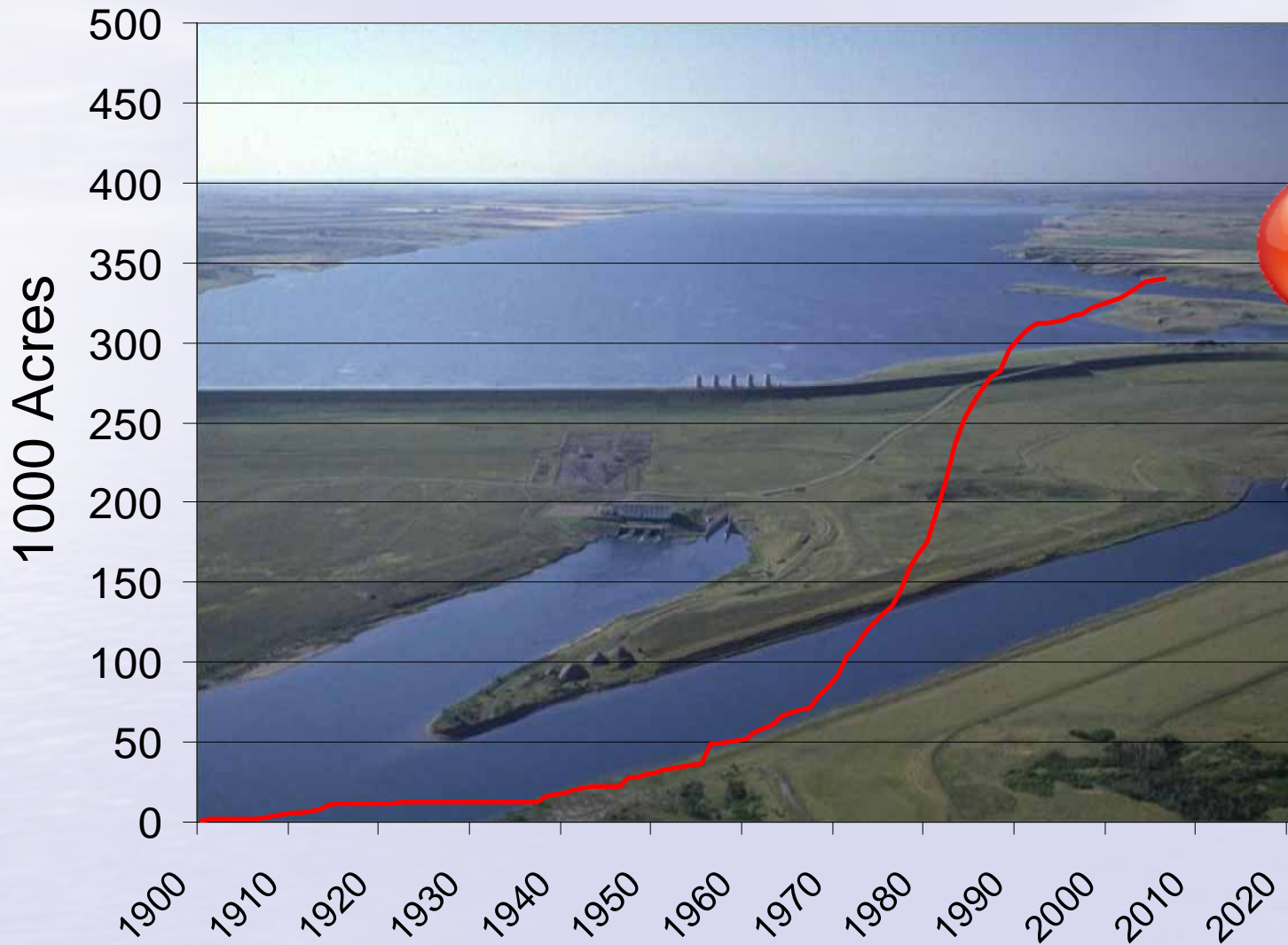
Prairie Farm Rehabilitation
Administration

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%

Cumulative Irrigation Development




**Construction of
Gardiner Dam 1968**

**1971 - 1990 Annual
Development 10,000 acres**

**1991 - 2006 Annual
Development 2300 acres**

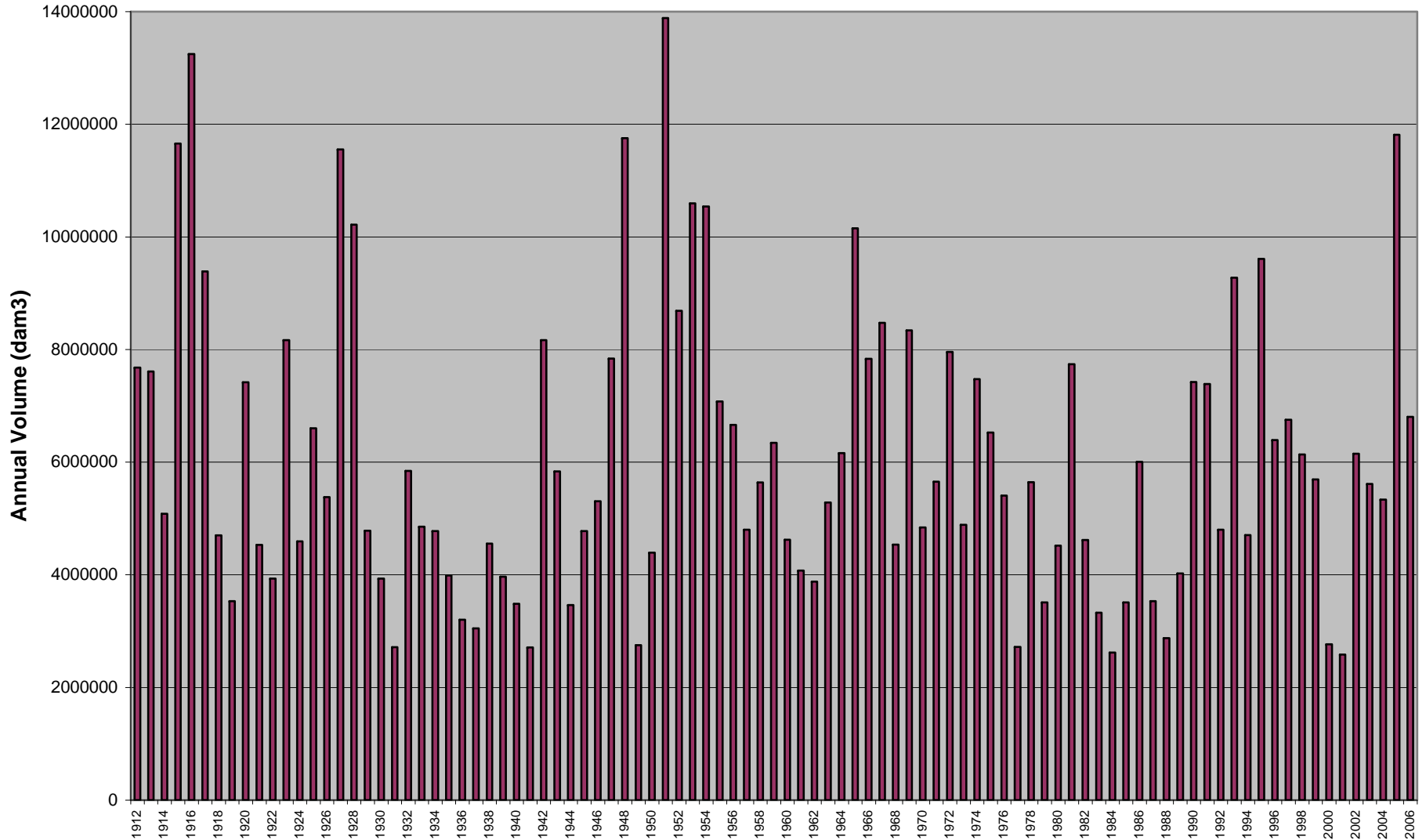


Lake Diefenbaker Gardiner Dam

- 
- 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:

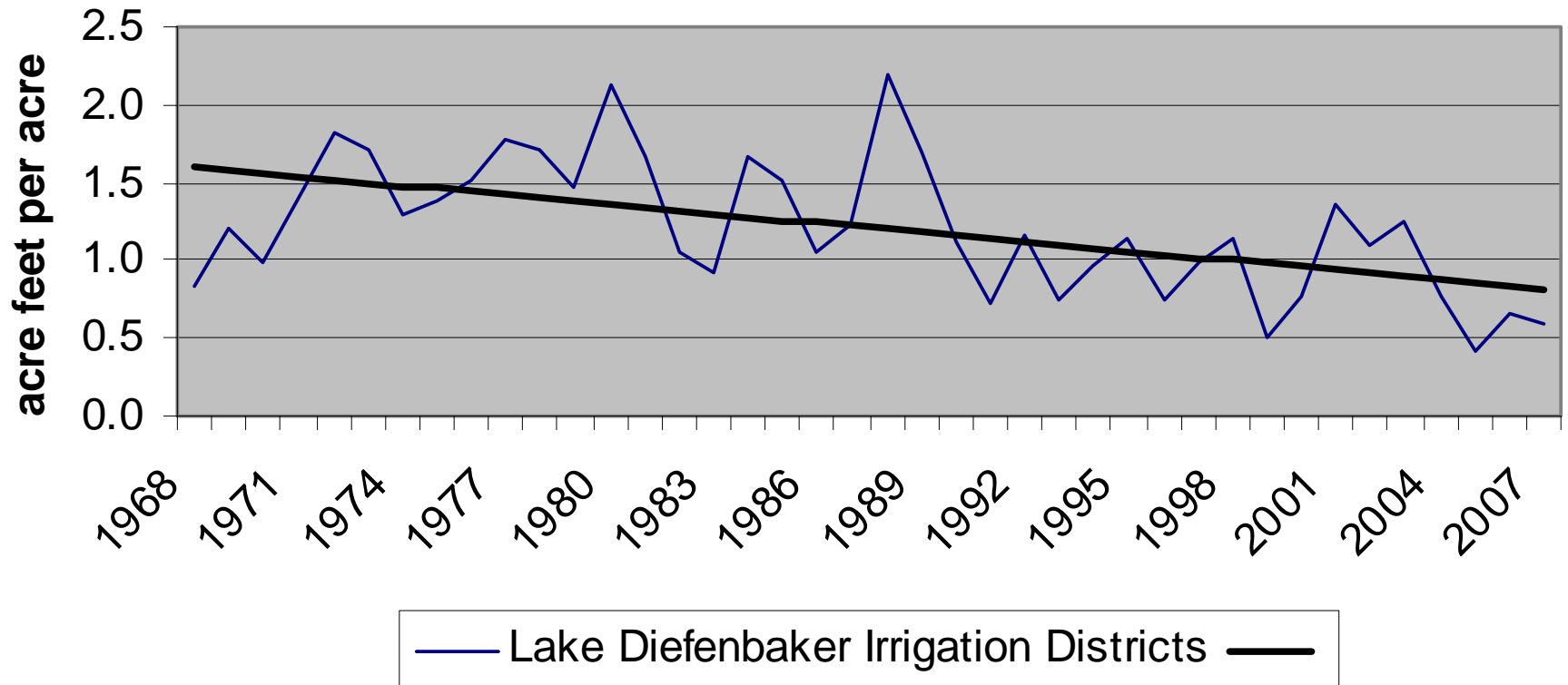
Surface area	43,000 ha (106,000 acres)
Useable storage	4,300,000 dam ³ (3,500,000 ac. ft.)
Average inflow	5,800,000 dam ³ (4,700,000 ac. ft.)
South Sask. River releases	50 m ³ /sec (1,280,000 ac. ft.)
Qu'Appelle River releases	270,000 dam ³ /year
Average evaporation losses	270,000 dam ³ /year (219,000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

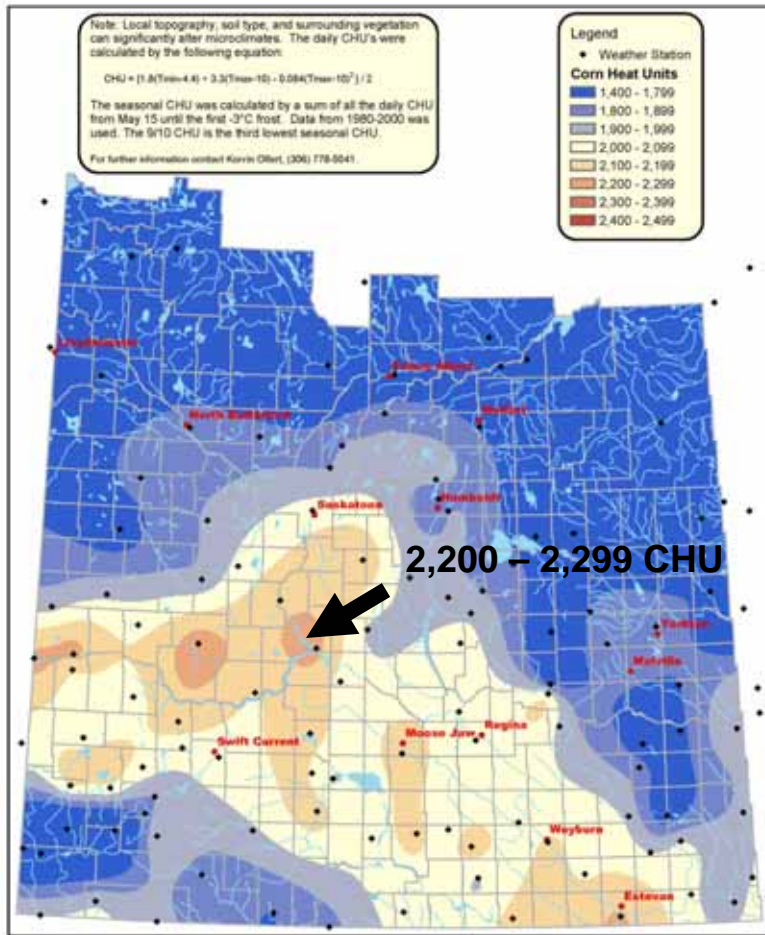




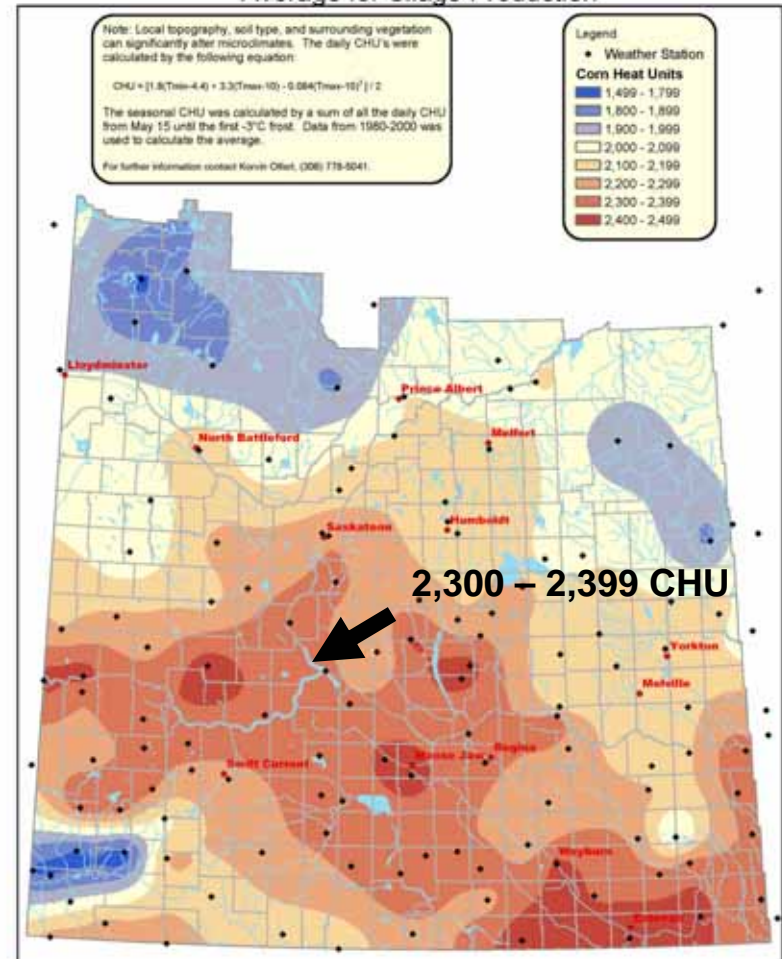
Low pressure centre pivots

Climate for Cropping

Saskatchewan Accumulated Corn Heat Units
90% Confidence for Grain Production



Saskatchewan Accumulated Corn Heat Units
Average for Silage Production



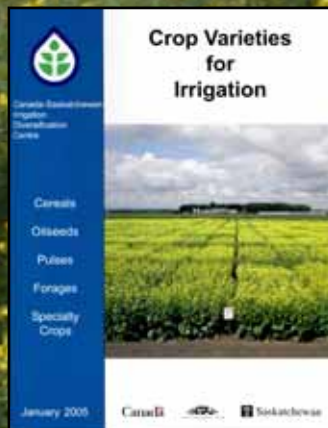
Crop Rotation: Forages 23%



Crop Rotation: Cereals 32%



Crop Rotation Oilseeds 25%



Crop Rotation: Pulses 11%



Crop Rotation: Vegetables 8%

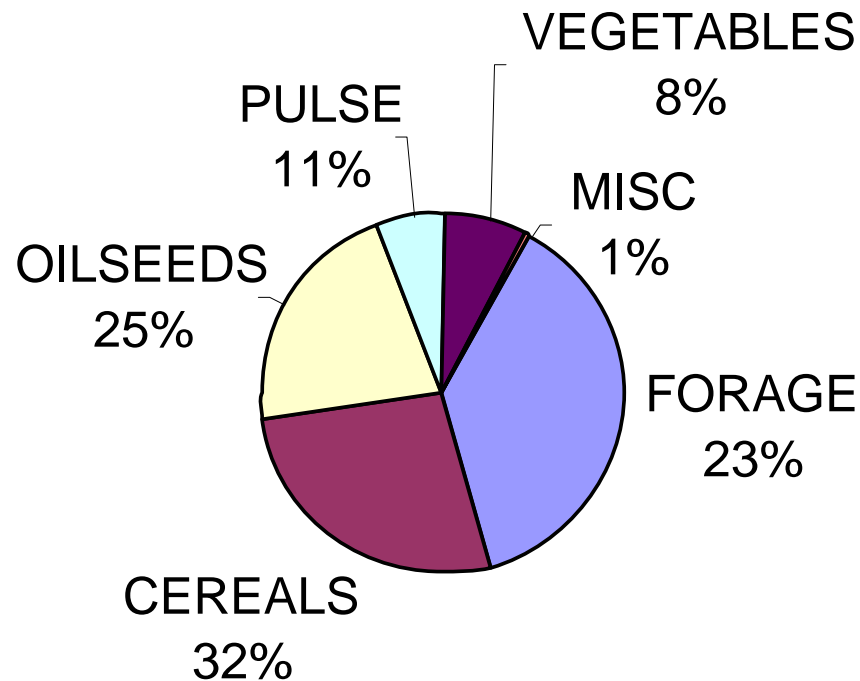


Crop Rotation: Misc. 1%



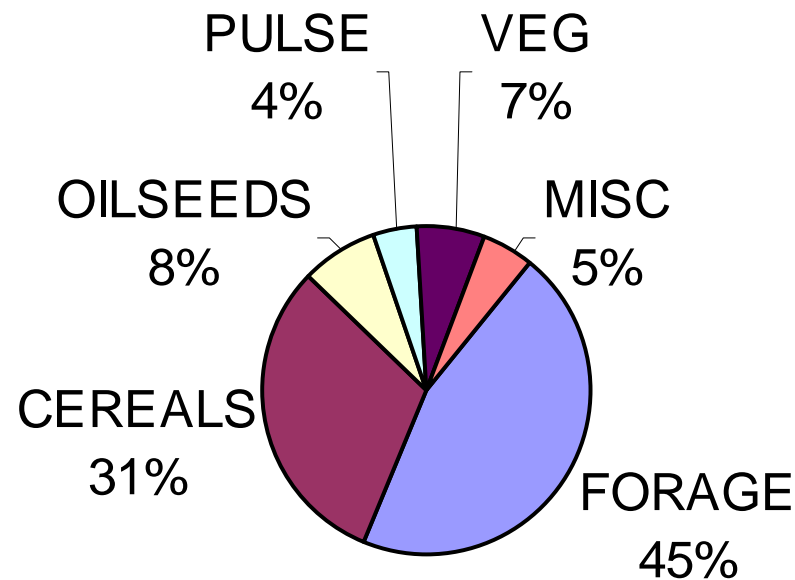
Irrigated Crop Rotation

LAKE DIEFENBAKER IRRIGATION 2007



Irrigated Crop Rotation

ALBERTA IRRIGATION DISTRICTS 2007



Irrigated Crop Budgets



ECONOMICS

ESTABLISHED PASTURE

UNIT	\$/ac	\$/ac
lb	\$45.10	
lb	\$8.22	
lb	\$3.18	
lb	\$1.90	
	\$1.00	
	\$0.08	
inches	\$14.77	
	\$10.58	
target	\$22.42	
	\$8.30	
\$/ha	\$0.00	
\$/ha	\$0.00	
\$/ha	\$0.00	
\$/ha	\$7.80	
\$/ha	\$7.50	
\$/ha	\$5.00	
lb	\$3.90	
\$/ha	\$138.44	
kg	\$43.71	
	\$7.18	
kg (total)	\$27.88	
	\$18.88	
TS	\$100.74	
(\$/ha)	\$248.18	
	2.5	
(1/ha)	113	
Cash Cost \$/day	\$0.48	
Total Cost \$/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	\$2.90	
Water Supply	\$5.09	
0	\$0.00	
0	\$0.00	
TOTAL	\$7.08	

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

MORE INFORMATION:
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AGRONOMICS

CATTLE ASSUMPTIONS:

Stocking Rate	2.5	head
Days Grazing	118	days
Weight to Pasture	800	head
ADG	2.0 to 2.5	head
Weight off Pasture	850	head

This budget includes weeding year costs (0-24) spread over 7 years of production. Pastures frequently need to be renovated or rotated out after 7 years in production.

LIVESTOCK	STOCKING RATE
Sheep	2 to 2.5/ha
Cow-calf (1400 lb cow)	1.0/ha
Cow-calf (1100 lb cow)	1.5/ha
Exempt	6-8/ha

Examples 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 supplemented with cycling of nutrients through manure and urine. Fertilizer inputs are based on soil test results and crop response.

IRRIGATION

Preseason 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 terminate in 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 pipe or other sprinkler irrigation system.

ECONOMICS

CROP: SEED POTATO

ITEM	#	UNIT	\$/ac	My Farm	\$/ac
Land			\$211.00		
Seed Infructescence			\$7.20		
Fertilizer - N	150	lb	\$85.50		
P	30	lb	\$14.85		
K	120	lb	\$51.60		
Herbicide			\$107.68		
Insecticide			\$22.00		
Fungicide			\$100.10		
Equipment fuel			\$100.00		
Equipment repair			\$80.00		
Custom work			\$56.00		
Irrigation power *			\$0.00		
Irrigation repair *			\$0.00		
Irrigation labor/water charge **			\$0.00		
Oil, insurance	14	time	\$24.28		
Mail insurance			\$0.00		
Harvest labor	30	hr/ac	\$300.00		
Other			\$12.00		
Storage O & M			\$71.00		
Warm overhead			\$3.20		
Preseason irrigation			\$1.00		
Specialized Equipment			\$511.00		
Land Rental Rate			\$235.00		
TOTAL NON CASH COSTS			\$559.16		
TOTAL COSTS			\$7,474.85		
RETURNING	LD	AV	HI		
YIELD (total)	50	12	14		
PRICE \$/ton			\$37.6		
GROSS	\$3,200	\$3,200	\$4,208		
RETURN TO					
LABOUR & MGT	\$678	\$1,178	\$1,778		
SPECIALIZED EQUIPMENT			\$511.00		
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		
0			\$0.00		
TOTAL			\$311.00		

* 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 Size 1 or Size 2.

SEEDING

Plant Population	21760	plants/acre
Weight of Seed Piece	80	grams
Seeding Date	1	May/June

FERTILIZATION

Soil test and basal test to ensure adequate fertility for yield & quality of this high value crop. Fertilization with 28-0-0 is after the method of fertilizing during the season.

IRRIGATION

Apply average 2000 water use per week in inches. June 15, 1.00; 1.25; 1.50; July 1.50, 1.80, 1.80, 1.50; Aug 1.50, 1.25, 1.00. Maintain soil above 75% available moisture. Use soil probe to check moisture status. Irrigate by soil moisture probe (1-2-3 weeks) or soil moisture sensor (1-2-3 weeks) or soil moisture sensor (1-2-3 weeks). Increase labor cost. Irrigate (Increase labor 4 weeks) irrigate for increase tuber growth, & to increase tuber rotation. Irrigate (3 weeks) irrigate to increase labor cost.



Irrigated Crop Budgets 2008

Crop	Gross \$/ac	Rotation %	Contribution \$/ac	Contribution %
VEGETABLE Seed Potato	\$3,600	8%	\$288	38%
PULSE Dry Bean	\$750	11%	\$83	11%
OILSEED Canola	\$600	25%	\$150	20%
CEREAL Durum	\$455	32%	\$146	20%
FORAGE Alfalfa	\$360	23%	\$83	11%
Irrigation Output (\$/ac)			\$750	

Irrigation: \$750 x 100,000 acres = \$75,000,000/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**



Irrigated Land Values

\$/acre for irrigated land (land only, pivot not included)

- Last 18 Month Period (Feb, 2007 – Aug, 2008): \$712
- Last 12 Month Period (Aug, 2007 – Aug, 2008): \$1,077

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.

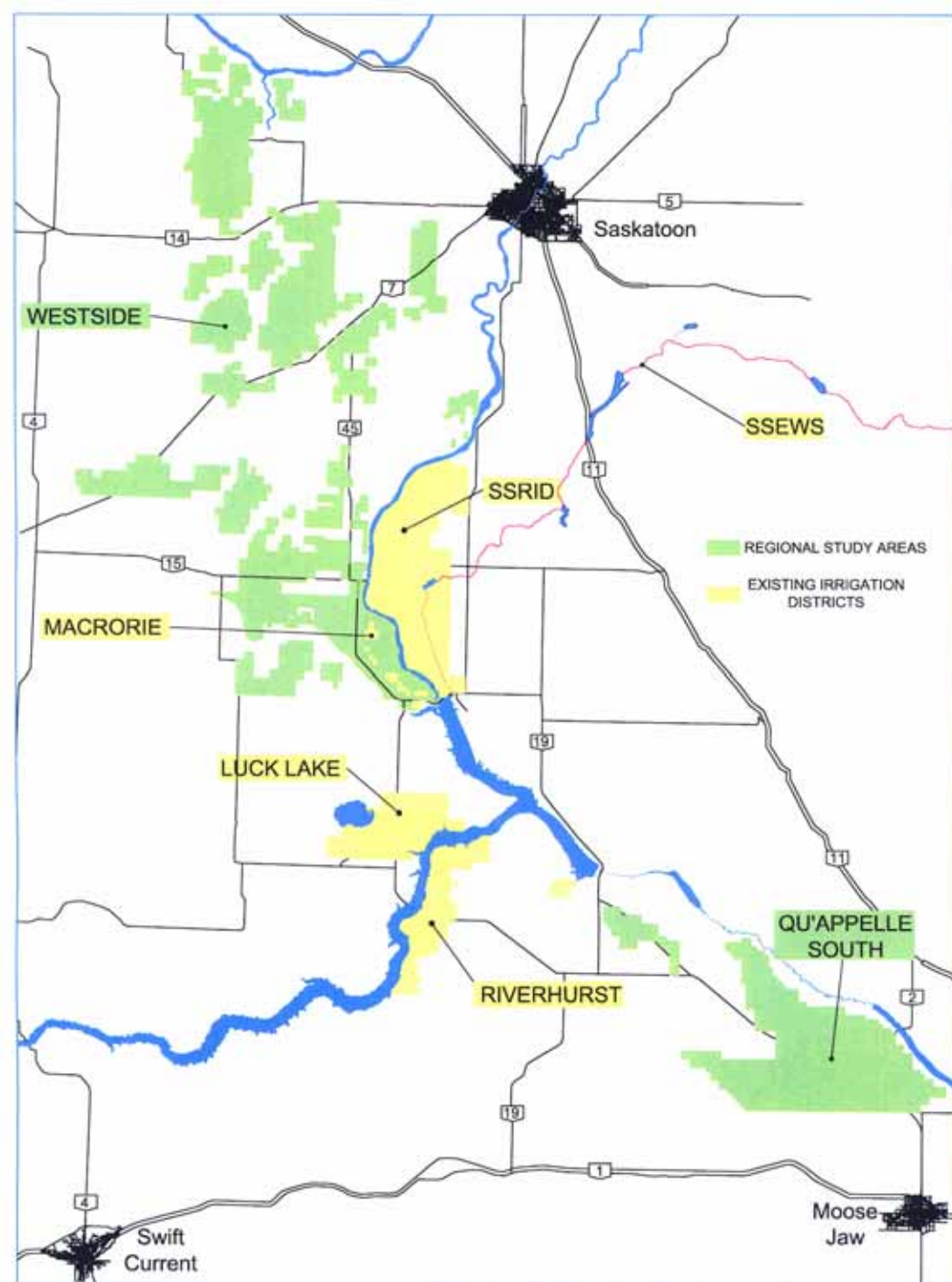
- R&D
- Education

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 72,000 acres of district irrigation.

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



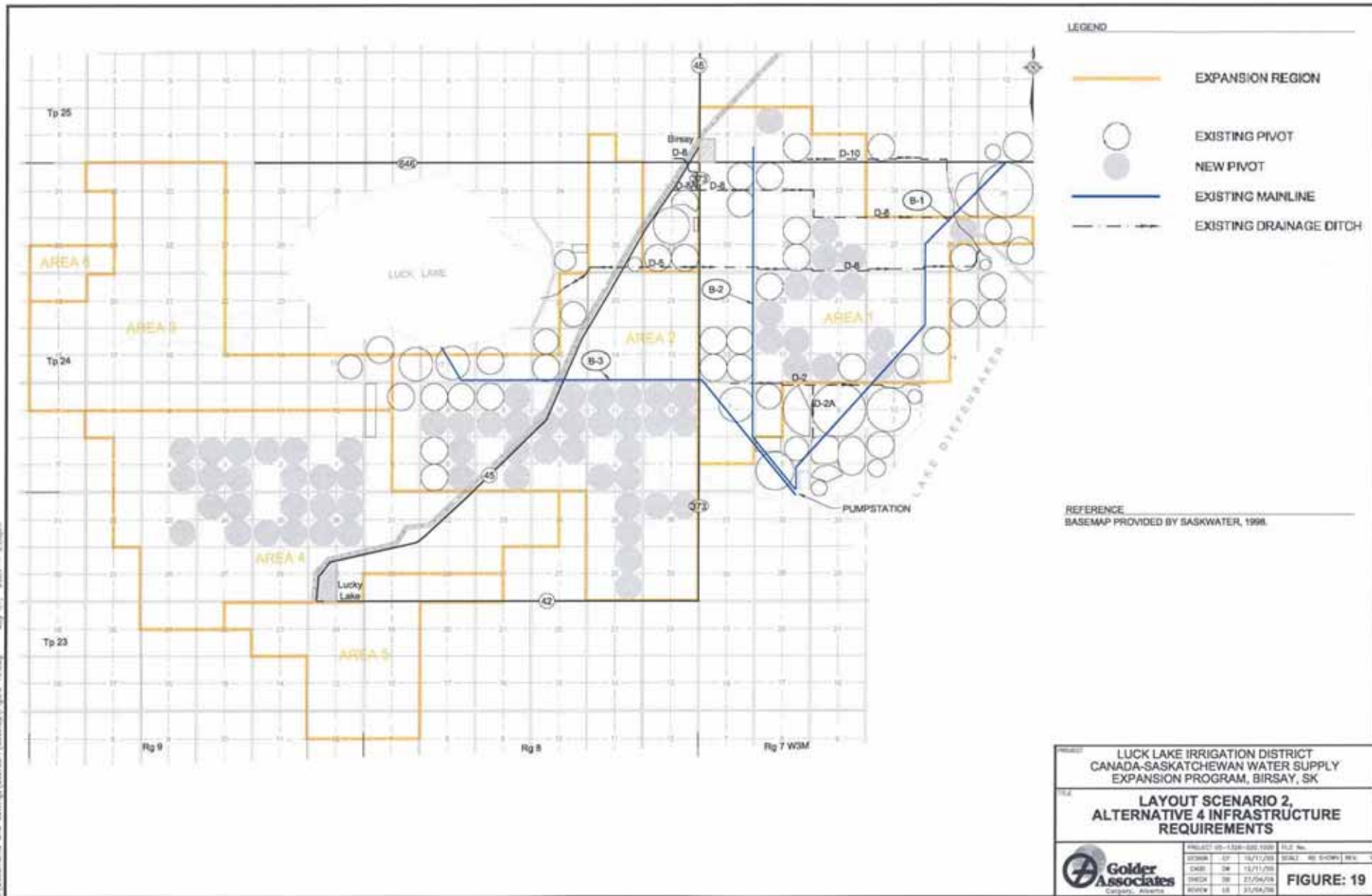
Luck Lake Irrigation Project

- 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



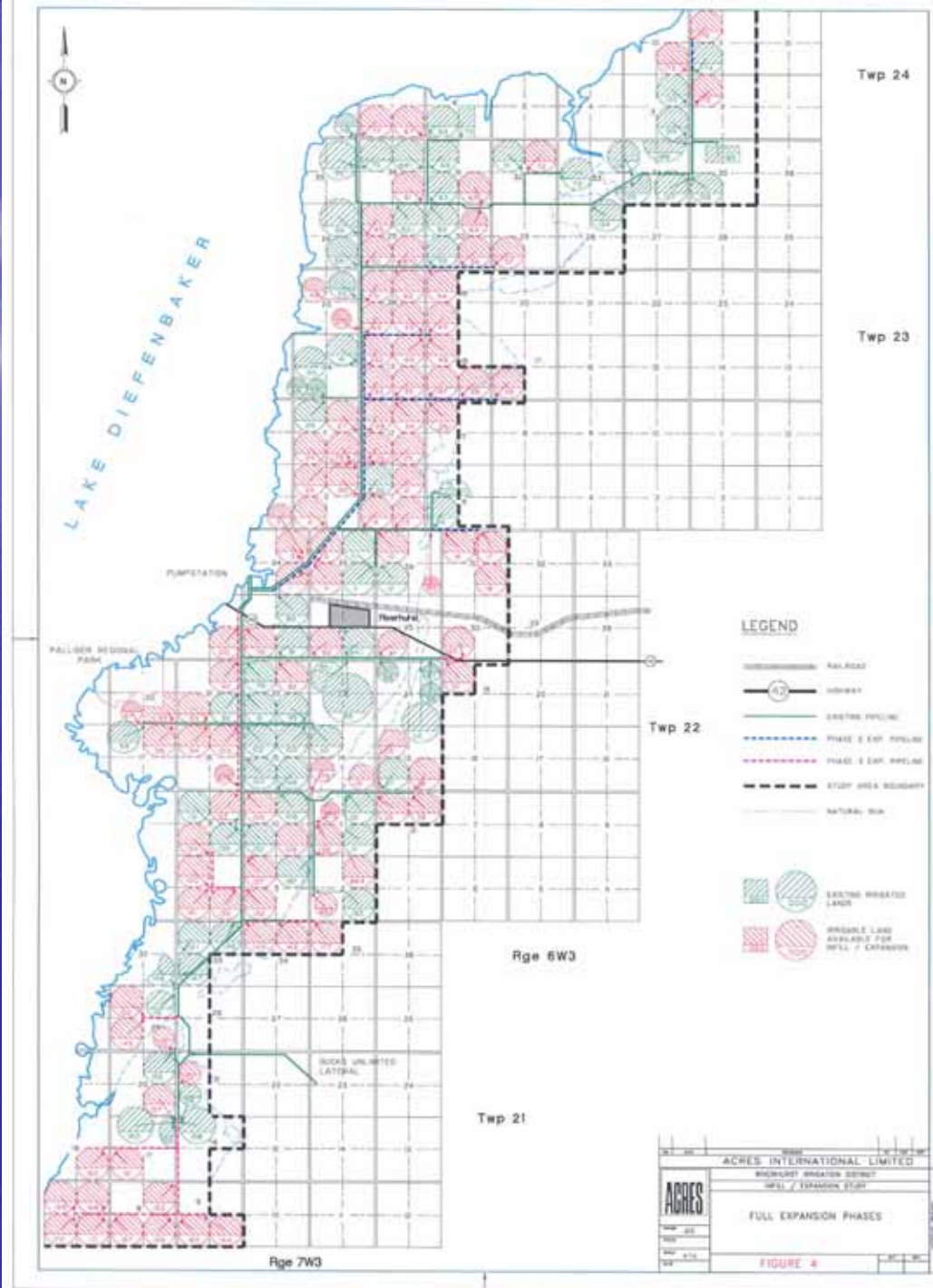
Riverhurst Irrigation Project

- 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

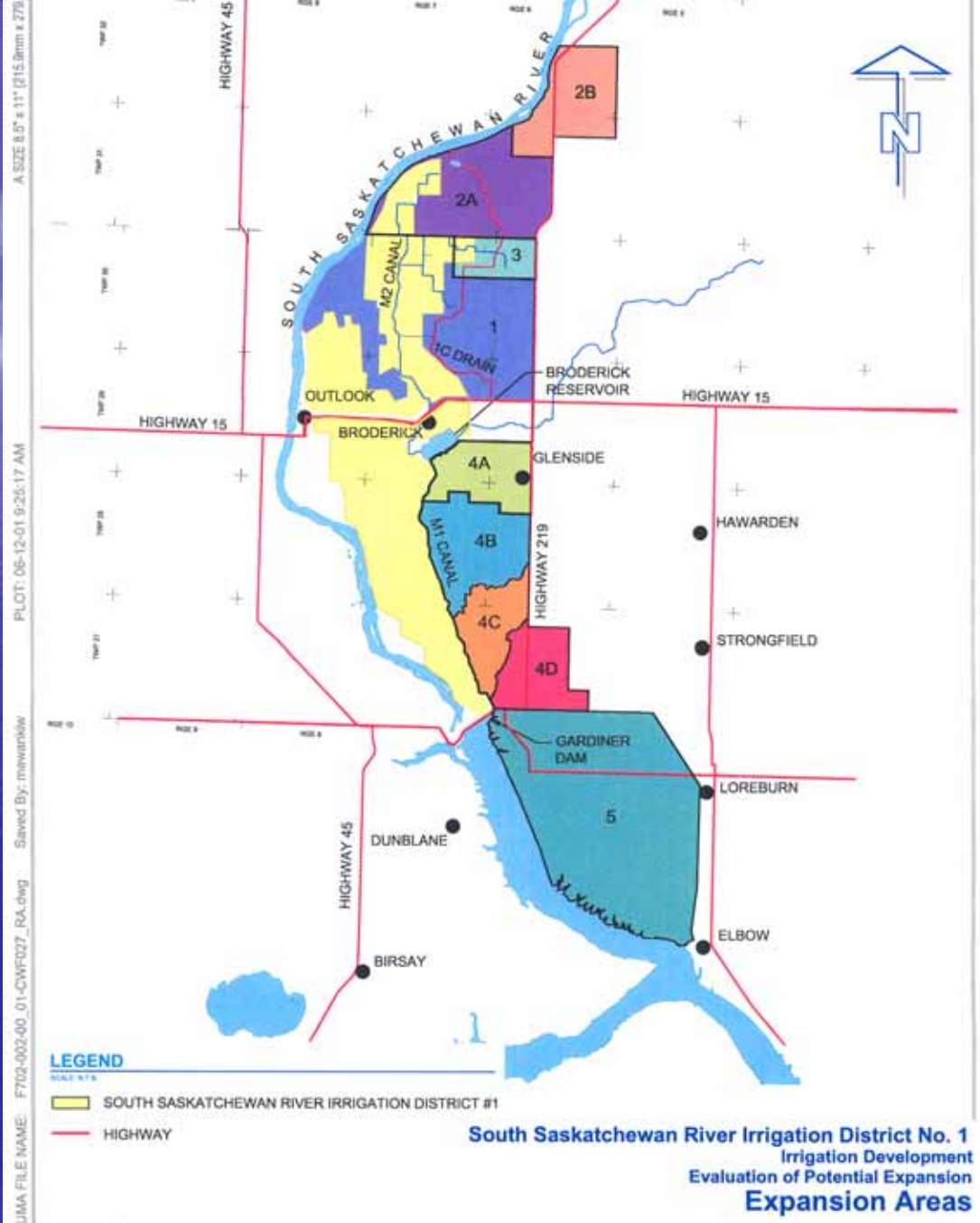
Riverhurst Irrigation District



South Sask. River Irrigation District

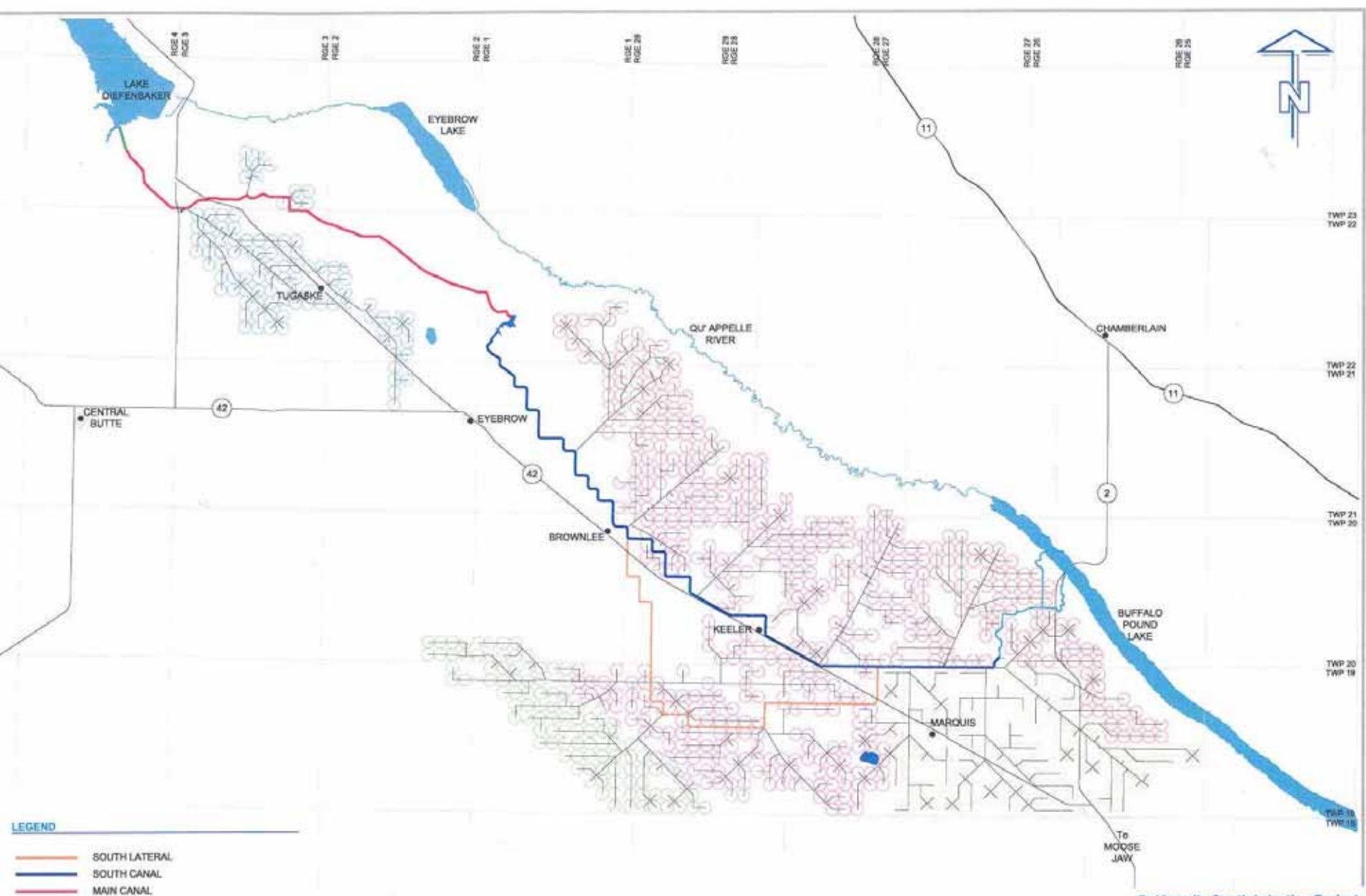
- Existing Development of 35,475 acres including 4,192 acres of flood
- Gravity canal and pipeline delivery systems
- Expansion requires phased addition of pipelines and pumps
- Infill and expansion potential of 28,350 acres
- Total infrastructure costs of \$58,259,000

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

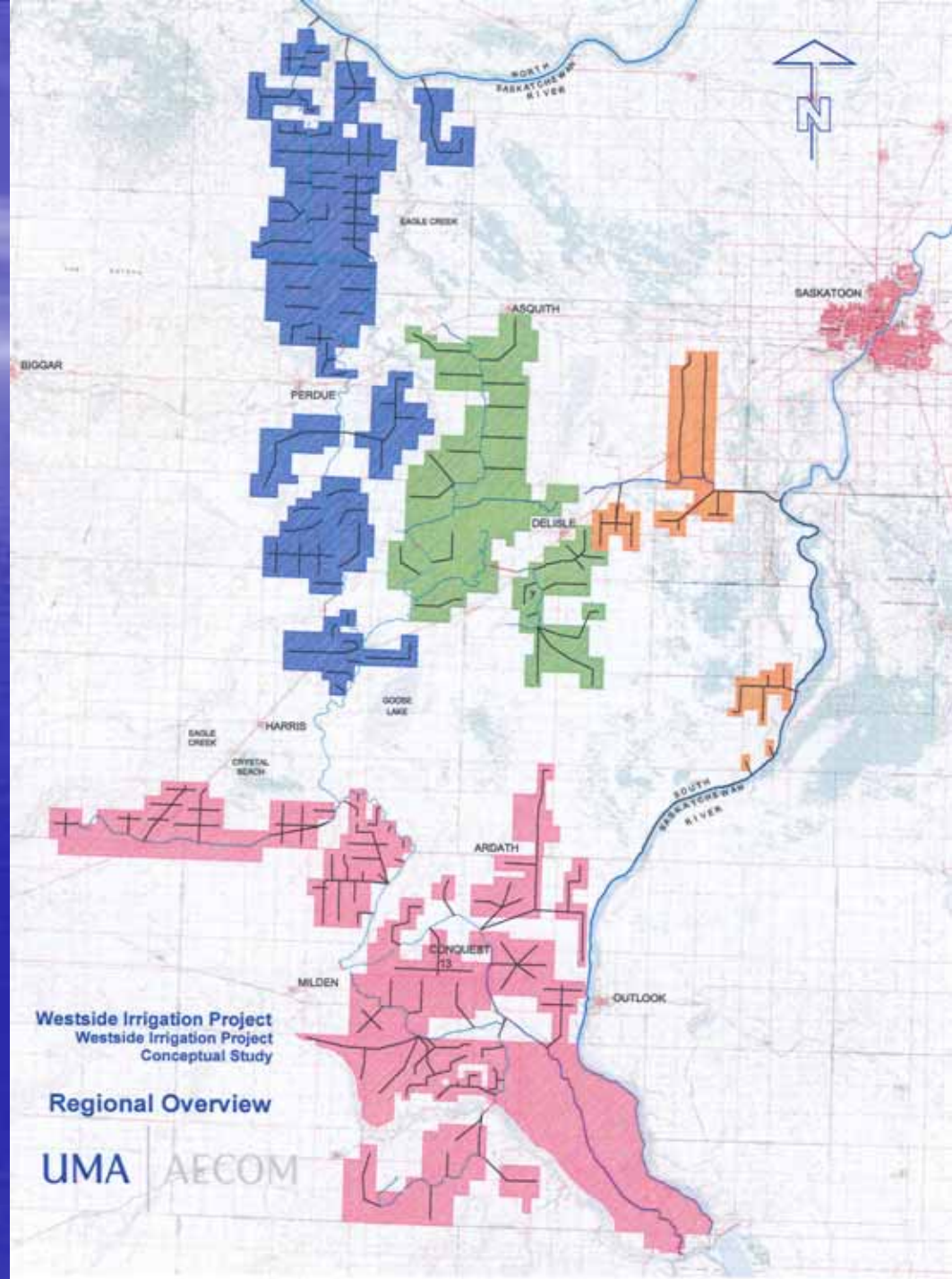


Qu'Appelle South Irrigation Project
 Irrigation Development
 Conceptual Study
Option 2A
 110,500 Acres
 Figure 6.6

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 (1000 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 (1000 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

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