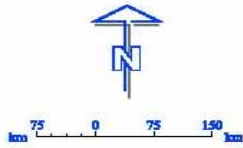


# Irrigation Opportunities from Lake Diefenbaker



*Lake Diefenbaker offers opportunities for multi-use water based development in Saskatchewan. It was envisioned that the associated irrigation work would carry water to approximately 450,000 acres of irrigable lands.*



# Lake Diefenbaker





Gardiner Dam and Lake Diefenbaker

Storage at FSL – 9.4 million dam<sup>3</sup> (7.6 million acre •feet)

Live Storage – 4.3 million dam<sup>3</sup> (3.5 million acre •feet)

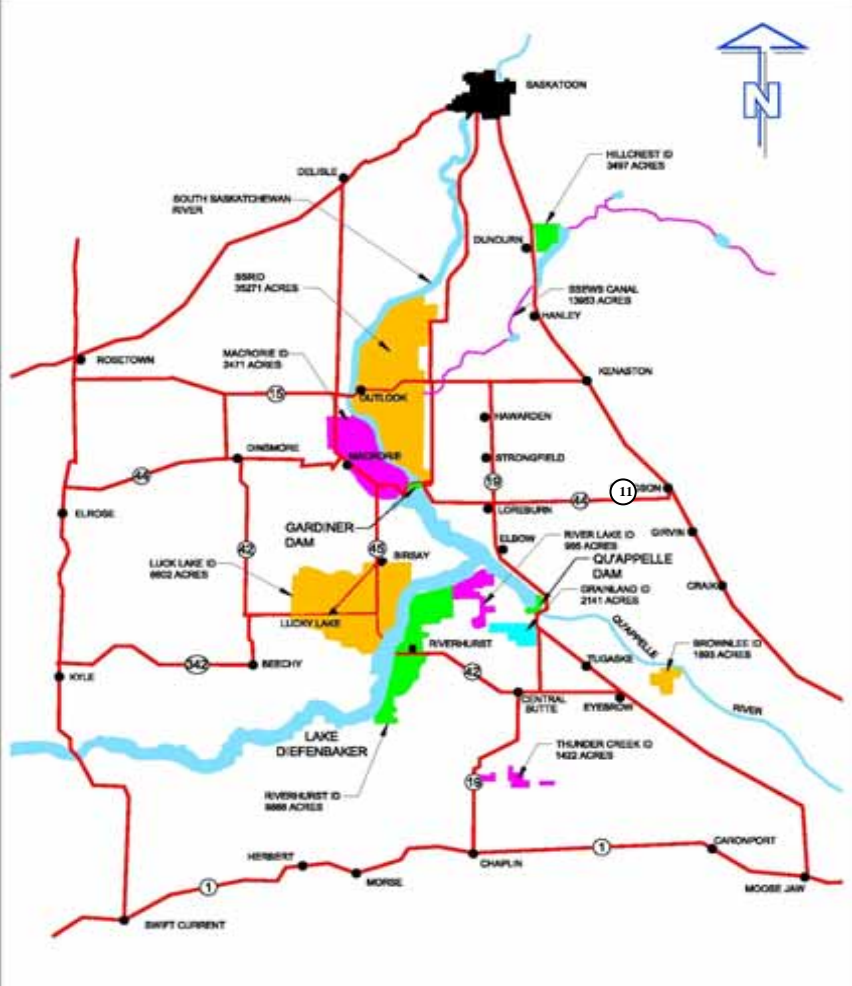
Annual inflow (mean) assuming Alberta is taking their entire share = 5.5 million dam<sup>3</sup> (which they are not)

90% probability = 3.0 Million dam<sup>3</sup> annually

Total irrigation = approximately 100,000 acres

# Lake Diefenbaker Development Area Irrigation Projects 2004

Project	Acres
South Saskatchewan River Irrigation District	35,271
Macrorie Irrigation District	2,471
Luck Lake Irrigation District	8,602
Riverhurst Irrigation District	9,868
Thunder Creek Irrigation District	1,422
Grainland Irrigation District	2,141
River Lake Irrigation District	985
Brownlee Irrigation District	1,893
Hillcrest Irrigation District (from SSEWS)	3,497
Private Irrigators (from SSEWS)	13,953
Other Private Irrigators	20,928
<b>Total</b>	<b>101,031</b>



# Lake Diefenbaker - Existing Irrigation Development

In comparison:

Alberta's 1.5 million acres of irrigation is supported by a combined storage of approximately 3.0 million dam<sup>3</sup>

Since 2006, five studies have been completed identifying potential infill, expansion and new projects.

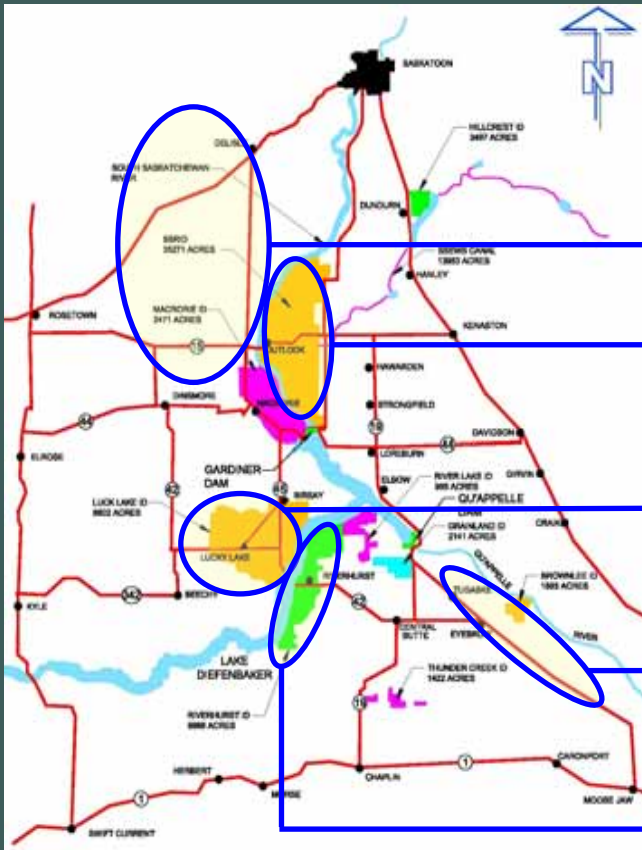
3 Existing Projects (infill and expansion):

- Luck Lake Irrigation District
- Riverhurst Irrigation
- South Saskatchewan River Irrigation District

and 2 New Projects:

- Westside Irrigation Project
- Qu'Appelle South Irrigation Project

# Potential Development



Westside Irrigation Project

SSRID Infill and Expansion

Luck Lake Irrigation District  
Infill and Expansion

Qu'Appelle South Irrigation  
Project

Riverhurst Irrigation System  
Expansion

# Luck Lake Irrigation District – Infill and Expansion

- Luck Lake project completed in 1987
- Currently 8,602 Acres of irrigation land
- Infill and expansion could add 9,397 Acres
- Cost is estimated @ \$2,728 per Acre

# Riverhurst Irrigation System Expansion

- Riverhurst project completed in 1987
- Currently 9,868 acres

# Riverhurst Irrigation System Expansion

## Expansion

- Existing infrastructure has reserve pumping and pipeline capacity to accommodate an approximate 25% expansion in serviced acreage or 2,260 acres
- Additional infrastructure is required to expand further
- An additional 8,640 acres could be added with additional infrastructure added

# Riverhurst Irrigation System Expansion

## Expansion

- Existing infrastructure has reserve pumping and pipeline capacity to accommodate an approximate 25% expansion in serviced acreage (2,260 acres)
- Once full capacity of a particular zone has been reached, additional infrastructure is required to expand. Expansion could add 8,640 acres

## Summary

Current	9,868		
Infill	2,260	→	10,900 New
Expansion	8,640		
	<hr/>		
	20,768 Acres		

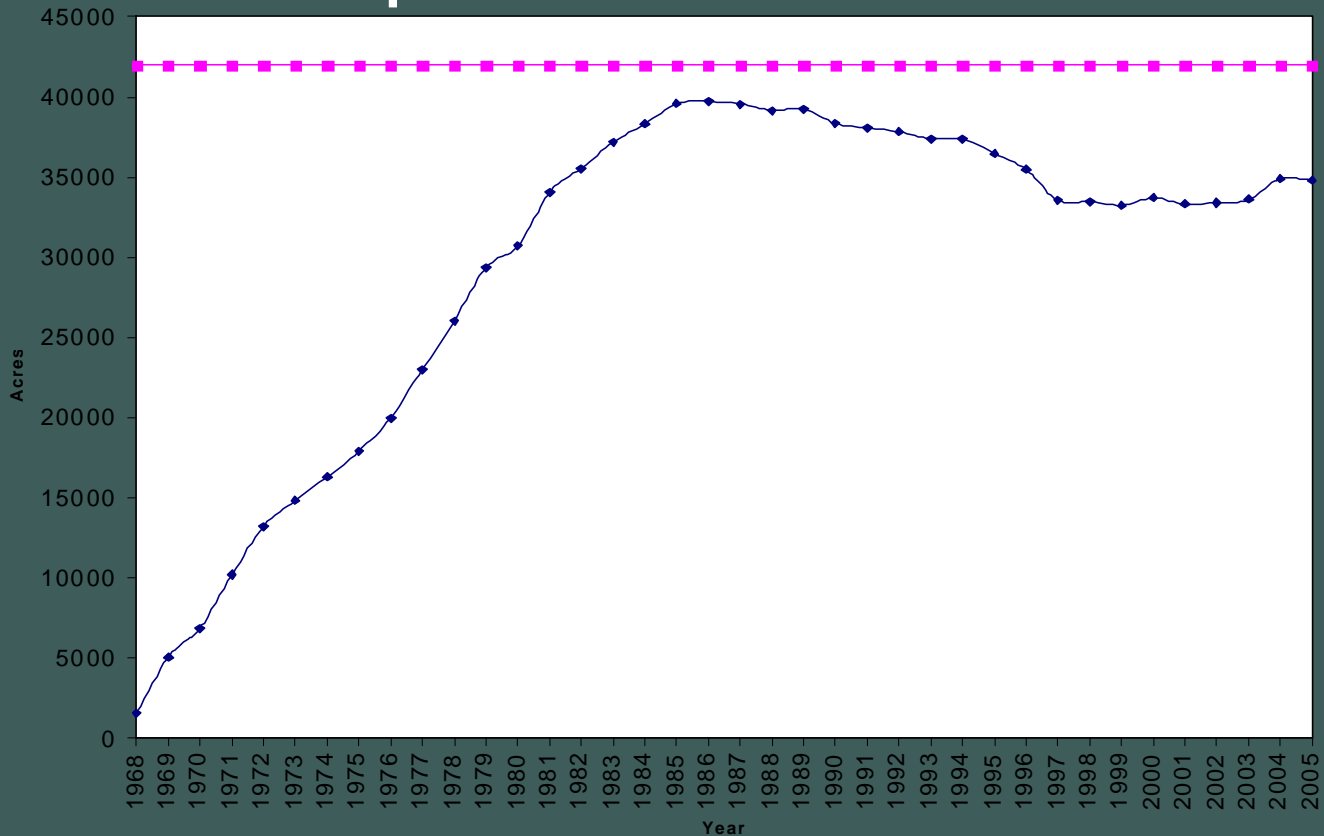


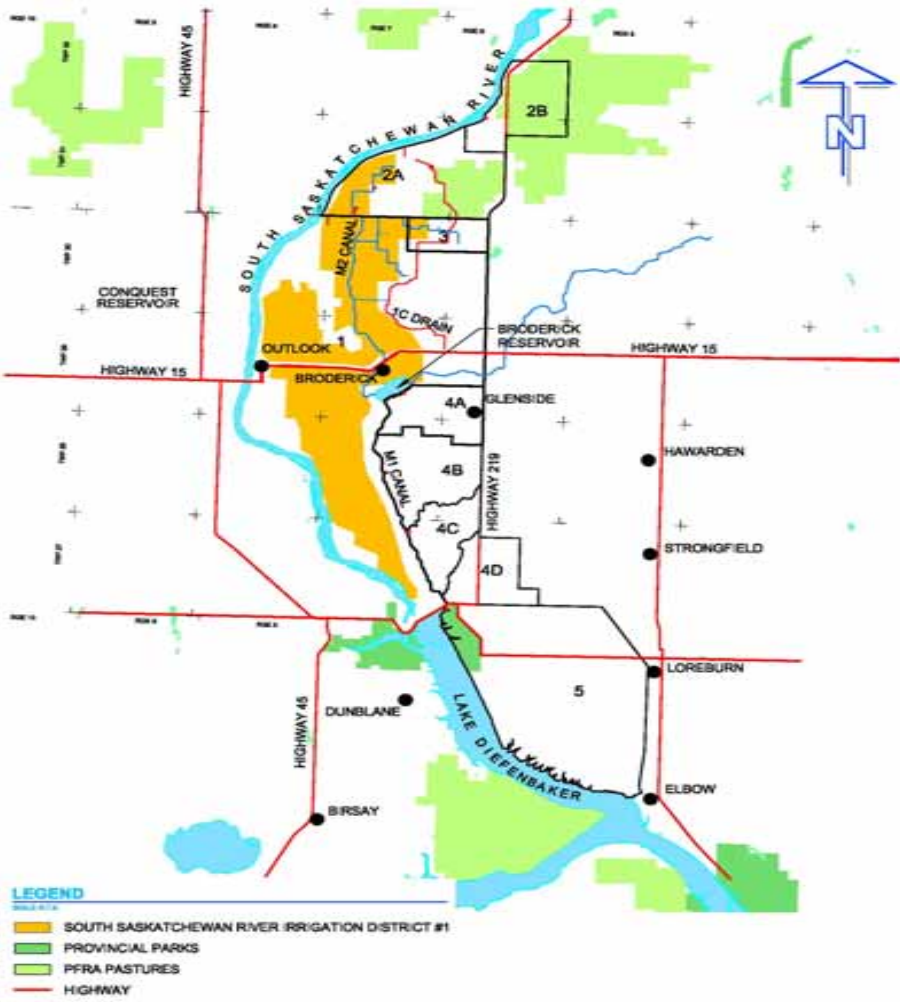
# SSRID Expansion UMA November 2006

# SSRID Expansion – Historical Update

- The peak irrigated acreage was recorded at 39,918 acres (95%) in 1987. Since 1987, irrigated acreage has averaged between 39,523 acres (1988) to 34,817 (2005)

# South Saskatchewan River Irrigation District No. 1 Uptake Rate 1968 to 2005





# Potential Expansion Areas

Based on soil suitability and topography

## Irrigable Expansion Summary

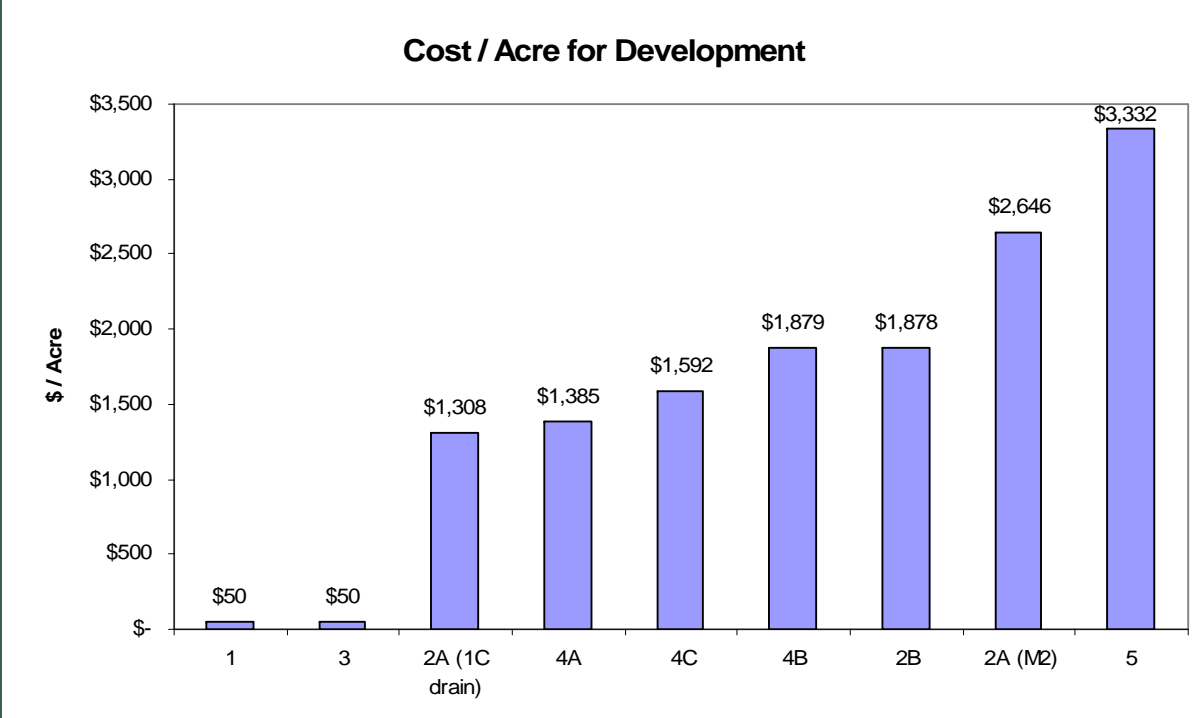
Area 1	5,070 acres
Area 2	4,680 acres
Area 2B (from South Saskatchewan River)	2,210 acres
Area 3	400 acres
Area 4A	1,040 acres
Area 4B	3,640 acres
Area 4C	1,690 acres
Area 4D	0 acres
Area 5 (includes part of Elbow Project)	9,620 acres
<b>Total Potential Expansion</b>	<b>28,350 acres</b>

# Capital Cost Summary

Estimated Capital Cost for Intensification and Expansion			
Area	Acres	\$ / Acre	\$ Cost
1	5,070	50	253,500
2A	3,510	2,640	9,286,000
2A (1C drain)	1,170	1,308	1,530,000
2B	2,210	1,878	4,150,000
3	400	50	20,000
4A	1,040	1,385	1,440,000
4B	3,640	1,879	6,840,000
4C	1,690	1,592	2,690,000
5	9,620	3,332	32,050,000
<b>Total</b>	<b>28,350</b>		<b>\$58,259,500</b>

\* Excludes on-farm and R.O.W. purchase

# Project Development Costs per Acre (\$/Acre)



## Summary of 3 Existing Projects (acres)

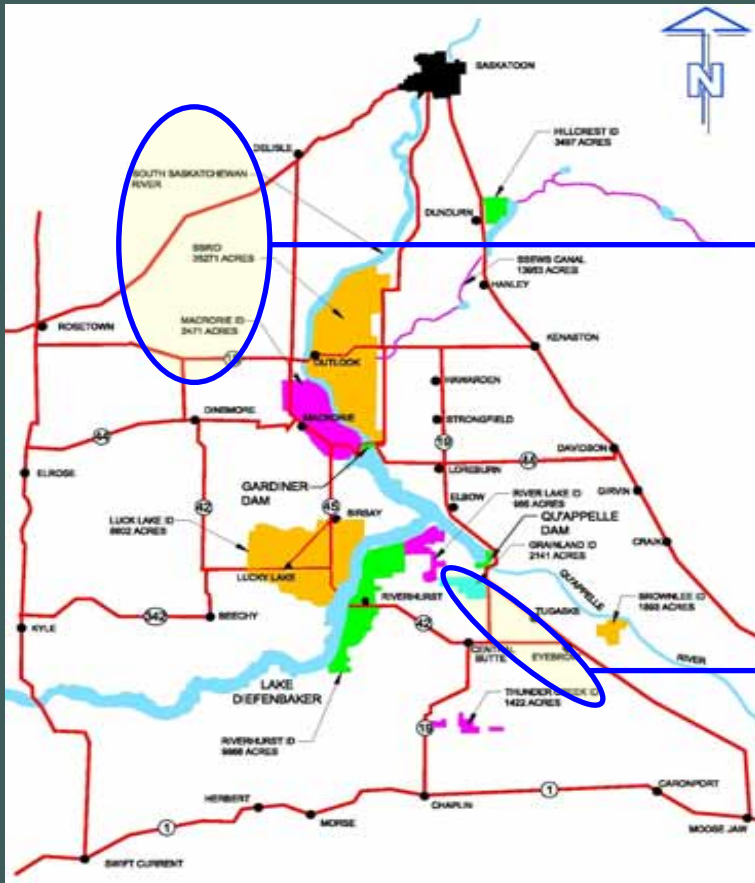
	Existing	Potential	Total
Luck Lake	8,602	9,397	17,999
Riverhurst	9,868	10,900	20,768
SSRID	35,271	26,140	61,411
Total	53,741	46,437	100,178

# New Projects

- Westside Irrigation Project – April 2006  
(UMA Engineering Ltd)
- Qu'Appelle South Irrigation Project – June 2007  
(UMA Engineering Ltd)

Potential for 485,000 acres of new development

# Lake Diefenbaker – New Irrigation Development



Westside Irrigation Project

Qu'Appelle South Irrigation Project

# Westside Irrigation Project - not a new idea

- Construction was initiated in the late 1960's but was abandoned in 1973
  - Earthwork and control structures on WMC completed to Conquest when work halted
  - Two of three embankments of Conquest Reservoir completed
  - Westside pump plant structure completed
  - 80,000 acres of flood irrigation planned

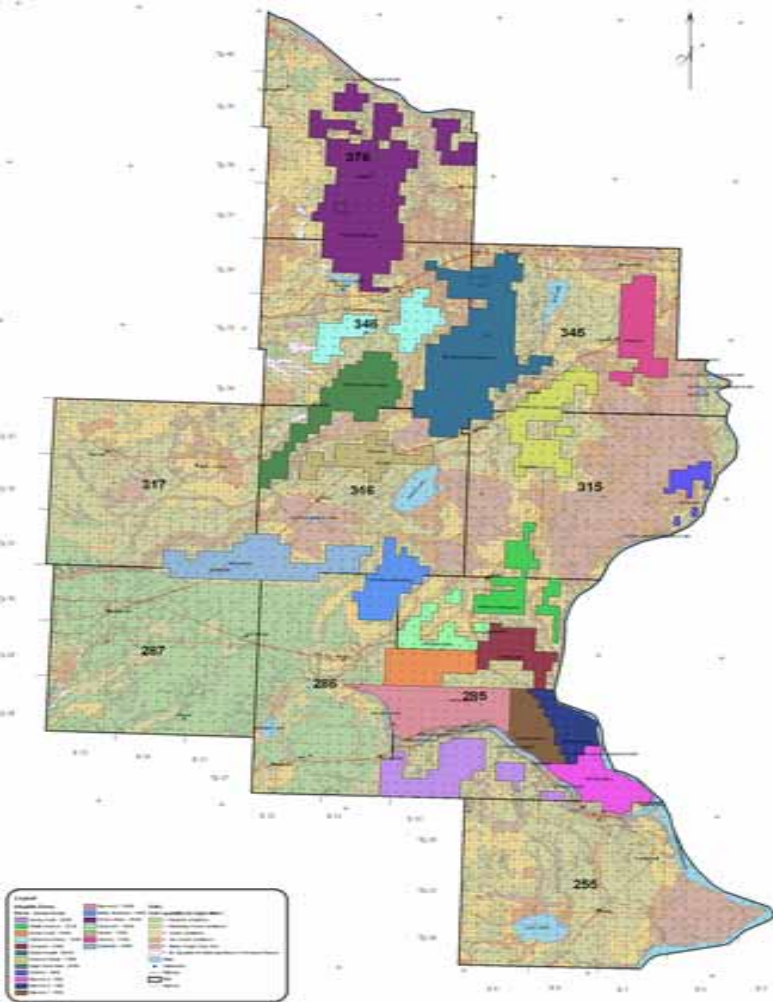
In the 1980's, farmers in the Macrorie area petitioned for revival of the project

- Two pumps installed and the WMC dyked off
- Macrorie Irrigation District irrigates 2,500 acres

# Typical Existing Canal Section



# Irrigable Land Blocks Within the Westside Irrigation Project



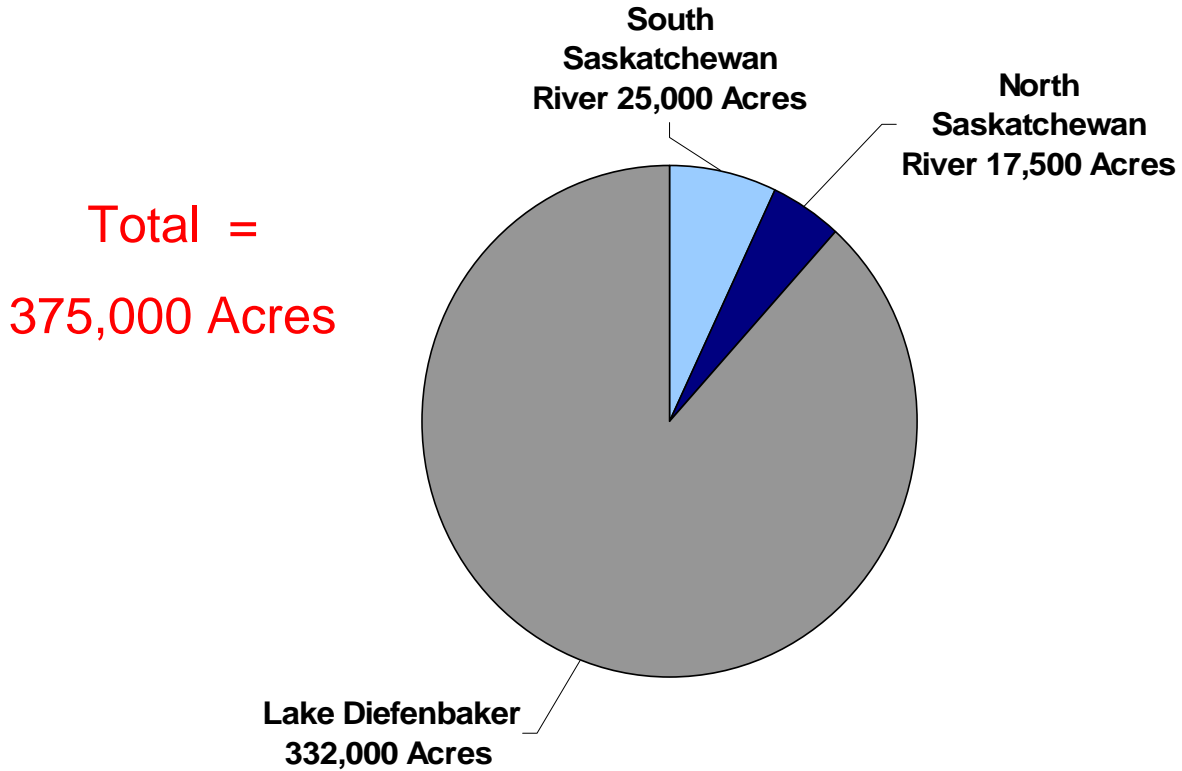
# Irrigable Blocks – Westside Irrigation Project

Block	Sections	Gross Acres
Anerley South	44	21,840
Bounty South, Solonetz Reservoirs	27.5	14,300
Ardath-Swanson	21	10,920
Conquest	31	16,120
Gledhow	24	12,480
Milden-Northeast	9.5	4,420
Zealandia	30.5	15,860
Donavon-Delisle	55	28,600
Tessier	40.5	17,371
Vanscoy / East Donavon - Delisle	25.5	10,790
Eagle Creek West	33.5	21,109
Catherwood-Kinley	50.5	18,720
Delisle West-Asquith	35	18,200
Perdue-Areele	116.5	60,580
	135	70,200
<b>Macrorie A,B,C&amp;D</b>		<del>32,960</del>
<b>Total</b>		<b>374,470</b>
<b>Macrorie ID</b>		<del>2,471</del>
<b>GRAND TOTAL</b>		<b>376,941</b>

# Westside and Qu'Appelle – Concepts Used

- Majority of acres serviced from pump station on Lake Diefenbaker
- Main Supply Canal to identified blocks
- Pump stations along main canal into pipeline distribution systems and pressurized pivots
- Some on-line reservoirs
- Some booster stations

# Westside Irrigation Project



# Summary

332,000 Acres

- Lake Diefenbaker  
@ \$5247 / Ac

25,500 Acres

- South Saskatchewan River  
@ \$5,115 / Ac

17,500 Acres

- North Saskatchewan River  
@ \$5,570 / Ac

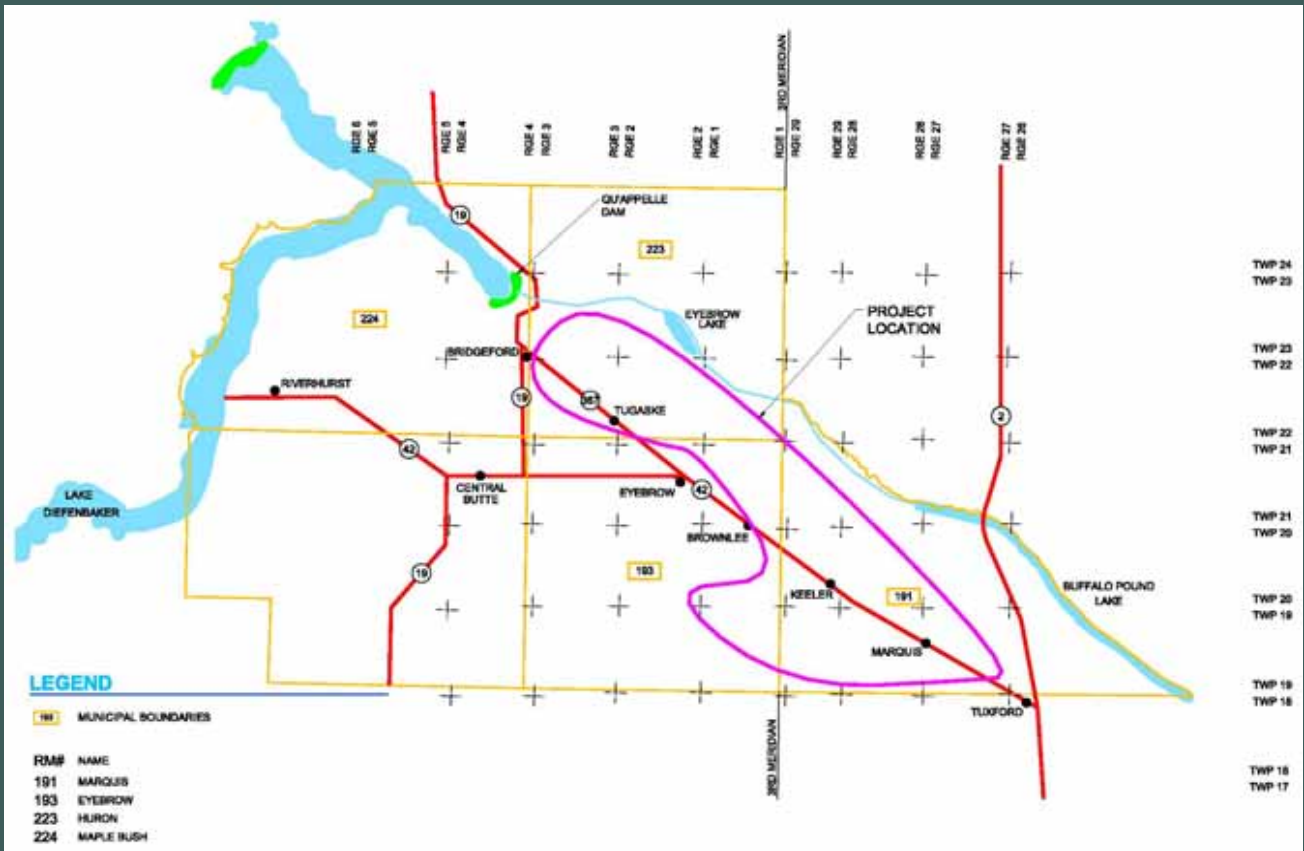
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**375,000 Acres**

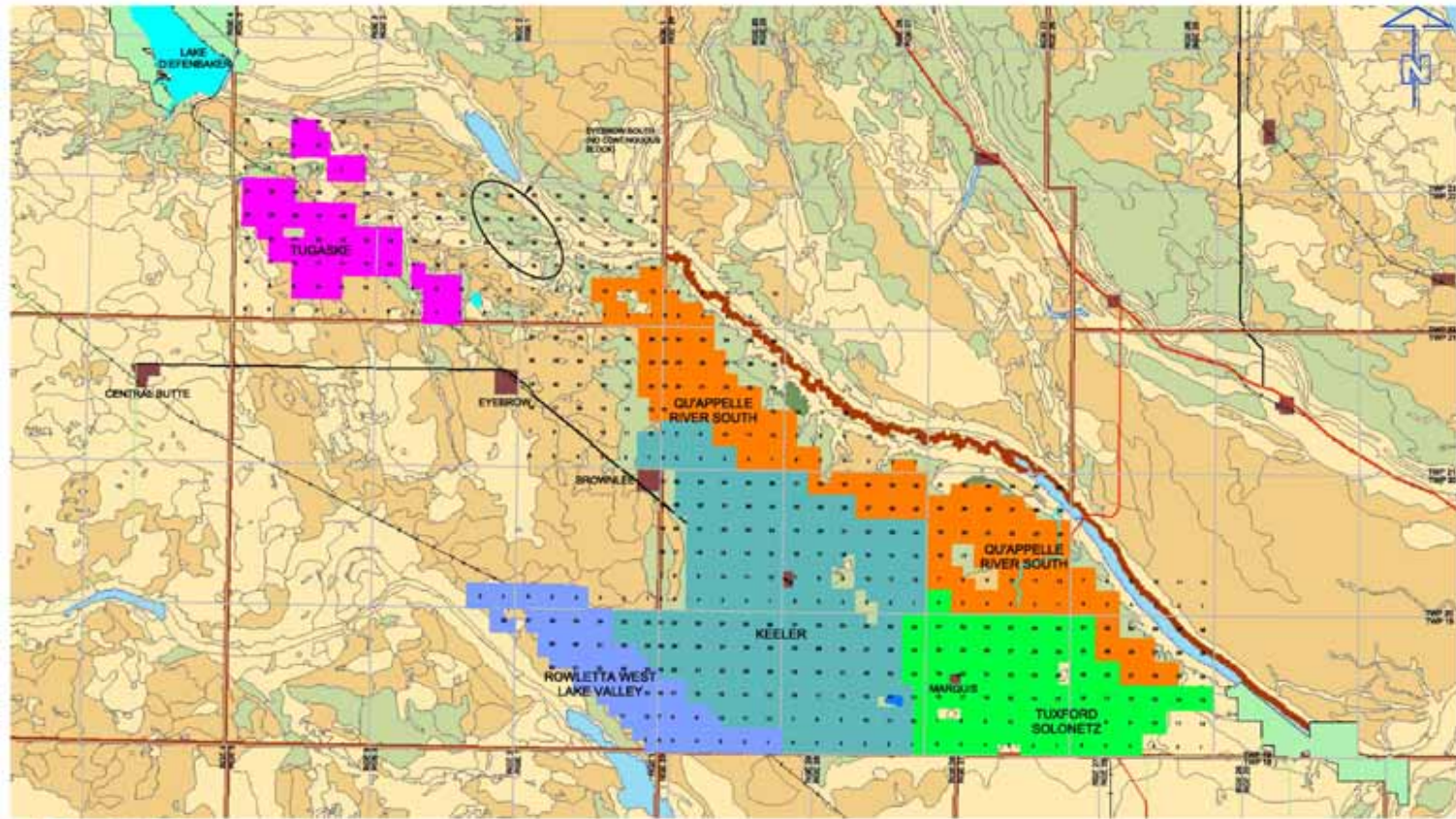
**\$1,967 million**

- Includes 3 Reservoirs
  - Conquest
  - Harris (Eagle Hill)
  - Delisle
  
- **Annual Water Needs**
  - 524,000 dam<sup>3</sup> – mean
  - 620,000 dam<sup>3</sup> – upper decile

# Qu'Appelle South Irrigation Project (Qu'SIP)



# Qu'SIP Potential Irrigable Land – Five Major Blocks



# Cost Summary

## Estimated Capital and On-Farm Costs

Option	*Acres Irrigated	Estimated Capital Cost (000,000)	Estimated Capital (Cost/Ac)	Estimated On-Farm (000,000)	Total Cost (includes On-Farm) (000,000)
1A	110,570	\$592.0	\$5,354	\$100.3	\$692.3
1B	96,400	\$511.9	\$5,310	\$87.5	\$599.4
<b>2A</b>	<b>110,570</b>	<b>\$558.8</b>	<b>\$5,054</b>	<b>\$100.3</b>	<b>\$659.1</b>
2B	96,400	\$475.7	\$4,934	\$87.5	\$563.2
Bridgeford-Tagaske	11,781	\$58.8	\$4,990	\$10.6	\$69.4

\* Does not include 2,600 acres of Eyebrow Lake South

# Qu'SIP – Water Requirements

- Mean Annual            170,000 dam<sup>3</sup>
- Upper Decile            210,000 dam<sup>3</sup>

# Qu'SIP – Water Requirements

## - Add Westside

		Westside
• Mean Annual	170,000 dam <sup>3</sup> -	524,000 dam <sup>3</sup>
• Upper Decile	210,000 dam <sup>3</sup> -	620,000 dam <sup>3</sup>
Total – both projects	694,000 dam <sup>3</sup>	Mean
	830,000 dam <sup>3</sup>	Upper Decile

# Water Availability

Adding current licences, and an allocation for future unknown demands, plenty of water is available to develop all five projects to their maximum.

➤ *Entitlement* is the question, not availability

# Summary of Economic Analysis Completed on 3 of the Projects (irrigation benefits only)

- South Saskatchewan River Irrigation Project
- Westside Irrigation Project
- Qu'Appelle South Irrigation Project

# Assumptions

Process - subtract displaced dryland benefits from irrigation benefits considering the following:

- Irrigation development costs (from studies)
- Uptake rates
- Crops and livestock mixes for irrigation
- Project years and discount rates

# Crop and Livestock Mixes (3 scenarios compared)

- Aggressive
- Livestock
- Grain - Oilseed

# Conclusion For All 3 Projects Are The Same

1. Including only the benefits derived from irrigation, Society receives a positive benefit from the development of irrigation in the Lake Diefenbaker area.

The Province should proceed with the development of irrigation

2. Other benefits are considerable:

- recreational,
- environmental,
- industrial, rural domestic and municipal water
- alternative water supply to Buffalo Pound Lake

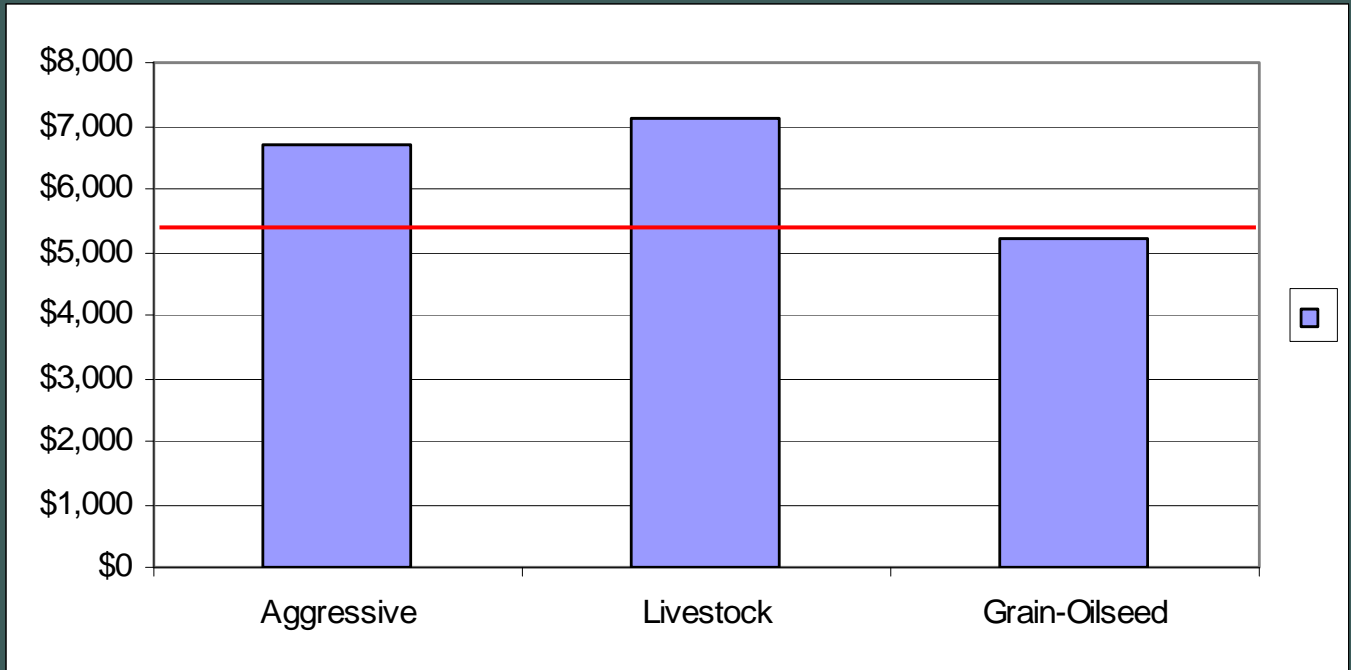


Photo by: Saskatchewan Environment

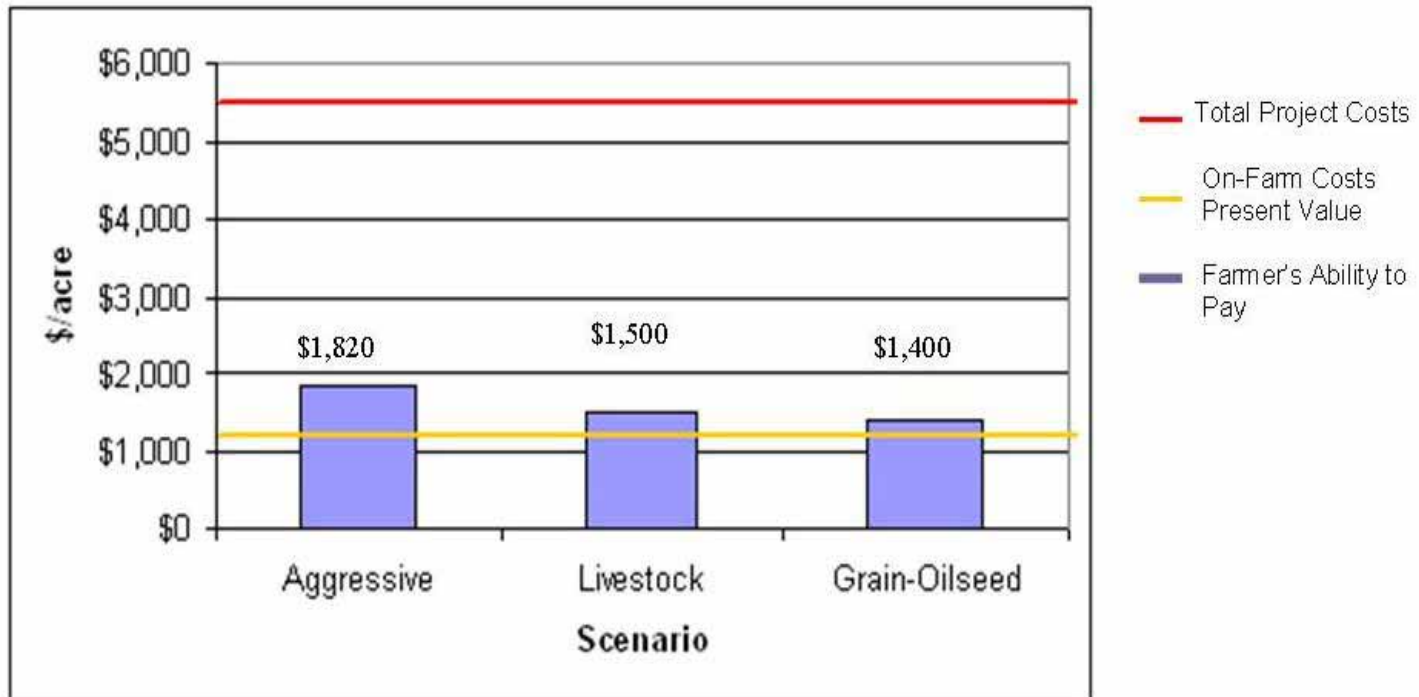
# Conclusion For All 3 Projects Are The Same

3. The Net Result is a revitalized rural area which further enhance benefits to society. The projects should be looked at as a rural water supply system similar to the SSEWS, and not as an irrigation project.
4. The farmers ability to pay is not much more than the cost of their equipment.

# Benefit Cost Comparisons (Qu'SIP)



# Farmer Ability to Pay for Irrigation Development (Qu'SIP)



# Thank you



# Questions?