

IRRIGATION INVESTMENT OPPORTUNITY

CANADIAN PRAIRIES

LAKE DIEFENBAKER, SASKATCHEWAN



- 500,000 irrigable acres to develop
- high quality water available
- irrigable land under \$1,500/acre
- 2,200 CHU 9 years out of 10; 115 frost-free days
- potatoes, beans, corn, alfalfa & many more crops

CONTACT:

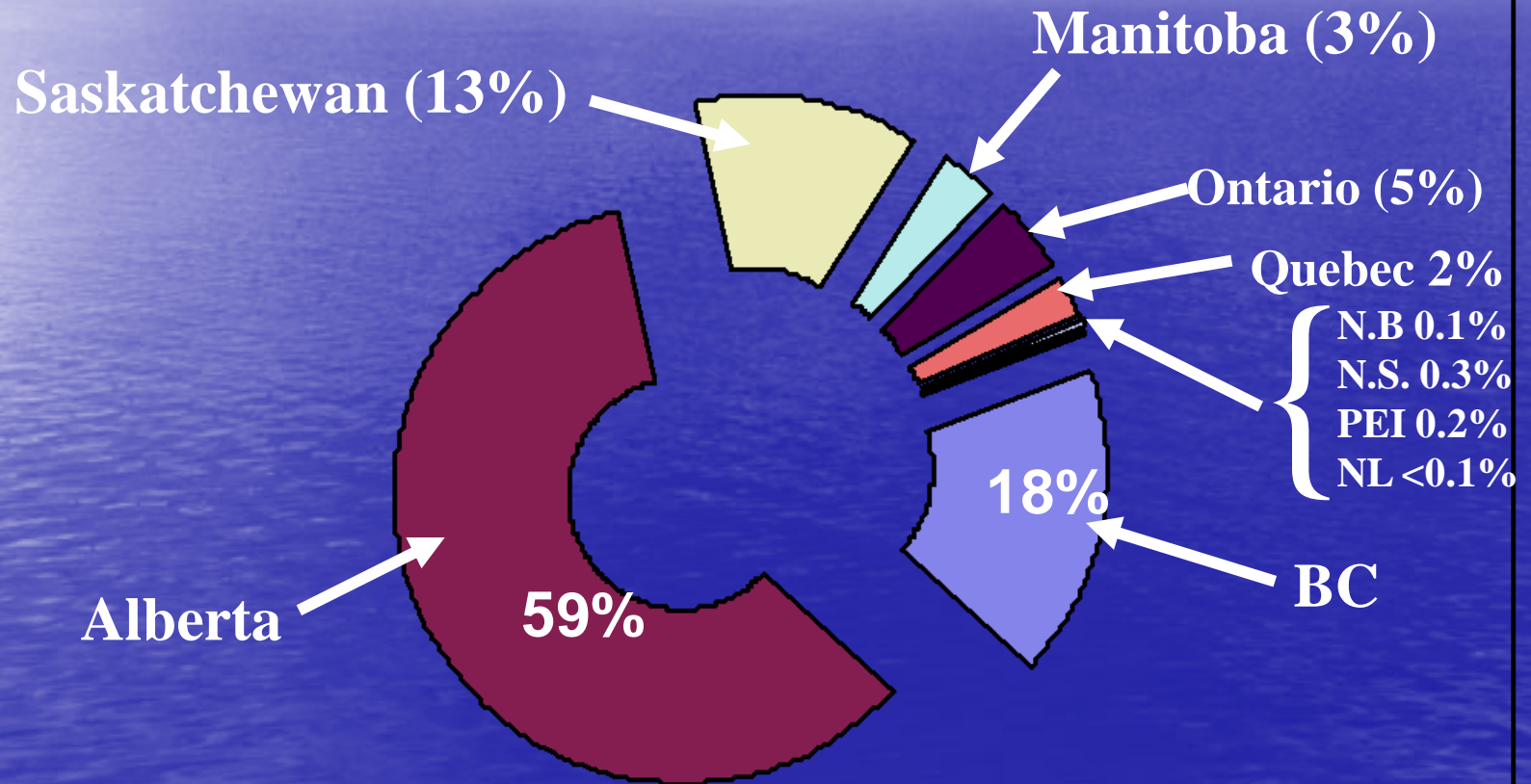
Saskatchewan Ministry of Agriculture

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

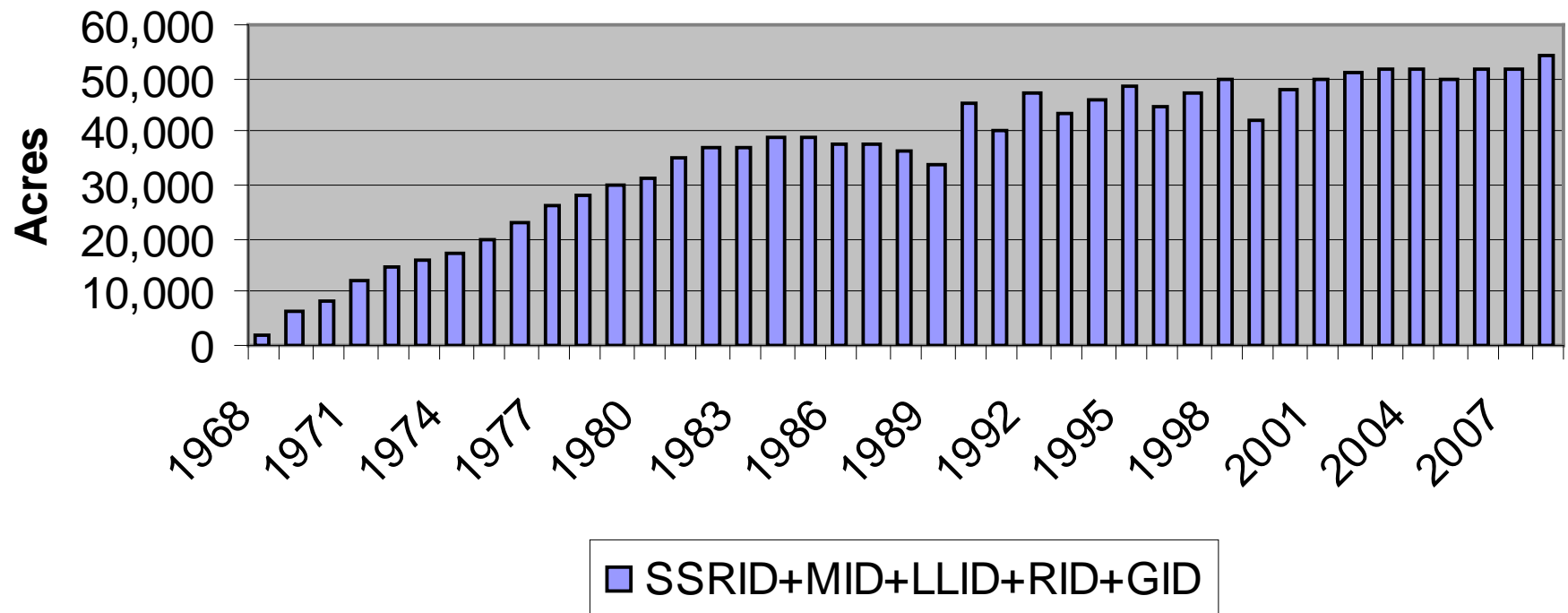
Administration du rétablissement
agricole des Prairies

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**



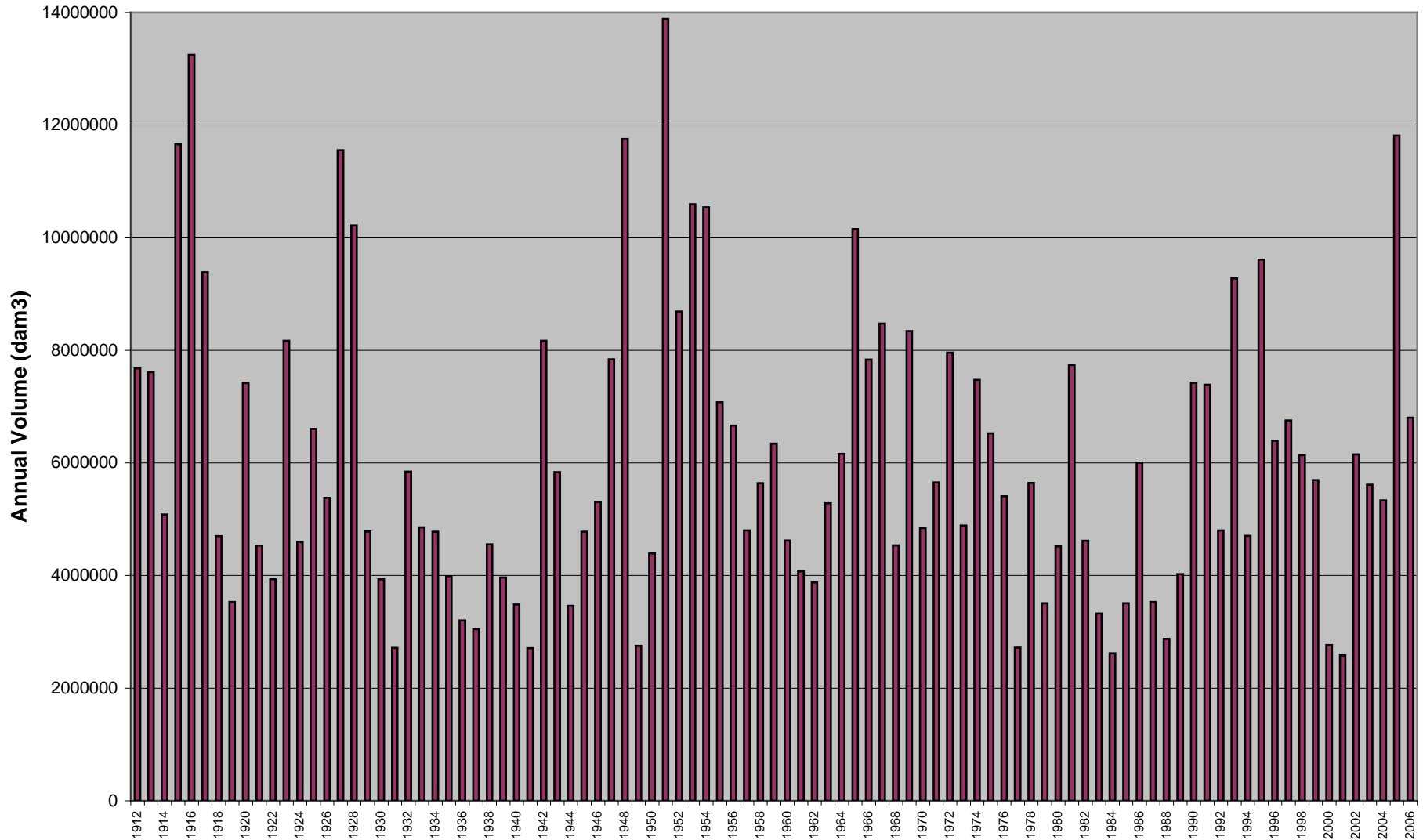


Lake Diefenbaker Gardiner Dam

- 
- An aerial photograph showing the vast expanse of Lake Diefenbaker, a large reservoir in Saskatchewan, Canada. The lake's surface is a deep blue, contrasting with the surrounding green and brown landscape. In the foreground, the Gardiner Dam is visible as a long, low structure with several small buildings and a road. The shoreline is irregular, with various inlets and peninsulas. The sky is a pale blue with some light clouds.
- 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:

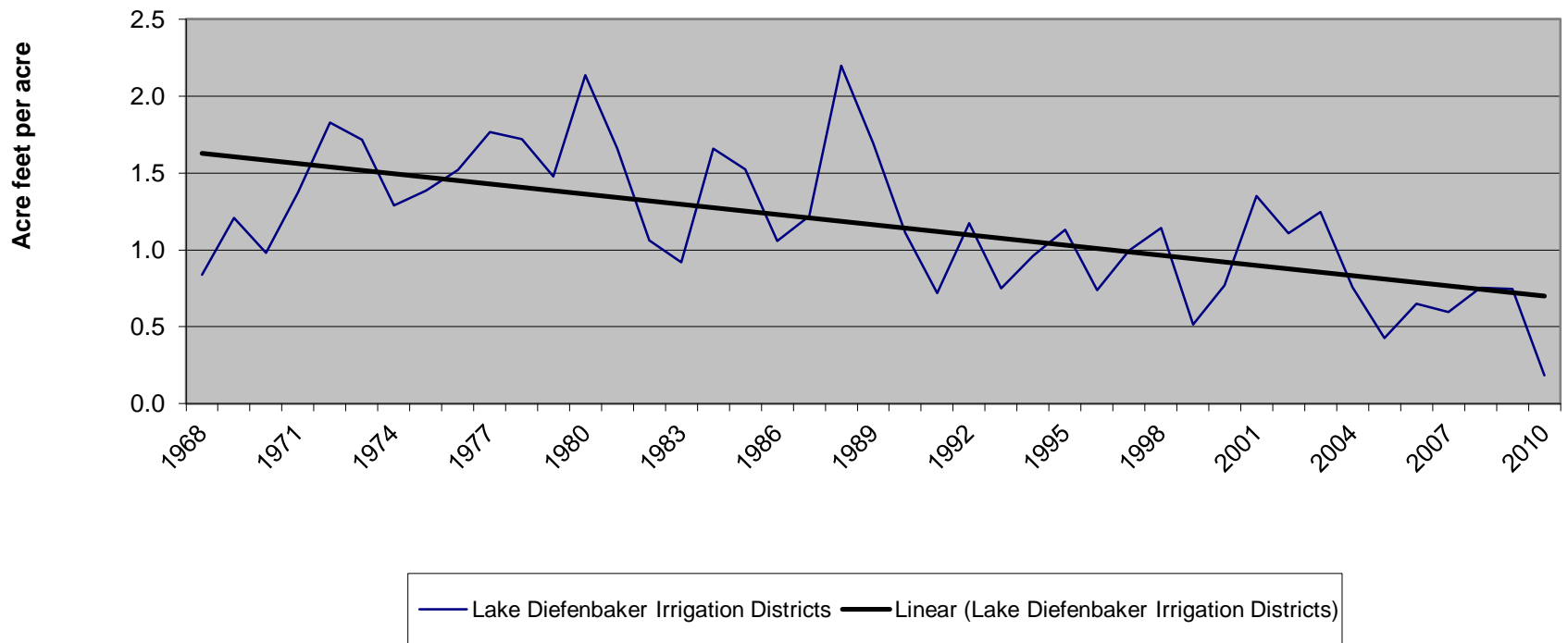
Surface area	43,000 ha (106,000 acres)
Useable storage	4,300,000 dam ³ (3,500,000 ac. ft.)
Average inflow	5,800,000 dam ³ (4,700,000 ac. ft.)
South Sask. River releases	50 m ³ /sec (1,280,000 ac. ft.)
Qu'Appelle River releases	270,000 dam ³ /year
Average evaporation losses	270,000 dam ³ /year (219,000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

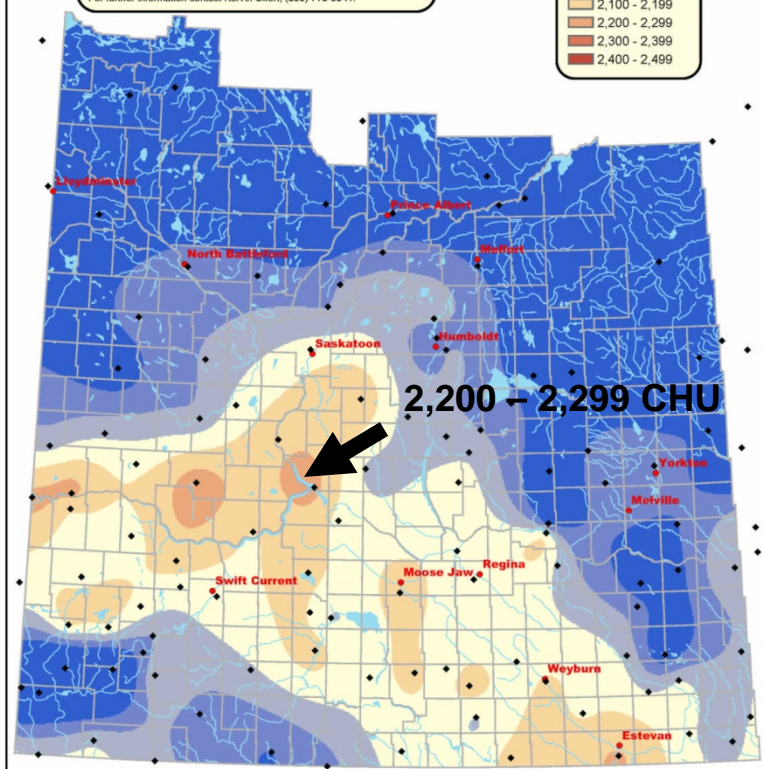
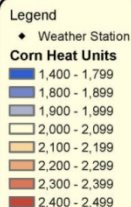
Saskatchewan Accumulated Corn Heat Units 90% Confidence for Grain Production

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.



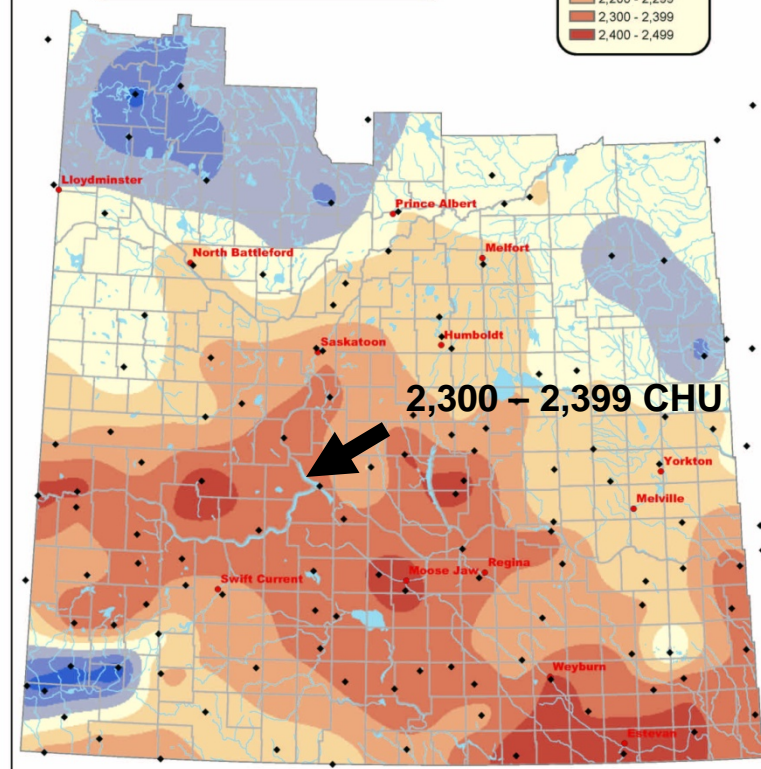
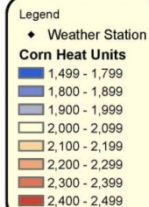
Saskatchewan Accumulated Corn Heat Units Average for Silage Production

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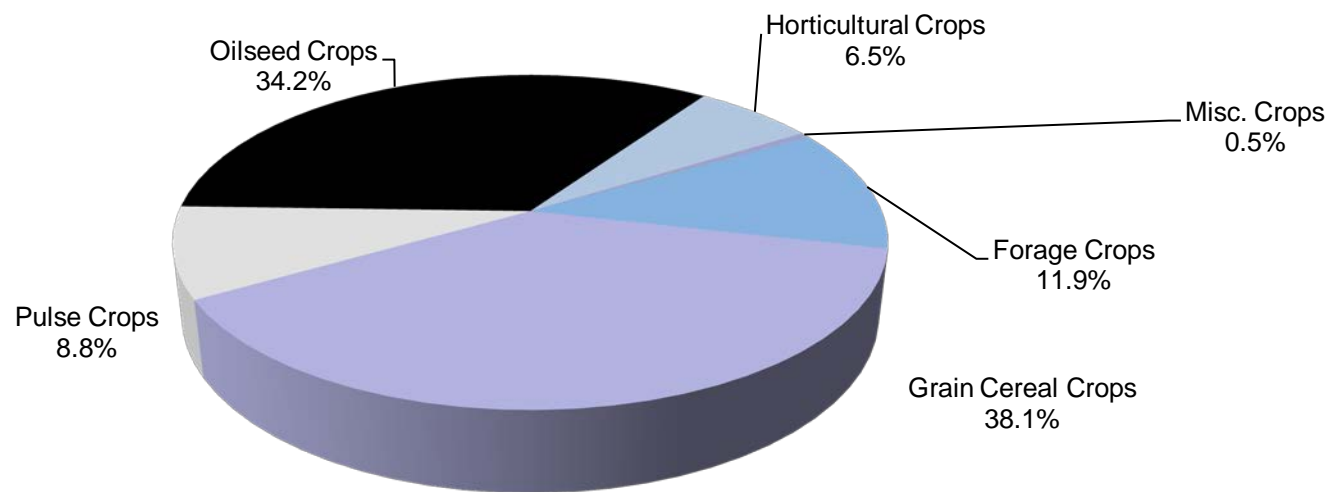
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Lake Diefenbaker Crop Mix 2011



■ Forage Crops ■ Grain Cereal Crops ■ Pulse Crops ■ Oilseed Crops ■ Horticultural Crops ■ Misc. Crops

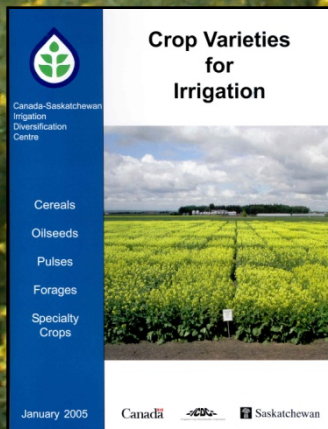
Crop Rotation: Forages 12%



Crop Rotation: Cereals 38%



Crop Rotation Oilseeds 34%



Crop Rotation: Pulses 9%



Crop Rotation: Vegetables 6.5%



Crop Rotation: Misc. 0.5%



Irrigated Crop Budgets

ECONOMICS

AGRONOMICS

ESTABLISHED PASTURE

UNIT	\$/ac	My Farm \$/ac
lb	\$45.10	
lb	\$8.22	
lb	\$3.18	
	\$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	
%	\$3.86	
\$/hd	\$139.44	
gs *	\$23.71	
	\$23.31	
	\$7.18	
(2 prod.)	\$23.68	
	\$19.68	
TS	\$100.74	
(\$/hd)	\$240.18	
	2.5	
Days of Grazing	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

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 a combined total of 24" of rain and irrigation is required. Irrigation should continue into September.

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.

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MORE INFORMATION:
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TAKING CROPS TO THE NEXT LEVEL

ECONOMICS

AGRONOMICS

CROP: SEED POTATO

ITEM	#	UNIT	\$/ac	My Farm \$/ac
Seed			\$611.00	
Seed treatment/inoc			\$70.20	
Fertilizer N	150	lb	\$60.96	
P	60	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	tons	\$227.80	
Land Rental Rate			\$0.00	
Specialized Equipment			\$311.06	
Land Rental Rate			\$235.00	
TOTAL NON CASH COSTS			\$659.16	
TOTAL COSTS			\$2,424.05	
LO				
YIELD ton/ac	10	AV	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	
O			\$0.00	
O			\$0.00	
O			\$0.00	
O			\$0.00	
TOTAL			\$311.06	

* Provided by landowner.

MORE INFORMATION:

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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	21750	plants/acre
Weight of Seed Piece	80	grams
Seeding Rate	1.3	tons/acre

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:

Approve 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-average (1.5-2.5 weeks); initiation to increase tuber set, stolon initiation-tuber set (3-4 weeks); irrigate for increase stolon growth, & to increase tuber initiation. Bulking (8 weeks); irrigate to increase tuber size.



Irrigated Crop Budgets 2011

Crop	Gross \$/ac*	Rotation %	Contribution \$/ac	Contribution %
Horticulture (Potatoes)	\$4392	7%	\$307	37%
Pulse (Dry Beans)	\$691	9%	\$62	7.5%
Oilseeds (Canola)	\$660	34%	\$224	27%
Cereals (Hd Wheat)	\$488	38%	\$185	22.5%
Forages (Alfalfa)	\$360	12%	\$43	6%
* 80% of target (Majority Crop)		Irrigation Output (\$/ac)	\$821	

Irrigation: \$821 x 100,000 acres = \$82,100,000/year around Lake Diefenbaker

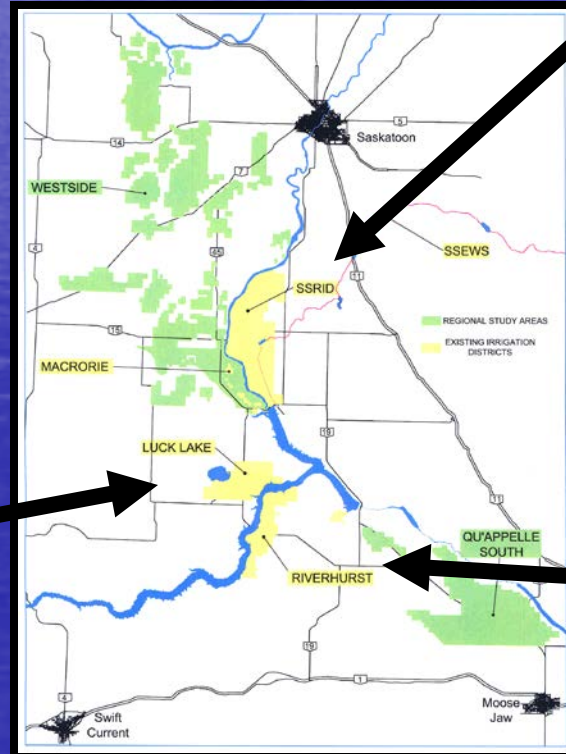
Cost of Irrigation \$/ac for 12" 2011

SSRID

\$27.20

Plus on-farm pumping

Luck
Lake ID
\$62.96



Riverhurst ID
\$57.42

On-Farm Irrigation Cost 2011

Quarter section pivot (133ac)

• Irrigation Certification	\$1,300
• Centre pivot	\$80,000
• Pivot pad	\$1,600
• Mainline (10")(\$5.32/ft)	\$9,900
• Trenching (\$2.25/ft)	\$4,185
• Wiring	\$2,325
• Fittings	\$1,500
• *Intake well/screen	\$1,500
• *Turbine pump/motor (30hp)	\$10,000
• Powerline (\$25,000/mile)	

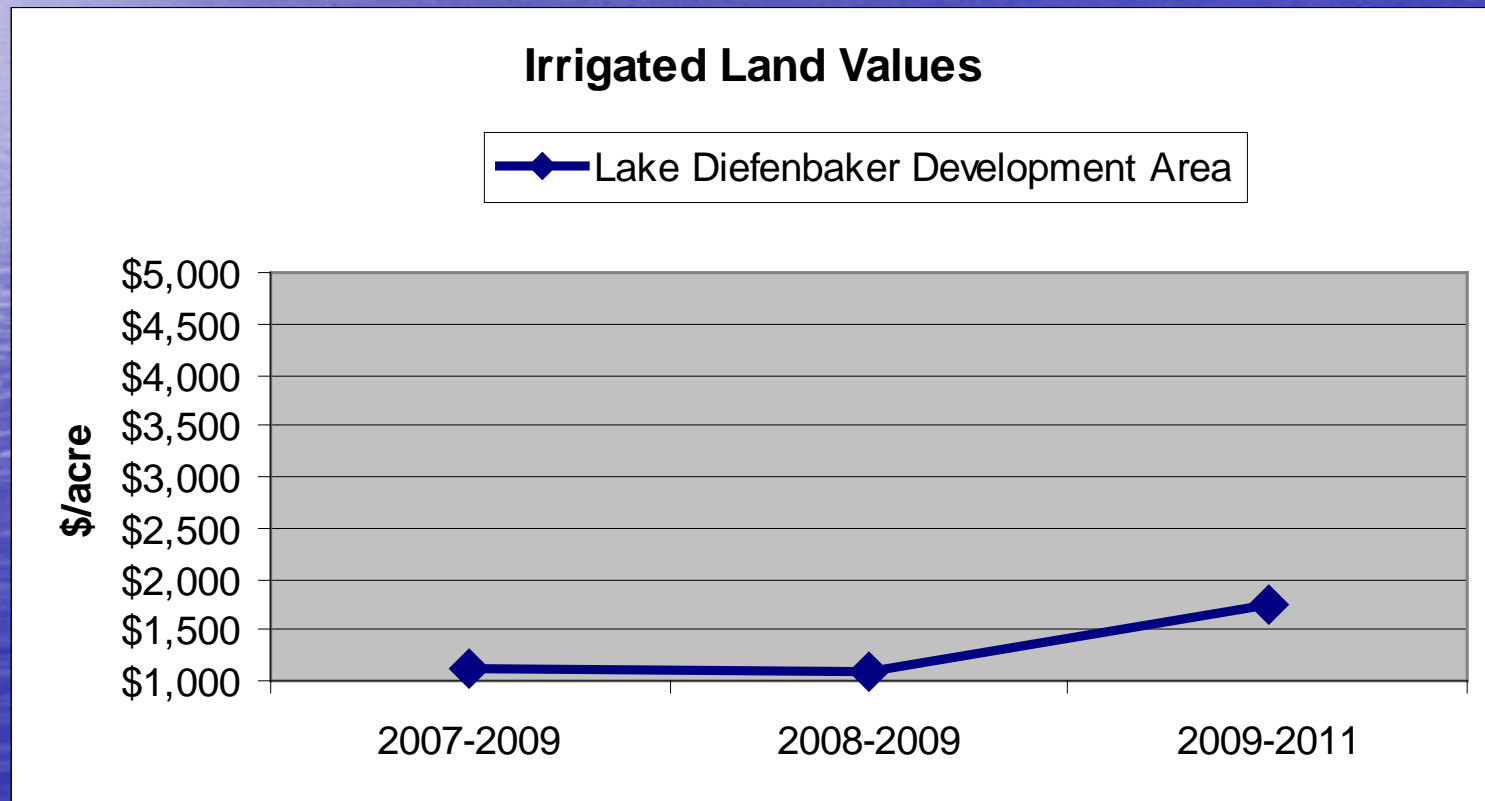
TOTAL **\$112,310

* Not required for pressurized mainline
districts

** Plus GST & PST

Irrigated Land Values

Average selling price for Irrigated Land
\$/ac



Source: Farm Credit Canada; Ministry of Agriculture's Lands Branch

The Irrigation Act, 1996

Irrigation Certification

- Soil/Water compatibility
- Environmental sustainability

Irrigation Districts

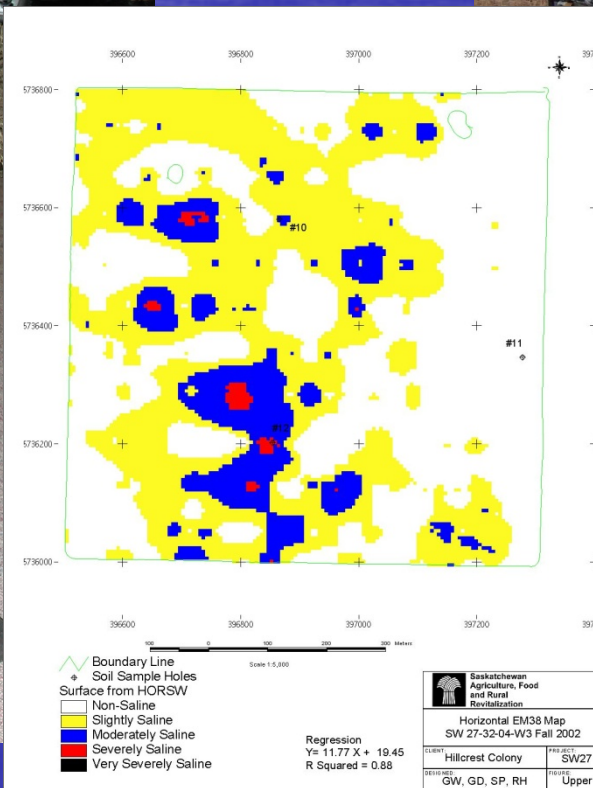
- Incorporated under the Act
- Pay 100% of operation, maintenance and administration costs plus Irrigation Replacement Fund contributions

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)

***TAKING CROPS
TO THE
NEXT LEVEL***

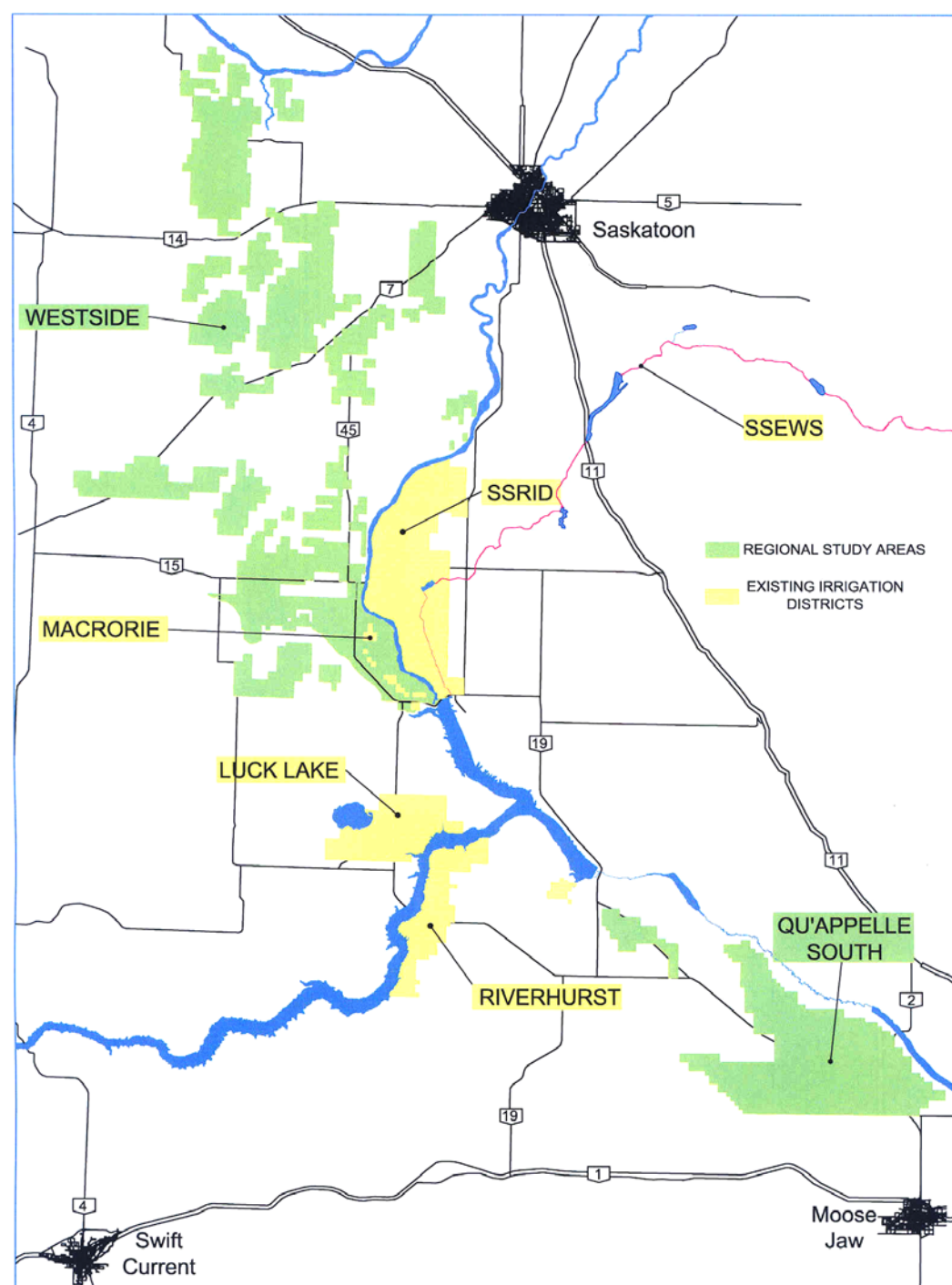


The Canada Saskatchewan Water Supply Expansion Program (CSWSEP)

- 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
- SIPA's study: Time To Irrigate - The Economic, Social and Environmental Benefits of Expanding Irrigation

**LAKE
DIEFENBAKER**
irrigated area:

CURRENT:
100,000 acres
INFILL:
50,000 acres;
EXPANSION:
500,000 acres.



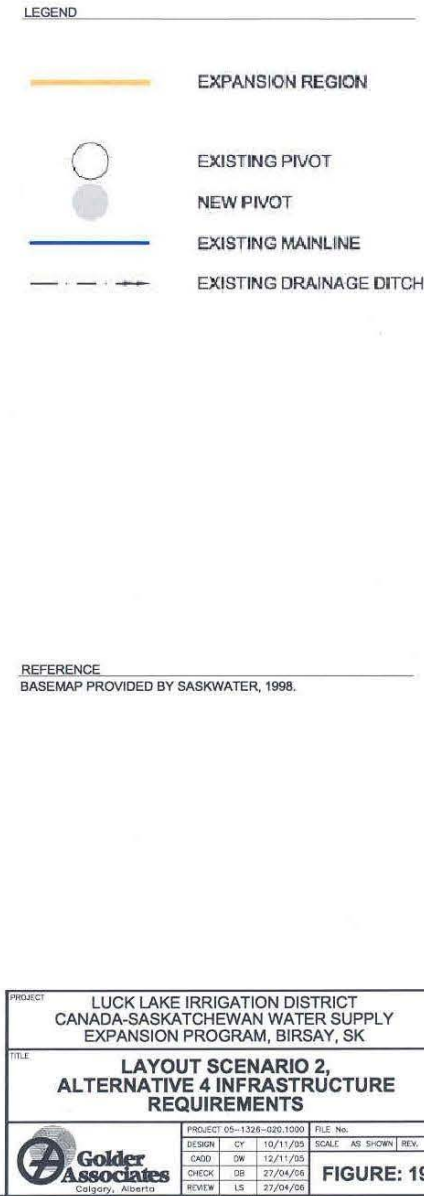
INFILL

- 2009-2011 \$6.2 million - Community Adjustment Fund 90%:10% Ministry
- 2011-2013 \$4.5 million - FRWIP Ministry 90%:10% districts with approved infill plans and replacement funds.

Luck Lake Irrigation Project

- Construction costs of \$38 million
- Pressurized pipeline delivery system
- Project completed in 1989
- Water delivered to 10,000 acres
- Built by Sask Water now owned and operated by the Ministry of Agriculture
- Provides water to Ducks Unlimited's Luck Lake Heritage Marsh, regional pipelines, communities and livestock

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Luck Lake Irrigation District

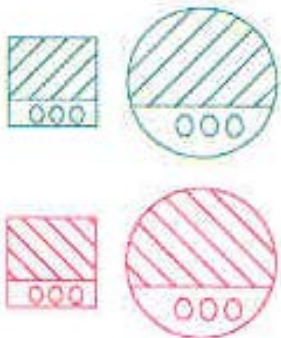
INFILL

- Infill requires the phased addition of pipelines and pumps
- Infill potential of 11,000 acres
- Total infrastructure costs of \$20M
- 2009-11 Community Adjustment Fund \$2.1M
- 2011-13 \$1.5M FRWIP

Riverhurst Irrigation Project

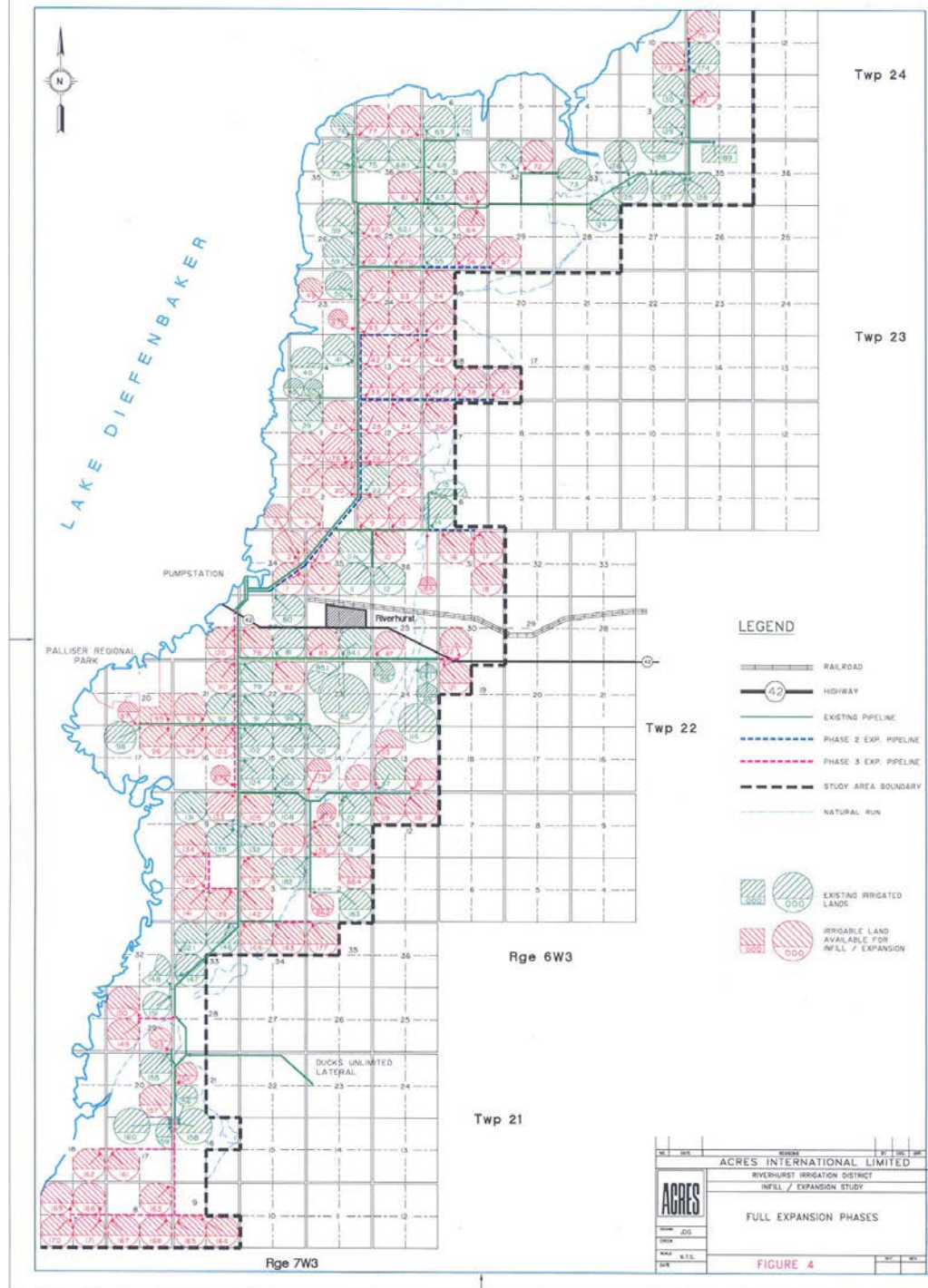
- Construction costs of \$52 million
- Pressurized pipeline delivery system
- Project completed in 1991
- Water delivered to 10,000 acres
- Built by Sask Water now owned and operated by Saskatchewan Agriculture
- Provides water to Ducks Unlimited's Thunder Creek Heritage Marsh, Regional Park, marina, Village of Riverhurst, golf course

Riverhurst Irrigation District



EXISTING IRRIGATED
LANDS

IRRIGABLE LAND
AVAILABLE FOR
INFILL / EXPANSION



Riverhurst Irrigation District

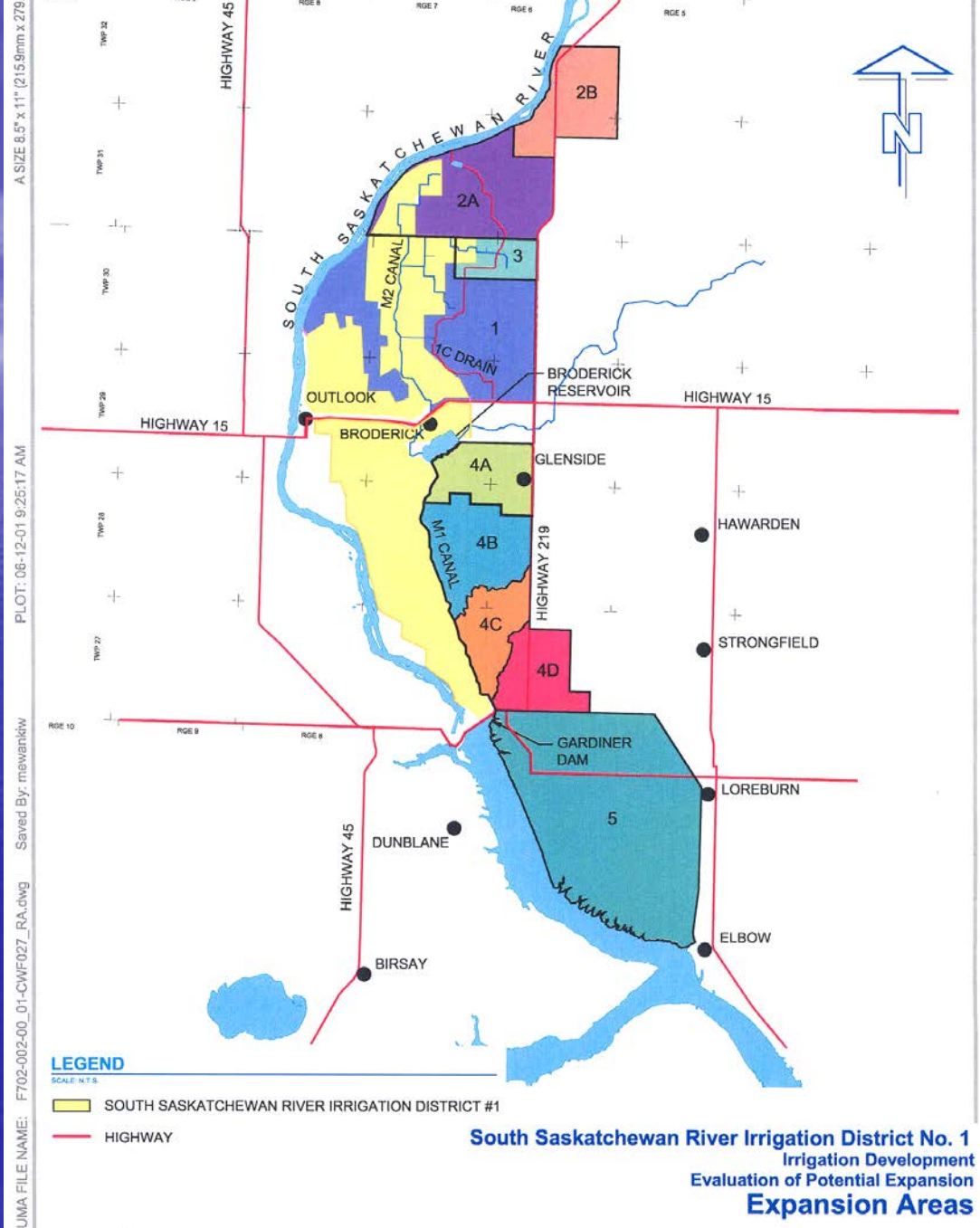
INFILL

- Existing Development of 10,000 acres
- Pressurized pipeline delivery systems
- Expansion requires phased addition of pipelines and pumps
- Infill potential of 11,000 acres
- Total infrastructure costs of \$22M
- 2009-11 Community Adjustment Fund \$1.9M
- 2011-13 FRWIP \$1.5M

South Sask. River Irrigation District

- Part of the South Saskatchewan River Project (Gardiner and Qu'Appelle dams and Lake Diefenbaker)
- Irrigation began in 1968 with flood irrigation methods which have been superseded by centre pivots
- Each quarter was designed with gravity canal delivery and drainage
- Existing Development of 34,000 acres with 2,000 acres of flood remaining
- Infill and rehabilitation requires the phased conversion of canals to pipelines

South Saskatchewan River Irrigation District



South Sask. River Irrigation District

- INFILL
- Infill potential of 28,000 acres
- Total infrastructure costs of \$58M
- 2009-11 Community Adjustment Fund \$1.9M
- 2010-12 \$178,000 Overall Infrastructure Plan Ministry Grant
- 2011-13 \$1.5M FRWIP

EXPANSION

- Lake Diefenbaker was originally intended to irrigate some 500,000 acres to create the "critical mass" for value-added processing
- CSWSEP studies:
 - Qu'Appelle South Irrigation Project
 - Westside Irrigation Project
 - Time To Irrigate Vol I & II – SIPA
- SIPA's Irrigation Development Corporation proposal

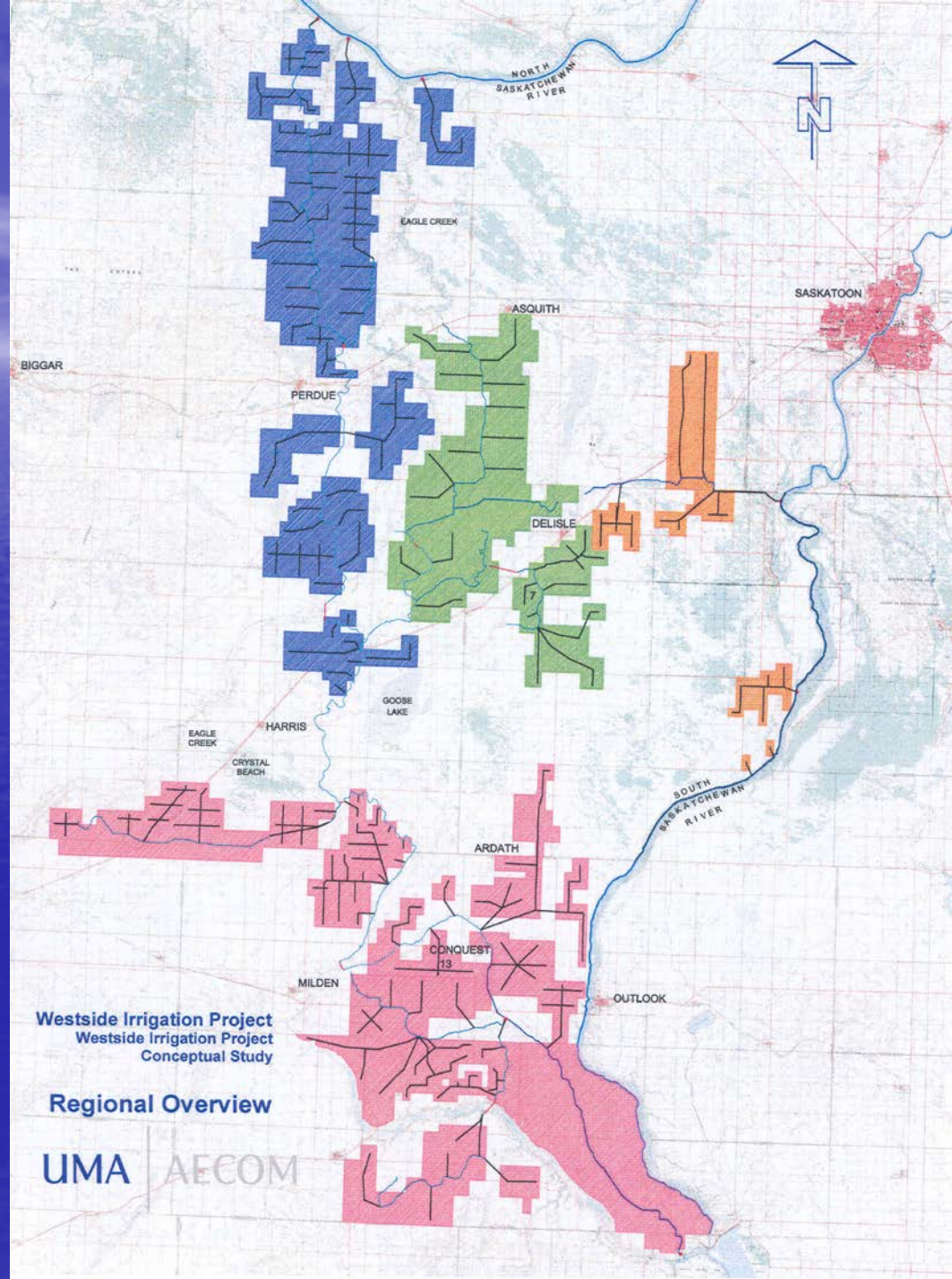
Qu'Appelle South Irrigation Project

- Total Development of 110,000 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 \$558M
- Total on-farm investment of \$100M
- Preliminary studies underway by South Central Enterprise Region

Westside Irrigation Project

- Total Development of 375,000 acres
 - Lake Diefenbaker = 332,000 acres
 - South Sask River = 26,000 acres
 - North Sask River = 17,000 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 \$2B
- Total on-farm investment of \$420M

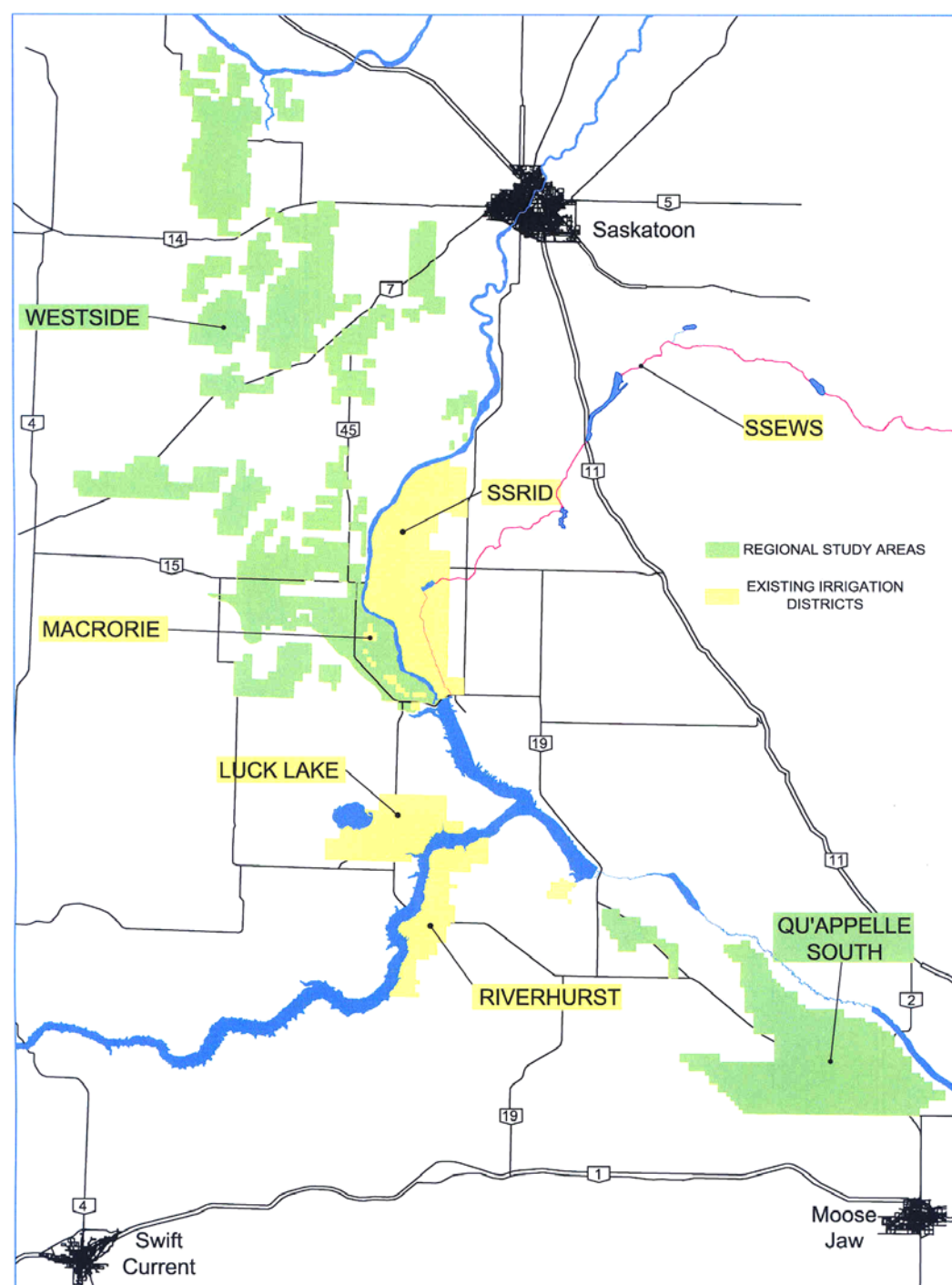
Westside Irrigation Project



Potential **INFILL** is 50,000ac. within existing irrigation districts.

Potential irrigation **EXPANSION** is 500,000ac.

Water use would be 20% of the average inflow into Lake Diefenbaker.



Development Summary

Irrigation **INFILL** and **EXPANSION**

District / Region INFILL/EXPANSION	EXISTING (‘000ac)	INFILL (‘000ac)	EXPANSION (‘000ac)	TOTAL (‘000ac)
Luck Lake ID	10	11	-	21
Riverhurst ID	10	11	-	21
S. Sask River ID	34	28	-	62
Qu’Appelle South	-	-	110	110
Westside	-	-	375	375
Total	54,000ac	50,000ac	485,000ac	589,000ac

Cost Summary

Irrigation District **INFILL**

District INFILL	INFILL ACRES (‘000 acres)	INFILL COST (\$Million)	INFILL AVERAGE COST (Off-farm \$/ac)
Luck Lake ID	11	20	1,800
Riverhurst ID	11	22	2,000
S. Sask River ID	28	58	2,000
TOTAL	50,000ac	\$100M	\$2,000/ac

Cost Summary

Irrigation EXPANSION

Regional EXPANSION	EXPANSION ACRES ('000 acres)	EXPANSION COST (\$Million)	EXPANSION AVERAGE COST (Off-farm \$/ac)
Qu'Appelle South	110	558	5,100
Westside	375	2,000	5,300
Total	485,000 ac	\$2,558M	\$5,300/ac

IRRIGATION INVESTMENT OPPORTUNITY

CANADIAN PRAIRIES

LAKE DIEFENBAKER, SASKATCHEWAN

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