



AGENDA

FOR THE *REGULAR MEETING OF RED DEER CITY COUNCIL*

TO BE HELD IN THE COUNCIL CHAMBERS, CITY HALL

MONDAY, NOVEMBER 21, 2005

COMMENCING AT *4:30 P.M.*

- (1) Confirmation of the Minutes of the Regular Meeting of Monday, November 7, 2005
- (2) **UNFINISHED BUSINESS**
 1. Community Services Director – *Re: 67 Street RCMP Detachment Concept Design Report* ..1
 2. Public Works Manager – *Re: Snow and Ice Policy Review* ..9
- (3) **PUBLIC HEARINGS**
- (4) **REPORTS**
 1. Parkland Community Planning Services – *Re: Land Use Bylaw Amendment 3156/LL-2005 – Rezoning of Former Red Deer County Building Site (4738 – 32 Street) From R2 – Residential (Medium Density) District to Direct Control District – DC 22*
(Consideration of 1st Reading of the Bylaw) ..13

2.	Parkland Community Planning Services – <i>Re: East Hill Major Area Structure Plan Bylaw Amendment 3207/A-2005</i> (Consideration of 1 st Reading)	..18
3.	BPS Consulting Ltd. – <i>Re: City of Red Deer Position Paper on Water and the Draft Water Management Plan for the South Saskatchewan River Basin</i>	..26
(5)	CORRESPONDENCE	
1.	Legislative & Administrative Services Manager – <i>Re: Board of Director Appointments for the Red Deer Downtown Business Association</i>	..39
(6)	PETITIONS AND DELEGATIONS	
(7)	NOTICES OF MOTION	
(8)	WRITTEN INQUIRIES	
(9)	BYLAWS	
1.	3156/LL -2005 – Land Use Bylaw Amendment – Rezoning of Former Red Deer County Building Site (4738 – 32 Street) From R2 – Residential (Medium Density) District to Direct Control District – DC 22 (1 st Reading)	..41 ..13
2.	3207/A-2005 – East Hill Major Area Structure Plan Amendment (1 st Reading)	..45 ..18

Christine Kenzie

From: Kelly Kloss
Sent: November 18, 2005 6:59 PM
To: Christine Kenzie
Subject: RE: Ellen Geddes - Correction to November 7th Council Minutes

Yes have copies of the changed pages to hand out.

-----Original Message-----

From: "Christine Kenzie"<Christine.Kenzie@reddeer.ca>
Sent: 18/11/2005 4:13:58 PM
To: "Kelly Kloss"<Kelly.Kloss@reddeer.ca>
Cc:
Subject: Ellen Geddes - Correction to November 7th Council Minutes

Ellen phoned on Friday to say that she had reviewed the November 7th Council Meeting Minutes and had noticed some spelling errors for names of those who spoke during the Public Hearing for the St. Joseph's Convent Development.

s/b Dr. George Nye not Mr. George Lye

s/b Mr. Pierre Gautier not Pierre Goatchia

s/b Bill Greenwood, President of Highland Green Community Association - not President of the Village Park Condo Association.

Ellen said that a Randy Knox was present and spoke about wanting a park. His name is not included - possibly he is the President of the Village Park Condo Association?

Do you want to bring these corrections up at the November 21st Council Meeting?

Christine Kenzie
Legislative & Administrative Services
City of Red Deer
403.342.8201
christine.kenzie@reddeer.ca



COMMUNITY SERVICES

CS-05-0089-0320

Date: November 14, 2005

To: Kelly Kloss, Legislative and Administrative Services Manager

CC: Superintendent Jim Steele, RCMP

From: Colleen Jensen, Community Services Director

Re: North 67th Street RCMP Station - Concept Design Recommendations

Background:

The Red Deer City RCMP Detachment, currently housed in one location downtown, has outgrown their existing space. The recommendation to move toward a 'precinct model' was outlined in the 2004 Crime Prevention and Policing Study, which was accepted as a planning tool by Council on December 29, 2004. The Study specified that the first move to the precinct model should be the establishment of a site on the north end of the city. A subsequent report to Council, entitled Options for the Existing RCMP Building, identified the opportunity to work in conjunction with the Emergency Services Station (#2) on 67th Street, for the development of a north RCMP site.

Based on the above noted report, Council approved proceeding with the development of a Concept Design for the proposed 67th Street facility, as per the Major Facility Planning and Construction Template, with the following resolution from the April 25th, 2005 meeting of Council:

"Resolved that Council of the City of Red Deer having considered the report from the Director of Community Services, dated April 21, 2005, re: Addition to the "Options for the Existing RCMP Building", hereby directs Administration to proceed with the undertaking of the Concept Design as described in the report (Phase II B of the Major Facilities Planning and Construction Template) for 67th Street RCMP Station, in conjunction with the current 67th Street Emergency Services Station, using the allocated \$75,000 from the 2005 Capital Budget.

Council further agrees that Community Services is responsible for the expenditure of the funds, with work to be completed by September, 2005."

Stephens Kozak Carr and Brown Architects were contracted in March 2005 to undertake the work, which included exploring the feasibility of accommodating the required RCMP operational functions, along with an addition and upgrade to the Emergency Service facility on the existing Emergency Services Station #2 site. They were also asked to make recommendations on the best possible facility design option and provide a very preliminary estimate of capital cost for the facility, along with some initial estimates of operational costs.

Discussion:

The resulting Concept Design report provides the first level of detail for the facility. Extensive work was done to address some of the site constraints, which include a water line, a high-pressure gas line and an electrical transformer. Space functions and requirements, and the relationship between space for each function or component have been addressed, taking into consideration the RCMP 'fit up standards'. Emergency Services needs have been evaluated as well. The final Concept Design report, as attached, includes recommendations addressing both the RCMP and Emergency Services needs, and a proposed footprint on the difficult site. Preliminary "order of magnitude" capital costs are provided, along with very preliminary operating costs, covered by a memo prepared by the RCMP.

In order to move forward with the Detailed Design for the 67th Street RCMP Station, according to the Major Facility Planning and Construction Template, SMT considered the Concept Design Report, including the projected costs at their November 3, 2005 meeting. A decision was made as follows:

"The Senior Management Team agreed that the Concept Plan as presented to the Senior Management Team on November 3, 2005 be presented to Council at their regular meeting in four weeks to seek approval to move forward to the detailed design phase of the 67 Street RCMP Detachment project, as outlined in the Major Facilities Planning and Construction Template."

It was further decided by SMT at their November 10 meeting that:

- "1. The option pertaining to the relocation of the EL & P Substation not be supported at this time;"*
- 2. The foundation to accommodate future second floor space is supported however, it is recommended that the full second floor not be included at this time."*

Based on SMT's recommendations, the preliminary capitals costs are identified as:

RCMP Facility	\$2,373,250
Emergency Services	\$ 657,500
Site servicing and work	\$ 580,000
Line relocations	\$ 220,000
Soft costs (fees, permits, testing)	\$ 450,000
Contingency	\$ 400,000
Upgrade structure to accommodate second floor addition	\$ 30,000
TOTAL	\$4,710,750

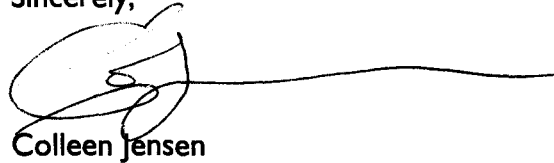
Council will note that the moving of the electrical transformer or the full shelling out of the second floor are not included in these costs.

The Concept Design for a new RCMP Station and Emergency Services Station upgrade at 67th Street (Emergency Services Station #2) is now being brought forward for Council's consideration and approval along with the recommendation to move to the Detail Design. Again, this is in keeping with the Major Facilities Planning and Construction Template.

Recommendation:

That Council for The City of Red Deer accept the Concept Design Report for the 67th Street RCMP Station and Emergency Services Station #2 upgrade as submitted by Stephens Kozak Carr and Brown Architects, and further that Council direct administration to proceed with the undertaking of the Detailed Design for the 67th Street RCMP Station and Emergency Services Station #2 upgrade, based on the order of magnitude costs as noted above in this memo, to begin in December 2005 and to be completed by the end of June 2006.

Sincerely,

A handwritten signature in black ink, appearing to be 'Colleen Jensen', with a long horizontal line extending to the right.

- c. Superintendent Steele
Fire Chief Jack McDonald

MEMO

Date: November 14th, 2005

To: Colleen Jensen, Community Services Director

From: Superintendent Jim Steele, RCMP

RE: **67th Street RCMP Detachment - Preliminary Start Up & Operating Cost Estimates**

The following are estimated start-up and operating costs for the proposed new RCMP facility on 67th Street, adjacent to the existing Emergency Services Station #2.

A. Furniture

Costs of furniture are estimated at \$6,000 per full time employee on the largest shift. Besides the individual workstation furniture, this cost would also include items such as: general shelving, furniture for the multi-purpose and interview rooms, and any other furniture that may be commonly used within the Detachment. The only additional furniture item would be personal lockers for the employees.

Cost: Largest working shift (25) at \$6,000/per	\$150,000
Personal lockers at 1,200/per	\$ 60,000
TOTAL COSTS FOR FURNITURE	\$210,000

B. Information Technology Costs

Information Technology budgeting for the 67th Street Detachment is set out in the table below, as determined by the RCMP Informatics staff.

Description of Item	Number of Items	Cost per Item	Total
Network Computers (includes CPU, Monitor, Keyboard, Mouse and Software)	Five (5)	\$2,000	\$10,000
Network Line Drops	Twenty (20)	\$200	\$4,000
ROSS Server – Recommended	One (1)	\$20,000	\$20,000
Fax Machine	One (1)	\$1,200	\$1,200
Telephone Server (with voice mail for 50 employees)	One (1)	\$10,000	\$10,000
Meridian Telephones	Twenty-Five (25)	\$400	\$10,000
Telephone Line Installations	Twenty-Five (25)	\$200	\$5,000
Photocopier	One (1)	\$2,000	\$2,000
TOTAL IT COSTS			\$62,200

C. Moving Expenses

Moving expenses is estimated at \$250 for each employee.

Cost: Fifty employees at \$250/per \$12,500

TOTAL START UP COSTS

\$368,360

Ongoing Costs**D. Operation and Managing Costs**

These costs include Detachment operating and managing costs (reoccurring annual expenditures to deal with utilities and regular maintenance of the new portion of the facility).

Operating and managing costs for Detachments have run from \$50/m² to \$70/m² for the year 2004. The \$50 cost per m² relates to a fairly energy efficient building that was built approximately four years ago. Although this is on the low side for costs, it would most likely compare to the 67th Street Detachment. There will also be an average increase of about 10 percent per year.

With this in mind, costs for the new building would be estimated to be \$70/m² with 10 percent escalations per year:

2004 - \$55.00

2005 - \$60.50

2006 - \$66.55

2007 - \$73.05

E. Human Resources

It is anticipated that a total of 50 employees would initially work out of the 67th Street Detachment. The vast majority of these people would be relocated from the downtown Detachment. There would be a need to add two additional municipal employees.

Cost: Two Municipal Employees at \$41,830/per year (including Benefits) **\$83,660**

Summary

Operating and Managing costs relating to the new addition only and including the Fire Hall addition for a total building size of 1,492.4 m² would be **\$104,468/year**. With the addition of the 2 Municipal Employees ongoing cost, the total would be **\$188,120**.

Superintendent, City of Red Deer RCMP

Jim Steele



EXECUTIVE SUMMARY

Purpose

The City of Red Deer RCMP Detachment is currently housed in one location in the city's downtown. Due to the growth of the city, the corresponding increase of required staffing and changes in standards for RCMP facilities, the Detachment has outgrown their existing space. To improve access and response times to north Red Deer and Queen Elizabeth II Highway access, a satellite station is recommended.

In addition, a satellite station would facilitate cooperation and interaction between the Emergency Services Department and the RCMP.

Methodology

The project methodology consisted of reviewing previous reports and documentation, site visits and review of the existing building and site, preparation and refinement of a space analysis program, a series of meetings with the Steering Committee and users of the proposed facility, and the preparation and analysis of several alternative solutions.

Recommendations

The recommendation contained within this Concept Design Report is to proceed with a renovation and addition to the existing Emergency Services building on 67th Street based on the alternative 4 concept (two storey wedge), for the following reasons:

- The combined use of the building and site by the Emergency Services Department and the RCMP will enhance the synergies between the two Departments.
- The project will positively enhance and support the public perception that the Emergency Services Department and the RCMP are an integral unit working together to provide the best possible service to The City of Red Deer.




67th Street RCMP Detachment Concept Design Report

November 7, 2005



- The site is currently owned by the City of Red Deer, has the ability to accommodate both the immediate and future projected requirements, and provides ideal access to main arterial roads and the north side of the City.
- Alternative Number 4 (Two Storey Rectangle)
 - accommodates all of the current functional requirements of both the Emergency Services Department and the RCMP
 - allows for future main level expansion
 - allows for future second floor expansion
- The total projected costs are estimated to range between \$4,680,750 to \$5,680,000, based on current year dollars, depending on the options selected.


Stephen L. Brown
Carmine Brown

Comments:

We agree with the recommendations of the Community Services Director.

“Morris Flewwelling”
Mayor

“Norbert Van Wyk”
City Manager



COUNCIL MEETING OF NOVEMBER 21ST , 2005

ATTACHMENT

DOCUMENT STATUS: PUBLIC

**REFERS TO: 67 STREET RCMP DETACHMENT
CONCEPT DESIGN REPORT**



67 Street RCMP Detachment Concept Design Report

November 7, 2005





STEERING COMMITTEE

Stephens Kozak Carr and Brown Architects wishes to acknowledge the input of, and extend thanks to, the 67th Street RCMP Facility Planning Committee.

The committee members are:

Colleen Jensen	Director, Community Services, The City of Red Deer
Supt. Jim Steele	RCMP, The City of Red Deer
Insp. Pete Calvert	RCMP, The City of Red Deer
Sgt. Doug Cooper	RCMP, The City of Red Deer
Jack McDonald	Fire Chief/Emergency Services Manager, The City of Red Deer
Allan Kwasney	RCMP K Division, Edmonton

Our thanks are also extended to the following:

Deb Comfort	Community Services, The City of Red Deer
Carla Petley	RCMP K Division, Edmonton
Julia Burrill	RCMP K Division, Edmonton
Mike Meagher	Emergency Services, The City of Red Deer



TABLE OF CONTENTS

EXECUTIVE SUMMARY.....	3
INTRODUCTION.....	5
TERMS OF REFERENCE.....	7
METHODOLOGY.....	7
AREA MAP.....	9
AERIAL PHOTOGRAPH OF SITE.....	10
SITE DYNAMICS OVERLAY.....	11
SPACE ANALYSIS	13
RECOMMENDED ALTERNATIVE.....	17
SITE and BUILDING ANALYSIS.....	21
BUILDING SYSTEMS.....	22
BUDGET	25
APPENDIX A.....	26
APPENDIX B.....	32



EXECUTIVE SUMMARY

Purpose

The City of Red Deer RCMP Detachment is currently housed in one location in the city's downtown. Due to the growth of the city, the corresponding increase of required staffing and changes in standards for RCMP facilities, the Detachment has outgrown their existing space. To improve access and response times to north Red Deer and Queen Elizabeth II Highway access, a satellite station is recommended.

In addition, a satellite station would facilitate cooperation and interaction between the Emergency Services Department and the RCMP.

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The project methodology consisted of reviewing previous reports and documentation, site visits and review of the existing building and site, preparation and refinement of a space analysis program, a series of meetings with the Steering Committee and users of the proposed facility, and the preparation and analysis of several alternative solutions.

Recommendations

The recommendation contained within this Concept Design Report is to proceed with a renovation and addition to the existing Emergency Services building on 67th Street based on the alternative 4 concept (two storey wedge), for the following reasons:

- The combined use of the building and site by the Emergency Services Department and the RCMP will enhance the synergies between the two Departments.
- The project will positively enhance and support the public perception that the Emergency Services Department and the RCMP are an integral unit working together to provide the best possible service to The City of Red Deer.



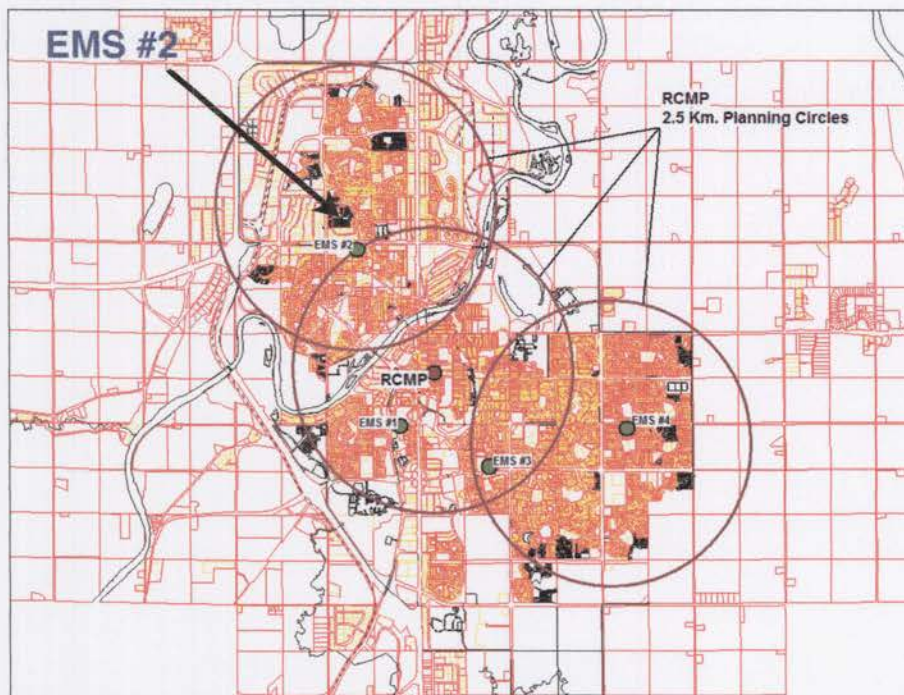
- The site is currently owned by the City of Red Deer, has the ability to accommodate both the immediate and future projected requirements, and provides ideal access to main arterial roads and the north side of the City.
- Alternative Number 4 (Two Storey Rectangle)
 - accommodates all of the current functional requirements of both the Emergency Services Department and the RCMP
 - allows for future main level expansion
 - allows for future second floor expansion
- The total projected costs are estimated to range between \$4,680,750 to \$5,680,000, based on current year dollars, depending on the options selected.



INTRODUCTION

Purpose

The Red Deer City RCMP Detachment is currently housed in one location in the city's downtown. Due to the growth of the city, the corresponding increase of required staffing and changes in standards for RCMP facilities, the Detachment has outgrown their existing space. To improve access and response times to north Red Deer and Queen Elizabeth II Highway access, a satellite station is recommended.



This satellite station would support the full services of the RCMP with the exclusion of permanent exhibit lockers.

The current Emergency Services Department Station #2 is located at 58th Avenue and 67th Street in north Red Deer. It has been determined that this site has sufficient space to accommodate an RCMP facility.

In March of 2005 the firm of Stephens Kozak Carr and Brown Architects was commis-

sioned to investigate the feasibility of accommodating the required RCMP operational functions and increased Emergency Service requirements within a new facility on the existing Emergency Services Department Station #2.

This project supports recommendations in the Crime Prevention and Policing Study, completed in 2004 by Converge Consulting Group, which suggests a move toward a 'precinct' model. Supporting this recommendation, City Council has agreed to move forward to the Concept Design phase in order to establish the associated costs to provide the required facility.



To address the safety and policing needs of the community, the City of Red Deer is identifying long-term solutions that will provide effective police and Emergency Service response and ensure adequate space is available for the RCMP members and associated municipal support staff and Emergency Service personnel. In addition, The City must ensure that every effort is being made to achieve these solutions in a prudent, visionary manner.

A brief summary of some of the key issues are:

- provide for the work space requirements for both the RCMP and Emergency Services staff
- increase the efficiency of the existing Fire Hall operation and ensure the increased requirements are accommodated
- provide secure storage areas
- provide equipment and vehicle storage space for both the RCMP and Emergency Services
- optimize street access and egress to and from the site
- ensure optimum usage of the existing site
- maximize potential cost savings and issues related to the Emergency Services facility currently located on the site by combining the RCMP and Fire Hall upgrade projects
- ensure optimization of possible synergies between the RCMP and Emergency Services in terms of personnel interaction, use of common facilities and use of common materials and equipment
- Develop a comprehensive cost estimate for the project to allow The City of Red Deer to commit the required funding and time scheduling to complete the project recommended
- Consider future requirements and allow for the future expansion of the facility

At current staffing levels, a total estimate of RCMP and civilian staff would be 50 with the largest shift to work out of the RCMP portion of the building at any one time, being approximately 25 people. It is important to note that the suggested staffing levels are in response to the city's growth, as outlined in the Crime Prevention and Policing Strategy, which was adopted by City Council as a planning tool and guideline only.



TERMS OF REFERENCE

The consultants were to review documents provided which were related to the project:

- Crime Prevention & Policing Study
- The Dillon Report (Emergency Services)
- Preliminary RCMP "Space Analysis/Comparison by RCMP 'K' Division"
- Site Plan and Drawings of existing Emergency Services Facility
- Business Plans, organizational structures, related to the RCMP
- Preliminary site assessment completed by The City's Engineering Department
- RCMP "Accommodation Space Allocations for Detachment Buildings"
- RCMP "Site Standards and Guidelines"
- RCMP "Building Standards and Guidelines"
- RCMP "Fit-Up Standards"
- RCMP "Physical Security Guides"

METHODOLOGY

The project methodology consisted of:

- a review of all documents forwarded by the Steering Committee as listed above.
- a visit to the existing site to assess the site and the site constraints as well as to review the condition of the existing Fire Hall.
- a review of and comments on the RCMP Space Analysis/Comparison document and Emergency Service requirements. Following discussions, some revisions were made to the space requirements.
- The revised Space Analysis document was used to test the viability of the site and to explore several planning alternatives in order to optimize site utilization, RCMP/Emergency Services synergies, functional optimization, best value for moneys expended, and the ability to expand in the future.
- Four scenarios were developed:
 1. Alternative 1 (one storey "wedge") - staying within existing site constraints
 2. Alternative 2 (two storey "wedge") - staying within existing site constraints
 3. Alternative 3 (one storey "rectangle") - extending into gas right of way
 4. Alternative 4 (two storey "rectangle") - extending into gas right of way

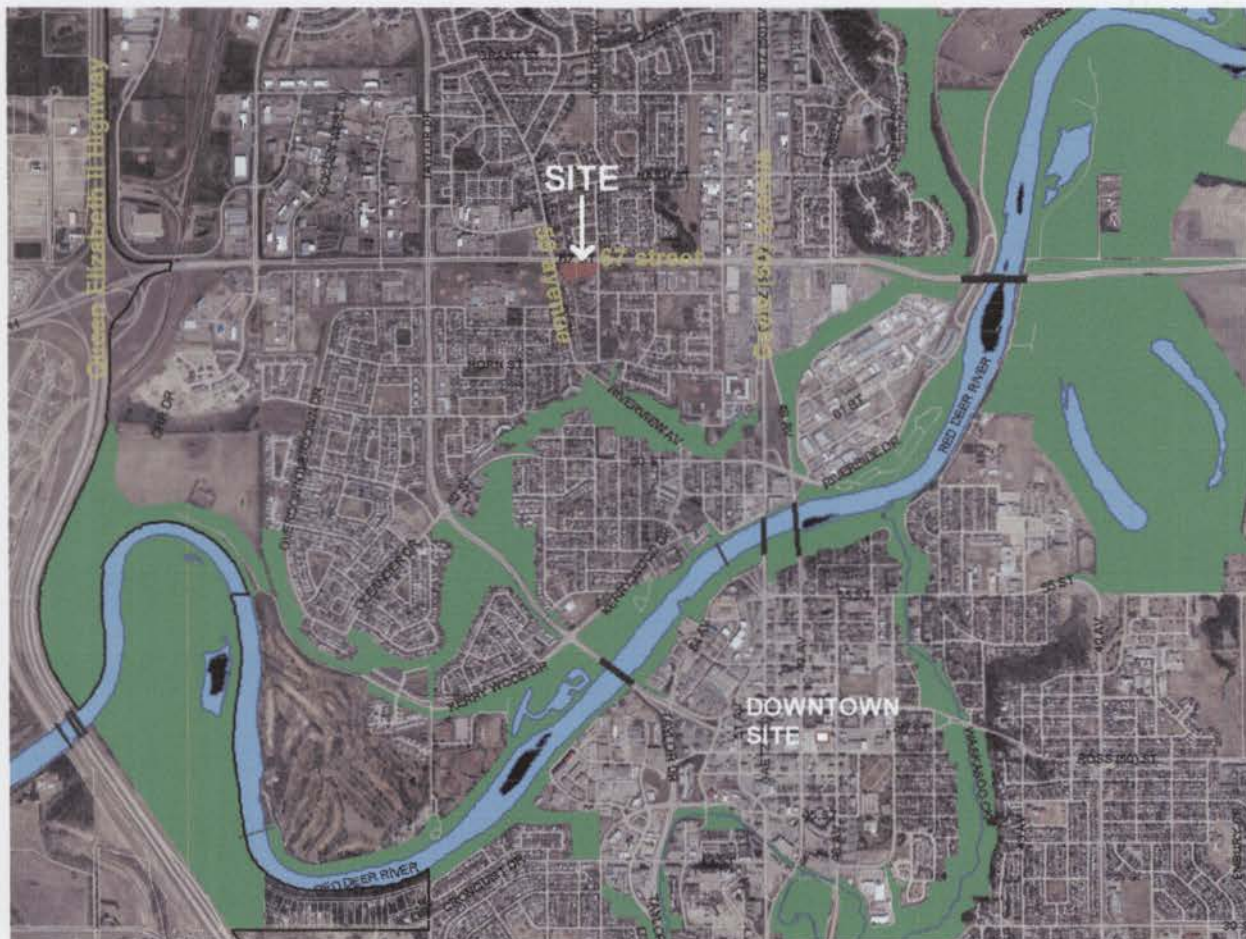
The plans and site plans of all of the options are represented in Appendix B.



- a series of ongoing meetings with the Steering Committee for discussions and feedback on the direction, content and progress of the study
- cost analysis of each viable solution was established



AREA MAP



This indicates the relationship of the existing Emergency Station #2 to the Downtown facility, access to north Red Deer and to Queen Elizabeth II Highway.

Note that the green areas represent the flood plain areas.

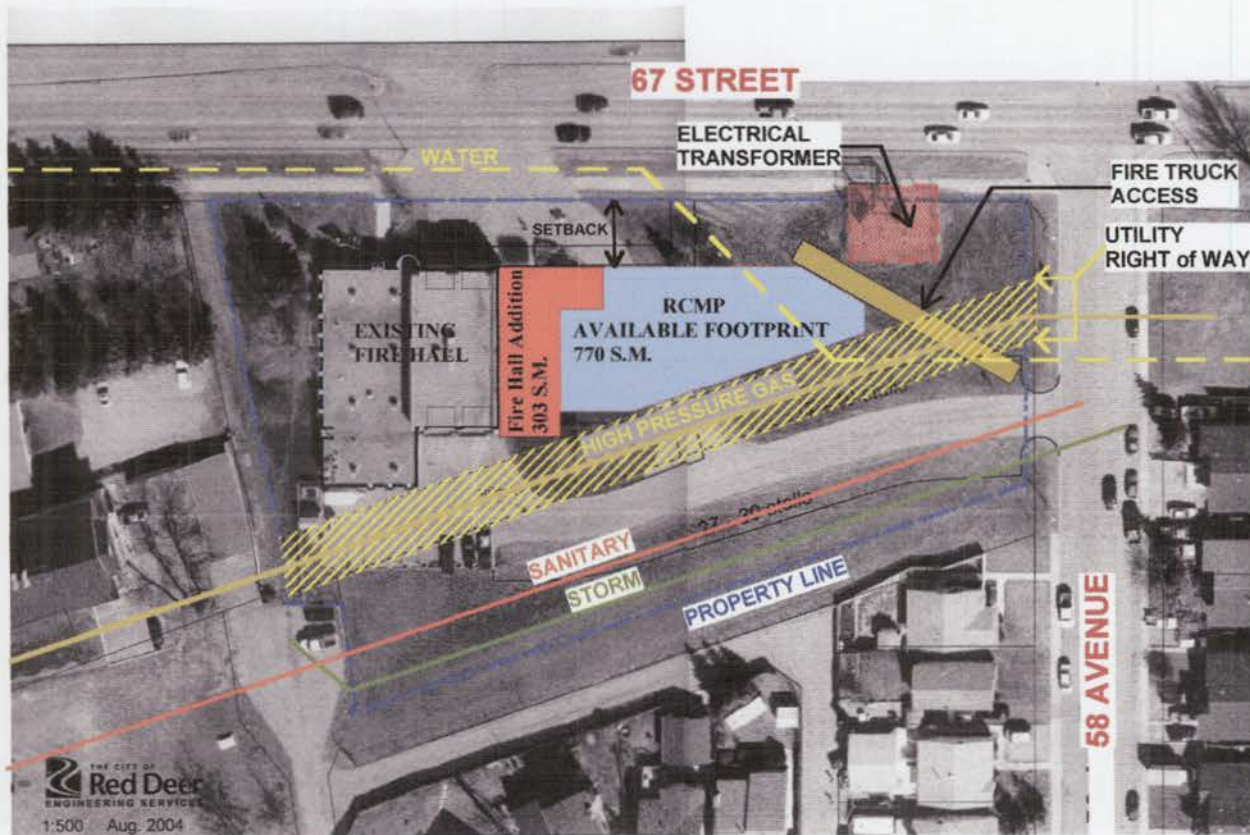


AERIAL PHOTOGRAPH of the SITE





SITE DYNAMICS OVERLAY



- In the mid 1970's City Council had the foresight to secure a piece of property for the Emergency Services department which was ideally suited to provide access to several main arterial roads and areas of the city. The site can accommodate both the expanded Emergency Service requirements as well as the new RCMP Detachment operations.
- As The City of Red Deer currently owns the site, there is no purchase price to add to the cost of the proposed project.
- The site is already familiar to the citizens of Red Deer as the delivery point of Emergency Services
- The addition of the RCMP services will be a visual reinforcement of the synergies being developed between the two departments. The public at large will observe that the two depart-



ments are working out of one facility and see that the Emergency Services Department and the RCMP are an integrated unit working together to better serve The City of Red Deer. This will create a much more positive image in the community.

- The increased interaction of the two Departments will assist with interdepartmental cooperation and understanding of each others' needs at scenes that are jointly responded to, such as motor vehicle accidents, domestic disputes, overdoses, fires, hazardous materials spills, etc., because people who are more familiar with one another will work better together.
- Increased Department interaction will promote a better understanding of the resources each Department could provide to the other when needed - thermal imaging cameras, breathing apparatus, chemical detectors, and other various types of specialized apparatus.
- The shared facilities and the resultant interactions between the Departments will reinforce to the members that they are part of a much bigger team and that they are all an integral part of The City of Red Deer.
- The addition of the multi-purpose (or community meeting room) will facilitate community interaction with the departments.
- The physical constraints of the site include:
 - The required front yard setback along 67 Street negates the ability to build or park within its area.
 - The existing main water line will have to be relocated in order to extend the existing building.
 - The existing electrical transformer location limits the ability for further future expansion of the facility. Although it does not have to be relocated at this time, consideration should be given to its future relocation.
 - The high pressure gas line and associated right of way severely limits the potential of the site. This must be relocated in order to make the site useable for this project.



SPACE ANALYSIS

The following table represents the final Space Analysis/Comparison for the Red Deer Detachment and Fire Hall at 67th Street.

The table was based on the original information provided by RCMP K Division and The City of Red Deer Emergency Services. The information was modified during the study process in collaboration with K Division, RCMP Red Deer and The City of Red Deer. The revisions include the addition of 2 Holding Cells, Secure Garage Bay, Guards' Station, and Prisoner Effects area, an increase in area of the Multipurpose Area and Apparatus Bay and the deletion of 1 Garage Bay.

AREA NAME	AREA (square meters)	REMARKS
EXERCISE ROOM	40.0	* shared space in the Fire Hall area
INTERVIEW, PUBLIC (1)	9.5	
INTERVIEW, PUBLIC (2)	9.5	
INTERVIEW, SOFT	9.5	
STORAGE, JANITOR	5.0	
LOCKER/WASHROOM - MALE	54.0	
LOCKER/WASHROOM - FEMALE	26.0	
OFFICE - VICTIM SERVICES	11.0	
MAIN WORK STATION	35.0	
MULTI-PURPOSE ROOM	100.0	* backup Emergency Operations Centre
PRIVATE OFFICE - NCO i/c	11.0	general duty
PRIVATE OFFICE - NCO i/c	11.0	traffic
PRIVATE OFFICE - NCO i/c	11.0	bylaw
PRIVATE OFFICE - ME Supervisor	11.0	
GENERAL OFFICE - RM	75.0	12 members
STORAGE - GENERAL OFFICE	50.0	
LAN/SERVER ROOM	6.0	
TELEPHONE	6.0	
MONITOR ROOM	7.5	



AREA NAME	AREA (square meters)	REMARKS
STORAGE - RECORDS	25.0	includes PIRS data entry area
VESTIBULE - PUBLIC ENTRY	3.5	
VESTIBULE - STAFF	3.5	
CLOSET - STAFF	0.0	included in gross-up factor
WASHROOM - FEMALE	0.0	included in gross-up factor
WASHROOM - MALE	0.0	included in gross-up factor
WASHROOM - PUBLIC	5.0	barrier free
RECEPTION - PUBLIC	19.0	
BAY - GARAGE	31.5	
BAY - SECURE	40.9	
BREATHTEST/PHOTO/FINGERPRINT	10.0	
INTERVIEW - SECURE (1)	9.5	
INTERVIEW - SECURE (2)	9.5	
CELL (MALE)	9.0	
CELL (FEMALE)	9.0	
GUARD STATION	12.0	
PRISONER EFFECTS	2.0	
STORAGE - JANITOR	5.0	
STORAGE - COLD	44.0	
STORAGE - FOUND PROPERTY	44.0	
POLICE EQUIPMENT	17.0	
APPARATUS BAY	238.6	to also be utilized as a maintenance area
WORKSHOP	40.0	2 levels
NET FLOOR AREA	1,066.0	
GROSS FLOOR AREA	1,492.4	grossed up by 1.4



Emergency Service Mechanical Operation

The Emergency Service department plans to relocate the Suppression Function out of Station 3 (to the Aspen Ridge site) in 2009. This will enable the Department to review the status of its Mechanical Branch and relocate this function to a more appropriate site.

Currently the Department's two mechanics work out of Station 3 in an undersized, outdated, and poorly located (in relation to the primary suppliers' locations) shop. By relocating the function to the 67th street site, in an additional Apparatus Bay sized to suit the required equipment, the functions will be more productive, and the result will be less down time for the emergency vehicles and an improved preventative maintenance program. It is a Provincial requirement to annually certify ambulances and fire vehicles, and the mechanics at Station 2 would be able to perform this function in the upgraded and properly outfitted new space.

The proper performance and timeliness of preventive maintenance pays for itself many times over when it prevents costly repairs that could have been avoided, and liability issues are mitigated. As well, the more efficient use of the mechanics' time (instead of driving across the city several times each day) will result in further efficiencies and benefits.

Breath Test and Cell Functions

Since January 2005, the RCMP have conducted 380 breath tests in the Downtown Detachment and project that a total of between 450 and 500 tests will be conducted by the end of the year. This will be approximately 160 more than in 2004. With Red Deer's increasing population and the heightened focus on curtailing impaired driving, the number of breath tests will continue to increase correspondingly.

Conducting such a high volume of tests in one location creates operational concerns. The majority of tests are carried out on weekends, causing delays in testing due to lack of space and equipment to handle the volume. Although it has not been an issue to date, it is only a matter of time before lawyers make an issue out of test delays and waiting times before samples are taken. In addition, and perhaps more importantly, delays and waiting tie up RCMP members whose presence "out on the streets" is critical. The RCMP estimate that approximately one third of the breath tests are taken from subjects that have been apprehended on the north side of the City. As such, the RCMP will probably conduct over 150 tests per year at the new detachment on 67 Street.

With the inclusion of the breath test function at the 67th Street Detachment, there will now be a requirement for other supportive functions in dealing with detaining persons under arrest and while the bookings take place. As per Policy from RCMP Departmental Security Services (DSS) there is a requirement for other amenities that make up a complete Detention Area to be provided as well (ie. Cells, Guard Station, Prisoners' Effects, Secure Interview Room ,etc.).



In addition to existing Policing pressures in the north end of the city, the provision of cells at 67th Street is also an alternative to assist with policing overflow from the Downtown Detachment until a new solution is created to replace the existing Downtown situation. Creating cells in the 67th Street Detachment will also reduce the future requirement for cell provisions in the Downtown solution. Providing alternate locations is also of benefit in times of emergency or uncontrollable circumstances where one building may be rendered inaccessible.

Multi-Purpose Room

The Multi-Purpose area has been sized and designed to be used for a variety of functions and to be used by both agencies either separately or in combination.

- Community interest groups such as Neighbourhood Watch, COPS, etc., that are associated with either the Fire Department or the RCMP will use this area to hold general meetings.
- The area will be used by both groups to conduct in-house training, either individually or as a joint group.
- The area will be used to conduct various scenarios which depict situations that both departments would be involved with.
- The area will function as a secondary or back-up Emergency Operations Centre in the event that the downtown location is compromised.

Exercise Room

The Exercise Area in the existing building will also be utilized by the RCMP members who will be working out of the new facility.

ONE STOREY and TWO STOREY OPTIONS

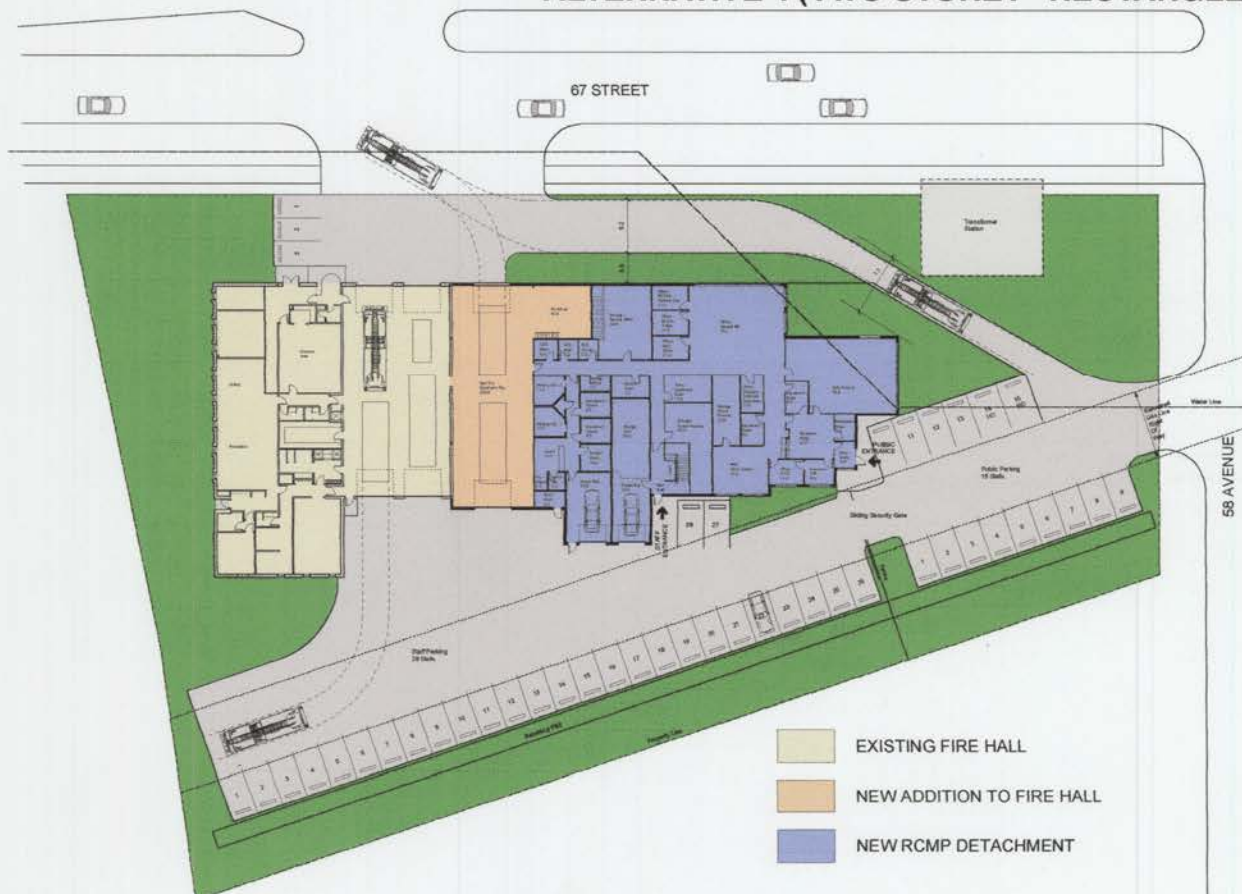
The gross floor area of the new facility as a one level solution is projected to be approximately 1,492.4 square meters. This immediately rejects Alternative 1 (one storey "wedge") as a possible option due to site restrictions.

When considering a two storey option it is important to realize that it is not possible to reduce the footprint size of the building by 50%, or down to 746.2 square meters. The functional requirements of the operation dictate that certain areas be maintained at a common level at grade. Grossing up the floor area, means that the area of the second level will be in the range of 100 square meters. In addition, two barrier free washrooms are required on the main floor and two stairwells (and possibly an elevator) are required. The main level footprint on the site will, therefore, be in the range of 1,325 square meters. This also rejects Alternative 2 (two storey "wedge") as a viable option.



RECOMMENDED ALTERNATIVE

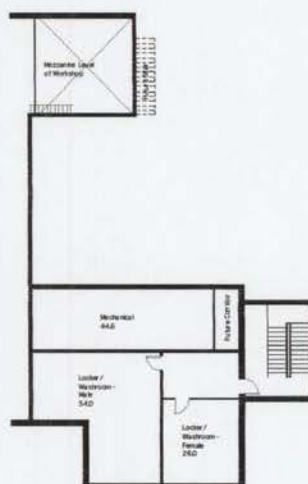
ALTERNATIVE 4 (TWO STOREY "RECTANGLE")



POSITIVE ATTRIBUTES	NEGATIVE ATTRIBUTES
<ul style="list-style-type: none"> • Allows clearance for fire trucks to the front of building • Is minimal room for main floor expansion • Provides area for future second floor expansion • Does not require relocation of the transformer • Easy access to Fire Hall exercise area • Is a functional and efficient floor plan • Good overview of parking areas 	<ul style="list-style-type: none"> • Requires relocation of gas line right of way

[illegible]

MAIN LEVEL



UPPER LEVEL



Elevations



NORTH ELEVATION



EAST ELEVATION



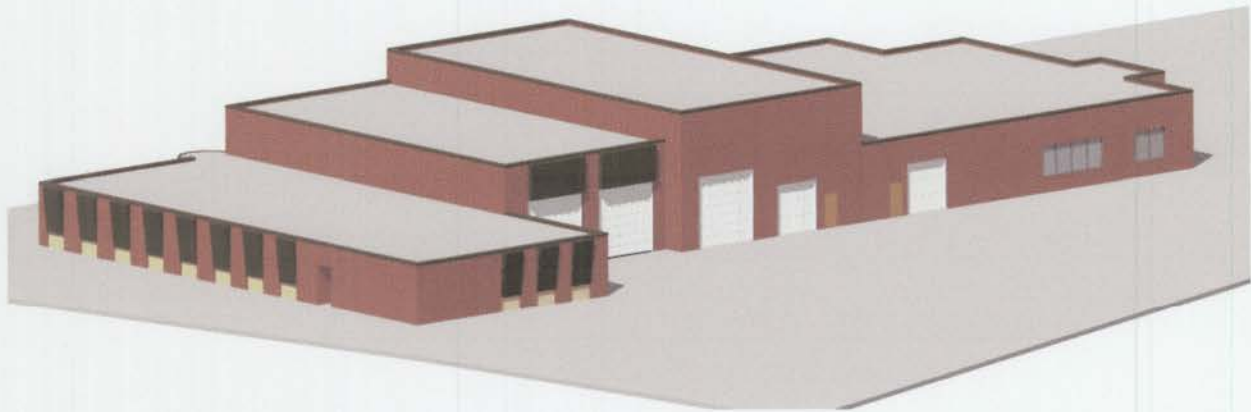
SOUTH ELEVATION



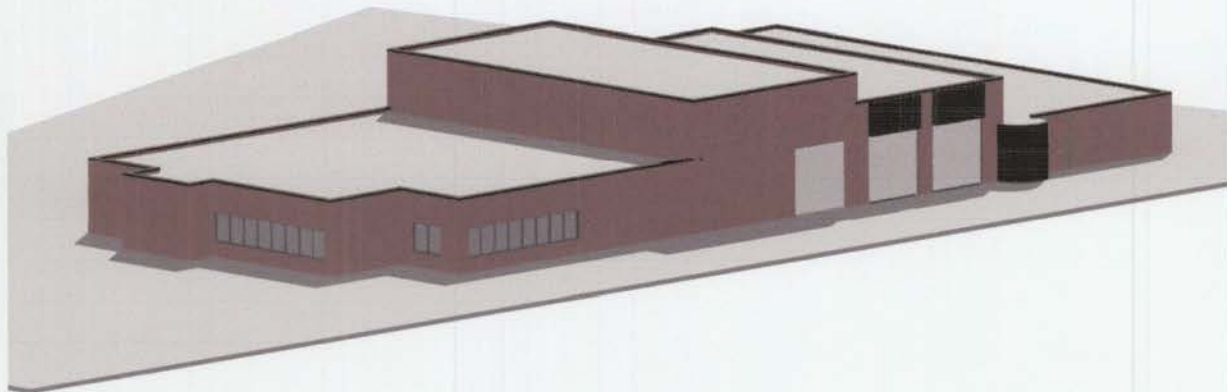
WEST ELEVATION



Perspectives



PERSPECTIVE FROM SOUTH-WEST



PERSPECTIVE FROM NORTH-EAST



SITE and BUILDING ANALYSIS

The main objectives of this design are the development of the best possible functional plan and the design concept of a joint use Fire Hall and RCMP facility that will result in a cost effective, energy efficiency that will satisfy all of the user requirements and meet the vision and quality control requirements of the RCMP, The City of Red Deer and the Emergency Services Department.

- The projects makes use of an existing site owned by The City of Red Deer and eliminates the cost implications of buying a new site.
- The site optimizes access to main arterial roadways.
- The site and buildings promote the image of joint Emergency Services and RCMP synergies to the surrounding community.
- Meets the requirements of the RCMP Space Analysis.
- Meets all of the operational relationship requirements of the RCMP.
- Complies with all of the relevant RCMP fit-up standards.
- Provides the best joint-use and shared use of the exercise facility between the RCMP and the Emergency Services personnel.
- RCMP Property Management Manual; Building Standards have been met with specific attention to "Office Space Series 200" "Prisoner Security Series 500", and "Projects Requiring Enhanced Security or Communications".
- Consideration for future expansion has been taken into account.
- CPTED (Crime Prevention Through Environmental Design) guidelines are incorporated into the site and building design.
- Principals of "Planning, Designing, and Constructing Police Facilities" training programs presented by the International Association of Chiefs of Police have been applied.
- The building is clearly zoned in terms of separation of public areas, operational areas, and the restricted secure areas. This facilitates control of access to the various areas and provides natural levels of security achieved by the planning of the building.
- The front counter area has total visibility and control over the public areas consisting of the Soft Interview, Public Washroom, Public Interview, and Multi-Purpose room areas.



- The front counter is not directly in line with the Public Entrance in order to minimize the image of control and confrontation to the public. This also ensures that the front counter does not have direct sight-lines for passing motorists and pedestrians to eliminate the possibility of pass-by shooting.
- The Multi-Purpose Room will provide a back-up facility to the current downtown Emergency Operations Centre (OEC).
- The Multi-Purpose area will be used for meeting with and between community groups, fostering closer ties with the surrounding community.
- The building has been designed incorporating "barrier free" principals.
- The site has been planned to clearly separate parking areas for the public, staff parking, police vehicle parking, and emergency vehicle access.
- The building has been designed to be energy efficient. The building will be capable of achieving a minimum of LEED Certification and will qualify for the Commercial Building Incentive Program (CBIP).

BUILDING SYSTEMS

Architectural

- The massing and materials of the addition have been designed to be compatible and integrate with the existing Fire Hall structure.
- The exterior wall construction will consist of exterior face brick to match the existing Fire Hall building, over rigid insulation, exterior sheathing, metal studs and gypsum board.
- The roof will be an SBS sheet membrane flat roof with a positive slope to drainage.
- The floor construction will be a concrete slab-on-grade.
- The interior wall in the secure areas will be concrete block.
- The interior walls in other areas will be gypsum board on metal studs.



Structural

- Structurally, our challenge is not only to look at the building as a static structure, but also to be concerned with how the building might evolve as occupant needs change, or how it will accommodate the rapid growth of information technology, and ensure that the structural system chosen is flexible to accommodate those future changes.
- Appropriate snow loading will be incorporated into the roof design due to differences in roof heights.
- Roof and structural systems will be comprised of steel columns and beams and open web steel joists.

Mechanical

- The HVAC system for the facility will be designed to provide optimum and comfortable environments specified for each area.
- The system in the existing Fire Hall is not expandable. The new additional areas will be serviced by a new mechanical system. The system options are a series of roof top units or units within an enclosed Mechanical Room within the building. The mechanical system preferred is units within a Mechanical Room, which will support ease of year-round indoor maintenance activities.
- It is proposed to provide a fire suppression system (sprinklers) for the new areas.

Electrical

- There is no capacity within the existing Fire Hall to service the new addition. The new facility will be serviced by the local power utility from a new power distribution system.
- Although an emergency generator is not required by code, provisions will be made to accommodate a future portable generator unit to be located outside of the building.



- Lighting systems will utilize four foot T8 fluorescent lamps and will have electronic ballasts with low Total Harmonic Distortion rating (THD) in order to limit harmonic content and its associated effects within the electrical distribution system.
- The building exterior and site lighting will be designed to suit all security requirements.
- Voice and data systems will conform to all RCMP requirements.



BUDGET

	ITEM	COST
	new RCMP Building - main level	\$2,108,250.00
	new RCMP Building - upper level	\$265,000.00
	Fire Hall - addition	\$457,500.00
	Fire Hall - renovations to existing	\$200,000.00
	Site Work - landscaping and parking	\$500,000.00
	Site Servicing	\$60,000.00
	Contingency / risk factor	\$400,000.00
Sub Total	COST OF CONSTRUCTION	\$3,990,750.00
	Water line relocation	\$125,000.00
	High pressure gas line right of way relocation	\$95,000.00
	Retaining wall at south face of parking area	\$20,000.00
	Soft Costs (consultants' fees, testing, surveys, etc)	\$450,000.00
	Land purchase cost	\$0.00
Sub Total	PROJECT COST	\$4,680,750.00
Optional Item	Build structure to accommodate future total second floor	\$30,000.00
Optional Item	Provide building exterior shell for full second floor	\$925,000.00
Optional Item	Relocate electrical transformer station	\$700,000.00

The budget figures are based on construction commencing in May of 2006

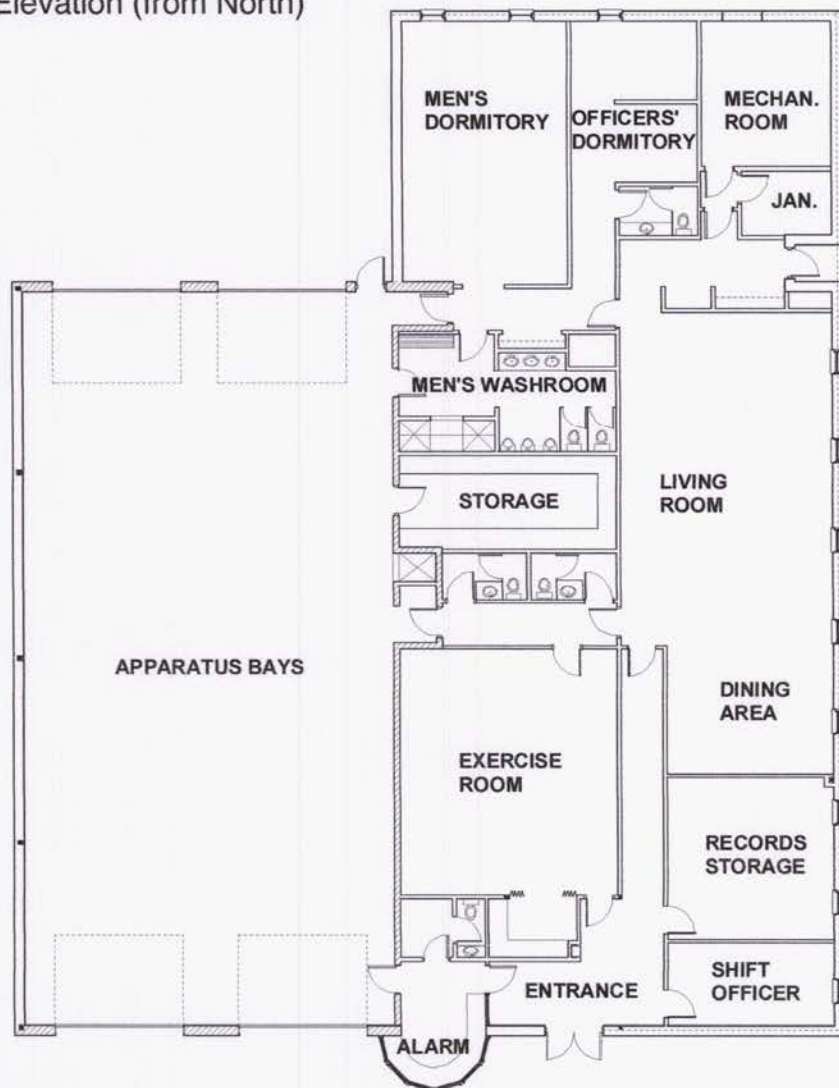


APPENDIX A

EXISTING FIRE HALL CONDITION REPORTS



67 Street Elevation (from North)



Existing
Floor Plan



interior Apparatus Bay



back berm from east



electrical transformer



site from east



ARCHITECTURAL REPORT

ROOFING: The existing built-up roof has been maintained on an annual basis and is still serviceable, but is reaching the end of its practical life expectancy. Consideration will be given to re-roofing the existing building with an SBS membrane in conjunction with the new construction.

EXTERIOR CLADDING: Brick masonry is on the complete exterior and is in excellent condition. No remedial work is required. The texture and exact colour of the existing brick may be difficult to match in the new construction.

EXTERIOR WINDOWS and DOORS: The building still has its original windows and entrances. Drafts have been reported in the Control Room and the recommendation is to replace all of the windows for improved energy efficiency reasons. The main entrance doors are currently scheduled to be replaced and a new vestibule provided.

APPARATUS BAYS: The overhead doors and operators are new.

CONCRETE FLOOR SLAB: No major problems were observed or noted.

OFFICE AREA FLOOR: Area outside of the apparatus bays have a floor system constructed of wood trusses over a crawl space. The structural system is sound. The crawl space was dry and there was no indication of mold being present.

EXTERIOR WALLS: No problems were noted.

INTERIOR WALLS: No problems were noted, however repainting is recommended.

FINISH FLOORING MATERIALS: The existing floor finishes are nearing the end of their projected life expectancy and should be replaced.

SITE: The asphalt paving is in good condition although most of the asphalt will be reworked for the new construction process.



STRUCTURAL REPORT

Structurally, the building can be divided into two major areas. The first area is the administrative part of the building and the second is the apparatus area. The structure of the administrative area consists of concrete piles and grade beams as foundation and wood joist supported by wood bearing walls as the superstructure. The apparatus bay structure consists of concrete piles and grade beams as foundation and wood trusses supported by masonry block bearing walls as the superstructure.

The preliminary review unveiled that the apparatus bay floor slab is a structural slab. In the administrative part, the main floor has been constructed with wood framing over a crawl space.

A number of cracks are visible on the apparatus bay slab and on the masonry block walls in the same area. At this point, they do not seem to affect the integrity of the structure.

Based on our visual observations, the structure appears to be within an acceptable range of performance and no immediate structural repair is required at this time.

MECHANICAL REPORT

The building contains an administrative area and an apparatus bay area. The administrative portion heating, ventilation, humidity and cooling requirements are met by three gas fired furnaces. Furnace FU-1 (45 kW input) has been modified to serve the west side of the building. Furnace FU-2 (32 kW input) has been modified to serve the interior area and north control room. Furnace FU-3 (26 kW input) serves the south perimeter spaces. These furnaces are approximately three years old and appear to be in good working order. Each furnace contains a drum style humidifier and cooling coil. Condensing units are located on the roof above the mechanical room. Two of the units appear new and one appears to be beyond its useful service life.

The apparatus area is heated via gas fired radiant tube heaters and ventilated with a make-up air/exhaust fan system in conjunction with CO detectors. The radiant tube heaters appear to have been recently installed and are in good working condition. The make-up air unit is still the original piece of equipment and though no problems were reported, it is beyond its life expectancy and could fail at any time.

Plumbing systems appear to be adequate and fully functional. A preliminary visual inspection of the crawlspace revealed locations where water or drainage leaks had occurred and been re-



paired. The sump and pump in the crawlspace were dry. This system was not tested for operation.

In general, the building mechanical systems appear to be well maintained and functional.

The existing mechanical systems in the Fire Station are not expandable and it would not be practical to try and incorporate them into a new addition. Any addition would require its own mechanical systems. An exception may be if there is a garage space planned for the RCMP facility. It would be possible, from a mechanical standpoint, to incorporate this into the existing Fire Station system since this should be upgraded in any case.

ELECTRICAL REPORT

The electrical systems in the Fire Hall are original equipment as installed in 1976. The Fire Hall power distribution system is rated at 300A 120/208V, 3 ph, 4 wire. There is adequate capacity in the electrical power distribution system for the requirements of the Fire Hall.

There is no capacity to connect a new RCMP detachment into the Fire Hall electrical distribution. It would be recommended that the new RCMP detachment be provided with a new power distribution system. This electrical distribution service could be sized to provide power to the RCMP detachment alone or sized to accommodate the Fire Hall as a sub-feed from the RCMP detachment.

The other systems in the Fire Hall are also original 1976 vintage and are in good condition, however are inadequate to support a new RCMP detachment.



RECOMMENDED UPGRADES

In order to meet immediate requirements as well as take advantage of cost savings and the efficiency of combining the work with the larger RCMP project, the following items should be addressed as a part of the overall scope of the project:

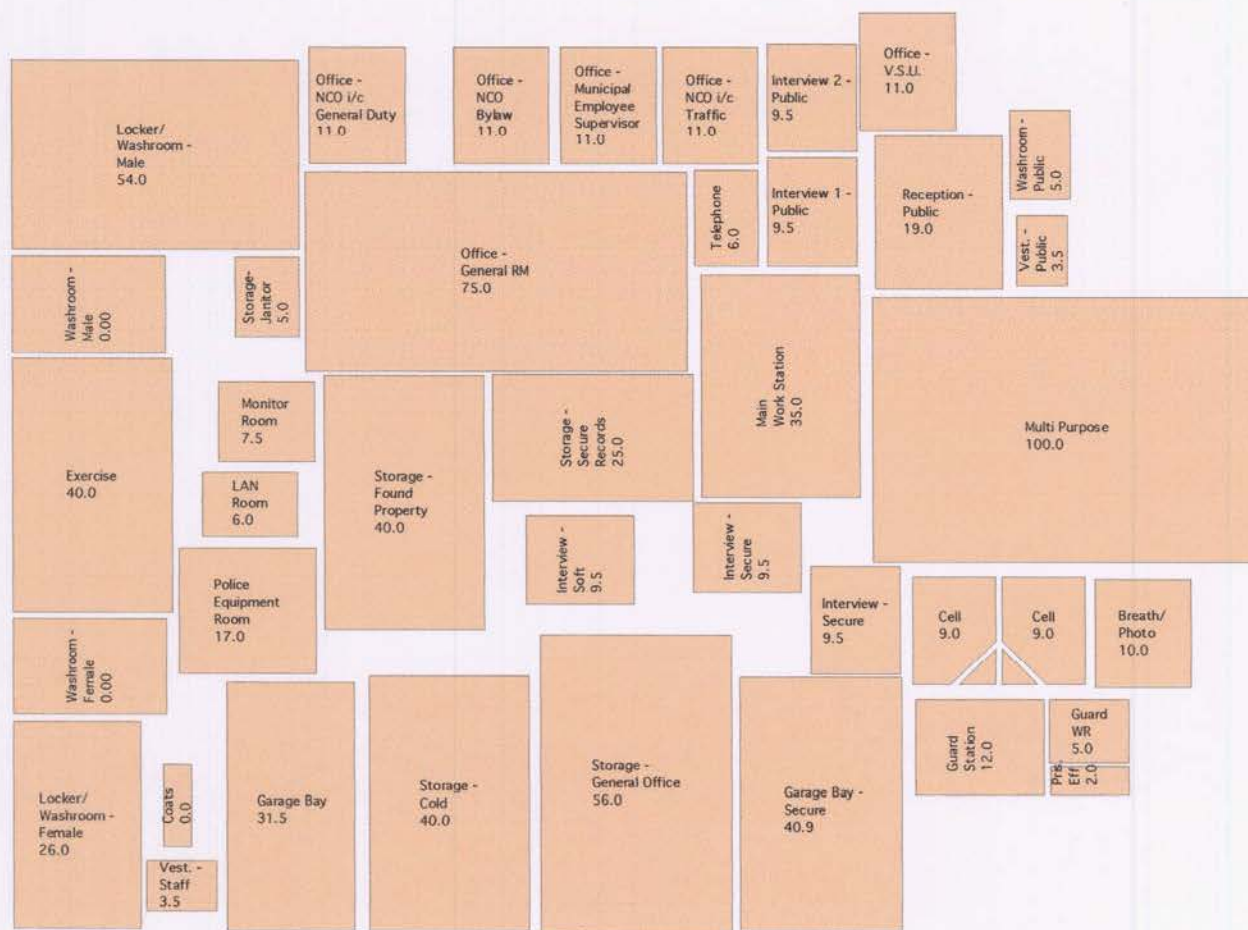
- Replace existing roofing
- Paint interior partitions
- Replace ceiling tiles
- Replace water heater
- Replace make-up air unit
- Replace exterior windows and doors
- Upgrade washrooms
- Replace flooring material



APPENDIX B

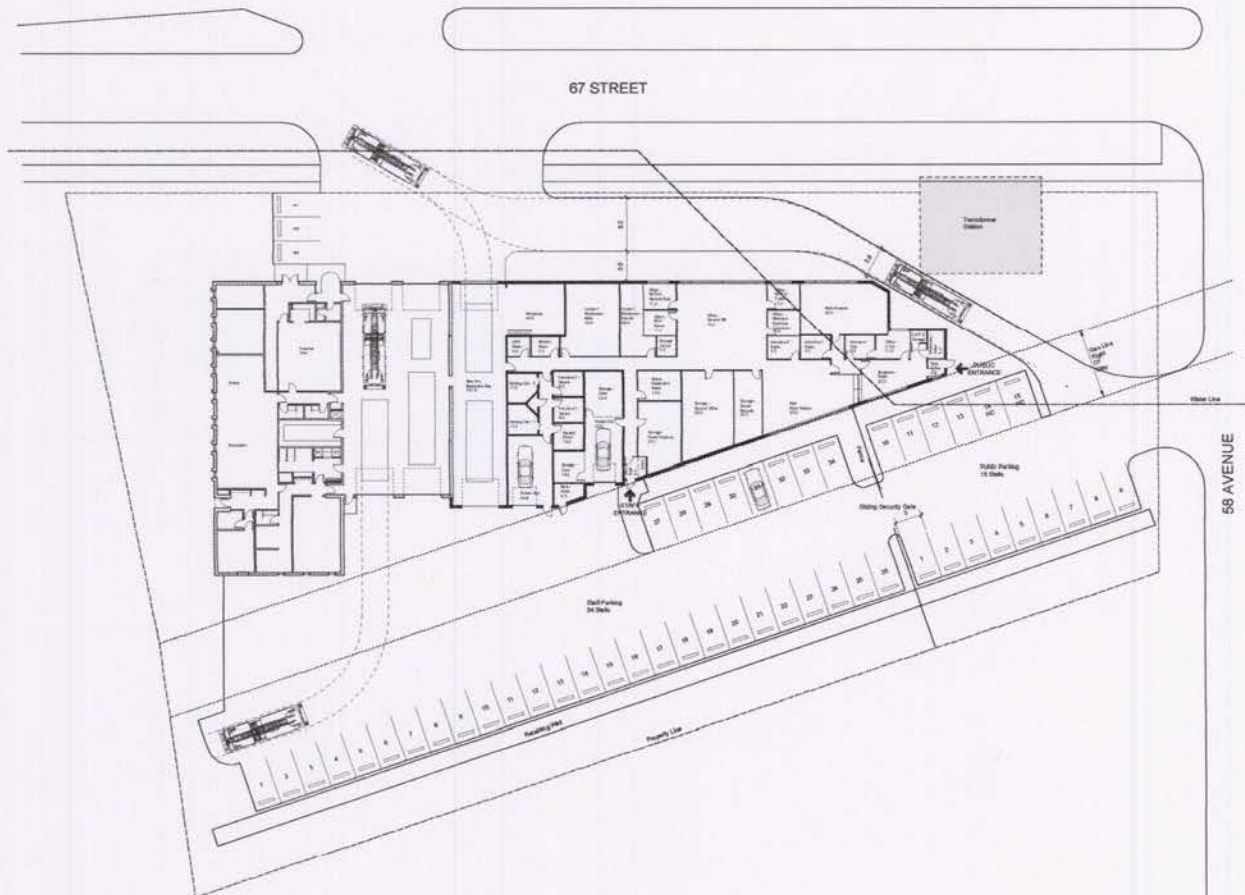
ALTERNATIVE DESIGNS

Functional area relative sizes and relationships used as the basis for the alternative layouts and studies.





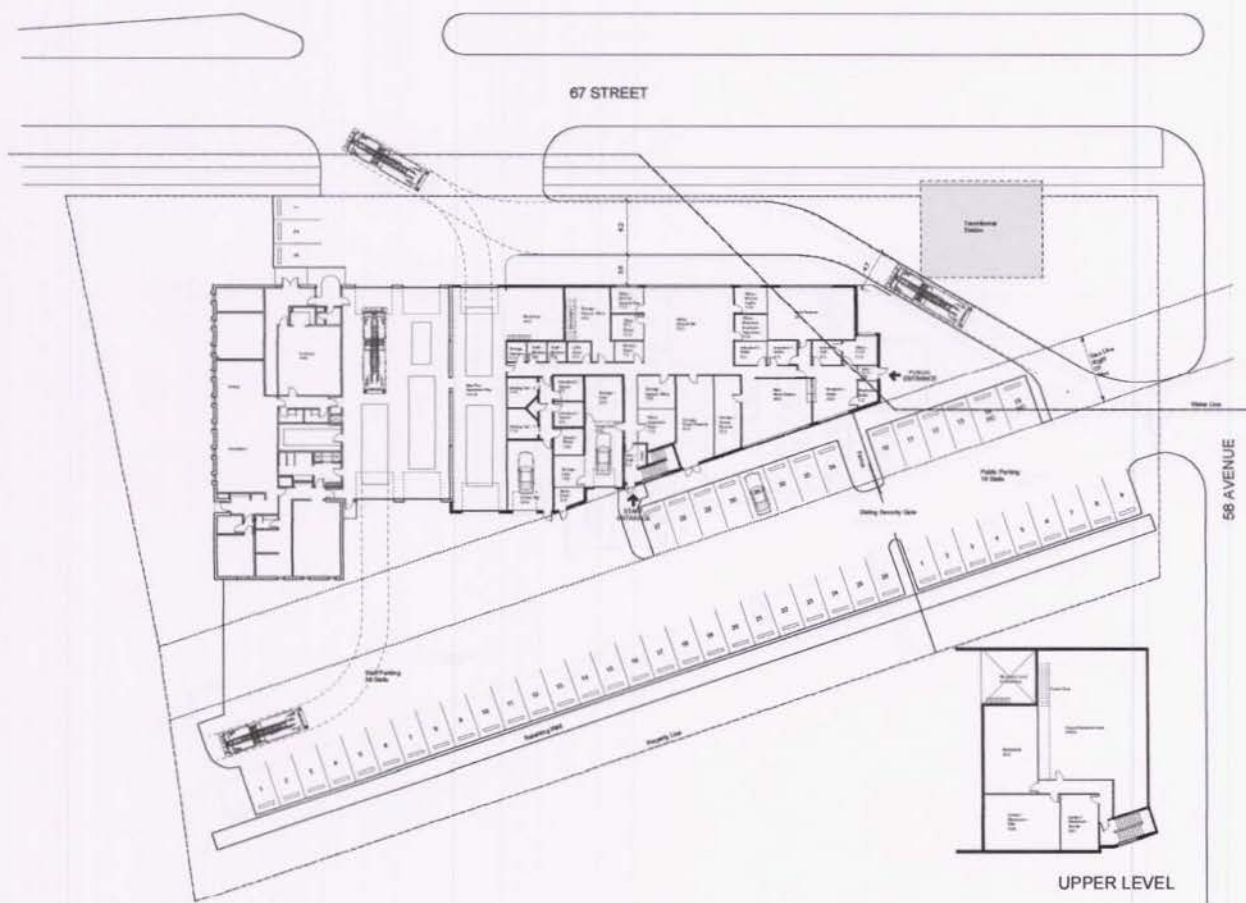
ALTERNATIVE 1 (ONE STOREY "WEDGE")



POSITIVE ATTRIBUTES	NEGATIVE ATTRIBUTES
	<ul style="list-style-type: none"> • The footprint does not accommodate the the program area requirements. The building is short 2 Cells, Guard's Area, Wash Room, and Prisoner Effects. The Apparatus Bay and Multipurpose areas are under sized. • There is no room for expansion • Emergency vehicle access is limited



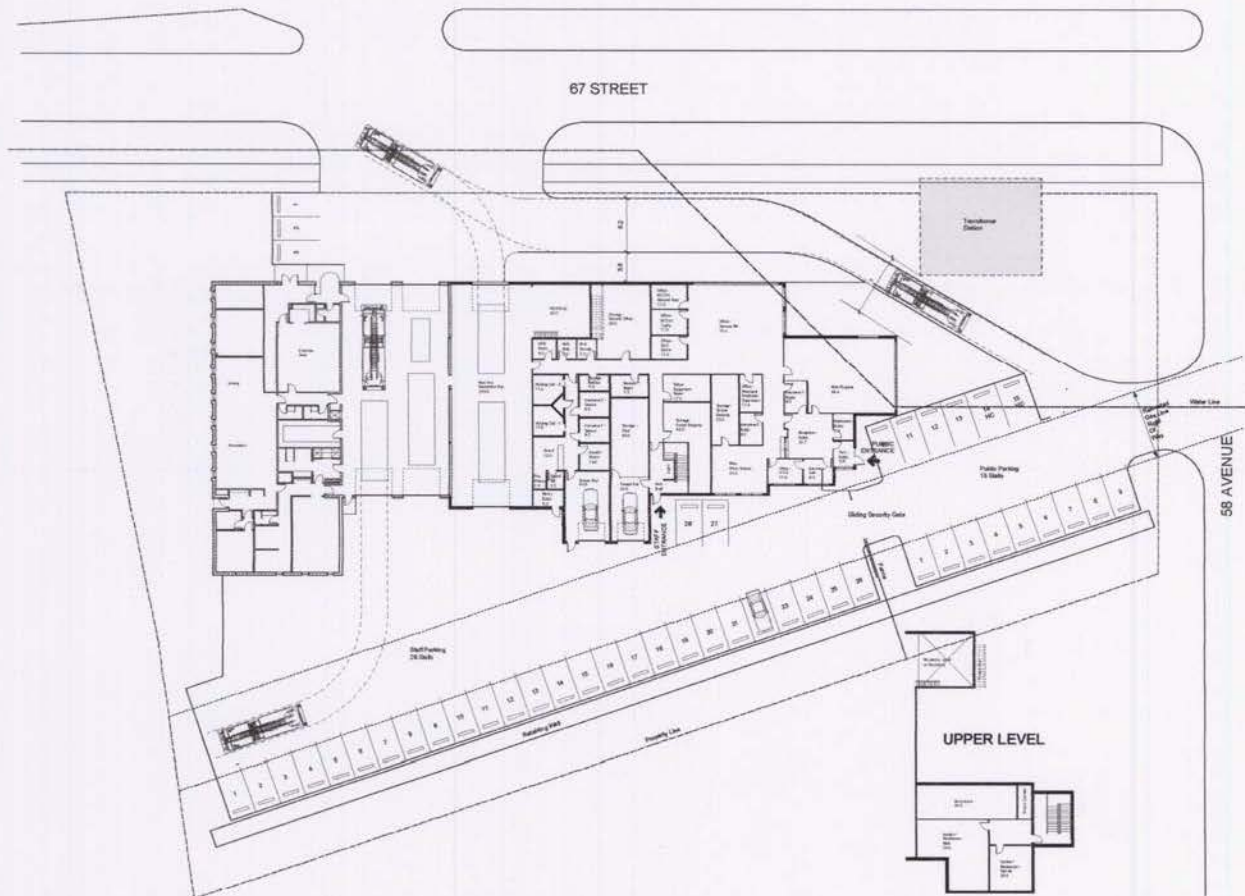
ALTERNATE 2 (TWO STOREY "WEDGE")



POSITIVE ATTRIBUTES	NEGATIVE ATTRIBUTES
	<ul style="list-style-type: none"> • The footprint does not accommodate the program area requirements. The building is short 2 Cells, Guard's Area, Wash Room, and Prisoner Effects. The Apparatus Bay and Multipurpose areas are under sized. • There is no room for expansion • Emergency vehicle access is limited



ALTERNATIVE 4 (TWO STOREY "RECTANGLE")



POSITIVE ATTRIBUTES	NEGATIVE ATTRIBUTES
<ul style="list-style-type: none"> • Meets all current program requirements. • Promotes RCMP / Emergency Services synergies • Allows future expansion of main floor • Allows future expansion of upper floor • Provides better access for emergency vehicles to front of building. 	<ul style="list-style-type: none"> • Requires relocation of gas line right of way



COST COMPARISON TABLE

	Alternative 1 (1 storey wedge)	Alternative 2 (2 storey wedge)	Alternative 3 (1 storey rectangle)	Alternative 4 (2 storey rectangle)
new RCMP Building - main level	n/a	n/a	\$2,475,000	\$2,108,250
new RCMP Building - upper level	n/a	n/a	n/a	\$265,000
Fire Hall - addition	n/a	n/a	\$457,500	\$457,500
Fire Hall - renovations to existing building	n/a	n/a	\$200,000	\$200,000
Site work - landscaping and parking	n/a	n/a	\$500,000	\$500,000
Site servicing	n/a	n/a	\$60,000	\$60,000
Contingency / risk factor	n/a	n/a	\$400,000	\$400,000
Water line relocation	n/a	n/a	\$125,000	\$125,000
High pressure gas line relocation	n/a	n/a	\$95,000	\$95,000
Retaining wall at parking area	n/a	n/a	\$20,000	\$20,000
Soft Costs (fees, testing, surveys, etc.)	n/a	n/a	\$450,000	\$450,000
Land purchase	n/a	n/a	\$0	\$0
Sub Total Project Cost	n/a	n/a	\$4,782,500	\$4,680,750
Structure to accommodate future 2nd floor (optional)	n/a	n/a	\$40,000	\$30,000
Second floor shell to full area (optional)	n/a	n/a	\$1,300,000	\$925,000
Relocate electrical transformer (optional)	n/a	n/a	\$700,000	\$700,000

Christine Kenzie

From: Deb Comfort
Sent: November 18, 2005 4:06 PM
To: Bev Hughes; Cindy Jefferies; Frank Wong; Jeffrey Dawson; Larry Pimm; Lorna Watkinson-Zimmer; Lynne Mulder; Tara Veer; Norbert Van Wyk; Kelly Kloss
Cc: Colleen Jensen
Subject: Clarification on RCMP 67th Street Report
Importance: High

Hello Everyone,
Bev has pointed out that the report on page 3 indicated that recommended concept is the (Two story wedge) and on page 4 indicates the recommended concept is the (2 Story Rectangle). Please note that the recommended concept is in fact the 2 Story Rectangle.

My apologies for the oversight and any confusion this may have caused.

Sincerely,

Deb Comfort
Strategic Initiatives Planner
City of Red Deer
Box 5008, 4914-48 Ave.
Red Deer, AB T4N 3T4
(403) 309-8500
deb.comfort@reddeer.ca

DATE: November 22, 2005

TO: Colleen Jensen, Community Services Manager
Supt. J. Steele, RCMP

FROM: Kelly Kloss, Legislative & Administrative Services Manager

SUBJECT: 67th Street RCMP Station – Concept Design Recommendations

Reference Report:

Community Services Director, dated November 14, 2005

Resolutions:

"Resolved that Council of the City of Red Deer having considered the report from the Community Services Director, dated November 14, 2005, re: North 67th Street RCMP Station – Concept Design Recommendations, hereby:

1. Accepts the Concept Design Report for the 67th Street RCMP Station and Emergency Services Station #2, as presented to Council on November 21, 2005.
2. Directs Administration to proceed with the undertaking of the Detailed Design for the 67th Street RCMP Station and Emergency Services Station #2 upgrade, based on the order of magnitude costs, as presented to Council on November 21, 2005, to begin in December 2005 and to be complete by the end of June, 2006. "

Report Back to Council: Yes

When the detailed design is complete.



Kelly Kloss
Manager

/chk

c D. Krejci, Controller
D. Comfort, Strategic Initiatives Planner



Public Works Department

Date: November 10, 2005
To: Legislative and Administrative Services Manager
From: Public Works Manager
Re: **Snow and Ice Policy Review**

Background

At the January 17, 2005 meeting Council passed a resolution directing Administration to provide information comparing The City of Red Deer Snow and Ice Control Program with that of other municipalities. Administration expanded the comparison to a full review of The City Snow and Ice Control Programs and Policies, and developed a proposed action plan to move the programs in the direction recommended as part of the review.

The comprehensive review included:

- Commissioning a study by Delta Factor Consultants and Associates;
- Obtaining public input from a Citizen Advisory Committee;
- Interviews with key stakeholder City Departments; and
- Discussions with other municipalities regarding related snow and ice programs.

Information Discovered

The review included assimilating some key statistical related data, summarized as follows:

- There has been a significant growth of roadway infrastructure in Red Deer. Approximately 250 lane kilometres of roads have been added to the roadway network over the last ten years.
- The traffic volumes on roadways have increased substantially on main thoroughfares. Gaetz (50) Avenue southbound has increased 63% and 67 Street, west of the River Bend access, has increased by 47% between 1996 and 2003.
- Resources have not kept up with growth. Only three additional pieces of snow fighting equipment have been added, but no additional dedicated staff, since 2000.

...../2

November 10, 2005
Legislative and Administrative Services Manager
Page 2 of 3

- The City spends less than other municipalities on snow and ice control. The other municipalities surveyed spend on average of 51% more than The City (\$16.79 City vs. \$25.43 average per capita).
- Using a level of service scale based on Highest Practical, Moderate, and Most Basic, The City's service level is Moderate to Most Basic. This is generally lower than the municipalities surveyed.

Discussion

The general finding from the Study and Advisory Committee work was that there is a need to change the snow and ice control policy and practices for the City. The attached document identifies key Administrative recommendations, after consideration of the different sources of input.

The Advisory Committee was requested to select from a suite of options associated with the different roadway classifications to determine a reasonable level of service. The Advisory Committee choices were:

- Highest Practical for Priority 1 and 2 roadways (generally hills, bridges, and arterial roads);
- Moderate for Priority 3 and 4 roadways (generally downtown, bus routes, industrial areas and collectors); and
- Most Basic for Priority 5 for roadways (residential).

This would require an additional \$600,000 annually to fund, based on the 2004 winter and historical analysis. (The attachment provides more details on the differences in the levels of service choices.) A one-time service plan funding requirement has been requested for 2006, to fund a \$600,000 pilot program. A pilot program is recommended to provide time to better assess staff and equipment resource requirements, the ability to meet the new service levels, and to determine the costs to maintain the higher level of service.

Next Steps

Some of the recommendations will not have a significant budget implication, so have already been implemented for the 2005/2006 winter. They are:

- Rescheduling crews to better correlate with collision statistical information;
- Prioritizing routes so that high hazard, high accident, and high traffic locations are located and mapped; and
- Changing the philosophy to plowing first and sanding later.

...../3

November 10, 2005
Legislative and Administrative Services Manager
Page 3 of 3

The process for finalizing the change to the existing Snow and Ice Control Policy still requires several steps:

- Pilot season starting January 1 2006;
- Public input and education;
- Review sidewalk program and policy;
- Confirm resource and funding required;
- Redraft Snow and Ice Policy; and
- Final recommendation to Council, fall 2006.

Recommendation

It is respectfully recommended that Council approve in principle the proposed Next Steps. This will involve commencing with the pilot program, ahead of 2006 budget approval. If the pilot funding is not approved the pilot will be terminated.



Paul A. Goranson, P.Eng., MBA
Public Works Manager

/blm

Att.

c Director of Development Services

Comments:

We agree with the recommendations of the Public Works Manager.

“Morris Flewwelling”
Mayor

“Norbert Van Wyk”
City Manager



COUNCIL MEETING OF NOVEMBER 21ST , 2005

ATTACHMENT

DOCUMENT STATUS: PUBLIC

**REFERS TO: SNOW & ICE CONTROL POLICY
REVIEW
PRESENTATION TO RED DEER
CITY COUNCIL**



Snow & Ice Control Policy Review

Presentation to Red Deer City Council November 21, 2005



Presentation Outline

- Background
- Information Discovered
- Components Reviewed and Recommendations
- Forecasted Costs
- Next Steps

Background

Council Decision

- Dated January 17, 2005 states:
 - “Resolved that Council of the City of Red Deer hereby directs the Administration to provide information on the City’s snow and ice control program in comparison to the snow clearing program in urban centers with climates similar to Red Deer’s such as Edmonton, Saskatoon, Regina, Grande Prairie, Fort St. John and Winnipeg.”

Objectives of Snow & Ice Control

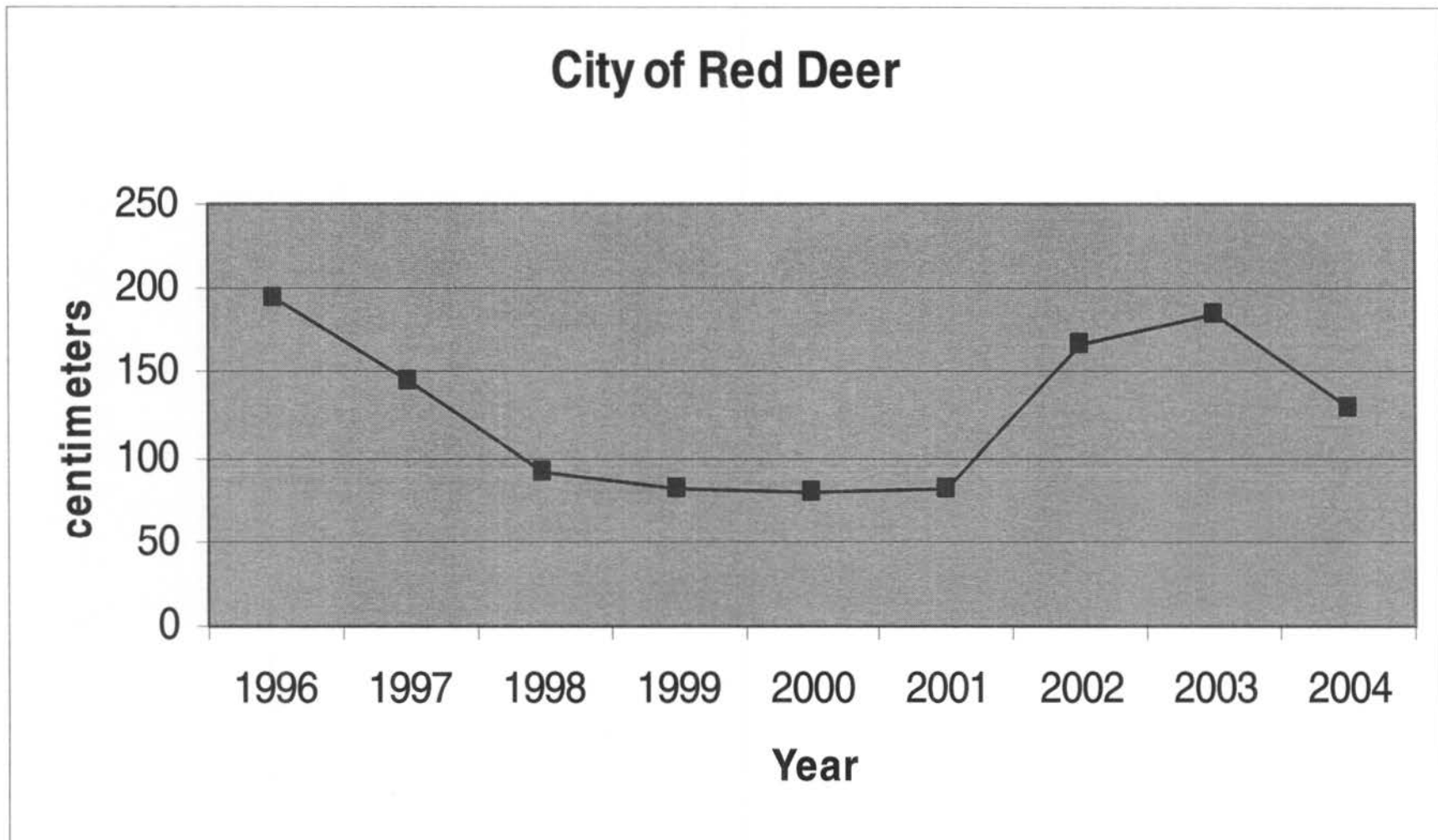
- **Safety**
 - Fewer collisions
- **Mobility**
 - Economic and social productivity
 - Time = money
- **Environmental Protection**
 - Fuel savings

What Has Public Works Been Doing?

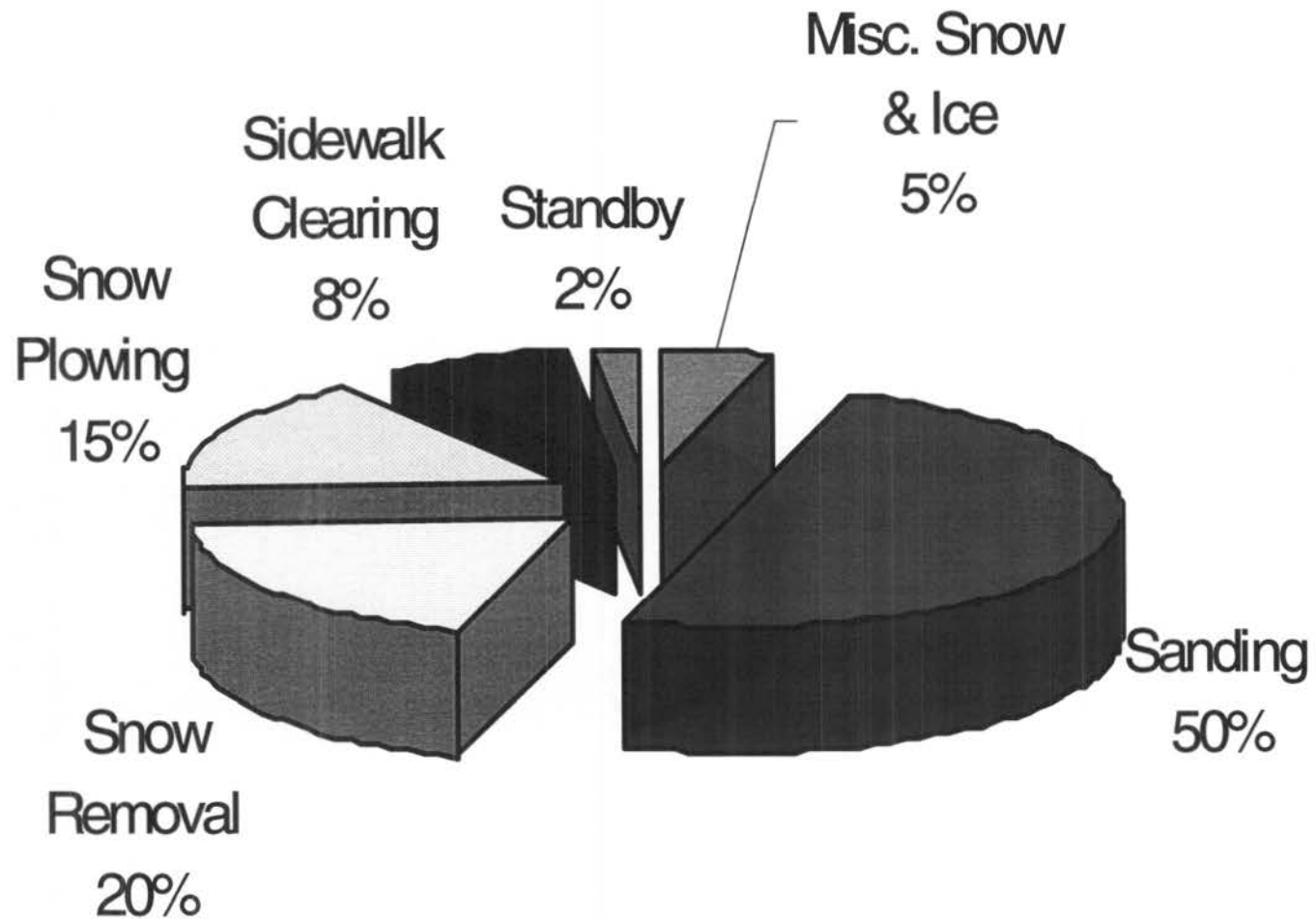
- Consultants hired in May
- Advisory Committee formed with 4 citizens
- Interviews conducted of Public Works, Transit, Social Planning, RCMP, and ES employees
- Several meetings, phone calls, and emails with consultants and Advisory Committee
- 3 drafts submitted in August and September with final draft submitted October 3
- Meeting with City Manager and Director of Development Services October 27

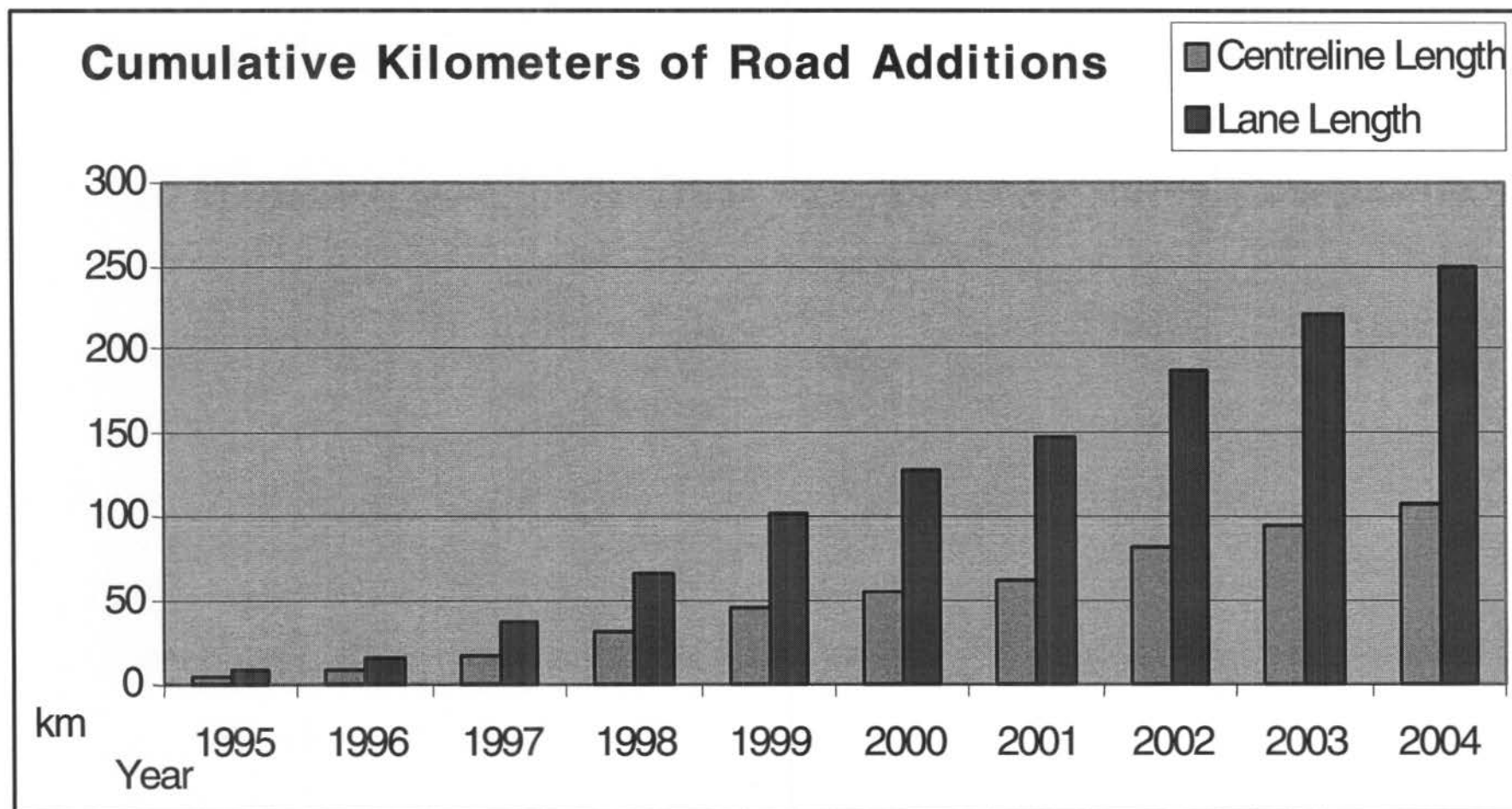
Information Discovered

Annual Snowfall



2004 Actual Expenditures





Total Street System: 469 km (over 1,000 lane-km)

Traffic Volume Growth

Location	Direction of Travel	Growth	Years
50 Ave North of 19 St	North	37%	1996-2003
	South	63%	1996-2003
67 St West of Riverbend Road	West	47%	1996-2003
	East	31%	1996-2003
Allan St West of Ayers Ave	West	27%	1999-2003
	East	15%	1999-2003

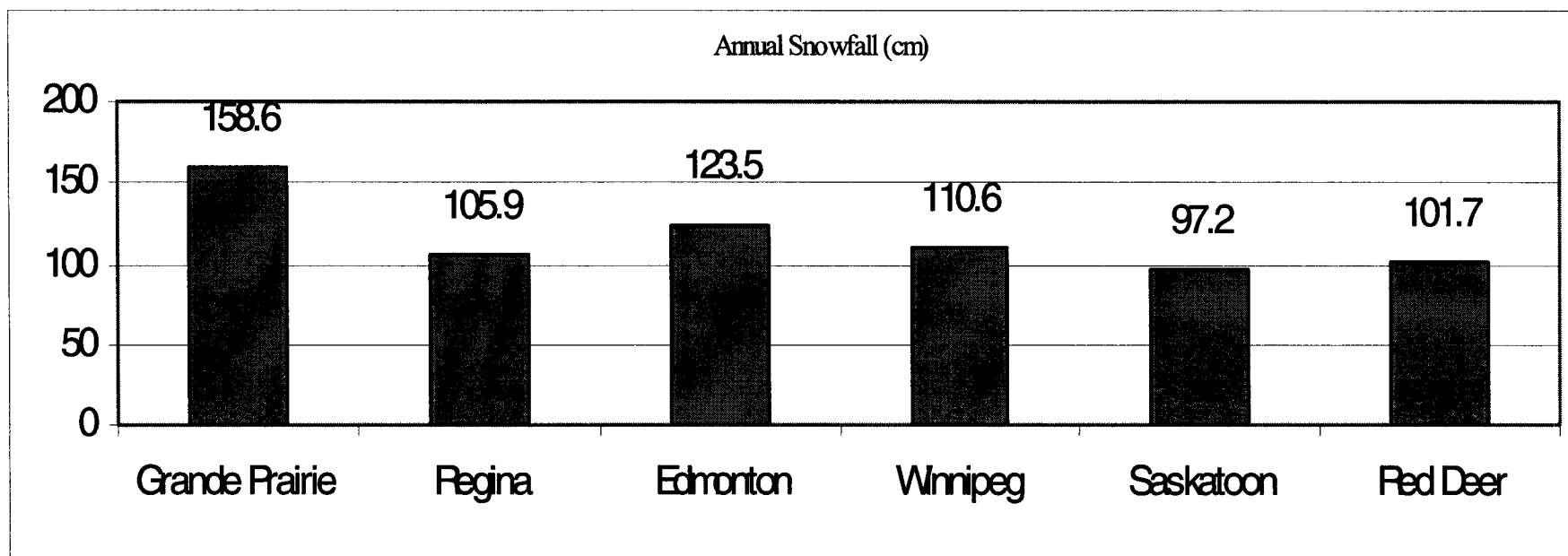
Staff & Equipment

	2000	2001	2002	2003	2004
Graders	4	4	4	4	4
Bombardier Sidewalk Plows	1	2	2	2	2
Sidewalk Skid Steer With Broom	1	1	1	1	1
Sanders with Plows	8	9	9	9	10
Loaders	1	1	1	1	1
Snow Blowers	2	2	2	2	2
Total Snow & Ice Equipment	2	2	2	2	2
	19	21	21	21	22
Permanent Employees	26	26	26	26	26

- **Municipalities Surveyed:**
 - Edmonton
 - Winnipeg
 - Saskatoon
 - Regina
 - Grande Prairie

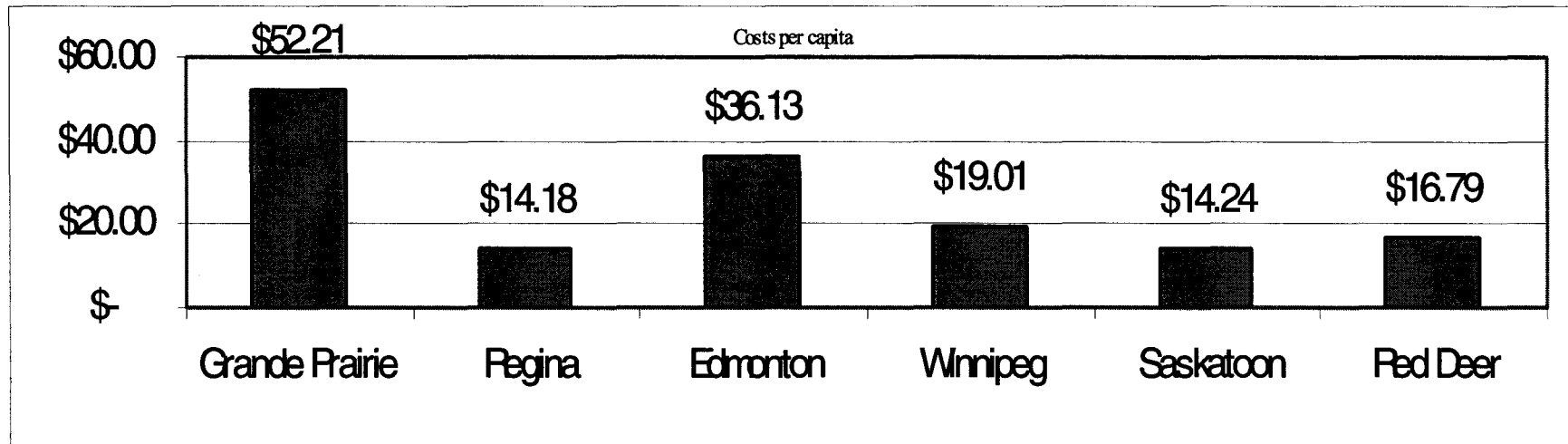
Population and Snowfall

	Grande Prairie	Regina	Edmonton	Winnipeg	Saskatoon	Red Deer
Population	40,226	190,400	667,000	631,200	205,900	75,923



Annual Snow and Ice Control Budgets

	Grande Prairie	Regina	Edmonton	Winnipeg	Saskatoon	Red Deer
Annual Costs	2,100,000	2,700,000	24,100,000	12,000,000	2,933,000	1,275,000



“The fact that Red Deer’s per capita spending is less than the median suggests that other cities are willing to spend more tax dollars on snow removal relative to other services.”

General Indication

“Although Red Deer’s annual snowfall is comparable, its budget, equipment and staffing levels and response times are generally lower than the municipalities surveyed.”

Components Reviewed and Recommendations

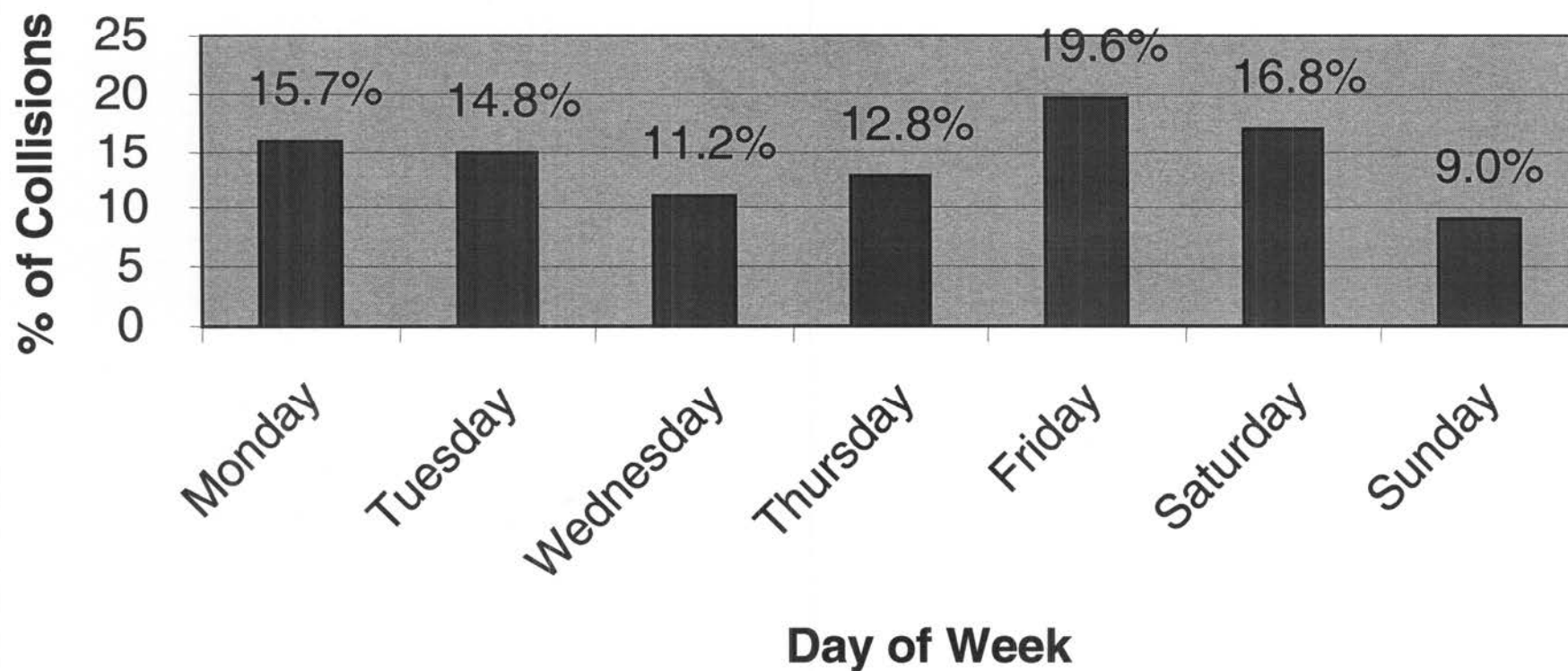
Components of the Review

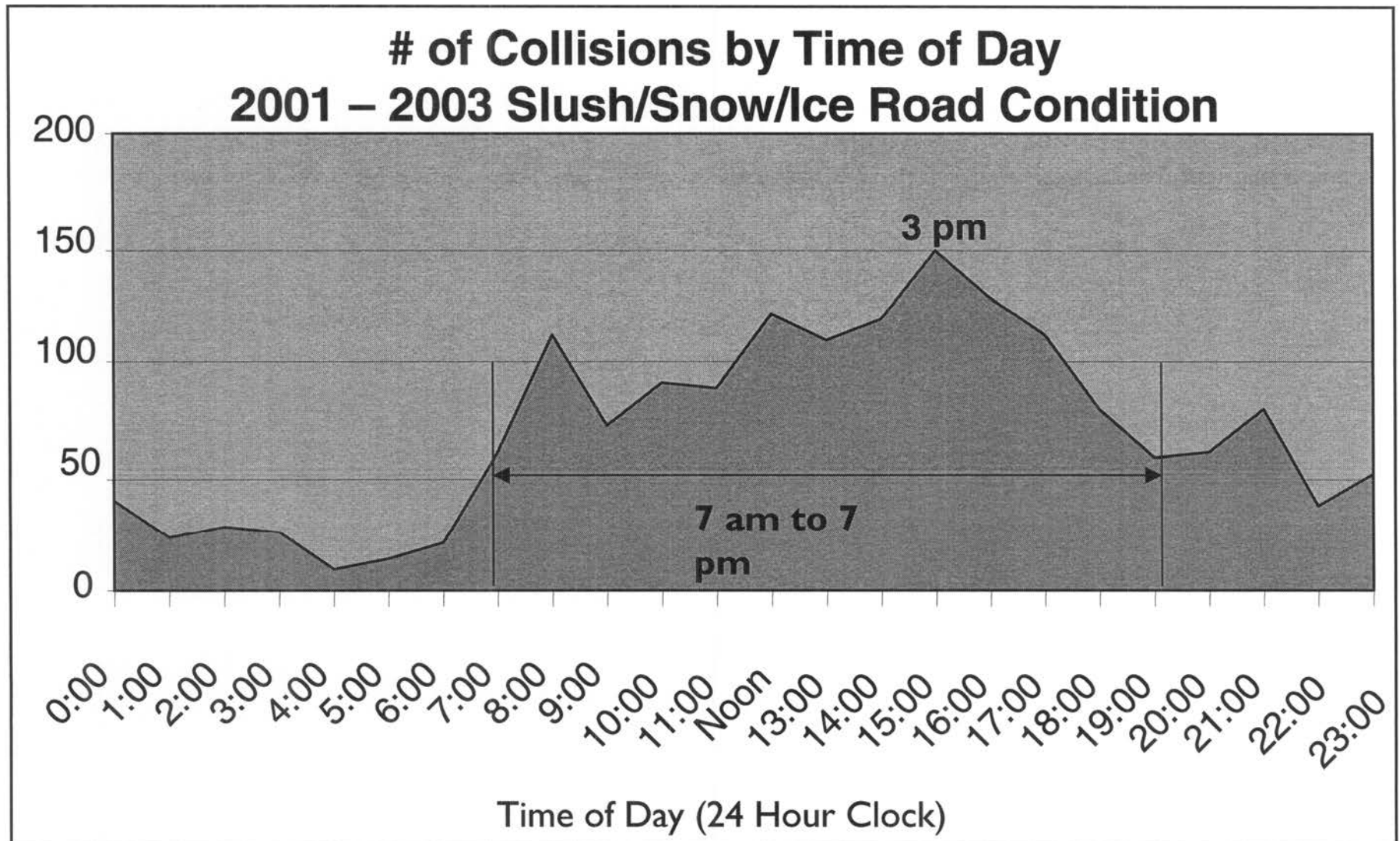
1. Ice Control
2. Snow Control
3. Sidewalks

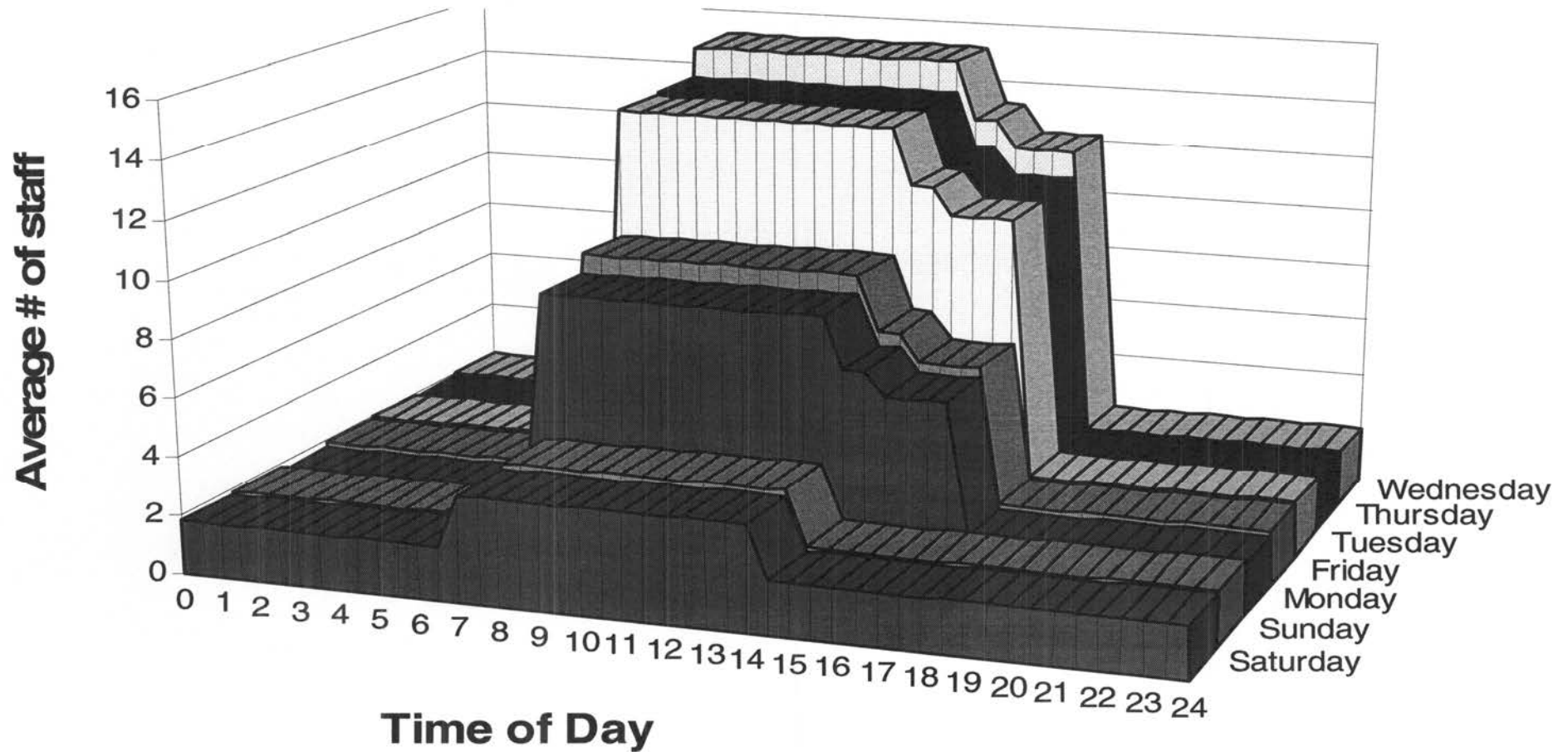


1. Ice Control

**% of Collisions by Day of Week
2001 – 2003 Slush/Snow/Ice Road Condition**







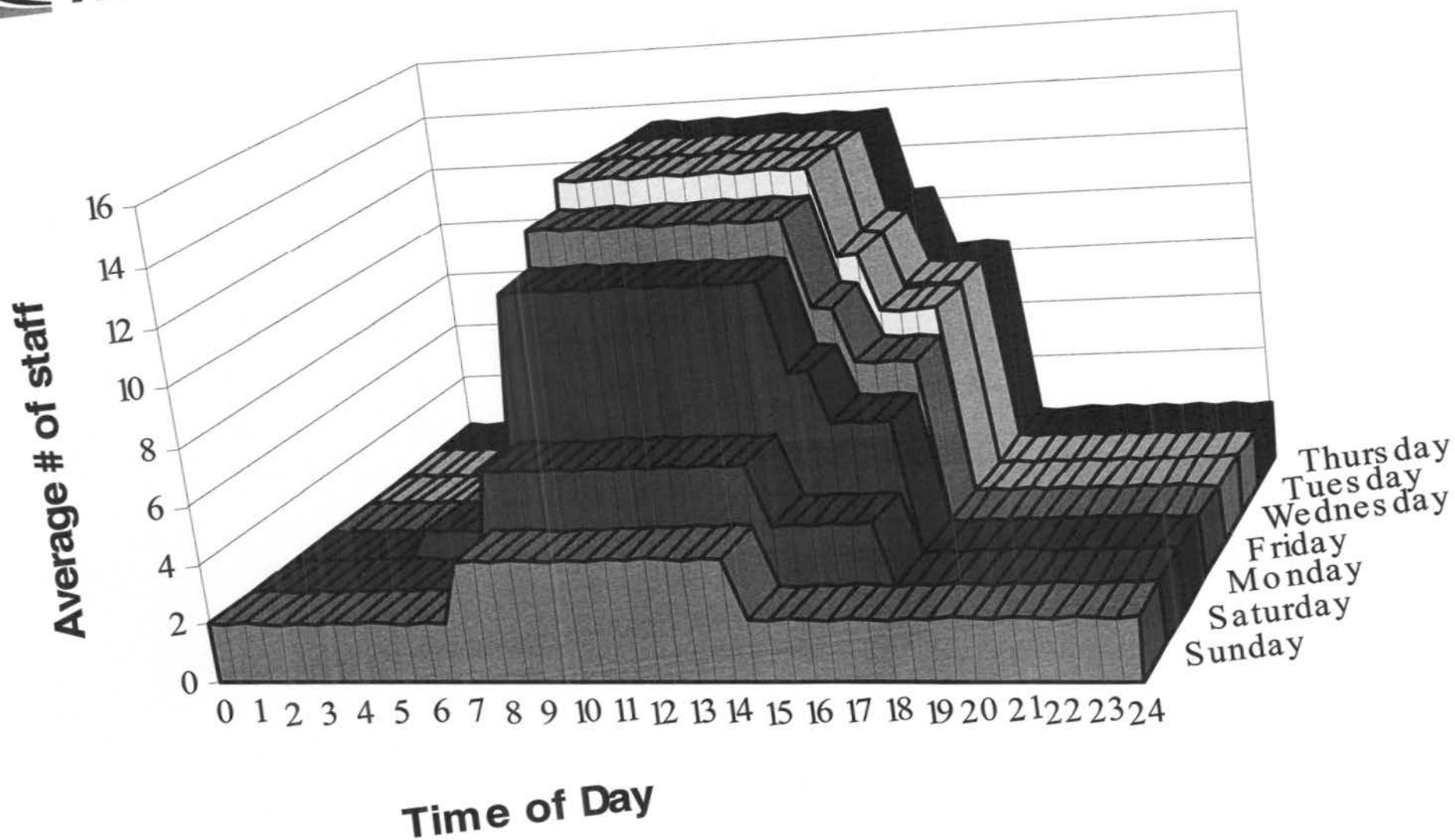


THE CITY OF

Red Deer

Key Ice Control Recommendations

1. Reschedule crews to provide more timely traction control, using the time of day/week collision statistics as a guide.
2. Change shift schedules to increase the minimum number of Operators on duty at any given time.





THE CITY OF

Red Deer

Key Ice Control Recommendations

3. Prioritize routes so that high hazard, high accident, high traffic locations are named and mapped out for traction control.

Map Sample



Priority 1 (Hills, Bridges, High Hazard Locations, Hospital Access)

(High Collision Intersections)

Priority 2 (Arterials)

Priority 3 (Downtown, Bus Routes, Other Collectors Residential Streets Adjacent to Schools)

Priority 4 (Industrial/Commercial)

Priority 5 (Residential)

Key Ice Control Recommendations

- Initiate a trouble spots hot line and dispatch crews on an immediate response basis.



2. Snow Control

Program Level Choices

- **Triggers to initiate a response**
 - snowfall vs. accumulated snowpack
- **Prioritization of response locations**
 - order of response
- **Scope of response coverage**
 - What roads get what response?
- **Time to complete the service**
 - How long does it take?

Service Level Choices

- Highest Practical
- Moderate
- Most Basic

The current service level is between Most Basic and Moderate.

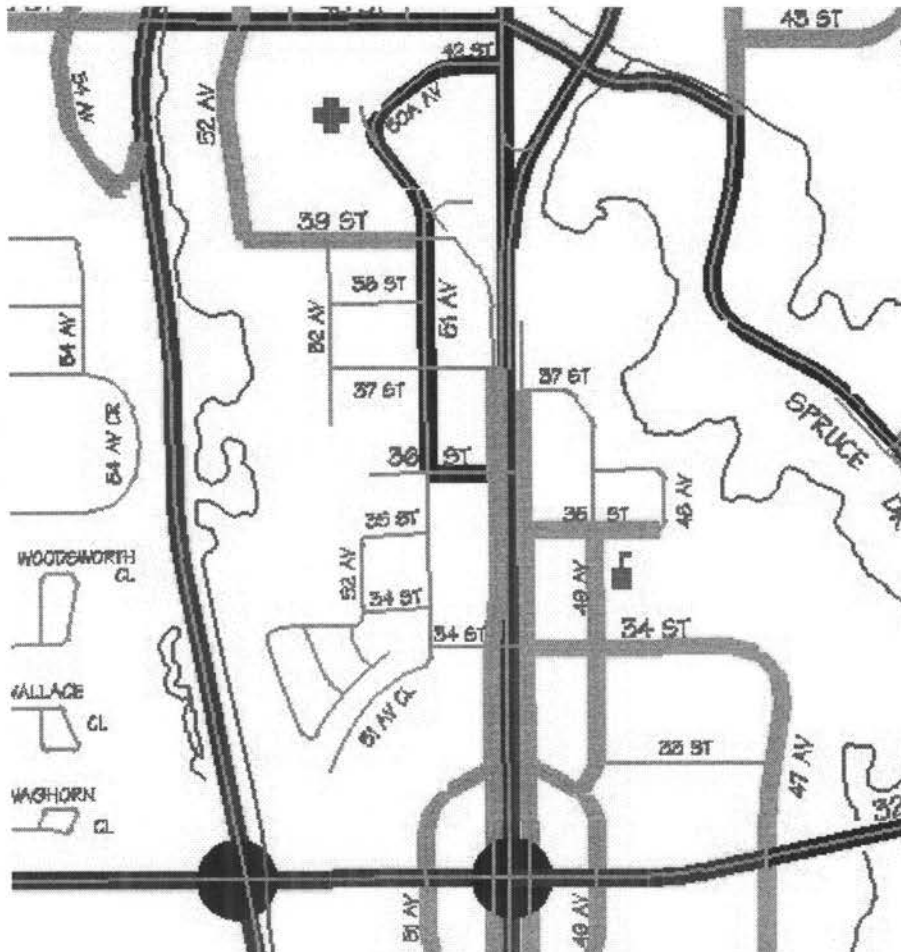
Differences from the Current Practice

- More objective triggers
- Location categories more clearly defined
- Definite actions and time frames
- Priority descriptions
 - i.e. Locations will be given a priority number and color instead of being called an Emergency or Supplemental Route

Advisory Committee Choices

Priority	Location	Trigger	Action
Priority 1	Hills, Bridges & Overpasses	2.5 cm snowfall	Plow - 8 hrs
*Highest Practical	High Collision Intersections	5 cm snowfall	Remove -24 hrs
	High Hazard Locations		
	Hospital Access		
Priority 2	Arterials	2.5 cm snowfall	Plow - 16 hrs
*Highest Practical		5 cm snowfall	Remove - 72 hrs
Priority 3	Downtown	10 cm packed accumulation	Plow & Remove
*Moderate	Bus Routes		Downtown - within 4 days
	Other Collectors		Bus Routes/ Other Collectors - within 8 days
			Residential Streets Adjacent to Schools - within 8 days
Priority 4	Industrial/Commercial	15 cm packed accumulation	Plow & Windrow
*Moderate			within 3 days
Priority 5	Residential	Discretionary	Plow & Windrow
*Most Basic			within 25 days

Map Sample



Priority	Trigger	Timeframe
1	2.5 cm Snowfall	Plow - 8 hrs Remove - 24 hrs
2	2.5 cm Snowfall	Starting After Priority 1: Plow - 16 hrs Remove - 72 hrs
3	10 cm Packed Snow Accumulation	Plow and Remove: Downtown - 4 days Bus Routes/Collectors - 8 days Residential Roads Adjacent to Schools - 8 days
4	15 cm Packed Snow Accumulation	Plow and windrow within 3 days
5	Discretionary	Plow and windrow within 25 days

Examples of Changes

Examples:

- Priority One's include the Hospital access on 51 Ave and 36 Street.
- Priority Two's (i.e. 67 St and Gaetz Ave) will be plowed twice as many times and faster.
- Priority Two's (i.e. Gaetz Ave) through downtown will be plowed and removed instead of being left until a Downtown clearing occurs.
- Priority Three's (i.e Downtown, Bus Routes) will be plowed and removed during an average snow year 3x / year as opposed to once or twice.
- Priority Four's includes more streets to be plowed.

Priority 5 - Residential Service Levels

Variables

- 1. Trigger for the response**
 - discretionary vs. 10 or 15cm accumulated snowpack

- 2. Scope of service provided**
 - windrow vs. removal

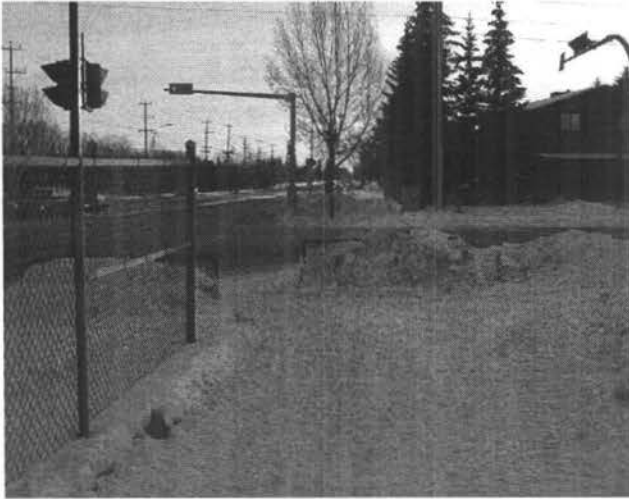
- 3. Speed of the response in terms of days**
 - 18 to 25 days

Priority 5 - Residential Windrow Placement

- Current - placed on the side of the street with odd number addresses during odd numbered years and vice versa

Priority 5 - Key Residential Recommendations

1. Recommendation – alternate placement not dependent on odd/even year



3. Sidewalks

Key Sidewalk Recommendations

1. Develop a pedestrian traffic network and assign priority. The network should link sources of pedestrians and destinations.
2. Clear to the same standard as required of private property owners in the bylaw.
3. Clearly define sidewalks that will be maintained (and not maintained) on a map.

Our focus has initially been on the streets. The sidewalk recommendations will be reviewed this winter season.

Forecasted Costs

Costs were based on actual number of snow events as recorded by Environment Canada

Environment Canada Classifications	30 yr average #days/yr	Model Thresholds	Actual frequency 2004/05
>= 0.2cm (trace)	38.2	2.5 – 5.0 cm	13
>= 5cm (light)	6.2	5.1 – 7.5 cm	2
>=10 cm	1.4	7.6 + cm	3
>=25 cm	0.04		

Snow Control Alternative Costs

- | | |
|----------------------|---------------|
| • Advisory Committee | • \$1,050,000 |
| • Highest Practical | • \$1,350,000 |
| • Moderate | • \$850,000 |
| • Most Basic | • \$350,000 |
| • 2004 Actual Cost | • \$446,230 |

Ice control, sidewalks, and residential clearing costs are not included in the above.

Residential Costs

- Plow and Windrow
 - \$250,000
- Plow and Remove
 - \$500,000



Total Program Cost (without Residential Clearing)

Program Components		Cost
Snow Removal & Plowing	2004 Actual	\$450,000
Snow Removal & Plowing	Pilot Project Increase	\$600,000
		\$1,050,000
Ice Control	2004 Actual	\$640,000
Sidewalk Clearing	2004 Actual	\$106,000
Standby & Miscellaneous	2004 Actual	\$85,000
Total Snow and Ice Program Cost for 2006		\$1,881,000

Next Steps

Our Thinking Has Changed...

- Tying collision data with the winter shift schedule
- Plowing more first before sanding
- Updating and improving material and equipment technology
- Sophisticating record keeping system

Next Steps

- Pilot season from January to April 2006 – based on Advisory Committee Choices for Service Levels
- \$600,000 one time funding requirement for pilot season to begin January 1, 2006

Next Steps

- Public Input and Education
- Review Sidewalk Program and Policy by Fall 2006
- Rewrite Snow & Ice Control Policy
- Final recommendation to City Council in Fall 2006

Questions?

Legislative & Administrative Services

DATE: November 22, 2005
TO: Paul Goranson, Public Works Manager
FROM: Kelly Kloss, Legislative & Administrative Services Manager
SUBJECT: Snow and Ice Policy Review

Reference Report:

Public Works Manager, dated November 10, 2005

Resolutions:

"Resolved that Council of the City of Red Deer having considered the report from the Public Works Manager, dated November 10, 2005, re: Snow and Ice Policy Review, hereby :

1. Approves the Pilot Snow and Ice Control program to commence effective December 1, 2005 with continuation subject to approval during the 2006 Budget deliberations.
2. Approves, subject to the above noted budget approval, the process for updating the Snow and Ice Control Policy as outlined in the above noted report."

Report Back to Council: Yes, in the fall of 2006.



Kelly Kloss
Manager

/chk

c Director of Development Services
M. Bovair, Financial Analyst



DATE: November 9, 2005

TO: Kelly Kloss, Legislative & Administrative Manager

FROM: Kristina Mark, Planner

RE: Land Use Bylaw Amendment 3156/LL-2005
Former Red Deer County Building Site
Lots 1 & 2, Block 9, Plan 708 M.C. (4758 – 32 Street)

Amendment Request

This office on behalf of the City of Red Deer has received a letter from Ralph Salomons Commercial Inc. requesting a land use bylaw amendment for the re-designation of the former Red Deer County building site. The site is currently designated R2 - Residential (Medium Density) District. The request is to have the site re-designated to a Direct Control District which would be labeled DC (22).

The site is proposed to be developed with low density commercial uses in a 25,000 square foot strip mall with medical offices and a pharmacy together serving as an anchor. The total site area is 0.86 ha (2.136 acres).

Background

As far back as the 1960s, this site was zoned a R2 Residential (General) District. Public and quasi-public buildings were permitted as a discretionary use. To our knowledge, the site was never used for residential purposes. The only known developments on the site have been for the Red Deer Health Unit and the Red Deer County's office.

The surrounding sites include R3 Residential (Multiple Family) District, C3 Commercial (Neighbourhood Convenience) District and C4 Commercial (Major Arterial) District.

To allow for easy accessibility and convenience from residential areas, Land Use Bylaw exceptions made have included the allowance of health and medical offices in C2 and C3 Commercial Districts.

In July 2003, City Council approved a Land Use Bylaw amendment to allow low impact commercial businesses in the C3 District to serve more than just the immediate neighbourhoods. The term neighbourhood is broadly or narrowly defined depending on the location and use proposed. For the proposed use, the low density commercial strip mall will be used to serve the immediate and surrounding neighbourhoods.

Community Public Meeting

On October 6, 2005, Parkland Community Planning Services hosted a neighbourhood meeting to gather community input on the proposed rezoning request. The meeting was advertised by neighbourhood newsletters delivered door to door. The meeting was held at Mountview Elementary School Library and was attended by 3 people, 2 representatives from Group 2 Architecture and Ralph Salomons from Ralph Salomons Commercial Inc.

Much of the discussion was about the building design and elevations of the proposed commercial establishment. A couple of questions referred to the proposed separation barrier between residential and commercial properties. The public in attendance conveyed support for the proposed commercial plaza.

Comments Received by City Departments

A letter describing the proposal for the land use bylaw amendment for the site re-designation was sent out to several City departments for comments. Comments relating to development will be addressed at the time of development permit application.

The Department of Inspections and Licensing expressed concerns about the rezoning proposal. They feel that the proposal contravenes section 9.1 of the Municipal Development Plan as the proposal is to offer medical services on the site.

Planning Analysis

In reviewing the request for direct control zoning to allow for medical offices, the ideal would be to have the site zoned either C2 or C3 Commercial. However, the subject site does not meet the minimum 1.0 ha (2.47 acre) site area requirement of the C2 Commercial (District Shopping Centre) District and exceeds the maximum 0.4 ha (1 acre) site area requirement of the C3 Commercial (Neighbourhood Convenience) District. The proposed development to include a

medical office use precludes the C4 Commercial (Major Arterial) District which does not permit this use.

There is no existing land use bylaw district that fully accommodates the requested development. This site is unique because it is located between arterial commercial and residential. The proposed direct control district would be a combination of the C3 and C4 districts to create a specialized zone for this unique site situation.

Care must be taken to ensure a practical transition between the areas of residential and commercial zoning. The site has a history of non-commercial uses. The proposed direct control district is designed to allow for residential compatible uses found in the C3 and C4 districts with the inclusion of medical office uses. The proposed direct control district would serve as a transitional zoning from C4 located west of the property and on Gaetz Avenue to the R2 and R3 zoning located to the east and north of the property. Future development would have an appearance of a neighbourhood C3 zoning with allowable uses such as a restaurant, retail store or salon. These types of uses were supported by those in attendance at the public meeting.

Exceptions to the location of medical offices have been approved outside the downtown to provide neighbourhood convenience. From a planning and land use perspective, planning staff have concluded that the request for a Land Use Bylaw amendment to allow the development of selective and compatible commercial businesses including a medical office on Lots 1 & 2, Block 9, Plan 708MC (4758 32 Street) would be a valuable contribution to the area.

Recommendation

Planning staff recommend that City Council proceeds with first reading of Bylaw Amendment No. 3156/LL-2005.

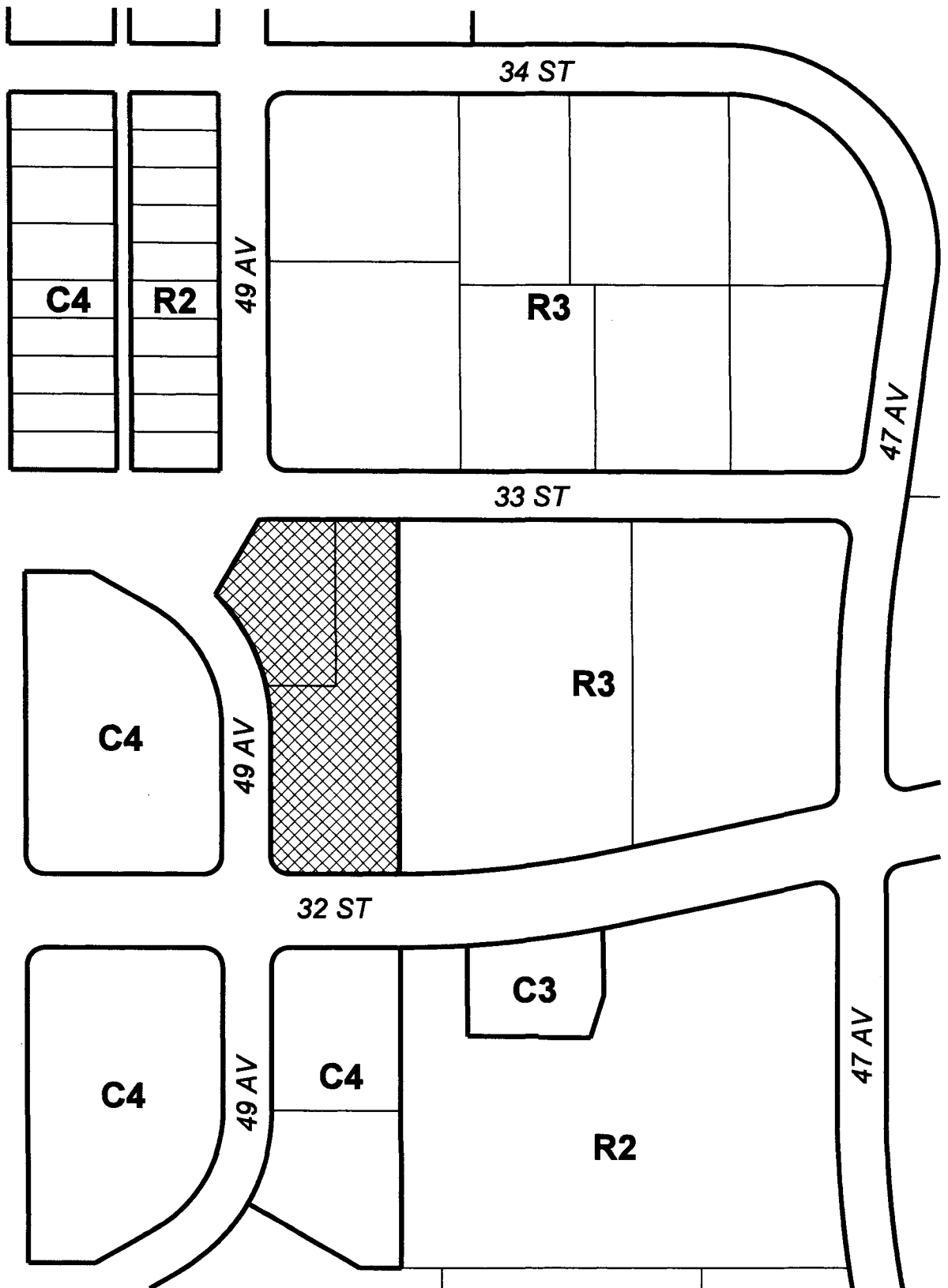
Sincerely,



Kristina Mark
Planner
/attch.

The City of Red Deer

PROPOSED LAND USE BYLAW AMENDMENT



AFFECTED DISTRICTS:

R2 - Residential (Medium Density)

DC(22) - Direct Control District No. 22

Change from:
R2 to DC(22)



MAP No. 34 / 2005
BYLAW No. 3156 / LL - 2005

Comments:

We agree that Council give first reading to the Land Use Bylaw Amendment. A Public Hearing would be held on Monday, December 19, 2005 at 7:00 p.m. in Council Chambers during Council's regular meeting.

"Morris Flewwelling"
Mayor

"Norbert Van Wyk"
City Manager



12 COPY

LEGISLATIVE & ADMINISTRATIVE SERVICES

November 22, 2005

Fax: 343-6490

Mr. Ralph Salomons
Ralph Salomons Realty Inc.
D201, 5212 – 48 Street
Red Deer, AB T4N 7C3

Dear Mr. Salomons:

Land Use Bylaw Amendment 3156/LL-2005
Former Red Deer County Building Site
Lots 1 & 2, Block 9, Plan 708 M.C. (4758 – 32 Street)

Red Deer City Council gave first reading to *Land Use Bylaw Amendment 3156/LL-2005* at the City of Red Deer's Council meeting held Monday, November 21, 2005. For your information, a copy of the bylaw is attached.


Land Use Bylaw Amendment 3156/LL-2005 provides for the rezoning of the former Red Deer County building site located at 4758 – 32 Street from R2 Residential (Medium Density) District to Direct Control District DC (22). The proposed development for the site is to be low density commercial uses in a strip mall with medical offices and a pharmacy serving as an anchor.

Council must hold a Public Hearing before giving second and third readings to the bylaw. This office will now advertise for a Public Hearing to be held on Monday, December 19, 2005 at 7:00 p.m. in Council Chambers of City Hall during Council's regular meeting.

According to the *Land Use Bylaw*, the City requires a deposit before public advertising. An amount equal to the estimated cost of advertising, which in this instance is \$400, is required by Wednesday, November 30, 2005. You will be invoiced for or refunded the difference once the actual cost of advertising is known.

Please call me if you have any questions or require additional information.

Sincerely,



Kelly Kloss
Manager

/attach.

c Parkland Community Planning Services
C. Adams, Administrative Assistant

* * * Transmission Result Report (MemoryTX) (Nov.22. 2005 9:48AM) * * *

1) CITY OF RED DEER
2) Legislative and Admin. Services

Date/Time: Nov.22. 2005 9:47AM

File No. Mode	Destination	Pg (s)	Result	Page Not Sent
4180 Memory TX	3436490	P. 6	OK	

Reason for error
E.1) Hang up or line fail
E.3) No answerE.2) Busy
E.4) No facsimile connection

LEGISLATIVE & ADMINISTRATIVE SERVICES

November 22, 2005

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Please call me if you have any questions or require additional information.

Sincerely,

Kelly Kloss
Manager

/attach.

c Parkland Community Planning Services
C. Adams, Administrative Assistant



Council Decision – November 21, 2005

Legislative & Administrative Services

DATE: November 22, 2005
TO: Kristina Mark, Parkland Community Planning Services
FROM: Kelly Kloss, Legislative & Administrative Services Manager
SUBJECT: Land Use Bylaw Amendment 3156/LL-2005
Former Red Deer County Building Site
Lots 1 & 2, Block 9, Plan 708 M.C. (4758 – 32 Street)

Reference Report:

Parkland Community Planning Services, dated November 9, 2005

Bylaw Readings:

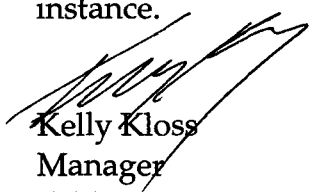
Land Use Bylaw Amendment 3156/LL-2005 was given first reading. A copy of the bylaw is attached.

Report Back to Council: Yes

A Public Hearing will be held on Monday, December 19, 2005 at 7:00 p.m. in Council Chambers, during Council's regular meeting.

Comments/Further Action:

Land Use Bylaw Amendment 3156/LL-2005 provides for the rezoning of the former Red Deer County building site located at 4758 – 32 Street from R2 Residential (Medium Density) District to Direct Control District DC (22). The proposed development for the site is to be low density commercial uses in a strip mall with medical offices and a pharmacy serving as an anchor. This office will now advertise for a Public Hearing. Ralph Salomons Commercial Inc. will be responsible for the advertising costs in this instance.



Kelly Kloss

Manager

/chk

/attach.

c Director of Development Services
Inspections & Licensing Manager
Land & Economic Development Manager
C. Adams, Administrative Assistant
T. Edwards, Clerk Steno

BYLAW No. 3156/LL-2005

Being a Bylaw to amend Bylaw No. 3156/96, the Land Use Bylaw of The City of Red Deer as described herein.

COUNCIL OF THE CITY OF RED DEER, ALBERTA, ENACTS AS FOLLOWS:

Bylaw No. 3156/96 is hereby amended as follows:

- 1 That "Use District Maps G6 and G7" contained in "Schedule B" of the Land Use Bylaw is amended in accordance with Land Use District Map No. 34/2005 attached hereto and forming part of the bylaw.
- 2 Part Six of the Land Use Bylaw is amended by adding the following new DC Direct Control District:

"DC(22) Direct Control District No. 22 (See Map G6)

151.7 (1) General Purpose

This District is created to permit redevelopment of the former Red Deer County building site Lots 1 & 2, Block 9, Plan 708 M.C. (4758 – 32 Street) with low density commercial uses. Redevelopment of this site would be with compatible commercial uses that provide a transition between the Gaetz Avenue C4 Arterial Commercial District west of the site and, the R2 and R3 residential developments east and north of the site.

(2) Site Development

- (a)** In order to ensure that the new development on this site matches the character and scale of the existing surrounding neighbourhood, all uses and development standards prescribed for this district, site plan, site access, pedestrian environment, the provision of landscaped areas, and the parking layout shall be subject to approval by the Municipal Planning Commission.
- (b)** The relationship of the use to adjacent residential areas will be a factor in considering the site plan and architectural treatment of the building.

(3) Permitted Uses

- (a)** Commercial recreation facility
- (b)** Commercial service facility.
- (c)** Restaurant.
- (d)** Merchandise Sales and/or rental, excluding
 - all uses where the primary focus is adult oriented merchandise and/or entertainment
 - liquor
 - motor vehicles
 - machinery and
 - fuel.
- (e)** Health and Medical Services.
- (f)** Signs:
 - (i)** awning, canopy sign,
 - (ii)** under canopy sign,
 - (iii)** fascia sign,
 - (iv)** free standing sign,
 - (v)** painted wall sign,
 - (vi)** projecting sign.

(4) Discretionary Uses

- (a)** Accessory building or use.
- (b)** Service and repair of goods traded in this district.
- (c)** Dangerous goods occupancy, where required, in association with a dry cleaning business.

(5) Regulations

(a)	Floor Area:	maximum	one third of site area
(b)	Building Height:	maximum	two storeys
(c)	Front Yard:	minimum	9.0 m
(d)	Side Yard:	minimum	3.0 m, unless the side yard abuts a residential parcel, in which case it shall be 7.0 m
(e)	Rear Yard:	minimum	9.0 m
(f)	Landscape Area:	minimum	15% of site area to include retention of existing vegetation on the South portion of site.
(g)	Parking:		subject to section 48
(h)	Loading Space:	minimum	one opposite each loading door with a minimum of one, which may be used as a parking space
(i)	Site Area:	minimum	0.5 ha
(j)	Frontage:	minimum	40.0 m. "

READ A FIRST TIME IN OPEN COUNCIL this 21st day of November 2005.

READ A SECOND TIME IN OPEN COUNCIL this day of 2005.

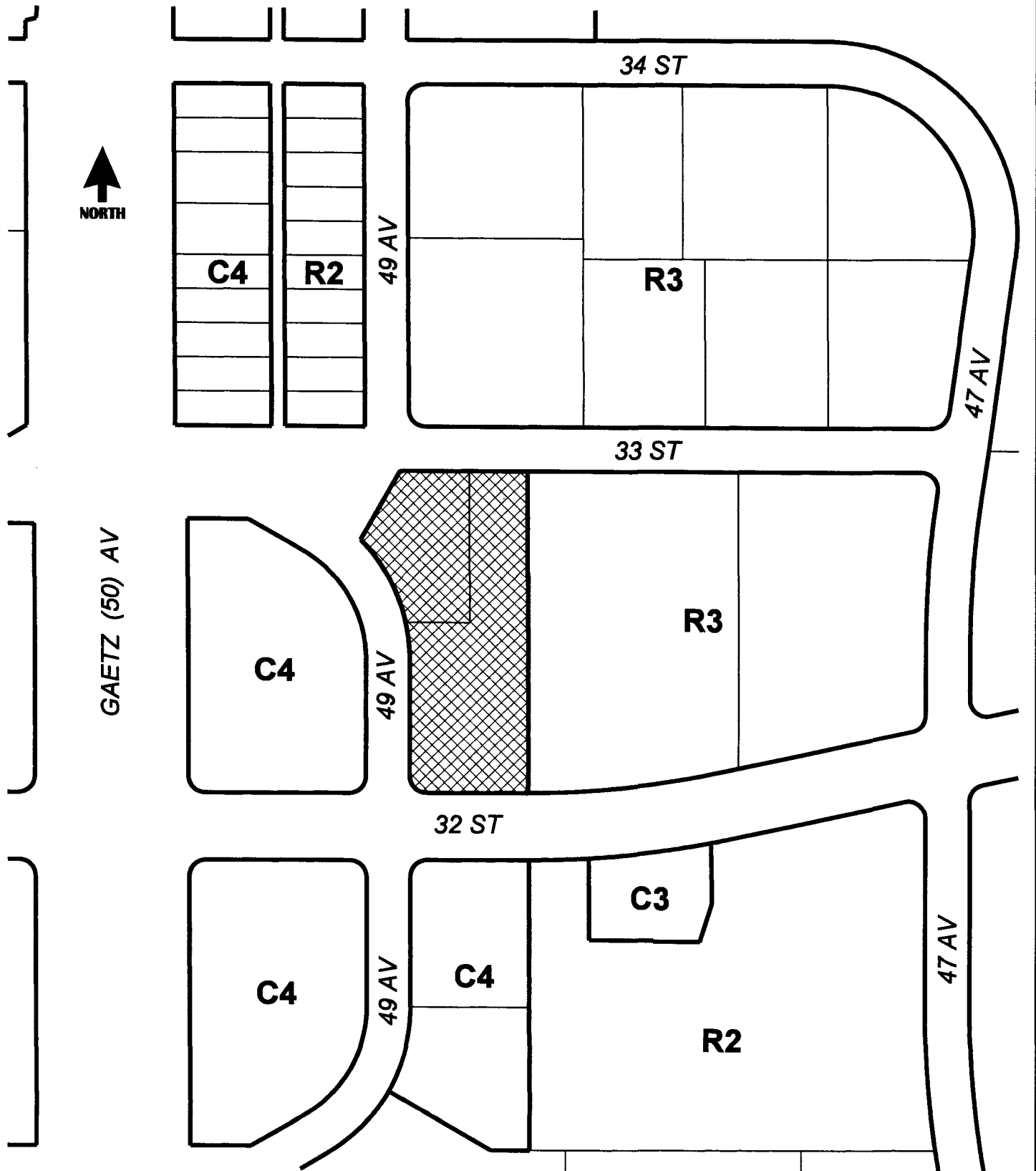
READ A THIRD TIME IN OPEN COUNCIL this day of 2005.

AND SIGNED BY THE MAYOR AND CITY CLERK this day of 2005.

MAYOR

CITY CLERK

The City of Red Deer *PROPOSED LAND USE BYLAW AMENDMENT*



AFFECTED DISTRICTS:

R2 - Residential (Medium Density)

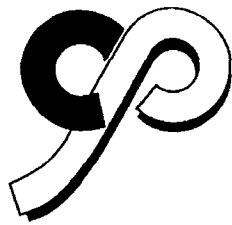
DC(22) - Direct Control District No. 22

Change from:

R2 to DC(22)



MAP No. 34 / 2005
BYLAW No. 3156 / LL - 2005



**PARKLAND
COMMUNITY
PLANNING
SERVICES**

Suite 404, 4808 Ross Street
Red Deer, Alberta, T4N 1X5
Phone: (403) 343-3394
FAX: (403) 346-1570
E-mail: pcps@pcps.ab.ca

DATE: November 14, 2005

TO: Kelly Kloss, Legislative & Administrative Services Manager

RE: Proposed Plan Amendment
East Hill Major Area Structure Plan
(Bylaw Amendment No. 3207/A-2005)

BACKGROUND

The East Hill Major Area Structure Plan started as the East Hill Concept Plan back in 1977. It was converted to an area structure plan in 1993 and has been amended in 1998, 2001 and 2003.

The primary purpose of the 2005 plan amendment is to incorporate into the plan area and develop a land use and servicing concept for those lands that were annexed from Red Deer County in 2004. This development concept will provide the framework for developers to prepare neighbourhood area structure plans on a quarter section basis, which precedes rezoning and subdivision.

PLAN CONTENT

The plan incorporates significant tree and wetland natural habitat areas on the basis of The City's Integrated Ecospace (Natural Habitat) Management Area Map (1995 as updated from time to time). It contains policies to encourage the preservation and incorporation into the neighbourhood design of natural habitat areas based on an ecological profile for each quarter section.

The predominant land uses in the plan area is residential with associated open spaces, park and school sites, commercial sites and public facilities.

Park site locations are shown conceptually to be more precisely determined at the neighbourhood area structure plan level where developers would have flexibility to incorporate natural habitat areas.

Arterial roadways provide a grid of main streets to carry traffic across the city and collector streets provide access to neighbourhoods. The alignment of collector roadways can be changed without a plan amendment provided the intersection points with arterial roads remain unchanged and the realignment is acceptable to The City Administration. The plan does not identify local roads which will be planned at the neighbourhood area structure plan level.

Trails are proposed along the river and creek escarpments, within neighbourhoods by incorporating natural areas and along collector and arterial roads as a separate sidewalk.

The plan identifies a conceptual location for the proposed bridge crossing and alignment of Northlands Drive to the future 20th Avenue urban expressway.

The plan proposes a town centre site which will provide approximately 58 hectares of land for commercial growth in the city up to and beyond the 115,000 population threshold (refer to *The City of Red Deer Growth Study, 2004*). The town centre is envisioned as an attractive, pedestrian-friendly shopping and entertainment district accommodating a variety of regional commercial centres (e.g. power centres, a main street centre) and mixing residential sites with commercial development to provide vibrancy and market support.

NEIGHBOURHOOD MEETING

On October 18, 2005 Parkland Community Planning Services hosted a public and landowner meeting to present the draft East Hill Major Area Structure Plan and gather community input. The meeting was advertised in the newspapers and a direct invitation was mailed to each landowner in the newly annexed lands. Seventy four persons attended the meeting.

While people took a strong interest in the overall plan directions and there was public support for the plan in general, a few concerns were raised in regards to environmental aspects and roadway proposals contained in the plan. A summary of the unresolved issues noted at the meeting and in written submissions returned after the meeting follows in the table below (ten letters were returned). Copies of all submissions received will be made available to Councillors under confidential cover.

ISSUE/CONCERN	No.	RESPONSE
55 Street Berm 55 Street will continue to function as Highway 11 for a number of years and will carry large volumes of traffic. Traffic noise should be mitigated by a berm to protect residential development to the north of 55 Street.	1	Berming or buffering of development from 55 Street traffic will be considered during development of the Neighborhood Area Structure Plans for the developments adjacent to 55 St. Noise studies are commonly required as part of the plan.
Northlands Drive 1) The alignment of future Northlands Drive as it curves to turn south into future 20 Avenue should be relocated to the east to avoid impacting the two acreages and farms on the NE ¼ Section 26 and the SW ¼ Section 25.	3	1) The alignment of the Northland Drive/20 Avenue curve shown on the East Hill Major Area Structure Plan is schematic and will be reviewed further as development gets closer to it and its construction becomes more immanent. As development approaches the existing acreages, they will be incorporated into the development plans. If The City requires portions of these acreages and other lands The City will consider various options available under the Municipal Government.
2) The proposed alignment of Northlands Drive does not recognize and respect natural capital. The City should include overpasses/underpasses or more	1	2) The proposed alignment of Northlands Drive is preliminary, based an initial review of many factors including: • future traffic demand and connections between

<p>innovative solutions in order to ensure that the remaining natural areas stay connected and are not isolated by the roadway.</p> <p>3) The expressway could be moved half a mile east to coincide with the existing Fortis electrical right of way, which would save farmland to build additional dwelling units and have less of an impact on existing acreage owners.</p> <p>4) It appears no public consultation was undertaken before this roadway was designed in its present location</p>	<p>1</p> <p>1</p>	<p>existing and proposed roads,</p> <ul style="list-style-type: none"> • a suitable river crossing location, • a suitable route up the escarpment considering road gradients, soil conditions, vegetation, etc. • various road design standards for the class of road proposed (e.g. curve radii, safety standards, intersection spacing, etc.) <p>Where the proposed alignment impacts natural capital the design will consider mitigating measures. Subject to budget approval, the City Administration is planning to conduct a functional design study for this road in 2006, with detailed design to follow in 2008 and construction in 2009/10.</p> <p>3) 20 Avenue will provide a more beneficial alignment for a future ring road than 10 Avenue as it is closer to the center of its service area. 10 Avenue will become an arterial road in the future, similar to 30 Avenue.</p> <p>4) The Northland Drive and 20 Avenue expressway concept was identified in the 1996 and 2004 Transportation Plans. Both plans were presented to the public and City Council.</p>
<p>Proposed 20 Avenue Urban Expressway</p> <p>1) The proposed urban expressway is not required at this time and should be located further east at 10 Avenue to be constructed when traffic volumes justify it, otherwise the road will have to be relocated in future. 20 Avenue should be an arterial roadway.</p> <p>2) The City has designated 20 Avenue as an urban expressway for a number of years. The existing berm east of Rosedale was completed in 2004 and is beautifully landscaped however it is only one metre high and will offer no mitigation from future traffic volumes on the urban expressway. It will cost the taxpayers additional money to reconstruct this berm to the standards required for an urban expressway. Why does The City allow these mistakes?</p> <p>3) The proposed expressway should have three lanes in each direction and 400 metre turning bays for each intersection to avoid additional costs in future and possible dangerous goods spills blocking traffic.</p>	<p>3</p> <p>1</p> <p>1</p>	<p>1) The need for an urban expressway will become more evident as development progresses to the north and east. 20 Avenue will provide a more beneficial alignment for a future ring road than 10 Avenue as it is closer to the center of its service area. 10 Avenue will become an arterial road in the future, similar to 30 Avenue.</p> <p>2) Berms of 1 to 1.5 m in height were built to meet City standards in place at the time that the adjacent neighborhoods were developed over the past 10 years or so. While general road alignment and cross-section elements have been anticipated, more specific road construction details will not be known until such construction becomes more immanent. While the first stage of 20 Avenue (initial 2 lanes extending from Ross Street to 55 Street) is expected to be constructed within the next 5 years, complete construction of the road may take decades. If traffic noise becomes an issue in specific areas in the future, berm height adjustments and/or wall construction may be considered.</p> <p>3) The expressway will be constructed in stages, but will ultimately allow for the construction of a 6-lane cross-section (i.e. 3 lanes in each direction) as well as left turn lanes. The length of turn lanes will be determined at the detailed design stage. The current plan also includes grade-separated interchanges at two locations, although further study will be done to confirm the need for these.</p>

<p>Highway 11</p> <p>The present alignment of Highway 11 (67 St. and 30 Ave.) presents problems in realizing the preservation focus for MacKenzie Creek. Without a grade separation it is a serious barrier to the North-South movement of pedestrians, cyclists, wildlife, and water.</p>	1	<p>MacKenzie Creek currently crosses 30 Avenue and 67 Street in two different locations. These crossings are not proposed to change in the future. Culverts provide for water crossings as well as some small animals. Pedestrians and cyclists are able to cross the road at the traffic signals at the 30 Ave / 67 St intersection. Development of the future residential neighborhoods will likely deter the movement of large animals along this corridor.</p>
<p>Molly Bannister Drive</p> <p>There is opposition to the construction of Molly Bannister Drive in order to preserve the Piper Creek valley instead.</p>	1	<p>Based on the City of Red Deer 2004 Transportation Study Update the East Hill plan identifies an alignment protection for a possible Molly Bannister Drive should it ever become necessary. The City will conduct a transportation study in 2006 to evaluate alternatives for accommodating the demand for travel between the Southeast residential areas and the commercial, office, and industrial areas of the City. Molly Bannister Drive is one option that will be considered.</p>
<p>Environmental Reserve</p> <p>The plan shows portions of private parcels as future parks. How will The City compensate landowners for these lands?</p>	1	<p>Where the plan identifies future parks, the Municipal Government Act authorizes a municipality to require the dedication of either environmental reserve in situations where specific natural features occur (or to register environmental easements where public access to these areas is not required) or municipal reserve (the latter up to 10% of the land). This occurs when the landowner applies for subdivision. The City is not required to compensate landowners for environmental reserves or easements or for up to 10% municipal reserve. The City and landowners would have to negotiate an acceptable purchase price for any additional lands required for parks.</p>
<p>Gaetz Lakes</p> <p>Gaetz Lakes is already protected as an environmental preservation area. When the West Half of Section 22 is subdivided additional environmental reserves should be dedicated along the top of the east escarpment to protect the lakes and the water quality from polluted storm water runoff.</p>	1	<p>The East Hill plan is a high level plan with broad directions. It does not analyze individual site features. At this level of plan it appears that the Gaetz Lakes reserve is adequately protected. Prior to subdivision of the West Half of Section 22 The City will, as a standard procedure, require that the developer submit a Phase 1 Environmental Site Assessment, which would identify potential development impacts, as well as a Geotechnical Study related to escarpment slope stability. There will also be public consultation including consultation with groups such as the Kerry Wood Nature Reserve. If such studies and consultation indicate that additional reserves are required to protect Gaetz Lakes, the City will do what is appropriate.</p>
<p>Michener Centre Wetlands</p> <p>There is concern about the potential lack of understanding and appreciation about the fields and particularly the natural wetland adjacent to the Michener Centre site and across from College Park. The concern revolves around the experience of this area as a pristine natural habitat for a variety of</p>	1	<p>The wetland is identified in the ecological profile as an important natural capital asset. The East Hill plan recognizes the importance of the Michener wetland by identifying it as a preservation focus area as well as a proposed park or natural area, and requires that the developer of this quarter section prepare a neighbourhood plan that incorporates the wetland,</p>

<p>wildlife and one of the best such natural areas within the city limits. It calls for more protection and preservation of this area with corridors to support this habitat area.</p>		<p>either as environmental reserve, municipal reserve or public utility lot. The East Hill Major Area Structure Plan is a high level plan and more precise analysis, planning and design follow at the neighbourhood area structure plan level, where this kind of detail will be determined. The process for the preparation of a neighbourhood area structure plan for the Michener quarter section will include public consultation where further input from people who experience wildlife within the city limits will be encouraged.</p>
<p>Environmental Conservation</p> <p>The annexation of vacant land presents an opportunity to plan for urban development that recognizes and conserves natural landscapes and utilizes the natural components of existing watersheds for storm water management. This will result in cleaner storm water runoff, linear corridors for linkages and preservation of remnant native plant and animal communities. These benefits combined should justify the preservation of existing drainage channels. The Municipal Government Act allows The City to take these drainage channels as environmental reserve. The City has taken numerous resolutions in the recent past to support a plan that puts environmental conservation efforts at a high priority.</p>	<p>1</p>	<p>The East Hill Plan is a conceptual plan and the development concept has been prepared at a broad level, not at a site specific level. For example, where the plan identifies a storm water detention pond, the location thereof is not precise and final. The final location of the pond will be determined through further studies at the neighbourhood area structure plan level. City Administration agrees that the two drainage channels at McKenzie Creek and "Timber" Creek could be identified on the development concept as proposed parks and natural areas in order to ensure that due consideration is given at the neighbourhood planning level to options for the conservation of these natural capital features and their incorporation into the plan. This could be achieved through environmental reserve dedication, municipal reserve dedication or public utility lot dedication. Based on this concern being brought to the attention of City Administration a number of roadways have been realigned to restrict the number of crossings of these two drainage channels. Some roadway crossings are however unavoidable. The revised plan better reflects the opportunities for environmental preservation of natural capital and facilitates further studies in order to confirm locations and options for preservation at the neighbourhood area structure plan level.</p>
<p>Storm Water Management</p> <p>1) The Storm Servicing Concept Map shows storm water being intercepted at 67 Street and the proposed Hwy 11 and piped without treatment directly to the river. The feasibility of constructed wetlands and retaining the flow and functions of the natural water courses (i.e. MacKenzie Creek and Timber Creek) needs to be investigated.</p> <p>2) The City's present ¼ section by ¼ section development policy precludes efficient use of the natural drainage system on ¼ sections that are straddled by a relatively large watershed. The policy needs to allow a more flexible approach to allow detention ponds and treatment facilities to align more closely with natural drainage corridors.</p>	<p>1</p> <p>1</p>	<p>1) Current City design standards include a requirement to remove the majority of suspended solids in storm water before discharging to creeks or the river. Various removal systems have been used in the City, including wetlands, wet ponds, and below ground separators. These design concepts are determined at the Neighborhood Area Structure Plan stage.</p> <p>2) The East Hill Major Area Structure Plan generally defines the greater drainage patterns and trunk alignments. More detail is provided at the NASP level.</p>

<p>Town Centre</p> <p>1) There is a concern that if the big box and power centre sites in the town centre developed too fast it could have an adverse impact on the existing Red Deer Centre (formerly Parkland Mall) by potentially diminishing its regional mall status. The mall needs 5 to 10 years to stabilize its growth and ensure additional retail in the proposed town centre complement the mix of tenants in the mall rather than adversely affect it.</p> <p>2) There is a concern with relatively small portions of the town centre being split off from the rest onto quarter sections with different landowners, which could make it difficult to develop</p>	<p>1</p> <p>1</p>	<p>1) Various landowners hold many of the parcels of land designated for commercial use, therefore the City cannot dictate when the lands are developed and marketed. The 2004 Growth Study anticipates commercial absorption in this area to occur over many years, into the 90,000 to 115,000 population threshold, however, land development may take place sooner, based on market demand and servicing capacity. Note that portions of the commercial land may not be serviced until new trunk lines are extended from the north when the first phase of Northlands Drive is built.</p> <p>2) The proposed town centre is split over several quarter sections to facilitate timely phasing of its development over ten to twenty five years, as well as to maximize the number of all-turns collector road access points and to disperse traffic flows. The East Hill plan requires that those portions of the town centre that are located on two adjacent quarter sections with different landowners are to be included in one neighbourhood area structure plan if the landowners cooperate. In the very least the plan requires "shadow planning" to be undertaken for land use, roads and services for adjacent quarter sections so as to ensure comprehensive development issues are addressed. Joint planning between adjacent landowners is not something out of the ordinary and the smaller portions of the town centre are respectively approximately 10 hectare and 14 hectare which would allow for the appropriate planning and design of these lands.</p>
<p>Landfill in SW ¼ Section 23-38-27-4</p> <p>The developer of this quarter section is requesting that all references to the landfill and its setback be removed from the plan.</p>	<p>1</p>	<p>The landfill is identified in the Land Use Bylaw and has to be recognized in the East Hill plan. If at the time of subdivision Alberta Environment approves a waiver to the landfill setback then the plan and the Land Use Bylaw could be amended to reflect this.</p>
<p>Collector Roadway Access Points</p> <p>There is a concern that policies contained in the draft East Hill plan require an amendment to the East Hill plan if a developer proposed to change the location of a collector road intersection with an arterial road.</p>	<p>1</p>	<p>While the collector road pattern may not be of great concern to the general public, the specific locations of access points onto arterials may concern the public as this could affect the flow of traffic through existing neighborhoods. This is the reason why an amendment to the East Hill plan would be required if a change were proposed to a collector access point. This is not a new policy and is a requirement in the existing East Hill plan.</p>

PLANNING ANALYSIS

This plan amendment is an initiative of The City Administration in response to annexation and continued demand for new residential and commercial growth areas. The land use concept and plan policies are supported by the "smart growth" principles contained in the Neighbourhood Planning & Design Guidelines & Standards.

The proposed town centre concept with mixed commercial and residential land uses, an integrated trail system and variety of commercial centres is in keeping with current and anticipated retail trends.

The plan develops a framework with specific requirements, including a focus on the conservation of natural capital, while allowing sufficient flexibility to ensure that detailed planning and design at the neighbourhood level can adapt to time and site specific conditions.

The proposed plan incorporates public and landowner input as well as City Administration. A number of revisions have been made during the course of plan preparation to address specific concerns.

COMMENTS FROM RED DEER COUNTY

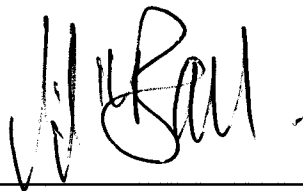
Red Deer County reviewed the draft plan and recognizes that the plan has no statutory bearing on the six quarter sections within The County's jurisdiction. The County indicated no objections or concerns regarding the draft plan provided it conforms to the Intermunicipal Development Plan.

MUNICIPAL PLANNING COMMISSION

In compliance with the *Neighbourhood Planning & Design Guidelines & Standards* this amendment to the East Hill Major Area Structure Plan was presented to the Municipal Planning Commission on November 14, 2005. On November 21 the Municipal Planning Commission will discuss the item and make a recommendation, which will be forwarded to City Council as a separate item from the November 21 Council Agenda.

RECOMMENDATION

It is recommended that City Council consider first reading of the plan amendment to the East Hill Major Area Structure Plan Bylaw Amendment No. 3207/A-2005.



Johan van der Bank ACP, MCIP
PLANNER

Date: November 21, 2005
To: Legislative & Administrative Services Manager
From: Municipal Planning Commission
Re: East Hill Major Area Structure Plan
Proposed Amendment
Bylaw Amendment No. 3207/A-2005

On November 21, 2005 Municipal Planning Commission gave consideration to a report from Parkland Community Planning Services regarding the proposed amendments to the East Hill Major Area Structure Plan. The focus of the amendments is to incorporate into the plan area and develop a land use and servicing concept of those lands which were annexed from Red Deer County in 2004. Following discussion the following resolution was introduced and passed.

"Resolved that the Municipal Planning Commission recommend that Council of the City of Red Deer considers first reading of the plan amendment to the East Hill Major Area Structure Plan Bylaw Amendment No. 3207/A-2005."

The above is submitted for Council's consideration.



Mayor Morris Flewwelling
Chairperson, Municipal Planning Commission

/lk

c Johan van der Bank, Parkland Community Planning Services

Comments:

We agree with the recommendations of Parkland Community Planning Services. In addition, a report from the Municipal Planning Commission will be presented at the November 21, 2005 Council Meeting. The Municipal Planning Commission did review the report on November 14, 2005 but tabled it to their November 21, 2005 meeting to allow more time for members to study the report.

A Public Hearing will be held on Monday, December 19, 2005 at 7:00 p.m. in Council Chambers, during Council's regular meeting.

"Morris Flewwelling"
Mayor

"Norbert Van Wyk"
City Manager

Legislative & Administrative Services

DATE: November 22, 2005
TO: Johan van der Bank, Parkland Community Planning Services
FROM: Kelly Kloss, Legislative & Administrative Services Manager
SUBJECT: East Hill Major Area Structure Plan Bylaw Amendment 3207/A-2005

Reference Report:

Parkland Community Planning Services, dated November 14, 2005

Bylaw Readings:

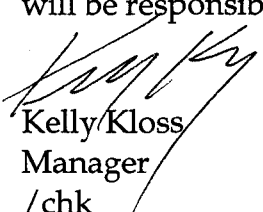
East Hill Major Area Structure Plan Bylaw Amendment 3207/A-2005 was given first reading. A copy of the bylaw is attached.

Report Back to Council: Yes

A Public Hearing will be held on Monday, December 19, 2005 at 7:00 p.m. in Council Chambers, during Council's regular meeting.

Comments/Further Action:

The East Hill Major Area Structure Bylaw Amendment provides for the incorporation into the plan area and the development of a land use and servicing concept for lands that were annexed from Red Deer County in 2004. The predominant land uses in the plan area is residential with associated open spaces, park and school sites, commercial sites and public facilities. This office will now advertise for a Public Hearing. The City will be responsible for the advertising costs in this instance.



Kelly Kloss
Manager
/chk
/attach.

c Director of Development Services
 Inspections & Licensing Manager
 Land & Economic Development Manager
 C. Adams, Administrative Assistant
 T. Edwards, Clerk Steno

BYLAW NO. 3207/A-2005

Being a bylaw to amend Bylaw No. 3207/98, the bylaw adopting the East Hill Major Area Structure Plan as a bylaw of the City of Red Deer.

COUNCIL OF THE CITY OF RED DEER, ALBERTA, ENACTS AS FOLLOWS:

1. That Bylaw No. 3207/98 is hereby amended:

By substituting the revised plan in its entirety, including all maps and text pages attached hereto and forming part of the bylaw, for the existing plan.

READ A FIRST TIME IN OPEN COUNCIL this 21st day of November 2005.

READ A SECOND TIME IN OPEN COUNCIL this day of 2005.

READ A THIRD TIME IN OPEN COUNCIL this day of 2005.

AND SIGNED BY THE MAYOR AND CITY CLERK this day of 2005.

MAYOR

CITY CLERK

CITY OF RED DEER

EAST HILL

MAJOR AREA STRUCTURE PLAN

Table of Contents		Page
Section 1.0	Introduction	1.1
1.1	Area Location	1.1
1.2	Enabling Legislation	1.1
1.3	Background	1.1
1.4	Planning Framework	1.1
Section 2.0	Future East Hill Community	2.1
2.1	Vision	2.1
2.2	Goal and Objectives	2.4
Section 3.0	Existing Site Characteristics	3.1
3.1	Tree and Wetland Natural Habitat Areas (Preservation Focus) ...	3.1
3.2	Natural Resource Extraction and Landfills	3.2
Section 4.0	Development Concept	4.1
4.1	Residential	4.1
4.2	Commercial	4.2
4.3	Circulation and Connections	4.10
4.4	Public Open Space	4.15
4.5	Public Facilities	4.18
4.6	Emergency Services	4.18
4.7	Schools	4.18
Section 5.0	Municipal Utility Services	5.1
5.1	Storm Water Drainage	5.1
5.2	Sanitary Sewer	5.1
5.3	Water Distribution	5.2
5.4	Power Transmission	5.2
Section 6.0	Plan Implementation	6.1
6.1	Neighbourhood Area Structure Plans	6.1
6.2	Land Use Bylaw	6.1
6.3	Area Redevelopment Plans	6.2
6.4	Existing Red Deer County Area Structure Plans	6.2
6.5	Additional Cost of Commercial Roadway Requirements	6.2
6.6	Amendments to this Plan	6.2
6.7	Plan Review	6.2

List of Figures

- Figure 1: Key Plan
- Figure 2: Concept Illustrating the Basic Elements of the Town Centre
- Figure 3: Tree and Wetland Natural Habitat Areas: Preservation Focus
- Figure 4: Natural Resource Extraction & Landfills
- Figure 5: Development Concept
- Figure 6: Vertical residential/commercial mix in a "main street" centre
- Figure 7: A commercial "power centre" designed as a pedestrian square
- Figure 8: Design options for "main street" commercial centres
- Figure 9: Small town "main street" ambience
- Figure 10: Trail & Open Space System
- Figure 11: Storm Servicing Concept
- Figure 12: Sanitary Servicing Concept
- Figure 13: Water Servicing Concept
- Figure 14: Electric Servicing Concept

EAST HILL MAJOR AREA STRUCTURE PLAN

1.0 INTRODUCTION - Figure 1

1.1 AREA LOCATION

The plan area is shown on Figure 1 and contains approximately 37 quarter sections or 2396 ha (5920 acres) of land. Approximately 17 quarter sections of land within the plan area are fully completed City residential neighbourhoods.

On Figure 5, conceptually shown outside of the plan area are six quarter sections of land that lie within Red Deer County. These lands are beyond the statutory requirements of this area structure plan but have been included for illustrative purposes.

1.2 ENABLING LEGISLATION

The East Hill Major Area Structure Plan has been adopted by the City of Red Deer as a statutory plan in accordance with Section 633 of the *Municipal Government Act*. This section describes an area structure plan as providing a framework for subsequent rezoning, subdivision and development of an area of land. In addition to this plan it is The City's policy to require individual neighbourhood area structure plans for each quarter section of those lands that are serviceable, prior to considering land use districting and subdivision. These plans must comply with the East Hill Major Area Structure Plan (refer to Section 1.4.5 and Section 6.1 for additional information).

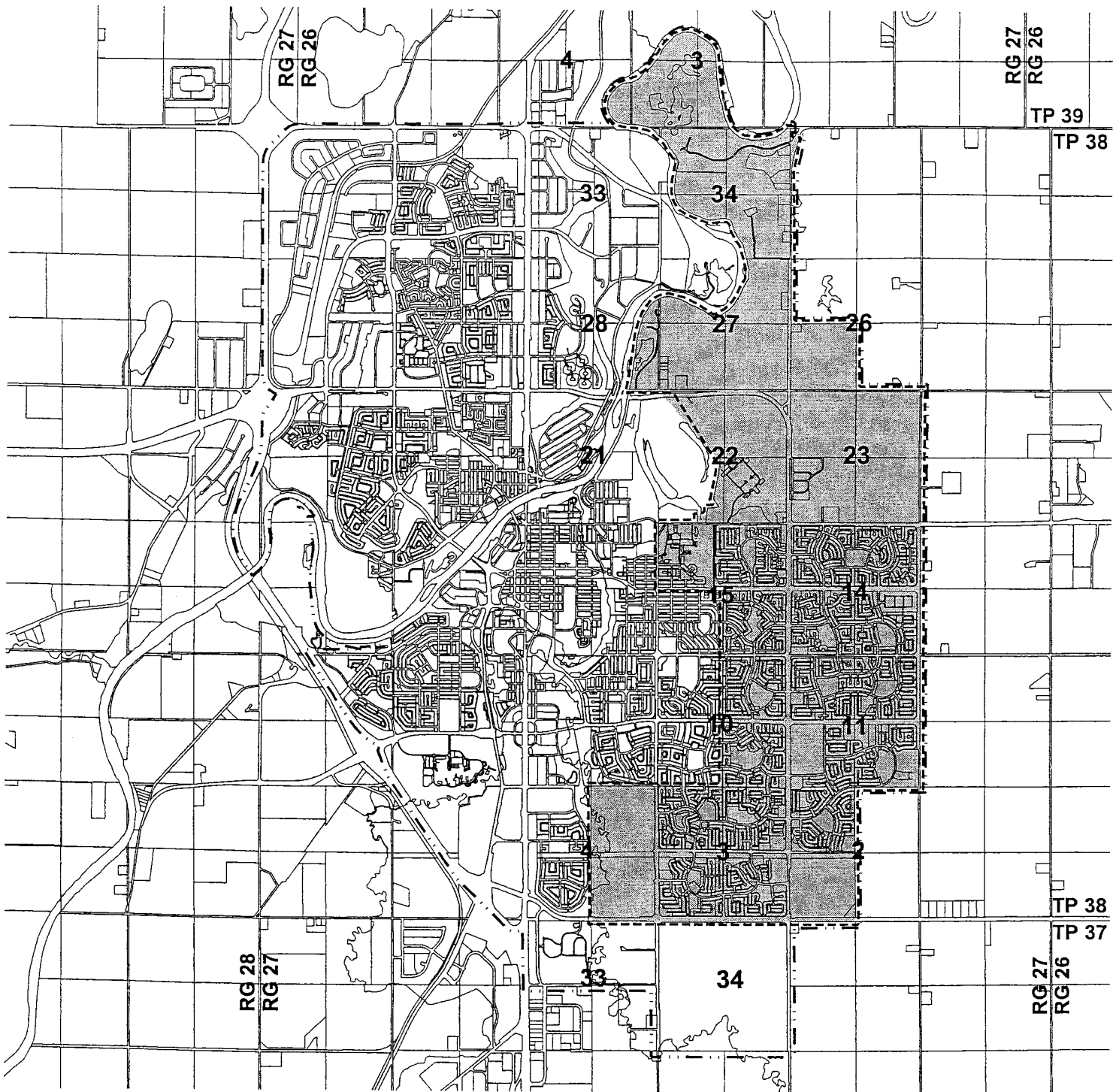
1.3 BACKGROUND

The East Hill Major Area Structure Plan has its origin in the original East Hill Concept Plan prepared in 1977-1978 containing 17 quarter sections of land with an area of 1100 hectares (2720 acres). At that time only four of these quarter sections were located inside the City and the remaining 13 quarters were located in Red Deer County.

The original East Hill Concept Plan has subsequently been amended by City Council in 1985 and 1989, it was converted to an area structure plan in 1993 and again amended in 1998, 2001, 2003 and 2005. During this time the plan responded to changes in Provincial legislation, City boundary expansions that added undeveloped and annexed lands to the plan, updated land use, servicing and transportation information, and the need to identify environmentally significant natural areas and school and commercial locations.

1.4 PLANNING FRAMEWORK

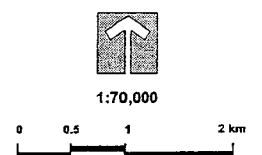
The East Hill Major Area Structure Plan is one of a series of inter-related planning documents adopted by the City of Red Deer. The following City planning documents were referenced in the preparation of the East Hill Major Area Structure Plan ensuring that all plans are consistent with each other.



City of Red Deer East Hill Major Area Structure Plan

Figure 1
Key Plan

- - Plan Area
- - - City Boundary



1.4.1 City of Red Deer Strategic Plan

The City's Strategic Plan provides purpose and guiding principles focusing on City direction in the areas of Community Development, Economic Development, Organization Development and Financial Development. The Strategic Plan specifically addresses community and land use planning. Regularly updated at three year intervals, the Strategic Plan is a current and relevant guideline for the sustained operation and growth of the City of Red Deer.

1.4.2 The City of Red Deer 2004 Growth Study

The City of Red Deer 2004 Growth Study focuses on land absorption rates and land inventory requirements for industrial, residential and commercial land uses within the city over the next 50 years. The update reflects changes in development trends, environmental management initiatives, existing land use, population forecasts, servicing, and transportation. The study is used to identify potential growth areas and generate future short, medium and longer term growth strategies for the city.

1.4.3 Intermunicipal Development Plan

The *Intermunicipal Development Plan* exists to facilitate land use planning cooperation between the City of Red Deer and Red Deer County. It is consistent with the provisions of the *Municipal Government Act* and the individual municipal development plans of the City and County. This plan exhibits a cooperative approach to land use planning matters in and around the City to provide for the future expansion of the City and to allow compatible development in the County without impeding the orderly expansion plans of the City.

1.4.4 Municipal Development Plan

The City of Red Deer Municipal Development Plan contains broad policies for guiding growth and change in the City. It focuses on the type, quality and direction of land use and development, and related issues. The Plan is vital to ensuring that the high quality of life valued by City residents is maintained as new growth occurs. As directed within the *Municipal Government Act*, The City of Red Deer's *Municipal Development Plan* addresses future land use, the process and order of future development, and the provision of services and facilities to accompany this growth.

1.4.5 Area Structure Plans and Area Redevelopment Plans

Area structure plans are usually prepared for undeveloped lands. The City of Red Deer uses two different categories of area structure plans, namely the major area structure plan and the neighbourhood area structure plan. Major area structure plans, such as this document, illustrate broad, long term transportation and land use development strategies for large areas/multiple quarter sections of land. A neighbourhood area structure plan generally encompasses approximately one quarter section (65 ha) of land and provides a significantly greater level of development detail and for a shorter time horizon. This would include housing types, the location of all roadways, lanes, and schools, requirements of public facilities such as parks, trails, churches and social care sites, population density, sequence of development and servicing details. Neighbourhood area structure plans form the basis for future zoning, subdivision and development decisions at the community or neighbourhood level.

Related to area structure plans is a planning tool known as an area redevelopment plan. This is a statutory plan covering an area of existing, mature and often older development in the City. Its

preparation is of necessity community driven, and its policies and land use concept outline directions for the rehabilitation, redevelopment and enhancement of specific sites, housing districts, shopping areas, and generally the public realm including streets and parks.

1.4.6 Land Use Bylaw

The City of Red Deer Land Use Bylaw is designed to regulate and control the subdivision, development and use of lands and buildings within the City to achieve orderly, economical and beneficial development for the overall greater public interest. The Land Use Bylaw divides the City into land use districts that prescribe both permitted and discretionary uses of land and buildings. The Land Use Bylaw implements the policies and objectives outlined in the *Municipal Development Plan*, area structure plans and area redevelopment plans.

1.4.7 Neighbourhood Planning Guidelines & Standards

The City of Red Deer *Neighbourhood Planning Guidelines & Standards*, as amended from time to time, provides guidelines and standards based on smart growth principles for the planning and design of neighbourhoods including neighbourhood form, housing, trails and linkages, roadways, transit, active and passive parks, school sites, leisure facilities, natural environment and heritage, social health and safety. This document provides the requirements for a neighbourhood area structure plan, the subdivision approval process, and park development templates.

1.4.8 Red Deer Growing Smarter: Design Elements and Ideas for New Residential Neighbourhoods

This document provides vision and principles for the development of sustainable neighbourhoods through a set of 50 design elements. It provides background information on City of Red Deer strategic planning framework, the evolution and overview of Red Deer's neighbourhood planning policies and standards, and outlines planning principles of major planning movements and practices throughout North America (as current in 2002). This document has been referenced during drafting of, and to some extent forms the basis of certain elements in, the *Neighbourhood Planning Guidelines & Standards*.

1.4.9 Discussion Paper on Environmental Initiatives – April 2004

The Discussion Paper on Environmental Initiatives was approved by City Council in April, 2004. Council resolved to adopt a conservation and reduction philosophy in all new developments and redevelopments throughout all levels of the organization with this to be reflected in the 2005-2008 Strategic Plan. The Paper contains a comprehensive overview of the types of environmental initiatives taken on by city departments. The Paper also identifies potential partnerships and funding sources that could assist the City in preserving the environment.

1.4.10 Subdivision & Development Regulation

Promulgated under the Municipal Government Act, this Regulation addresses a number of issues relevant to this plan, including:

- A development may require an approval or authorization under the Environmental Protection and Enhancement Act for any construction including sanitary, storm water, and/or waterworks systems. The proponent of a project requiring any of these approvals must submit the

appropriate applications to Alberta Environment and approval must be obtained prior to construction.

- A development may require an approval under the Water Act for any construction associated with storm water management or for any activities within a water body or potentially affecting a water body. The proponent of a project requiring any of these approvals must submit the appropriate applications to Alberta Environment and approval must be obtained prior to construction.
- A development may require a setback waiver from a wastewater treatment facility, landfill or waste site, as indicated within the Subdivision and Development Regulation under the MGA. The setback may be varied by a subdivision authority or development authority with the written consent of the Deputy Minister of Environment. The proponent of a project requiring a setback waiver must submit the appropriate application to The City, who will request approval from Alberta Environment prior to construction.
- Approval from Alberta Environment does not mean that the applicant also has authority under federal legislation. Fisheries and Oceans for matters under the Fisheries Act and Canadian Coast Guard for matters under the Navigable Waters Protection Act are to be contacted for matters relating to federal laws.

2.0 FUTURE EAST HILL COMMUNITY – Figure 2

2.1 VISION

This section describes a possible future built out scenario of the presently (2005) undeveloped lands (approximately 780 ha gross developable land) within the East Hill Major Area Structure Plan into a core community symbolizing a mandate for sustainable development in the City. Depending on population growth and future land absorption rates it may take 10 to 20 years to build out the plan area.

This is the vision for the East Hill communities for the year 2025:

As more people realize and desire the benefits of a sustainable community lifestyle the East Hill has built out with integrated, vibrant and dynamic neighbourhoods designed to meet these expectations. Over the past 20 years since 2005 the neighbourhoods south of 32 Street (±230 ha) have added 2800 to 4000 new dwelling units (8000 to 11000 residents) to the East Hill community, while the neighbourhoods between 55 Street and 67 Street (±240 ha, excluding ±112 ha dedicated for a town centre site) have added 3200 to 4500 dwelling units (9000 to 12000 residents). During the last few years of this time period the lands northward of 67 Street up to the Riverbend Golf Course & Recreation Area (±200 ha) have built out to accommodate 2,500 to 3500 dwelling units (7000 to 10000 residents). Development in the East Hill has seen the city's 2005 population of 79082 grow by 24000 to 33000.

The more recently completed neighbourhoods of the East Hill community are easily identified by their compact land use pattern, pleasant environment, walkable streets and green spaces linking neighbourhoods to commercial sites, natural areas, parks, school sites and other community gathering places.

The neighbourhoods north of 55 Street in particular as well as the larger East Hill community and the surrounding region support a regional commercial centre that has developed from individual commercial developments initially into a vibrant town centre, located at the intersection of 30 Avenue and 67 Street. It integrates commercial, residential and public uses, including a main street theme, and constitutes the pride of the community (see Figure 2).

Transit service links the town centre with the surrounding neighbourhoods and the entire city. The architecture reflects elements of traditional prairie downtowns and contemporary designs. Recreation, social and cultural activities supplement viable commercial services, and shape the town centre as a focal point for the surrounding neighbourhoods and the larger East Hill community. The town centre Main Street is alive as residents and shoppers walk along the pedestrian-friendly street lined with shade trees, shops and the glitter of architectural lighting. Wide sidewalks and pedestrian trail linkages provide safe and convenient access to various facilities and amenities. Employment areas and buildings are designed to be compatible with adjacent residential uses and school sites. The multi-neighbourhood park site at the intersection of 30 Avenue and 67 Street provides additional vibrancy to the town centre. It accommodates two high school sites and a major recreation venue.

A compact land use pattern, an interconnected street pattern with direct pedestrian linkages and higher residential densities around transit stops have become characteristic of development on the East Hill and have made public transit more efficient, and more people walk or ride to local destinations.

Landscaped arterial roadways, with no more than two lanes for each travel direction, facilitate vehicle and transit travel between neighbourhoods and into the city.

Each neighbourhood reflects a special image and character of mixed housing linked by inviting streetscapes, walkways and enhanced open spaces. Schools and other public institutions are constructed as architectural landmarks in the neighbourhood. Tree-lined residential streets, houses that are intimately related to the sidewalk and wide walkways create a comfortable pedestrian setting. The neighbourhood attractions are linked to the residences through a network of local and collector roadways, trails and linear parks that are well used by residents. Everyday necessities are within walking distance of most homes. Friends and neighbours meet along streets, sidewalks, and points of interest.

Trails connect the neighbourhoods to the Waskasoo trail network and places of interest throughout the community. A variety of active and passive parks, from large neighbourhood parks to linear parks, and tiny manicured local parkettes are strategically located throughout the neighbourhoods, creating linkages and a sense of community.

Preservation and beautification of the environment are diligently practiced. The natural scenic areas along the Red Deer River Valley and its tributary and ravines, including creeks and seasonal streams, have been preserved and enhanced to form the backdrop for a shared trails system, used for cross-country skiing, jogging, walking, biking and roller-blading. Rest areas, look outs and interpretive sites contain recreational amenities that are actively used. Natural treed areas and wetlands remind residents of their heritage and enhance the open space system.

Servicing is provided in an efficient and environmentally-friendly manner. Green infrastructure, recycling and energy conservation are efficiently practiced. The natural systems of the area are utilized and enhanced to provide aesthetic and recreational value. Wet and dry storm water ponds and constructed wetlands are found throughout the community providing amenity to the neighbourhoods while effectively and naturally managing storm water volume and enhancing run-off water quality.

(Adapted for The City of Red Deer from 'Heritage Valley Servicing Concept Design Brief', 2001, City of Edmonton)

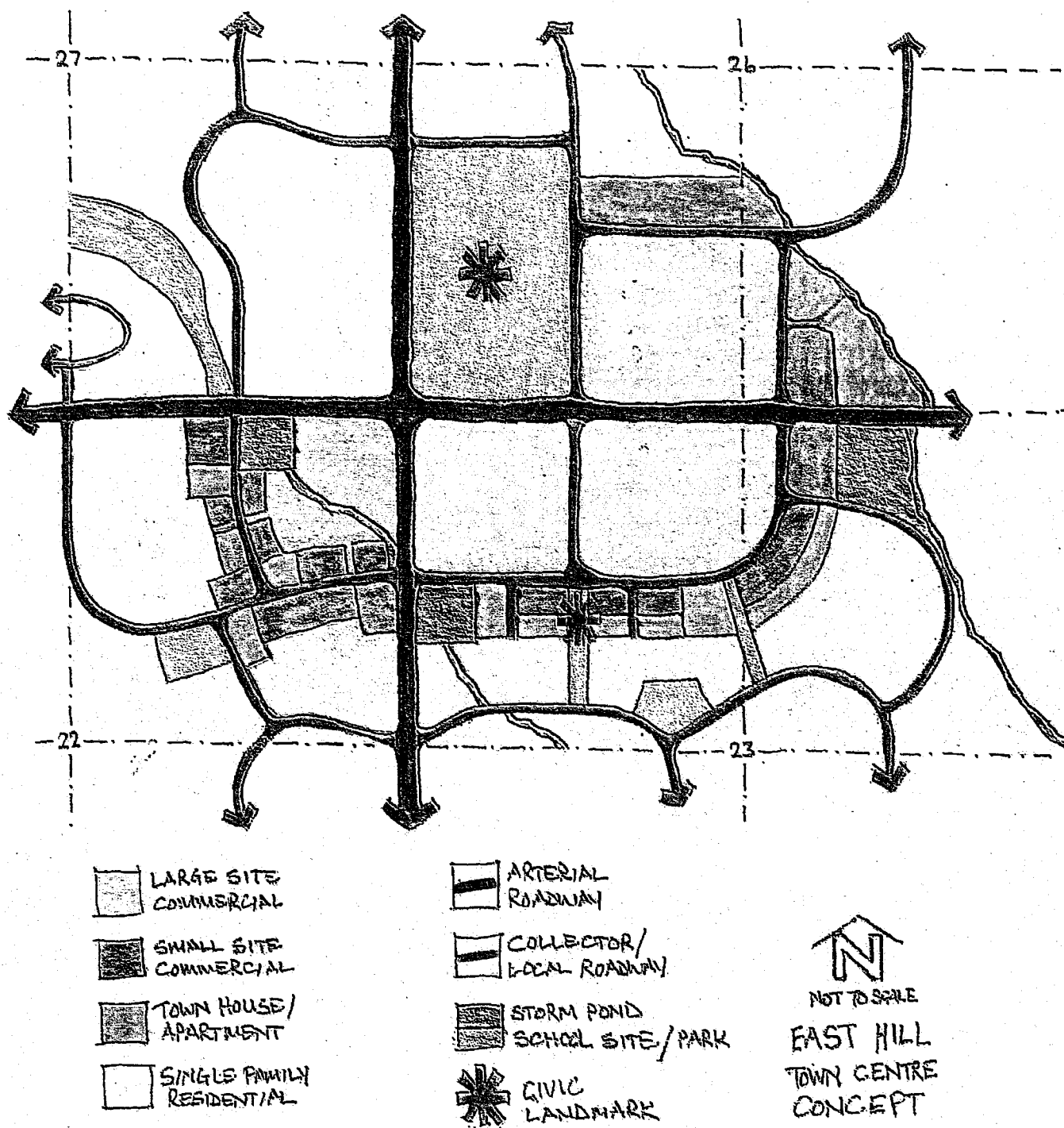


Figure 2: Concept illustrating the basic elements of the town centre site

Note: The development concept shown in Figure 2 is for illustration purposes only. The intent is to illustrate the basic elements of the proposed town centre, such as mixed land use/integration, pedestrian linkages, landmark sites, and avoiding commercial traffic shortcuts through adjacent residential areas. It is not a blueprint for development on the relevant quarter sections, and it does not have to be amended if the neighbourhood area structure plans propose development concepts that are different to this one.

2.2 GOAL AND OBJECTIVES

The stated vision of this plan translates into the following goal:

'To provide a broad planning direction for the subdivision of lands in a manner which facilitates the economically, socially and ecologically sustainable building out of the plan area as a desirable place for healthy living, education, work and recreation for individuals and families of all ages and with varying needs and desires.'

The following objectives support the goal:

- i) *To guide City expansion in an orderly manner reflecting high standards in terms of quality of life.*
- ii) *To establish an infrastructure and services framework for more detailed neighbourhood planning.*
- iii) *To manage growth and resources in a manner capable of sustaining fiscal, social and environmental activities into the future.*
- iv) *To provide transportation mode options for regional, district and local destinations, encouraging the use of alternatives to the motor car (i.e. walking, bicycling and transit).*
- v) *To facilitate the creation of employment opportunities in the plan area.*
- vi) *To preserve special natural features (natural capital) through the preparation of ecological profiles for each neighbourhood prior to neighbourhood area structure planning.*
- vii) *To identify future commercial sites in locations which serve the community and are economically viable.*
- viii) *To implement the City's Municipal Development Plan and the City/County Intermunicipal Development Plan.*

In striving to achieve the goal and objectives, the plan endorses and promotes the principles of 'smart growth' and sustainable development practices which underpin The City's *Neighbourhood Planning Guidelines & Standards*, as amended from time to time, and the trends highlighted in *The City of Red Deer 2004 Growth Study*.

This plan supports environmentally sustainable practices and standards, ecological conservation, management of the city's ecological footprint, the use of green infrastructure, and efforts to work towards regional conservation.

3.0 EXISTING SITE CHARACTERISTICS – Figure 3 & 4

Section 3.1 and Figure 3 must be read in conjunction with Section 4.0 and Figure 5 and 10.

3.1 TREE AND WETLAND NATURAL HABITAT AREAS (Preservation Focus) – Figure 3

The topography of the plan area consists of generally flat land, rising gradually towards future 10 Avenue to the east (see Figure 5 for the location of future 10 Avenue). Most of the undeveloped land in the plan area has been used primarily for agricultural purposes with limited vegetation and trees remaining. The Red Deer River valley and two major ravines are located in the plan area, as well as a large wetland in the Red Deer County conceptual area.

Figure 3, Tree and Wetland Natural Habitat Areas (Preservation Focus), is based on the City's Ecospace (Natural Habitat) Management Plan which is updated regularly to preserve and enhance Red Deer's natural environment through careful community planning. Figure 3 identifies existing drainage courses, wetlands and a variety of natural areas, including treed areas, other vegetation growth and escarpment.

Figure 3 also identifies the preservation focus within the plan area, including the extent that these may relate to features outside of the plan boundary. Preservation focus areas are a combination of drainage patterns and natural features serving as wildlife corridors and significant reserves of biodiversity. These preservation focus areas are identified to flag their presence and significance. The preferred outcome is to preserve these focus areas intact as natural features either within environmental reserve or municipal reserves or alternatively to incorporate them with storm water management facilities. Final strategies for the actual preservation of these focus areas may not be in place at the time of adopting this plan therefore, their actual preservation along with numerous less prominent natural features will be confirmed through the preparation of ecological profiles for each quarter section and through the preparation of neighbourhood area structure plans. These processes take into account practical and economic considerations, the result of which may determine which of the focus areas are successfully preserved.

Focus preservation areas identified on Figure 3 are the following:

- W₁ - these wetlands are significant seasonal wetlands tying into Piper Creek with storm water servicing potential
- W₂ - this wetland is a significant wetland with entrance feature and storm water servicing potential
- W₃ - along with associated trees, this area has many natural attributes
- W₄ - this prominent wetland is a significant natural feature in the area
- W₅ - these wetlands and treed area have a significant regional drainage function
- WRS - the wetland, ravine and seasonal streams are part of a natural drainage system with potential to be linked through storm water management facilities to Red Deer River. The seasonal stream has the potential to be utilised in its natural state as a linear park providing a separate linkage through residential development from 20 Avenue to the wetland on the NW ¼ Section 26 and ultimately into the Waskasoo park system via the ravine leading northward of the wetland
- RS - this ravine and seasonal stream could potentially serve as a water source to McKenzie Trails recreational area and has storm water servicing potential
- T₁ - mature tree stand
- T₂ - this significant feature is a seasonal stream with an expansive mature tree stand

- E₁ - Red Deer River escarpment with associated trees
- E₂ - Piper Creek escarpment with associated trees

Since natural features and associated wildlife are not confined to man-made boundaries, a number of natural areas are positioned outside of the plan boundary but retain close connection to natural areas within. Preservation focus areas located outside of the plan area boundaries are conceptual, however the City will endeavour to work with Red Deer County, the landowners, developers and other interested parties to develop a regional approach to conservation of natural areas in the Red Deer region.

3.2 NATURAL RESOURCE EXTRACTION AND LANDFILLS – Figure 4

Natural Resource Extraction

Figure 4 identifies the north and northeast areas of the Plan as having been subject to gravel and oil and gas extraction in the past. The required statutory setbacks from the oil and gas wells and pipelines, as prescribed by the Alberta Energy & Utilities Board, will be detailed in phase one site assessments which are submitted as part of each neighbourhood area structure plan.

A neighbourhood area structure plan will incorporate any setbacks into its development concept as part of a public utility lot, municipal reserve (not necessarily included as part of the required 10% municipal reserve dedication) or road right of way, subject to approval by the City.

The City's policy with regard to future oil and gas extraction facilities is outlined in the *Municipal Development Plan*.

Notwithstanding the proposed uses shown on Figure 5 Part of the SE ¼, Part of the NW ¼ and the whole of the SW ¼ Section 34-38-27-W4, all lying east of the Red Deer River bank, may be considered for gravel extraction. When subdivision of any of these lands occur access to the gravel extraction operation, which is presently taken along an existing unregistered gravel road, will be secured through appropriate measures, such as an access agreement.

Landfills

The City's existing landfill site and five closed or inactive landfill sites are all relevant to the East Hill plan area (see Figure 4). A 450 metre development setback is required from any active landfill site while a 300 metre development setback would be applicable to an inactive or closed landfill site. This setback applies to subdivision or development for a school, hospital, food establishment or residential/commercial accommodation use.

- a) The City's closed solid waste disposal site, located in the NE ¼ Section 33-37-27-W4, has a 300 m setback from proposed residential development. The south ±200 m of the SE ¼ Section 4-38-27-W4 and ±115 m of the southwest corner of the SW ¼ Section 3-38-27-W4 are affected by this setback. The lands within this setback could be developed for commercial land uses that do not include the preparation and handling of food products or for commercial accommodation.
- b) The City's active solid waste disposal site, located in Section 34-37-27-W4, has a 450 m setback from proposed residential development. This setback is accommodated within a planned buffer located within the solid waste disposal site up to the south boundary of residential development in the south half of Section 3-38-27-W4. Therefore no lands

proposed for residential development are affected by this setback. The lands within this setback on the north half of Section 34-37-27-W4 could be developed for commercial land uses that do not include the preparation and handling of food products or for commercial accommodation.

- c) There are two confirmed closed solid waste disposal sites located in the SE ¼ Section 21-38-27-W4 immediately west of the Gaetz lakes sanctuary. The most southerly of these two sites affects a small part of the NW ¼ Section 15-38-27-W4. See Figure 4.
- d) A suspected landfill identified on the SW ¼ Section 23-38-27-W4 may require setbacks affecting the adjacent residential developments. More detail regarding the nature and extent of this landfill will be acquired through a phase one site assessment as part of neighbourhood area structure planning. At this time removal of the landfill contents and reclamation may be required prior to residential planning, or if the landfill site remains, a setback requirement will be established. The setback identified on Figure 4 indicates the setback requirement if a closed landfill site is confirmed and is to remain.
- e) The landfill and well on the SW ¼ Section 34-38-27-W4 and the landfill on the east half of Section 28-38-27-W4 are located within areas that are not identified for residential use (except for one country residential lot in the McKenzie subdivision) and therefore do not have an impact on proposed residential uses.

Based on developer requests supported with geotechnical evidence at the time of subdivision The City may apply to Alberta Environment to reclassify dry landfill sites.

4.0 DEVELOPMENT CONCEPT – Figure 5 & 10

Section 4.0 and Figure 5 and 10 must be read in conjunction with Section 3.1 and Figure 3.

The development concept illustrated on Figure 5 has been prepared in response to current and anticipated residential and commercial market trends, population growth, development and planning objectives and principles contained in the City's *Municipal Development Plan, Neighbourhood Planning Guidelines & Standards* and *The City of Red Deer 2004 Growth Study*.

4.1 RESIDENTIAL – Figure 5

Sustainable Growth

This major area structure plan promotes the principles of sustainable community development, otherwise referred to as 'smart growth' principles. These principles are incorporated into the *Neighbourhood Planning Guidelines & Standards* which support the implementation of this plan and as such are required to be incorporated into the planning and design of all neighbourhoods within the East Hill community.

All development within the plan area must be preceded by an approved neighbourhood area structure plan based on the requirements of this Plan and the City's *Neighbourhood Planning Guidelines & Standards*, with a goal to incorporating principles of sustainable community development. This includes the establishment of neighbourhood identity, the promotion of compact land use patterns (minimum density requirement) and mixed housing opportunities in terms of form, tenure and affordability, and the provision of trails to connect homes with natural areas, parks, schools, the town centre and other community gathering places.

Neighbourhood design in Sections 22 and 23-38-27-W4 will focus towards and provide direct pedestrian/bicycle linkages to the town centre site, while being conscious of ensuring that opportunities for shortcutting of motorcars from surrounding areas to the town centre site are not encouraged.

Density

For new neighbourhood area structure plans adopted after November 2002 the design density must fall within the range of 12.35 to 17.30 dwelling units per gross developable hectare (5 to 7 du/gross developable acre), subject to available capacity in the major sanitary sewer system. Plans originally adopted prior to November 2002 will be evaluated based on the former *Planning & Subdivision Guidelines* and the density shall not exceed 45 persons per hectare, unless the plan has been amended to meet the new City of Red Deer *Neighbourhood Planning Guidelines & Standards*.

Existing Country Residential Development

The 2004 annexation lands now located within the plan area include two developed country residential subdivisions, i.e. College Park on the SW ¼ Section 23-38-27-W4 and MacKenzie on the SW ¼ Section 27-38-27-W4, as well as several acreages scattered throughout.

With regard to the College Park subdivision, any development of adjoining lands is required to provide residential use and traffic patterns compatible with the existing residential use. Additional

requirements for adjoining development as set out in the *Neighbourhood Planning Guidelines & Standards* will apply to planning of the adjacent lands. An area redevelopment plan for College Park will be prepared to ensure the requirements are implemented. Other existing residential developments (i.e. acreages) will be incorporated into future Neighbourhood Area Structure Plans.

Existing Red Deer County Statutory Plans

Previously adopted Red Deer County Area Structure Plans that are part of the annexed lands will be superseded by this plan (Spruce Woods ASP on part of SE ¼ Section 34-38-27-W4 and Thompson ASP on the south half of NE ¼ Section 34-38-27-W4).

Required Number of Dwelling Units in the Town Centre

This plan requires a minimum number of dwelling units in the town centre. Section 4.2.1.3 provides direction for each quarter section containing a component of the town centre.

4.2 COMMERCIAL – Figure 5

The *City of Red Deer 2004 Growth Study* predicts major residential growth in the City's southeast and north east sectors, placing strong demand for increased future commercial development in these areas. The proposed 20 Avenue expressway (see Figure 5) and its bypass connections with the proposed realigned Highway 11 (via 67 Street), Highway 2 (via McKenzie Road) and Highway 11A (via proposed Northlands Drive river crossing) will facilitate prime commercial development opportunities on the City's east side.

As shown on Figure 5, existing and future commercial areas will serve East Hill residents for commercial needs and employment opportunities. Future commercial development will focus on the designated town centre site. Home businesses may play an increasingly significant role. A future industrial employment node (potentially with fringe commercial uses) is envisioned outside the plan area east of The City's existing waste management facility on 19 Street.

4.2.1 Town Centre Concept

A town centre site of approximately 112 ha is proposed at the arterial roadway intersection of 30 Avenue and 67 Street, accessible within one kilometre west of the future expressway along 20 Avenue.

The following sections describe the basic elements of the town centre concept, which must be incorporated into the town centre design during the preparation of individual neighbourhood area structure plans.

A new land use district will be developed to implement the town centre concept. Refer to Section 6.0 *Plan Implementation* for additional information.

4.2.1.1 General Directions for Development in the Town Centre Site

The town centre site is envisioned as a commercial, civic and residential mixed use area. It will provide a range of commercial sites for retail, services, entertainment and limited office use to serve the East Hill community as well as a regional market. Possibly, larger commercial sites for power centres or lifestyle centres will be provided adjacent to the 30 Avenue and 67 Street

arterial roadway, while smaller sites (within a main street centre) will be provided along the internal collector roadways.

Any “main street” commercial centre within the town centre site will reflect a pedestrian-friendly street environment lined with shade trees, shops and wide sidewalks. This can be developed on either the public collector roadway system as part of smaller commercial lots, or on a private roadway on a larger commercial lot.

The town centre site is located adjacent to a proposed multi-neighbourhood park site, which will accommodate two high school sites and a major event venue / community centre / recreation facility.

The town centre site includes medium and high density residential uses. This will be in the form of town houses and apartments, the latter either as stand alone developments or as dwelling units above commercial ground floors or a combination of these depending on market demand. Figure 6 conceptually illustrates commercial development with dwelling units above the ground floor.

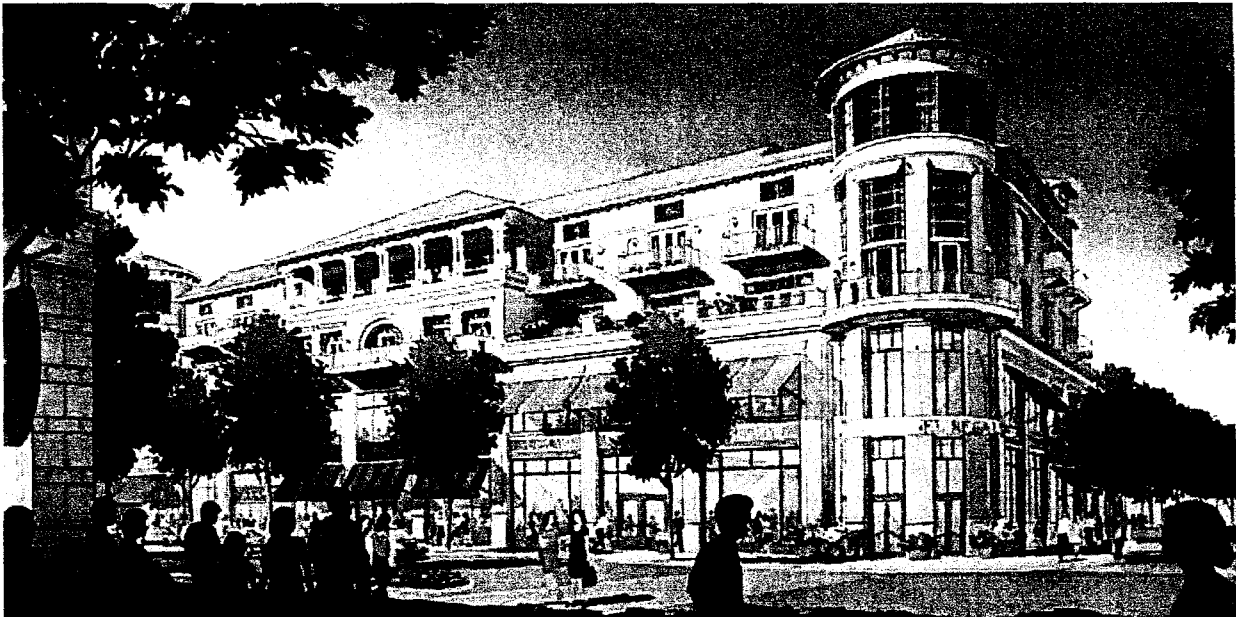


Figure 6: Vertical residential/commercial mix in a “main street” centre

(Source: Congress for the New Urbanism, Image Bank – www.cnu.org)

It is anticipated that the majority of residential development within the town centre site will occur on its fringe. Rather than turning its back towards residential lands adjacent to the town centre site, commercial and residential uses within the town centre site will be appropriately integrated with surrounding residential neighbourhoods. There is a gradual transition of residential densities and land use intensity from low and medium density in adjacent areas to medium and high density on the fringes of the town centre site and high density in the town centre core where commercial uses dominate.

The town centre will be designed to accommodate motorcars and other transportation modes. Collector trails and neighbourhood trail linkages will provide safe, direct and convenient access from adjacent residential areas to various facilities throughout the town centre site. The existing oil/gas facilities may present opportunities to provide separate pathways for this purpose.

The town centre site will include one or more landmark buildings and at least one public square. These features will be distinctive and prominent at carefully selected locations and will function as community focal points/gathering places.

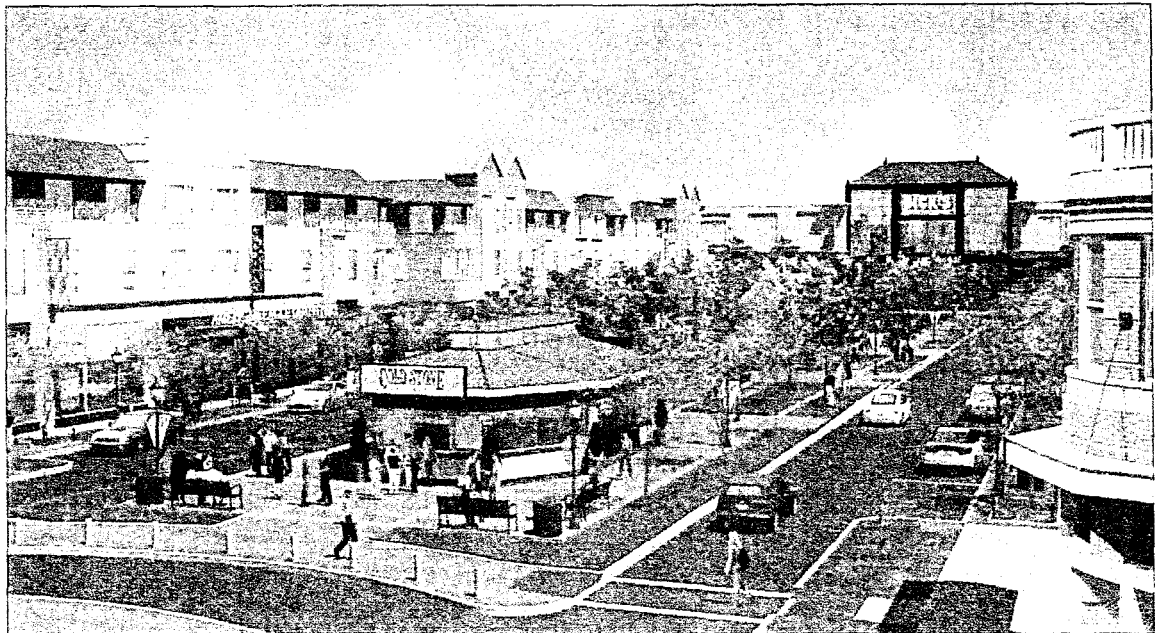
There is potential for the development of transit facilities within the proposed town centre.

4.2.1.2 Commercial Form Options in the Town Centre Site

The overall town centre concept will include a mix of commercial types, including the following:

- a) **Large Commercial Centres** – The majority of the commercial development in the town centre will be regional commercial. This could take a variety of forms, including the following:
 - (i) *Power Centre or Lifestyle Centre* - A “power centre” or “lifestyle centre” is defined as an open-air retail and leisure centre, dominated by a group of large anchor “big box” stores and upscale national chain speciality stores, such as warehouse clubs, discount department stores and other retailers that tend to offer a very deep selection in a particular merchandise category, such as books, toys, shoes, furniture, audio, video and other appliances, office supplies or sporting goods. The “big box” anchor stores tend to comprise approximately 75% of the entire centre, which may contain between 20 ha (200,000 square feet) and 60 ha (600,000 square feet) or more of space.

In Red Deer, the commercial development at South Point Common is an example of a “power centre”. While the typical power centre is oriented specifically towards shoppers with cars, there are design considerations that would facilitate a pedestrian-friendly environment, as illustrated in Figure 7 below. A lifestyle centre typically has an architectural theme and a pedestrian-friendly environment. It is the vision of this plan to encourage this kind of town centre development for the East Hill community.



A national tenant terminates the end of a square at Crocker Park near Cleveland, Ohio.

Figure 7: A commercial “power centre” designed as a pedestrian square

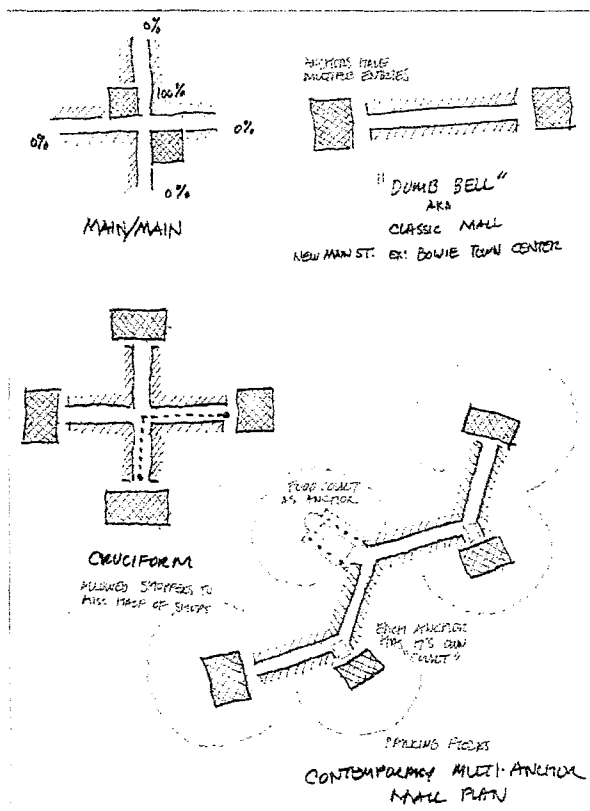
(Source: New Urban News, Volume 10 Number 1, January/February 2005)

- (ii) *Traditional Regional Shopping Centre* – Traditionally a regional shopping centre is defined as an enclosed shopping centre of approximately 35 ha (350,000 square feet) to 80 ha (800,000 square feet) or more that serves sections of, or entire urban areas, as well as surrounding rural communities. Anchors typically include department stores, along with a concentration of apparel and other specialty stores.

In Red Deer, the Bower Place Mall in the South Hill area and the Parkland Mall in the North Hill area are considered traditional regional shopping centres.

- (iii) *Main Street Commercial Centre* – the town centre commercial area will include a “main street” centre. This is envisioned as an approximately 200 to 400 m long section of either a private or public street designed to reflect a typical prairie small town main street with associated architecture. It will be oriented towards creating a pedestrian friendly environment intrinsically linked to adjacent residential areas, and it may include residential development on the second floor.

Commercial lots along “main street” are smaller, and national tenants are strategically placed as anchors at junctions and terminated vistas. “Main street” form options include the concepts shown in Figure 8 (there may be others).



Illustrated at left (clockwise from lower left): the cruciform mall format, which allows shoppers to miss half of the shops; the historic downtown “main/main” format; the two-anchor dumb bell format; and the modern shopping mall layout centered on the food court. Below is the corresponding zigzag main street format, here shown centered on a civic plaza. Other plazas are placed at the end anchors. Terminated vistas create a sense of enclosure and place and draw shoppers from one section of the town center to the next. Notice the streets branching off of the main street, connecting the town center to the rest of the town (not shown).

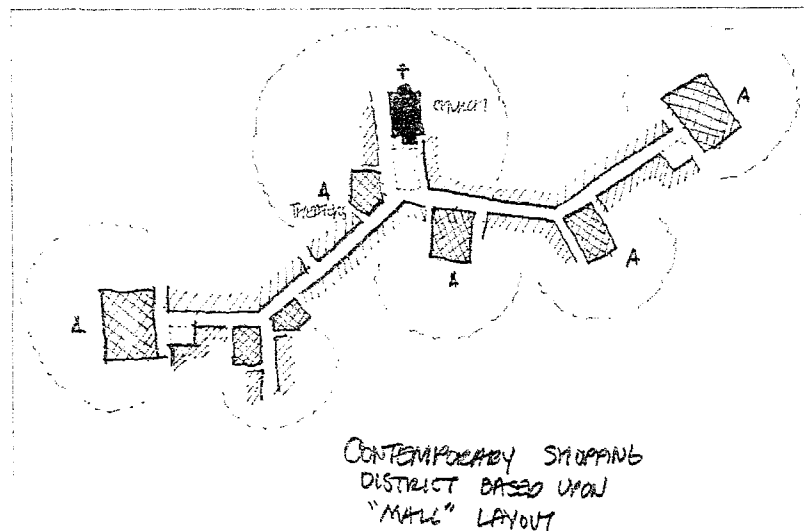


Figure 8: Design options for “main street” commercial centres
(Source: New Urban News, Volume 10 Number 1, January/February 2005)

Figure 9 illustrates the typical small town ambience of the “main street” type commercial centre.

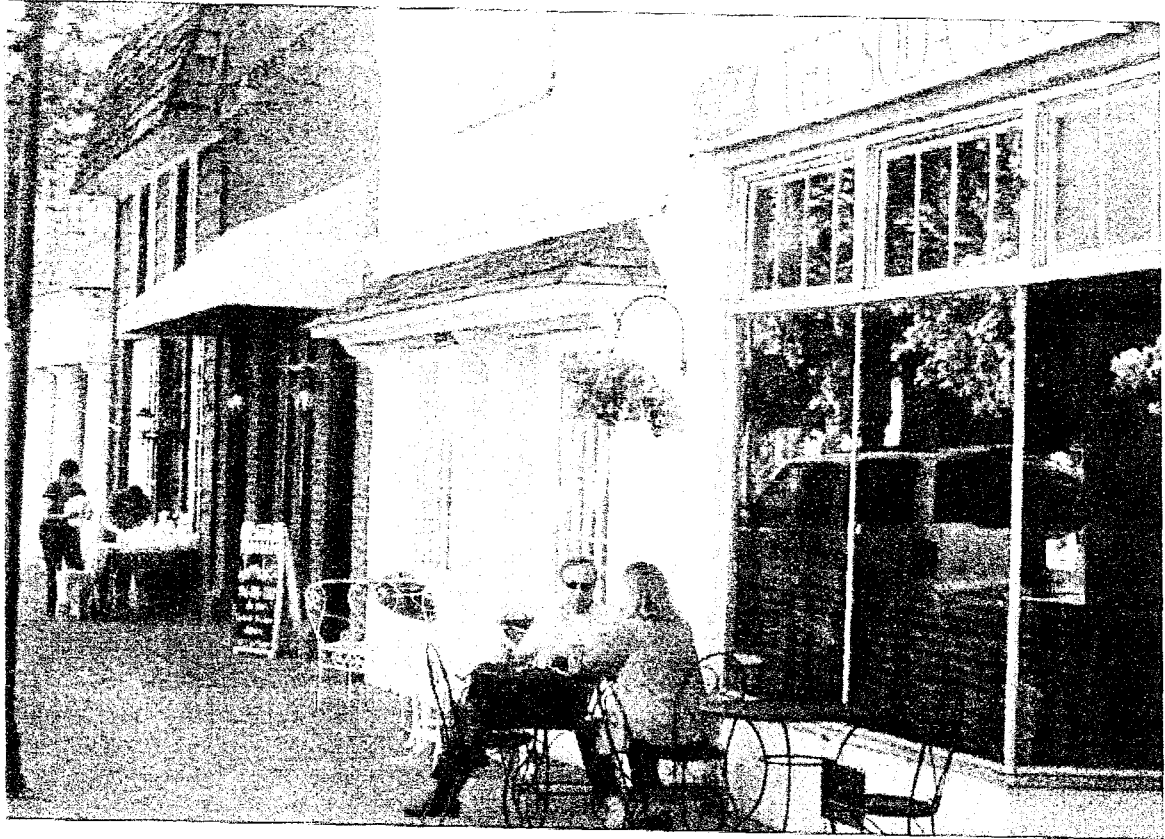


Figure 9: Small town main street ambience

(Source: New Urban News, Volume 10 Number 1, January/February 2005)

- b) **Medium and Small Shopping Centres** – while the regional commercial component of the town centre is oriented towards a regional market, the town centre will include some smaller centres, including the following:
- (i) *Highway Commercial Centre* – these centres accommodate uses that are oriented towards main traffic routes, with convenient access and egress onto major arterials. Typically the minimum permissible lots sizes are smaller than regional commercial centres. In addition to uses that are similar to those found in other commercial developments, highway commercial centres may also accommodate premises that cater for bulk goods and large products such as motor vehicle sales, repair shops and agricultural equipment. Typically the landscaping standards along major entryways such as the location of the town centre, requires higher landscaping standards.
 - (ii) *District and Neighbourhood Convenience Shopping Centres* – these types of shopping centre provide in the frequent shopping needs of the local community. At the very least the town centre site will include one district shopping centre on the NE ¼ Section 22-38-27-W4 and one neighbourhood convenience centre on the NW ¼ Section 23-38-27-W4, but the specific location of these sites on those quarter sections are not identified on Figure 5. Sections 4.2.2 and 4.2.3 below describe the functions of these shopping centre

types in more detail. District and Neighbourhood Convenience Shopping Centres may take on a "main street" format similar to that found in regional commercial centres.

4.2.1.3 Specific Development Directions for Quarter Sections Containing a Component of the Town Centre Site

The ±112 ha town centre site is distributed across five quarter sections, i.e. the NE ¼ Section 22-38-27-W4, the NW ¼ Section 23-38-27-W4, the NE ¼ Section 23-38-27-W4, the SW ¼ Section 26-38-27-W4 and the SE ¼ Section 26-38-27-W4. This distribution aims to ensure visibility along 67 Street, provide sufficient roadway access, disperse traffic through multiple intersections and facilitate development phasing over time in order to meet commercial growth demands for the 115,000 population threshold as identified in *The City of Red Deer 2004 Growth Study*.

A breakdown of the land use allocations within the overall town centre site is as follows:

- ±72 ha gross commercial land (±58 ha net)
- ±40 ha gross residential land – ±1380 medium and high density dwelling units at 35 du/ha

The following breakdown is specific to each of the five quarter sections containing the town centre site: [Note that residential density requirements are calculated at the low end of The City's density range requirement, i.e. 12.35 dwelling units per hectare outside of the town centre site, and at an average of 35 du/ha gross (±50 du/ha net) for medium density (town houses) and high density (multi-family/apartment buildings) within the town centre site]

a) NE 22-38-27-W4:

- 57.81 ha available for overall development, of which a maximum of 26 ha gross is designated as a component of the town centre site
- Within the 26 ha component of the town centre site:
 - ±19 ha gross commercial, including ±2 ha commercial collector roadways and a ±4 ha storm water detention pond)
 - ±7 ha gross mixed used residential/commercial fringe area, to be developed at a minimum density of 35 du/ha, yielding a minimum of 245 dwelling units within the fringe area (i.e. 38% of the total minimum housing stock)
 - Additional commercial area could be provided if the required minimum number of dwelling units (245) were developed at a density higher than 35 du/ha
- ±32 ha gross residential area on the remainder of the quarter section to be developed at a minimum density of 12.35 du/ha, yielding a minimum of 395 dwelling units.
- Overall this ¼ section (57.81 ha) will yield a minimum of 640 dwelling units
- See note on municipal reserve below

b) NW 23-38-27-W4:

- 56.68 ha available for overall development, of which a maximum of 40 ha gross is designated as a component of the town centre site
- Within the 40 ha component of the town centre site:
 - ±28.5 ha gross commercial, including ±3.5 ha commercial collector roadways

- ±11 ha (including a ±4 ha storm water detention pond) gross mixed used residential/commercial fringe area, to be developed at a minimum density of 35 du/ha, yielding a minimum of 385 dwelling units within the fringe area (i.e. 65% of the total minimum housing stock)
- Additional commercial area could be provided if the required minimum number of dwelling units (385) were developed at a density higher than 35 du/ha
- ±16.68 ha gross residential area on the remainder of the quarter section to be developed at a minimum density of 12.35 du/ha, yielding a minimum of 205 dwelling units.
- Overall this ¼ section (56.68 ha) will yield a minimum of 590 dwelling units
- See note on municipal reserve below

c) **NE 23-38-27-W4:**

- 55.42 ha available for overall development, of which a maximum of 10 ha gross is designated as a component of the town centre site
- Within the 10 ha component of the town centre site:
 - ±3.5 ha gross commercial, including ±1.2 ha commercial collector roadways
 - ±6.5 ha (including a ±1.8 portion of a ±4 ha storm water detention pond) gross mixed used residential/commercial fringe area, to be developed at a minimum density of 35 du/ha, yielding a minimum of 225 dwelling units within the fringe area (i.e. 29% of the total minimum housing stock)
 - Additional commercial area could be provided if the required minimum number of dwelling units (225) were developed at a density higher than 35 du/ha
- ±45.42 ha gross residential area on the remainder of the quarter section to be developed at a minimum density of 12.35 du/ha, yielding a minimum of 560 dwelling units.
- Overall this ¼ section (55.42 ha) will yield a minimum of 785 dwelling units
- See note on municipal reserve below

d) **SE 26-38-27-W4:**

- ±57.49 ha available for overall development, of which a maximum of 14 ha gross is designated as a component of the town centre site
- Within the 14 ha component of the town centre site:
 - ±4.5 ha gross commercial, including ±1.25ha commercial collector roadways
 - ±9 ha gross mixed used residential/commercial fringe area, to be developed at a minimum density of 35 du/ha, yielding a minimum of 315 dwelling units within the fringe area (i.e. 37% of the total minimum housing stock)
 - Additional commercial area could be provided if the required minimum number of dwelling units (315) were developed at a density higher than 35 du/ha
- ±43.49 ha gross residential area on the remainder of the quarter section to be developed at a minimum density of 12.35 du/ha, yielding a minimum of 540 dwelling units.

- Overall this ¼ section (57.49 ha) will yield a minimum of 855 dwelling units
- See note on municipal reserve below

e) **SW 26-38-27-W4:**

- 58.42 ha available in this quarter section, of which ±24 ha gross will be developed as a multi-neighbourhood park site / major event venue. Although the multi-neighbourhood park site will form a functional and integral component of the town centre, it shall not be included in calculations for residential density requirements for this quarter section. This leaves ±34.42 ha available for overall development, of which a maximum of 22 ha gross is designated as a component of the town centre site.
- Within the 22 ha component of the town centre site:
 - ±16 ha gross commercial, including ±1.25 ha commercial collector roadways
 - ±6 ha gross mixed used residential/commercial fringe area, to be developed at a minimum density of 35 du/ha, yielding a minimum of 210 dwelling units within the fringe area (i.e. 57% of the total minimum housing stock)
 - Additional commercial area could be provided if the required minimum number of dwelling units (210) were developed at a density higher than 35 du/ha
- ±12.42 ha gross residential area on the remainder of the quarter section to be developed at a minimum density of 12.35 du/ha, yielding a minimum of 155 dwelling units.
- Overall this ¼ section (34.42 ha) will yield a minimum of 365 dwelling units
- See note on municipal reserve below

4.2.1.4 Municipal Reserve Dedication within the Town Centre Site

Typically, in respect of commercial developments, The City requests money in lieu of municipal reserve dedication; however, considering that the town centre concept includes residential land uses and landmark sites, which may consist of public open space, as well as an overall pedestrian friendly theme, The City may request that some or all required municipal reserve land (instead of cash in lieu) be dedicated within the town centre site.

4.2.1.5 Storm Water Management Facilities within the Town Centre Site

Storm detention ponds are required on each of the three quarter sections comprising the town centre site. The approximate sizes of these storm water management facilities are provided in the breakdown in the previous section. The natural slope on the lands in question is such that the lowest points on the three quarter sections coincide with desirable commercial site locations. If developers propose to place storm water management facilities in locations other than the natural low points, or in less efficient configurations for marketing or other reasons, the additional construction costs must be borne by the developer.

4.2.2 Commercial Sites for District Shopping Centres

Within the plan area there are two developed district shopping centres, i.e. the Deer Park Centre Mall located on the southeast corner of the 30 Avenue/Dunlop Street intersection and the East

Hill Shopping Centre located at the northwest corner of 30 Ave and 22 Street, as identified on Figure 5. Located a short distance west and just outside of the plan area is another existing district shopping centre, i.e. the Eastview Shopping Centre at the southeast corner of 40 Avenue and 39 Street.

Typically a district shopping centre serves the daily to weekly shopping needs of residents in adjacent and nearby residential neighbourhoods. In accordance with the Land Use Bylaw a district shopping centre is a retail/service facility located on a site that is between 1.0 and 3.0 hectares in size. In general, a district shopping centre typically comprises a maximum of approximately 107,000 square feet of leasable space. These shopping centres are usually developed as an open-air plaza concept built in an "I", "L" or "U" shape. Another option is to develop a district shopping centre based on a small scale "main street" theme. District shopping centres are anchored by a supermarket or a specialized grocery store. The anchor supermarkets at the existing centres are the Co-op (approximately 26,000 square feet), Save-On Foods (approximately 41,000 square feet) and IGA (approximately 14,500 square feet).

4.2.3 Commercial Sites for Neighbourhood Convenience Shopping Centres

The existing and proposed sites for neighbourhood convenience centres in the East Hill area, as shown on Figure 5, will fulfil the daily shopping needs of East Hill area residents.

In accordance with the Land Use Bylaw a neighbourhood convenience centre provides for a convenience type retail/service facility on a site with a maximum site size of 4047 square metres (1.0 acres). The purpose of a neighbourhood convenience centre is to provide retail and service facilities that meet the day-to-day needs of the residents in adjacent residential neighbourhoods located within an approximate one kilometre service area, or approximately two neighbourhoods of a ¼ section each. These sites typically provide for a small strip plaza containing between approximately one and five stores. The tenants in a neighbourhood convenience centre may include a gasoline service facility along with a convenience store and services such as a hair salon, dry cleaner, or a neighbourhood scale coffee/restaurant facility. Typically neighbourhood convenience centres are positioned at the corner of arterial and major collector roadway intersections. In addition to having convenient roadway access, these sites are accessible by transportation mode alternatives along the trails which are provided as a standard within arterial and collector roadways.

4.2.4 Restricted Commercial Sites

Figure 5 identifies an area for "Restricted Commercial" use north along 19 Street on SE ¼ Section 4-38-27-4. The uses in this area will be similar to the C4 Commercial (Major Arterial) District however because this area is within the minimum setback requirement from the closed landfill site, no schools, hospitals, food establishments or residential uses (including commercial accommodation) will be permitted, in accordance with the *Municipal Government Act Subdivision and Development Regulation*. This area will be redistricted to Direct Control or a special commercial district.

4.3 CIRCULATION AND CONNECTIONS – Figure 5 and 10

Land use is an important determinant of demand for travel. The type and location of land use and the intensity of activity can increase or reduce travel demand. The East Hill Plan provides travel mode options for regional, district and local destinations. Careful planning of routes and linkages will encourage walking, biking and the use of other alternatives to the motor car for

travel to local destinations, while compact communities and a transit-friendly street layout will promote transit use and reduce motor vehicle reliance.

The East Hill area is a predominantly residential land use area with some commercial at pre-designated locations. In order to accommodate this traffic, a planned system of trails, transit routes and roadways will effectively manage transportation activity patterns within and between neighbourhoods. As new neighbourhoods are developed, all planned trails, roadways and transit routes are to be constructed according to City of Red Deer *Engineering Design Guidelines*, *Neighbourhood Planning Guidelines & Standards* and *Trails and Pathways Master Plan* to ensure a fully integrated, consistent, and safe circulation system.

4.3.1 Trail System – Figure 5 and 10

The proposed trail and open space system, as shown on Figure 10, provides direction for planning at the neighbourhood level. The purpose of the resulting system of trails and open spaces is to provide opportunities for transportation mode alternatives to the motorcar for trips to local destinations. These trails will link residential neighbourhoods with adjacent neighbourhoods, leisure facilities and amenities, and school facilities, and will provide pedestrian and bicycle connections to the existing and expanding Waskasoo Park system, commercial core areas and places of employment.

The major electric transmission easement running east-west between 20 Avenue and Piper Creek through Sections 2, 3 and 4-38-27-W4 in the south portion of the plan area, as well as the oil/gas pipelines in Section 23-38-27-W4, present opportunities to create a continuous neighbourhood trail linkage to the Waskasoo park system as well as between the town centre site and surrounding neighbourhoods.

There is an opportunity to establish a district level linear corridor of open space and trails that would connect with the Waskasoo Park to provide residents of the East Hill with a circular system of alternative travel mode linkages to various parts of the city. This system will follow linkages along the electrical R.O.W. along 22 Street, the arterial trail along 20 Avenue, the drainage channel / linear park within the NE ¼ Section 23 and the South ½ of Section 26 and the wetland and ravine system on the North ½ of Section 26. In some areas the corridor would overlap with proposed trails and pathways, e.g. along the major electrical right-of-way and along 20 Avenue, while in other areas it would follow natural drainage systems, e.g. in the NE ¼ Section 23 and the south half of Section 26.

The City's collector roadway design standard and the Trails & Pathways Master Plan standards require the provision of a separate sidewalk on both sides of a collector street with one of these being a minimum of 2.5 m wide. This collector trail functions as a component of the overall trail system in each neighbourhood and is connected, to The City's satisfaction, to other categories of trails (i.e. major trails along expressways and arterial roadways, neighbourhood trails within park sites and nature trails within natural areas) and to trail systems in adjacent neighbourhoods. This will provide a continuous trail system linking homes to gathering places such as neighbourhood convenience and district shopping centres, transit stops and parks, as well as providing pedestrian short cuts to bus stops and other local destinations.

As an addition to the collector trail system, the proposed park site and neighbourhood trail linkage symbol in Figure 5 identifies the requirement to provide neighbourhood and/or nature trail linkages in combination with park sites and natural areas (municipal reserve) in each quarter section neighbourhood, to The City's satisfaction. The alignment of neighbourhood and nature

trails and the location of the park sites will be determined at the Neighbourhood Area Structure Plan level where more detailed site information is available.

A major storm water management facility with landscaped areas and neighbourhood trails exists on the south boundary of the SE ¼ Section 22-38-27-W4 (i.e. the Michener Centre). It is required that neighbourhood planning for this quarter section and adjacent quarter sections integrate their trail systems with trails in this major facility.

4.3.2 Transit – Figure 5

The East Hill area is served by bus stops on arterial and collector roadways as determined by The City. Each neighbourhood area structure plan is required to identify the designated transit routes and bus stops. These are subject to change over time due to passenger demand and funding, as well as the building out of neighbourhoods.

New development must endeavour to create transit friendly neighbourhoods by concentrating higher density residential, commercial and school locations within close proximity to potential transit routes. Roadway layout must reflect walkable distances to transit stops for all residences within a neighbourhood.

There is potential for the development of transit facilities within the proposed town centre site.

4.3.3 Roadways – Figure 5

The principles of sustainable community development apply also to the design of residential streets (i.e. collector and local roadways). These streets are integral components of community space and should reflect the function of the street and the type and intensity of the adjacent land uses. Issues to be considered in the design of residential streets include the following:

- a) Roadways will incorporate all modes of transportation.
- b) Roadway design is a significant factor in the cost of neighbourhood development and developers are encouraged to propose ways to reduce costs associated with roadway construction and maintenance, for evaluation by The City.

There are four classes of roadways in the East Hill Major Area Structure Plan: local roadways, collector roadways, arterial roadways and expressways. Most quarter sections abut an arterial roadway on one or two sides and have an internal collector roadway system that links with existing collector roadways in adjoining neighbourhoods without creating opportunities for shortcutting. The majority of residential development will be located on local roadways, and to a lesser degree on collector roadways.

Local Roadways

Local roadways are not identified on Figure 5. The alignment of local roadways will be determined as part of the neighbourhood area structure plan, to the satisfaction of The City and based on The City's *Engineering Design Guidelines*.

Collector Roadways

Designated collector roadways are identified on Figure 5. Typically a collector roadway provides direct frontage access to abutting land uses, provides public parking on both sides, accommodates snow storage, serves as a transit route and provides sidewalks for transportation mode alternatives to the motorcar. The current standard provides for a treed boulevard and separate sidewalk on both sides of the street, with a minimum of one sidewalk being a 2.5 collector trail.

The alignment of collector roadways proposed on Figure 5 is based on the standard of 400 m minimum intersection spacing onto arterial roadways and 800 m intersection spacing onto expressways, as well as the requirement for collector street linkages between adjacent neighbourhoods without creating opportunities for shortcutting between arterial roadways or incompatible land uses. Collector roadways must provide efficient and effective circulation of traffic within each neighbourhood and efficient and effective connections to adjacent arterial roadways.

Based on these minimum ground rules a developer may propose an alternative collector roadway design as part of the preparation of the Neighbourhood Area Structure Plan for evaluation by The City. In this regard developers are encouraged to consider transit routing, the actual location of natural features (from Figure 3 and from the detailed neighbourhood ecological profile), any park site locations and any other design considerations that may enhance the neighbourhood identity, sense of place, land use pattern and walkability of the neighbourhood – details which for practical reasons are typically not available and considered at the major area structure plan level. Changes to the collector roadway alignment which avoid shortcutting and maintain the predetermined intersection spacing to the satisfaction of the City Administration may be made without obtaining an amendment to the East Hill MASP.

The commercial streets within the town centre site will be divided collector roadways. The commercial traffic generated within the town centre site is expected to be up to eight times more than what would be typical for residential traffic volumes. The developers of the relevant quarter sections will be responsible for all costs associated with the construction of collector roadways including intersection treatments and additional lanes.

The collector roadway pattern within Section 23 is designed to discourage external traffic shortcutting to the town centre from areas south of 55 Street, from 30 Avenue and from 20 Avenue.

The collector roadway intersection proposed on 30 Avenue approximately at 61 Street will provide access for residential developments to the east on the NW and SW ¼ Section 23-38-27-W4, including the existing College Park subdivision. The collector roadway alignment will provide land for a buffer area between the proposed roadway and existing College Park residences. The existing 61 Street will remain a local roadway with a new intersection to be constructed connecting it with the proposed collector roadway for access into College Park. There will be no roadway connections between College Park and the future developments to the east on SW ¼ Section 23. One or more pedestrian linkages will be provided from future subdivisions east of College Park through College Park to the arterial trail along 30 Avenue. More detail will be provided in an area redevelopment plan for College Park.

Arterial Roadways

Arterial roadways provide for the movement of large volumes of traffic, including truck and transit routes, by connecting major areas of traffic generation within the City. As efficient flow of traffic is the primary function of this classification of roadway, direct residential lot access is not permitted to/from a divided arterial roadway. Subject to the approval of The City, right in/ right out site accesses for major non-residential developments such as district and regional shopping centres, high schools or other major public facilities may be permitted.

Intersections and junctions onto arterial roadways are infrequent and appropriately designed, therefore all turn intersections onto divided arterials are provided at 400 m intervals to effectively channel traffic from the major collector network.

Off-site levies normally fund the basic cost of constructing four-lane divided arterial roads, but additional improvements necessitated by adjacent developments (e.g. additional accesses and traffic lanes) will be borne by the developer.

Arterial roadways within the plan area consist of the following:

- 30 Avenue
- 40 Avenue
- 22 Street between 30 and 40 Avenues
- 32 Street
- 50 (Ross) Street, and
- 67 Street westbound from a point approximately 800 m west of 20 Avenue

The extensions of Ross Street and 32 Street east of 20 Avenue and related intersections as illustrated on Figure 5 are shown conceptually within Red Deer County jurisdiction. These proposed roadways are illustrated on lands that are not likely to be developed until the city reaches a population of 160,000 and are shown in order to illustrate how the arterial roadway system potentially could be completed to 10 Avenue.

The arterial roadway along 22 Street west of 30 Avenue is built within a 37.5m right of way (reduced from 48 m) that allows for the construction of a berm along the north side of 22 Street (a berm was not required along the south side due to the presence of a 61 m wide Altalink right-of-way. Minimum intersection spacing along 22 Street is 200 metres. East of 30 Avenue, 22 Street is classified as a collector road.

The Molly Bannister Drive alignment protection serves to ensure that the planning of the NE ¼ Section 4 accommodates this roadway alignment into the neighbourhood design without adversely affecting any future decisions regarding a possible roadway crossing over Piper Creek. This does not necessarily imply that Molly Bannister Drive will be extended across Piper Creek, and any such decision would require Council approval. If the protected alignment for Molly Banister Drive between 40 Avenue and Bremner Avenue is ever implemented this will be an arterial roadway with a 43 m right-of-way width from 40 Avenue to Piper Creek.

Expressways

The expressway classification of road reflects the highest level of roadway function in the plan area. Expressways require a 60 to 80 metre right-of-way and a recommended intersection spacing of 800 metre. Where expressways intersect with major arterials and/or highways, a grade-separated intersection may eventually be required. Although further study is required to

determine the traffic needs, it is anticipated that diamond-type interchanges will be required on 20 Avenue at 67 Street and Delburne Road (19 Street). A 150m by 400m triangular area from each affected quarter section has been identified on Figure 5 to accommodate these interchanges.

Expressways within the plan area are:

- 67 Street (Highway 11) eastbound from a point 800 m west of 20 Avenue
- Delburne Road (19 Street)
- 20 Avenue, and
- Northland Drive with its river crossing and linkage to Highway 11A

The eastward extension of 67 Street reflects the future alignment of Highway 11 that has been protected by a Provincial Ministerial Order.

4.4 PUBLIC OPEN SPACE – Figure 3, 5 & 10

For the purpose of interpreting Figure 5 (read in conjunction with Figure 3) public open space on Figure 5 consists of the following categories:

- a) utility rights of way/easements
- b) proposed neighbourhood parks and trail linkages
- c) proposed natural areas, and
- d) a multi-neighbourhood park site

Figure 10 identifies proposed trail linkages based on the information and standards contained in the Trails & Pathways Master Plan.

4.4.1 Utility Easements

Those areas that are set aside for surface, underground or overhead infrastructure, such as electric transmission lines, well sites or oil/gas pipelines are identified on Figure 5 as “Major Easement/R.O.W”. On Figure 10 those easements/R.O.W. that have potential as trail linkages are identified as such.

4.4.2 Proposed Neighbourhood Parks and Trail Linkages

On Figures 5 and 10 proposed neighbourhood parks and neighbourhood trail linkages are conceptually identified with a park and trail symbol. This symbol indicates that in each quarter section a minimum of 10% of the developable area is required to be dedicated as municipal reserve for neighbourhood parks, parkettes and linear parks, containing neighbourhood and nature trails as may be required by The City. The location of proposed neighbourhood parks and neighbourhood/nature trails as indicated on Figure 5 is not specific but rather conceptual and arbitrary. Final locations will be determined with the preparation of a neighbourhood area structure plan when more detailed site information is available. For this purpose developers are required to consult Figure 3 for the location of natural areas and preservation focus areas, Figure 5 for the location of school sites, as well as individual neighbourhood ecological profiles and the *Neighbourhood Planning Guidelines & Standards* to find the most appropriate location for neighbourhood parks and trails within each quarter section.

At the neighbourhood area structure planning level neighbourhood parks will be strategically located to incorporate preservation focus areas, provide centrally located amenities, and create active and passive recreation opportunities for all ages, needs and desires. Neighbourhood parks

may also accommodate school sites as designated on Figure 5, and accommodate neighbourhood/nature trails consisting of separate pathways.

Neighbourhood parks and leisure facilities and amenities are located on sites more or less central to each quarter section neighbourhood or, where the phasing of adjacent quarter sections permits joint development, on a combined site located centrally and serving two adjacent quarter sections. Development of each neighbourhood park will be directed by a neighbourhood park plan which is prepared as part of the neighbourhood area structure plan in accordance with the *Neighbourhood Planning Guidelines & Standards*. Each neighbourhood park site will be landscaped for natural and aesthetic purposes. Each neighbourhood area structure plan must be designed to include a convenient trail system providing internal and external connections in the neighbourhood to local amenities, schools, parks, commercial centres and transit stops.

Neighbourhood parks provide a variety of recreational amenities for neighbourhoods and may be combined with a school site. Where Figure 5 does not identify the requirement for a school site in a quarter section, developers are encouraged to reduce the size of the neighbourhood park site to design more dispersed parkettes and linear parks throughout the neighbourhood.

Linear parks may consist of municipal reserve, a public utility lot or utility easements. Linear parks may combine active and passive recreation along with a trail, but not all linear parks have to contain a trail. The City's Recreation Parks & Culture Department will work with the developer at the neighbourhood area structure plan stage to identify the location of trails.

Where opportunity exists, such as in the NE ¼ Section 23-38-27-W4 and the South ½ of Section 26-38-27-W4, developers must consider incorporation of natural areas as linear parks, such as a seasonal stream or drainage channel.

A parkette is a small municipal reserve site (approximately 0.2 to 0.8 hectare in size) that may contain active (e.g. a tot lot) and/or passive (e.g. a bench and table) recreation and a linkage to the trail system.

The landmark sites and public square envisioned for the town centre could consist of parkettes.

4.4.3 Proposed Natural Areas

This category includes areas that qualify for environmental reserve dedication under the *Municipal Government Act* as well as areas which do not qualify as such but are nonetheless environmentally significant. All of these natural areas are identified on Figure 3 with the purpose of providing a framework and preservation focus for neighbourhood level planning in conjunction with more detailed ecological profiles of each quarter section, as well as to identify regional preservation needs. Neighbourhood planning shall consider these preservation focus areas for possible incorporation into the open space system.

4.4.3.1 Potential Environmental Reserve

Figure 5 identifies those public, semi-public and private natural areas which are suspected with reasonable certainty, but without having conducted a site analysis, as potentially qualifying for environmental reserve dedication in accordance with the *Municipal Government Act*. Reasonable certainty is based on the existence of, for example, steep and/or unstable slopes, or a natural drainage course.

The following areas are identified as potential environmental reserve dedication:

- Piper Creek bed, shore and escarpment
- the deep ravine connecting the Red Deer River with a wetland in the NW ¼ Section 26-38-27-W4 including the wetland itself
- the ravine on the SE ¼ Section 27-38-27-W4 connecting a drainage channel south of 67 Street with the McKenzie Trails area
- the steep slopes along the Red Deer River escarpment

Subject to detailed analysis at the neighbourhood area structure plan level it is required that these lands are dedicated as environmental reserve at the time of subdivision.

Other lands not identified on Figure 5 may also qualify for environmental reserve dedication based on closer evaluation at the neighbourhood area structure plan level, which will be preceded by the preparation of a detailed ecological profile. Examples of such areas include the drainage course which straddles the NE ¼ Section 23 and the South ½ of Section 26-38-28-4 as well as the two wetlands on the SE ¼ Section 22-38-28-4.

4.4.3.2 *Other Natural Areas*

At the level of planning for this major area structure plan the final strategies to ensure the preservation of natural areas which do not qualify for dedication as environmental reserve may not yet be in place. At the neighbourhood area structure plan level the preservation of such areas will require any one or a combination of the following strategies:

- 1) The lands are included as part of the required 10% municipal reserve dedication;
- 2) The lands are included as part of municipal reserve dedication in excess of the required 10%; and/or
- 3) Funds are identified to purchase the lands containing such natural areas.

4.4.4 **Multi-neighbourhood Park Site**

A ±24 hectare (±60 acre) multi-neighbourhood park/school site, containing a multi-neighbourhood leisure facility and high school sites for both the Catholic and the Public school authorities, is identified at the intersection of 67 Street and 30 Avenue on the SW ¼ Section 26-38-27-W4. The City and the appropriate school authorities involved will acquire the land required for this park site. The multi-neighbourhood park site can potentially be integrated as a civic and recreational component of the town centre site.

The City and both school authorities recognize the potential efficiencies for land use and capital costs that could be realized by sharing facilities such as parking lots and building envelopes. The Multi-neighbourhood Park Site presents an opportunity to explore this route.

The multi-neighbourhood park site requires collector street access along its north and east sides. The designated access points for these collector streets are set back ±600 m north and ±400 metres east from the 30 Avenue/67 Street intersection, as shown on Figure 5.

Roadway design at the 67 Street/30 Avenue intersection will have to accommodate a pedestrian crosswalk.

4.5 PUBLIC FACILITIES – Figure 5

Typically public facilities include large infrastructure and installations such as a landfill site or an electrical substation, an emergency services site, leisure facilities and amenities such as libraries, swimming pools, arenas, and outdoor playing fields and courts, semi-public sites such as places of worship and social care/day care/retirement home/assisted living residence, park and recreation areas that may include a school site, and trail linkages.

Special sites are provided by The City for public facilities that serve a district population, including libraries, arenas and swimming pools. In addition to primarily residential uses, each neighbourhood is required to provide certain public facilities. Usually special sites are set aside for public infrastructure and installations, while leisure facilities and amenities are located on neighbourhood park sites and residential areas include social care and worship sites.

Facilities such as the Westerner Exposition Park and the Collicutt Centre combine various leisure facilities and amenities, including educational facilities, which serve the surrounding neighbourhoods, the city and the region. The City's landfill site is another regional facility. The East Hill Major Area Structure Plan recognizes the land uses, access issues and traffic generation resulting from these existing public facilities within and near the plan area.

4.6 EMERGENCY SERVICES – Figure 5

Figure 5 identifies the following four potential new locations for future emergency services facilities that could accommodate fire, ambulance and/or other community services:

- a) Along the north side of 22 Street between 30 Avenue and 40 Avenue on the NE ¼ Section 3-38-27-W4.
- b) On the west side of 40 Avenue near the intersection of 22 Street within the NE ¼ Section 4-38-27-W4.
- c) On the west side of 30 Avenue at the intersection of future 55 Street within the SE ¼ Section 22-38-27-W4.
- d) On the NW ¼ Section 23-38-27W4 near the intersection of 30 Avenue and 67 Street. This site is within the proposed town centre and its actual location, design and architecture must complement residential and commercial development. It has the potential to be a landmark site/building as envisioned in Section 4.2.1.

In the event that a proposed emergency services site is not used, alternative land use will be determined through the more detailed neighbourhood area structure plan process.

4.7 SCHOOLS – Figure 5

The K-9 Catholic school designation means a school building that could contain kindergarten (K) through grade 9, or grades K-5 (elementary school), or grades 6-9 (middle school). A Catholic High School could contain any grades from 9 to 12.

The K-8 Public school designation means a school building that could contain kindergarten (K) through grade 8, or grades K-5 (elementary school), or grades 6-8 (middle school). A Public High School contains grades 9 to 12.

As is the case with the park site and trail linkage symbol, the location of proposed school sites is flexible and will be determined at the neighbourhood area structure plan level. However, the school site must be located in the quarter section in which it is shown on Figure 5.

Typically the location of all catholic K-9 and public K-8 school sites are planned to occur in conjunction with a neighbourhood park site internal to the neighbourhood. These sites are preferably located at the intersection of two collector streets, but the minimum access requirement is to provide site access from one collector and one local street. The school site is to be positioned within a neighbourhood park site containing a minimum of one sports field and in close proximity to the trail system.

High school sites are positioned at the edge of quarter sections next to arterial roadways and near a proposed transit stop. These sites are required to have collector roadway frontage and be directly connected to the trail system.

When appropriate, K-9 and K-8 school sites may be placed nearer to the edge of a quarter section so as to be shared by the adjacent neighbourhood.

The designation and location of school sites as shown on Figure 5 are pursuant to agreements between Red Deer Public School District No. 104, Red Deer Catholic Regional Division No. 39 and the City of Red Deer. All school locations shown are tentative with actual construction of any school being dependent upon approval of the respective school board.

This plan and the *Neighbourhood Planning Guidelines & Standards* encourages the school boards to decide if a school site is required within a quarter section development as early as possible. This is to ensure that, if municipal reserve is not required for a large school site, then the size of the neighbourhood park site could be reduced and the 'surplus' municipal reserve could be better utilized as smaller parkettes and/or linear parks with neighbourhood trails that are distributed throughout the neighbourhood.

Potential efficiencies for land use and capital costs that could be realized by sharing facilities between the two school authorities, such as parking lots and building envelopes, will be explored.

5.0 MUNICIPAL UTILITY SERVICES – Figures 11, 12, 13 & 14

Ecologically sustainable development principles suggest that potential exists within undeveloped areas of the East Hill community to combine natural features with servicing requirements. This is often referred to as green infrastructure. Examples include the Michener storm ponds that have combined storm water management with an existing wetland to create a multi-purpose facility with storm drainage and natural interpretative functions.

Neighbourhood ecological profiles must be considered when developing servicing plans for the consideration of potential multi-purpose features.

5.1 STORM WATER DRAINAGE - Figure 11

Surface water runoff from the East Hill area is drained through buried pipe systems and overland surface systems to the Red Deer River directly or via Piper and Waskasoo Creeks. The East Hill Major Area Structure Plan has been divided into separate storm drainage basins, each with its own designed system of gathering surface water runoff as shown on Figure 11. The City has adopted a policy of restricting direct storm water discharges into the creeks and river in order to limit potential damage associated with increased rates of runoff from urban developments. The restrictions are imposed through the use of a storm water collection system that incorporates water retention and detention facilities for the area.

A number of “dry-ponds” are designated for the East Hill area. These public utilities are usually designed so that they may also serve, in part, as neighbourhood play fields and recreation/open space areas. A detention pond that contains a formal sports field(s) can be credited with up to, but not more than, 1.0 hectare (2.5 acres) of the required minimum ten percent municipal reserve dedication at the discretion of the Recreation Parks & Culture Department. As illustrated on Figure 11, the majority of the storm water detention ponds are located near the boundary of a quarter section. This may limit their use for recreation facilities which are required to be located centrally to a neighbourhood.

The City will also support alternative methods of storm water management, including the creation of permanent man-made storm water ponds and the incorporation of natural marshes or wetlands into the overall storm water system (i.e. green infrastructure), where this can be accomplished without causing concerns for potential flooding.

5.2 SANITARY SEWER – Figure 12

The sanitary sewer system, shown on Figure 12, is divided into drainage basins as shown on Figure 11. This collection system is designed to use a combination of sewage lift stations and gravity trunk mains to direct all sewage to the wastewater treatment plant located at the north end of the City along the river.

As new development occurs, the extension of existing trunk mains will permit all areas within the boundaries of the East Hill Major Area Structure Plan to be serviced. A portion of the plan area north of 55 Street will be serviced via the Waskasoo Regional Sewer Line that originates south of the City in Red Deer County and connects to the City's wastewater treatment plant in the north.

5.3 WATER DISTRIBUTION – Figure 13

The City of Red Deer obtains raw water from the Red Deer River. Water treatment is accomplished with two plants located at the river. The City's water distribution system for the East Hill area consists of a combination of water pressure zones, booster pump stations, water reservoirs, and trunk mains to adequately distribute water to meet domestic and fire flow demands. See Figure 13.

5.4 POWER TRANSMISSION – Figure 14

The concept for the transmission of electric power to meet domestic and commercial demand on the East Hill is provided on Figure 14. This includes the following overhead power lines:

- Delburne Road from 30 Avenue to 20 Avenue
- 20 Avenue north from Delburne Road to 22 Street
- 20 Avenue from 55 Street to 76 Street
- 76 Street from 30 Avenue to 20 Avenue
- 67 Street from the Red Deer River to 20 Avenue

6.0 PLAN IMPLEMENTATION

6.1 NEIGHBOURHOOD AREA STRUCTURE PLANS

The objectives of the East Hill Major Area Structure Plan shall be implemented through the preparation of neighbourhood area structure plans for all undeveloped quarter sections and/or other undeveloped parcels of land within the plan area. Where cooperation exists between landowners a joint neighbourhood area structure plan for each of the following lands is required (if landowner cooperation is not feasible “shadow planning”¹ of these areas is required):

- The north half of Section 22-38-27-W4
- The south half of Section 22-38-27-W4
- The south half of Section 27-38-27-W4
- The south half of Section 26-38-27-W4
- The north half of Section 23-38-27-W4
- The west half of Section 23-38-27-W4 (“shadow planning” for servicing consideration only)

All neighbourhood area structure plans within the plan area shall be consistent with the East Hill Major Area Structure Plan, read in conjunction with the *Neighbourhood Planning Guidelines & Standards*.

The neighbourhood area structure plans for those quarter sections containing the town centre site must address the following matters:

- The gradual transition of residential densities and land use intensity from lands adjacent to the town centre to high density residential and commercial land uses within the town centre.
- The design considerations required to develop a comprehensive and coherent town centre across five quarter sections of land.

6.2 LAND USE BYLAW

A new commercial land use district is required to implement the vision of the commercial and residential mixed use town centre as described in Section 4.2.1. The town centre land use district must address the following aspects:

- The district must allow for a variety of commercial and retail uses at the regional, district and neighbourhood convenience shopping centre levels. This must include uses that are normally associated with highway commercial development, but it must require higher landscaping standards than that which is typical of highway commercial development.
- The district regulations must allow for the subdivision of small commercial stand alone or fee simple sites.
- Development regulations must ensure that commercial development standards are compatible with residential uses, both within and adjacent to the town centre.
- Development regulations must allow for commercial buildings containing dwelling units above the ground floor.
- Development regulations must require on-site provision for pedestrian movement and connections to trails within public roadways.

¹ “Shadow planning”: means coordination of land use, roadways and servicing infrastructure to a level satisfactory to The City Administration.

- Development regulations must address the three dimensional interrelationship between residential and commercial uses, including building placement and orientation, aesthetic requirements, landscaping, privacy, on-site provision for pedestrians, etc.

6.3 AREA REDEVELOPMENT PLANS

Area redevelopment plans may be prepared for the existing College Park and Michener Centre developments. These types of statutory plans are governed by the *Municipal Government Act* and are required by the City's *Neighbourhood Planning Guidelines & Standards* as a pre-condition for the redevelopment of large land areas. All area redevelopment plans within this plan area shall be consistent and remain cognizant of the principles and concepts as promoted in the East Hill Major Area Structure Plan.

6.4 EXISTING RED DEER COUNTY AREA STRUCTURE PLANS

Previously adopted Red Deer County Area Structure Plans (Spruce Woods ASP on part of SE ¼ Section 34-38-27-W4 and Thompson ASP on the south half of NE ¼ Section 34-38-27-W4) being part of the annexed lands, will be superseded by this plan.

6.5 ADDITIONAL COST OF COMMERCIAL ROADWAY REQUIREMENTS

The commercial streets within the town centre site will be divided collector roadways. The commercial traffic generated within the town centre site is expected to be up to eight times more than what would be typical for residential traffic volumes. The developers of the relevant quarter sections will be responsible for all costs associated with the construction of collector roadways including intersection treatments and additional lanes.

6.6 AMENDMENTS TO THIS PLAN

Any amendment to the East Hill Major Area Structure Plan shall follow the process as outlined in the *Municipal Government Act* and the City's *Neighbourhood Planning Guidelines & Standards*.

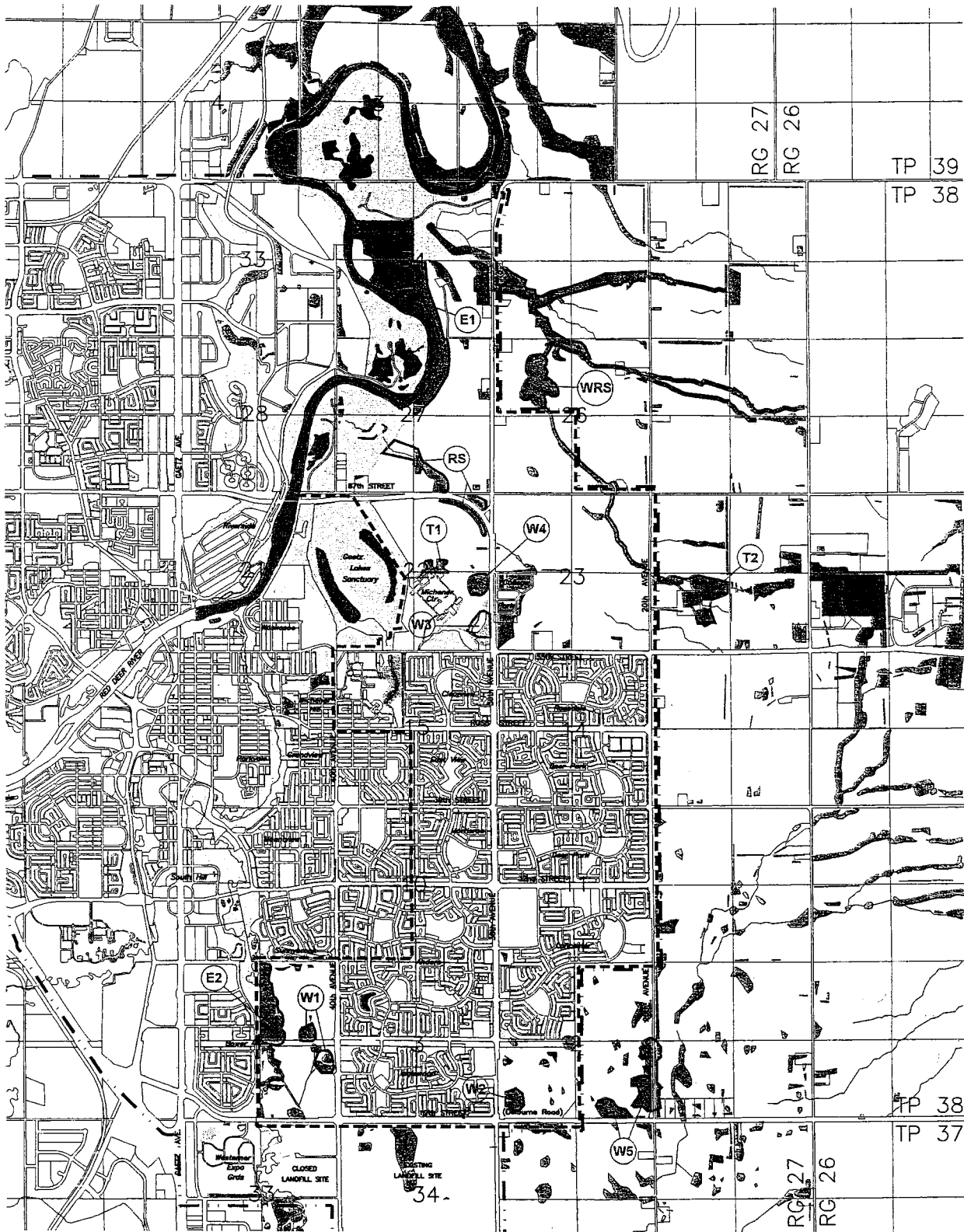
Provided the intent of the Plan is maintained, a minor adjustment to proposed land use boundaries or roadway alignments may be made where necessary without amendment to this Plan.

A change to the collector roadway alignment which, to the satisfaction of The City, avoids shortcutting may be made without obtaining an amendment to the East Hill MASP.

The access points of the collector roadways onto adjacent arterial roadways as proposed in Figure 5 are fixed and cannot be changed without a plan amendment, because this may affect landowners in existing subdivisions.

6.7 PLAN REVIEW

The East Hill Major Area Structure Plan should undergo a comprehensive review and update every five years. This way, any changing or emerging land use and development issues can be given appropriate consideration, and the best interests of the residents of the East Hill area can continue to be recognized into the future.



City of Red Deer

East Hill Major Area Structure Plan Tree and Wetland Natural Habitat Areas:

- Plan Area
- City Boundary
- Existing Water Courses and Lakes
- Existing Public and/or Private Wetlands and Seasonal Streams
- Existing Public Natural Areas
- Existing Semi-Public Natural Areas
- Existing Private Natural Areas

Environmental Preservation Focus
(Refer to text for specific policies)

- W1 Wetlands
- W2 Wetlands
- W3 Wetlands & Trees
- W4 Wetlands
- W5 Wetlands & Trees
- WRS Wetland, Ravine & Seasonal Streams
- RS Ravine & Seasonal Stream
- T1 Mature Treed Stand
- T2 Seasonal Stream and Mature Tree Stand
- E1 Red Deer River Escarpment w/ Trees
- E2 Piper Creek Escarpment w/ Trees

Preservation Focus*

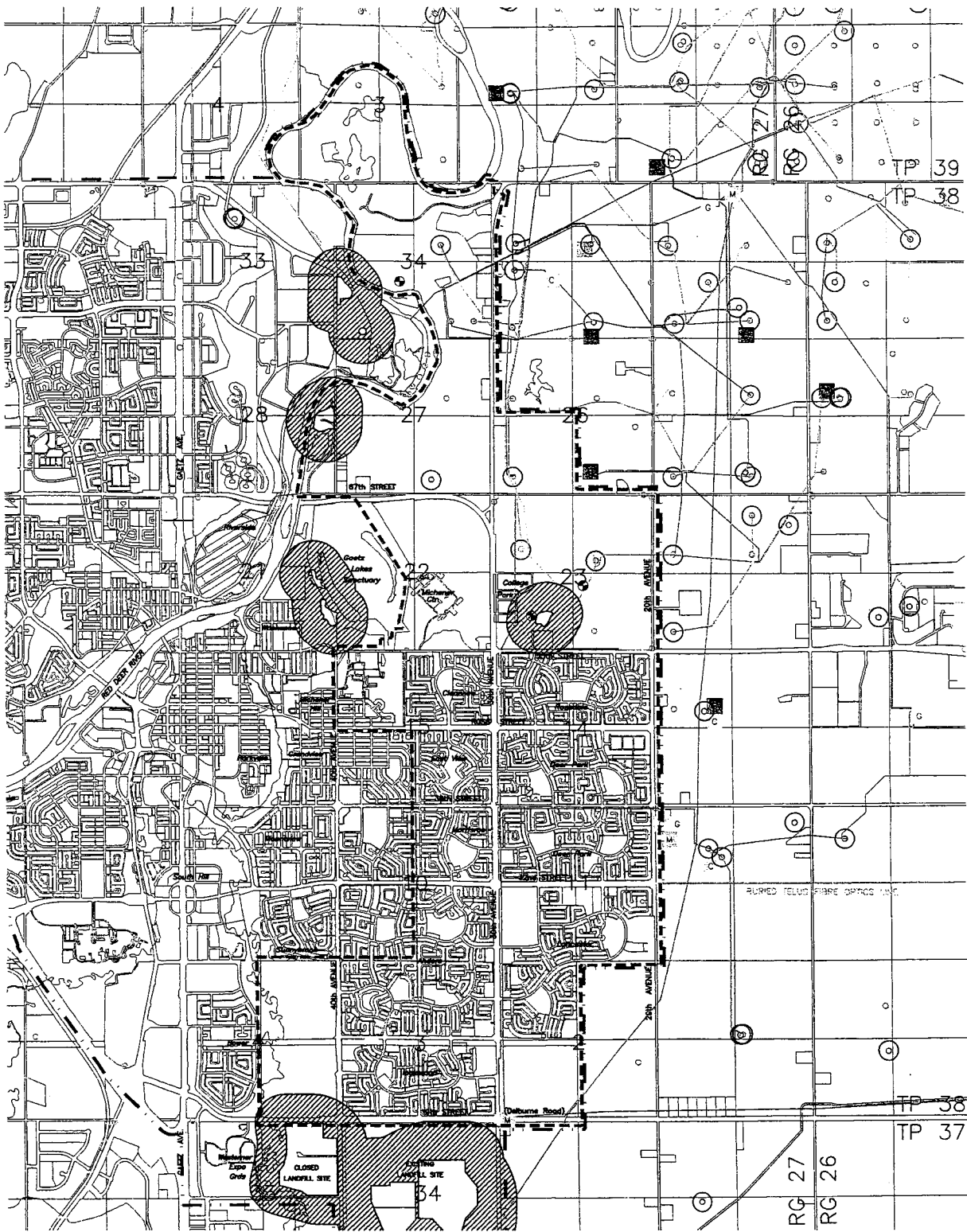


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PARKLAND COMMUNITY PLANNING SERVICES
NOVEMBER 2005

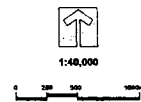
* Information from The City of Red Deer R.P. & C. Department Integrated Ecospace (Natural Habitat) Management Area Map, 1995 (updated 1998; minor updates 2004).



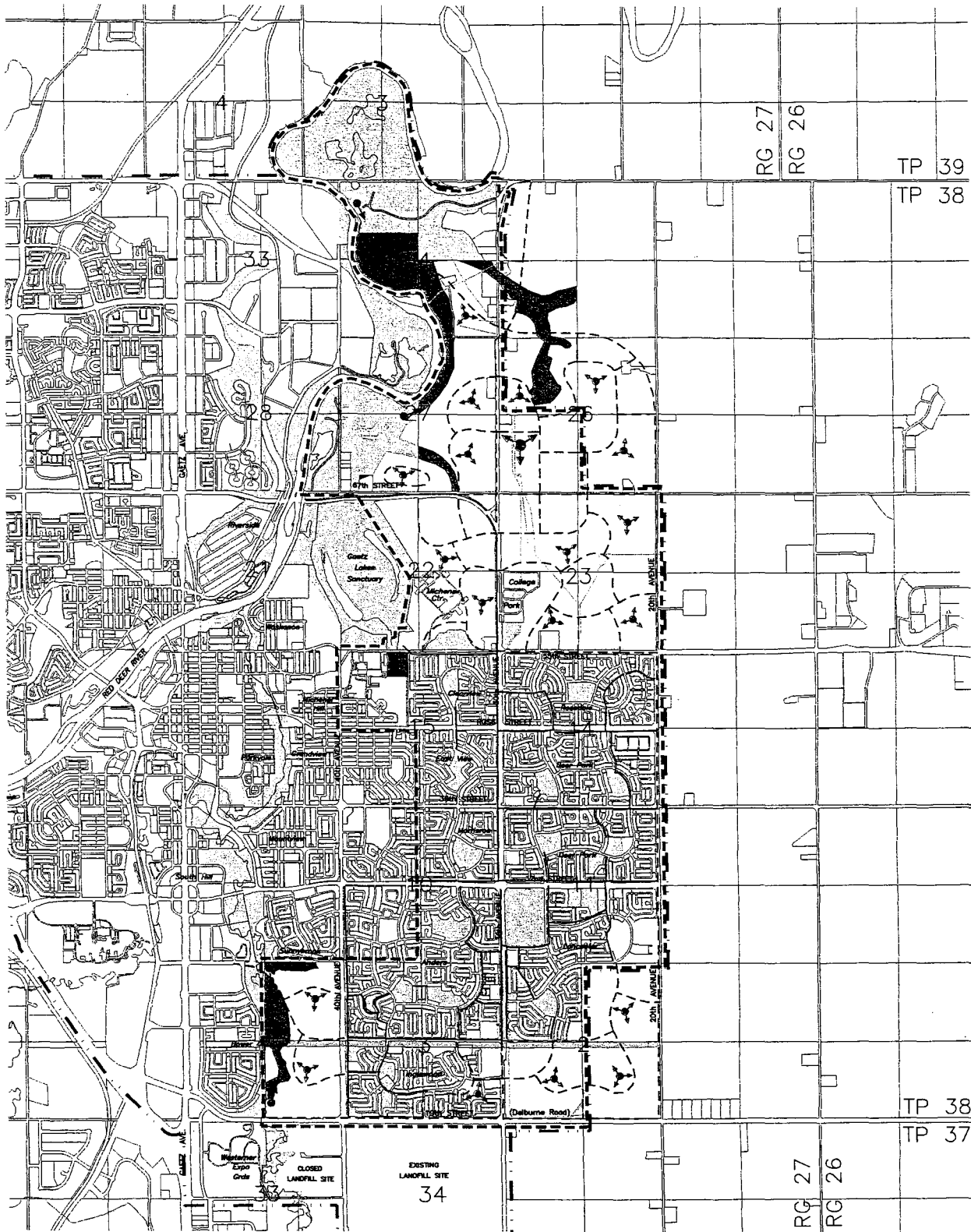
City of Red Deer East Hill Major Area Structure Plan

Figure 4
Natural Resource Extraction
& Landfills

- | | | |
|---|---|---|
| <ul style="list-style-type: none"> --- Plan Area - - - City Boundary — Oil Pipeline — Gas Pipeline — Water Pipeline — Abandoned Pipeline — Sour Gas/Oil Pipeline ▨ Landfill Setback | <ul style="list-style-type: none"> ● Gravel/Sand Operation ○ Abandoned Well ○ Flowing Gas Well ○ Suspended Gas Well ○ Flowing Oil Well ○ Water Injection Well ○ Water Source Well ○ Well Setback - 100m | <ul style="list-style-type: none"> ■ Battery Station ○ Compressor Station ○ Gas Plant ■ Injection Facility ■ Meter Station |
|---|---|---|
- (Contents of landfill site adjacent to College Park yet to be confirmed, development restrictions may apply)





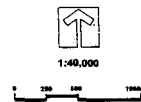


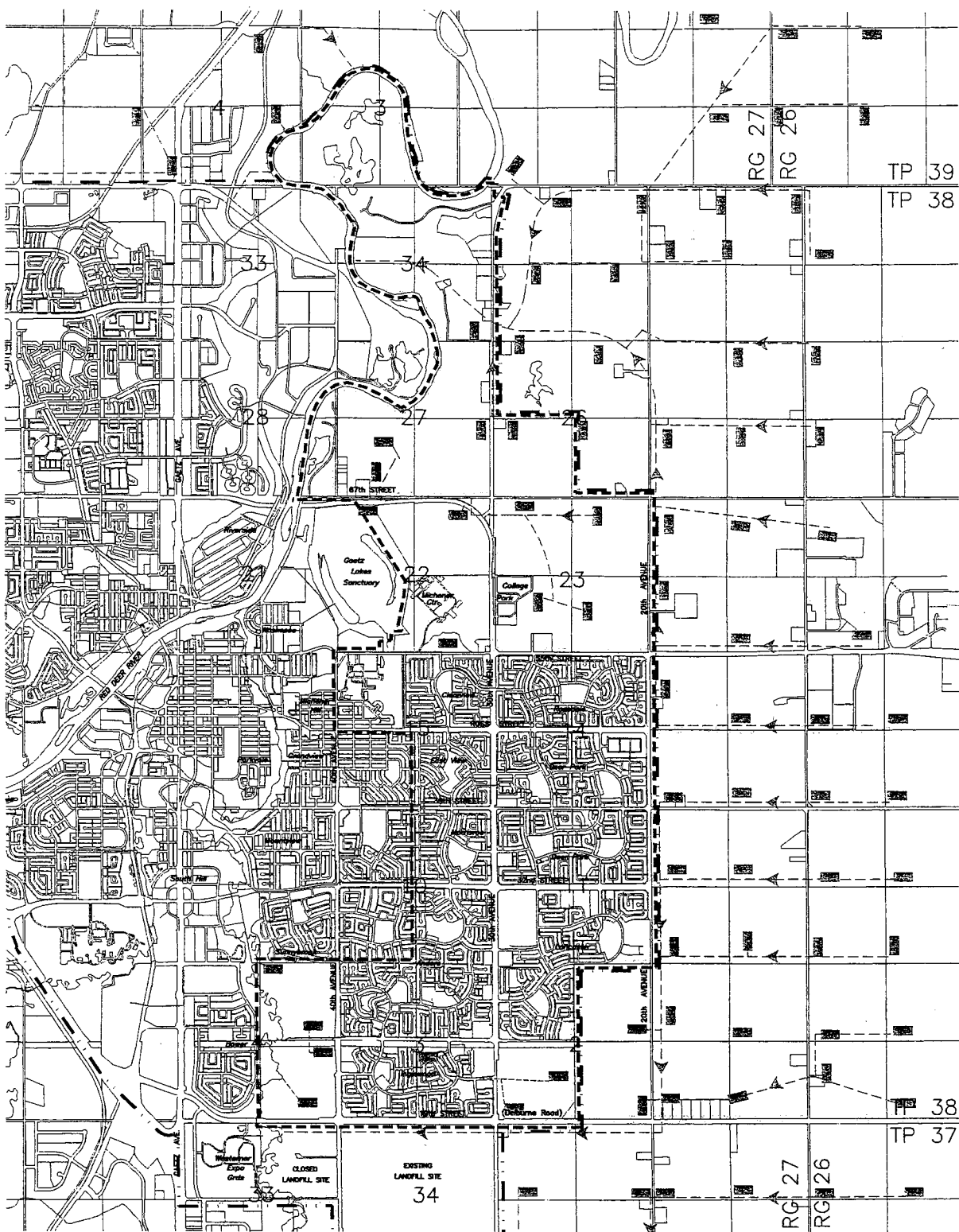
City of Red Deer East Hill Major Area Structure Plan

Figure 10 Trail & Open Space System

- Plan Area
- - - City Boundary
- Existing Trail
- Proposed Arterial and Collector Trail
- Proposed Neighbourhood Park & Trail Linkage* (See Text & Map 2)
- Proposed Multi-Neighbourhood Park (24 ha)
- Direction of Future Waskasoo Major Trail System
- Proposed Natural Area
- Potential Trail Linkage (Major Easement / R.O.W.)
- Existing Park & Natural Area

* Locations shown are conceptual and arbitrary

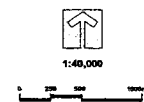


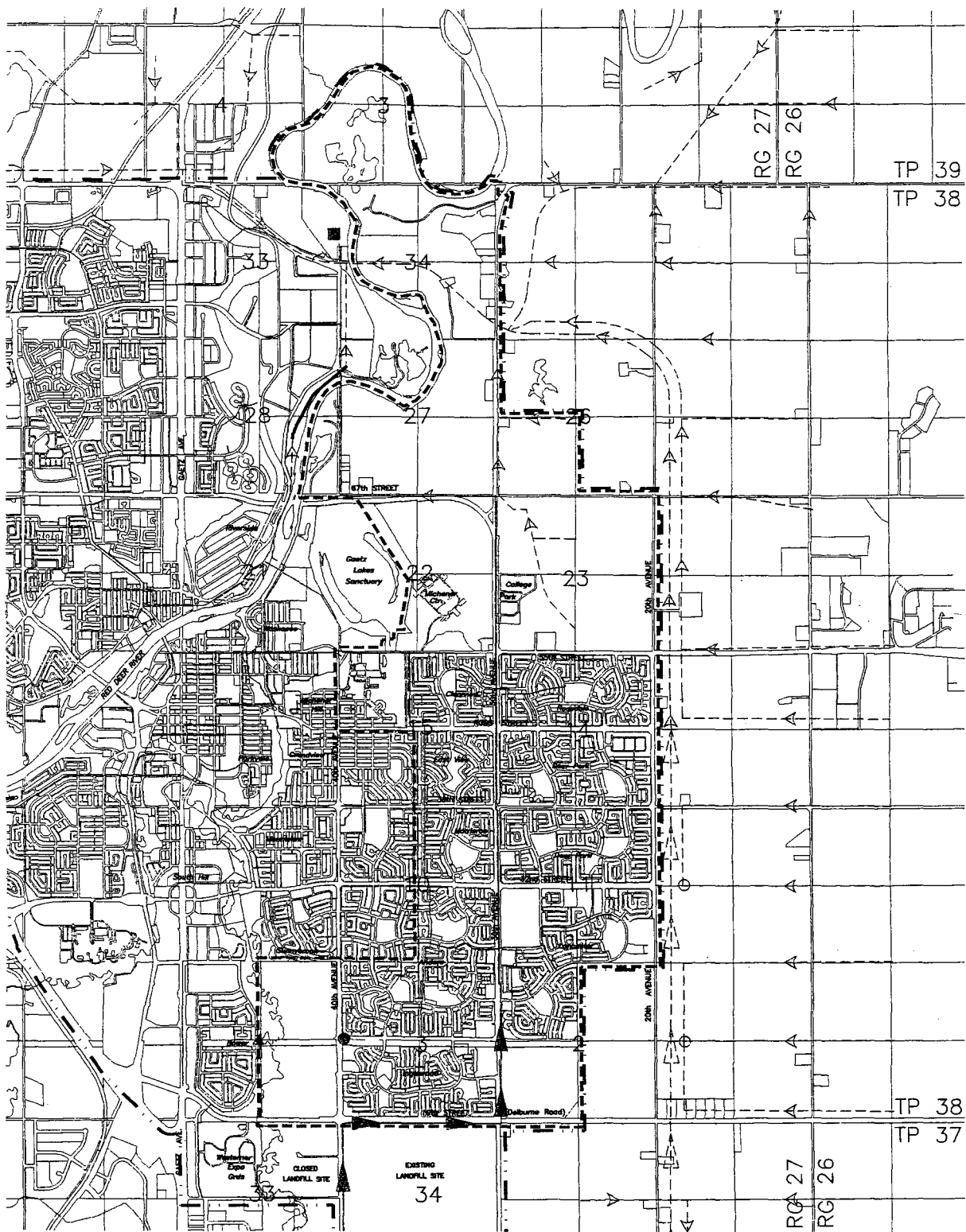


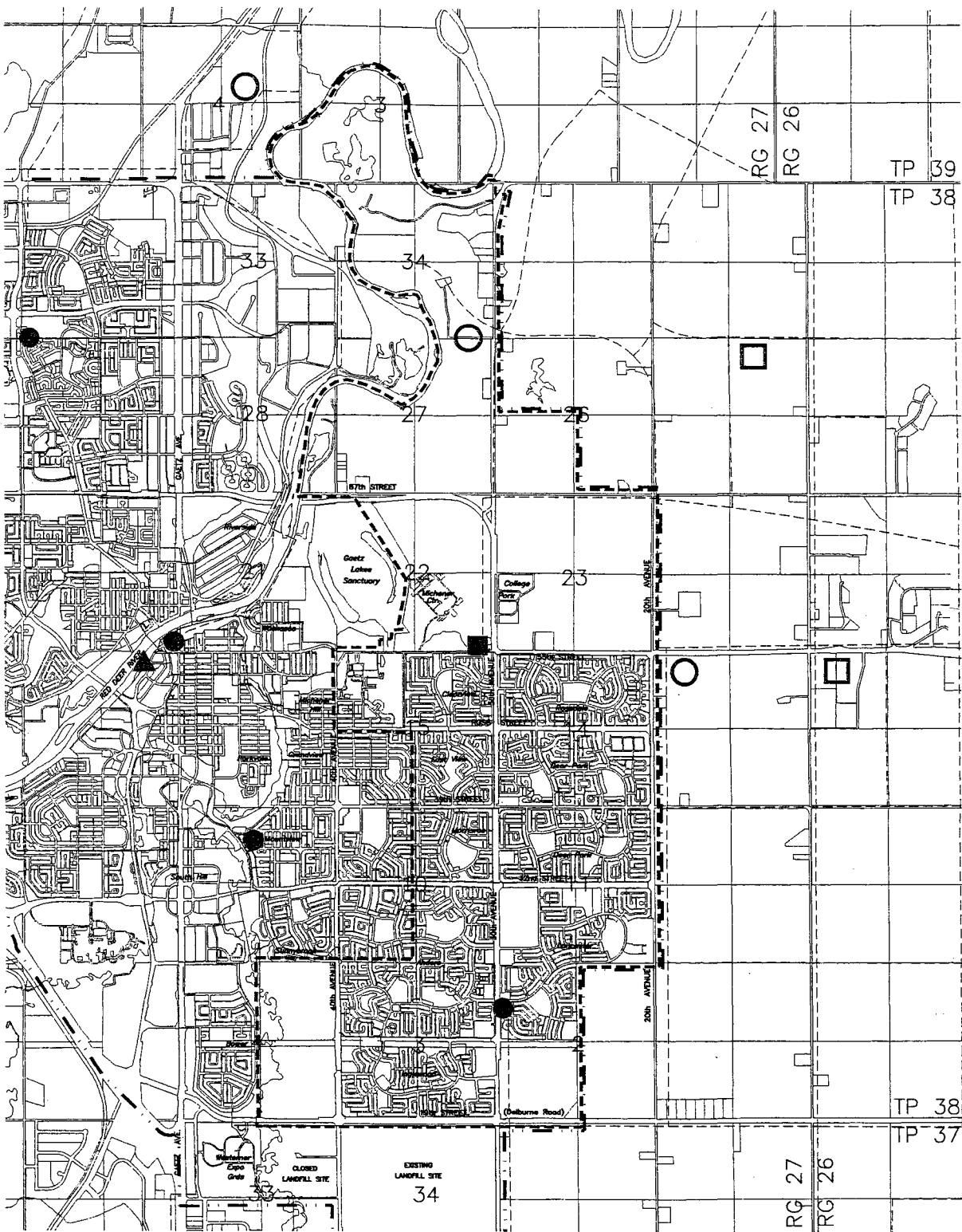
City of Red Deer East Hill Major Area Structure Plan

Figure 11
Storm Servicing
Concept

- - Plan Area
- ... City Boundary
- Existing Storm Water System
- - - Proposed Storm Water System
- ▲ Flow Direction
- ▤ Proposed Storm Pond
- ▨ Service Basin Area



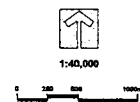




City of Red Deer
East Hill Major Area Structure Plan

Figure 13
Water Servicing Concept

- Plan Area
- City Boundary
- Existing Water Trunk
- ▲ Existing Water Treatment Plant
- Existing Pump Station
- Existing Reservoir/Pump Station
- Proposed Water Trunk
- Proposed Pump Station
- Proposed Reservoir/Pump Station



November 15, 2005

Mr. Norbert Van Wyk
City Manager
City of Red Deer
4814 48 Avenue
Red Deer, AB T4N 3T4

Dear Sir:

Re: City of Red Deer Position Paper on Water and the Draft Water Management Plan for the South Saskatchewan River Basin

I very much appreciate that the Council and administration of the City of Red Deer, in recognizing the strategic importance of the water to the City and all other communities in the Red Deer River basin, have requested the preparation of a 'City of Red Deer Position Paper on Water'. This paper is for the consideration by Council as the guiding framework for City participation in and responses to initiatives to address water management, water quality, water use and related matters in both the Red Deer River Basin and the broader South Saskatchewan River Basin, of which the Red Deer River basin is a part.

An important initiative, to which the Position Paper on Water applies, is the review of water management planning for the South Saskatchewan River Basin (SSRB). Underway for a number of years, Alberta Environment has recently released the Draft Water Management Plan for the SSRB. The Department is requesting public and community input to the draft plan by December 9.

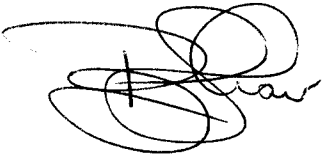
Included with this submission are the following reports:

- (a) The proposed 'City of Red Deer Position Paper on Water (November 2005)';
 - This was prepared by BPS Consulting Ltd. for the City of Red Deer in consultation with senior City Administration
 - It is recommended that City Council adopt the paper as the City's Position on Water.
- (b) A series of SSRB materials, including the Draft Water Management Plan for the South Saskatchewan River Basin, Summary of the Draft Water Management Plan for the South Saskatchewan River Basin, a Background Information report, and Questions and Answers on the Draft Water Management Plan for the South Saskatchewan River Basin.
 - The Draft Water Management Plan and the supporting materials have been prepared by Alberta Environment under the direction of a Steering Committee in consultation with four Basin Advisory Committees (BACs), including one for the Red Deer River Basin;
 - Alberta Environment is holding a community open house and public meeting in Red Deer on December 1;
 - The deadline for input on the Draft Plan is December 9. City administration has requested the preparation a proposed response for consideration by Council on December 5.

- (c) Special Areas Water Supply Review Report (August 2005)
- This report was prepared by BPS Consulting Ltd. for the City of Red Deer;
 - It examines the implications of a proposed major irrigation project, which includes diversion of a large amount of (raw) water out of the Red Deer River Basin; the proposed project has implications for the Draft Water Management Plan for the South Saskatchewan River Basin, including water management in the Red Deer River basin;
 - It is presented for information as partial background for the City of Red Deer Position Paper on Water (November 2005).
- (d) Special Areas Water Supply Project: Economics and Issues Final Report (June 2005)
- This report was prepared by Applications Management Consulting Ltd. for the City of Red Deer
 - It examines the costs and benefits of the aforementioned proposed major irrigation project, which is currently under review by the Province.

It is recommended that City Council adopt the 'City of Red Deer Position Paper on Water (November 2005), which will then provide the foundation for the forthcoming proposed City of Red Deer response to the Draft Water Management Plan for the South Saskatchewan River Basin.

Sincerely

A handwritten signature in black ink, appearing to read 'Bill Shaw', with a stylized, cursive script.

Bill Shaw, FCIP, ACP

THE CITY OF RED DEER
POSITION PAPER on WATER (November 2005)

PURPOSE

The City of Red Deer Position Paper on water sets out the City's positions regarding the water and watershed management within the Red Deer River basin. The Position Paper addresses key areas in which the City of Red Deer has involvement and the corresponding interests therein.

BACKGROUND

The availability of water, both in quantity and quality, is of strategic importance to the environment and economy of the City and the entire Red Deer River basin.

Amongst the four major river basins in the southern portion of Alberta, the Red Deer River basin has by far the smallest supply of river water. The natural flow of the Red Deer River is less than half of the Bow and Oldman Rivers (i.e. 49% of the Oldman River, 43% of the Bow River) and only one-quarter (26%) of the North Saskatchewan River.

Although water is a renewable resource, recent water management planning programs indicate water supplies in southern Alberta are limited, particularly in years of lower than average river flows. This is especially so for the Bow and Oldman River systems, but is quickly becoming a reality for the Red Deer River. Because of the relatively small size of the Red Deer River, the mounting pressures for uses of Red Deer River water both within and outside the Red Deer River watershed and the need to apportion water to Saskatchewan, it is important that the City of Red Deer is more vigilant, proactive and interactive in the management and use of water within the Red Deer River basin.

As the 'lifeblood' of the basin, a healthy Red Deer River is vital. Since the use of land and water throughout the watershed affects the quality of water in the Red Deer River and its tributary streams, the City also recognizes the need to be proactive in partnering with other communities and interests to promote and sustain a healthy watershed, which in turn will promote and sustain a healthy river.

CITY CONTEXT

The City's interest in water use and water management, both within the City and across the basin, is not new:

- throughout the years there have been major upgrades to the City's water treatment plant to provide higher quality potable water to a growing population and major upgrades to the wastewater treatment plant so return flows lessen impacts on the Red Deer River;
- in the 1970's, recognizing the need for flow regulation of the Red Deer River to assure better year round water supplies, the City participated in technical and public advisory processes which led to the building and operation of Dickson Dam;
- the City has actively participated on the Red Deer River Basin Advisory Committee since its inception in the year 2000 to assist the Province in the review of water management in the South Saskatchewan River Basin;
- in 2002 members of City council and administration took part in a number of community open houses to provide input to the Province's Water for Life Strategy;

- having major concerns about the inappropriate use of significant amounts of raw water for deep well injection, in 2004 the City objected to and participated in appeals of an approved application for a water licence for deep well injection;
- the City has and continues to support regional water delivery solutions, such as by supplying treated water to the North Red Deer River Water Services Commission.

POSITIONS on PLANNING FRAMEWORK AND COOPERATION

South Saskatchewan River Basin water management plan

The City:

- (1) supports the need for and completion of an updated South Saskatchewan River Basin water management plan since the Red Deer River basin is an integral part of the South Saskatchewan River Basin (SSRB);
- (2) will continue to be involved in the preparation of the SSRB water management plan through participation on the Red Deer River Basin Advisory Committee;
- (3) will review the draft SSRB water management plan and provide a formal response to the draft plan;
- (4) will seek and commit to involvement in the implementation of the SSRB water management plan on behalf of and in partnership with other communities and interests within the Red Deer River basin while representing City views and needs therein.

Red Deer River Basin water management plan

The City:

- (1) recognizes that following approval of the South Saskatchewan River Basin water management plan, there is a need for a more detailed integrated water management plan for the Red Deer River basin;
- (2) will encourage Alberta Environment to undertake, as soon as possible, a planning program to prepare and complete an integrated water management plan for the Red Deer River basin, and in doing so actively engage stakeholders throughout the basin;
- (3) will seek and commit to involvement in the preparation and implementation of a water management plan for the Red Deer River basin in partnership with other communities and interests throughout the basin, while representing City views and needs therein.

Interbasin cooperation

The City:

- (1) recognizes the need for consultation and cooperation among the four sub-basins in the South Saskatchewan River Basin (i.e. Red Deer, Bow, Oldman and South Saskatchewan downstream from the Bow-Oldman confluence), but in doing so will promote the collective voice of the Red Deer River basin as an equal partner in water management in the SSRB;
- (2) while recognizing the need for integrated water management among the four sub-basins to assist 'sharing of water' in times of need such as shortages, will promote the primacy of Red Deer River basin water for use within the Red Deer River basin as a basic principle in managing waters in the SSRB;

- (3) upon completion of the South Saskatchewan River Basin water management plan, will review the plan to further identify the City's perspectives and nature of involvement in the cooperative management of the waters of the South Saskatchewan River system.

POSITIONS ON GUIDANCE AND STEWARDSHIP FOR THE RED DEER RIVER WATERSHED

Red Deer River Basin Advisory Committee

The City:

- (1) supports the continuing significant roles of the Red Deer River Basin Advisory Committee to assist in the processes to prepare and finalize a water management plan for the South Saskatchewan River basin, including considering public and stakeholder input to the draft SSRB water management plan and advising on changes to the draft plan;
- (2) should the Red Deer River Basin Advisory Committee have a continuing role in the preparation of a water management plan for the Red Deer River Basin, will seek and commit to continued membership on the Red Deer River Basin Advisory Committee, and in doing so to reflect broad municipal interests across the basin, while representing City views and needs thereon.

Red Deer River Municipal Users Group

The City:

- (1) recognizes the Red Deer River Municipal Users Group as an association of municipalities, primarily from within the Red Deer River basin, to serve as an integrated municipal voice for the use of Red Deer River waters within the basin and to seek timely and equitable funding for municipal and regional water systems, including upgrades, throughout the basin;
- (2) commits to continued membership on the Red Deer River Municipal Users Group to collaboratively engage with other communities on water use and management within the Red Deer river basin, while representing City views and needs thereon;
- (3) will from time to time review the City's commitments to the Red Deer River Municipal Users Group for financial support and services, including staff resources, based on the strategic business plan, management, activities and successes of the Red Deer River Municipal Users Group.

Red Deer River Watershed Alliance

The City:

- (1) recognizes the Red Deer River Watershed Alliance as the Watershed Planning and Advisory Committee for the Red Deer River basin and its roles as a collaborative partnership of stakeholders interested in promoting a healthy Red Deer River watershed to ensure a legacy of ecological integrity and economic sustainability within the watershed;
- (2) commits to continued membership on the Red Deer River Watershed Alliance to collaboratively engage with other communities and interests to assist the Alliance to fulfill its various purposes, while representing City views and needs thereon;

- (3) will from time to time review City commitments to the Red Deer River Watershed Alliance for financial support and services, including staff resources, based on the strategic business plan, management, activities and successes of the Alliance.

Alberta Environment

The City:

- (1) will encourage the Minister of Environment to commit the Department to long-term financing of the base operation of the Red Deer River Watershed Alliance since the Alliance is a water management partnership advocated in the *Water for Life: Alberta's Strategy for Sustainability*; it is recognized that commitments may need to be reviewed from time to time based on the strategic business plan, management, activities and successes of the Alliance;
- (2) will encourage the Minister of Environment to commit the Department to funding portions of special projects undertaken by and through the Red Deer River Watershed Alliance, especially those identified in *Water for Life: Alberta's Strategy for Sustainability* as these serve to implement the mandate of the Department in the management of water and watershed resources;
- (3) will encourage Alberta Environment to prepare and distribute annually a report on the Red Deer River (system), including but not limited to its water quality, flows, allocations, consumptive uses, issues, and planning and management overviews;
- (4) will seek to meet annually with the Regional Director to discuss water and watershed management in the Red Deer River Basin.

POSITIONS on SPECIFIC WATER MATTERS

Water quality [note: also see Water Allocation (2)]

The City:

- (1) recognizes the need to protect the water quality of the Red Deer River and its tributary streams, and will actively intervene when appropriate in the pursuit of water quality protection;
- (2) advocates that managing the water of the Red Deer River must be an appropriate balance between water quality and allocation (i.e. net use/consumption);
- (3) will review and provide input to the recommended Water Conservation Objective for the Red Deer River upon release of the draft South Saskatchewan River Basin water management plan; in this regard it is important that specific provision be made in the Water Conservation Objective for the reach of the Red Deer River between the City's water supply intake and the location(s) of return flow(s);
- (4) recognizes that the Water Conservation Objective could be revised in the future if science shows that water quality needs can be met with a lesser flow;
- (5) will advise Alberta Environment to continue to monitor and report annually on the water quality of the Red Deer River system.

Water allocation

The City:

- (1) subject to (2) below, advocates that the management of water use within the Red Deer river system provides for total allocations that exceed 50% of the median

annual flow of the river, but in doing so that the allocation approval system accounts for return flows to the river such that net use (i.e. consumptive use) does not exceed 45% of the median annual flow;

- (2) advises that the "net use does not exceed 45% of the median annual flow" should be re-evaluated from time to time with new information on the aquatic environment with mandatory reviews when net use (i.e. consumptive use) reaches 40% of the median annual flow and 45% of the median annual flow; such new information includes lesser flows than in the Water Conservation Objective if science shows that water quality needs can be met with a lesser flow;
- (3) will actively intervene in water licence applications when appropriate to promote the beneficial and effective use of water within the basin.

Water apportionment

The City:

- (1) recognizes the benefit of the integrated management of the waters across the South Saskatchewan River basin with regard to water apportionment to Saskatchewan, whereby low Red Deer River flows into Saskatchewan can be augmented by flows from the Bow and/or Oldman Rivers, and vice versa;
- (2) notwithstanding (1) above, strongly advocates that during water shortage periods across the entire South Saskatchewan River basin, water management policy for the SSRB and for the Red Deer River Basin must not require the Red Deer River to pass more than 50% of its waters to Saskatchewan;
- (3) opposes a 'cap' (fixed or otherwise) on allocations on the Red Deer River whereby more than 50% of the median annual flow of the Red Deer River will be required to flow to Saskatchewan; the City may review this position if Alberta Environment can clearly demonstrate to the satisfaction of the City that a 'cap' is required to assure the water quality of the Red Deer River.

Water to sustain communities and basin growth

The City:

- (1) advocates water management for the Red Deer River basin must recognize the need for assured water supplies to meet present and future needs throughout the basin, including but not limited to growth pressures along the Highway 2 corridor and those portions of the basin where potable water may be in short supply;
- (2) encourages, where practical and cost effective, multi-municipal/regional solutions for the delivery and use of potable water to communities throughout the basin;
- (3) will continue to advise the Province and Red Deer County that land uses around Gleniffer Lake Reservoir must not be able to change or modify the operation priority of Dickson Dam as a flow regulation structure to supply assured minimum year-round flows of the Red Deer River downstream from the dam.

Water conservation

The City:

- (1) recognizes the stewardship of water resources will be enhanced through water conservation programs;
- (2) commits to undertake a City of Red Deer water conservation action plan;

- (3) encourages the Red Deer River Watershed Alliance and Red Deer River Municipal Users Group to work together to prepare a basin wide Municipal Water Conservation Guide; as a member of these groups the City will assist the preparation of this guide.

Water for irrigation

The City:

- (1) opposes the approval of any existing or future application for the allocation of water, including by transfer of a water licence or portion thereof, from the Red Deer River system for any large scale agriculture irrigation project, including any as part of a multiple use project (note: this does not apply to small, individual irrigation operations, whether public or private);
- (2) advocates that no new licence, including by amendment of an existing licence or by transfer in whole or in part of an existing licence, be approved for irrigation in the Bow and Oldman River basins.

Interbasin diversion of water

The City:

- (1) generally is supportive of the interbasin diversion of treated water from the Red Deer River if the treatment and delivery of Red Deer river water through regional systems to communities outside the basin is the most prudent and effective way to provide potable water to these communities;
- (2) in the absence of adopted river basin water management plans and a province-wide Provincial Government policy report on the interbasin transfer of water, opposes the interbasin diversion of raw (i.e. non-potable) water out of the Red Deer River basin; upon the availability of these plans and policy report, the City may review its opposition;
- (3) will advise the Provincial Government to not consider or approve any interbasin diversion of raw (i.e. non-potable) water until a water management plan for each affected basin and for each affected major sub-basin therein is approved and the Province has adopted a Provincial Policy on interbasin diversions of raw water that addresses needs, opportunities, benefits, impacts and other related considerations for donor and receiving basins;
- (4) will request the Provincial Government to review and amend the Water Act with regard to the interbasin diversion of raw (i.e. non-potable) water so the Act clearly provides for multiple opportunities for public review and input as part of the application process, including a public hearing process and/or opportunity for appeal.

Groundwater

The City:

- (1) will encourage the Province to undertake for the Red Deer River basin a thorough groundwater supply study and prepare a groundwater management strategy;
- (2) may approve the use of groundwater as a means to provide potable water to a development or use of land within the City but only in a manner whereby the provisions of the Water Act are met and only where City water supply services are not available;
- (3) may approve the use of groundwater as a means to provide non-potable water for use by a business or industry within the City for non-drinking use (e.g. washing,

cleaning, landscape maintenance) purposes but only in a manner whereby the provisions of the Water Act are met.

Wetlands

The City:

- (1) will continue as a part of its Ecological Management System to identify wetlands deemed as significant assets worthy of conservation and to integrate the conserved wetlands into the urban fabric;
- (2) will seek the cooperation Red Deer County in a sensitive lands conservation strategy for lands in and around the County and City's rural/urban fringe.

REVIEW, AMENDMENT and DEPARTURE

The City:

- (1) may review and amend from time to time the City's positions on water use and management, including watershed management;
- (2) may depart from a position contained herein if information becomes available that persuades the City that a departure from the position is appropriate.

Special Areas Water Supply Project (SAWSP)

1. What is the Special Areas Water Supply Project?

Low precipitation and lack of secure water supply have had significant negative impacts on several areas of east central Alberta. In looking for a way to relieve the water problems in these areas, The Special Areas Board (SAB) has initiated The Special Areas Water Supply Project (SAWSP). SAWSP is a proposal that has been put forth by the Board that will see water from the Red Deer River diverted to the Sounding and Berry Creek systems in east central Alberta. While SAWSP has several dimensions, it is essentially an irrigation project that the SAB sees as being a long-term solution to the recurring droughts that plague the Special Areas.

2. What is the process for approving the SAWSP proposal?

As a concerned stakeholder, The City was asked by the SAB and Alberta Environment to supply comments and feedback on the project. The City's response to the project will be considered by Alberta Environment as they consider SAB's application. The final decision as to whether or not the project will move forward lies with the Minister of Environment. The Minister may or may not solicit advice from the Lieutenant Governor in Council. Further, because the proposed project involves diverting water out of the Red Deer River Basin, the approval of SAWSP will require a special act of the Legislature.

3. What are the Special Areas?

The Special Areas is a unique rural municipal area covering over one million hectares in southeastern Alberta (see attached map). There are three separate areas administered as a single entity. The Special Areas Board was set up in 1938 to administer this area as municipal services could not be provided due to financial hardship resulting from the Depression and drought in the 1930's.

4. How is this project seen as benefiting the Special Areas?

It is thought that the diverted water resulting from SAWSP will provide a long-term solution to recurring drought in the Special Areas. The SAB anticipates that irrigation waters will lessen the impact of drought conditions resulting in economic growth within the areas and improvements to habitat and range conditions within the water supply area. A reduction in the amount of unemployment and out-migration from the Special Areas is also seen as a benefit resulting from the project.

5. What will SAWSP involve?

The project will divert a maximum of 76,500 cubic decameters of water from the Red Deer River Basin to the Sounding Creek Basin. Withdrawals from the Red Deer River would be downstream from Content Bridge (Highway 21 Bridge) from approximately April 1 to October 31.

The diversion project would consist of:

- a pump station on the Red Deer River south of the Hamlet of Nevis and a four and a half kilometre pipeline;
- an 84 kilometre main canal or pipeline to convey water to the Sounding and Berry Creeks;
- storage reservoirs along the main canal at Shooting Lake and on a tributary to Sullivan Lake;
- a distribution system within the Sounding and Berry Creek basins that would involve upgrades to existing works or new construction of approximately 94 kilometres of canals, channel improvements and two water supply reservoirs and;
- 17 multi-use projects that will provide a waterside habitat for wildlife, stockwater availability and pumping to dugouts.

6. How much will SAWSP cost?

SAB has estimated the cost of the project using 2004 figures. These figures indicate that the capital cost of the project is \$192.28 million. Operating costs came in at approximately \$3.1 million annually, including \$1.6 million in energy cost. Studies commissioned by The City of Red Deer show some inconsistencies in cost and estimate that the capital cost could run upwards of \$240 million plus the cost of land and interest.

Funding for the project would be negotiated between the Province and the SAB. There have been discussions surrounding the Province's future involvement in projects such as these which would see them decrease their funding from 86 per cent to 75 per cent.

7. Why does Council feel that this is an important issue to be involved in?

Effective water management is essential if we wish to see communities remain healthy and continue to grow. The City is taking a proactive approach in water management to ensure that Red Deer's future is prosperous. The City wants to ensure that water from the Red Deer River and Red Deer River Basin is being used as effectively and efficiently as possible and will therefore continue to take the necessary steps to ensure its safe and effective use. For example, The City supports the delivery of treated water from the Red Deer River through regional waterlines to communities distant from the river where these systems are cost effective.

Although The City recognizes the need for water in the above noted Special Areas, the project in question, which is largely centred around irrigation, does not make effective or efficient use of water from the Red Deer River. The City would like to work with all parties involved in order to generate a comprehensive water management plan for the Red Deer River Basin that will consider the water uses and needs of communities surrounding the basin.

8. What are The City's reservations surrounding SAWSP?

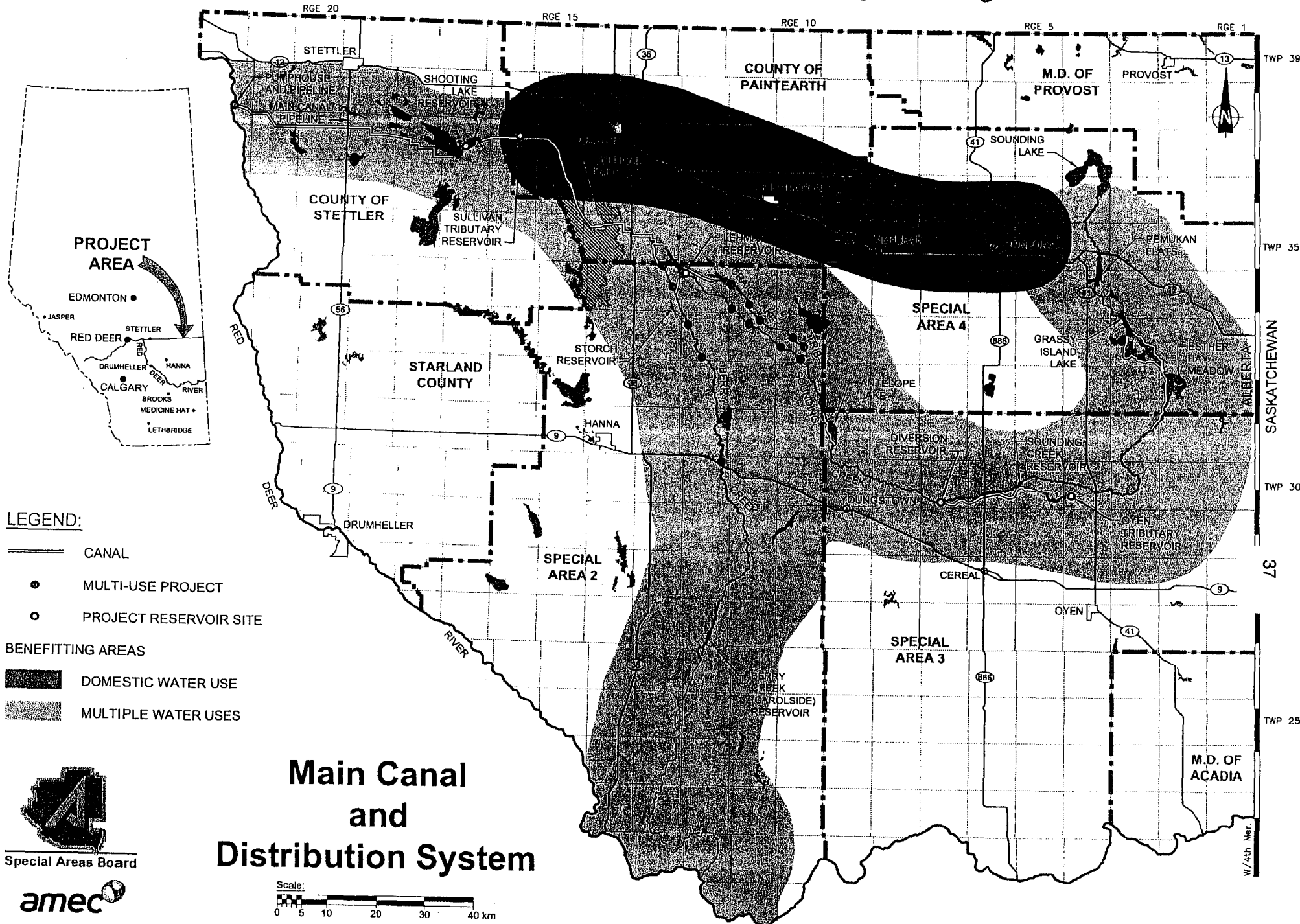
In reports commissioned by The City several reservations regarding the project were identified. Some of the most significant reservations include:

- ***Significant water loss associated with the inefficiencies of the irrigation process.***
Studies commissioned by the City indicate that water losses associated with SAWSP would range from 25 per cent to 40 per cent, including transmission losses (seepage/spills), evaporation in storage reservoirs and canals, on-farm evaporation during spray irrigation and flow through water. Very little, if any water will return to the Red Deer River for re-use, contribution to apportionment or for water for the aquatic environment.
- ***Future water demands and projected growth of the Red Deer River Basin.***
Alberta Environment's growth projections indicate that there is a substantial need for water to support the growth of the Red Deer River Basin. By 2050 the demand for water is expected to exceed current water allocation limits. The significant need for water in the future makes it necessary for The City and surrounding areas to monitor and manage how water from the Red Deer River Basin is used and allocated.
- ***Returns are relatively insignificant compared to the cost of the project.***
If implemented, the project may potentially increase the population of some of the Special Areas by a maximum of 2 per cent, moreover, less than 10 per cent of the farms in the Special Areas will be assured future security.
- ***Potential for additional water management issues.***
As the amount of water devoted to irrigation increases, so to does the potential for water management issues. 20.3 per cent of the water in the Red Deer River Basin is currently allocated to irrigation. If SAWSP is approved this number would jump to 41.9 per cent. The amount of water proposed to be allocated to SAWSP represents 35 per cent of the amount of water, as proposed by Alberta Environment, left to be allocated from the Red Deer River. This one project proposes to use the same amount of water to be left for all other non-irrigation uses across the entire basin. The Bow and Oldman River Basins are both highly allocated to irrigation and as a result suffer from water management issues such as water quality.

9. Is there a water management plan in place for Red Deer?

The Province is responsible for creating and implementing water management plans. Alberta has a Water Act in place which focuses on managing and protecting water within the province. Further to this Act is the Framework for Water Management Planning which outlines the Province's planning direction for water. Alberta Environment is currently reviewing water management in the South Saskatchewan River Basin which includes the use of quality water from the Red Deer River and is generating a series of water management recommendations for consideration by the public in the fall of 2005.

Special Areas Water Supply Project



Comments:

We recommend that the following process be used in considering the reports related to the Special Areas Water Supply Project:

1. At the November 21, 2005 Council meeting:
 - Receive as information a presentation on the City's Position Paper on Water (November 2005), the Special Areas Water Supply Project Review Report (August 2005), Special Areas Water Supply Project: Economics and Issues Final Report (June 2005), and the South Saskatchewan River Basin Draft Water Management Plan.
 - Following a question period, refer the reports to the Environmental Advisory Board for comment. This will also allow the City to make a presentation to the Red Deer River Municipal Users Group and request their support for the general 'policies' in the Position Paper regarding water allocation and conservation objectives.
2. At the November 29, 2005 Environmental Advisory Board meeting, present the noted papers and reports for review, discussion and recommendations.
3. At the December 5, 2005 Council meeting:
 - Resubmit the proposed City's Position Paper on Water , with any changes pursuant to input from the Environmental Advisory Board and municipalities in the basin, with a recommendation that Council adopt the Paper.
 - Present the City's response to the South Saskatchewan River Basin Draft Water Management Plan with a request that Council approve the response and that same be forwarded to Alberta Environment by the December 9, 2005 deadline. The City's response to this particular Plan is still being drafted but will be available for review at the December 5, 2005 meeting.

Submitted as attachments with this agenda are the following:

- Special Areas Water Supply Project: Economics and Issues – Final Report, dated June, 2005
- Special Areas Water Supply Project: Review Report, dated August, 2005
- South Saskatchewan River Basin Draft Water Management Plan

"Morris Flewwelling"
Mayor

"Norbert Van Wyk"
City Manager



FILE

LEGISLATIVE & ADMINISTRATIVE SERVICES

November 17, 2005

Hon. Luke Quелlette, MLA
4808 – 51 Avenue
Innisfail, AB T4G 1M2

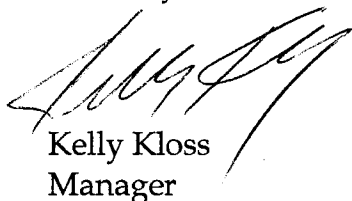
Dear Mr. Quелlette:

Re: Special Areas Water Supply Project

Enclosed are the reports that will be presented to Red Deer City Council on Monday, November 21, 2005 regarding the Special Areas Water Supply Project.

The Mayor and City Manager have asked that this information be forwarded to you for your information.

Sincerely,



Kelly Kloss
Manager

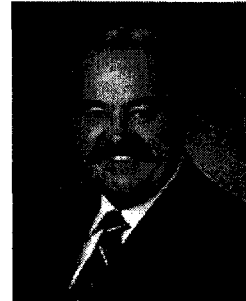
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[HOME](#) > [ELECTED MEMBERS](#)

Contact Information for Honourable Luke Ouellette (PC)
Biography

MLA for Innisfail-Sylvan Lake



Constituency Office

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✓ Innisfail, AB

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FILE

LEGISLATIVE & ADMINISTRATIVE SERVICES

November 17, 2005

Mr. Ray Prins, MLA
4960B Highway 2A
Lacombe, AB T4L 1J9

Dear Mr. Prins:

Re: Special Areas Water Supply Project

Enclosed are the reports that will be presented to Red Deer City Council on Monday, November 21, 2005 regarding the Special Areas Water Supply Project.

The Mayor and City Manager have asked that this information be forwarded to you for your information.

Sincerely,

A handwritten signature in black ink, appearing to read 'Kelly Kloss', written over the printed name and title.

Kelly Kloss
Manager

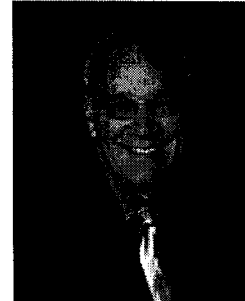
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/attach.

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Contact Information for Mr. Raymond Prins (PC)
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FILE

LEGISLATIVE & ADMINISTRATIVE SERVICES

November 17, 2005

Mrs. Mary Anne Jablonski, MLA
#200, 4814 Ross Street
Red Deer, AB T4N 1X4

Dear Mary Anne:

Re: Special Areas Water Supply Project

Enclosed are the reports that will be presented to Red Deer City Council on Monday, November 21, 2005 regarding the Special Areas Water Supply Project.

The Mayor and City Manager have asked that this information be forwarded to you for your information.

Sincerely,



Kelly Kloss
Manager

KK/chk

/attach.



FILE

LEGISLATIVE & ADMINISTRATIVE SERVICES

November 17, 2005

Hon. Victor Doerksen, MLA
Minister of Innovation & Science
#503, 4901 – 48 Street
Red Deer, AB T4N 6M4

Dear Victor:

Re: Special Areas Water Supply Project

Enclosed are the reports that will be presented to Red Deer City Council on Monday, November 21, 2005 regarding the Special Areas Water Supply Project.

The Mayor and City Manager have asked that this information be forwarded to you for your information.

Sincerely,

Kelly Kloss
Manager

KK/chk

/attach.

FILE COPY



Council Decision – November 21, 2005

Legislative & Administrative Services

DATE: November 22, 2005
TO: Bill Shaw, BPS Consulting Ltd.
FROM: Kelly Kloss, Legislative & Administrative Services Manager
SUBJECT: City of Red Deer Position Paper on Water and the Draft Water Management Plan for the South Saskatchewan River Basin

Reference Report:

BPS Consulting Ltd., dated November 15, 2005

Resolutions:

"Resolved that Council of the City of Red Deer having considered the report from BPS Consulting Ltd., dated November 15, 2005, re: City of Red Deer Position Paper on Water and the Draft Water Management Plan for the South Saskatchewan Rive Basin, hereby refers the City of Red Deer Position Paper on Water, and related reports, to the Environmental Advisory Board for comments with the matter to be brought back to the December 5, 2005 Council Meeting."

Report Back to Council: Yes

Comments/Further Action:

This item is to be presented to the Environmental Advisory Board at their November 29, 2005 meeting. The EAB recommendation is to be forwarded to Council for the December 5, 2005 Council meeting. A response to the Draft Water Management Plan for the South Saskatchewan River Basin is to be drafted for Council 's approval as well.


Kelly Kloss
Manager

/chk

c City Manager
Director of Development Services
Public Works Manager



Legislative & Administrative Services

DATE: November 14, 2005
TO: City Council
FROM: Legislative & Administrative Services Manager
SUBJECT: Red Deer Downtown Business Association
Board of Director Appointments

History

In 1984 the Downtown Business Community formed a Business Revitalization Zone (BRZ) with a mission statement to guide the progress of Red Deer's central business district to provide a healthy atmosphere of business development and social and cultural improvements. The Downtown Business Revitalization Zone Bylaw 2827/83 designates the Downtown as a Business Revitalization Zone and establishes a Board of Directors for the Business Revitalization Zone. Under this Bylaw, the Board of Directors of the Downtown Business Association are appointed by resolution of Red Deer City Council.

Downtown Business Association

Terms of three directors of the Red Deer Downtown Business Association expire at the end of this year. The Red Deer Downtown Business Association held their Annual Meeting on October 26, 2005 and three directors were selected.

The Downtown Business Association requests Council's approval of the recommended directors. As in the past, names of the directors have been submitted in confidence to Council.

Recommendation

That Council approve the appointment of three new directors to the Red Deer Downtown Business Association for 3-year terms (2006 - 2008).

A handwritten signature in black ink, appearing to read 'Kelly Kloss', is written over the name and title.

Kelly Kloss
Manager

Comments:

We agree with the recommendation of the Legislative & Administrative Services Manager.

“Morris Flewwelling”
Mayor

“Norbert Van Wyk”
City Manager



FILE COPY

LEGISLATIVE & ADMINISTRATIVE SERVICES

November 22, 2005

Sonia Sawyer, Executive Director
Red Deer Downtown Business Association
Second Floor, 5024 Ross Street
Red Deer, AB T4N 1Y3

Dear Sonia:

Council Approval of Downtown Business Association Board of Directors for 2006

At the Monday, November 21, 2005 Council meeting, Council reviewed your request for approval of the Downtown Business Association Board of Directors for 2006. Council passed the following resolution:

"Resolved that Council of the City of Red Deer having considered the correspondence from the Legislative & Administrative Services Manager, dated November 14, 2005, re: Red Deer Downtown Business Association, Board of Director Appointments, approves the appointments of the following directors to the Red Deer Downtown Business Association for the term January 1, 2006 to December 31, 2008:

Geoff Goodwin
Erika Rowden
Angela Noble"

Please call if you have any questions.

Sincerely,



Kelly Kloss
Manager

BYLAW No. 3156/LL-2005

Being a Bylaw to amend Bylaw No. 3156/96, the Land Use Bylaw of The City of Red Deer as described herein.

COUNCIL OF THE CITY OF RED DEER, ALBERTA, ENACTS AS FOLLOWS:

Bylaw No. 3156/96 is hereby amended as follows:

- 1 That "Use District Maps G6 and G7" contained in "Schedule B" of the Land Use Bylaw is amended in accordance with Land Use District Map No. 34/2005 attached hereto and forming part of the bylaw.
- 2 Part Six of the Land Use Bylaw is amended by adding the following new DC Direct Control District:

"DC(22) Direct Control District No. 22 (See Map G6)

151.7 (1) General Purpose

This District is created to permit redevelopment of the former Red Deer County building site Lots 1 & 2, Block 9, Plan 708 M.C. (4758 – 32 Street) with low density commercial uses. Redevelopment of this site would be with compatible commercial uses that provide a transition between the Gaetz Avenue C4 Arterial Commercial District west of the site and, the R2 and R3 residential developments east and north of the site.

(2) Site Development

- (a) In order to ensure that the new development on this site matches the character and scale of the existing surrounding neighbourhood, all uses and development standards prescribed for this district, site plan, site access, pedestrian environment, the provision of landscaped areas, and the parking layout shall be subject to approval by the Municipal Planning Commission.
- (b) The relationship of the use to adjacent residential areas will be a factor in considering the site plan and architectural treatment of the building.

(3) Permitted Uses

- (a) Commercial recreation facility
- (b) Commercial service facility.

- (c) Restaurant.
- (d) Merchandise Sales and/or rental, excluding
 - all uses where the primary focus is adult oriented merchandise and/or entertainment
 - liquor
 - motor vehicles
 - machinery and
 - fuel.
- (e) Health and Medical Services.
- (f) Signs:
 - (i) awning, canopy sign,
 - (ii) under canopy sign,
 - (iii) fascia sign,
 - (iv) free standing sign,
 - (v) painted wall sign,
 - (vi) projecting sign.

(4) Discretionary Uses

- (a) Accessory building or use.
- (b) Service and repair of goods traded in this district.
- (c) Dangerous goods occupancy, where required, in association with a dry cleaning business.

(5) Regulations

- | | | | |
|-----|------------------|---------|--|
| (a) | Floor Area: | maximum | one third of site area |
| (b) | Building Height: | maximum | two storeys |
| (c) | Front Yard: | minimum | 9.0 m |
| (d) | Side Yard: | minimum | 3.0 m, unless the side yard abuts a residential parcel, in which case it shall |

			be 7.0 m
(e)	Rear Yard:	minimum	9.0 m
(f)	Landscape Area:	minimum	15% of site area to include retention of existing vegetation on the South portion of site.
(g)	Parking:		subject to section 48
(h)	Loading Space:	minimum	one opposite each loading door with a minimum of one, which may be used as a parking space
(i)	Site Area:	minimum	0.5 ha
(j)	Frontage:	minimum	40.0 m. "

READ A FIRST TIME IN OPEN COUNCIL this day of 2005.
 READ A SECOND TIME IN OPEN COUNCIL this day of 2005.
 READ A THIRD TIME IN OPEN COUNCIL this day of 2005.
 AND SIGNED BY THE MAYOR AND CITY CLERK this day of 2005.

 MAYOR

 CITY CLERK

The City of Red Deer

PROPOSED LAND USE BYLAW AMENDMENT



GAETZ (50) AV

C4

R2

49 AV

34 ST

R3

47 AV

33 ST

C4

49 AV

R3

32 ST

C4

49 AV

C4

C3

R2

47 AV

AFFECTED DISTRICTS:

R2 - Residential (Medium Density)

DC(22) - Direct Control District No. 22

Change from:
R2 to DC(22)



MAP No. 34 / 2005
BYLAW No. 3156 / LL - 2005

Item No. 2

BYLAW NO. 3207/A-2005

Being a bylaw to amend Bylaw No. 3207/98, the bylaw adopting the East Hill Major Area Structure Plan as a bylaw of the City of Red Deer.

COUNCIL OF THE CITY OF RED DEER, ALBERTA, ENACTS AS FOLLOWS:

1. That Bylaw No. 3207/98 is hereby amended:

By substituting the revised plan in its entirety, including all maps and text pages attached hereto and forming part of the bylaw, for the existing plan.

READ A FIRST TIME IN OPEN COUNCIL this day of 2005.

READ A SECOND TIME IN OPEN COUNCIL this day of 2005.

READ A THIRD TIME IN OPEN COUNCIL this day of 2005.

AND SIGNED BY THE MAYOR AND CITY CLERK this day of 2005.

MAYOR

CITY CLERK

CITY OF RED DEER EAST HILL MAJOR AREA STRUCTURE PLAN

Table of Contents	Page
Section 1.0 Introduction	1.1
1.1 Area Location	1.1
1.2 Enabling Legislation	1.1
1.3 Background	1.1
1.4 Planning Framework	1.1
Section 2.0 Future East Hill Community	2.1
2.1 Vision	2.1
2.2 Goal and Objectives	2.4
Section 3.0 Existing Site Characteristics	3.1
3.1 Tree and Wetland Natural Habitat Areas (Preservation Focus) ...	3.1
3.2 Natural Resource Extraction and Landfills	3.2
Section 4.0 Development Concept	4.1
4.1 Residential	4.1
4.2 Commercial	4.2
4.3 Circulation and Connections	4.10
4.4 Public Open Space	4.15
4.5 Public Facilities	4.18
4.6 Emergency Services	4.18
4.7 Schools	4.18
Section 5.0 Municipal Utility Services	5.1
5.1 Storm Water Drainage	5.1
5.2 Sanitary Sewer	5.1
5.3 Water Distribution	5.2
5.4 Power Transmission	5.2
Section 6.0 Plan Implementation	6.1
6.1 Neighbourhood Area Structure Plans	6.1
6.2 Land Use Bylaw	6.1
6.3 Area Redevelopment Plans	6.2
6.4 Existing Red Deer County Area Structure Plans	6.2
6.5 Additional Cost of Commercial Roadway Requirements	6.2
6.6 Amendments to this Plan	6.2
6.7 Plan Review	6.2

List of Figures

- Figure 1: Key Plan
- Figure 2: Concept Illustrating the Basic Elements of the Town Centre
- Figure 3: Tree and Wetland Natural Habitat Areas: Preservation Focus
- Figure 4: Natural Resource Extraction & Landfills
- Figure 5: Development Concept
- Figure 6: Vertical residential/commercial mix in a "main street" centre
- Figure 7: A commercial "power centre" designed as a pedestrian square
- Figure 8: Design options for "main street" commercial centres
- Figure 9: Small town "main street" ambience
- Figure 10: Trail & Open Space System
- Figure 11: Storm Servicing Concept
- Figure 12: Sanitary Servicing Concept
- Figure 13: Water Servicing Concept
- Figure 14: Electric Servicing Concept

CITY OF RED DEER

EAST HILL MAJOR AREA STRUCTURE PLAN

1.0 INTRODUCTION - Figure 1

1.1 AREA LOCATION

The plan area is shown on Figure 1 and contains approximately 37 quarter sections or 2396 ha (5920 acres) of land. Approximately 17 quarter sections of land within the plan area are fully completed City residential neighbourhoods.

On Figure 5, conceptually shown outside of the plan area are six quarter sections of land that lie within Red Deer County. These lands are beyond the statutory requirements of this area structure plan but have been included for illustrative purposes.

1.2 ENABLING LEGISLATION

The East Hill Major Area Structure Plan has been adopted by the City of Red Deer as a statutory plan in accordance with Section 633 of the *Municipal Government Act*. This section describes an area structure plan as providing a framework for subsequent rezoning, subdivision and development of an area of land. In addition to this plan it is The City's policy to require individual neighbourhood area structure plans for each quarter section of those lands that are serviceable, prior to considering land use districting and subdivision. These plans must comply with the East Hill Major Area Structure Plan (refer to Section 1.4.5 and Section 6.1 for additional information).

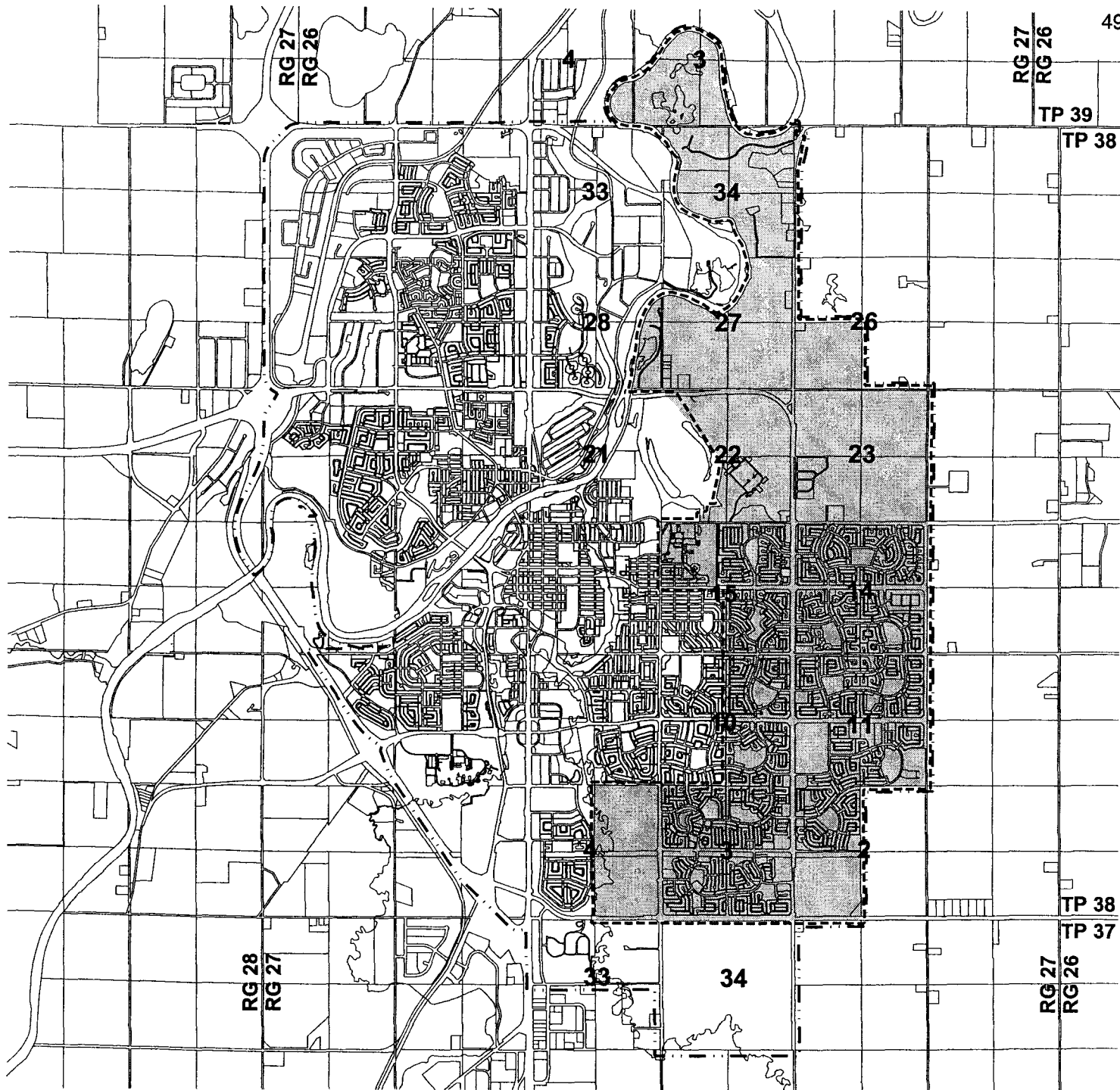
1.3 BACKGROUND

The East Hill Major Area Structure Plan has its origin in the original East Hill Concept Plan prepared in 1977-1978 containing 17 quarter sections of land with an area of 1100 hectares (2720 acres). At that time only four of these quarter sections were located inside the City and the remaining 13 quarters were located in Red Deer County.

The original East Hill Concept Plan has subsequently been amended by City Council in 1985 and 1989, it was converted to an area structure plan in 1993 and again amended in 1998, 2001, 2003 and 2005. During this time the plan responded to changes in Provincial legislation, City boundary expansions that added undeveloped and annexed lands to the plan, updated land use, servicing and transportation information, and the need to identify environmentally significant natural areas and school and commercial locations.

1.4 PLANNING FRAMEWORK

The East Hill Major Area Structure Plan is one of a series of inter-related planning documents adopted by the City of Red Deer. The following City planning documents were referenced in the preparation of the East Hill Major Area Structure Plan ensuring that all plans are consistent with each other.



City of Red Deer East Hill Major Area Structure Plan

Figure 1
Key Plan

- - Plan Area
- - - City Boundary

1.4.1 City of Red Deer Strategic Plan

The City's Strategic Plan provides purpose and guiding principles focusing on City direction in the areas of Community Development, Economic Development, Organization Development and Financial Development. The Strategic Plan specifically addresses community and land use planning. Regularly updated at three year intervals, the Strategic Plan is a current and relevant guideline for the sustained operation and growth of the City of Red Deer.

1.4.2 The City of Red Deer 2004 Growth Study

The City of Red Deer 2004 Growth Study focuses on land absorption rates and land inventory requirements for industrial, residential and commercial land uses within the city over the next 50 years. The update reflects changes in development trends, environmental management initiatives, existing land use, population forecasts, servicing, and transportation. The study is used to identify potential growth areas and generate future short, medium and longer term growth strategies for the city.

1.4.3 Intermunicipal Development Plan

The *Intermunicipal Development Plan* exists to facilitate land use planning cooperation between the City of Red Deer and Red Deer County. It is consistent with the provisions of the *Municipal Government Act* and the individual municipal development plans of the City and County. This plan exhibits a cooperative approach to land use planning matters in and around the City to provide for the future expansion of the City and to allow compatible development in the County without impeding the orderly expansion plans of the City.

1.4.4 Municipal Development Plan

The City of Red Deer Municipal Development Plan contains broad policies for guiding growth and change in the City. It focuses on the type, quality and direction of land use and development, and related issues. The Plan is vital to ensuring that the high quality of life valued by City residents is maintained as new growth occurs. As directed within the *Municipal Government Act*, The City of Red Deer's *Municipal Development Plan* addresses future land use, the process and order of future development, and the provision of services and facilities to accompany this growth.

1.4.5 Area Structure Plans and Area Redevelopment Plans

Area structure plans are usually prepared for undeveloped lands. The City of Red Deer uses two different categories of area structure plans, namely the major area structure plan and the neighbourhood area structure plan. Major area structure plans, such as this document, illustrate broad, long term transportation and land use development strategies for large areas/multiple quarter sections of land. A neighbourhood area structure plan generally encompasses approximately one quarter section (65 ha) of land and provides a significantly greater level of development detail and for a shorter time horizon. This would include housing types, the location of all roadways, lanes, and schools, requirements of public facilities such as parks, trails, churches and social care sites, population density, sequence of development and servicing details. Neighbourhood area structure plans form the basis for future zoning, subdivision and development decisions at the community or neighbourhood level.

Related to area structure plans is a planning tool known as an area redevelopment plan. This is a statutory plan covering an area of existing, mature and often older development in the City. Its

preparation is of necessity community driven, and its policies and land use concept outline directions for the rehabilitation, redevelopment and enhancement of specific sites, housing districts, shopping areas, and generally the public realm including streets and parks.

1.4.6 Land Use Bylaw

The City of Red Deer Land Use Bylaw is designed to regulate and control the subdivision, development and use of lands and buildings within the City to achieve orderly, economical and beneficial development for the overall greater public interest. The Land Use Bylaw divides the City into land use districts that prescribe both permitted and discretionary uses of land and buildings. The Land Use Bylaw implements the policies and objectives outlined in the *Municipal Development Plan*, area structure plans and area redevelopment plans.

1.4.7 Neighbourhood Planning Guidelines & Standards

The City of Red Deer *Neighbourhood Planning Guidelines & Standards*, as amended from time to time, provides guidelines and standards based on smart growth principles for the planning and design of neighbourhoods including neighbourhood form, housing, trails and linkages, roadways, transit, active and passive parks, school sites, leisure facilities, natural environment and heritage, social health and safety. This document provides the requirements for a neighbourhood area structure plan, the subdivision approval process, and park development templates.

1.4.8 Red Deer Growing Smarter: Design Elements and Ideas for New Residential Neighbourhoods

This document provides vision and principles for the development of sustainable neighbourhoods through a set of 50 design elements. It provides background information on City of Red Deer strategic planning framework, the evolution and overview of Red Deer's neighbourhood planning policies and standards, and outlines planning principles of major planning movements and practices throughout North America (as current in 2002). This document has been referenced during drafting of, and to some extent forms the basis of certain elements in, the *Neighbourhood Planning Guidelines & Standards*.

1.4.9 Discussion Paper on Environmental Initiatives – April 2004

The Discussion Paper on Environmental Initiatives was approved by City Council in April, 2004. Council resolved to adopt a conservation and reduction philosophy in all new developments and redevelopments throughout all levels of the organization with this to be reflected in the 2005-2008 Strategic Plan. The Paper contains a comprehensive overview of the types of environmental initiatives taken on by city departments. The Paper also identifies potential partnerships and funding sources that could assist the City in preserving the environment.

1.4.10 Subdivision & Development Regulation

Promulgated under the Municipal Government Act, this Regulation addresses a number of issues relevant to this plan, including:

- A development may require an approval or authorization under the Environmental Protection and Enhancement Act for any construction including sanitary, storm water, and/or waterworks systems. The proponent of a project requiring any of these approvals must submit the

appropriate applications to Alberta Environment and approval must be obtained prior to construction.

- A development may require an approval under the Water Act for any construction associated with storm water management or for any activities within a water body or potentially affecting a water body. The proponent of a project requiring any of these approvals must submit the appropriate applications to Alberta Environment and approval must be obtained prior to construction.
- A development may require a setback waiver from a wastewater treatment facility, landfill or waste site, as indicated within the Subdivision and Development Regulation under the MGA. The setback may be varied by a subdivision authority or development authority with the written consent of the Deputy Minister of Environment. The proponent of a project requiring a setback waiver must submit the appropriate application to The City, who will request approval from Alberta Environment prior to construction.
- Approval from Alberta Environment does not mean that the applicant also has authority under federal legislation. Fisheries and Oceans for matters under the Fisheries Act and Canadian Coast Guard for matters under the Navigable Waters Protection Act are to be contacted for matters relating to federal laws.

2.0 FUTURE EAST HILL COMMUNITY – Figure 2

2.1 VISION

This section describes a possible future built out scenario of the presently (2005) undeveloped lands (approximately 780 ha gross developable land) within the East Hill Major Area Structure Plan into a core community symbolizing a mandate for sustainable development in the City. Depending on population growth and future land absorption rates it may take 10 to 20 years to build out the plan area.

This is the vision for the East Hill communities for the year 2025:

As more people realize and desire the benefits of a sustainable community lifestyle the East Hill has built out with integrated, vibrant and dynamic neighbourhoods designed to meet these expectations. Over the past 20 years since 2005 the neighbourhoods south of 32 Street (±230 ha) have added 2800 to 4000 new dwelling units (8000 to 11000 residents) to the East Hill community, while the neighbourhoods between 55 Street and 67 Street (±240 ha, excluding ±112 ha dedicated for a town centre site) have added 3200 to 4500 dwelling units (9000 to 12000 residents). During the last few years of this time period the lands northward of 67 Street up to the Riverbend Golf Course & Recreation Area (±200 ha) have built out to accommodate 2,500 to 3500 dwelling units (7000 to 10000 residents). Development in the East Hill has seen the city's 2005 population of 79082 grow by 24000 to 33000.

The more recently completed neighbourhoods of the East Hill community are easily identified by their compact land use pattern, pleasant environment, walkable streets and green spaces linking neighbourhoods to commercial sites, natural areas, parks, school sites and other community gathering places.

The neighbourhoods north of 55 Street in particular as well as the larger East Hill community and the surrounding region support a regional commercial centre that has developed from individual commercial developments initially into a vibrant town centre, located at the intersection of 30 Avenue and 67 Street. It integrates commercial, residential and public uses, including a main street theme, and constitutes the pride of the community (see Figure 2).

Transit service links the town centre with the surrounding neighbourhoods and the entire city. The architecture reflects elements of traditional prairie downtowns and contemporary designs. Recreation, social and cultural activities supplement viable commercial services, and shape the town centre as a focal point for the surrounding neighbourhoods and the larger East Hill community. The town centre Main Street is alive as residents and shoppers walk along the pedestrian-friendly street lined with shade trees, shops and the glitter of architectural lighting. Wide sidewalks and pedestrian trail linkages provide safe and convenient access to various facilities and amenities. Employment areas and buildings are designed to be compatible with adjacent residential uses and school sites. The multi-neighbourhood park site at the intersection of 30 Avenue and 67 Street provides additional vibrancy to the town centre. It accommodates two high school sites and a major recreation venue.

A compact land use pattern, an interconnected street pattern with direct pedestrian linkages and higher residential densities around transit stops have become characteristic of development on the East Hill and have made public transit more efficient, and more people walk or ride to local destinations.

Landsaped arterial roadways, with no more than two lanes for each travel direction, facilitate vehicle and transit travel between neighbourhoods and into the city.

Each neighbourhood reflects a special image and character of mixed housing linked by inviting streetscapes, walkways and enhanced open spaces. Schools and other public institutions are constructed as architectural landmarks in the neighbourhood. Tree-lined residential streets, houses that are intimately related to the sidewalk and wide walkways create a comfortable pedestrian setting. The neighbourhood attractions are linked to the residences through a network of local and collector roadways, trails and linear parks that are well used by residents. Everyday necessities are within walking distance of most homes. Friends and neighbours meet along streets, sidewalks, and points of interest.

Trails connect the neighbourhoods to the Waskasoo trail network and places of interest throughout the community. A variety of active and passive parks, from large neighbourhood parks to linear parks, and tiny manicured local parkettes are strategically located throughout the neighbourhoods, creating linkages and a sense of community.

Preservation and beautification of the environment are diligently practiced. The natural scenic areas along the Red Deer River Valley and its tributary and ravines, including creeks and seasonal streams, have been preserved and enhanced to form the backdrop for a shared trails system, used for cross-country skiing, jogging, walking, biking and roller-blading. Rest areas, look outs and interpretive sites contain recreational amenities that are actively used. Natural treed areas and wetlands remind residents of their heritage and enhance the open space system.

Servicing is provided in an efficient and environmentally-friendly manner. Green infrastructure, recycling and energy conservation are efficiently practiced. The natural systems of the area are utilized and enhanced to provide aesthetic and recreational value. Wet and dry storm water ponds and constructed wetlands are found throughout the community providing amenity to the neighbourhoods while effectively and naturally managing storm water volume and enhancing run-off water quality.

(Adapted for The City of Red Deer from 'Heritage Valley Servicing Concept Design Brief', 2001, City of Edmonton)

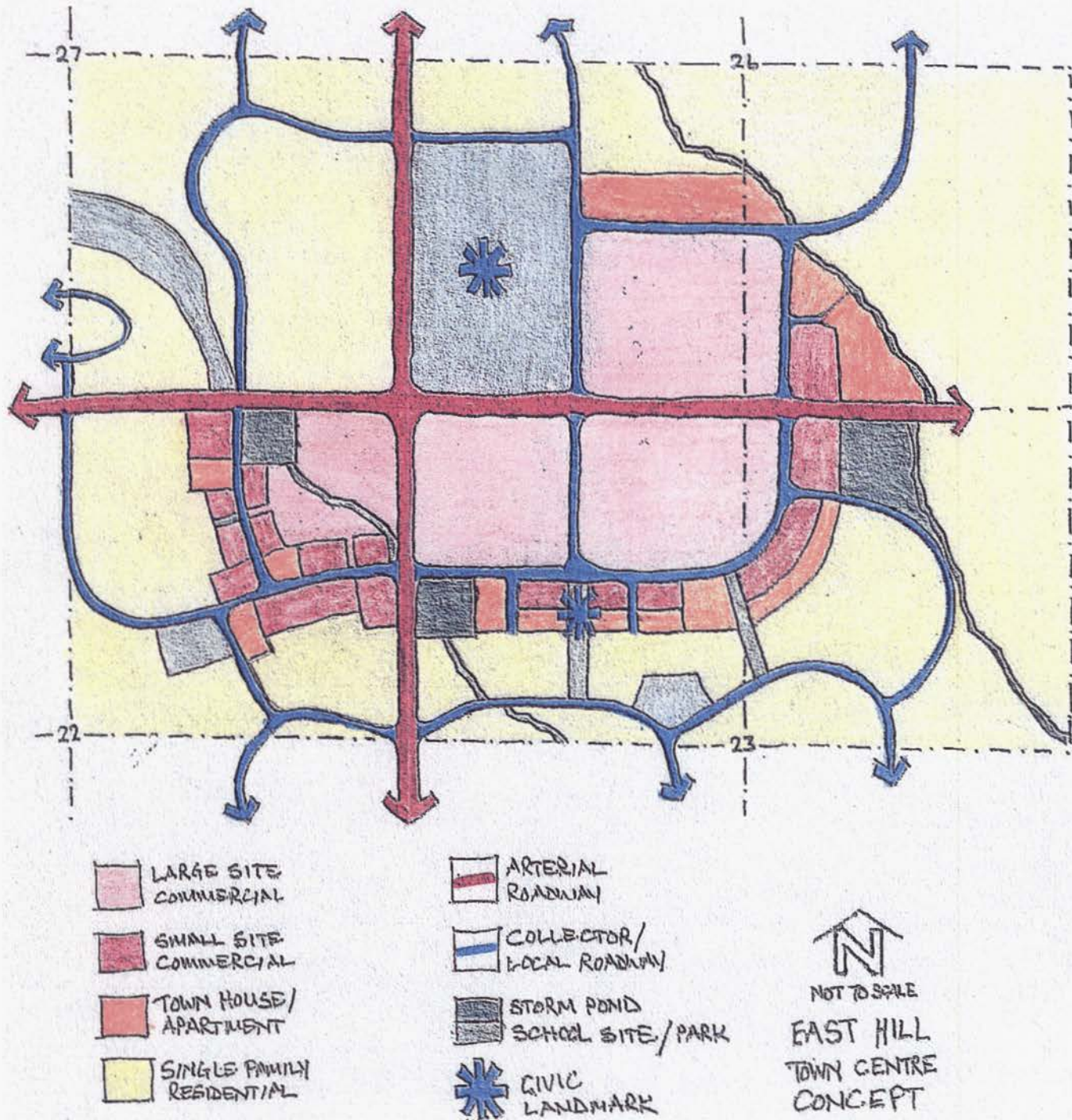


Figure 2: Concept illustrating the basic elements of the town centre site

Note: The development concept shown in Figure 2 is for illustration purposes only. The intent is to illustrate the basic elements of the proposed town centre, such as mixed land use/integration, pedestrian linkages, landmark sites, and avoiding commercial traffic shortcuts through adjacent residential areas. It is not a blueprint for development on the relevant quarter sections, and it does not have to be amended if the neighbourhood area structure plans propose development concepts that are different to this one.

2.2 GOAL AND OBJECTIVES

The stated vision of this plan translates into the following goal:

'To provide a broad planning direction for the subdivision of lands in a manner which facilitates the economically, socially and ecologically sustainable building out of the plan area as a desirable place for healthy living, education, work and recreation for individuals and families of all ages and with varying needs and desires.'

The following objectives support the goal:

- i) *To guide City expansion in an orderly manner reflecting high standards in terms of quality of life.*
- ii) *To establish an infrastructure and services framework for more detailed neighbourhood planning.*
- iii) *To manage growth and resources in a manner capable of sustaining fiscal, social and environmental activities into the future.*
- iv) *To provide transportation mode options for regional, district and local destinations, encouraging the use of alternatives to the motor car (i.e. walking, bicycling and transit).*
- v) *To facilitate the creation of employment opportunities in the plan area.*
- vi) *To preserve special natural features (natural capital) through the preparation of ecological profiles for each neighbourhood prior to neighbourhood area structure planning.*
- vii) *To identify future commercial sites in locations which serve the community and are economically viable.*
- viii) *To implement the City's Municipal Development Plan and the City/County Intermunicipal Development Plan.*

In striving to achieve the goal and objectives, the plan endorses and promotes the principles of 'smart growth' and sustainable development practices which underpin The City's *Neighbourhood Planning Guidelines & Standards*, as amended from time to time, and the trends highlighted in *The City of Red Deer 2004 Growth Study*.

This plan supports environmentally sustainable practices and standards, ecological conservation, management of the city's ecological footprint, the use of green infrastructure, and efforts to work towards regional conservation.

3.0 EXISTING SITE CHARACTERISTICS – Figure 3 & 4

Section 3.1 and Figure 3 must be read in conjunction with Section 4.0 and Figure 5 and 10.

3.1 TREE AND WETLAND NATURAL HABITAT AREAS (Preservation Focus) – Figure 3

The topography of the plan area consists of generally flat land, rising gradually towards future 10 Avenue to the east (see Figure 5 for the location of future 10 Avenue). Most of the undeveloped land in the plan area has been used primarily for agricultural purposes with limited vegetation and trees remaining. The Red Deer River valley and two major ravines are located in the plan area, as well as a large wetland in the Red Deer County conceptual area.

Figure 3, Tree and Wetland Natural Habitat Areas (Preservation Focus), is based on the City's Ecospace (Natural Habitat) Management Plan which is updated regularly to preserve and enhance Red Deer's natural environment through careful community planning. Figure 3 identifies existing drainage courses, wetlands and a variety of natural areas, including treed areas, other vegetation growth and escarpment.

Figure 3 also identifies the preservation focus within the plan area, including the extent that these may relate to features outside of the plan boundary. Preservation focus areas are a combination of drainage patterns and natural features serving as wildlife corridors and significant reserves of biodiversity. These preservation focus areas are identified to flag their presence and significance. The preferred outcome is to preserve these focus areas intact as natural features either within environmental reserve or municipal reserves or alternatively to incorporate them with storm water management facilities. Final strategies for the actual preservation of these focus areas may not be in place at the time of adopting this plan therefore, their actual preservation along with numerous less prominent natural features will be confirmed through the preparation of ecological profiles for each quarter section and through the preparation of neighbourhood area structure plans. These processes take into account practical and economic considerations, the result of which may determine which of the focus areas are successfully preserved.

Focus preservation areas identified on Figure 3 are the following:

- W₁ - these wetlands are significant seasonal wetlands tying into Piper Creek with storm water servicing potential
- W₂ - this wetland is a significant wetland with entrance feature and storm water servicing potential
- W₃ - along with associated trees, this area has many natural attributes
- W₄ - this prominent wetland is a significant natural feature in the area
- W₅ - these wetlands and treed area have a significant regional drainage function
- WRS - the wetland, ravine and seasonal streams are part of a natural drainage system with potential to be linked through storm water management facilities to Red Deer River. The seasonal stream has the potential to be utilised in its natural state as a linear park providing a separate linkage through residential development from 20 Avenue to the wetland on the NW ¼ Section 26 and ultimately into the Waskasoo park system via the ravine leading northward of the wetland
- RS - this ravine and seasonal stream could potentially serve as a water source to McKenzie Trails recreational area and has storm water servicing potential
- T₁ - mature tree stand
- T₂ - this significant feature is a seasonal stream with an expansive mature tree stand

- E₁ - Red Deer River escarpment with associated trees
- E₂ - Piper Creek escarpment with associated trees

Since natural features and associated wildlife are not confined to man-made boundaries, a number of natural areas are positioned outside of the plan boundary but retain close connection to natural areas within. Preservation focus areas located outside of the plan area boundaries are conceptual, however the City will endeavour to work with Red Deer County, the landowners, developers and other interested parties to develop a regional approach to conservation of natural areas in the Red Deer region.

3.2 NATURAL RESOURCE EXTRACTION AND LANDFILLS – Figure 4

Natural Resource Extraction

Figure 4 identifies the north and northeast areas of the Plan as having been subject to gravel and oil and gas extraction in the past. The required statutory setbacks from the oil and gas wells and pipelines, as prescribed by the Alberta Energy & Utilities Board, will be detailed in phase one site assessments which are submitted as part of each neighbourhood area structure plan.

A neighbourhood area structure plan will incorporate any setbacks into its development concept as part of a public utility lot, municipal reserve (not necessarily included as part of the required 10% municipal reserve dedication) or road right of way, subject to approval by the City.

The City's policy with regard to future oil and gas extraction facilities is outlined in the *Municipal Development Plan*.

Notwithstanding the proposed uses shown on Figure 5 Part of the SE ¼, Part of the NW ¼ and the whole of the SW ¼ Section 34-38-27-W4, all lying east of the Red Deer River bank, may be considered for gravel extraction. When subdivision of any of these lands occur access to the gravel extraction operation, which is presently taken along an existing unregistered gravel road, will be secured through appropriate measures, such as an access agreement.

Landfills

The City's existing landfill site and five closed or inactive landfill sites are all relevant to the East Hill plan area (see Figure 4). A 450 metre development setback is required from any active landfill site while a 300 metre development setback would be applicable to an inactive or closed landfill site. This setback applies to subdivision or development for a school, hospital, food establishment or residential/commercial accommodation use.

- a) The City's closed solid waste disposal site, located in the NE ¼ Section 33-37-27-W4, has a 300 m setback from proposed residential development. The south ±200 m of the SE ¼ Section 4-38-27-W4 and ±115 m of the southwest corner of the SW ¼ Section 3-38-27-W4 are affected by this setback. The lands within this setback could be developed for commercial land uses that do not include the preparation and handling of food products or for commercial accommodation.
- b) The City's active solid waste disposal site, located in Section 34-37-27-W4, has a 450 m setback from proposed residential development. This setback is accommodated within a planned buffer located within the solid waste disposal site up to the south boundary of residential development in the south half of Section 3-38-27-W4. Therefore no lands

proposed for residential development are affected by this setback. The lands within this setback on the north half of Section 34-37-27-W4 could be developed for commercial land uses that do not include the preparation and handling of food products or for commercial accommodation.

- c) There are two confirmed closed solid waste disposal sites located in the SE ¼ Section 21-38-27-W4 immediately west of the Gaetz lakes sanctuary. The most southerly of these two sites affects a small part of the NW ¼ Section 15-38-27-W4. See Figure 4.
- d) A suspected landfill identified on the SW ¼ Section 23-38-27-W4 may require setbacks affecting the adjacent residential developments. More detail regarding the nature and extent of this landfill will be acquired through a phase one site assessment as part of neighbourhood area structure planning. At this time removal of the landfill contents and reclamation may be required prior to residential planning, or if the landfill site remains, a setback requirement will be established. The setback identified on Figure 4 indicates the setback requirement if a closed landfill site is confirmed and is to remain.
- e) The landfill and well on the SW ¼ Section 34-38-27-W4 and the landfill on the east half of Section 28-38-27-W4 are located within areas that are not identified for residential use (except for one country residential lot in the McKenzie subdivision) and therefore do not have an impact on proposed residential uses.

Based on developer requests supported with geotechnical evidence at the time of subdivision The City may apply to Alberta Environment to reclassify dry landfill sites.

4.0 DEVELOPMENT CONCEPT – Figure 5 & 10

Section 4.0 and Figure 5 and 10 must be read in conjunction with Section 3.1 and Figure 3.

The development concept illustrated on Figure 5 has been prepared in response to current and anticipated residential and commercial market trends, population growth, development and planning objectives and principles contained in the City's *Municipal Development Plan, Neighbourhood Planning Guidelines & Standards* and *The City of Red Deer 2004 Growth Study*.

4.1 RESIDENTIAL – Figure 5

Sustainable Growth

This major area structure plan promotes the principles of sustainable community development, otherwise referred to as 'smart growth' principles. These principles are incorporated into the *Neighbourhood Planning Guidelines & Standards* which support the implementation of this plan and as such are required to be incorporated into the planning and design of all neighbourhoods within the East Hill community.

All development within the plan area must be preceded by an approved neighbourhood area structure plan based on the requirements of this Plan and the City's *Neighbourhood Planning Guidelines & Standards*, with a goal to incorporating principles of sustainable community development. This includes the establishment of neighbourhood identity, the promotion of compact land use patterns (minimum density requirement) and mixed housing opportunities in terms of form, tenure and affordability, and the provision of trails to connect homes with natural areas, parks, schools, the town centre and other community gathering places.

Neighbourhood design in Sections 22 and 23-38-27-W4 will focus towards and provide direct pedestrian/bicycle linkages to the town centre site, while being conscious of ensuring that opportunities for shortcutting of motorcars from surrounding areas to the town centre site are not encouraged.

Density

For new neighbourhood area structure plans adopted after November 2002 the design density must fall within the range of 12.35 to 17.30 dwelling units per gross developable hectare (5 to 7 du/gross developable acre), subject to available capacity in the major sanitary sewer system. Plans originally adopted prior to November 2002 will be evaluated based on the former *Planning & Subdivision Guidelines* and the density shall not exceed 45 persons per hectare, unless the plan has been amended to meet the new City of Red Deer *Neighbourhood Planning Guidelines & Standards*.

Existing Country Residential Development

The 2004 annexation lands now located within the plan area include two developed country residential subdivisions, i.e. College Park on the SW ¼ Section 23-38-27-W4 and MacKenzie on the SW ¼ Section 27-38-27-W4, as well as several acreages scattered throughout.

With regard to the College Park subdivision, any development of adjoining lands is required to provide residential use and traffic patterns compatible with the existing residential use. Additional

requirements for adjoining development as set out in the *Neighbourhood Planning Guidelines & Standards* will apply to planning of the adjacent lands. An area redevelopment plan for College Park will be prepared to ensure the requirements are implemented. Other existing residential developments (i.e. acreages) will be incorporated into future Neighbourhood Area Structure Plans.

Existing Red Deer County Statutory Plans

Previously adopted Red Deer County Area Structure Plans that are part of the annexed lands will be superseded by this plan (Spruce Woods ASP on part of SE ¼ Section 34-38-27-W4 and Thompson ASP on the south half of NE ¼ Section 34-38-27-W4).

Required Number of Dwelling Units in the Town Centre

This plan requires a minimum number of dwelling units in the town centre. Section 4.2.1.3 provides direction for each quarter section containing a component of the town centre.

4.2 COMMERCIAL – Figure 5

The *City of Red Deer 2004 Growth Study* predicts major residential growth in the City's southeast and north east sectors, placing strong demand for increased future commercial development in these areas. The proposed 20 Avenue expressway (see Figure 5) and its bypass connections with the proposed realigned Highway 11 (via 67 Street), Highway 2 (via McKenzie Road) and Highway 11A (via proposed Northlands Drive river crossing) will facilitate prime commercial development opportunities on the City's east side.

As shown on Figure 5, existing and future commercial areas will serve East Hill residents for commercial needs and employment opportunities. Future commercial development will focus on the designated town centre site. Home businesses may play an increasingly significant role. A future industrial employment node (potentially with fringe commercial uses) is envisioned outside the plan area east of The City's existing waste management facility on 19 Street.

4.2.1 Town Centre Concept

A town centre site of approximately 112 ha is proposed at the arterial roadway intersection of 30 Avenue and 67 Street, accessible within one kilometre west of the future expressway along 20 Avenue.

The following sections describe the basic elements of the town centre concept, which must be incorporated into the town centre design during the preparation of individual neighbourhood area structure plans.

A new land use district will be developed to implement the town centre concept. Refer to Section 6.0 *Plan Implementation* for additional information.

4.2.1.1 General Directions for Development in the Town Centre Site

The town centre site is envisioned as a commercial, civic and residential mixed use area. It will provide a range of commercial sites for retail, services, entertainment and limited office use to serve the East Hill community as well as a regional market. Possibly, larger commercial sites for power centres or lifestyle centres will be provided adjacent to the 30 Avenue and 67 Street

arterial roadway, while smaller sites (within a main street centre) will be provided along the internal collector roadways.

Any “main street” commercial centre within the town centre site will reflect a pedestrian-friendly street environment lined with shade trees, shops and wide sidewalks. This can be developed on either the public collector roadway system as part of smaller commercial lots, or on a private roadway on a larger commercial lot.

The town centre site is located adjacent to a proposed multi-neighbourhood park site, which will accommodate two high school sites and a major event venue / community centre / recreation facility.

The town centre site includes medium and high density residential uses. This will be in the form of town houses and apartments, the latter either as stand alone developments or as dwelling units above commercial ground floors or a combination of these depending on market demand. Figure 6 conceptually illustrates commercial development with dwelling units above the ground floor.

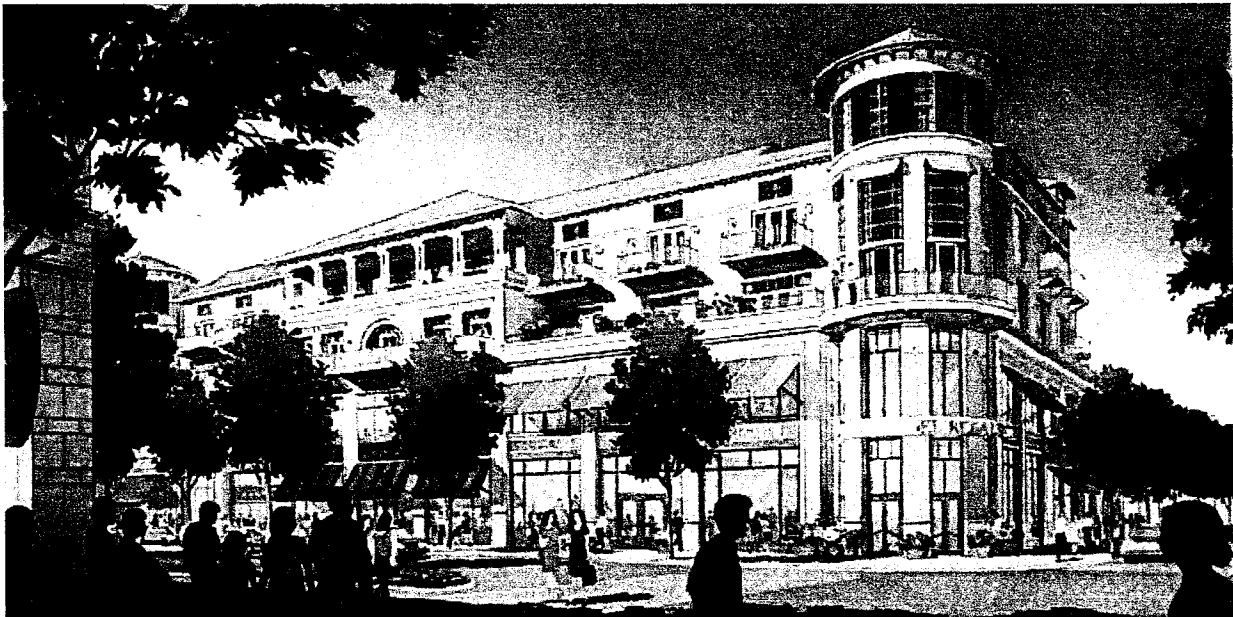


Figure 6: Vertical residential/commercial mix in a “main street” centre

(Source: Congress for the New Urbanism, Image Bank – www.cnu.org)

It is anticipated that the majority of residential development within the town centre site will occur on its fringe. Rather than turning its back towards residential lands adjacent to the town centre site, commercial and residential uses within the town centre site will be appropriately integrated with surrounding residential neighbourhoods. There is a gradual transition of residential densities and land use intensity from low and medium density in adjacent areas to medium and high density on the fringes of the town centre site and high density in the town centre core where commercial uses dominate.

The town centre will be designed to accommodate motorcars and other transportation modes. Collector trails and neighbourhood trail linkages will provide safe, direct and convenient access from adjacent residential areas to various facilities throughout the town centre site. The existing oil/gas facilities may present opportunities to provide separate pathways for this purpose.

The town centre site will include one or more landmark buildings and at least one public square. These features will be distinctive and prominent at carefully selected locations and will function as community focal points/gathering places.

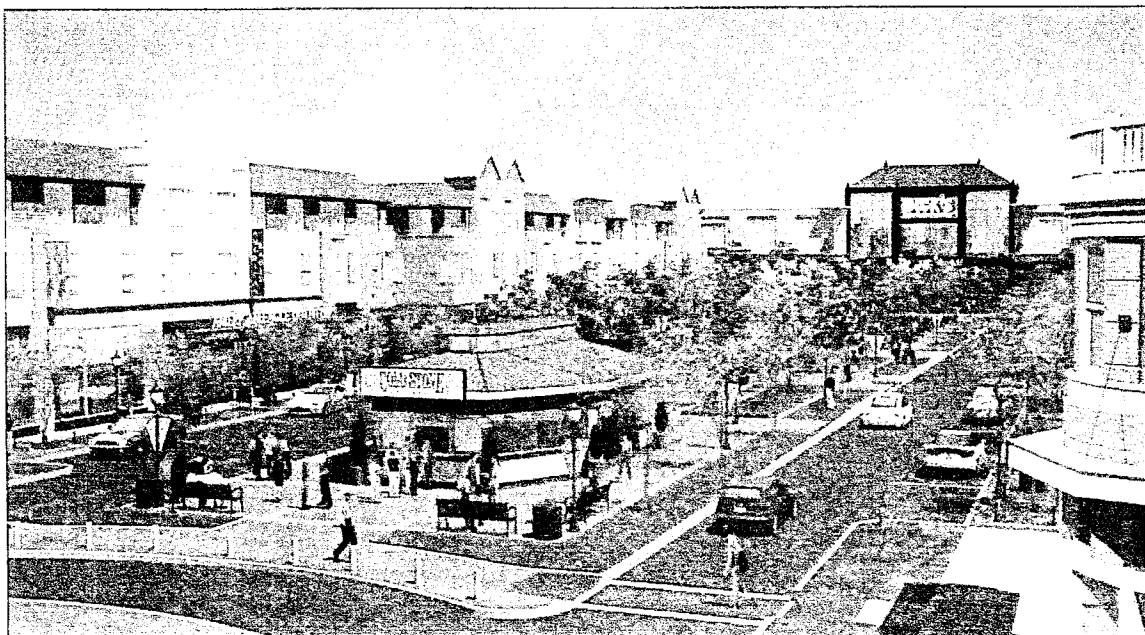
There is potential for the development of transit facilities within the proposed town centre.

4.2.1.2 Commercial Form Options in the Town Centre Site

The overall town centre concept will include a mix of commercial types, including the following:

- a) **Large Commercial Centres** – The majority of the commercial development in the town centre will be regional commercial. This could take a variety of forms, including the following:
 - (i) *Power Centre or Lifestyle Centre* - A “power centre” or “lifestyle centre” is defined as an open-air retail and leisure centre, dominated by a group of large anchor “big box” stores and upscale national chain speciality stores, such as warehouse clubs, discount department stores and other retailers that tend to offer a very deep selection in a particular merchandise category, such as books, toys, shoes, furniture, audio, video and other appliances, office supplies or sporting goods. The “big box” anchor stores tend to comprise approximately 75% of the entire centre, which may contain between 20 ha (200,000 square feet) and 60 ha (600,000 square feet) or more of space.

In Red Deer, the commercial development at South Point Common is an example of a “power centre”. While the typical power centre is oriented specifically towards shoppers with cars, there are design considerations that would facilitate a pedestrian-friendly environment, as illustrated in Figure 7 below. A lifestyle centre typically has an architectural theme and a pedestrian-friendly environment. It is the vision of this plan to encourage this kind of town centre development for the East Hill community.



A national tenant terminates the end of a square at Crocker Park near Cleveland, Ohio.

Figure 7: A commercial “power centre” designed as a pedestrian square

(Source: New Urban News, Volume 10 Number 1, January/February 2005)

- (ii) *Traditional Regional Shopping Centre* – Traditionally a regional shopping centre is defined as an enclosed shopping centre of approximately 35 ha (350,000 square feet) to 80 ha (800,000 square feet) or more that serves sections of, or entire urban areas, as well as surrounding rural communities. Anchors typically include department stores, along with a concentration of apparel and other specialty stores.

In Red Deer, the Bower Place Mall in the South Hill area and the Parkland Mall in the North Hill area are considered traditional regional shopping centres.

- (iii) *Main Street Commercial Centre* – the town centre commercial area will include a “main street” centre. This is envisioned as an approximately 200 to 400 m long section of either a private or public street designed to reflect a typical prairie small town main street with associated architecture. It will be oriented towards creating a pedestrian friendly environment intrinsically linked to adjacent residential areas, and it may include residential development on the second floor.

Commercial lots along “main street” are smaller, and national tenants are strategically placed as anchors at junctions and terminated vistas. “Main street” form options include the concepts shown in Figure 8 (there may be others).

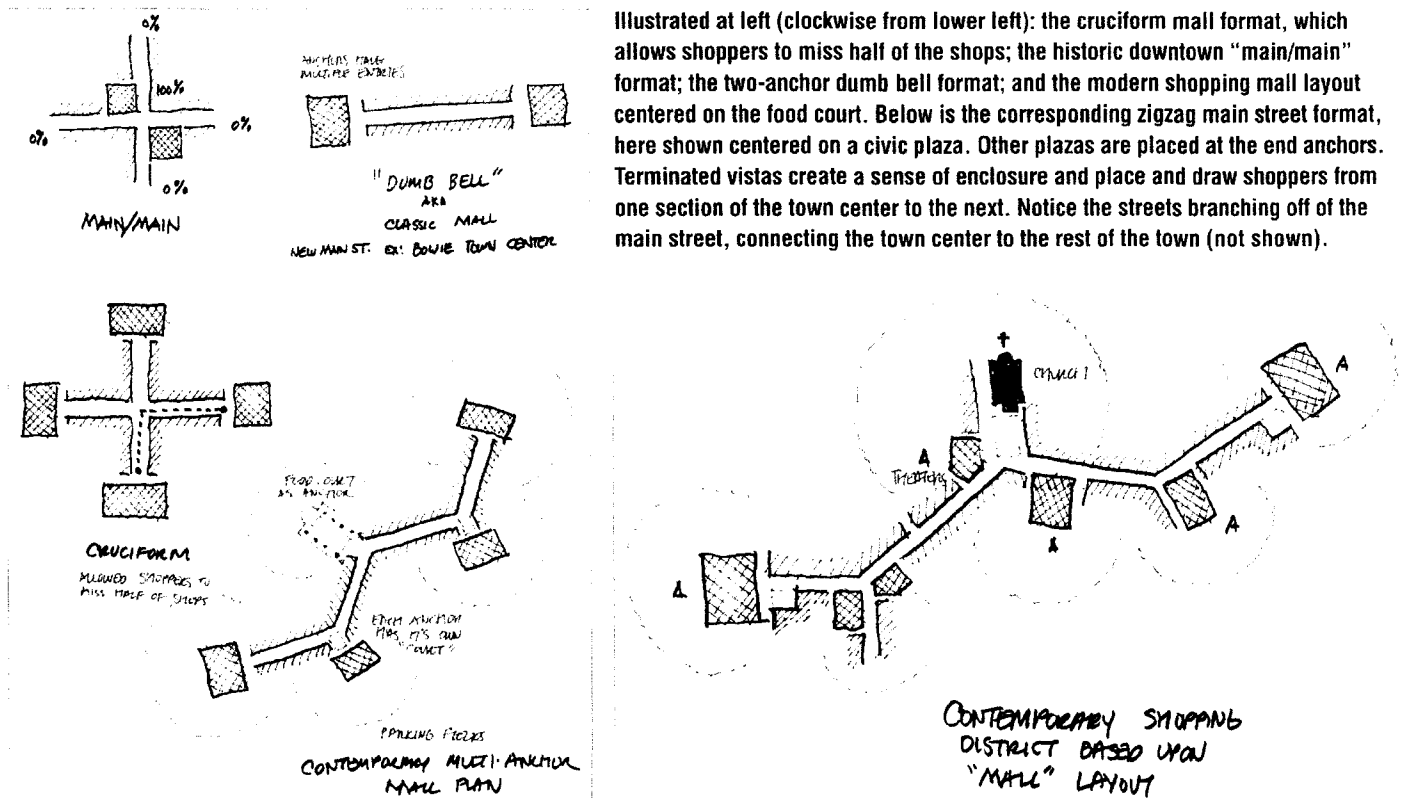


Figure 8: Design options for “main street” commercial centres

(Source: New Urban News, Volume 10 Number 1, January/February 2005)

Figure 9 illustrates the typical small town ambience of the “main street” type commercial centre.

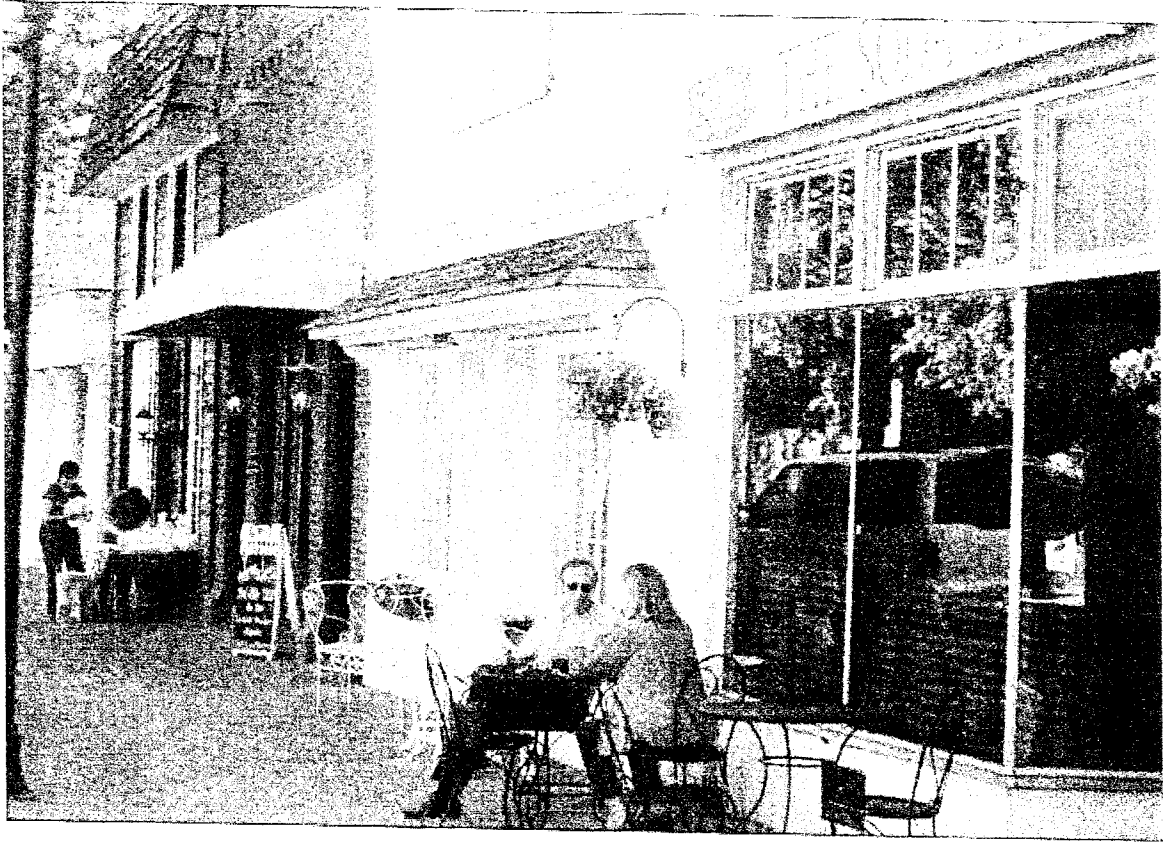


Figure 9: Small town main street ambience

(Source: New Urban News, Volume 10 Number 1, January/February 2005)

- b) **Medium and Small Shopping Centres** – while the regional commercial component of the town centre is oriented towards a regional market, the town centre will include some smaller centres, including the following:
- (i) *Highway Commercial Centre* – these centres accommodate uses that are oriented towards main traffic routes, with convenient access and egress onto major arterials. Typically the minimum permissible lots sizes are smaller than regional commercial centres. In addition to uses that are similar to those found in other commercial developments, highway commercial centres may also accommodate premises that cater for bulk goods and large products such as motor vehicle sales, repair shops and agricultural equipment. Typically the landscaping standards along major entryways such as the location of the town centre, requires higher landscaping standards.
 - (ii) *District and Neighbourhood Convenience Shopping Centres* – these types of shopping centre provide in the frequent shopping needs of the local community. At the very least the town centre site will include one district shopping centre on the NE ¼ Section 22-38-27-W4 and one neighbourhood convenience centre on the NW ¼ Section 23-38-27-W4, but the specific location of these sites on those quarter sections are not identified on Figure 5. Sections 4.2.2 and 4.2.3 below describe the functions of these shopping centre

types in more detail. District and Neighbourhood Convenience Shopping Centres may take on a “main street” format similar to that found in regional commercial centres.

4.2.1.3 Specific Development Directions for Quarter Sections Containing a Component of the Town Centre Site

The ±112 ha town centre site is distributed across five quarter sections, i.e. the NE ¼ Section 22-38-27-W4, the NW ¼ Section 23-38-27-W4, the NE ¼ Section 23-38-27-W4, the SW ¼ Section 26-38-27-W4 and the SE ¼ Section 26-38-27-W4. This distribution aims to ensure visibility along 67 Street, provide sufficient roadway access, disperse traffic through multiple intersections and facilitate development phasing over time in order to meet commercial growth demands for the 115,000 population threshold as identified in *The City of Red Deer 2004 Growth Study*.

A breakdown of the land use allocations within the overall town centre site is as follows:

- ±72 ha gross commercial land (±58 ha net)
- ±40 ha gross residential land – ±1380 medium and high density dwelling units at 35 du/ha

The following breakdown is specific to each of the five quarter sections containing the town centre site: [Note that residential density requirements are calculated at the low end of The City's density range requirement, i.e. 12.35 dwelling units per hectare outside of the town centre site, and at an average of 35 du/ha gross (±50 du/ha net) for medium density (town houses) and high density (multi-family/apartment buildings) within the town centre site]

a) NE 22-38-27-W4:

- 57.81 ha available for overall development, of which a maximum of 26 ha gross is designated as a component of the town centre site
- Within the 26 ha component of the town centre site:
 - ±19 ha gross commercial, including ±2 ha commercial collector roadways and a ±4 ha storm water detention pond)
 - ±7 ha gross mixed used residential/commercial fringe area, to be developed at a minimum density of 35 du/ha, yielding a minimum of 245 dwelling units within the fringe area (i.e. 38% of the total minimum housing stock)
 - Additional commercial area could be provided if the required minimum number of dwelling units (245) were developed at a density higher than 35 du/ha
- ±32 ha gross residential area on the remainder of the quarter section to be developed at a minimum density of 12.35 du/ha, yielding a minimum of 395 dwelling units.
- Overall this ¼ section (57.81 ha) will yield a minimum of 640 dwelling units
- See note on municipal reserve below

b) NW 23-38-27-W4:

- 56.68 ha available for overall development, of which a maximum of 40 ha gross is designated as a component of the town centre site
- Within the 40 ha component of the town centre site:
 - ±28.5 ha gross commercial, including ±3.5 ha commercial collector roadways

- ±11 ha (including a ±4 ha storm water detention pond) gross mixed used residential/commercial fringe area, to be developed at a minimum density of 35 du/ha, yielding a minimum of 385 dwelling units within the fringe area (i.e. 65% of the total minimum housing stock)
- Additional commercial area could be provided if the required minimum number of dwelling units (385) were developed at a density higher than 35 du/ha
- ±16.68 ha gross residential area on the remainder of the quarter section to be developed at a minimum density of 12.35 du/ha, yielding a minimum of 205 dwelling units.
- Overall this ¼ section (56.68 ha) will yield a minimum of 590 dwelling units
- See note on municipal reserve below

c) **NE 23-38-27-W4:**

- 55.42 ha available for overall development, of which a maximum of 10 ha gross is designated as a component of the town centre site
- Within the 10 ha component of the town centre site:
 - ±3.5 ha gross commercial, including ±1.2 ha commercial collector roadways
 - ±6.5 ha (including a ±1.8 portion of a ±4 ha storm water detention pond) gross mixed used residential/commercial fringe area, to be developed at a minimum density of 35 du/ha, yielding a minimum of 225 dwelling units within the fringe area (i.e. 29% of the total minimum housing stock)
 - Additional commercial area could be provided if the required minimum number of dwelling units (225) were developed at a density higher than 35 du/ha
- ±45.42 ha gross residential area on the remainder of the quarter section to be developed at a minimum density of 12.35 du/ha, yielding a minimum of 560 dwelling units.
- Overall this ¼ section (55.42 ha) will yield a minimum of 785 dwelling units
- See note on municipal reserve below

d) **SE 26-38-27-W4:**

- ±57.49 ha available for overall development, of which a maximum of 14 ha gross is designated as a component of the town centre site
- Within the 14 ha component of the town centre site:
 - ±4.5 ha gross commercial, including ±1.25ha commercial collector roadways
 - ±9 ha gross mixed used residential/commercial fringe area, to be developed at a minimum density of 35 du/ha, yielding a minimum of 315 dwelling units within the fringe area (i.e. 37% of the total minimum housing stock)
 - Additional commercial area could be provided if the required minimum number of dwelling units (315) were developed at a density higher than 35 du/ha
- ±43.49 ha gross residential area on the remainder of the quarter section to be developed at a minimum density of 12.35 du/ha, yielding a minimum of 540 dwelling units.

- Overall this ¼ section (57.49 ha) will yield a minimum of 855 dwelling units
- See note on municipal reserve below

e) **SW 26-38-27-W4:**

- 58.42 ha available in this quarter section, of which ±24 ha gross will be developed as a multi-neighbourhood park site / major event venue. Although the multi-neighbourhood park site will form a functional and integral component of the town centre, it shall not be included in calculations for residential density requirements for this quarter section. This leaves ±34.42 ha available for overall development, of which a maximum of 22 ha gross is designated as a component of the town centre site.
- Within the 22 ha component of the town centre site:
 - ±16 ha gross commercial, including ±1.25 ha commercial collector roadways
 - ±6 ha gross mixed used residential/commercial fringe area, to be developed at a minimum density of 35 du/ha, yielding a minimum of 210 dwelling units within the fringe area (i.e. 57% of the total minimum housing stock)
 - Additional commercial area could be provided if the required minimum number of dwelling units (210) were developed at a density higher than 35 du/ha
- ±12.42 ha gross residential area on the remainder of the quarter section to be developed at a minimum density of 12.35 du/ha, yielding a minimum of 155 dwelling units.
- Overall this ¼ section (34.42 ha) will yield a minimum of 365 dwelling units
- See note on municipal reserve below

4.2.1.4 Municipal Reserve Dedication within the Town Centre Site

Typically, in respect of commercial developments, The City requests money in lieu of municipal reserve dedication; however, considering that the town centre concept includes residential land uses and landmark sites, which may consist of public open space, as well as an overall pedestrian friendly theme, The City may request that some or all required municipal reserve land (instead of cash in lieu) be dedicated within the town centre site.

4.2.1.5 Storm Water Management Facilities within the Town Centre Site

Storm detention ponds are required on each of the three quarter sections comprising the town centre site. The approximate sizes of these storm water management facilities are provided in the breakdown in the previous section. The natural slope on the lands in question is such that the lowest points on the three quarter sections coincide with desirable commercial site locations. If developers propose to place storm water management facilities in locations other than the natural low points, or in less efficient configurations for marketing or other reasons, the additional construction costs must be borne by the developer.

4.2.2 Commercial Sites for District Shopping Centres

Within the plan area there are two developed district shopping centres, i.e. the Deer Park Centre Mall located on the southeast corner of the 30 Avenue/Dunlop Street intersection and the East

Hill Shopping Centre located at the northwest corner of 30 Ave and 22 Street, as identified on Figure 5. Located a short distance west and just outside of the plan area is another existing district shopping centre, i.e. the Eastview Shopping Centre at the southeast corner of 40 Avenue and 39 Street.

Typically a district shopping centre serves the daily to weekly shopping needs of residents in adjacent and nearby residential neighbourhoods. In accordance with the Land Use Bylaw a district shopping centre is a retail/service facility located on a site that is between 1.0 and 3.0 hectares in size. In general, a district shopping centre typically comprises a maximum of approximately 107,000 square feet of leasable space. These shopping centres are usually developed as an open-air plaza concept built in an "I", "L" or "U" shape. Another option is to develop a district shopping centre based on a small scale "main street" theme. District shopping centres are anchored by a supermarket or a specialized grocery store. The anchor supermarkets at the existing centres are the Co-op (approximately 26,000 square feet), Save-On Foods (approximately 41,000 square feet) and IGA (approximately 14,500 square feet).

4.2.3 Commercial Sites for Neighbourhood Convenience Shopping Centres

The existing and proposed sites for neighbourhood convenience centres in the East Hill area, as shown on Figure 5, will fulfil the daily shopping needs of East Hill area residents.

In accordance with the Land Use Bylaw a neighbourhood convenience centre provides for a convenience type retail/service facility on a site with a maximum site size of 4047 square metres (1.0 acres). The purpose of a neighbourhood convenience centre is to provide retail and service facilities that meet the day-to-day needs of the residents in adjacent residential neighbourhoods located within an approximate one kilometre service area, or approximately two neighbourhoods of a ¼ section each. These sites typically provide for a small strip plaza containing between approximately one and five stores. The tenants in a neighbourhood convenience centre may include a gasoline service facility along with a convenience store and services such as a hair salon, dry cleaner, or a neighbourhood scale coffee/restaurant facility. Typically neighbourhood convenience centres are positioned at the corner of arterial and major collector roadway intersections. In addition to having convenient roadway access, these sites are accessible by transportation mode alternatives along the trails which are provided as a standard within arterial and collector roadways.

4.2.4 Restricted Commercial Sites

Figure 5 identifies an area for "Restricted Commercial" use north along 19 Street on SE ¼ Section 4-38-27-4. The uses in this area will be similar to the C4 Commercial (Major Arterial) District however because this area is within the minimum setback requirement from the closed landfill site, no schools, hospitals, food establishments or residential uses (including commercial accommodation) will be permitted, in accordance with the *Municipal Government Act Subdivision and Development Regulation*. This area will be redistricted to Direct Control or a special commercial district.

4.3 CIRCULATION AND CONNECTIONS – Figure 5 and 10

Land use is an important determinant of demand for travel. The type and location of land use and the intensity of activity can increase or reduce travel demand. The East Hill Plan provides travel mode options for regional, district and local destinations. Careful planning of routes and linkages will encourage walking, biking and the use of other alternatives to the motor car for

travel to local destinations, while compact communities and a transit-friendly street layout will promote transit use and reduce motor vehicle reliance.

The East Hill area is a predominantly residential land use area with some commercial at pre-designated locations. In order to accommodate this traffic, a planned system of trails, transit routes and roadways will effectively manage transportation activity patterns within and between neighbourhoods. As new neighbourhoods are developed, all planned trails, roadways and transit routes are to be constructed according to City of Red Deer *Engineering Design Guidelines*, *Neighbourhood Planning Guidelines & Standards* and *Trails and Pathways Master Plan* to ensure a fully integrated, consistent, and safe circulation system.

4.3.1 Trail System – Figure 5 and 10

The proposed trail and open space system, as shown on Figure 10, provides direction for planning at the neighbourhood level. The purpose of the resulting system of trails and open spaces is to provide opportunities for transportation mode alternatives to the motorcar for trips to local destinations. These trails will link residential neighbourhoods with adjacent neighbourhoods, leisure facilities and amenities, and school facilities, and will provide pedestrian and bicycle connections to the existing and expanding Waskasoo Park system, commercial core areas and places of employment.

The major electric transmission easement running east-west between 20 Avenue and Piper Creek through Sections 2, 3 and 4-38-27-W4 in the south portion of the plan area, as well as the oil/gas pipelines in Section 23-38-27-W4, present opportunities to create a continuous neighbourhood trail linkage to the Waskasoo park system as well as between the town centre site and surrounding neighbourhoods.

There is an opportunity to establish a district level linear corridor of open space and trails that would connect with the Waskasoo Park to provide residents of the East Hill with a circular system of alternative travel mode linkages to various parts of the city. This system will follow linkages along the electrical R.O.W. along 22 Street, the arterial trail along 20 Avenue, the drainage channel / linear park within the NE ¼ Section 23 and the South ½ of Section 26 and the wetland and ravine system on the North ½ of Section 26. In some areas the corridor would overlap with proposed trails and pathways, e.g. along the major electrical right-of-way and along 20 Avenue, while in other areas it would follow natural drainage systems, e.g. in the NE ¼ Section 23 and the south half of Section 26.

The City's collector roadway design standard and the Trails & Pathways Master Plan standards require the provision of a separate sidewalk on both sides of a collector street with one of these being a minimum of 2.5 m wide. This collector trail functions as a component of the overall trail system in each neighbourhood and is connected, to The City's satisfaction, to other categories of trails (i.e. major trails along expressways and arterial roadways, neighbourhood trails within park sites and nature trails within natural areas) and to trail systems in adjacent neighbourhoods. This will provide a continuous trail system linking homes to gathering places such as neighbourhood convenience and district shopping centres, transit stops and parks, as well as providing pedestrian short cuts to bus stops and other local destinations.

As an addition to the collector trail system, the proposed park site and neighbourhood trail linkage symbol in Figure 5 identifies the requirement to provide neighbourhood and/or nature trail linkages in combination with park sites and natural areas (municipal reserve) in each quarter section neighbourhood, to The City's satisfaction. The alignment of neighbourhood and nature

trails and the location of the park sites will be determined at the Neighbourhood Area Structure Plan level where more detailed site information is available.

A major storm water management facility with landscaped areas and neighbourhood trails exists on the south boundary of the SE ¼ Section 22-38-27-W4 (i.e. the Michener Centre). It is required that neighbourhood planning for this quarter section and adjacent quarter sections integrate their trail systems with trails in this major facility.

4.3.2 Transit – Figure 5

The East Hill area is served by bus stops on arterial and collector roadways as determined by The City. Each neighbourhood area structure plan is required to identify the designated transit routes and bus stops. These are subject to change over time due to passenger demand and funding, as well as the building out of neighbourhoods.

New development must endeavour to create transit friendly neighbourhoods by concentrating higher density residential, commercial and school locations within close proximity to potential transit routes. Roadway layout must reflect walkable distances to transit stops for all residences within a neighbourhood.

There is potential for the development of transit facilities within the proposed town centre site.

4.3.3 Roadways – Figure 5

The principles of sustainable community development apply also to the design of residential streets (i.e. collector and local roadways). These streets are integral components of community space and should reflect the function of the street and the type and intensity of the adjacent land uses. Issues to be considered in the design of residential streets include the following:

- a) Roadways will incorporate all modes of transportation.
- b) Roadway design is a significant factor in the cost of neighbourhood development and developers are encouraged to propose ways to reduce costs associated with roadway construction and maintenance, for evaluation by The City.

There are four classes of roadways in the East Hill Major Area Structure Plan: local roadways, collector roadways, arterial roadways and expressways. Most quarter sections abut an arterial roadway on one or two sides and have an internal collector roadway system that links with existing collector roadways in adjoining neighbourhoods without creating opportunities for shortcutting. The majority of residential development will be located on local roadways, and to a lesser degree on collector roadways.

Local Roadways

Local roadways are not identified on Figure 5. The alignment of local roadways will be determined as part of the neighbourhood area structure plan, to the satisfaction of The City and based on The City's *Engineering Design Guidelines*.

Collector Roadways

Designated collector roadways are identified on Figure 5. Typically a collector roadway provides direct frontage access to abutting land uses, provides public parking on both sides, accommodates snow storage, serves as a transit route and provides sidewalks for transportation mode alternatives to the motorcar. The current standard provides for a treed boulevard and separate sidewalk on both sides of the street, with a minimum of one sidewalk being a 2.5 collector trail.

The alignment of collector roadways proposed on Figure 5 is based on the standard of 400 m minimum intersection spacing onto arterial roadways and 800 m intersection spacing onto expressways, as well as the requirement for collector street linkages between adjacent neighbourhoods without creating opportunities for shortcutting between arterial roadways or incompatible land uses. Collector roadways must provide efficient and effective circulation of traffic within each neighbourhood and efficient and effective connections to adjacent arterial roadways.

Based on these minimum ground rules a developer may propose an alternative collector roadway design as part of the preparation of the Neighbourhood Area Structure Plan for evaluation by The City. In this regard developers are encouraged to consider transit routing, the actual location of natural features (from Figure 3 and from the detailed neighbourhood ecological profile), any park site locations and any other design considerations that may enhance the neighbourhood identity, sense of place, land use pattern and walkability of the neighbourhood – details which for practical reasons are typically not available and considered at the major area structure plan level. Changes to the collector roadway alignment which avoid shortcutting and maintain the predetermined intersection spacing to the satisfaction of the City Administration may be made without obtaining an amendment to the East Hill MASP.

The commercial streets within the town centre site will be divided collector roadways. The commercial traffic generated within the town centre site is expected to be up to eight times more than what would be typical for residential traffic volumes. The developers of the relevant quarter sections will be responsible for all costs associated with the construction of collector roadways including intersection treatments and additional lanes.

The collector roadway pattern within Section 23 is designed to discourage external traffic shortcutting to the town centre from areas south of 55 Street, from 30 Avenue and from 20 Avenue.

The collector roadway intersection proposed on 30 Avenue approximately at 61 Street will provide access for residential developments to the east on the NW and SW ¼ Section 23-38-27-W4, including the existing College Park subdivision. The collector roadway alignment will provide land for a buffer area between the proposed roadway and existing College Park residences. The existing 61 Street will remain a local roadway with a new intersection to be constructed connecting it with the proposed collector roadway for access into College Park. There will be no roadway connections between College Park and the future developments to the east on SW ¼ Section 23. One or more pedestrian linkages will be provided from future subdivisions east of College Park through College Park to the arterial trail along 30 Avenue. More detail will be provided in an area redevelopment plan for College Park.

Arterial Roadways

Arterial roadways provide for the movement of large volumes of traffic, including truck and transit routes, by connecting major areas of traffic generation within the City. As efficient flow of traffic is the primary function of this classification of roadway, direct residential lot access is not permitted to/from a divided arterial roadway. Subject to the approval of The City, right in/ right out site accesses for major non-residential developments such as district and regional shopping centres, high schools or other major public facilities may be permitted.

Intersections and junctions onto arterial roadways are infrequent and appropriately designed, therefore all turn intersections onto divided arterials are provided at 400 m intervals to effectively channel traffic from the major collector network.

Off-site levies normally fund the basic cost of constructing four-lane divided arterial roads, but additional improvements necessitated by adjacent developments (e.g. additional accesses and traffic lanes) will be borne by the developer.

Arterial roadways within the plan area consist of the following:

- 30 Avenue
- 40 Avenue
- 22 Street between 30 and 40 Avenues
- 32 Street
- 50 (Ross) Street, and
- 67 Street westbound from a point approximately 800 m west of 20 Avenue

The extensions of Ross Street and 32 Street east of 20 Avenue and related intersections as illustrated on Figure 5 are shown conceptually within Red Deer County jurisdiction. These proposed roadways are illustrated on lands that are not likely to be developed until the city reaches a population of 160,000 and are shown in order to illustrate how the arterial roadway system potentially could be completed to 10 Avenue.

The arterial roadway along 22 Street west of 30 Avenue is built within a 37.5m right of way (reduced from 48 m) that allows for the construction of a berm along the north side of 22 Street (a berm was not required along the south side due to the presence of a 61 m wide Altalink right-of-way. Minimum intersection spacing along 22 Street is 200 metres. East of 30 Avenue, 22 Street is classified as a collector road.

The Molly Bannister Drive alignment protection serves to ensure that the planning of the NE ¼ Section 4 accommodates this roadway alignment into the neighbourhood design without adversely affecting any future decisions regarding a possible roadway crossing over Piper Creek. This does not necessarily imply that Molly Bannister Drive will be extended across Piper Creek, and any such decision would require Council approval. If the protected alignment for Molly Banister Drive between 40 Avenue and Bremner Avenue is ever implemented this will be an arterial roadway with a 43 m right-of-way width from 40 Avenue to Piper Creek.

Expressways

The expressway classification of road reflects the highest level of roadway function in the plan area. Expressways require a 60 to 80 metre right-of-way and a recommended intersection spacing of 800 metre. Where expressways intersect with major arterials and/or highways, a grade-separated intersection may eventually be required. Although further study is required to

determine the traffic needs, it is anticipated that diamond-type interchanges will be required on 20 Avenue at 67 Street and Delburne Road (19 Street). A 150m by 400m triangular area from each affected quarter section has been identified on Figure 5 to accommodate these interchanges.

Expressways within the plan area are:

- 67 Street (Highway 11) eastbound from a point 800 m west of 20 Avenue
- Delburne Road (19 Street)
- 20 Avenue, and
- Northland Drive with its river crossing and linkage to Highway 11A

The eastward extension of 67 Street reflects the future alignment of Highway 11 that has been protected by a Provincial Ministerial Order.

4.4 PUBLIC OPEN SPACE – Figure 3, 5 & 10

For the purpose of interpreting Figure 5 (read in conjunction with Figure 3) public open space on Figure 5 consists of the following categories:

- a) utility rights of way/easements
- b) proposed neighbourhood parks and trail linkages
- c) proposed natural areas, and
- d) a multi-neighbourhood park site

Figure 10 identifies proposed trail linkages based on the information and standards contained in the Trails & Pathways Master Plan.

4.4.1 Utility Easements

Those areas that are set aside for surface, underground or overhead infrastructure, such as electric transmission lines, well sites or oil/gas pipelines are identified on Figure 5 as “Major Easement/R.O.W”. On Figure 10 those easements/R.O.W. that have potential as trail linkages are identified as such.

4.4.2 Proposed Neighbourhood Parks and Trail Linkages

On Figures 5 and 10 proposed neighbourhood parks and neighbourhood trail linkages are conceptually identified with a park and trail symbol. This symbol indicates that in each quarter section a minimum of 10% of the developable area is required to be dedicated as municipal reserve for neighbourhood parks, parkettes and linear parks, containing neighbourhood and nature trails as may be required by The City. The location of proposed neighbourhood parks and neighbourhood/nature trails as indicated on Figure 5 is not specific but rather conceptual and arbitrary. Final locations will be determined with the preparation of a neighbourhood area structure plan when more detailed site information is available. For this purpose developers are required to consult Figure 3 for the location of natural areas and preservation focus areas, Figure 5 for the location of school sites, as well as individual neighbourhood ecological profiles and the *Neighbourhood Planning Guidelines & Standards* to find the most appropriate location for neighbourhood parks and trails within each quarter section.

At the neighbourhood area structure planning level neighbourhood parks will be strategically located to incorporate preservation focus areas, provide centrally located amenities, and create active and passive recreation opportunities for all ages, needs and desires. Neighbourhood parks

may also accommodate school sites as designated on Figure 5, and accommodate neighbourhood/nature trails consisting of separate pathways.

Neighbourhood parks and leisure facilities and amenities are located on sites more or less central to each quarter section neighbourhood or, where the phasing of adjacent quarter sections permits joint development, on a combined site located centrally and serving two adjacent quarter sections. Development of each neighbourhood park will be directed by a neighbourhood park plan which is prepared as part of the neighbourhood area structure plan in accordance with the *Neighbourhood Planning Guidelines & Standards*. Each neighbourhood park site will be landscaped for natural and aesthetic purposes. Each neighbourhood area structure plan must be designed to include a convenient trail system providing internal and external connections in the neighbourhood to local amenities, schools, parks, commercial centres and transit stops.

Neighbourhood parks provide a variety of recreational amenities for neighbourhoods and may be combined with a school site. Where Figure 5 does not identify the requirement for a school site in a quarter section, developers are encouraged to reduce the size of the neighbourhood park site to design more dispersed parkettes and linear parks throughout the neighbourhood.

Linear parks may consist of municipal reserve, a public utility lot or utility easements. Linear parks may combine active and passive recreation along with a trail, but not all linear parks have to contain a trail. The City's Recreation Parks & Culture Department will work with the developer at the neighbourhood area structure plan stage to identify the location of trails.

Where opportunity exists, such as in the NE ¼ Section 23-38-27-W4 and the South ½ of Section 26-38-27-W4, developers must consider incorporation of natural areas as linear parks, such as a seasonal stream or drainage channel.

A parkette is a small municipal reserve site (approximately 0.2 to 0.8 hectare in size) that may contain active (e.g. a tot lot) and/or passive (e.g. a bench and table) recreation and a linkage to the trail system.

The landmark sites and public square envisioned for the town centre could consist of parkettes.

4.4.3 Proposed Natural Areas

This category includes areas that qualify for environmental reserve dedication under the *Municipal Government Act* as well as areas which do not qualify as such but are nonetheless environmentally significant. All of these natural areas are identified on Figure 3 with the purpose of providing a framework and preservation focus for neighbourhood level planning in conjunction with more detailed ecological profiles of each quarter section, as well as to identify regional preservation needs. Neighbourhood planning shall consider these preservation focus areas for possible incorporation into the open space system.

4.4.3.1 Potential Environmental Reserve

Figure 5 identifies those public, semi-public and private natural areas which are suspected with reasonable certainty, but without having conducted a site analysis, as potentially qualifying for environmental reserve dedication in accordance with the *Municipal Government Act*. Reasonable certainty is based on the existence of, for example, steep and/or unstable slopes, or a natural drainage course.

The following areas are identified as potential environmental reserve dedication:

- Piper Creek bed, shore and escarpment
- the deep ravine connecting the Red Deer River with a wetland in the NW ¼ Section 26-38-27-W4 including the wetland itself
- the ravine on the SE ¼ Section 27-38-27-W4 connecting a drainage channel south of 67 Street with the McKenzie Trails area
- the steep slopes along the Red Deer River escarpment

Subject to detailed analysis at the neighbourhood area structure plan level it is required that these lands are dedicated as environmental reserve at the time of subdivision.

Other lands not identified on Figure 5 may also qualify for environmental reserve dedication based on closer evaluation at the neighbourhood area structure plan level, which will be preceded by the preparation of a detailed ecological profile. Examples of such areas include the drainage course which straddles the NE ¼ Section 23 and the South ½ of Section 26-38-28-4 as well as the two wetlands on the SE ¼ Section 22-38-28-4.

4.4.3.2 Other Natural Areas

At the level of planning for this major area structure plan the final strategies to ensure the preservation of natural areas which do not qualify for dedication as environmental reserve may not yet be in place. At the neighbourhood area structure plan level the preservation of such areas will require any one or a combination of the following strategies:

- 1) The lands are included as part of the required 10% municipal reserve dedication;
- 2) The lands are included as part of municipal reserve dedication in excess of the required 10%; and/or
- 3) Funds are identified to purchase the lands containing such natural areas.

4.4.4 Multi-neighbourhood Park Site

A ±24 hectare (±60 acre) multi-neighbourhood park/school site, containing a multi-neighbourhood leisure facility and high school sites for both the Catholic and the Public school authorities, is identified at the intersection of 67 Street and 30 Avenue on the SW ¼ Section 26-38-27-W4. The City and the appropriate school authorities involved will acquire the land required for this park site. The multi-neighbourhood park site can potentially be integrated as a civic and recreational component of the town centre site.

The City and both school authorities recognize the potential efficiencies for land use and capital costs that could be realized by sharing facilities such as parking lots and building envelopes. The Multi-neighbourhood Park Site presents an opportunity to explore this route.

The multi-neighbourhood park site requires collector street access along its north and east sides. The designated access points for these collector streets are set back ±600 m north and ±400 metres east from the 30 Avenue/67 Street intersection, as shown on Figure 5.

Roadway design at the 67 Street/30 Avenue intersection will have to accommodate a pedestrian crosswalk.

4.5 PUBLIC FACILITIES – Figure 5

Typically public facilities include large infrastructure and installations such as a landfill site or an electrical substation, an emergency services site, leisure facilities and amenities such as libraries, swimming pools, arenas, and outdoor playing fields and courts, semi-public sites such as places of worship and social care/day care/retirement home/assisted living residence, park and recreation areas that may include a school site, and trail linkages.

Special sites are provided by The City for public facilities that serve a district population, including libraries, arenas and swimming pools. In addition to primarily residential uses, each neighbourhood is required to provide certain public facilities. Usually special sites are set aside for public infrastructure and installations, while leisure facilities and amenities are located on neighbourhood park sites and residential areas include social care and worship sites.

Facilities such as the Westerner Exposition Park and the Collicutt Centre combine various leisure facilities and amenities, including educational facilities, which serve the surrounding neighbourhoods, the city and the region. The City's landfill site is another regional facility. The East Hill Major Area Structure Plan recognizes the land uses, access issues and traffic generation resulting from these existing public facilities within and near the plan area.

4.6 EMERGENCY SERVICES – Figure 5

Figure 5 identifies the following four potential new locations for future emergency services facilities that could accommodate fire, ambulance and/or other community services:

- a) Along the north side of 22 Street between 30 Avenue and 40 Avenue on the NE ¼ Section 3-38-27-W4.
- b) On the west side of 40 Avenue near the intersection of 22 Street within the NE ¼ Section 4-38-27-W4.
- c) On the west side of 30 Avenue at the intersection of future 55 Street within the SE ¼ Section 22-38-27-W4.
- d) On the NW ¼ Section 23-38-27W4 near the intersection of 30 Avenue and 67 Street. This site is within the proposed town centre and its actual location, design and architecture must complement residential and commercial development. It has the potential to be a landmark site/building as envisioned in Section 4.2.1.

In the event that a proposed emergency services site is not used, alternative land use will be determined through the more detailed neighbourhood area structure plan process.

4.7 SCHOOLS – Figure 5

The K-9 Catholic school designation means a school building that could contain kindergarten (K) through grade 9, or grades K-5 (elementary school), or grades 6-9 (middle school). A Catholic High School could contain any grades from 9 to 12.

The K-8 Public school designation means a school building that could contain kindergarten (K) through grade 8, or grades K-5 (elementary school), or grades 6-8 (middle school). A Public High School contains grades 9 to 12.

As is the case with the park site and trail linkage symbol, the location of proposed school sites is flexible and will be determined at the neighbourhood area structure plan level. However, the school site must be located in the quarter section in which it is shown on Figure 5.

Typically the location of all catholic K-9 and public K-8 school sites are planned to occur in conjunction with a neighbourhood park site internal to the neighbourhood. These sites are preferably located at the intersection of two collector streets, but the minimum access requirement is to provide site access from one collector and one local street. The school site is to be positioned within a neighbourhood park site containing a minimum of one sports field and in close proximity to the trail system.

High school sites are positioned at the edge of quarter sections next to arterial roadways and near a proposed transit stop. These sites are required to have collector roadway frontage and be directly connected to the trail system.

When appropriate, K-9 and K-8 school sites may be placed nearer to the edge of a quarter section so as to be shared by the adjacent neighbourhood.

The designation and location of school sites as shown on Figure 5 are pursuant to agreements between Red Deer Public School District No. 104, Red Deer Catholic Regional Division No. 39 and the City of Red Deer. All school locations shown are tentative with actual construction of any school being dependent upon approval of the respective school board.

This plan and the *Neighbourhood Planning Guidelines & Standards* encourages the school boards to decide if a school site is required within a quarter section development as early as possible. This is to ensure that, if municipal reserve is not required for a large school site, then the size of the neighbourhood park site could be reduced and the 'surplus' municipal reserve could be better utilized as smaller parkettes and/or linear parks with neighbourhood trails that are distributed throughout the neighbourhood.

Potential efficiencies for land use and capital costs that could be realized by sharing facilities between the two school authorities, such as parking lots and building envelopes, will be explored.

5.0 MUNICIPAL UTILITY SERVICES – Figures 11, 12, 13 & 14

Ecologically sustainable development principles suggest that potential exists within undeveloped areas of the East Hill community to combine natural features with servicing requirements. This is often referred to as green infrastructure. Examples include the Michener storm ponds that have combined storm water management with an existing wetland to create a multi-purpose facility with storm drainage and natural interpretative functions.

Neighbourhood ecological profiles must be considered when developing servicing plans for the consideration of potential multi-purpose features.

5.1 STORM WATER DRAINAGE - Figure 11

Surface water runoff from the East Hill area is drained through buried pipe systems and overland surface systems to the Red Deer River directly or via Piper and Waskasoo Creeks. The East Hill Major Area Structure Plan has been divided into separate storm drainage basins, each with its own designed system of gathering surface water runoff as shown on Figure 11. The City has adopted a policy of restricting direct storm water discharges into the creeks and river in order to limit potential damage associated with increased rates of runoff from urban developments. The restrictions are imposed through the use of a storm water collection system that incorporates water retention and detention facilities for the area.

A number of “dry-ponds” are designated for the East Hill area. These public utilities are usually designed so that they may also serve, in part, as neighbourhood play fields and recreation/open space areas. A detention pond that contains a formal sports field(s) can be credited with up to, but not more than, 1.0 hectare (2.5 acres) of the required minimum ten percent municipal reserve dedication at the discretion of the Recreation Parks & Culture Department. As illustrated on Figure 11, the majority of the storm water detention ponds are located near the boundary of a quarter section. This may limit their use for recreation facilities which are required to be located centrally to a neighbourhood.

The City will also support alternative methods of storm water management, including the creation of permanent man-made storm water ponds and the incorporation of natural marshes or wetlands into the overall storm water system (i.e. green infrastructure), where this can be accomplished without causing concerns for potential flooding.

5.2 SANITARY SEWER – Figure 12

The sanitary sewer system, shown on Figure 12, is divided into drainage basins as shown on Figure 11. This collection system is designed to use a combination of sewage lift stations and gravity trunk mains to direct all sewage to the wastewater treatment plant located at the north end of the City along the river.

As new development occurs, the extension of existing trunk mains will permit all areas within the boundaries of the East Hill Major Area Structure Plan to be serviced. A portion of the plan area north of 55 Street will be serviced via the Waskasoo Regional Sewer Line that originates south of the City in Red Deer County and connects to the City's wastewater treatment plant in the north.

5.3 WATER DISTRIBUTION – Figure 13

The City of Red Deer obtains raw water from the Red Deer River. Water treatment is accomplished with two plants located at the river. The City's water distribution system for the East Hill area consists of a combination of water pressure zones, booster pump stations, water reservoirs, and trunk mains to adequately distribute water to meet domestic and fire flow demands. See Figure 13.

5.4 POWER TRANSMISSION – Figure 14

The concept for the transmission of electric power to meet domestic and commercial demand on the East Hill is provided on Figure 14. This includes the following overhead power lines:

- Delburne Road from 30 Avenue to 20 Avenue
- 20 Avenue north from Delburne Road to 22 Street
- 20 Avenue from 55 Street to 76 Street
- 76 Street from 30 Avenue to 20 Avenue
- 67 Street from the Red Deer River to 20 Avenue

6.0 PLAN IMPLEMENTATION

6.1 NEIGHBOURHOOD AREA STRUCTURE PLANS

The objectives of the East Hill Major Area Structure Plan shall be implemented through the preparation of neighbourhood area structure plans for all undeveloped quarter sections and/or other undeveloped parcels of land within the plan area. Where cooperation exists between landowners a joint neighbourhood area structure plan for each of the following lands is required (if landowner cooperation is not feasible "shadow planning"¹ of these areas is required):

- The north half of Section 22-38-27-W4
- The south half of Section 22-38-27-W4
- The south half of Section 27-38-27-W4
- The south half of Section 26-38-27-W4
- The north half of Section 23-38-27-W4
- The west half of Section 23-38-27-W4 ("shadow planning" for servicing consideration only)

All neighbourhood area structure plans within the plan area shall be consistent with the East Hill Major Area Structure Plan, read in conjunction with the *Neighbourhood Planning Guidelines & Standards*.

The neighbourhood area structure plans for those quarter sections containing the town centre site must address the following matters:

- The gradual transition of residential densities and land use intensity from lands adjacent to the town centre to high density residential and commercial land uses within the town centre.
- The design considerations required to develop a comprehensive and coherent town centre across five quarter sections of land.

6.2 LAND USE BYLAW

A new commercial land use district is required to implement the vision of the commercial and residential mixed use town centre as described in Section 4.2.1. The town centre land use district must address the following aspects:

- The district must allow for a variety of commercial and retail uses at the regional, district and neighbourhood convenience shopping centre levels. This must include uses that are normally associated with highway commercial development, but it must require higher landscaping standards than that which is typical of highway commercial development.
- The district regulations must allow for the subdivision of small commercial stand alone or fee simple sites.
- Development regulations must ensure that commercial development standards are compatible with residential uses, both within and adjacent to the town centre.
- Development regulations must allow for commercial buildings containing dwelling units above the ground floor.
- Development regulations must require on-site provision for pedestrian movement and connections to trails within public roadways.

¹ "Shadow planning": means coordination of land use, roadways and servicing infrastructure to a level satisfactory to The City Administration.

- Development regulations must address the three dimensional interrelationship between residential and commercial uses, including building placement and orientation, aesthetic requirements, landscaping, privacy, on-site provision for pedestrians, etc.

6.3 AREA REDEVELOPMENT PLANS

Area redevelopment plans may be prepared for the existing College Park and Michener Centre developments. These types of statutory plans are governed by the *Municipal Government Act* and are required by the City's *Neighbourhood Planning Guidelines & Standards* as a pre-condition for the redevelopment of large land areas. All area redevelopment plans within this plan area shall be consistent and remain cognizant of the principles and concepts as promoted in the East Hill Major Area Structure Plan.

6.4 EXISTING RED DEER COUNTY AREA STRUCTURE PLANS

Previously adopted Red Deer County Area Structure Plans (Spruce Woods ASP on part of SE ¼ Section 34-38-27-W4 and Thompson ASP on the south half of NE ¼ Section 34-38-27-W4) being part of the annexed lands, will be superseded by this plan.

6.5 ADDITIONAL COST OF COMMERCIAL ROADWAY REQUIREMENTS

The commercial streets within the town centre site will be divided collector roadways. The commercial traffic generated within the town centre site is expected to be up to eight times more than what would be typical for residential traffic volumes. The developers of the relevant quarter sections will be responsible for all costs associated with the construction of collector roadways including intersection treatments and additional lanes.

6.6 AMENDMENTS TO THIS PLAN

Any amendment to the East Hill Major Area Structure Plan shall follow the process as outlined in the *Municipal Government Act* and the City's *Neighbourhood Planning Guidelines & Standards*.

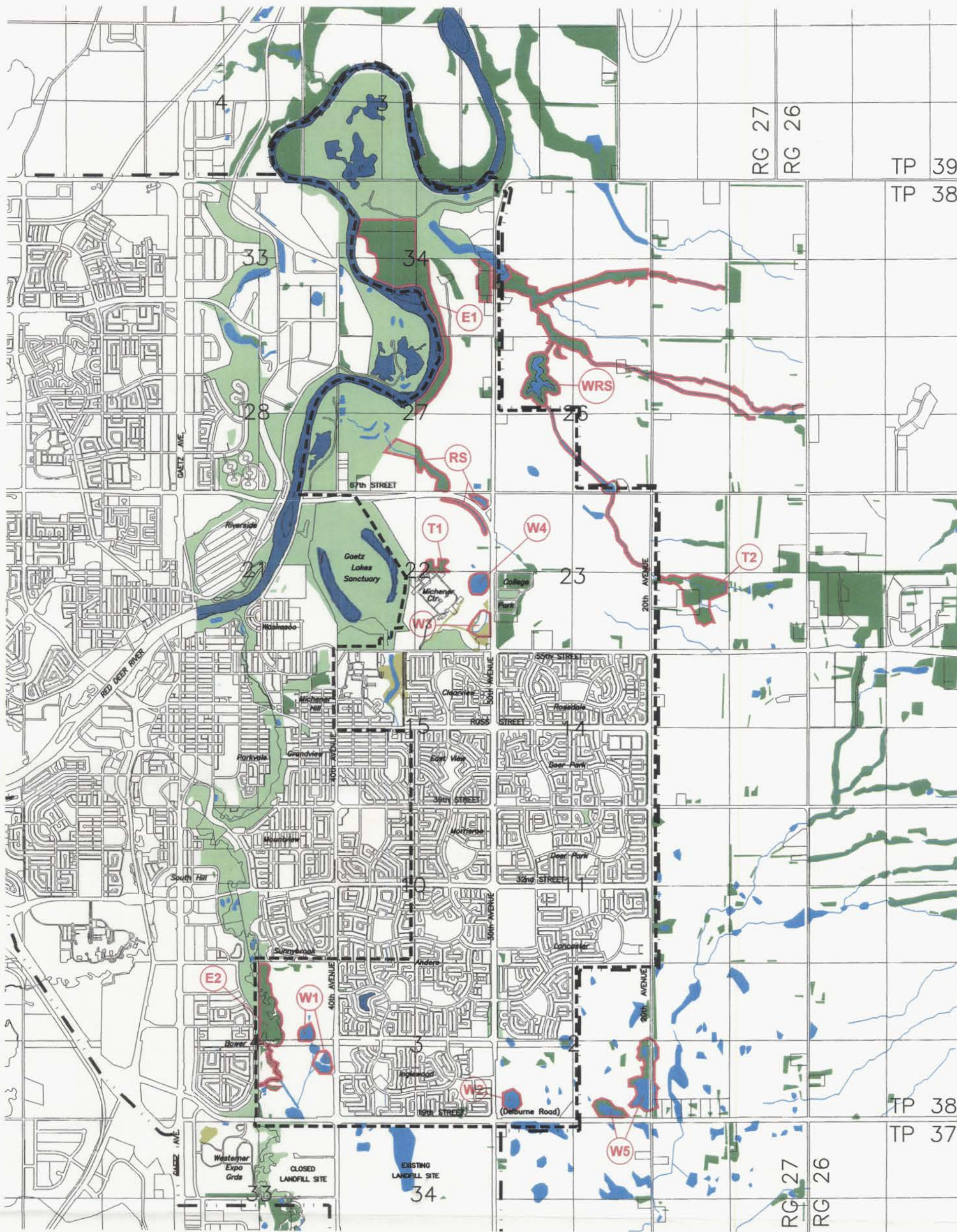
Provided the intent of the Plan is maintained, a minor adjustment to proposed land use boundaries or roadway alignments may be made where necessary without amendment to this Plan.

A change to the collector roadway alignment which, to the satisfaction of The City, avoids shortcutting may be made without obtaining an amendment to the East Hill MASP.

The access points of the collector roadways onto adjacent arterial roadways as proposed in Figure 5 are fixed and cannot be changed without a plan amendment, because this may affect landowners in existing subdivisions.

6.7 PLAN REVIEW

The East Hill Major Area Structure Plan should undergo a comprehensive review and update every five years. This way, any changing or emerging land use and development issues can be given appropriate consideration, and the best interests of the residents of the East Hill area can continue to be recognized into the future.



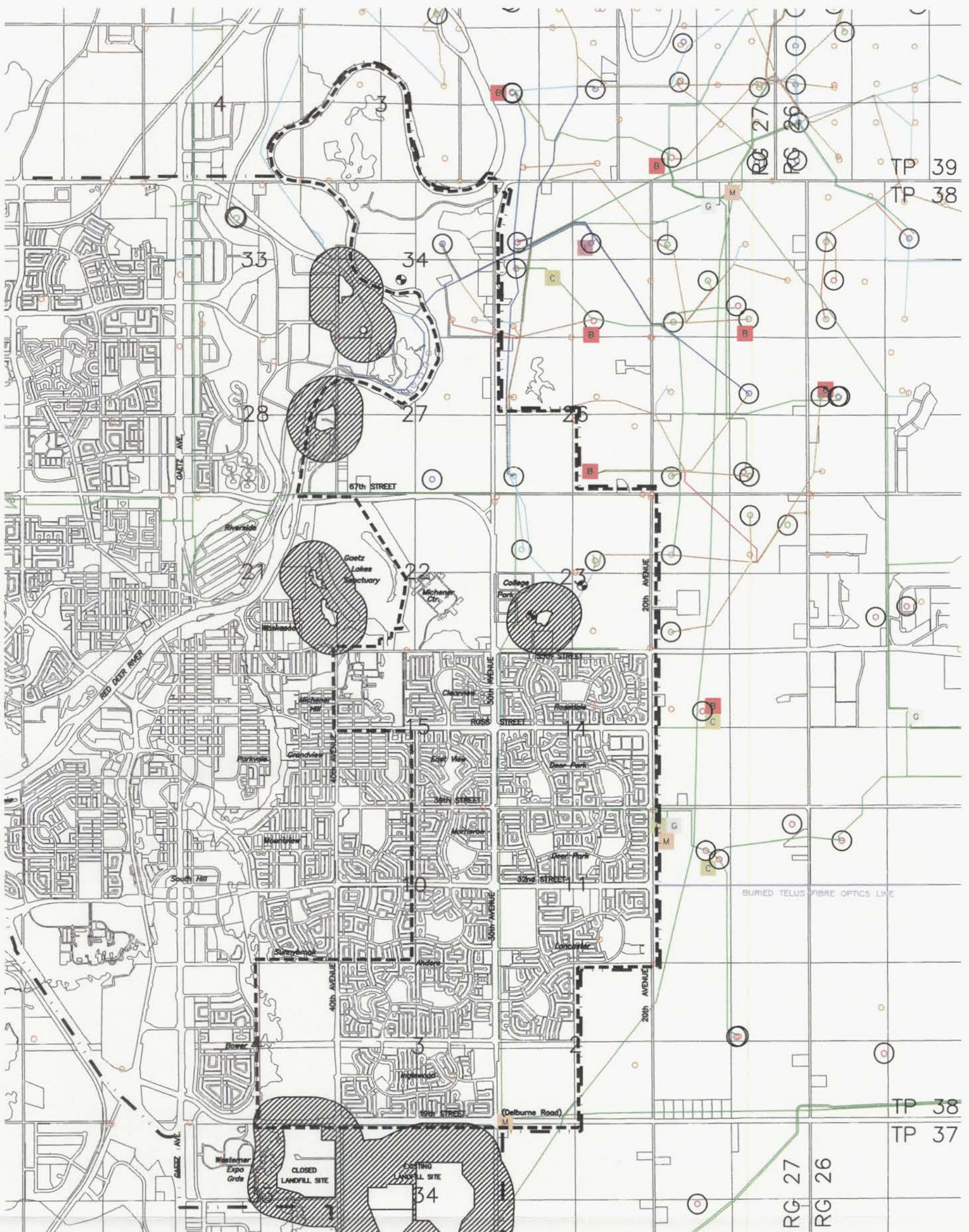
City of Red Deer
East Hill Major Area Structure Plan Tree and Wetland Natural Habitat Areas:
 Preservation Focus*

- Plan Area
- - - City Boundary
- Existing Water Courses and Lakes
- Existing Public and/or Private Wetlands and Seasonal Streams
- Existing Public Natural Areas
- Existing Semi-Public Natural Areas
- Existing Private Natural Areas
- Environmental Preservation Focus (Refer to text for specific policies)
- W1 Wetlands
- W2 Wetlands
- W3 Wetlands & Trees
- W4 Wetlands
- W5 Wetlands & Trees
- WRS Wetland, Ravine & Seasonal Streams
- RS Ravine & Seasonal Stream
- T1 Mature Treed Stand
- T2 Seasonal Stream and Mature Tree Stand
- E1 Red Deer River Escarpment w/ Trees
- E2 Piper Creek Escarpment w/ Trees

Preservation Focus*



* Information from The City of Red Deer R. P. & C Department Integrated Ecospace (Natural Habitat) Management Area Map, 1995 (updated 1998; minor updates 2004).

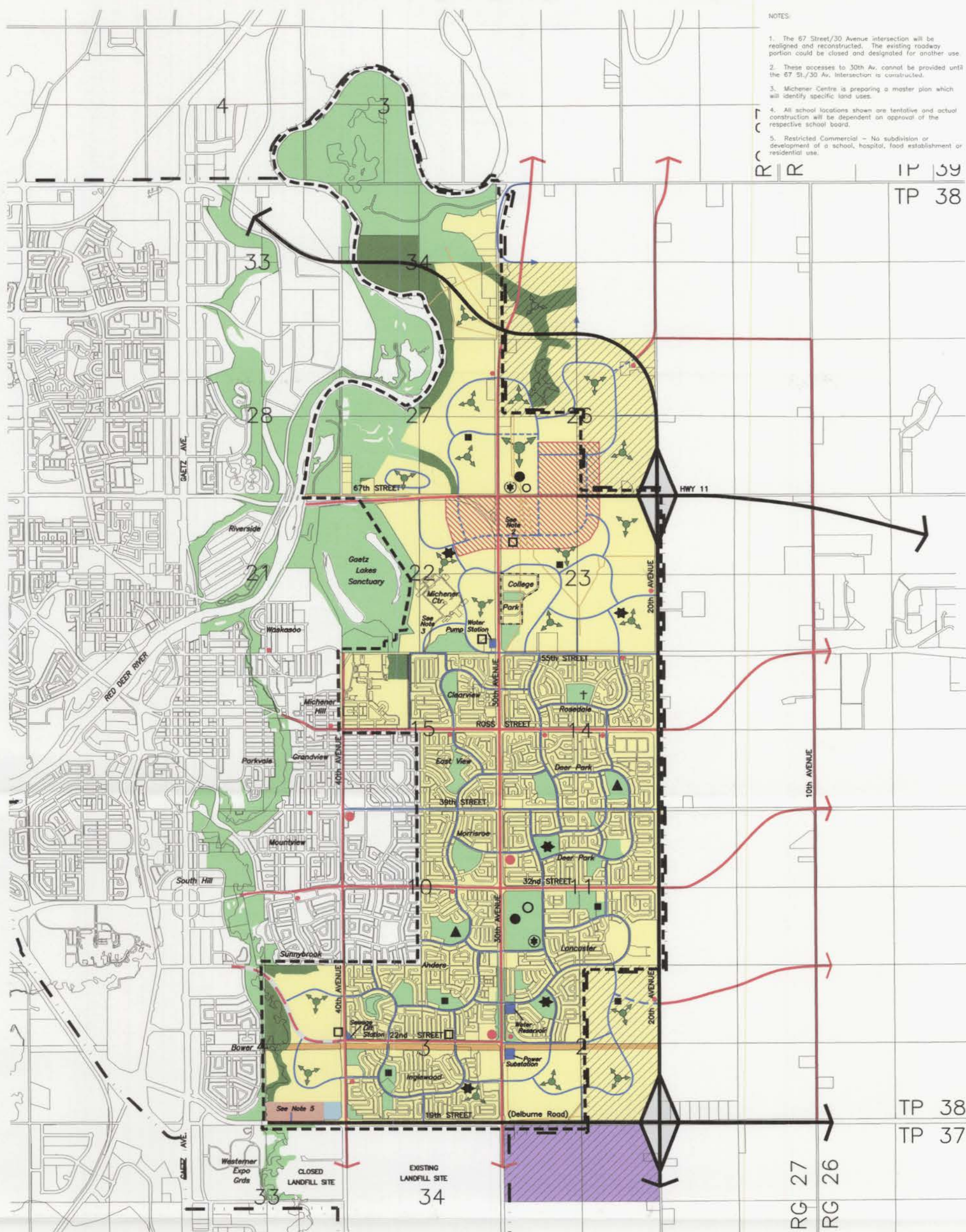


City of Red Deer East Hill Major Area Structure Plan

Figure 4 Natural Resource Extraction & Landfills

- | | | |
|--|---|---|
| <ul style="list-style-type: none"> Plan Area City Boundary Oil Pipeline Gas Pipeline Water Pipeline Abandoned Pipeline Sour Gas/Oil Pipeline Landfill Setback
(Contents of landfill site adjacent to College Park yet to be confirmed, development restrictions may apply) | <ul style="list-style-type: none"> Gravel/Sand Operation Abandoned Well Flowing Gas Well Suspended Gas Well Flowing Oil Well Water Injection Well Water Source Well Well Setback - 100m | <ul style="list-style-type: none"> Battery Station Compressor Station Gas Plant Injection Facility Meter Station |
|--|---|---|





NOTES:

1. The 67 Street/30 Avenue intersection will be realigned and reconstructed. The existing roadway portion could be closed and designated for another use.
2. These accesses to 30th Av. cannot be provided until the 67 St./30 Av. Intersection is constructed.
3. Michener Centre is preparing a master plan which will identify specific land uses.
4. All school locations shown are tentative and actual construction will be dependent on approval of the respective school board.
5. Restricted Commercial - No subdivision or development of a school, hospital, food establishment or residential use.

TP 39
TP 38
TP 38
TP 37
RG 27
RG 26

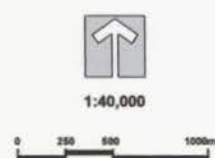
City of Red Deer East Hill Major Area Structure Plan

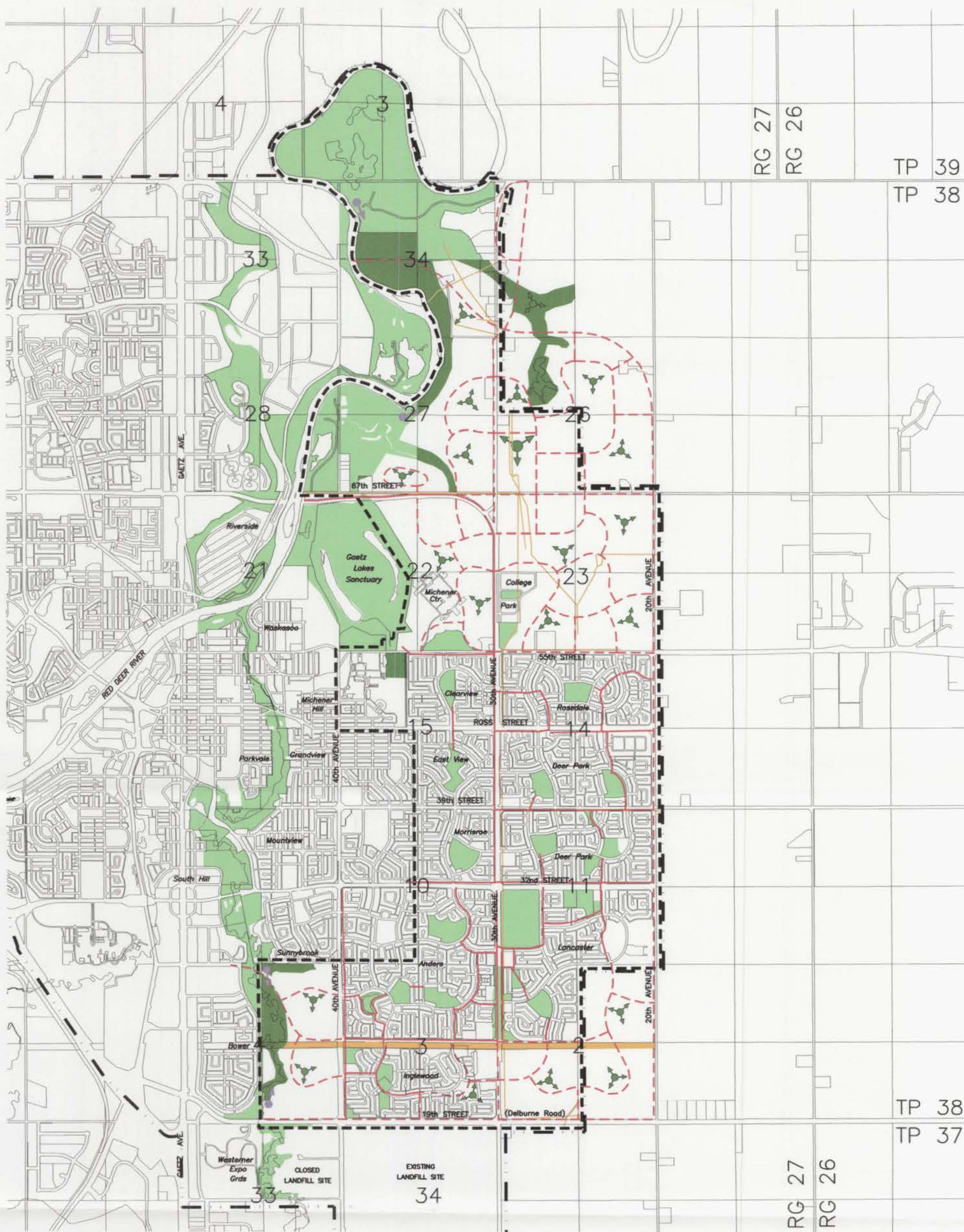
- Plan Area
 - City Boundary
 - College Park ARP Boundary
 - Expressway and Grade Separation
(the need for a grade separated intersection will be determined through additional studies)
 - Arterial Road
 - Molly Bannister Dr. - Alignment Protection
 - Divided Collector Road
 - Collector Road
 - Proposed Neighbourhood Park & Trail Linkage* (See Text & Map 2)
 - Proposed Multi-Neighbourhood Park (24 ha)
- * Locations shown are conceptual and arbitrary

- Residential
- Existing Parks & Natural Areas
- Industrial / Limited Commercial
- Town Centre (Mixed Use - Commercial & Residential)
- Restricted Commercial
- Proposed Natural Areas
- Major Easement / R.O.W.
- Area in Red Deer County is included for conceptual purposes (potential uses shown)

- Public Utility Site
 - Public Service
 - Potential Emergency Services Site
 - Neighbourhood Commercial Centre
 - District Commercial Centre
 - Multi-Neighbourhood Leisure Facility
- Schools (see Note 4)
- Public K-8 School
 - Public Elementary School
 - Public High School
 - Catholic K-9 School
 - Catholic High School
 - Catholic Elementary School

Figure 5 Development Concept Plan (READ WITH MAP 3)



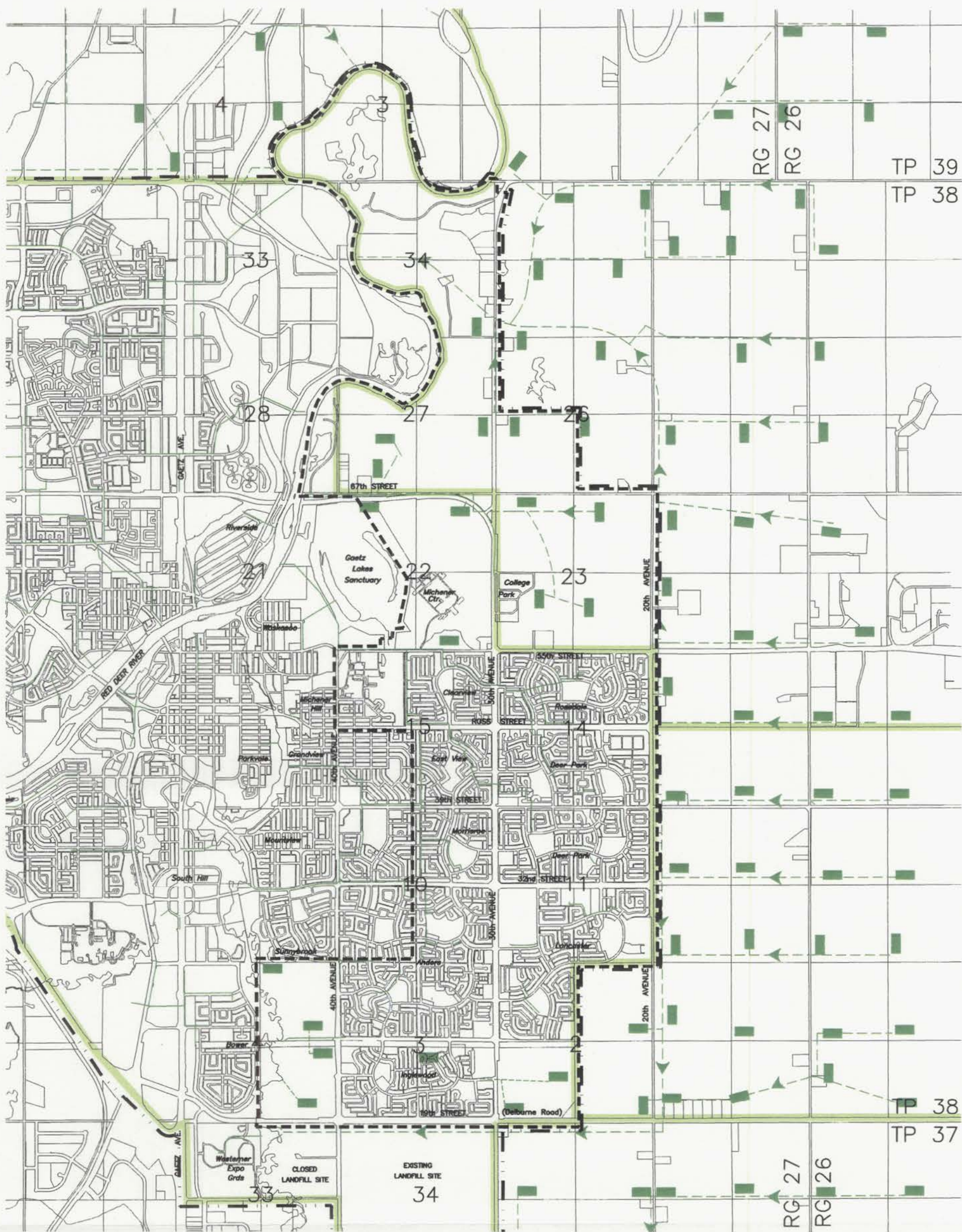


City of Red Deer
East Hill Major Area Structure Plan

Figure 10
Trail & Open Space System

- Plan Area
 - - - City Boundary
 - Existing Trail
 - - - Proposed Arterial and Collector Trail
 - Proposed Neighbourhood Park & Trail Linkage* (See Text & Map 2)
 - Proposed Multi-Neighbourhood Park (24 ha)
 - Direction of Future Waskasoo Major Trail System
 - Proposed Natural Area
 - Potential Trail Linkage (Major Easement / R.O.W.)
 - Existing Park & Natural Area
- * Locations shown are conceptual and arbitrary

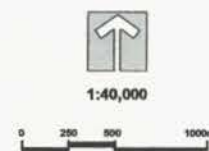


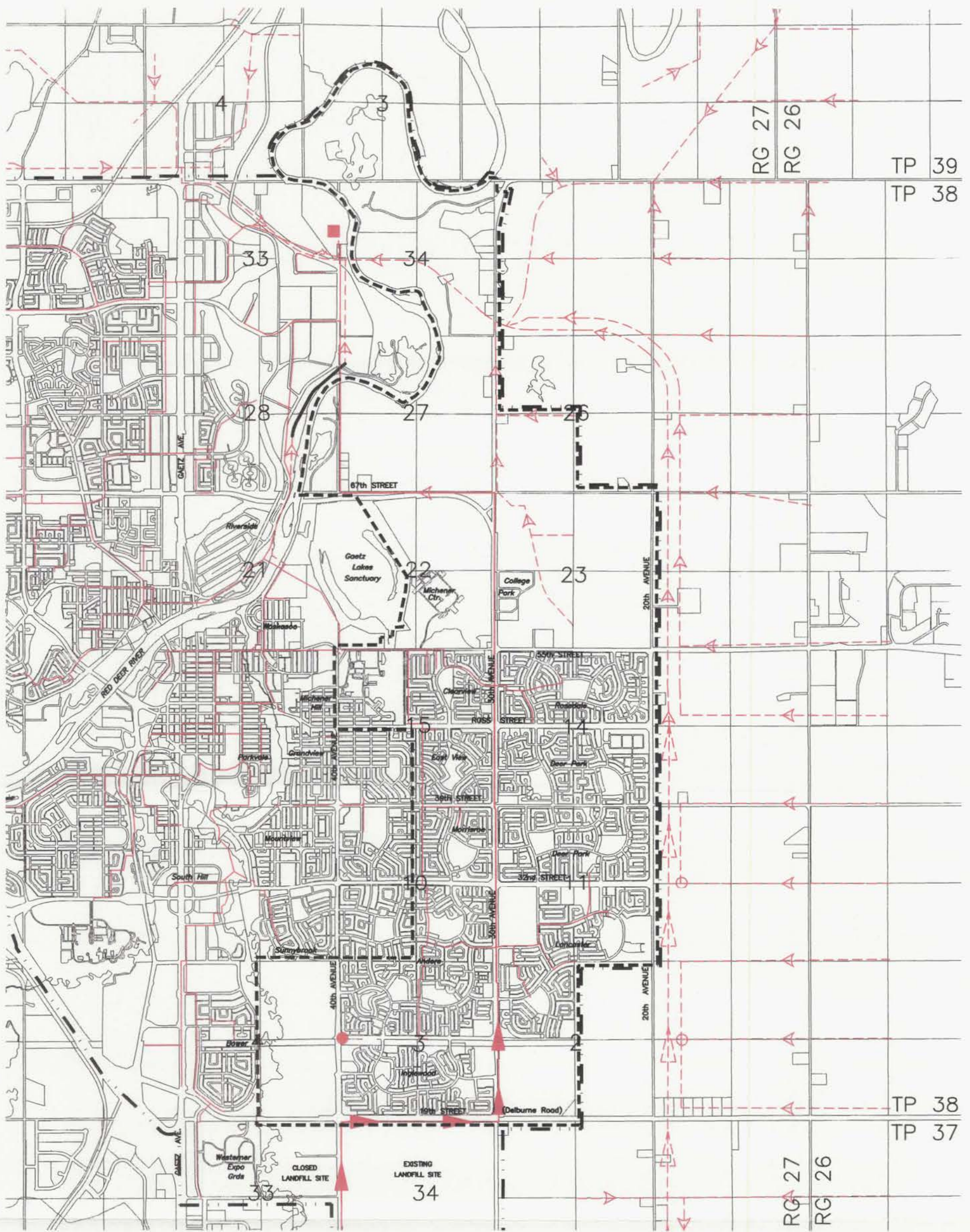


City of Red Deer East Hill Major Area Structure Plan

- Plan Area
- City Boundary
- Existing Storm Water System
- Proposed Storm Water System
- Flow Direction
- Proposed Storm Pond
- Service Basin Area

Figure 11
Storm Servicing
Concept



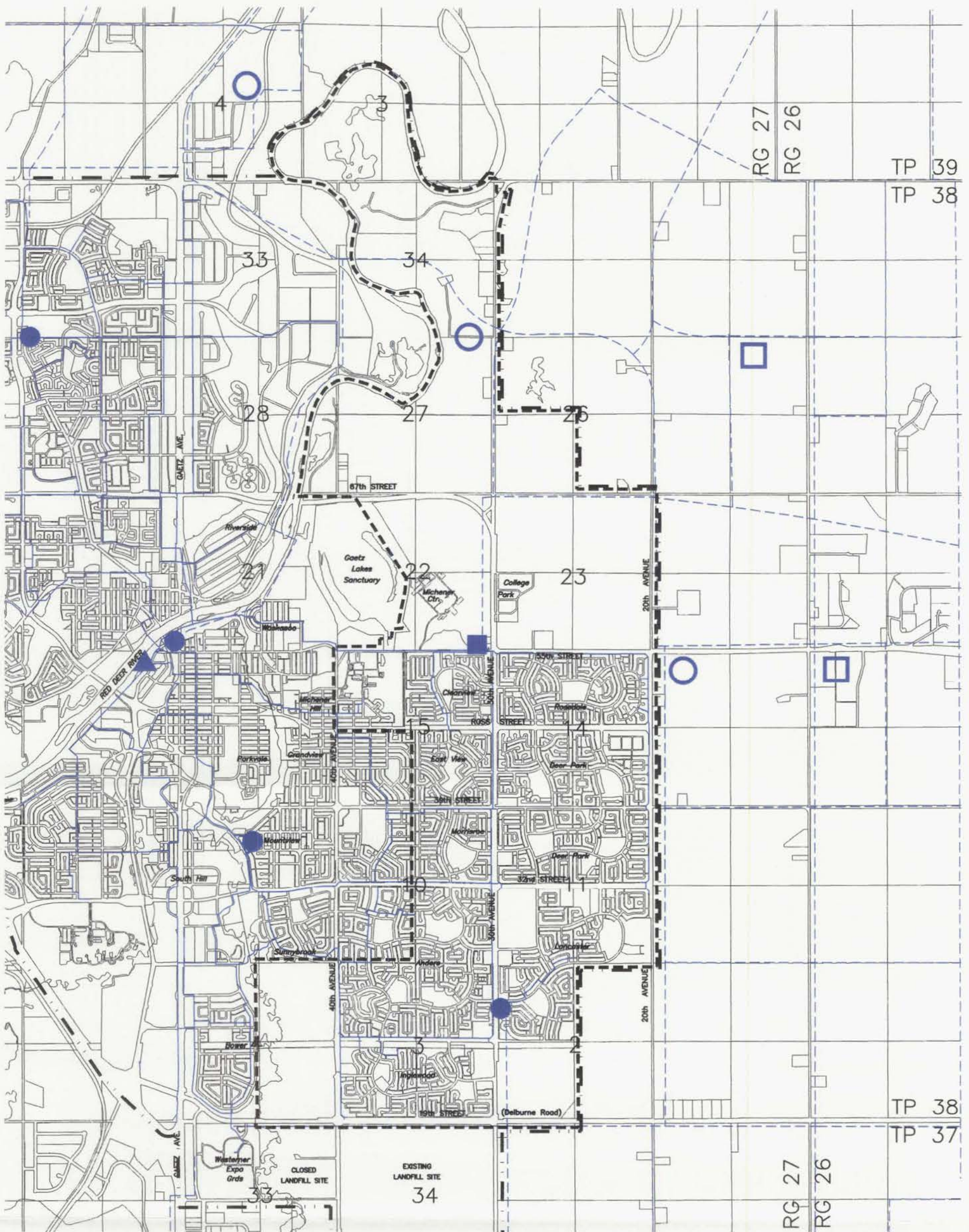


City of Red Deer East Hill Major Area Structure Plan

Figure 12
Sanitary Servicing
Concept

- Plan Area
- ... City Boundary
- Existing System (Pipe >300mm)
- Existing Force Main System
- Existing Waskasoo Regional Trunk System
- Existing Waste Water Treatment Plant
- Existing Lift Station
- Proposed Gravity Trunk Main
- Proposed Force Main
- Proposed Lift Station

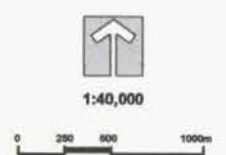


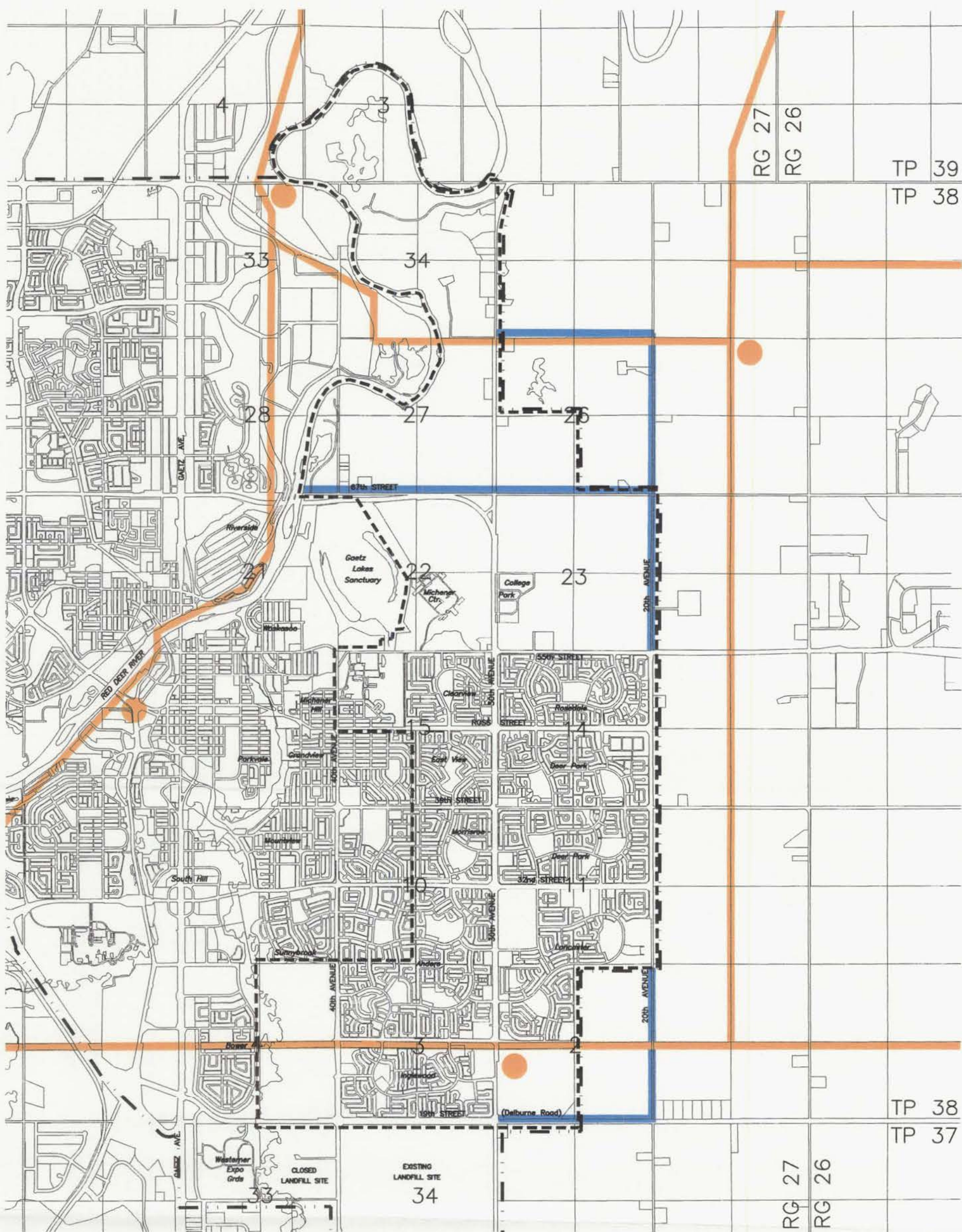


City of Red Deer
East Hill Major Area Structure Plan

Figure 13
Water Servicing Concept

- Plan Area
- - - City Boundary
- Existing Water Trunk
- ▲ Existing Water Treatment Plant
- Existing Pump Station
- Existing Reservoir/Pump Station
- - - Proposed Water Trunk
- Proposed Pump Station
- Proposed Reservoir/Pump Station





City of Red Deer
East Hill Major Area Structure Plan

Figure 14
Electric Servicing Concept

- Plan Area
- City Boundary
- Transmission Right-of-Way
- Power Substation
- Distribution Right-of-Way





SPECIAL AREAS WATER SUPPLY PROJECT UNREALISTIC AND IRRESPONSIBLE

By Dorothy Dickson

While I understand that the agricultural sector is having difficulties and needs to change to remain viable, I think other options must be explored to provide more long-term security than is provided by the plan for the Special Areas Water Supply Project (SAWSP). I oppose SAWSP as I do not think it is realistic in its expectations, environmentally sustainable, or financially responsible.

Options should be sought that would reduce the need for manipulation of water supply, such as returning pastures to native species that evolved to survive drought, temperature fluctuations, etc.; not planting crops that are dependent on irrigation; and consolidating small towns into fewer more viable communities that might specifically attract small industry that is not dependent on water.

I'm afraid that the time may have come to accept the fact that many people, young and old, wish to live in (or within driving distance of) centres large enough to provide amenities and job opportunities for the lifestyle they want and that population decline in rural areas is inevitable.

I think flexibility and adaptability will be the watchwords for all of us in the future, but SAWSP is based solely on the possibility (not certainty) of an increased water supply enabling the continuation and some expansion of past practices.

In trying to assess the need for and value of this particular plan, there are too many unknown factors in the calculations, especially regarding future commodity markets, input costs – including energy – and, most of all, the unpredictability caused by climate change.

Indeed the whole plan is based on "assumptions," "estimates," "predictions based on historical data" (which probably no longer apply), and motherhood statements about "enhancing" the environment and

"mitigating" the damage the project will cause.

Even the Special Areas Board Chair said that the aim of this plan is to handle immediate problems and agreed it would tie up water needed years down the road. Society cannot afford to be so short-sightedly selfish with an element as essential to life as water.

for its workers.

Other reservoirs (Glenifer, Abraham, Oldman) where the attraction of water-based recreation has been touted as a social and financial plus have not lived up to hopes because of often dangerous conditions.

It seems that the proponents are assuming that grain and cattle prices

C. Olson



Red Deer River downstream from the proposed diversion

Economic Analysis Based on Guesstimates

The economic analysis is based on a series of assumptions and too many optimistic outcome scenarios! The plan does not state how many farmers/ranchers are expected to benefit, and the possible job increases it suggests are small compared to the estimated costs. The "guesstimate" for long-term jobs created is only about 200 – certainly nowhere near enough to "keep the young people at home," as one resident of a small town hopefully stated.

Even the short-term jobs for construction of the project would be mostly for labour and not create a "more stable population." But then, attracting industry and more people would only increase the demand on the water supply and no little town is likely to grow enough to afford proper treatment and sewage disposal plants, let alone the hospitals, doctors, schools, and other facilities that industry expects

will go up, but market economics would dictate that the more of a commodity that is available, the lower the market price, while the cost of farm inputs, especially gasoline and fuel-based chemicals, will certainly rise. Taxpayers are already having to subsidize farmers because of droughts, floods, market constraints, etc. What will it cost us if the water supply to farms and other businesses fails?

If any irrigation is allowed (and trying to grow crops in an area not naturally suited to them is obviously a gamble), it must not be with the type of equipment allowed in the south, where an appalling amount of water is wasted. As noted in the Socio-Economic Assessment, farmers would have to make a major investment in this gamble to be able to take advantage of the project, and their income would be totally reliant on there being enough water to make it work every year.

I'm afraid that many of the benefits listed are not just

"unquantified" but also unreal. There is no list of "unquantified costs" such as increased use of fossil fuels and chemicals and the associated health and environmental costs. How will the continuing research and monitoring of uncertainties listed in the water quality study be done and paid for when government field staff are already overworked and the government has not been willing to provide funding for promises of monitoring, enforcement, etc. required in other regions?

smaller towns in the Red Deer River watershed that are strategically placed near major transportation routes and in reach of larger centres for commuters (e.g., Innisfail) are also growing rapidly. Upstream industries and new developments such as coal bed methane extraction are also increasing and need water for their operations.

If you get several drought years in a row (which seems to be an increasing pattern), I doubt if you could have enough water stored – after all the

wanted and anyone who said otherwise was just fearmongering because we would never run out. He added that talk of global warming and climate change affecting the supply was just nonsense.

Needs of the River

In the other rivers that contribute to the South Saskatchewan basin, demand for irrigation and other allocations is already sometimes in deficit, and in-stream flow objectives are not always met. It is therefore likely that demands on the Red Deer River, which currently usually has adequate flow for IFN and allocation needs, may be called on to pass on more of its flow to help meet apportionment needs.

So far, the Red Deer has not been required to contribute more than 50 percent of its natural flow – which is the minimum amount needed for IFN. This is noted in the draft SSRB Water Management Plan which states, "[A]s the utilization of the existing licences in these [Bow and Oldman] basins increases, there will be an increasing requirement for contributions from the Red Deer River [to meet apportionment requirements]."

So it is absolutely essential that the IFN of the Red Deer River are met while we still have the capacity to do so, before we risk over-allocation for other uses. We must also avoid setting the percentage for IFN too low, as it is now apparent was done in other watersheds, which did not allow enough leeway for drier years. The IFN of other rivers and riparian ecosystems of the basin are already not being protected at a high enough level to ensure their environmental health.

If the Red Deer River has to pass on more than 50 percent of its flow even in drier years, the extra would have to come from allocations in order to keep enough for IFN. If our contribution was fixed at a maximum of 50 percent, it could cause considerable hardship for users in the more southerly basins. It seems it would be both unwise and unfair even to consider the SAWSP before the management plans for the whole South Saskatchewan Basin are completed.

When estimating flow in the river, historical data probably will no longer apply, as weather patterns are changing more rapidly and unpredictably than



A ranch bordering the area of the proposed water supply project

Salinization is another worry and we apparently have no way of dealing with it, other than prevention. Much as I would like to see the continuation of small family farms and a rural lifestyle, I must sadly admit that they are becoming increasingly endangered and I think it will take much more innovative thinking than projects like this to save them.

Impacts on Other Users

Other users, including the aquatic ecosystem, will certainly be affected by this proposal and I suspect that the plan's assumptions regarding upstream development, population growth, and water needs are inadequate; it does not state on what rates of growth the needs of areas with prior allocations for the next 50 years are based or when they were calculated.

Red Deer's population increased by over 32 percent in the last decade and seems to be accelerating. Some

senior (i.e., prior to 1977) and current junior allocations and the in-stream flow needs (IFN) were satisfied – to meet all the new uses that are proposed in the plan. This would only create a worse situation for those who had come to depend on the project.

We should learn from, rather than repeat, mistakes made in the south of the province, especially in regard to environmental damage and the waste of water from irrigation methods. It should also be noted that during the recent floods, water that had to be released from overflowing dams, including the Dickson Dam, only exacerbated the downstream situation.

I was somewhat appalled at the Open House when a rancher at one information booth insisted to his audience that the main reason other Canadians come to Alberta is not the energy industry jobs but the abundance of water, and that there was more than enough for everyone to have all they

would be expected under "natural" conditions. Unfortunately, the "Water for Life" program only starts at the base of the foothills and does not protect the upstream supply from the mountains, on which the flow in all the rivers in the South Saskatchewan River basin largely depend and which appears to be decreasing.

The flow is also likely to be adversely affected by the increased industrial activity and mechanized recreation being allowed in the lower ranges. It should be noted that, even with reduced snowfall and therefore less run-off from the mountains, the melting of glaciers may, for a short time, boost the flow somewhat in some watersheds, but not in the Red Deer River, which is not glacier fed.

Furthermore, transferring water from one river basin to another is a scientifically stupid thing to do because the chemical and living composition of two rivers or streams is never identical and the consequences of mixing them is not predictable. The Province should not set a precedent by allowing this – the law preventing it is there for a purpose.

The desire of humans to "even out" the flow of rivers for their convenience is not compatible with the way river ecosystems work because both the life in the river and the riparian habitat have evolved with spring surges and lesser flows later in the year.

The South Saskatchewan Basin study clearly states this: "[T]he pattern of flows (frequency, magnitude and duration) is more important to ecosystem health than total annual volumes."

As has been all too clearly shown on other rivers, water withdrawals for use and/or storage, which make flows lower than natural in the spring and summer, place great stress on the aquatic and riparian ecosystems. Fish habitat, riparian vegetation, channel maintenance processes, and water quality are all affected.

The water quality study done for this project obviously had some reservations about the continuing quality of the water in the Red Deer River if the project goes forward and, because of uncertainties of the outcome, recommends the need for continual monitoring and even a

contingency plan.

More cultivation, irrigation, chemical pollution, sewage, etc. would all also affect water quality and habitat. With the quality of the water now reasonably good, no risk should be taken that might reduce it. The Red Deer is now one of the healthiest rivers in central and southern Alberta – keep it that way.



Disturbance from a pipeline shows clearly on this native prairie in Special Areas. Careful stewardship of the grasslands has kept this ranch in good condition, showing grazing is a compatible land use.

Finding Sustainable Solutions

This project seems to be based on the question "How can we manipulate the environment to make farming more economically possible?" It would be better to ask "How can we change our farming methods to make them better suited to the current environment and flexible enough to cope with future changes in climate and the economy?" SAWSP does not take account of these changes so is not a sustainable, long-term solution – and agriculture, of all industries, is a long-term proposition.

The idea of "enhancing" nature is arrogant. Much of the time we don't even understand how it works, and mitigation has been described as about as useful as "putting lipstick on a corpse." If you want to continue

farming in this somewhat inhospitable region, work with what has worked in nature for millennia, rather than trying to fight and manipulate it.

Prairie grasslands are the most altered ecosystems in Canada with the highest number of endangered species. NONE of what is left should be altered for any sort of development, including farming. It is the responsibility of Albertans to preserve these precious ecosystems.

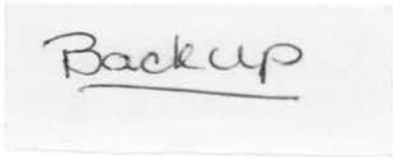
Alter the farming methods to take advantage of the inherent properties of the native species and, wherever possible, restore some of what has already been lost. Environmentally and economically native grassland is the most sustainable groundcover for the region.

Unfortunately, I think that government actions over the past decade in closing rural hospitals, not ensuring home care and child care delivery, and so on speak louder than the motherhood words of their Rural Development Strategy.

This article is based on the author's comments for the public consultation conducted by Equus Consulting Group May-July 2005. The final report is available at www.specialareas.ab.ca but does not reflect the depth of the author's comments, which are often not even mentioned.



© Loucas Raptis

Backup**Christine Kenzie**

From: Kelly Kloss
Sent: November 09, 2005 3:13 PM
To: Christine Kenzie
Subject: FW: Red Deer EAB

FYI

-----Original Message-----

From: Paul Goranson
Sent: November 09, 2005 8:58 AM
To: Lisa Kindrachuk
Cc: Kelly Kloss
Subject: FW: Red Deer EAB

Lisa,

Pls put the following on the agenda for the Nov. 29th meeting:

1. PAMZ presentation on the EAB agenda for the Nov 29th meeting - Kevin Warren
2. South Saskatchewan River Basin Management Plan - Bill Shaw
3. City of Red Deer - Position Paper on Water - Bill Shaw

(Kelly/Lisa: note that Item 3 is going to Council for the Dec 5th meeting and Norbert would like to have the related EAB resolution from the meeting on the 29th to go with the Council Agenda. This will mean that we need a pretty quick turnaround to make the printing)

thx

Paul A. Goranson, P.Eng., MBA
Public Works Manager
City of Red Deer
(403)342-8238
fax (403)343-7074
<mailto:paul.goranson@reddeer.ca>

-----Original Message-----

From: Kevin Warren [<mailto:amarok@telus.net>]
Sent: November 01, 2005 1:49 PM
To: Paul Goranson
Subject: Red Deer EAB

Paul,

Who is the current chair of the Environmental Advisory Board? When is next meeting?

I'd like to be put on the agenda for the November meeting. Would need about a half hour.

Would like to give a 15 minute presentation about analysis we have done on Red Deer Data and also discuss possible Red Deer Locations for PAMZ's Peregrine Station for 2 months in 2006.

2005-11-10

Kevin Warren
Amarok Consulting

PAMZ Executive Director

This communication is intended for the use of the recipient(s) to which it is addressed, and may contain confidential, personal and or privileged information. Please contact me immediately if you are not the/an intended recipient of this communication, and do not copy, distribute, or take action relying on it. Any communication received in error, or subsequent reply, should be deleted or destroyed.

[This message has been scanned for security content threats, including computer viruses.]

2005-11-10

**SSRB WATER MANAGEMENT PLAN
RESPONSE SCHEDULE (for discussion purposes)**

Week of	Date	Who		Purposes
		By	With/To	
Nov 1	3 or 4	Bill S	Norbert VW, Bryon J, Paul G, others? (i.e. Tech Group)	1. Discuss SSRB plan recommendations 2. Determine 'initial' City position (i.e. revised recommendations) 3. Discuss gaining support of BAC and/or municipalities 4. Generally approve process and contacts as below or as revised
Nov 7	7, 8 or 9	Bill S	Al Kennedy (BAC Chair)	1. Discuss differences between BAC and plan recommendations 2. Discuss 'initial' City position (i.e. revised recommendations) 3. Determine Chair's view of initial City position and if Chair will support this position and if not what variation thereof 4. Discuss need for BAC meeting
Nov 7	7, 8 or 9	Bill S	BAC municipal members	Same as 1 - 4 immediately above (<i>chair to read member</i>)
Nov 14	14 or 15	Tech Group	Representatives of Alta Environment	1. Discuss differences between BAC and plan recommendations 2. Presentation on water quality, including incremental impact of increased water use 3. Views of Alberta Environment on initial City response
Nov 14	16, 17 or 18	Bill S and NVW or BJ/PG	Reps of North Red Deer Group; Mountain View Regional; Kneehill Regional; Stettler Regional; Drumheller	1. Present differences between BAC and plan recommendations 2. Discuss 'initial' City position (i.e. revised recommendations) 3. Determine group's views of initial City position and if group will support this position and if not what variation thereof
Nov 14	14/15	BAC meeting if one is required		
Nov 14	16	Bill S/Tech Group	Council agenda	1. (draft) City Water Position Paper, including key aspects relating to initial City response to SSRB water plan recommendations 2. SAWSP Project report
Nov 21	<u>21</u>	Tech Group	Council	1. Present City Water Position Paper 2. Present overview of SAWSP Project report 3. Council receive 1, 2 for information and decision on Dec 5
Nov 21	<u>22</u>	Bill S/City	All municipalities	Email re: City position to discuss at Red Deer River Municipal Users Group[
Nov 21	<u>24</u>	Bill S, Lorna W-Z	Red Deer River Municipal Users Gr.	1. discuss business plan 2. discuss SSRB plan and determine united municipal recommendation(s)
Nov 28	<u>29</u>	Tech Group	Council agenda	1. Proposed City response to draft SSRB Water Management Plan
Dec 5	5th	Tech Group	Council	1. Present proposed City response to draft SSRB Water Management Plan 2. Provide summary of process and 'degree of support' for proposed City response 3. City Council approve response to SSRB Water Management Plan
Dec 5	6 th or 7 th	Mayor	Alta Environment, Equus Consulting	1. Send City response by email and letter

Note: SSRB public meetings schedule: Nov 22 - Medicine Hat; Nov 23 - Bindloss; Nov 24 - Brooks; Nov 29 - Calgary; Nov 30 - Drumheller; Dec 1 - Red Deer; Dec 5 - Lethbridge

*Drumheller
letter to
Roy R.*

EAB →

SPECIAL AREAS WATER SUPPLY PROJECT

Review Report

prepared for:
The City of Red Deer

by:
BPS Consulting Ltd.

August 2005

**SPECIAL AREAS WATER SUPPLY PROJECT
A Review Report to the City of Red Deer**

TABLE OF CONTENTS

EXECUTIVE SUMMARY

- 1.0 Introduction
- 2.0 Approach
- 3.0 The Essence of the Special Areas Water Supply Project (SAWSP)
 - 3.1 Proposal
 - 3.2 Purpose
 - 3.3 Resulting Improvements
 - 3.4 Components
 - 3.5 Water Requirements
 - 3.6 Water Use
 - 3.7 Costs
 - 3.8 Benefits
 - 3.9 Status of Application
- 4.0 SAWSP in the context of Red Deer River Water, Use and Management
 - 4.1 Natural Flows
 - 4.2 Water Allocations
 - 4.3 Estimated Water Demand
 - 4.4 Water Use Management
 - 4.5 Water Quality Management
 - 4.6 Water Deficiencies
- 5.0 SAWSP in the Context of Water Use in the South Saskatchewan River Basin
 - 5.1 The Red Deer River
 - 5.2 Water Allocations within the Three Major Rivers
 - 5.3 Irrigation Allocations
 - 5.4 Apportionment
- 6.0 Provincial Framework
 - 6.1 Framework for Water Management
 - 6.2 Water for Life Strategy
- 7.0 Observations on the public meeting handout – Information about the Special Areas Water Supply Project (June 2005)
 - 7.1 Protection of the 'Natural Flow' of the Red Deer River
 - 7.2 Effect on Other Users on the Red Deer River
 - 7.3 Effect on the Red Deer River's Contribution to Apportionment
 - 7.4 Inter-Basin Transfer
 - 7.5 Economic Analysis
 - 7.6 Benefits
 - 7.7 Environmental Considerations
 - 7.8 Map – Highway 12 Municipal Water Supply

- 8.0 Other Aspects to Consider
 - 8.1 Water Use Efficiency
 - 8.2 Population and Employment Growth
 - 8.3 Farm Support
 - 8.4 Water for Agriculture and Irrigation
 - 8.5 Re-Use of Water
 - 8.6 Future Water Needs
 - 8.7 Options
- 9.0 Summary
 - 9.1 SAWSP
 - 9.2 Causes for Reservations Regarding SAWSP

Appendices

- Appendix A Information about the Special Areas Water Supply Project (June 2005)
- Appendix B Executive Summary of Special Areas Water Supply Project: Economic and Issues Final Report by Applications Management and Analysis Ltd.

EXECUTIVE SUMMARY

Approach

This Special Areas Water Supply Project Review Report reflects on aspects of SAWSP in relation to water use, quality and availability from a Red Deer River basin wide perspective. These reflections consider the natural flows of the Red Deer River, existing and future needs for water use, and management options being considered for the Red Deer River.

In many ways, this report is a critique of a major irrigation project regardless of where it would be located in the Red Deer River Basin. This report raises numerous reservations regarding the allocation of a large volume of water for irrigation, in this case for SAWSP, within the Red Deer River basin since:

- limits to water allocations are being considered for all major rivers in southern Alberta including the Red Deer,
- irrigation delivery systems are inherently inefficient (i.e. the portion of water losses and unused water is high), and
- there already are very large amounts of water already committed to irrigation in southern Alberta, including in the Red Deer River basin.

One component that makes SAWSP different from other irrigation projects is that SAWSP would divert water to the Sounding Creek basin. This represents a diversion of water out of the South Saskatchewan River Basin, of which the Red Deer River basin is a part. Reservations are raised about this interbasin diversion.

While the report raises numerous reservations about SAWSP as an irrigation project, including an interbasin diversion component, this should not to be construed as opposition to the delivery of water to the Special Areas, adjacent rural communities and urban communities therein for a variety of other uses to help sustain and diversify communities in the eastern parts of the Red Deer River basin.

SAWSP Project Overview

SAWSP is a proposal by the Special Areas Board to divert water from the Red Deer River via a system of pipelines, canals, natural channels and storage reservoirs to the Sounding and Berry Creek systems. The project is seen as a long-term solution to recurring droughts. Providing an improved supply of water is seen to support economic growth and to reduce unemployment and out-migration from the Special Areas, as well as to also improve habitat and range conditions within the water supply area.

SAWSP would divert an annual maximum of 76,500 cubic decameters (dam^3): note: 1 dam^3 is 0.81 acre-feet. The average annual diversion is anticipated to be 53,400 dam^3 . Withdrawals from the Red Deer River would be downstream from Content Bridge (Highway 21 Bridge) from approximately April 1 to October 31.

On average, 6% of the withdrawn water will be used along the main canal, 32% diverted to Berry Creek and 62% diverted to Sounding Creek, which is not in the Red Deer River basin.

The following improvements would be supported by the diverted water:

- Water for stock and rural domestic or household needs along the conveyance routes

- Provide for 8,100 ha (20,000 ac) of sprinkler irrigation and 2,340 ha (5,780 ac) of backflood irrigation
- 17 multi-use projects to create or stabilize 3,350 ha (8,280 ac) of wetlands for waterfowl conservation
- 423 km of canals and natural channels for wildlife habitat and stock watering.

Capital costs of the project are estimated to be \$192.28 million in 2004 dollars. Annual maintenance and operating costs are estimated to be \$3.1 million annually, including \$1.6 million energy costs.

Causes for Reservations about SAWSP

Pursuant to the purposes of the Review Report, the following summarizes a number of key concerns raised in the Review Report regarding SAWSP.

- (a) Water 'losses' associated with SAWSP would be high (in the order of 41% of the diverted water): these losses include 14% in-basin distribution system losses, 14% on-farm losses and 13% flow through water. In an average diversion year (53,400 dam³) losses would be 21,900 dam³ or 84% the existing Red Deer City water licences (26,222 dam³).
- (b) SAWSP will have little if any return flows to the Red Deer River for re-use and/or to help contribute to apportionment to Saskatchewan.
- (c) Because little if any of the SAWSP diversion would be returned to the Red Deer River, SAWSP would increase the consumptive uses of water diverted from the Red Deer River by 43.7% (using 1996 Alberta Environment figures, which indicate 76.4% of diversions, or 174,900 dam³, from the Red Deer River are not returned).
- (d) 62% of the water will be diverted to the Sounding Creek system (i.e. an inter-basin transfer), being therefore a loss of water available for use within the Red Deer River basin. In an average diversion year (53,400 dam³) the interbasin diversion would amount to 33,108 dam³ or nearly 20% more than the combined licences (approx. 28,000 dam³) for six municipal/regional water delivery systems in the Basin (Mountain View, North Red Deer, Town of Stettler, Stettler Regional, Three Hills/Trochu, Kneehill Regional).
- (e) Because the Sounding Creek basin is a closed basin, none of the water proposed for interbasin diversion will be available for re-use along the Battle or North Saskatchewan Rivers.
- (f) While the Special Areas Board indicates the median requirements of SAWSP will be approximately 5% of the median flow in the Red Deer River, when taking 50% apportionment to Saskatchewan into consideration SAWSP is 10% of the median flow that could be allocated for use in the Red Deer River basin. In lower flow years, SAWSP can represent up to 15% of the flow of the river available for use within the basin.
- (g) Based on management options which are considering allocation 'caps' for the Red Deer River, SAWSP represents 28% to 36% of the water left to be allocated from the Red Deer River. For one option (35% allocation; 65% flow through) 213,582 dam³ of water remains to be allocated. SAWSP represents 36% of this. For a second option (39% allocation; 61% flow through) 273,482 dam³ of water would remain for allocation. SAWSP represents 28% of this.
- (h) SAWSP would take the majority of the remaining reliable water allocations from the Red Deer River. Options being considered for water management of the Red Deer River factor in water allocations (present, pending and possible future) and a Water Conservation Objective for the Red Deer River. These scenarios estimate

SAWSP will have the following deficits: Scenario A – 6% of the years; Scenario B – 7% of the years; Scenario C – 15% of the years. In contrast, future non-irrigation licenses located anywhere in the basin would have much higher deficits, being Scenario A – 87% of the years; Scenario B – 91% of the years; Scenario C – 97% of the years. These are much higher than SAWSP because these licences will be junior to the SAWSP licence.

- (i) Across the entire SSRB, irrigation is by far the highest user of water, with 74.6% of total allocations being for irrigation (note: for the Bow River basin it is 76.4% and for the Oldman River basin it is 87.4%).
- (j) Within the Red Deer River Basin the largest portion of allocated water (20.3%) is to irrigation. If SAWSP is added, the proportion allocated to irrigation would be 41.9% of the total allocations of 348,595 dam³ (2003 total plus SAWSP). The significant water management issues (water quality and no meaningful capacity for additional water licences) in the Bow and Oldman River basins are very much due to the high allocation of water for irrigation. Should not the Red Deer River Basin learn from these southern basins.
- (k) As management options for the Red Deer River provide for flow throughs to Saskatchewan ranging from 60% to 65%, an interbasin diversion of water lessens even further the Red Deer River Basin's ability to utilize its water for the benefit of the Red Deer River basin.
- (l) While the Special Areas Board indicates during the years 1975 to 1995 the Red Deer River contributed an average of 98.4% of its natural flow to apportionment what is relevant is not the past but the future, being future water use needs. The future scenarios currently being considered are that for the Red Deer River to pass from 58% to 65% of its natural median flow to Saskatchewan, this being much less than the historic portions quoted by the Special Areas, thus making it much more important to consider options for the future use of water.
- (m) The revised 2004 estimated capital cost for SAWSP is \$192.28 million. This is an increase of \$23.58 million (14%) over prior estimates in 2000 dollars. Since the project, if approved, would take at least seven years for more studies, detailed engineering and construction, the costs of the project will be considerably higher than the current estimate.
- (n) The 2004 estimates for annual operating and maintenance costs of SAWSP (\$3.1 million) are 50% higher than the 2000 estimate. Inflation will further increase the costs of operating and maintenance.
- (o) Water quality for irrigation will be problematic in some of the years. While additional studies may identify how to adequately address these problems, annual operating costs and capital costs may rise significantly.
- (p) Applications Management Consulting Ltd. concludes "the benefit-cost analysis shows that SAWSP is not a viable project under any of the agricultural scenarios analyzed. . . . The results of the benefit-cost analysis could change significantly under alternative assumptions used to arrive at values for the benefits and costs included in the analysis. There are a greater number of downsides risks than upside risks to these assumptions to value the net benefits. As a result, the benefit-cost ratio could be lower, pushing the project to be even less viable".
- (q) SAWSP would be licenced for 76,500 dam³. Using 2003 figures for the Red Deer River basin, this is 189% larger than the combined licences for municipal use, 160% larger than combined licences for commercial uses and 79% larger than petrochemical/gas plant licences. Considering the relatively small number of farms that could utilize the diverted water, the small number of added jobs created, that little or no increase in population growth would result and the high capital costs of the project, in comparison to other potential water uses SAWSP would return only a small portion of benefits provided by other uses of water.

- (r) There is no clear indication that SAWSP includes supplying water to municipalities along Highway 12 (Halkirk and east) since no volume of water has been assigned to this use, nor are any costs provided (e.g. water treatment plant, pipelines).
- (s) Forecasts indicate that by the middle of this century water demands could exceed Red Deer River allocation caps by 20%. This certainly implies that how water is to be allocated, now and in the future, needs to be very closely managed and calls for the principle of efficiency and effective use to be more closely applied.
- (t) There is no integrated water management plan for the Red Deer River basin within which to determine the appropriateness of allocating water for irrigation within (Berry Creek system) and outside (Sounding Creek system) the Red Deer River basin, this being especially important given potential caps to water allocations and the variety of other future long-term water needs across the whole basin.

Actions to Consider

The City of Red Deer may wish to consider the following actions

Special Areas Board

1. With a covering letter, forward a copy of the Review Report to Jay Slemph (copy to Bill MacMillan of Equus Consulting Group which undertook the public consultation process for the Special Areas Board)
2. Meet with the Special Areas Board to present and discuss:
 - a. Views of the City re: irrigation use of water/SAWSP
 - b. Process matters re: additional studies and public consultations
 - c. Desire of the City to work with communities throughout the Red Deer River basin to promote sustainable communities
 - d. The City's encouragement of regional water delivery systems like Henry Kroeger Regional Water Services Commission, Stettler Regional Water Services Commission, North Red Deer Water Services Commission, proposed system assisting communities from Halkirk to Consort
 - e. A need for a comprehensive water management plan for the RDRB that considers water uses and needs throughout the basin into the future

Red Deer River Municipal Users Group (RDRMUG)

1. Continue to actively participate in RDRMUG
2. Request that the City be provided the opportunity to speak to RDRMUG regarding:
 - a. Desire of the City to work with communities throughout the Red Deer River basin to promote sustainable communities
 - b. The City's encouragement of regional water delivery systems like Henry Kroeger Regional Water Services Commission, Stettler Regional Water Services Commission, North Red Deer Water Services Commission, proposed system assisting communities from Halkirk to Consort
 - c. Views of the City re: irrigation use of water/SAWSP
 - d. A need for a comprehensive water management plan for the RDRB that considers water needs throughout the basin into the future
3. Encourage municipalities to jointly review Phase 2 recommendations of the SSRB Water Management Plan and provide common input

Alberta Environment

1. Send a letter to Alberta Environment advising:
 - a. that City input has been forwarded directly to Special Areas and consultant following receipt a review of the economics and issues of SAWSP undertaken by Applications Management Consulting Ltd.
 - b. of the City's willingness to share reports (Applications Management Consulting Ltd. and BPS Consulting Ltd.) with Alberta Environment as part of the department's review of the SAWSP application
 - c. that no decision should be made on SAWSP until the completion of additional studies and reports (e.g. environmental impact assessment, Highway 12 municipal water supply if it is to be a component of SAWSP) and more public/community consultation
 - d. that no decision should be made on SAWSP until the Province reviews interbasin transfers on a province-wide basis and provides a report on the implications of an interbasin diversion from the Red Deer River basin (i.e. SSRB) to the Battle/North Saskatchewan River Basin, including potential means to compensate the Red Deer River Basin for the loss of water or to replace the diverted water with other water. nNote: this matter is very important since the Red Deer River is the smallest of rivers in the SSRB and the only river from which allocations may be capped at less than 50%, thus greatly limiting water availability in the basin and which would be further limited by any interbasin diversion)
 - e. that no decision should be made on SAWSP in the absence of a detailed integrated water management plan for the Red Deer River Basin prepared following the approval of the SSRB Water Management Plan: Phase 2.
2. request a meeting with Alberta Environment to discuss Red Deer River water and water management issues, including potential irrigation projects and the strategic need to consider long term water use options.

South Saskatchewan River Basin Water Management Plan: Phase 2

1. Continue to actively participate in the Red Deer River Basin Advisory Committee
2. When available, review the draft Water Management Plan for the South Saskatchewan River Basin: Phase 2
3. Meet with other municipalities to discuss the draft Water Management Plan for the South Saskatchewan River Basin: Phase 2 and to consider common approaches to input
4. Submit a formal City response to the draft South Saskatchewan River Basin Water Management Plan: Phase 2.

SPECIAL AREAS WATER SUPPLY PROJECT
A Review Report prepared for the City of Red Deer
by BPS Consulting Ltd. (Bill Shaw, FCIP, ACP)

1.0 Introduction

The City of Red Deer requested a background report on the Special Areas Water Supply Project (SAWSP). This report is to address:

- the impact of the project of water availability
- the impact of the project on the Red Deer River
- the relation of SAWSP to water use and management in the Red Deer River Basin
- the relation of SAWSP to water use in the South Saskatchewan River Basin
- observations on facets of SAWSP as outlined in public meeting handouts and background reports.

2.0 Approach

The report is written from a basin wide perspective having regard to:

- water being a renewable yet limited resource (i.e. there are limits to water availability in the Red Deer River basin)
- existing and potential water uses within the Red Deer River basin
- the allocation of water for effective and efficient use
- Provincial legislation and water planning frameworks
- the work and input of the Red Deer River Basin Advisory Committee.

While there are multi-use aspects to SAWSP, the project largely is an irrigation project. Irrigation does and will provide benefits to the economies and communities of southern Alberta, including those in east central Alberta in which the Special Areas is located. However, while recognizing benefits of irrigation SAWSP is questioned within the present and future context of the inherent inefficiencies of irrigation water delivery systems and the very high cost thereof.

This approach would be the same if the irrigation project was upstream around Sundre, along the Highway 2 corridor, along the eastern and western banks of the Red Deer River downstream from the Highway 21 Bridge or, as the case may be for SAWSP, in the eastern portion of the Red Deer River Basin. In fact, the report would more rigorously question irrigation in the upper portions of the basin.

While the report questions SAWSP because it is a major irrigation project, readers should not infer that additional use of Red Deer River in the eastern part of the basin is opposed. Such an inference would be wrong. For example, contemplated projects to deliver treated water via pipelines to large portions of Stettler County and to Highway 12 communities from Halkirk to Consort appear very valid. The availability of water to all parts of the basin is important to sustain the economies and social fabric of communities. This is already evident in large parts of the eastern portion of the basin with water allocations for the Sheerness power project, the Deadfish irrigation project, the Henry Kroeger regional water system and the Stettler water system. This is not unlike major water allocations in the western portion of the basin, for example for the petrochemical plants and the communities along the Highway 2 corridor. In the future, the effective use of water should be more of a determinant of use, regardless of where it is within the basin.

3.0 The Essence of the Special Areas Water Supply Project (SAWSP)

The following summarizes key aspects of SAWSP. Appendix A (Information About the Special Areas Water Supply Project – June 2005) gives a more complete summary of the proposed project. Included in Appendix A is map that displays the proposed project.

3.1 Proposal

SAWSP is a proposal by the Special Areas Board to divert water from the Red Deer River via a system of pipelines, canals, natural channels and storage reservoirs to the Sounding and Berry Creek systems in east central Alberta (see map in Appendix A).

3.2 Purpose

The project is seen as long-term solution to recurring droughts in the Special Areas. Providing an improved supply of water is seen to support economic growth and to reduce unemployment and out-migration from the Special Areas, as well as to also improve habitat and range conditions within the water supply area.

3.3 Resulting Improvements

The following improvements would be supported by the diverted water:

- Water for stock and rural domestic or household needs along the conveyance routes
- Provide for 8,100 ha (20,000 ac) sprinkler irrigation and 2,340 ha (5,780 ac) backflood irrigation
- 17 multi-use projects to create or stabilize 3,350 ha (8,280 ac) of wetlands for waterfowl conservation
- 423 km of canals and natural channels for wildlife habitat and stock watering.

The project also identifies the potential of supplying water for municipal purposes along Highway 12 east of Halkirk.

3.4 Components

Diversion and conveyance components include:

- pump station (containing seven large capacity pumps) south of the Highway 21 bridge (Content Bridge)
- a 4.5 km pipeline and an 84 km canal to the Sounding and Berry Creek headwaters
- a series of storage reservoirs
- channel improvements and canals along Sounding Creek and Berry Creek.

3.5 Water requirements

The project proposes to divert from April 1 to October 31:

- at a maximum pumping rate of 7.08 cubic meters per second (cms).
- up to 76,500 cubic decameters (dam³) annually (note: 1 dam³ is 0.81 acre-feet)
- an average of 53,400 cubic decameters (dam³) annually.

3.6 Water Uses

On average the withdrawn water will be diverted to:

- 6% - along the main canal
- 32% - to Berry Creek
- 62% to Sounding Creek.

The anticipated breakdown of uses of water is:

- 39% - Sprinkler irrigation
- 8% - Backflood irrigation
- 7% - Domestic and stock water
- 13% - Multi-use projects (wetland stabilization)
- 13% - Reservoir evaporation
- 2% - Conveyance losses
- 11% - Berry Creek flow through
- 7% - Sounding Creek flow through.

3.7 Costs

Project costs (2004) are estimated to be:

- Capital - \$192.28 million
- Operating - \$3.1 million annually, including \$1.6 million energy costs).

3.8 Benefits

The project proponents list the following benefits arising from the project:

- Stabilized and increased forage production to support the ranching economy
- Increased hunting and recreation opportunities
- A secure supply and better distribution of stockwater
- Better utilization of rangelands and improved upland habitat
- Environmental benefits associated with wetland and upland habitat
- Domestic and municipal water supplies
- Potential new industrial developments
- Employment and a more stable population
- More efficient and higher utilization of existing infrastructure and services
- Improved social conditions
- Opportunities and renewed hope for the future.

3.9 Status of Application

An application to divert water for SAWSP was made considered complete by Alberta Environment in November 2003. As such, SAWSP has a priority status.

4.0 SAWSP in the Context of Red Deer River Water, Use and Management

4.1 Natural flows

The following are natural flow figures for the Red Deer River (1912 – 2001):

- High 4,635,000 dam³ (in 1916)
- Low 758,000 dam³ (in 1949)
- Median 1,586,000 dam³.

SAWSP calls for maximum annual diversions of 76,500 dam³ or 4.8% of the median natural flow of the Red Deer River. Since a minimum of 50% of the Red Deer River must be passed on to Saskatchewan, the amount of water required by SAWSP therefore is nearly 10% of the water that can be allocated from the river for use within the Red Deer River basin.

4.2 Water Allocations

In 2003 the total licenced allocations from the Red Deer River system was 341,518 dam³, or 21.5% of the median natural flow of the Red Deer River. These allocations consist of:

- 272,095 dam³ for non-irrigation uses (79.7 % of total allocations)
- 69,423 dam³ for irrigation (20.3% of total allocations).

Irrigation uses have the highest total allocations. For comparison, total allocations by major users are:

- 69,423 dam³ - irrigation (20.3% of total allocations)
- 52,417 dam³ - agriculture (15.3% of total allocations)
- 47,733 dam³ - commercial (14.0 % of total allocations)
- 40,374 dam³ - municipal (11.8% of total allocations)
- 37,306 dam³ - water management (10.9% of total allocations)
- 31,782 dam³ - gas/petrochemical (9.3% of total allocations)
- 28,138 dam³ - habitat enhancement, management of fish and wildlife, recreation (8.2 % of total allocations)
- 11,832 dam³ - oilfield injection 3.5% of total allocations).

At 76,500 dam³ the SAWSP project would by far be the largest single allocation from the Red Deer River. This single allocation is 189% larger than the combined licences for municipal use, 160% larger than combined licences for commercial uses and 79% larger than petrochemical/gas plant licences.

Irrigation licences including SAWSP (76,500 dam³) and existing (2003) irrigation licences (69,423 dam³) would total 145,923 dam³, or 41.9% of the total allocations of 348,595 dam³ (2003 total allocations plus SAWSP).

4.3 Estimated Water Demand

Alberta Environment estimated in 1996:

- diversion from the Red Deer River – 229,000 dam³
- consumption – 174,900 dam³, being 76.4% of the estimated diversions.

Little, if any of the SAWSP diversion would be returned to the Red Deer River and therefore be virtually a 100% consumptive use. Therefore, SAWSP would increase consumptive uses (in 1996) by 43.7%.

4.4 Water Use Management

Presently Alberta Environment is reviewing water management in the South Saskatchewan River Basin (SSRB), including the use and quality of water in the Red Deer River. In working with the Red Deer River Basin Advisory Committee, Alberta Environment is generating a series of water management recommendations for consideration by the public in the Fall of 2005.

Regarding the allocation of water from the Red Deer River, two options are currently being considered. These are:

- (1) Provincial Steering Committee view: that allocations from the Red Deer River be capped at 555,100 dam³), being 35% of median natural flow (represents 'forecast' irrigation use and a high non-irrigation growth projection to the year 2015);

- (2) Red Deer River BAC recommendation: that allocations be reviewed (i.e. a 'trigger' or 'soft cap') when allocations reach 615,000 dam³ or 39% of median natural flow (represents 'forecast' irrigation use and a moderate non-irrigation growth projection to approximately the year 2040).

These allocation options need to be considered in the context of current (2003) allocations which totaled 341,518 dam³. For the Provincial Steering Committee view 213,582 dam³ would remain to be allocated. For this option SAWSP represents 36% of the water available for allocation. With regards to the Red Deer River BAC 'trigger' 273,482 dam³ would still be available for allocation. SAWSP represents 28% of this option.

The above paragraph considers water in a median flow year. However, in half of the years the amount of natural flow in the Red Deer River is less than the median (i.e. 1,586, 000 dam³) and at times considerably less. The water available to licencees is dependent on the actual flows in the river and the seniority of licences. This is important to consider with respect to SAWSP, as addressed in the following section on water quality.

4.5 Water Quality Management

An integral part of Alberta Environment's review of water management in the South Saskatchewan River Basin (SSRB) includes considerations for the continuing water quality of the Red Deer River. In accordance with the *Water Act*, a Water Conservation Objectives (WCO) must be established for the Red Deer River. A WCO is the amount and quality of water necessary for the protection of a natural water body, its aquatic habitat, or any part of them, for the protection of tourism, recreational, transportation or waste assimilation uses of water, or for management of fish or wildlife, and may include water necessary for the rate of flow of water or water level requirements.

As a part of the review of water management in the SSRB, the Provincial Steering Committee and the Red Deer River Basin Advisory Committee have agreed on the Water Conservation Objectives (WCO) to be recommended to the public. The recommended WCO for all water licenses below Dickson Dam is the greater of 50% of the Instream Flow Needs or 16 cubic metres per second (cms), with the 16 cms potentially being lower in the future if science shows that water quality needs can be met with a lower minimum flow. (Note: Instream Flow Needs is a scientifically determined amount of water required to sustain a healthy aquatic environment, including water quality, fish habitat, riparian vegetation and channel maintenance).

This WCO likely will impact the SAWSP project whereby the potential pumping season may need to be shortened to maintain sufficient flows for water quality purposes in the Red Deer River past and downstream of the SAWSP intake.

4.6 Water Deficiencies

Water management needs for the Red Deer River also consider potential water deficits to different users. To do so, the Provincial Steering Committee and the Red Deer River Basin Advisory Committee considered a series of future water use scenarios. Of the eleven scenarios considered, three became the focus of attention by the Red Deer River BAC. These are:

- Scenario A is an allocation cap at 550,000 dam³ (35% of the natural flow of the Red Deer River – the 'view of the Provincial Steering Committee')

- Scenario B is an allocation cap at 668,000 dam³ (42% of the natural flow of the Red Deer River – an option suggested by the Red Deer BAC)
- Scenario C is an allocation cap at 795,000 dam³ (50% of the natural flow of the Red Deer River - an option suggested by the Red Deer BAC).

Table 1 summarizes forecast water deficits for each of the three scenarios. These scenarios factor in water allocations (present, pending and possible future) and the proposed WCO for the Red Deer River. Of particular interest is that SAWSP will have the following deficits: Scenario A – 6% of the years; Scenario B – 7% of the years; Scenario C – 15% of the years. In contrast, future non-irrigation licenses located anywhere in the basin would have much higher deficits, being Scenario A – 87% of the years; Scenario B – 91% of the years; Scenario C – 97% of the years because these licences will be junior to the SAWSP licence.

Table 1
COMPARISON OF SCENARIOS - RED DEER RIVER MAIN STEM
(Dickson Dam to Mouth)
Number of deficit years out of 68 years/% of years

Type of Allocation		Scenarios		
		A	B	C
Irrigation	Senior Non-District	0/0%	0/0%	0/0%
	Junior Non-District not subject to WCO	1/1%	2/3%	5/7%
	Future Non-District	n/a	n/a	n/a
Non-Irrigation	Senior License (prior to Dickson Dam)	0/0%	0/0%	0/0%
	Junior License not subject to WCO	9/13%	10/15%	10/15%
	Junior License subject to WCO	19/28%	20/29%	22/32%
	Future License	59/87%	62/91%	66/97%
Existing/Future Projects	Sheerness	8/12%	8/12%	9/13%
	Deadfish	7/10%	7/10%	8/12%
	Special Areas Water Supply Project	4/6%	5/7%	10/15%

Notes:

- an irrigation deficit (i.e. SAWSP) is a shortage of 100 mm (10 cm or 3.94 inches) in a growing season
- a future licence deficit is when 10% or more of the licenced volume will not be available during the year.

5.0 SAWSP in the Context of Water Use in the South Saskatchewan River Basin

5.1 The Red Deer River

Not to be forgotten is that the Red Deer River is a relatively small river, and certainly so in comparison to the Bow and Oldman Rivers. Alberta Environment reports for the years 1975 to 2001 the natural flows in the South Saskatchewan River system were as follows:

- Total volume – 8,400,000 dam³
 - Oldman River – 37.8 % (3,175,200 dam³)
 - Bow River – 43.1% (3,620,400 dam³)
 - Red Deer – 18.4% (1,545,600 dam³).

It is interesting to note that the Red Deer River natural flow volume of 1,545,600 dam³ during this 26 year period is less 3% than the 1,586,000 dam³ for the longer 89 year period reported above. Because the Red Deer River is a relatively small river yet serves a basin area much larger than either the Bow or the Oldman River basins, it is important that Red Deer River water uses be closely managed for the overall effective benefit of the entire Red Deer River basin.

5.2 Water Allocation within the Three Major Rivers

In May 2003 Alberta Environment reported in the "South Saskatchewan River Basin Water Allocation" report that the Bow and Oldman River systems are much more highly allocated than the Red Deer River system. The allocations are:

- Oldman River – 70.4%
- Bow River River – 68.1%
- Red Deer River – 18.4% (note: varies from figure provided above)

Essentially, water allocations in the Bow and Oldman basin are high because of the long history in Southern Alberta of water being provided for irrigation. Table 2 indicates the percentage of allocations to major use sectors for each of the three rivers.

Table 2
Water Allocation (2003)
(maximum allocation in dam³)

Use	Oldman River	Bow River	Red Deer River	South Sask River	All Rivers
Irrigation	87.42%	76.35%	20.33%	17.98%	74.58%
Municipal	2.70%	17.57%	11.82%	66.26%	13.42%
Commercial	3.73%	1.88%	13.98%	10.70%	3.73%
Water Manag't	4.16%	1.06%	10.92%	0.00%	2.83%
Agriculture	0.85%	0.37%	15.35%	3.44%	1.72%
Oilfield Inject	0.10%	0.30%	3.46%	0.00%	0.91%
Gas/Petro Chem	0.00%	0.03%	9.31%	0.00%	0.01%
Habitat/Recreation	0.50%	0.86%	8.24%	0.27%	1.27%
Total Allocations	(2,218,900 dam ³)	(2,770,073 dam ³)	(341,518 dam ³)	(252,631 dam ³)	(5,623,914 dam ³)

Across the entire basin, irrigation is by far the highest user of water, and especially in the Bow and Oldman River basins, followed by municipal uses.

5.3 Irrigation Allocations

The total volume of water allocated for irrigation across the SSRB is 4,194,410 dam³, this being 75% of the total volume of SSRB allocations. The next nearest is municipal at 754,666 dam³, being only 18% of the amount of water allocated to irrigation. The amount of water allocated for commercial, oilfield, gas and petrochemical uses is 261,217 dam³, or only 6% of the amount of water allocated to irrigation.

Following a review of SSRB water management in the 1980s, the 1991 South Saskatchewan Basin Water Allocation Regulation (AR307/91) was created to identify all present and future irrigation projects in the SSRB. An area (acres) for irrigation lands was established for each project and Alberta Environment assessed a volume of water for each project. The Regulation essentially "capped further allocations for irrigation but did not give the project any assurance of the availability of water" (Alberta Environment SSRB Water Allocation, 2003, p.8). This report concludes that "Most irrigation projects in the 1991 South Saskatchewan Basin Water Allocation Regulation are nearing their limits." (page 12).

Key water issues in southern Alberta (river water quality and lack of reliable water for future allocation) are largely the result of historic commitments of very large volumes of water to irrigation. While the irrigation industry is important to many parts of Southern Alberta, it is relevant to ask if the Red Deer River basin should also commit a very large portion of water to irrigation and agriculture.

5.4 Apportionment

Alberta is required to send 50% of the natural flow of the South Saskatchewan River system to Saskatchewan. Because the Bow and the Oldman River systems are highly allocated (70.4% and 68.1% respectively) and as greater portions of allocated waters are consumed over time (i.e. not returned to the river) it is highly likely that in the future the Red Deer River flows will be required to contribute more frequently to the assurance of 50% flows into Saskatchewan.

Alberta Environment has indicated as much as shown in the following:

- "Red Deer River will be required to subsidize southern basins for apportionment (greater than 50% of natural flows more frequently)" (Alberta Environment, power point presentation at Environmental Forum, April 21, 2005, p. 22)
- "A fixed 50% of natural flow from the Red Deer River sub-basin to apportionment would enable substantial development in the Red Deer River basin. However, this would result in frequent large deficits to junior allocations in the Oldman/South Saskatchewan mainstems because water availability from the Red Deer River to help meet apportionment would be reduced." (Alberta Environment, SSRB Water Management Plan Phase Two General Overview, March 2004).

SAWSP will have little if any return flows to the Red Deer River for re-use and/or to help contribute to apportionment. This includes the portion of SAWSP being diverted to the Sounding Creek system, being a transfer of water out of the Red Deer River basin to a 'closed system' (considered by Alberta Environment as part of the North Saskatchewan River/Battle River basin). As a closed system, no 'flow through' will reach the Battle River or North Saskatchewan River and therefore will not contribute to apportionment even for those basins.

6.0 Provincial Framework

The SAWSP project would assist in helping the Province to meet Alberta's Rural Development Initiative. As well, SAWSP appears to be consistent with portions of Alberta's Water for Life Strategy and Alberta Environment's Framework for Water Management Planning. However, SAWSP does not necessarily meet all of the principles and objectives of these two water strategies as concisely discussed below.

6.1 Framework for Water Management

Principle: Water plays an essential role in a prosperous economy and balanced economic development. Water must be wisely allocated and efficiently used.

Comment: it is recognized that the availability of an assured supply of water is important to the long-term social and economic well-being of an area. In this regard it is relevant to note that communities along Highway 9 from Delia to Oyen are served by a regional water line from the Red Deer River to provide water to sustain communities and support growth.

Comment: Given the large volume of water required for irrigation, that inherent inefficiencies of water use in irrigation delivery systems, that irrigation allocations are highly consumptive with little returns for re-use, and that the amount of available water from the Red Deer River is limited, is the proposed SAWSP project in keeping with "Water must be wisely allocated and efficiently used"?

Principle: Water must be managed using an integrated approach with other natural resources. Water management is based on a watershed approach.

Comment: The Red Deer River watershed does not yet have adopted water management plan, including adopted conservation objectives. Because of the implications of SAWSP on future water availability and quality, and that it involves a large transfer of raw water outside of the basin, decisions on SAWSP should not be made in the absence of a more detailed water management plan for the Red Deer River watershed.

Principle: Water must be managed and conserved in a fair and equitable manner. Water rights which existed under the Water Resources Act (now the Water Act) must be recognized.

Comment: While the 1991 South Saskatchewan Basin Water Allocation Regulation (AR307/91) sets aside 97,000 acres for irrigation in the Red Deer River Basin including 25,000 acres for the Special Areas Water Supply Project, this does not constitute a right to water. The Regulation essentially "capped further allocations for irrigation but did not give the projects any assurance of the availability of water" (Alberta Environment SSRB Water Allocation, 2003, p.8).

Comment: The diversion of water from the Red Deer River basin to the Sounding Lake basin not only requires a water licence to be approved, but also legislative approval under the Section 47 of the *Water Act*, which states: "A licence shall not be issued that authorized the transfer of water between major river basins in the Province unless the licence is specifically authorized by a special Act of the Legislature."

6.2 Water for Life Strategy

Principle: Alberta's water resources must be managed within the capacity of individual watersheds.

Comment: This principle would direct that the Sounding Creek Basin, even though it is a closed system, should manage its water based upon the capacity of the water within that basin and not be reliant on water from another basin. Nonetheless, within

Alberta there are and will be needs to share water among watersheds where the delivery of water from one river system into an adjoining basin has supportable rationale. For example, water from the Red Deer River is being diverted into the Battle River watershed in the form of treated water to the Town of Stettler, which in turns delivers water to other communities along Highway 12. A second similar system is currently under construction whereby treated water from the Red Deer River will be diverted to the Battle River watershed in the form of a regional water line to serve Blackfalds, Lacombe, Ponoka and the adjacent rural communities. Diverting large quantities of raw water for irrigation and habitat projects in the sounding Creek basin is not readily consistent with this principle.

Principle: Albertans must become leaders at using water more effectively and efficiently, and will use and reuse water wisely and responsibly.

Comment: Little if any of the SAWSP water will be returned to the mainstem of the Red Deer River for reuse. As well, irrigation delivery systems by their very nature are not efficient. The report South Saskatchewan River Basin: Irrigation in the 21st Century (Volume 1: Summary Report) indicates (p. xvi) " that overall efficiencies could improve from 54% to 64% for the Oldman River Basin districts, and from the current 40% to 55% for the Bow River districts, with continued improvement in on-farm systems, district infrastructure and water management." Improvements to district infrastructure are requiring very large expenditures (i.e. public subsidies).

7.0 Observations on the public meeting handout - Information about the Special Areas Water Supply Project - June 2005)

The following notes statements in the information handout and then makes one or more observations regarding the statements.

7.1 Protection of the 'Natural Flow' of the Red Deer River

The median requirements of SAWSP will be approximately 5% of the median flow in the Red Deer River (being 1,586,000 dam³).

Observation: when the requirement for apportionment to Saskatchewan (i.e. a minimum of 50%) is factored in, SAWSP requires nearly 10% of the flow of the Red Deer River in a median year.

Observation: For 25% of the years, the natural flow of the Red Deer River is less than 1,125,000 dam³. The 76,500 dam³ for SAWSP represents 6.8% of 1,125,000 dam³, but when factoring in minimum apportionment requirement this represents 13.6% of the flow of the Red Deer. This percentage increases where the natural flow is less than 1,125,000 dam³.

Observation: The 'view' of the Provincial Steering Committee is that an allocation cap of 35% of the median flow should be placed on the Red Deer River. This means that 555,100 dam³ would be available for allocation. SAWSP represents 13.7% of this.

In October the median SAWSP requirements are approximately 16% of median natural flow.

Observation: This has considerable effects on downstream flows and water quality.

7.2 Effect on Other Water Users on the Red Deer River

All municipal water users except the proposed Stettler Regional Pipeline have priority over SAWSP.

Observation: Agreed, therefore the latest City of Red Deer River expansion application, the North Red Deer Water Services Commission application, the Mountain View Regional Water Services Commission expansion application and the Kneehill Regional Water Services application have an older priority date than SAWSP, as does the Town of Stettler and Town of Drumheller water systems.

Future applications for water from the Red Deer River would have lower priority for use than would SAWSP.

Observation: this has considerable impact on future water users. As shown in Table 1, SAWSP will have deficits in 6% of the years for Scenario A and 7% of the years for Scenario B. In contrast, future non-irrigation licenses located anywhere in the basin would have much higher deficits, being 87% of the years for Scenario A and 91% of the years for Scenario B. The seniority of SAWSP therefore places the 'security' of water for future users at much greater risk.

In times of low water availability experience in Southern Alberta has shown that in practice licence holders are able to cooperate and share water during times of low supply.

Observation: the reciprocal could also apply here, whereby during times of shortages the Special Areas could expect more senior licences to share water with SAWSP. As well, in southern Alberta the economies of communities and irrigation districts are much more closely intertwined (e.g. Lethbridge, Taber and the surrounding irrigation districts). In the Red Deer River basin, the economic connections for the irrigation areas within SAWSP and the multitude of municipalities outside of Special Areas are not so clear.

7.3 Effect on the Red Deer River's Contribution to Apportionment

During the years 1975 to 1995 the Red Deer River contributed an average of 98.4% of its natural flow to apportionment.

Observation: The southern basins (the Bow and Oldman) use a similar argument with the Red Deer River BAC when the issue of apportionment arises during interbasin discussions on water management in the SSRB. The Red Deer River BAC consistently indicates that what is relevant is not the past but the future. The future scenarios currently being considered are that the Red Deer River will need to pass from 58% to 65% of its natural median flow to Saskatchewan, this being much less than the historic portions quoted by the Special Areas. The historic average of 98.4% is used by the Special Areas to suggest there is lots of 'room' for the Special Areas diversion and still easily meet apportionment requirements. As shown in the scenarios, there is much less room when future uses, including consumptive uses, are considered.

Observation: The matter of apportionment becomes more critical during periods of low flow. In 25% of the years the natural flow of the Red Deer River is less than 1,125,000 dam³. For this annual flow, because at least 50% must be passed on the Saskatchewan for apportionment purposes this means that the amount of water

flowing through to Saskatchewan must be at least 562,500 dam³. Of this, the SAWSP diversion (76,500 dam³) represents nearly 14% and because little or none of the diversion would return the Red Deer River this would be a marked impact on the capacity of the Red Deer to deliver the required amount of water for apportionment (or in other words – a very marked impact on the amount of other water licences that could be issued in the future).

7.4 Inter-Basin Transfer

As the Sounding Creek Basin is a closed system, there would be no flow of surface water from one major system to another.

Observation: By making this point the Special Areas Board indicates that Section 47 of the *Water Act* ("A licence shall not be issued that authorized the transfer of water between major river basins in the Province unless the licence is specifically authorized by a special Act of the Legislature.") is not applicable. However, Alberta Environment has ruled that it is applicable such that public meeting advertisements for the SAWSP project noted the meetings were to consider the "Proposed Diversion and Interbasin Transfer of Water between the Red Deer River Basin and Sounding Creek Basin and the Battle River Basin". On average, 62% of the water will be diverted out of the Red Deer River Basin to the Sounding Creek basin.

Observation: The proposal is for a transfer of water out of the Red Deer Basin and in doing so will transfer biota from Red Deer River basin to the Sounding Creek basin, and therefore may require an environmental impact assessment.

7.5 Economic Analysis

In 2004 dollars total capital costs are \$192,280,000.

Observation: The Summary Report of Feasibility Investigations: Special Areas Water Supply Project stated that the capital costs in 2000 dollars would be \$168,700,000. The revised 2004 estimated capital cost is an increase of \$23,580,000. This is a 14% increase, or 3.5% a year. If the project is approved, detailed engineering and construction will require seven years for the project to be complete. If annual inflation is 2.5% a year capital project costs would rise to nearly \$230,000,000. With the amount of major infrastructure and capital projects underway and scheduled for Alberta, the 2004 capital costs may be underestimated and annual inflation rates could be higher. Assuming that an annual inflation rate of 5% for three year and 3% for the remaining four years, the project cost could rise to nearly \$245,000,000.

Observation: Land costs are not included.

Observation: Interest costs (carrying charges) are not included.

Annual operation and maintenance costs are estimated to be approximately \$3.1 million (including \$1.6 million for energy to power the pumps).

Observation: The Summary Report of Feasibility Investigations: Special Areas Water Supply Project stated that the annual operating and maintenance costs to be \$2.06 million. The 2004 estimates are 50% higher than the 2000 estimate thus raising the question what these costs will be in 2012 at project start-up and what the annual cost increases thereafter will be?

In similar water supply projects in the SSRB, the province has paid for construction and operation.

Observation: This statement needs to be verified. There were discussions that the Province would decrease its portion of funding of such projects from 86% to 75%. If 75% is the level of provincial funding, would the project remain feasible for the Special Areas Board?

Observation: In comparison, the funding formula for the North Red Deer River Water Services Commission project is 50.58 - 49.42 (provincial/proponents).

Regional construction benefits include 1,327 person-years of employment and \$59.8 million in labor income.

Observation: these benefits are on-time benefits (i.e. not sustained) and would be derived for any similar construction project in the Province.

7.6 Benefits

The economic benefits are estimated to be about 70 cents per dollar invested in capital and operating costs.

Observation: As such there will be no quantifiable returns for 30 cents out of the dollar. If capital costs turn out to be \$230 million, this means that there will be no return on \$69 million.

The project will support between 60 and 91 person years of new employment.

Observation: while this may be somewhat significant in the local sense the number of new jobs is a very low return on a very large investment

Unquantified benefits – a number are listed in the handout

Observations: it is quite likely that the costs of land, interest and the 30 cents on the dollar shortfall of quantified benefits would exceed the 'value' of the unquantified benefits if they could be valued.

Note: an analysis of benefits was much more thoroughly addressed in the Executive Summary of Special Areas Water Supply Project: Economic and Issues Final Report by Applications Management and Analysis Ltd. The Executive Summary of this report is contained in Appendix B of this report.

7.7 Environmental Considerations

SAWSP would provide significant benefits to wetland related wildlife species.

Observation: diversions from the Red Deer River at the magnitude proposed by the Special Areas will impact the aquatic habitat of the Red Deer River, thus impacting fish and other Red Deer River aquatic life

Water quality will be improved over the current situation.

Observation: The introduction of additional water to existing stream channels should improve water quality along these channels. Background reports do indicate that water quality for irrigation will be problematic for a small percentage of years. As recommended by Golder Associates, a contingency plan needs to be developed to address the risk of unacceptable water quality in the system (e.g. due to salt loadings from beds and surface runoff being higher than assumed during modeling).

7.8 Map – Highway 12 Municipal Water Supply

The map shows 'domestic' water uses for the area along Highway 12 from Halkirk to Consort.

Observation: The project proposal does not allocate a portion of the SASWP water for community/municipal use along Highway 12, nor does it show the costs of the infrastructure to do so or quantify the benefits. No information has been provided as to the amount of treated water to be delivered to the communities along Highway 12.

Observation: While multiple use projects and the provision of additional potable water to communities along Highway 12 is to be applauded, it is not at all clear that sending potable water from SAWSP to the Highway 12 communities would be more cost effective than utilizing the existing infrastructure for the Town of Stettler water delivery system, which already has a water treatment plant, which either has or could be added extra capacity.

Observation: If the communities along Highway 12 wish to 'piggyback' on the SAWSP application and gain a part of the possible future SAWSP license through a transfer, this still does not constitute a benefit of the SAWSP project unless the water (potable) is to be physically delivered from the SAWSP system.

8.0 Other Aspects to Consider

8.1 Water Use efficiency

The Special Areas Water Supply Project In-Basin Distribution Study (Summary Report) indicates that water losses in the SAWSP project are expected to be:

- in-basin distribution system loss: 7,900 dam³ or about 14% of the water released from Sullivan Lake, which includes:
 - 3,300 dam³ - annual reservoir evaporation losses
 - 1,500 dam³ - creek channel evaporation losses
 - 1,300 dam³ - evapotranspiration losses along creek channels
 - 400 dam³ - seepage losses along channels
 - 500 dam³ - annual channel priming losses
 - 900 dam³ - annual canal conveyance system losses.

The South Saskatchewan River Basin Irrigation in the 21st Century Report (p. 63) indicates that in 1999 on-farm irrigation efficiencies within irrigation districts in the Bow and Oldman River Basins ranged between 32% to 73%, with the weighted mean being 71% (therefore, 29 is 'lost' through evaporation or flow through).

- If this is applied to SAWSP where approximately 47% of the diverted water is anticipated to be used for irrigation then 14% of the total diverted water is not 'efficiently' used on the farm (i.e. 14% is 29% of 47%).

Flow through water (i.e. ending in sounding Lake or downstream Berry Creek) could amount to approximately 18% of the SAWSP water. To avoid double counting, assuming that one-quarter of this is flow-through is return flow from farms, 13% of the total diverted water is not used within the system.

Therefore, using the above calculations the water use efficiency for the SAWSP project is in the order of 59%, with 'inefficiencies' being (note: these being estimated orders of magnitude):

- 14% - in-basin distribution system losses
- 14% - on-farm losses
- 13% - flow through.

In comparison, the South Saskatchewan River Basin Irrigation in the 21st Century Report indicates that water use efficiency on average for irrigation districts is also 59%, including 47% for on-farm stored soil moisture (i.e. irrigation), 6% for non-irrigation uses and 6% for base canal flow. Inefficiencies (most often due to the nature of the systems) stem from:

- 4% - canal and reservoir evaporation
 - 3% - canal seepage
 - 17% - farm losses
 - 15% - operational spills and downtime flowby
 - 3% - recaptured runoff
- (note: total of uses and 'inefficiencies' totals 101% due to round-off).

Taking into account only in-basin distribution system losses and on-farm losses, the SAWSP system would annually lose 27% of the diverted water. Given that the mean amount of water diverted annually is forecast to be 53,400 cubic decameters (dam³), on average the SAWSP system will lose 14,418 dam³ annually. When adding flow through waters of which little or none is returned to a 'main stem', losses total 21,900 dam³. These losses are 227% more than the amount of water to be licensed for the North Red Deer River Water Services Commission.

8.2 Population and Employment Growth

SAWSP background reports indicate that regional employment will increase by 66 to 116 person-years while the population of the region would be expected to increase by 140 to a high of 245 people, which is only 2% of the estimated population of 12,000 for the Special Areas and the urban municipalities therein. If the populations of Stettler and Paintearth Counties and the urban municipalities therein are added (25,750), the increase of 245 is only 1%. While any addition to the population of the Special Areas is not insignificant, when considering the cost SAWSP the number of long-term jobs and population gained are very small returns.

8.3 Farm Support

SAWSP will provide water for stock watering and domestic uses along the conveyance routes, and up to 10,120 ha (25,000 ac) of irrigation land. The background reports indicate:

- up to 152 farms could become involved in irrigation
- live streams created by SAWSP will reduce the need for pumping to 100 dugouts

- improved Rangeland use along the conveyance systems totaling 240,000 acres (with an average farm size of 3,220 acres this would assist 80 farms, likely there being some double counting with irrigation lands).

However, the number of farm units to benefit is not as great as what might be expected from the above. The Watrecon Consulting Socio-Economic Assessment of the Special Areas Water Supply Project indicates (page 107) "with SAWSP about 10 per cent of the farms in CD 4 will have a more secure future". As Census Division 4 includes the Special Areas and Acadia, the number of farms in the Special Areas is less than the total of 1,487 farms in the Special Areas and Acadia. As such it is likely less than 125 - 13 farms in the Special Areas will have a more secure future. This is not many considering the costs of SAWSP.

8.4 Water for Agriculture and Irrigation

Without doubt agriculture, including irrigation, forms an important sector in the economy of the Red Deer River Basin. In this regard water allocations from the Red Deer River already do much to support the viability and sustainability of agriculture. Of the 341,518 dam³ allocated from the Red Deer River, over 35% is for non-irrigation agriculture (14.7%) and irrigation (20.3%).

8.5 Re-Use of Water

Given limits to available water in the SSRB, a case could be made to give priority to water uses that return large portions of their water back to system for reuse. For example, municipalities normally return more than 80% of the water withdrawals back to the river. Returned water provides for potential multiplier effects regarding water use and reuse. A disadvantage of SAWSP is that little or no water will be returned to the Red Deer River nor would any of the water proposed for interbasin diversion be available for re-use along the Battle or North Saskatchewan Rivers.

8.6 Future Water Needs

Growth projections for the Red Deer River basin undertaken on behalf of Alberta Environment indicate substantial needs for water to support future growth. For the year 2046 (only 41 years from now) the high forecast for water is 668,300 dam³ (includes existing allocations and forecast needs for irrigation and non-irrigation uses). This is 20% more than the amount provided for Provincial Steering Committee's view of allocation limits of 555,100 dam³ (see Section 4.4). While such demand levels may in fact take longer to manifest, this shows that growth in the Red Deer River basin is anticipated to exceed 'water allocation limits', thus suggesting the need to very closely manage how water is allocated in the future.

8.7 Options

Should the Special Areas Board receive a license for the SAWSP project in the future the water could be used for other purposes should other demands arise and a 'transfer' of part of the licence is approved by Alberta Environment. This is no different for any water licence held by the City of Red Deer, as the City could choose to 'transfer' (permanently or time specific) a portion of a licence to another user. As such, the large SAWSP licence, if approved, has potential for partial use for economic diversification in the Special Areas (or for water use elsewhere in the Red Deer River basin). One downside of this could be if SAWSP is totally or primarily funded by the Province and a portion of the SAWSP licence is transferred to a private enterprise, that private enterprise could in fact be receiving a

'subsidy' by not having to construct the delivery system (or portion thereof). A similar private enterprise receiving a new license elsewhere along the river likely would have to pay the full costs of the delivery system.

9.0 SUMMARY

9.1 SAWSP

SAWSP is proposal by the Special Areas Board to divert water from the Red Deer River via a system of pipelines, canals, natural channels and storage reservoirs to the Sounding and Berry Creek systems in east central Alberta. The project is seen as a long-term solution to recurring droughts in the Special Areas. Providing an improved supply of water is seen to support economic growth and to reduce unemployment and out-migration from the Special Areas, as well as to also improve habitat and range conditions within the water supply area. An application to divert water for SAWSP was made in November 2003. The application is considered by Alberta Environment to be complete and therefore has a priority status.

9.2 Causes for Reservations regarding SAWSP

Pursuant to the purposes of the Review Report, the following summarizes a number of key concerns raised in the Review Report.

- (a) Water 'losses' associated with SAWSP would be high (in the order of 41% of the diverted water): these losses include 14% in-basin distribution system losses, 14% on-farm losses and 13% flow through water. In an average diversion year (53,400 dam³) losses would be 21,900 dam³ or 84% the existing Red Deer City water licences (26,222 dam³).
- (b) SAWSP will have little if any return flows to the Red Deer River for re-use and/or to help contribute to apportionment to Saskatchewan.
- (c) Because little if any of the SAWSP diversion would be returned to the Red Deer River, SAWSP would increase the consumptive uses of water diverted from the Red Deer River by 43.7% (using 1996 Alberta Environment figures, which indicate 76.4% of diversions, or 174,900 dam³, from the Red Deer River are not returned).
- (d) 62% of the water will be diverted to the Sounding Creek system (i.e. an inter-basin transfer), being therefore a loss of water available for use within the Red Deer River basin. In an average diversion year (53,400 dam³) the interbasin diversion would amount to 33,108 dam³ or nearly 20% more than the combined licences (approx. 28,000 dam³) for six municipal/regional water delivery systems in the Basin (Mountain View, North Red Deer, Town of Stettler, Stettler Regional, Three Hills/Trochu, Kneehill Regional).
- (e) Because the Sounding Creek basin is a closed basin, none of the water proposed for interbasin diversion will be available for re-use along the Battle or North Saskatchewan Rivers.
- (f) While the Special Areas Board indicates the median requirements of SAWSP will be approximately 5% of the median flow in the Red Deer River, when taking 50% apportionment to Saskatchewan into consideration SAWSP is 10% of the median flow that could be allocated for use in the Red Deer River basin. In lower flow years, SAWSP can represent up to 15% of the flow of the river available for use within the basin.
- (g) Based on management options which are considering allocation 'caps' for the Red Deer River, SAWSP represents 28% to 36% of the water left to be allocated from the Red Deer River. For one option (35% allocation; 65% flow through) 213,582 dam³ of water remains to be allocated. SAWSP represents 36% of this. For a

second option (39% allocation; 61% flow through) 273,482 dam³ of water would remain for allocation. SAWSP represents 28% of this.

- (h) SAWSP would take the majority of the remaining reliable water allocations from the Red Deer River. Options being considered for water management of the Red Deer River factor in water allocations (present, pending and possible future) and a Water Conservation Objective for the Red Deer River. These scenarios estimate SAWSP will have the following deficits: Scenario A – 6% of the years; Scenario B – 7% of the years; Scenario C – 15% of the years. In contrast, future non-irrigation licenses located anywhere in the basin would have much higher deficits, being Scenario A – 87% of the years; Scenario B – 91% of the years; Scenario C – 97% of the years. These are much higher than SAWSP because these licences will be junior to the SAWSP licence.
- (i) Across the entire SSRB, irrigation is by far the highest user of water, with 74.6% of total allocations being for irrigation (note: for the Bow River basin it is 76.4% and for the Oldman River basin it is 87.4%).
- (j) Within the Red Deer River Basin the largest portion of allocated water (20.3%) is to irrigation. If SAWSP is added, the proportion allocated to irrigation would be 41.9% of the total allocations of 348,595 dam³ (2003 total plus SAWSP). The significant water management issues (water quality and no meaningful capacity for additional water licences) in the Bow and Oldman River basins are very much due to the high allocation of water for irrigation. Should not the Red Deer River Basin learn from these southern basins.
- (k) As management options for the Red Deer River provide for flow throughs to Saskatchewan ranging from 60% to 65%, an interbasin diversion of water lessens even further the Red Deer River Basin's ability to utilize its water for the benefit of the Red Deer River basin.
- (l) While the Special Areas Board indicates during the years 1975 to 1995 the Red Deer River contributed an average of 98.4% of its natural flow to apportionment what is relevant is not the past but the future, being future water use needs. The future scenarios currently being considered are that for the Red Deer River to pass from 58% to 65% of its natural median flow to Saskatchewan, this being much less than the historic portions quoted by the Special Areas, thus making it much more important to consider options for the future use of water.
- (m) The revised 2004 estimated capital cost for SAWSP is \$192.28 million. This is an increase of \$23.58 million (14%) over prior estimates in 2000 dollars. Since the project, if approved, would take at least seven years for more studies, detailed engineering and construction, the costs of the project will be considerably higher than the current estimate.
- (n) The 2004 estimates for annual operating and maintenance costs of SAWSP (\$3.1 million) are 50% higher than the 2000 estimate. Inflation will further increase the costs of operating and maintenance.
- (o) Water quality for irrigation will be problematic in some of the years. While additional studies may identify how to adequately address these problems, annual operating costs and capital costs may rise significantly.
- (p) Applications Management Consulting Ltd. concludes "the benefit-cost analysis shows that SAWSP is not a viable project under any of the agricultural scenarios analyzed. . . . The results of the benefit-cost analysis could change significantly under alternative assumptions used to arrive at values for the benefits and costs included in the analysis. There are a greater number of downsides risks than upside risks to these assumptions to value the net benefits. As a result, the benefit-cost ratio could be lower, pushing the project to be even less viable".
- (q) SAWSP would be licenced for 76,500 dam³. Using 2003 figures for the Red Deer River basin, this is 189% larger than the combined licences for municipal use,

160% larger than combined licences for commercial uses and 79% larger than petrochemical/gas plant licences. Considering the relatively small number of farms that could utilize the diverted water, the small number of added jobs created, that little or no increase in population growth would result and the high capital costs of the project, in comparison to other potential water uses SAWSP would return only a small portion of benefits provided by other uses of water.

- (r) There is no clear indication that SAWSP includes supplying water to municipalities along Highway 12 (Halkirk and east) since no volume of water has been assigned to this use, nor are any costs provided (e.g. water treatment plant, pipelines).
- (s) Forecasts indicate that by the middle of this century water demands could exceed Red Deer River allocation caps by 20%. This certainly implies that how water is to be allocated, now and in the future, needs to be very closely managed and calls for the principle of efficiency and effective use to be more closely applied.
- (t) There is no integrated water management plan for the Red Deer River basin within which to determine the appropriateness of allocating water for irrigation within (Berry Creek system) and outside (Sounding Creek system) the Red Deer River basin, this being especially important given potential caps to water allocations and the variety of other future long-term water needs across the whole basin.

Like all parts of the Red Deer River Basin, water is required to sustain the economy and social fabric of communities in the eastern portion of the basin, including the Special Areas. Red Deer River has been supplied to areas and communities that are a considerable distance from the river to provide domestic water, municipal water via a regional system from Delia to Oyen, irrigation and power generation. SAWSP is seen as means to improve water supplies and thereby stabilize the population and economy of the area.

This paper has reflected upon SAWSP as primarily an irrigation project. The many questions and reservations raised would apply to any irrigation project no matter where it would be located in the Red Deer River. This is not to be construed as opposition to water being supplied to the eastern portion of the basin by other more efficient means for other uses.

An aspect of SAWSP which likely is very different from other irrigation in that it involves an interbasin diversion of water out of the Red Deer River basin, and therefore the South Saskatchewan River basin. Reservations are raised about this aspect as well, especially reflecting the small size of the Red Deer River and impending allocation caps of less than 40%. The interbasin diversion of water out of the Red Deer River basin has its place (e.g. treated water to Stettler and Highway 2 communities north of Red Deer). However, the transfer of very large volumes of untreated water through systems and to uses which are inefficient conveyers and uses of water is questioned.

Information About The Special Areas Water Supply Project

June 2005

This pamphlet describes an application made by the Special Areas Board under the Water Act to divert water from the Red Deer River. It includes a description of a proposed inter-basin transfer of water (which would require legislative approval under the Water Act).

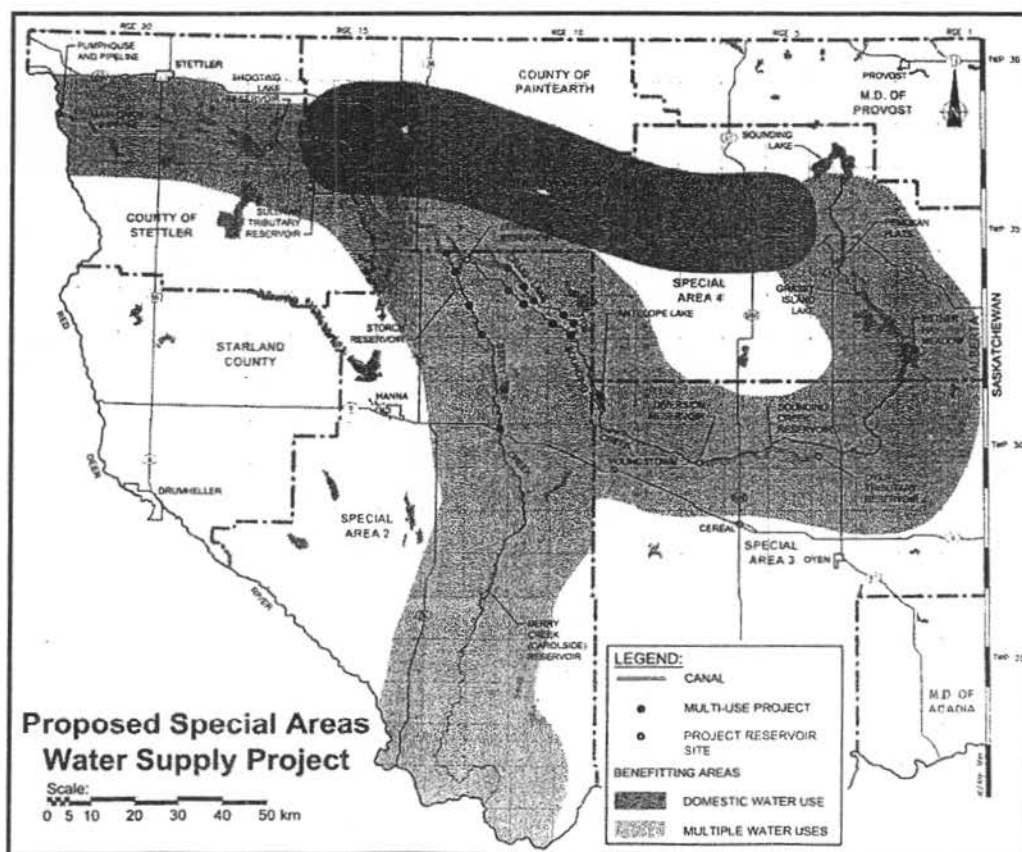
1. The Purpose of the Water Diversion

The Special Areas Water Supply Project (SAWSP) is proposed to divert up to 76,500 cubic decameters (an average of 53,400 cubic decameters) of water annually at a maximum rate of 7.08 cubic meters per second from the Red Deer River as a long-term solution to recurring droughts in the Special Areas. Application for water diversion from the Red Deer River was made in November 2003 in order to provide an improved water supply to landowners and communities located in Special Areas 2, 3 and 4, and in the Counties of Stettler and Paintearth.

Low precipitation and a lack of secure water supply have caused severe hardships in these Special Areas. These characteristics remain impediments to diversifying economic opportunities, stabilizing farm incomes and improving social conditions. Providing an improved water supply will support economic growth and reduce unemployment and out-migration from the Special Areas. It will also improve habitat and range conditions within the water supply area.

The diverted water would support the following improvements:

- Stock watering, municipal and rural domestic or household needs along the conveyance routes.
- Multi-use projects that would create or stabilize 3,350 ha (8,280 ac) of wetlands for waterfowl conservation.
- Sprinkler and backflood irrigation projects that would improve agricultural prospects on 10,430 ha (25,780 ac).
- Maintenance of 423 km of stream (canals and natural channels) for wildlife habitat and stock watering.



SAWSP would include diversion works consisting of a pump station on the Red Deer River south of the Hamlet of Nevis (SSW 15-38-22-W4) and a 4.5 km pipeline. An 84 km main canal or pipeline would convey water to the headwaters of Sounding and Berry Creeks. Storage reservoirs would be developed along the main canal at Shooting Lake and on a tributary to the northwest arm of Sullivan Lake.

A distribution system within Sounding and Berry Creek basins would involve upgrades of existing works or new construction of about 94 km of canals, channel improvements, two water supply reservoirs, and 17 multi-use projects.

2. Protection of the "Natural Flow" of the Red Deer River

Alberta Environment will soon establish water conservation objectives as part of a Water Management Plan for the Red Deer River. These objectives define the amount of water that must be left in the river to protect living species and their habitats. SAWSP will use off-stream storage to meet its needs during low flow periods when pumping is curtailed to protect (future) water conservation objectives for the Red Deer River.

Based on computer analysis of 68 years of flows in the Red Deer River, the median requirements of SAWSP will be approximately 5% of the median natural flow of the Red Deer River at Nevis, except in October when median SAWSP requirements are approximately 16% of median natural flow. During October, natural flow on the Red Deer River is relatively low and SAWSP demands are high due to filling of the multi-use projects.

A Water Conservation Objective is the amount and quality of water necessary for the protection of a natural water body, its aquatic environment, or any part of them, or for protection of non-withdrawal uses of water. Water Conservation Objectives are established by the *Water Act* Director.

3. The Effect on Other Water Users on the Red Deer River

All water licences are granted in order of the date of application. All existing water users will have priority of allocation over SAWSP, and therefore will be protected from a loss of their supply due to diversion to SAWSP. Municipalities drawing water from the Red Deer River hold licences that include sufficient allocation to service population growth (as projected) for at least the next 50 years. All municipal users except the proposed Stettler Regional Pipeline have priority over SAWSP.

Future applicants for water from the Red Deer River would have a lower priority for use than would SAWSP. In times of low water availability, these users would legally have a lower priority for water supply than SAWSP. However, experience in Southern Alberta has shown that in practice, licence holders are able to cooperate and share water during times of low water supply. Off-stream storage within SAWSP provides considerable flexibility in operating the project.

4. The Effect on the Red Deer River's Contribution to Apportionment

Alberta has agreed to send at least 50% of the natural flow of the entire South Saskatchewan River Basin downriver to other provinces that require the water (apportionment).

During the years 1975 to 1995 (the latest available information), the Red Deer River contributed an average of 98.4% of its natural flow to apportionment. If SAWSP had been built 20 years ago, the Red Deer would have contributed an average of 94.8% of its natural flow to apportionment.

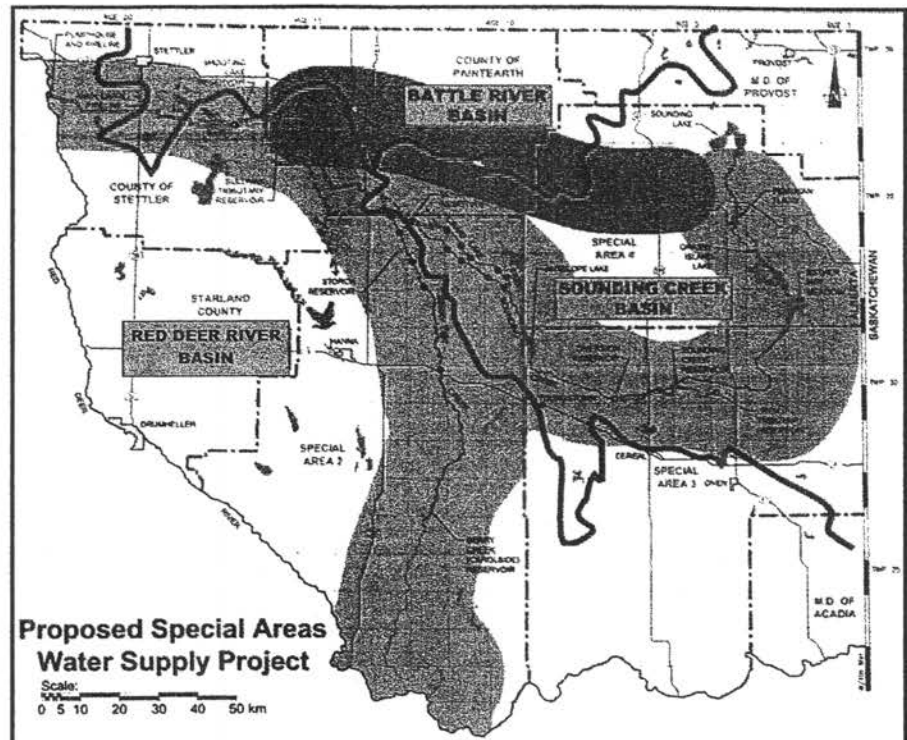
5. Inter-Basin Transfer

The *Water Act* requires a special Act of the legislature to approve inter-basin transfer between major river basins because such transfers could result in (a) introduction of alien species into the receiving basin, or (b) net loss of water available for use by the people living in the basin which is the source of the transfer. The South Saskatchewan River and North Saskatchewan River Basins are considered major basins.

SAWSP has requested approval of an inter-basin transfer of surface water from the Red Deer River Basin into the Sounding Creek Basin (directly adjacent) because this is likely the only opportunity to provide water to meet the needs of residents living there.

As the Sounding Creek Basin is a closed system (does not contribute surface flow to the Battle River), transfer of biota between river basins is not an issue. There would be no flow of surface water from one major river basin to another.

Unfortunately, the Battle River is not a practical source of water.



6. Economic Analysis

Costs

Capital costs of the project (Year 2004 dollars) are described below:

Diversion Works	\$25,270,000
Main Canal and Reservoirs	\$99,090,000
Distribution System	\$67,920,000
Total Cost*	\$192,280,000

*Costs include 20% contingencies and 15% engineering. Land costs are not included. About 50% of the land in the Special Areas is leased Crown land.

Annual operation and maintenance costs are estimated to be approximately \$3.1 million, (including \$1.6 million for energy to power the pumps).

In similar major water supply projects in the South Saskatchewan River Basin, the province has paid for construction and operation. Water users pay a fee for the delivery of the water.

Benefits

A socio-economic assessment (Watrecon 2005) identified direct **quantified** benefits at a provincial level in the range of \$8.5 to \$9.6 million per year; supporting between 60 and 91 person-years of new employment. Over a 50 year period, the economic benefits are estimated to be about 70 cents per dollar invested in capital and operating costs. Regional incomes would increase by \$8.7 to \$9.8 million.

Construction of SAWSP and related facilities would generate considerable short-term benefits. The regional construction benefits include 1,327 person-years of employment and \$59.8 million in labor income.

Other **unquantified** benefits include:

- opportunities for agricultural diversification and intensification and opportunities for regional value-added businesses,
- reduced stress and uncertainty for farm families caused by periodic droughts, and stabilization of regional population,
- reduced drought relief demands on governments (when pumping from the Red Deer is curtailed because of low flows, stock water and irrigation users will be supplied from off-stream storage within the SAWSP),
- improved wetland and upland habitat for the protection of wildlife, including species at risk in Alberta, and
- increased opportunities for water-based recreation.

7. Environmental Considerations

Habitat

The Special Areas has some of the largest remaining tracts of native mixed-grass prairie and its associated ecosystem in Canada. The SAWSP would minimize loss of native grasslands through the use of natural channels as the conveyance system. Most of the land area that would be irrigated is currently under cultivation. Land uses on environmentally sensitive Crown leased land would be controlled by the Special Areas Board. The project would make possible the implementation of range management systems which would lead to improved range conditions and increased wildlife habitat diversity, foraging opportunities, thermal protection and nesting cover.

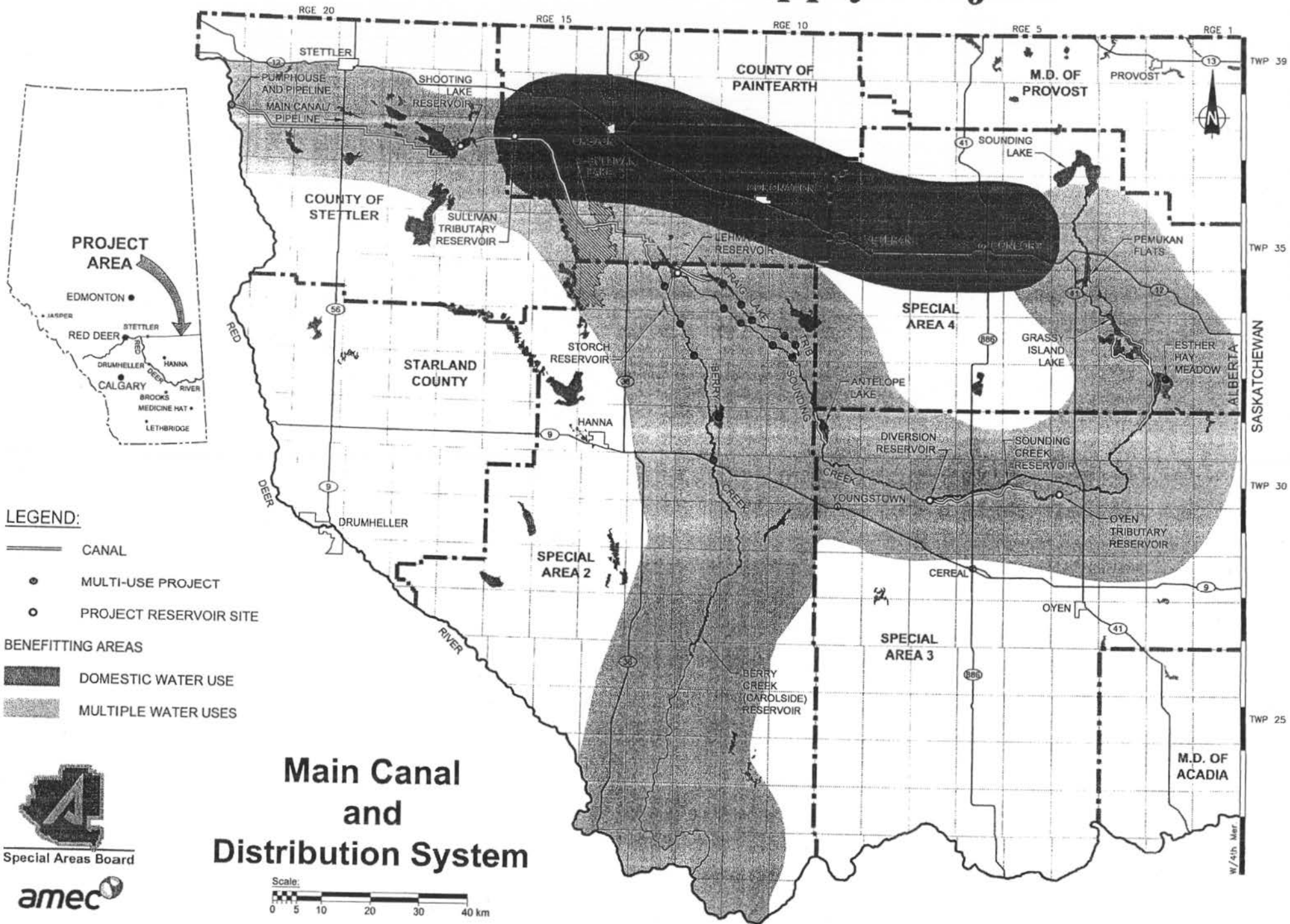
SAWSP would provide significant benefits to wetland-related wildlife species. As currently proposed, the project would create or enhance 17 wetland projects that would provide about 3,350 ha (8,280 ac) of high quality wetlands. In addition, the project would provide about 423 km of flowing streams (natural channels with riparian vegetation, and canals). Pumped diversions and releases from balancing reservoirs would ensure valuable wetland habitat would still exist in the Special Areas during periods of drought when it is most needed by wildlife.

Water Quality

Water quality will be improved over the current situation, because the amount of water flowing through the channels will be increased. However, changes in water quality can occur when stream and reservoir areas are expanded. Studies to date project that water quality changes will rarely exceed guidelines. Salt absorption from the beds of reservoirs is the most likely cause of water quality change—occasional exceedences in concentrations of salts, calcium, magnesium and sodium are anticipated to be limited to the lower portions of Sounding Creek, primarily early in the irrigation season. The magnitude and frequency of exceedences will not impact on project benefits or the environment. A monitoring and contingency system will be implemented to detect and address changes in salt concentrations above guidelines.

Water quality will also be affected by adjacent land uses, and therefore exceedences in coliform bacteria levels, phosphorus and turbidity (clarity) may be experienced from time to time, as they are throughout the South Saskatchewan River Basin.

Special Areas Water Supply Project



Project Overview

Diversion Works

Pumping Facilities	7 vertical turbine pumps (subject to review) 108 m (354 ft) lift 7.1 m ³ /s (250 cfs) capacity (capacity may be reduced to as low as 5.0 m ³ /s)
Pipeline	1829 mm (72 in) 4.5 km long
Main Canal	84 km, from Red Deer River valley to headwaters of Sounding and Berry Creeks.

Storage Reservoirs

Shooting Lake Reservoir	2000 dam ³ live storage
Sullivan Lake Tributary Reservoir	4000 dam ³ live storage
Lehman Reservoir	24,000 dam ³ live storage
Oyen Reservoir	14,250 dam ³ live storage

Distribution System

Sounding Creek, Berry Creek and Craig Lake Tributary natural channels to the extent possible.
Some canals and channel improvements required.
423 km of flowing streams (canals, natural channels) for habitat and stockwatering (plus 84 km Main Canal).
17 multi-use projects provide 3350 ha (8280 ac) of wildlife habitat.
16 backflood projects irrigating 2340 ha (5780 ac).
7290 ha (18,000 ac) of sprinkler irrigation (plus 800 ha (2000 ac) along Main Canal).

Costs

Diversion Works	\$25.27 million (2004\$)
Main Canal and Storages	\$99.09
Distribution System	\$67.92
Total	\$192.28 million
Operation and Maintenance	\$1.5 million/year
Energy	\$1.6 million/year

Water Requirements

Pumping period: Assumed to be Apr 15 to Oct 31; variable in actual operation depending on flow, weather, etc.
Variable year-to-year, ranging from 13,200 dam³ to 76,500 dam³.
Mean diversion = 53,400 dam³.

Benefits

Stabilized and increased forage production to support the ranching economy of the area.
Increased hunting and recreational opportunities.
Secure supply and better distribution of stockwater.
Better utilization of rangelands and improved upland habitat.
Domestic and municipal water supplies.
Environmental benefits associated with wetland and upland habitat.
Employment and more stable population.
More efficient and higher utilization of existing infrastructure and services.
Improved social conditions.
Potential new industrial developments.
Contribute to provincial social and economic objectives, particularly Alberta's Rural Development Initiative.

Opportunities and renewed hope for the future.

Special Areas Water Supply Project: Economics and Issues

Final Report

EXECUTIVE SUMMARY

The Special Areas Water Supply Project (SAWSP) has been proposed by the Special Areas Board (SAB) to improve water supplies to landowners and communities located within the Special Areas in east-central Alberta. The objective of the project is to address the water supply problems experienced over many years in the region, as a result of recurring droughts, by diverting up to 76,000 dam³ of water from the Red Deer River (south of Nevis) and transferring water into the Sounding Creek basin and the Battle River basin (inter-basin transfer).

The City of Red Deer has been invited to review documents describing the proposed SAWSP, and to provide comments on the project to the SAB and Alberta Environment. These comments will be considered by the SAB as it completes its requirements for approval of its license application for the project, and by Alberta Environment as it considers the application. The City of Red Deer engaged Applications Management Consulting Ltd. to provide an analysis of the economics and other process issues related to the project from a provincial public interest perspective. This report is based on a review of the studies that have been conducted on the SAWSP and discussions with various staff and consultants working for the Special Areas Board on this project.

Project Viability

A benefit-cost analysis to assess the economic viability of the SAWSP was undertaken by Watrecon Consulting.¹ The results of this analysis show that SAWSP is not a viable project under any of the agricultural scenarios analyzed. In the base case analysis using a 5% discount rate, the net present value under the most pessimistic agricultural scenario totals -\$115 million, with an associated benefit-cost ratio of 0.552, while the net present value under the most optimistic agricultural scenario totals -\$90 million, with an associated benefit-cost ratio of 0.693.

To address uncertainty, sensitivity analysis was conducted in the Watrecon study using discount rates of 3% and 7%. Lowering the discount rate, which in effect increases the future value of the net benefits of SAWSP, does not make the project viable under any of the agricultural scenarios analyzed. Using a 3%

Special Areas Water Supply Project: Economics and Issues

Final Report

discount rate, the net present value under the most pessimistic agricultural scenario totals -\$95 million, with an associated benefit-cost ratio of 0.697, while the net present value under the most optimistic agricultural scenario totals -\$56 million, with an associated benefit-cost ratio of 0.849. At a 7% discount rate, the stream of future net benefits is further discounted, producing the least desirable benefit-cost analysis results. Using a 7% discount rate, the net present value under the most pessimistic agricultural scenario totals -\$122 million, with an associated benefit-cost ratio of 0.446, while the net present value under the most optimistic agricultural scenario totals -\$105 million, with an associated benefit-cost ratio of 0.571. None of these benefit-cost analysis results meet the test of viability.

The report identifies a number of unquantified benefits that are not included in the benefit cost ratio.² It is concluded in the report that “assessing whether SAWSP is in the public interest, these unquantified benefits must be considered in addition to the quantified benefits...”³ However, the report does not attempt to provide any indication or analysis that would support a conclusion that these “unquantified” benefits would be sufficient to overcome the negative benefit cost analysis results for the project.

Benefit Cost Analysis Deficiencies

This report shows that the Watrecon analysis is incomplete, and could be significantly enhanced to provide a more complete measure of the benefits and costs arising from the project. It was found that the following cost and benefit variables should be included in the analysis:

Benefits:

- Improvements in human health as a result of the project (municipal water supply benefits).
- Non-consumptive use values: habitat support, pollution control, water-based recreation.
- Nonuse values: existence, option and bequest values.
- Reduced government expenditures on drought relief.

¹ Watrecon Consulting, *Socio-Economic Assessment of the Special Areas Water Supply Project*, Submitted to Special Areas Board, April 26, 2005.

² Ibid, pg 102

³ Ibid, page 103.

Special Areas Water Supply Project: Economics and Issues

Final Report

- Aesthetic values of green fields and well tended farmsteads.

Costs:

- On farm transition costs to irrigation agriculture.
- Lost agriculture production attributable to project footprint.
- Environmental costs:
 - during the construction phase,
 - of the project footprint,
 - of instream water flow reduction south of Nevis,
 - of the interbasin transfer of water
 - of increased forage production
- Loss of archaeological, historical and prehistoric resources.
- Project design and construction costs related to mitigation.
- Monitoring costs.

The quantification of these costs requires the completion of an analysis consistent with an Environmental Impact Assessment and a valuation of the losses of ecosystem services as a result of SAWSP. Without having a “complete” definition and analysis of all the relevant benefit and cost categories, the results of the benefit cost analysis and any conclusions based on these results must be considered “preliminary” at best.

Sensitivity and Risk Analysis

The results of the benefit cost analysis could change significantly under alternative assumptions used to arrive at values for the benefits and costs included in the analysis. There are a greater number of downside risks than upside risks to these assumptions used to value the net benefits. **As a result, the benefit cost ratio could be lower, pushing the project to be even less viable than presented in the Watrecon report.**

Socio-Economic Impact Analysis

While the estimated economic benefits to the province and the region associated with the construction and operation of the project are significant, they could be expected to accrue to a similar extent wherever a capital investment of the same

Special Areas Water Supply Project: Economics and Issues

Final Report

magnitude were made. As a result, the value of these socio-economic impacts cannot be considered "incremental". The "incremental" socio-economic impacts would be those that are over and above a similar investment (presumably the next best use of the capital and operating expenditures) in the region.

The "regional" socio-economic benefits are significant, and would not accrue to this region if a similar investment were made elsewhere in the province. However, it could be expected that these benefits in a similar magnitude would be shifted to the region where that investment were made. Again, in this instance, the estimated socio-economic impacts cannot be considered "incremental".

Rural Special Areas Economic Development

Given the failure of the benefit-cost analysis to demonstrate the economic viability of the project, the Watrecon report indicates that the need for providing support for the agricultural industry and economic growth of communities in the region is sufficient reason to proceed with the project. The concluding statement in the report is:

"Thus, for the purposes of developing a sustainable and vibrant economy in east-central Alberta providing water to the region via SAWSP appears to be an effective solution."⁴

The analysis presented in the Watrecon report does not support this conclusion. There is no tangible evidence provided that the economy of the east-central part of the province will be "sustainable" or "vibrant" as a result of this project.

It should be noted that while our view is that the analysis of the SAWSP does not support such an ambitious claim for improving the economic prospects for the region, it does not mean that this is not a laudable goal for the province to pursue. If this is the primary objective of the project, or one of the primary objectives of the project, it should be evaluated using the social benefit cost analysis framework against other alternative programs that could be implemented to achieve this objective (e.g. smaller scale investments to support sustainable dryland farming).

⁴ Ibid, page 107.

Special Areas Water Supply Project: Economics and Issues

Final Report

Decision Process Issues

The report also shows that SAWSP may be subject to numerous provincial and federal regulations and further regulatory processes.

Water Management Plan for the South Saskatchewan River Basin (Provincial)

Before the Alberta Government grants a license to allow SAWSP to divert water from the Red Deer River, a special Act of legislature is required, as per Section 47 of the Water Act, to allow the transfer of water between major river Basins (Red Deer River Basin and Sounding Creek River Basin and Battle River Basin).

Running separate, but in parallel to the passage of a special Act of legislature, Alberta Environment is developing a Water Management Plan for the South Saskatchewan River Basin (SSRB) that includes a public consultation component. This Water Management Plan, scheduled to be submitted to the Minister in December 2005, may serve as a basis for the Minister of Environment to make a decision to grant SAWSP a license to divert water from the Red Deer River.

The Water Management Plan is expected to make a determination on:

- The "in-stream flow needs" (IFN) which is the amount of water that should remain in the rivers for the aquatic environment to be maintained over the long term; and,
- The amount of water required by the Red Deer River so that Alberta will be able to meet its obligation under the Master Agreement on Apportionment between the Prairie Provinces and the federal government.

Once these two determinations are made, Alberta Environment will then decide if there is sufficient water available for the SAWSP, given the existing license holders on the Red Deer River.

It is reasonable to conclude that the SAWSP will have impacts on future water allocations for the entire South Saskatchewan River Basin. In the Bow and Oldman Rivers, IFN generally exceed existing flows, and restoring flows is considered to be impossible under the existing water allocation system. The aquatic environment in these rivers is considered to be in a state of long-term

Special Areas Water Supply Project: Economics and Issues

Final Report

declining health.⁵ Any future water allocations in the Red Deer River Basin that come after pending allocations (includes SAWSP if approved) run a higher risk of not having water available, since they will be subject to the IFN established as a result of the SSRB Water Management Planning process and be junior in priority in these pending allocations.⁶ Post-SAWSP projects will likely require some water storage to ensure a reliable water supply in dry years, an additional cost that could affect business investment decisions in the region in the future.

Historical Resource Act (Provincial)

As stated by AMEC Earth & Environmental, the proposed development will likely affect archaeological and paleontological resources, and may require a Historical Resources Impact Assessment. This requires a qualified paleontologist (holding a paleontological collection permit within the Province of Alberta) to assess the potential impact prior to the issue of a development permit.

Environmental Impact Assessment (Provincial)

Under the Environmental Protection and Enhancement Act (EPEA) of Alberta there is an Environmental Assessment process of which the most comprehensive form is an Environmental Impact Assessment (EIA). At this time there has been no determination if SAWSP falls under the Mandatory Activities subject to an EIA. However SAWSP may still be considered for an Environmental Assessment (EA) where the complexity and scale of the project, technology, resource allocations or siting conditions create a potential for significant adverse environmental effects⁷.

Environmental Assessment Act (Federal)

Based on our review of the Comprehensive Study List Regulations under the Canadian Environmental Assessment Act, this project will likely require a federal environmental assessment.⁸

In addition, the SAWSP project may fall under two Federal Acts: the Navigable Waters Act which is administered by the Department of Transportation; and the

⁵ Kim Lalonde Environmental Consulting, Alberta Environment, Alberta Agriculture, Food and Rural Development, *The State of Southern Alberta's Water Resources*, Published by Alberta Agriculture, Food and Rural Development, 2004, page 10.

⁶ This statement was included in Alberta Environment's materials on the South Saskatchewan River Basin Water Management Plan that were provided at the open houses conducted in June 2005 by the Special Areas Board as part of the public consultation process on the SAWSP.

⁷ Alberta Environment, *Alberta's Environmental Assessment Process*, September 2004, page 4.

⁸ Canadian Environmental Assessment Act, Comprehensive Study List Regulations.
<http://laws.justice.gc.ca/en/C-15.2/SOR-94-638/66167.htm>.

Special Areas Water Supply Project: Economics and Issues

Final Report

Fisheries Act which is administered by the Department of Fisheries and Oceans. Consequently, SAWSP may have to apply for a permit/license, under each Act, prior to commencement of the project.⁹

⁹ Personal communication with Keith MacDonald, Senior Program Officer, Canadian Environmental Assessment Agency, Alberta Regional Office June 27, 2005.



COUNCIL MEETING OF NOVEMBER 21ST, 2005

ATTACHMENT

DOCUMENT STATUS: PUBLIC

**REFERS TO: SPECIAL AREA WATER SUPPLY
PROJECT REPORTS**

South Saskatchewan River Basin Draft Water Management Plan

The draft water management plan for the South Saskatchewan River Basin (SSRB) consolidates the existing Phase One Approved Water Management Plan for the SSRB and the subsequent Phase Two.

The main purpose of Phase Two was to recommend how much flow is to remain in the main rivers of the SSRB for the aquatic environment and, conversely, how much water remains available for allocation. This plan recommends the best possible balance between water consumption and environmental protection, in light of economic and social objectives and ecological requirements.

Attached are:

- The draft water management plan; and
- A background information document intended to further explain the water management issues addressed by the draft plan.
- Summary of the Draft Plan
- Questions and Answers

Source: Alberta Environment Website

http://www3.gov.ab.ca/env/water/regions/ssrb/draft_plan.html



DRAFT

***(Approved) Water Management Plan
for the
South Saskatchewan River Basin
in Alberta**

Alberta Environment

18 October 2005

*Only the Phase One components of this draft plan are presently approved. Once approved by the Lieutenant Governor-in-Council, this plan will be an "Approved Water Management Plan" as defined by the *Water Act*.

Table of Contents

Executive Summary	1
A. Background	4
1. Introduction	4
2. Context for the Plan and Issues Considered.....	6
B. Recommendations and Provisions	7
1. Place Water Resource Limits on the Bow, Oldman, and South Saskatchewan River Sub-basin	7
2. Place Water Resource Limits on the Red River Sub-basin.....	7
3. Establish Water Conservation Objectives (WCOs)	8
4. Repeal the <i>South Saskatchewan Basin Water Allocation Regulation</i> (1991) .	10
5. SSRB Sub-basins Continue to be Treated as a Whole to Meet the <i>Master Agreement on Apportionment</i> (1969)	10
6. Use of Water Allocation Transfers and Water Conservation Holdbacks and Matters and Factors that Must be Considered When Making Decisions.....	10
• Water Allocation Transfers	10
• Water Conservation Holdbacks.....	11
• Matters and Factors that must be considered in making decisions on applications for Licences, Preliminary Certificates, and Approvals	12
7. Water Management Strategies to be Developed	14
• Water Demand and Consumption	14
• The Aquatic Environment.....	15
C. Other Items	16
1. Future Watershed Management Planning Priorities	16
2. Performance Monitoring Requirements	16
3. First Nations Involvement.....	16
4. Schedule for Review of the Plan	17
D. References	18
E. Glossary	20

Appendices

A. Public Consultation Process	26
B. Relationship of the Water Management Plan to other Planning Initiatives	28
C. Issues Not Considered	35
D. Summary of Information Assembled	36
E. Existing Instream Objectives and Water Conservation Objectives	38

List of figures

Figure 1: The Planning Area	5
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List of Tables

Table 1: Matters and factors that must be considered in making decisions on applications for a transfer of an allocation of water under a licence in the SSRB	13
Table 2: Matters and factors that must be considered in making decisions on applications for licences, preliminary certificates or approvals affecting surface water in the SSRB	14

EXECUTIVE SUMMARY

This is the draft (Approved¹) Water Management Plan under the *Water Act* for the South Saskatchewan River Basin (SSRB) in Alberta. The draft plan is a consolidation of the Phase One Approved Water Management Plan for the SSRB conducted in 2002, and recommendations from phase two of the planning process.

This plan reflects the balance that the Government of Alberta is striving to achieve for Albertans between protecting the aquatic environment of the SSRB's main rivers, and the water diversion and consumption that contributes to economic prosperity in southern Alberta. The plan was prepared as a result of receiving Albertans' views on the direction water management should take in the SSRB.

This plan will provide the foundation for future watershed management planning of sub-basins in the SSRB.

The recommendations made in this plan represent advice to the Minister of Environment and the Director, who are responsible for making decisions under the *Water Act*. The provisions described in this plan are other actions to be taken by Alberta Environment (AENV).

AENV recognizes and accepts that the limits for water allocations are being reached in the Bow, Oldman, and South Saskatchewan River sub-basins.

The principal recommendation contained in this plan is that:

- AENV stop accepting applications for new water allocations in the Bow, Oldman and South Saskatchewan River sub-basins until the Minister of Environment specifies how water, not currently allocated, should be used (in other words, create a Crown reservation of water).

Other recommendations and provisions included are:

- AENV set the total amount of water available for allocation in the Red Deer River sub-basin at 600,000 cubic decameters (dam³), an amount which would be subject to re-evaluation from time to time with new information on the aquatic environment and the reliability of new licences.
- AENV continue to consider the SSRB as a whole in order to meet the *Master Agreement on Apportionment*. A committee consisting of sub-basin representatives will be formed to provide advice to AENV on how best to meet apportionment on an operational basis.
- AENV establish the following Water Conservation Objectives (WCOs):
 - Bow (Bears paw Dam to Bassano Dam), Oldman, St. Mary, Belly, and Waterton Rivers WCOs:
A rate of flow 10 per cent greater than the existing instream objectives (Bow and Oldman rivers) or 10 per cent greater than the existing WCOs for the St. Mary, Belly, and Waterton rivers to improve the aquatic environment and riparian health.

¹ Only the Phase One components of this draft plan are presently approved. Once approved by the Lieutenant Governor-in-Council, this plan will be an "Approved Water Management Plan" as defined by the *Water Act*.

- Bow River (Bassano Dam to mouth) WCO:

A rate of flow of 17.1 cubic meters per second (cms) to improve the aquatic environment and riparian health.

- South Saskatchewan River WCO:

A rate of flow of 42.5 cms to improve the aquatic environment and riparian health.

- Red Deer River WCO:

Upstream of confluence with Blindman River:

- A rate of flow that is 45% of the natural rate of flow, or 16 cms, whichever is greater at any point in time, for all future licences and licences with a retrofit provision.

Downstream of confluence with Blindman River:

- For future licences for withdrawals from November to March, inclusive:
A rate of flow that is 45% of the natural rate of flow, or 16 cms, whichever is greater at any point in time.
- For future licences for withdrawals from April to October, inclusive:
A rate of flow that is 45% of the natural rate of flow, or 10 cms, whichever is greater at any point in time.
- For licences with a retrofit provision:
A rate of flow that is 45% of the natural rate of flow, or 10 cms, whichever is greater at any point in time.

This WCO is designed to permit water diversion while setting a limit on negative impacts on the aquatic environment.

- AENV apply for licences to permit water to be held for WCOs or protection of the aquatic environment in response to opportunities to secure water for these purposes.
- The *South Saskatchewan Basin Water Allocation Regulation* (1991) be repealed.
- The Director is authorized to consider applications for transfers of water allocations.
- The Director is authorized to withhold up to 10 per cent of the volume of water being transferred if it is considered to be in the public interest to protect the aquatic environment or to implement a WCO.
- The Director shall consider the matters and factors provided in this plan in making decisions on applications for licences, preliminary certificates, approvals, or transfers of an allocation of water.
- To improve the efficiency, effectiveness and productivity of water use in the Bow, Oldman, and South Saskatchewan River sub-basins, AENV will act in three broad water management areas:
 - continue to improve water management and administration of water allocations,

- support the development of water markets for transfers to accommodate re-distribution of water already allocated, and
- encourage improvements in water conservation by water users.
- In the Bow, Oldman, and South Saskatchewan River sub-basins, opportunities to restore flows to meet WCOs should be taken. Licence holders will be encouraged to take voluntary action to help restore flows.
- Watershed Planning and Advisory Councils (WPACs) are encouraged to consider the priorities in their watersheds and undertake future watershed management planning with this water management plan as a foundation. A number of priorities are suggested.
- No licence will be cancelled for the sole reason of accomplishing recommended outcomes of this plan. Normal administration of water allocations by Alberta Environment will continue, which may involve canceling licences on grounds stated in the *Water Act*.

A. Background

1. Introduction

This is the draft (Approved²) Water Management Plan for the South Saskatchewan River Basin (SSRB), which comprises the Red Deer, Bow, Oldman, and South Saskatchewan River sub-basins within Alberta (Figure 1). The plan applies to all of the named rivers and their tributaries, including all natural water sources with hydrological connection to them. Groundwater that is hydraulically directly connected to surface water is subject to this plan.

This plan reflects the balance that the Government of Alberta is striving to achieve for Albertans between protection of the aquatic environment of SSRB's main rivers, and the water diversion and consumption that contributes to economic prosperity in southern Alberta. The plan was prepared as a result of receiving Albertans' views on the direction water management should take in the SSRB.

This plan will provide the foundation for future watershed management planning for sub-basins in the SSRB.

The key objectives of the planning process were to:

- provide a strategy that balances water consumption and environmental protection in the SSRB, including establishing Water Conservation Objectives (WCOs) and the volume of water that may be available for future allocation;
- review the 1990 *Water Management Policy for the SSRB*;
- review the 1991 *South Saskatchewan Basin Water Allocation Regulation*; and
- determine the matters or factors that the Director must consider in making decisions on applications for approvals, preliminary certificates, licences, or transfers of water allocations.

The plan authorizes and/or recommends the use of:

- water allocation transfers,
- water conservation holdbacks,
- WCOs,
- Crown reservation of water (i.e. the Minister of Environment specifying how water currently unallocated should be used), and
- not accepting licence applications for a specified period of time.

The planning process was guided by a Steering Committee with representatives from Alberta Environment; Alberta Agriculture, Food and Rural Development (Irrigation Branch); Alberta Sustainable Resource Development; and Fisheries and Oceans Canada.

The public consultation process is described in Appendix A. Basin Advisory Committees (BACs) were integral to this process and their report, "Water Management Recommendations," provided the foundation for this plan.

² Only the Phase One components of this draft plan are presently approved. Once approved by the Lieutenant Governor-in-Council, this plan will be an "Approved Water Management Plan" as defined by the *Water Act*.



Figure 1: The SSRB Planning Area

2. Context for the Plan and Issues Considered

In Alberta, our quality of life - and life itself - depends on having a safe and sustainable water supply for the environment, our communities, and economic well-being. Population growth, and agricultural and industrial developments are increasing the demand and pressure on Alberta's water supplies, and aquatic ecosystems. Nowhere in Alberta is this more apparent than in the SSRB.

The issues considered in this plan have arisen as a result of questions about the availability of water in the SSRB for all uses. These issues include:

- Meeting water demand and consumption:
 - increasing demand for water relative to supply;
 - unresolved water needs of some First Nations;
 - the suitability of the limits on water allocations to irrigation;
 - significant water supply risks to new licence holders in drier years in the Bow, Oldman, and South Saskatchewan River sub-basins;
 - Alberta's ability to meet the *Master Agreement on Apportionment*; and
 - differences in sub-basin water contributions required to meet the *Master Agreement on Apportionment*.
- Protecting the aquatic environment:
 - poor and declining health of the aquatic environment in portions of the SSRB;
 - increased stress on the aquatic environment as licence use increases;
 - significant imbalances in some parts of the basin between water consumption and flows required to sustain functioning aquatic ecosystems;
 - negatively affected riparian vegetation due to water diversion, storage, and land use management; and
 - knowledge gaps concerning how the aquatic environment (which includes riparian vegetation) responds to changes in river flow regimes (e.g., measuring performance of flow restoration efforts).

A premise for the planning process was that no licence would be cancelled for the sole reason of accomplishing recommended outcomes of the water management plan. Normal administration of water allocations by Alberta Environment will continue, and this may involve cancelling licences on grounds stated in the *Water Act*.

B. Recommendations and Provisions

Recommendations in this plan represent advice to the Minister of Environment and the Director, who are solely responsible for making decisions under the *Water Act*. The provisions described in this plan are other actions to be taken by Alberta Environment.

1. Place Water Resource Limits on the Bow, Oldman, and South Saskatchewan River Sub-basins

Recommendations

- That AENV stop accepting applications for new water allocations in these sub-basins until a Crown reservation is in place in order to determine the purposes for unallocated water.
- That AENV establish a Crown reservation that will make water that is unallocated available for purposes such as:
 - First Nations requirements,
 - storage of peak flow,
 - protection of the aquatic environment, and
 - innovative initiatives with a very low net use of water.

Rationale

Alberta Environment (AENV) recognizes and accepts that the limits for water allocations are being reached in the Bow, Oldman, and South Saskatchewan River sub-basins.

The flow regimes of the Bow and Oldman rivers and southern tributaries has been altered by water diversions. This has created risks for both consumptive users and the aquatic environment. For example, in drier years, low priority licences may not receive their total allocations. Existing diversions have also adversely affected the aquatic environment, including riparian vegetation in the Bow, Oldman, and South Saskatchewan River sub-basins. Issuing more licences would compound these adverse aquatic effects.

2. Place Water Resource Limits on the Red Deer River Sub-basin

Recommendations

- That AENV set the total amount of water available for allocation in the Red Deer River sub-basin at 600,000 cubic decameters (dam³).
- AENV ensure water remaining in excess of the 600,000 dam³ is reserved for the aquatic environment.

Rationale

The Red Deer River has fewer allocations than other rivers in the SSRB and, hydrologically, has the healthiest aquatic environment. The 600,000 dam³ will support future growth while limiting impacts on the aquatic environment. This volume will also prevent licences with an unacceptably high risk of not being able to obtain their full allocations in drier years from being issued and help limit possible future increases in risk to existing licences. However, this volume should be re-evaluated from time to time as more information becomes available on the aquatic environment or the reliability of new licences.

The 600,000 dam³ includes:

- Sum of existing licences, pending applications and future projections.

- This allows for future irrigation demand to reach 39,271 hectares, the area limit for the Red Deer River sub-basin specified in the *South Saskatchewan Basin Water Allocation Regulation*, as well as non-irrigation demand to reach the medium growth projection for 2046.

3. Establish Water Conservation Objectives (WCOs)

The WCOs recommended in this plan specify minimum flow rate targets to be achieved through gradual flow restoration or allocation (in the case of the Red Deer River).

In this plan, WCOs are recommended downstream of major dams and diversions for the following rivers:

- Red Deer downstream of the Dickson Dam
- Bow River downstream of the Bearspaw Dam
- Oldman River downstream of the Oldman River Dam
- St. Mary River downstream of the St. Mary River Dam
- Belly River downstream of the uppermost diversion
- Waterton River downstream of the Waterton River Dam
- All of the South Saskatchewan River

Recommended Water Conservation Objectives

- Red Deer River WCO:

Upstream of confluence with Blindman River:

- A rate of flow that is 45% of the natural rate of flow, or 16 cms, whichever is greater at any point in time, for all future licences and licences with a retrofit provision.

Downstream of confluence with Blindman River:

- For future licences for withdrawals from November to March, inclusive:
A rate of flow that is 45% of the natural rate of flow, or 16 cms, whichever is greater at any point in time.
- For future licences for withdrawals from April to October, inclusive:
A rate of flow that is 45% of the natural rate of flow, or 10 cms, whichever is greater at any point in time.
- For licences with a retrofit provision:
A rate of flow that is 45% of the natural rate of flow, or 10 cms, whichever is greater at any point in time.

This WCO is designed to permit water diversion while setting a limit on negative impacts on the aquatic environment.

Operating practices of the Dickson Dam will continue to be improved and enhanced.

Rationale

This WCO would permit water diversion for economic development in the Red Deer River sub-basin while setting a limit on negative impacts on the aquatic environment.

The minimum flow of 16 cms is that required to meet water quality standards for the flow dependent variables of dissolved oxygen and temperature (for fish) during the winter, due to the present nutrient loadings from point and non-point sources.

This WCO will require that future water allocation licences, particularly those requiring year round diversion, will have to include water storage, as water is likely to be unavailable for diversion during the winter months.

- Bow (Bears paw Dam to Bassano Dam), Oldman, St. Mary, Belly and Waterton Rivers WCOs:
 - Rate of flow 10 per cent greater than the existing instream objectives (Bow and Oldman rivers) or 10 per cent greater than the existing WCOs for the St. Mary, Belly, and Waterton rivers. (See Appendix 'E' for existing instream objectives and WCOs.)
 - These WCOs for the St. Mary, Belly, and Waterton Rivers should be applied to any licences issued after May 1, 2005 (i.e., for applications received prior to the decision to no longer accept new applications).
 - In the Oldman (except as above), Bow and South Saskatchewan River sub-basins, licences issued for applications pending on May 1, 2005 and existing licences with a retrofit provision should be subject to the existing instream objectives or existing WCOs (see Appendix 'E' for existing instream objectives and WCOs).

Rationale

The lower reaches of these rivers have unhealthy riparian areas and degraded aquatic environments due to water diversions. While WCOs will not fully restore the aquatic environment, they will permit opportunities for improvement.

Research and monitoring of the aquatic system will be a priority in order to support any refinements to the WCOs.

- Bow River (Bassano Dam to mouth) WCO:
 - 17.1 cms

Rationale

This WCO would serve to improve the aquatic environment and riparian health, which are currently rated as degraded and unhealthy, respectively.

- South Saskatchewan River WCO:
 - 42.5 cms

Rationale

The WCO is the current rate of flow AENV attempts to maintain at Medicine Hat as an operational practice. It is also the rate of flow at which many of the licence holders must stop diverting from the South Saskatchewan River. The WCO would serve as a flow restoration target, but in dry years this rate of flow may not always be maintained if storage in the Oldman Reservoir is not available.

4. Repeal the South Saskatchewan Basin Water Allocation Regulation (1991)

Recommendation

- The Regulation be repealed.

Rationale

The Regulation is superseded by the recommendations and provisions of this plan that set limits on water allocations.

5. SSRB sub-basins continue to be treated as a whole to meet the *Master Agreement on Apportionment* (1969)

Provisions

- All of the sub-basins on the SSRB will continue to be treated as a whole in order to meet the *Master Agreement on Apportionment*.
- In order to address concerns regarding sub-basin contributions to apportionment:
 - A committee with representation from each of the WPACs and the South Saskatchewan River sub-basin will be formed. The committee will provide advice to AENV Water Management Operations on an annual basis (more frequently if required) on how to best meet apportionment on an operational basis; and
 - The WPACs and representatives from the South Saskatchewan River sub-basin should develop criteria to be considered in providing this advice.

Rationale

Under the 1990 *SSRB Water Management Policy*, the basin has operated as a single unit to meet requirements of the *Master Agreement on Apportionment*. This permits flexibility in drawing on the sub-basins in response to annual variations in water supply and demand.

6. Use of Water Allocation Transfers and Water Conservation Holdbacks and Matters and Factors that Must be Considered When Making Decisions.

Some water management tools provided by the *Water Act* require authorization by an Approved Water Management Plan. The SSRB Approved Water Management Plan, Phase One (2002) authorized water allocation transfers and water conservation holdbacks. This draft (Approved) SSRB Water Management Plan continues these authorizations, as detailed below.

- Water Allocation Transfers

The Director (as designated under the *Water Act*) is hereby authorized to consider applications to transfer water allocations under licences in the SSRB in Alberta, subject to sections 81, 82 and 83 of the *Water Act*.

In order for a transfer to proceed, an application for the transfer must be submitted to AENV. The AENV designated Director decides whether the transfer will be allowed. If a

transfer is allowed to proceed, then a new licence is issued for the transferred allocation. The Director may attach conditions to a licence transfer.

Under section 82(5) of the *Water Act*, an Approved Water Management Plan can identify matters and factors that must be considered by the AENV designated Director in making a decision on an application for a water allocation transfer. The matters and factors that must be considered in the SSRB are listed in Table 1.

Only allocations of "licences in good standing" can be transferred (see definition in Glossary).

Under the *Water Act* (81(6)), proposed transfers must undergo public review. The applicant for a transfer must also provide public notice of the application. Directly affected parties can submit statements of concern.

AENV will maintain a public list of water allocation licences to assist interested parties in arranging transfers. This list will include the volume and priority for each licence.

- Water Conservation Holdbacks

The Director is hereby authorized to withhold up to 10 per cent of an allocation of water under a licence that is being transferred, if the Director is of the opinion that withholding water is in the public interest to protect the aquatic environment or to implement a Water Conservation Objective.

Water conservation holdbacks permit up to 10 per cent of the volume of a transferred allocation to remain in the river for the benefit of the aquatic environment, to implement a WCO, or the withheld water may be reserved (section 35 of *Water Act*) or added to an existing reservation.

Section 83(1) of the *Water Act* states:

If the Director is of the opinion that withholding water is in the public interest to protect the aquatic environment or to implement a Water Conservation Objective, and the ability to withhold water has been authorized in an applicable approved water management plan or order of the Lieutenant Governor in Council, the Director may withhold up to 10 per cent of an allocation of water under a licence that is being transferred.

The Director may withhold less than 10 per cent if a smaller amount of water is sufficient to protect the aquatic environment or to implement a WCO. When the point of diversion is being moved a significant distance downstream, a holdback may not be justifiable as the entire allocation is then contributing to increased flows over a greater distance.

It is recommended that withheld water remain in the river through a WCO licence.

- Matters and Factors that Must be Considered in Making Decisions on Applications for Licences, Preliminary Certificates or Approvals

The *Water Act* contains a provision (section 51(4)) that an Approved Water Management Plan can identify matters and factors that must be considered by the AENV designated Director in making decisions on applications for water licences, preliminary certificates or approvals. The matters and factors that must be considered in the SSRB are listed in Table 2.

Table 1. Matters and factors that must be considered in making decisions on applications for a transfer of an allocation of water under a licence in the SSRB

Matters and Factors	Guideline
Existing, potential and cumulative effects on the aquatic environment and any applicable instream objective and/or Water Conservation Objective	<ul style="list-style-type: none"> • No significant adverse effect on the aquatic environment resulting from the transfer • No significant adverse effect on existing instream objectives or Water Conservation Objectives resulting from the transfer
Existing, potential and cumulative hydraulic, hydrological and hydrogeological effects	<ul style="list-style-type: none"> • No significant adverse effect.
Existing, potential and cumulative effects on household users, traditional agriculture users and other higher and lower priority licensees	<ul style="list-style-type: none"> • From the <i>Water Act</i>, Section 82(3)(b): <i>the transfer of the allocation, in the opinion of the Director, does not impair the exercise of rights of any household user, traditional agriculture user or other licensee other than the household user, traditional agriculture user or other licensee who has agreed in writing that the transfer of the allocation may take place</i>
With respect to irrigation, the suitability of the land to which the allocation of water is to be transferred for irrigated agriculture	<ul style="list-style-type: none"> • The land must be suitable for irrigated agriculture: Class 4 or better in accordance with the standards of Alberta Agriculture, Food and Rural Development
The historic volume, rate and timing of the diversion under the original licence	<ul style="list-style-type: none"> • No significant adverse effect.
The volume, rate and timing of the diversion under the proposed new licence	<ul style="list-style-type: none"> • No significant adverse effect.
Location of the existing diversion and the proposed new diversion	<ul style="list-style-type: none"> • No significant adverse effect.
Water quality (including public health and safety and assimilative capacity)	<ul style="list-style-type: none"> • No significant adverse effect on public health and safety or assimilative capacity
The linkages between surface and ground water and the effects or changes in the overall system of water use	<ul style="list-style-type: none"> • No significant adverse effect on groundwater quantity or quality
Existing, potential and cumulative effects on the operation of reservoirs or other water infrastructure	<ul style="list-style-type: none"> • No significant adverse effect on operations unless the reservoir or infrastructure licensee agrees it is feasible to adjust operations to mitigate effects
Current conditions on the licence from which water is to be transferred	<ul style="list-style-type: none"> • In the case of a transfer of part of an allocation, there will be no adjustments to the current conditions on the part of the allocation that is not being transferred, unless necessary to give effect to the transfer
<i>Master Agreement on Apportionment</i> (Alberta's commitments to Saskatchewan)	<ul style="list-style-type: none"> • The terms of the <i>Apportionment Agreement</i> will be respected
Existing treaty rights and other interests of First Nations in Alberta.	<ul style="list-style-type: none"> • Government of Alberta <i>First Nation Consultation Policy on Land Management and Resource Development</i>, 2005, as amended
The <i>Water Act</i> (82)(5)(c)(iv) also provides that the Director may consider any other matters applicable to the transfer of the allocation that the Director considers relevant.	

Table 2. Masters and factors that must be considered in making decisions on applications for licences, preliminary certificates or approvals affecting surface water in the SSRB

Matters and Factors	Guideline
Existing, potential and cumulative effects on the aquatic environment and any applicable instream objective and/or Water Conservation Objective	<ul style="list-style-type: none">• No significant adverse effect on the aquatic environment• No significant adverse effect on existing instream objectives or Water Conservation Objectives
Existing, potential, and cumulative hydraulic, hydrological and hydrogeological effects	<ul style="list-style-type: none">• No significant adverse effect
With respect to irrigation, the suitability of the land for irrigated agriculture	<ul style="list-style-type: none">• The land must be suitable for irrigated agriculture: Class 4 or better in accordance with the standards of Alberta Agriculture, Food and Rural Development
Existing, potential, and cumulative effects on the operation of reservoirs or other water infrastructure	<ul style="list-style-type: none">• No significant adverse effect on operations unless the reservoir or infrastructure licensee agrees it is feasible to adjust operations to mitigate effects
Existing treaty rights and other interests of First Nations in Alberta.	<ul style="list-style-type: none">• Government of <i>Alberta First Nation Consultation Policy on Land Management and Resource Development, 2005</i>, as amended

7. Water Management Strategies to be Developed

AENV and water users should pursue broad water management strategies to help ensure water availability for economic development and the aquatic environment in the SSRB.

Water Demand and Consumption

- Improvements in water management and administration of allocations
 - Alberta Environment will improve its water management and administration by, for example:
 - tracking actual water use,
 - upgrading computer modeling capabilities, and
 - exploring innovations and improvements in water licencing and legislation in order to better match allocations with needs.
- Water markets
 - AENV will support the development of water markets for transfers to accommodate the re-distribution of water already allocated in the SSRB.
- Water conservation
 - Improvements in water conservation methods will be encouraged.

The Aquatic Environment

- High Flow Events and Dam Management
 - Major on-stream dams owned and operated by the Alberta Government are managed to safely pass flows resulting from significant precipitation and snow melting events that occur upstream. Flow releases are made in accordance with flood operating procedures so that the flood is passed through the facility without jeopardizing the integrity of the dam and in a manner that attempts to minimize the impacts of high flows downstream on infrastructure and public safety. After the inflows have peaked, releases are reduced in a staged manner to return the reservoir to its target level for that time of year. During this time, there may be opportunities for flow management to provide benefits for the aquatic and riparian environment. These opportunities depend on many things, including the time of year, reservoir storage levels, the magnitude of releases, and biological benefits.
 - Minor changes in dam operating practices could have more implications to the aquatic environment than transfers or holdbacks. For example, judicious flow reduction after a high flow event could greatly benefit replenishment of cottonwood poplar trees, in the right conditions.
 - Operating practices will continue to be improved and enhanced.
- Protection and Management of Riparian Vegetation
 - AENV will complete the Aquatic and Riparian Condition Assessment (ARCA) for the mainstem rivers of the SSRB to help protect and manage riparian vegetation. Protection and management of riparian vegetation requires suitable water and land management. Land management is outside the jurisdiction of AENV, however, AENV will work in partnership with the WPACs to prepare watershed management plans to encourage healthy riparian ecosystems.
- Flow Restoration in the Bow, Oldman, and South Saskatchewan River Sub-basins
 - Opportunities to restore flows should be taken. Licence holders will be encouraged to take voluntary flow restoration actions.
 - Research should be conducted to determine how increments of flow restoration will benefit the aquatic environment.
 - Operating licences for government dams and WCO conditions on diversion licences should be revised if measurable amounts of flow are licenced for WCOs or protection of the aquatic environment. This will ensure the increased instream flow remains in the river, subject to priorities.
 - Discussions should be held with senior priority licence holders regarding voluntary withdrawal restrictions to prevent withdrawals of restored flows. These discussions are important as the priority of senior licences would likely permit the withdrawal of restored flow water.
- Allow private parties to hold licences for Water Conservation Objectives
 - Currently, the *Water Act* specifies that only the government can apply for and hold a licence for a water conservation objective. However, as a result of public input, AENV will put forward a proposal to amend the *Water Act* to permit private parties to hold such licences, when obtained under the transfer provisions of the *Water Act*.

- **Water Quality**
 - Water quality should be studied in more detail throughout the SSRB. This will support further decision making as to sustaining growth and managing the rivers to enhance aquatic life.
- **Maintenance of the Red Deer River Sub-basin's Aquatic Environment**
 - The Red Deer River's aquatic environment is a research priority as it is currently the healthiest (hydrologically) of the SSRB rivers. Research should focus on monitoring the impacts of additional allocations. Additional monitoring and study should also be carried out on the flows required for waste assimilation. With further research, the WCO and allocation volume (600,000 dam³) may be adjusted to minimize or prevent unacceptable impacts. If monitoring reveals potential problems, adaptive management principles will be applied.
 - If it is determined 16 cms winter minimum flow is no longer required to meet water quality requirements, consideration will be given to storing the surplus water in Glennifer Lake to the extent possible to supplement high flow events for the benefit of the aquatic environment.

C. Other Items

1. Future Watershed Management Planning Priorities

Watershed Planning and Advisory Councils (WPACs) are encouraged to consider the priorities in their watersheds and undertake future watershed management planning with this water management plan serving as a foundation. The recommendations report of the Basin Advisory Committees and the *Water For Life* strategy both contain suggested priorities. These include: Holistic watershed management, performance indicators, land uses, economic planning, water conservation, water quality, groundwater, objectives for aquatic ecosystems and evaluation of infrastructure needs (e.g. storage).

2. Performance Monitoring Requirements

In consultation with the WPACs, performance monitoring of the aquatic environment should be conducted, including:

- Flow monitoring to confirm water modelling results and adherence to designated WCOs.
- Tracking and reporting of actual water diversions and consumption.
- Water quality monitoring, particularly of dissolved oxygen and temperature, to confirm modelling results and to help ensure protection of the aquatic environment. Additional parameters such as nutrients and pesticides can be monitored using the Long-term River Network program and targeted water quality initiatives.
- Assessments of biological communities, particularly fish populations and riparian forests.

Research and monitoring of the aquatic system will be a priority in order to support any refinements to the WCO and allocation recommendations.

3. First Nations Involvement

AENV is currently assessing First Nation involvement in WPACs.

4. Schedule for Review of the Plan

No specific schedule is in place to review the plan. Plan revisions will be considered, if and when required, as new information becomes available and according to WPAC input. The *Water Act* (section 12) describes the process for revisions.

D. References

Information on the SSRB Water Management Plan and the background studies can be found at: www3.gov.ab.ca/env/water/regions/ssrb/index.asp

Activation Analysis, 2005. *Alberta Environment Expert Workshop on Water Allocation Strategies for Limited Water Supplies*. Prepared for Alberta Environment. Edmonton, Alberta. 29 pp.

Alberta Environment, 2002a. *The Framework for Water Management Planning*. 37 pp.

Alberta Environment, 2002b. *South Saskatchewan River Sub-basin Contributions to International and Interprovincial Water-sharing Agreements*. Edmonton, Alberta. 28 pp. + App.

Alberta Environment, 2003a. *South Saskatchewan River Basin Water Allocation*. Southern Region, Calgary, Alberta. 12 pp. + App.

Alberta Environment, 2003b. *South Saskatchewan River Basin Water Management Plan, Phase Two: Background Studies*. Pub. No.: I/943. Edmonton, Alberta. 24 pp.

Alberta Environment, 2003c. *South Saskatchewan River Basin, Water Management Plan, Phase 2, Scenario Modelling Results, Part 1*. Pub. No.: 710 (Revised). Edmonton, Alberta. 31 pp + App.

Basin Advisory Committees for the South Saskatchewan River Basin, 2004. *Water Management Recommendations*. Equus Consulting Group. Edmonton, Alberta. 19 pp.

Clipperton, G. K., C. W. Koning, Allan G. H. Locke, John M. Mahoney, and B. Quazi. 2003. *Instream Flow Needs Determinations for the South Saskatchewan River Basin, Alberta, Canada*. Alberta Environment and Alberta Sustainable Resource Development, Pub. No: T/719, Calgary, Alberta. 271 pp. + App.

Cows and Fish, Alberta Riparian Habitat Management Society, 2005. *South Saskatchewan River Basin Riparian Health Overview*. Report No. 026. Lethbridge, Alberta. 341 pp.

Golder Associates, 2003. *Report on Strategic Overview of Riparian and Aquatic Condition of the South Saskatchewan River Basin*. Prepared for Alberta Environment. Edmonton, Alberta. 29 pp. + App.

Government of Alberta, 2003. *Water for Life: Alberta's Strategy for Sustainability*. Edmonton, Alberta. 31 pp.

Government of Alberta, 2002. *Water Management Plan for the South Saskatchewan River Basin, Phase One, Water Allocation Transfers*. (O.C. 321/2002) Pub. No: T/661. Edmonton, Alberta. 17 pp.

Government of Alberta, 1999. *Water Act*. Edmonton, Alberta.

Government of Alberta, 1991. *South Saskatchewan Basin Water Allocation Regulation (Alberta Regulation 307/1991)*. Edmonton, Alberta. 7 pp.

Government of Alberta, 1990. *South Saskatchewan River Basin Water Management Policy*. Edmonton, Alberta. 3 pp.

Hydroconsult EN3 Services Ltd., 2002. *South Saskatchewan River Basin Non-irrigation Water Use Forecasts*. Prepared for Alberta Environment. Edmonton, Alberta. 48 pp.

Irrigation Water Management Study Committee, 2002. *South Saskatchewan River Basin: Irrigation in the 21st Century. Volume 1: Summary Report*. Alberta Irrigation Projects Association. Lethbridge, Alberta. 175 pp.

Prairie Provinces Water Board, 1969. *Master Agreement on Apportionment*.

E. Glossary

AENV ~ Alberta Environment

Allocation ~ The volume, rate and timing of a diversion of water. When water is redirected for a use other than for household purposes (use by an owner of property adjacent to a water body or from an aquifer), it is referred to as an allocation. All water users (except for household users) apply to Alberta Environment for a licence to use a set allocation of water.

Apportionment ~ (see *Master Agreement on Apportionment*)

Approval ~ Under the *Water Act*, an approval provides authority for constructing works or for undertaking an activity within a water body. The approval includes conditions under which the activity can take place.

Aquatic Environment ~ (As defined in Alberta's *Water Act*) The components of the earth related to, living in or located in or on water or the beds or shores of a water body, including but not limited to all organic and inorganic matter, and living organisms and their habitat, including fish habitat, and their interacting natural systems.

BAC / Basin Advisory Committee ~ Established in each of the four sub-basins of the South Saskatchewan River Basin to provide advice for the SSRB Water Management Plan. Members of the BACs represented all sectors interested in water management in the sub-basin. Each sector selected its own representatives on the BAC. Typical sectors represented in a BAC include irrigation agriculture, non-irrigation agriculture, ecosystem protection/environmental, First Nations, industry, municipal and recreation.

cfs ~ cubic feet per second

cms ~ cubic metres per second

Condition on Licences ~ The terms of the licence that must be followed.

Crown Reservation ~ Section 35(1) of the *Water Act* states that "the Minister may by order reserve water that is not currently allocated under a licence or registration or specified in a preliminary certificate

- (a) in order to determine how the water should be used, or
- (b) for any other purpose."

dam³ ~ decametres cubed (1,000 cubic meters). 1 dam³ = 0.81 acre feet.

Director ~ For purposes of administration of the *Water Act*, certain staff in Alberta Environment, such as Approvals Managers, are designated as "Director". Under the *Water Act* the Director has sole authority to make decisions concerning a number of specified subjects, e.g., transfers, holdbacks, establishing WCOs.

Dissolved Oxygen ~ Amount of available oxygen contained in the water, but not including the oxygen that is part of the water molecule (H₂O). Expressed as milligrams per litre.

Instream Flow ~ The rate of flow in a river, without reference to its purpose.

Instream Needs / Instream Flow Needs (IFN) ~ This is the scientifically determined amount of water, flow rate, water level or water quality that is required in a river or other body of water to sustain a healthy aquatic environment or to meet human needs such as recreation, navigation, waste assimilation, or aesthetics.

Instream Objectives ~ Flows that are to remain in the river via dam operations or as a restriction on licences. Instream Objectives are in place in all SSRB rivers below dams, although some offer limited protection of the aquatic environment. Instream Objectives have usually been set in response to fish habitat instream needs (the Fish Rule Curve) and/or water quality.

Irrigation District ~ An organization that owns and manages a water delivery system for irrigation for a given region. In Alberta, there are 13 irrigation districts. Some districts convey water for other purposes such as municipal use and stockwatering.

Licence In Good Standing ~ This term is used in Alberta's *Water Act*, but is not defined. One of the issues that must be determined by the Director is whether or not the allocation of water to be transferred is held "under a licence in good standing" (*Water Act*, s. 81(7)(c)).

The licence has to be in good standing at the time the Director considers the application (that is, it already exists in good standing or the licence holder brings the licence into good standing prior to the time when the Director considers the application to transfer.)

Examples of a licence not in "good standing":

- breach of the *Water Act*
- subject to an investigation under the *Water Act*
- subject to an enforcement tool or prosecution
- breach of terms and conditions of the licence
- non-compliance with the terms and conditions (e.g. did not build the diversion site within the specified period)

Master Agreement on Apportionment ~ Schedule A of the 1969 *Master Agreement on Apportionment* for the South Saskatchewan River between Alberta and Saskatchewan allows Alberta to "divert, store or consume" from the river system each year, a volume of water equal to one-half of the apportionable flow of the South Saskatchewan River at the Alberta-Saskatchewan boundary. The remaining volume of flow must be allowed to pass downstream into Saskatchewan. The exception to this general rule is that Alberta is entitled to divert, store or consume a minimum of 2.1 million-acre feet in any year. The effect of this exception is that during years when the volume of natural flow is less than 4.2 million-acre feet (a rare occurrence), Alberta may pass less than one-half of the apportionable flow to Saskatchewan. If at any time during a year Alberta wants to divert, store or consume more than half the apportionable flow, a flow rate of 1,500 cubic feet per second (cfs) must be maintained at the Saskatchewan border, unless the natural flow is less than 3,000 cfs, in which case half the natural flow must be passed. (*There is no policy in Alberta as to the amount of water each sub-basin of the SSRB must contribute to the Saskatchewan apportionment.*)

Natural Flow / Natural Rate of Flow ~ Natural flow is the flow in rivers that would have occurred in the absence of any man-made effects on, or regulation of, flow. For purposes of water management, natural flow is a calculated value based on the recorded flows of contributing rivers; a number of factors concerning the river reaches (e.g. evaporation, channel

losses, etc.); and water diversions. This is also known as “re-constructed flow” and “naturalized flow”.

Preliminary Certificates ~ An authorization issue by the Director to issue a licence if certain conditions are met.

Reservoir ~ A man-made structure which collects and stores water. During periods of low river flow, government reservoirs may release additional flow if water is available.

Retrofit Provision ~ Water licenses issued in recent years contain a condition indicating that once a water conservation objective is established, the licence may be amended to include the objective. The licence holder would then not be permitted to withdraw water when river flow is less than the objective.

Riparian Area ~ The area along streams, lakes, and wetlands where water and land interact. These areas support plants and animals, and protect aquatic ecosystems by filtering out sediments and nutrients originating from upland areas.

Riparian Vegetation ~ The vegetation that exists in riparian areas and is supported by the interaction of the water and land.

River Basin ~ An area of land drained by a river and its associated streams or tributaries. Alberta's *Water Act* identifies seven major river basins within the province:

- Peace/Slave River Basin
- Athabasca River Basin
- North Saskatchewan River Basin
- South Saskatchewan River Basin
- Milk River Basin
- Beaver River Basin
- Hay River Basin

SSRB ~ South Saskatchewan River Basin. The South Saskatchewan River Basin includes the sub-basins of the Red Deer River, Bow River, and Oldman River (including the South Saskatchewan).

Southern Tributaries ~ This term refers to the St. Mary, Belly and Waterton rivers, which are also collectively referred to as the southern tributaries of the Oldman River.

Sub-basin ~ A part of a river basin drained by a tributary or having characteristics that are significantly different from other areas in the basin.

Surface Water ~ Refers to water bodies such as lakes, ponds, wetlands, rivers, and streams. It may also refer to sub-surface water with a direct and immediate hydrological connection to surface water (for example, a water in a well beside a river).

Voluntary Action ~ Performing an activity freely without compulsion.

WCO ~ Water Conservation Objective

WPAC ~ Watershed Planning and Advisory Council (see *Water for Life: Alberta's Strategy for Sustainability*). In the SSRB (at the time of writing this plan), WPAC's include the Bow River Basin Council and the Oldman Watershed Council. A WPAC is also being formed for the Red Deer River watershed.

Water Act ~ The purpose of Alberta's *Water Act* is to support and promote the conservation and management of water, including the wise allocation and use of water (s.2).

Water Allocation Transfer ~ A water allocation transfer occurs after the holder of an existing water licence agrees to provide all or part of the amount they are allocated to another person or organization. Alberta Environment must approve any transfer of this kind. When this occurs, the allocation is separated from the original land, and a new licence, with the seniority of the transferred allocation, is issued and attached to the new location. Under the *Water Act*, Alberta Environment can place conditions on the new licence. Water allocation transfers can occur only if authorized under an approved water management plan, or by the Lieutenant Governor in Council. See Sections 81,82 and 83 of the *Water Act*.

Water Conservation Holdback ~ If the Director is of the opinion that withholding water is in the public interest to protect the aquatic environment or to implement a Water Conservation Objective, and the ability to withhold water has been authorized in an applicable approved water management plan or order of the Lieutenant Governor in Council, the Director may withhold up to 10 per cent of an allocation of water under a licence that is being transferred. The withholding occurs at the time the new licence created for the transferred allocation is issued (section 82(2) of the *Water Act*).

Water Conservation Objective (WCO) ~ As defined in Alberta's *Water Act*, a Water Conservation Objective is the amount and quality of water necessary for the protection of a natural water body or its aquatic environment. It may also include water necessary to maintain a rate of flow or water level requirements.

From the *Water Act*: "*Water Conservation Objective*" means the amount and quality of water established by the Director under Part 2, based on information available to the Director, to be necessary for the

- (i) protection of a natural water body or its aquatic environment, or any part of them,
- (ii) protection of tourism, recreational, transportation or waste assimilation uses of water, or
- (iii) management of fish or wildlife, and may include water necessary for the rate of flow of water or water level requirements.

A licence can be issued by the Director to the Government of Alberta for the purpose of implementing a Water Conservation Objective.

Water Licence ~ A water licence provides the authority for diverting and using surface water or groundwater. The licence identifies the water source; the location of the diversion site; an amount of water to be diverted and used from that source; the priority of the "water right" established by the licence; and the condition under which the diversion and use must take place.

Water Management Plan ~ Alberta's *Water Act* and *Framework for Water Management Planning* outlines the process for water management planning and the components required for water management plans in the province.

Water Use Efficiency ~ To use the least possible water to accomplish an objective such as growing a crop.

Water Use Effectiveness ~ To use water for purposes that provide the maximum desired benefits for society.

Watershed ~ An area of land that catches precipitation and drains into a larger body of water such as a marsh, stream, river or lake.

Appendices

Appendix A

Public Consultation Process

Phase One

Basin Advisory Committees (BACs) were formed in late 2000 and early 2001. Letters inviting representatives for the BACs were sent to municipalities, Treaty #7 First Nations, major water-using industries, recreation groups with an interest in water, fish and game clubs, environmental organizations, irrigation districts, and agricultural organizations in the SSRB. After initial organizational meetings, the basic structure of the BACs was created.

A number of BAC sessions were held in 2001 to familiarize the members with water management and relevant issues in the SSRB.

In 2001, Alberta Environment (AENV) decided to carry out the planning in phases. The primary purpose of Phase One was to seek public views on the authorization of water allocation transfers, water conservation holdbacks, and the question of not accepting applications for new allocations in the basins of the St. Mary, Belly, and Waterton rivers.

Phase One commenced in October 2001. Several meetings were held with each BAC and in plenary at which the above matters were discussed. Based on these discussions a draft plan was prepared.

During January 2002, public meetings to receive comments on the draft plan were held in Red Deer, Drumheller, Bindloss, Calgary, Brooks, Medicine Hat, and Lethbridge.

Although some people were concerned about the development of a market for water, the public was broadly supportive of authorizing the use of water allocation transfers and water conservation holdbacks in the SSRB.

On the question of AENV no longer accepting applications for new allocations in the basins of the St. Mary, Belly, and Waterton rivers, some opinions were heard that AENV should continue to issue licences indefinitely. Those holding this view saw accepting a high-risk licence as a private business decision. However, most members of the public were in agreement with a set allocation volume in view of the adverse impacts on the aquatic environment and the administrative difficulties of an unlimited number of licences.

The comments were documented and then considered in preparation of the final draft plan. In June 2002 the plan was approved by the provincial cabinet to become the first Approved Water Management Plan in Alberta under the new *Water Act*.

Phase Two

During the final months of Phase One, discussions began on Phase Two. Over a one-year period, background studies for the project were prepared. In June 2003 the studies were completed and a summary booklet of the studies was prepared and provided to the BACs and others. The BACs reviewed the studies during the summer of 2003.

In September of 2003, Equus Consulting Group (Mr. Bill McMillan) was retained by AENV to help the BACs develop recommendations for the draft water management plan. During the next few months each BAC met with Mr. McMillan on several occasions to hear presentations on the background studies and to consider possible recommendations. Chairs and Vice-chairs of the BACs were appointed by the BACs at the suggestion of Mr. McMillan. The Chairs had discussions on a number of occasions with Mr. McMillan, which helped the Chairs understand the differing perspectives of each BAC. In July 2004, the BACs submitted a report on their recommendations to the Steering Committee for the planning project. These recommendations formed the foundation for the water management plan.

During Phase Two, AENV created new staff positions in each region to improve relationships with First Nations. The Aboriginal Consultation Manager for the Southern Region of Alberta Environment held a number of meetings with the Treaty #7 First Nations between April and May 2005. General concerns identified during these meetings were considered in preparation of the water management plan.

Appendix B

Relationship of the Water Management Plan to Other Planning Initiatives

In general, water management plans should “provide broad guidance for water management, set out clear and strategic directions regarding how water should be managed or result in specific actions” (*Framework for Water Management Planning*, p.13). The success of the SSRB water management plan will depend in part on an understanding of the many other commitments and initiatives that affect how water is used and managed in southern Alberta.

This appendix contains a description of the main planning initiatives known to impact water use and conservation in the SSRB, along with some examples of how the initiatives interrelate with the water management plan. Some local watershed initiatives not specifically identified in this appendix. Rather a list of the agencies involved in these initiatives is provided.

Provincial Initiatives

- *Water for Life: Alberta's Strategy for Sustainability*

The Alberta Government has recently adopted a new approach to water management through *Water for Life: Alberta's Strategy for Sustainability*. *Water for Life* outlines key directions and priorities to guide future water management in Alberta.

Water for Life is based on the following commitments to Albertans:

- Albertans will be assured their drinking water is safe.
- Albertans will be assured that the province's aquatic ecosystems are maintained and protected.
- Albertans will be assured that water is managed effectively to support sustainable economic development.

The SSRB Water Management Plan will help towards achieving *Water for Life's* goal of protecting aquatic ecosystems.

The strategy also contains medium-term (2007-10) and long-term (2010-14) outcomes:

- Water management objectives and priorities for sustaining aquatic ecosystems are established through watershed plans.
- Water is managed and allocated to sustain aquatic ecosystems and ensure their contribution to Alberta's natural capital and quality of life are maintained.
- Water management objectives and priorities to support sustainable economic development are established through watershed plans.
- The overall efficiency and productivity of water use in Alberta has improved by 30 per cent from 2005 levels by 2015 (firm targets to be determined by the Provincial Water Advisory Council).

While the Government of Alberta, led by Alberta Environment, will remain accountable and will continue to oversee water and watershed management activities in the province, *Water for Life* identifies three types of partnerships that are integral to achieving stewardship of our water resources:

- a Provincial Water Advisory Council ,
 - Watershed Planning and Advisory Councils (WPACs), and
 - Watershed Stewardship Groups (WSGs)
- *Government of Alberta's First Nation Consultation Policy on Land Management and Resource Development*

The Government of Alberta is responsible for managing the development of its natural resources for the benefit of all Albertans. Alberta acknowledges that the existing Aboriginal and treaty rights of the Aboriginal peoples of Canada are recognized and affirmed by Section 35 of the *Constitution Act* (1982).

Alberta will consult with First Nations where land management and resource development on provincial Crown land may infringe First Nation rights and traditional uses.

- *Sustainable Resource and Environmental Management (SREM)*

The SREM framework is designed to focus provincial government departments on delivering environmental outcomes through integrated policy making and performance measurement. SREM involves a tiered approach to achieving environmental outcomes (see Table below). There is recognition in SREM that environmental quality can be achieved only if the cumulative effects of economic development can be effectively managed through long-term integrated actions. Assessment of the implications of economic development and growth strategies will assist with making appropriate decisions and achieving environmental outcomes.

SREM Tier	Initiatives to Establish Environmental Outcomes
Provincial Scale: Vision & Mission	Government of Alberta and federal business plans; Water for Life; Alberta Agriculture Growth Strategy; Economic Development Strategy; Canada and Alberta Biodiversity Strategies; Alberta Land Use Strategy; Municipal policies
Regional Scale: Priorities	Southern Alberta Sustainability Strategy (SASS), Eastern Slopes Policy
Sub-regional Scale: Objectives	Water Management Plans; Airshed Management Plans; Integrated Land Management/Integrated Resource Planning Policies; Access Management Plans; Municipal Area Structure Plans; Species at Risk; Recovery Plans; Energy development guidelines specific to grasslands; Inter-Municipal Regional Partnership Strategies
Local Scale: Results	Regulatory approvals; Environmental Impact Assessment decisions; Local plans: parks, subdivisions, logging etc.; Stormwater guidelines for streams; Total loading limits for streams; Local Cows & Fish initiatives; Environmental Farm Plans

Regional Initiatives

- *Southern Alberta Sustainability Strategy (SASS)*

At the regional scale, environmental outcomes can be described as “integrated regional priorities” i.e. long-term, integrated, value-based decisions made by making trade-offs between environmental protection and socio-economic development. These decisions require an understanding of the interaction of environmental sectors and media, as well as their interaction with the regional economy. They also require public debate and consensus for action.

The SASS process provides environmental and socio-economic information about the future of the southern Alberta landscapes, which allows for informed public debate about environmental outcomes. Public debate, for example, may focus on such questions as:

- How can protection of instream flows be maintained or improved in a region experiencing rapid economic growth?
- How can future development of natural gas (coalbed methane), timber harvesting, tourism, and recreation continue while protecting the watershed?
- What priority should protection of native grasslands have over development of urban and rural residential housing, energy development, or agriculture?

The desired outcome of the project is fourfold:

- to arrive at societal consensus on the desired future vision for southern Alberta;
- understanding of the major forces driving change and the critical uncertainties facing southern Alberta over the next two generations;
- strategic understanding of the current and emerging socio-economic and environmental situation, issues and opportunities, and their relationship to one another; and
- processes and policy changes required to address future issues and opportunities.

South Saskatchewan River Basin (SSRB)

The following lists describe management plans in place or currently underway in the SSRB, along with other projects and initiatives that may impact water management. Where appropriate, lead government departments are identified.

- *Integrated Resource Plans, Forest Management Plans*
 - Lead: Alberta Sustainable Resource Development
 - Purpose: There is generally one objective per plan (e.g., protection of watersheds)
 - Several plans are either in place or underway
- *Municipal Development Plans*
 - Lead: Urban and rural municipalities
 - Purpose: To guide development towards reducing negative impacts on the environment, including the water resource
 - Several plans are either in place or underway

- *Management Plans for Parks and Protected Areas (National and Provincial)*
 - Lead: Parks Canada; Alberta Community Development
 - Purpose:
 - Parks Canada: As a strategic and long-term guide, a management plan establishes a vision looking 15 or more years into the future. Its primary goal is to ensure that there is a clearly defined direction for the maintenance or restoration of ecological integrity and, in the light of this primary goal, for guiding appropriate use. Management plans outline how our natural heritage will be preserved in each park and protected area.
 - Alberta Community Development: Management plans describe the type and extent of outdoor recreation and tourism opportunities, facilities, and services that will be permitted. These plans have the inherent effect of watershed protection.
 - Several plans are either in place or to be initiated
- *National Water Supply Expansion Program (NWSEP)*
 - NWSEP is a four-year initiative under the Agricultural Policy Framework.
 - Purpose: To reduce the risk of future water shortages through the planning and development of secure, healthy, and reliable water resources.
 - Project tiers include smaller-scale water development projects; larger-scale infrastructure projects (such as regional water pipelines); and strategic initiatives such as studies, planning activities, and/or undertakings that increase the knowledge base of the water resource.
 - In total, the Government of Canada is providing \$12.5 million for projects in Alberta until March 31, 2008.
- *Local watershed initiatives in smaller basins (in place or underway)*
 - Examples include: Little Red Deer River Watershed Initiative, Crowfoot Creek, Nose Creek Watershed Partnership, Beaver Creek Watershed Group, Frank Lake Water Quality Mitigation Initiative, Milk River Watershed Planning and Advisory Council, (proposed), Chestermere Lake Working Group, Grand Valley Creek Partnership, Pine Lake Restoration Society, Grand Valley Creek Partnership, Calgary River Valleys Committee, Alberta Low Impact Development Partnership, Piikani Nation Follow-up Environmental Impact Assessment.
 - A number of local watershed protection groups/initiatives are currently active in the SSRB. These local initiatives can take many forms but are often characterized by private landowners working in partnership with local municipalities and agencies such as:
 - Agriculture and Agri-Food Canada, Prairie Farm Rehabilitation Administration (PFRA)
 - Ducks Unlimited Canada
 - Alberta Agriculture, Food and Rural Development (AAFRD)
 - Department of Fisheries and Oceans (DFO)
 - Alberta Conservation Association (ACA)
 - Cows and Fish, Alberta Riparian Habitat Management Program
 - Community Riparian Program under the Agriculture and Food Council.

These local groups will be key to achieving long-term sustainable watershed management.

Bow River Basin

- *Highwood Water Management Plan*
 - Lead: Alberta Environment
 - Purpose: Phase 1 of the Highwood Management Plan deals with matters directly relevant to the Highwood Diversion Plan and information requirements of the Natural Resources Conservation Board/Canadian Environmental Assessment Agency Joint Review Panel. Phase 2 will address other aspects of water management in the Highwood River Basin, including Water Conservation Objectives and the current moratorium on *Water Act* approvals in the basin. The overall goal is to achieve sustainable water management in the Highwood River, Little Bow River, and Mosquito Creek sub-basins.
 - A Public Advisory Committee (PAC) was formed to advise on the development of the water management plan for the Highwood-Little Bow system.
 - Studies (e.g., Instream Flow Needs) conducted within this process have served as prototypes for other studies within the SSRB
- *Little Bow River and Mosquito Creek Water Quality Protection Plan*
 - Lead: Alberta Environment
 - Purpose: To prepare a Water Quality Protection Plan that will outline the activities in the Little Bow River Basin necessary to achieving a mesotrophic state of water quality in the reservoir.
- *Elbow River Water Management Plan*
 - Lead: The Elbow River Watershed Partnership
 - Purpose. The Partnership was formed in response to a growing concern about the deteriorating water quality in the Elbow River, the increasing urbanization of the Elbow watershed, and concern about relying solely on the government to protect the watershed. The Partnership is preparing a water management plan to address stakeholder concerns.
- *Ghost-Waiparous Access Management Plan*
 - Lead: Alberta Sustainable Resource Development
 - Purpose: To develop an access management plan intended to provide opportunities for recreational use in the Ghost-Waiparous area while maintaining the area's natural resources.
- *The Bow River Basin Council (BRBC)*
 - The BRBC is a multi-stakeholder, charitable organization dedicated to the improvement and protection of the waters of the Bow River Basin, considering:
 - riparian zones,
 - aquatic ecosystems,
 - quality and quantity of water, and
 - effects of land use on surface and groundwater.
 - The BRBC currently has approximately 140 members
 - The Bow Basin Advisory Council (BAC) is one of four basin advisory groups asked to develop recommendations for the SSRB plan. The BAC in the Bow River Basin is a sub-committee of the BRBC.
 - Released *The 2005 Report on the State of the Bow River Basin* on April 29, 2005

Red Deer River Basin

- *Red Deer River Corridor Integrated Management Plan (in place)*
 - Lead: Alberta Environment, Alberta Sustainable Resource Development, Alberta Community Development, municipalities
 - Purpose: The purpose of this integrated management plan is threefold:
 - To coordinate and integrate land and resource management in the corridor to provide long-term, integrated management direction;
 - To mitigate and resolve conflicts between resource uses and minimize impacts of resource uses on historic and natural resources; and
 - To promote sustainable development in the corridor.
 - The plan contains references to water management, river recreation, and fisheries
- *Glennifer Lake Reservoir Shorelands Areas Structure Plan (in place)*
 - Lead: Alberta Environment, Alberta Community Development, municipalities
 - Purpose: Contains policies for reservoir levels for recreation and affects water management for the Red Deer River downstream.
- *Special Areas Water Supply Project (proposed)*
 - Lead: The Special Areas Board (Alberta Municipal Affairs)
 - Purpose: The Board has submitted an application under the *Water Act* to divert and supply water to landowners and communities within the Special Areas.
- *Red Deer River Watershed Public Advisory Committee (WPAC)*
 - There is a proposal to create a WPAC in the Red Deer River Basin.

Old Man River Basin

- *Oldman Watershed Council*
 - The Oldman Watershed Council was formed in September 2004, when the Oldman River Basin Water Quality Initiative merged with the Oldman Basin Advisory Council.
 - The council focuses on five key areas:
 - Provide information and input into water management planning activities that reflect the needs of stakeholders in the Oldman Watershed.
 - Increase awareness and understanding of the Oldman Watershed among residents and stakeholders and encourage commitment and responsibility for water quality and water use.
 - Refine and expand knowledge of water-related conditions and processes throughout the watershed.
 - Promote sustainable land use practices that protect the watershed.
 - Reduce contaminants, such as microbes, nutrients and pesticides, entering surface water and groundwater in the watershed.
 - Members include: Chinook Health Region; Agriculture, Food and Rural Development; Alberta Environment; Alberta Cattle Feeders' Association; Agriculture and Agri-Food Canada; Alberta Cattle Commission; Alberta Health; Alberta Irrigation Projects Association; Alberta Pork Producers; Canbra Foods; City of Lethbridge; County of Lethbridge; Health Canada; Oldman River Intermunicipal Service Agency; Prairie Farm Rehabilitation Administration; Southern Alberta Environmental Group; University of Lethbridge.

- *C5 Forest Management Plan (underway)*
 - Lead: Alberta Sustainable Resource Development
 - Purpose: The C5 Forest Management Plan's purposes are to:
 - Identify goals that define the preferred future forest and the objectives and strategies (operational activities) required to manage the forest area on a sustainable forest management basis.
 - Recognize resource values, uses, and activities, including Aboriginal uses, on the landscape within the framework of the Alberta Advantage.
 - Identify sustainable timber harvest levels (Annual Allowable Cut) for a period equivalent to two forest rotations.
 - Provide the context for the development of Regional Timber Harvest Planning and Operating Ground Rules that are to be produced before 2006
 - Objectives include reducing impacts on the watershed from forest harvesting, road building, and reclamation.
- *Castle River Access Management Plan (underway)*
 - Lead: Alberta Sustainable Resource Development
 - Purpose: The purpose of this plan is to address and provide operational-level direction for the recreational use of on- and off-highway vehicles in the Castle River sub-region. The plan provides a mapped system of routes and trails specifically for that use. The plan may have the incidental benefit of reducing impacts on the watershed from erosion caused by off-road vehicle use

South Saskatchewan River Sub-basin

No water management initiatives are currently underway in this sub-basin.

Appendix C

Issues Not Considered in the Planning Process

A number of issues were outside the scope of the SSRB planning process. These issues included the following:

- Climate change
Climate change was not considered due the absence of “high-confidence” research conclusions on future water supply and demand that may result from climate change. After the SSRB planning process began, a major climate change research initiative for the SSRB commenced. Results of this initiative are expected in 2006.
- Water storage
Water storage as a possible solution to water supply issues was not considered as this issue may be addressed by the WPACs in their watershed management planning initiatives.
- Forced reductions in allocations
A premise of the SSRB water management planning process was that no licence would be cancelled for the sole reason of accomplishing recommended plan outcomes.
- WCOs upstream of major dams and diversions
These WCOs were not seen as a priority.
- Non-point source and point source pollution issues
These issues are better addressed within smaller-scale watershed management plans. Water quality variables considered in the plan were those that are flow dependent (i.e., dissolved oxygen and temperature) as they affect fish and ammonia downstream of wastewater treatment plants. Other forms of pollution such as metals and chemicals are best controlled at the source.
- Number of households or dugouts per parcel
This is a suitable topic for smaller scale watershed management plans. Ministerial Order 4/99 presently limits the number of households per parcel of land to three.
- Groundwater
The planning process focused on surface water issues. Groundwater that is not hydraulically connected to surface water is not considered in this plan.

Appendix D

Summary of the Information Assembled as Part of the Planning Process

This section describes the key information considered during the planning process, including a number of studies specifically prepared to support the process.

Legislation

- *The Water Act*
- *Water (Ministerial) Regulation* (Alberta Regulation 205/98).
- *South Saskatchewan Basin Water Allocation Regulation* (Alberta Regulation 307/1991):
 - has the effect of capping the amount of water that can be allocated to irrigation (by stating areas for which maximum water allocations have been determined) for irrigation districts, private irrigation, and a number of possible irrigation projects, if applications are made
 - does not allocate water or establish a priority date for the projects
 - irrigation area expansion limits for irrigation districts are now incorporated into the *Irrigation Districts Act*.
- *Irrigation Districts Act*
- *Fisheries Act* (federal)

Policies

- *Water Management Policy for the South Saskatchewan River Basin* (1990)
 - Provides six general policies for water management in the SSRB
- *The Framework for Water Management Planning*
- *Water For Life: Alberta's Strategy for Sustainability*
- *Approved Phase One Water Management Plan for the South Saskatchewan River Basin*
 - Authorized water allocation transfers and water conservation holdbacks,
 - provided recommendations to the Director on use of water allocation transfers and water conservation holdbacks, and
 - provided recommendation to the Director to stop accepting applications for new allocations of water from the St. Mary, Belly, and Waterton rivers.

Licences for Dam Operations

- Licences for dams owned and operated by Alberta Environment: Oldman River, Waterton-St. Mary Headworks Project, Dickson Dam.

Existing Instream Objectives

- Existing instream objectives and WCOs (as described in Appendix 'E').

International and Interprovincial Water-sharing Agreements

- *The Master Agreement on Apportionment*
- *The Boundary Waters Treaty*

Background Studies for the Planning Process

- *Water Demand and Consumption*
 - South Saskatchewan River Sub-basin Contributions to International and Interprovincial Water-sharing Agreements (Alberta Environment, 2002b)
 - South Saskatchewan River Basin Water Allocation (Alberta Environment, 2003a)

- South Saskatchewan River Basin Non-irrigation Water Use Forecasts (Hydroconsult EN3 Services Ltd., 2002)
- South Saskatchewan River Basin: Irrigation in the 21st Century. Volume 1: Summary Report (Irrigation Water Management Study Committee, 2002)
- Aquatic Environment
 - Instream Flow Needs Determinations for the South Saskatchewan River Basin (Clipperton et al, 2003)
 - Report on Strategic Overview of Riparian and Aquatic Condition of the South Saskatchewan River Basin (Golder Associates, 2003)
- Water Balance Modeling
 - South Saskatchewan River Basin, Water Management Plan, Phase 2, Scenario Modelling Results, Part 1 (Alberta Environment, 2003c)
- Recreation
 - Recreation Flows for the Bow River and its Tributaries, Alberta, 2002. George, C., W. Tymensen and S. B. Rood. Report for Alberta Environment. Lethbridge, Alberta.
 - Recreation Flows for Paddling Along Rivers in Southern Alberta, 2001. Rood, S. B., and W. Tymensen. Report for Alberta Environment. Lethbridge, Alberta.
 - Recreation Flows for the Red Deer River, Alberta, 2002. Rood, S. B., C. George and W. Tymensen. Report for Alberta Environment. Lethbridge, Alberta.

Appendix E

Existing Instream Objectives (IOs) and Water Conservation Objectives

Red Deer River Basin

On the mainstem reaches from Dickson Dam to the Saskatchewan border, the following IOs have been applied:

- 8.50 m³/s (300 ft³/sec) for irrigation licences
- 4.25 m³/s (150 ft³/sec) for non-irrigation licences.

Bow River Basin

There are five mainstem reaches from Ghost Reservoir to Bassano Dam:

- Ghost Reservoir outlet to Bearspaw Reservoir outlet,
- Bearspaw Reservoir outlet to Elbow river confluence,
- Elbow river confluence to Highwood River confluence,
- Highwood River confluence to Carseland weir, and
- Carseland weir to Bassano dam.

Each reach has an IO, which is based on a relationship known as the 80 per cent habitat fish rule curve. The IOs in these reaches are based on habitat only and do not include water quality (temperature and dissolved oxygen) protection parameters.

The reach below Bassano to the mouth has three IO values:

- 39.6 m³/s (1,400 ft³/sec) for all licences except the Eastern Irrigation District (EID);
- 2.83 m³/s (100 ft³/sec) for EID's 1963 licence (1903 priority);
- 11.3 m³/s (400 ft³/sec) for EID's 1998 licence.

Oldman River Basin

There are six mainstem reaches from the Oldman Reservoir to the mouth:

- Oldman Reservoir outlet to Pincher Creek confluence,
- Pincher Creek confluence to the Lethbridge Northern Irrigation District (LNID) weir,
- LNID weir to Willow Creek confluence,
- Willow Creek confluence to Belly River confluence,
- Belly River confluence to St. Mary River confluence, and
- St. Mary River confluence to Mouth.

Each reach has an IO that is the greater of the 80 per cent habitat fish rule curve (80 FRC) or the water quality (temperature and oxygen) protection IO flows.

The three Southern Tributaries to the Oldman River each have WCOs established. They are:

- 2.27 m³/s (80 ft³/sec) for the Waterton River at the mouth;
- 0.93 m³/s (33 ft³/sec) for the Belly River below the Belly River Diversion,
- 2.75 m³/s (97 ft³/sec) for the St. Mary River at the mouth.

South Saskatchewan River Sub-basin

From the confluence of the Bow and Oldman rivers to the Saskatchewan border, an IO of 42.5 m³/s (1,500 ft³/sec) is attached to licences.

Background Information

for public consultation on the

South Saskatchewan River Basin

DRAFT Water Management Plan



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Table of Contents

MAP OF THE SOUTH SASKATCHEWAN RIVER BASIN	1
INTRODUCTION	2
Why is a Water Management Plan being prepared?	2
What is the challenge?	2
What were the objectives for the planning process?	3
PROCESS AND PUBLIC INVOLVEMENT	4
Has the public been consulted?	4
What is the proposed process for public consultation?	4
PHASE ONE	5
What was the result of Phase One?	5
PHASE TWO	5
What is the main objective of Phase Two?	5
What are Water Conservation Objectives?	5
KEY FINDINGS	7
What were the key findings of Phase Two?	7
Water demand and consumption	7
Aquatic environment	8
BACKGROUND INFORMATION	8
How much water is available?	8
How much water do the rivers discharge?	9
How much water is allocated?	10
How is allocated water used?	11
How much water do we pass to Saskatchewan?	12
What is the anticipated future water demand for irrigation?	13
What is the anticipated future water demand for other uses?	13
What is the role of dams, canals and reservoirs?	14
What is the role of high flow events?	15
What impacts has water consumption had on the aquatic environment?	15
What is the Water Resources Management Model?	17
What were the results of the "initial" WRMM computer simulations for Phase Two? ..	18
WHAT ARE THE KEY PROPOSALS OF THE DRAFT PLAN?	19
What do these recommendations mean for southern Alberta?	20
What are some of the positive aspects of a decision by Alberta Environment to no longer accept applications for new allocations?	20
ECONOMIC GROWTH OPPORTUNITIES WITH WATER AVAILABILITY CONSTRAINTS	21
Demand-side Management	21
Supply-side Management	22
WHERE CAN I GET MORE INFORMATION?	23
THE BASIN ADVISORY COMMITTEES	24
GLOSSARY	26



MAP OF SOUTH SASKATCHEWAN RIVER BASIN

The water withdrawn from the rivers of the South Saskatchewan River Basin (SSRB) plays a vital role in the economy of southern Alberta and the prosperity and quality of life we enjoy. The services and benefits of a healthy aquatic environment also contribute to our well being and lifestyle.

INTRODUCTION

This document provides background information for the draft Water Management Plan for the South Saskatchewan River Basin. It is intended to help the reader understand the reasons for the recommendations and provisions in the plan.

Why is a Water Management Plan being prepared?

In Alberta, our quality of life and life itself depend on having a safe and sustainable water supply for the environment, for our communities, and for economic well-being. Population growth, agricultural and industrial developments are increasing the demand and pressure on Alberta's water supplies, our economy, and our aquatic ecosystems. Nowhere is this more apparent than in Alberta's South Saskatchewan River Basin (SSRB).



In response to these demands, Alberta Environment led the development of a water management plan to better manage water in the SSRB. Phase One of the SSRB Water Management Plan approved the use of water allocation transfers and is currently being implemented. Phase Two is now complete. It dealt with identifying an acceptable balance between society's desire for water consumption and environmental protection. Phases One and Two have been melded to result in the present draft water management plan.

The plan focuses on a number of priority water issues in the SSRB that fall under the jurisdiction of Alberta Environment's Water Act. This plan was prepared using the best information available at the time, although it is not a comprehensive plan covering all aspects of the vast and complex subject of water in the basin.

What sub-basins are included in the SSRB?

The SSRB includes the sub-basins of the Red Deer River, Bow River, Oldman River and South Saskatchewan River (downstream of the confluence of the Bow and Oldman rivers up to the Saskatchewan border).

What is the challenge?

The SSRB faces a number of challenges:

- ❑ With the exception of the Red Deer River, rivers in the SSRB are highly allocated.
- ❑ Large increases in municipal, industrial, and stockwatering water demands are predicted, even after taking into consideration an expected decrease in per capita municipal use. It has been forecasted that demand for non-irrigation consumptive use could increase between 35 and 67 per cent by 2021, assuming the water is available. With its existing allocations, irrigation will continue to be the major consumer of water in the basin.

- ☐ There is a significant gap between typical existing flows in the Bow, Oldman, South Saskatchewan, St. Mary, Belly, and Waterton Rivers below the major diversions and the flows required to maintain a functioning aquatic ecosystem in the long term.
- ☐ The aquatic environment has been adversely affected to varying degrees by water consumption.

Our society has already made many important decisions about water consumption. However, there are important decisions yet to be made about the use of water to support a growing economy, retaining water in the rivers for other users, and maintaining a sustainable aquatic ecosystem. It is not possible to have both a high degree of consumptive water use and a functioning aquatic ecosystem in the long term in any given river reach. Therefore, the challenge for the plan is to find an acceptable balance between water consumption and protection of the aquatic environment.

What were the objectives for the planning process?

The terms of reference for the planning process specified the following objectives.

- ☐ Educate the public on the status of water management in the SSRB.
- ☐ Review and update the existing 1990 Water Management Policy for the SSRB.
- ☐ Review and update the 1991 Water Allocation Regulation for the South Saskatchewan River Basin.
- ☐ Develop a strategy that best balances water consumption and environmental protection in the SSRB, including:
 - ☐ Recommend water conservation objectives (WCOs); and
 - ☐ Determine the volumes of water that may be available for future allocation, at various degrees of risk.
- ☐ Determine the matters and factors that the Director must consider in making decisions on applications for approvals, preliminary certificates, licences, or transfers of water allocations.
- ☐ Determine required amendments to Phase One of the Approved Water Management Plan, to be made when Phases One and Two are merged to become the new Approved Water Management Plan.
- ☐ Identify river reaches that could benefit from a riparian health assessment and make restoration of riparian conditions.
- ☐ Make recommendations for restoration of riparian vegetation.
- ☐ Suggest possible operational practices to allow high flow events for long-term health of the aquatic environment.
- ☐ Determine the next priorities for water management planning.
- ☐ Develop an implementation section for the plan to identify specific actions to be taken.

PROCESS AND PUBLIC INVOLVEMENT

Has the public been consulted?

During the last five years, the SSRB water management planning process involved consultation with four Basin Advisory Committees (BACs) located in the Red Deer River, Bow River, Oldman River, and the South Saskatchewan River sub-basins. Membership on the BACs was designed to represent all sectors interested in water management in the sub-basin. Typical sectors represented in a BAC include irrigation agriculture, non-irrigation agriculture, ecosystem protection, industry, municipal and recreation. During Phase One, the general public was consulted in a series of public meetings.

Who is leading the process?

Alberta Environment is leading the planning process. The process is a combined effort shared by Alberta Environment, Alberta Agriculture, Food and Rural Development, and Alberta Sustainable Resource Development. Fisheries and Oceans Canada is also providing input.

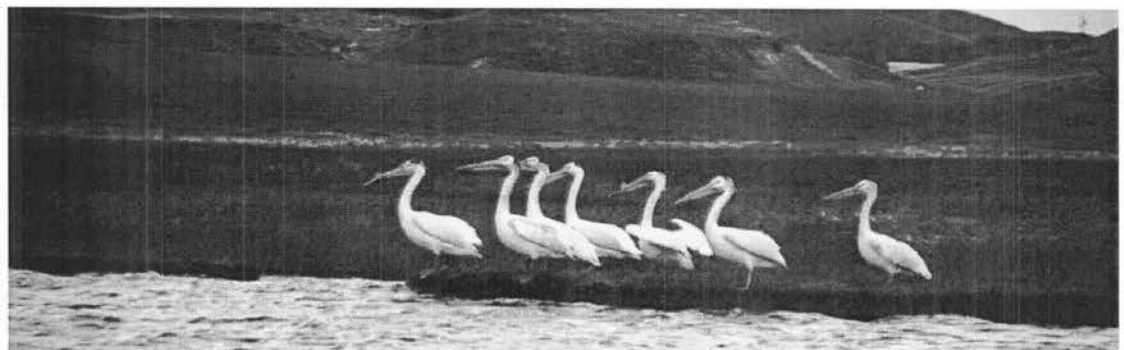
First Nations were not actively involved in the consultation efforts of Phase One due to a number of factors. Efforts have been made to consult First Nations more effectively during Phase Two of the planning process.

In July 2004, the BACs provided their recommendations in an integrated report for Phase Two, which was carefully considered in the preparation of the draft plan.

What is the proposed process for public consultation?

The following bullets outline the key steps anticipated during the coming months to obtain input from Albertan's and approval from Provincial Cabinet.

- ☐ Review of draft plan by:
 - ☐ General public;
 - ☐ Basin Advisory Committees; and
 - ☐ First Nations.
- ☐ Meetings to receive comments on draft plan with:
 - ☐ General public (seven locations)
 - ☐ First Nations.
- ☐ Final draft plan prepared with consideration of input.
- ☐ Submit final plan for approval by Provincial Cabinet and the Lieutenant Governor-In-Council.



PHASE ONE

What was the result of Phase One?

Phase One of the water management plan was developed in consultation with the four BACs and the general public through a series of public meetings. It was approved in June 2002. Phase One determined that water resources in the SSRB are approaching their limits.

Where can I get a copy of the Phase One Plan?

The Plan is available online at
http://www3.gov.ab.ca/env/water/Regions/ssrb/draft_plan.html

Phase One authorizes water allocation transfers and water conservation holdbacks within the South Saskatchewan River Basin, subject to Alberta Environment's approval and conditions. It also resulted in Alberta Environment no longer accepting applications for new allocations from the highly allocated St. Mary, Belly, and Waterton Rivers.

What is a water allocation transfer?

A water allocation transfer occurs after the holder of an existing water withdrawal licence agrees to provide all or part of the amount they are allocated to another person or organization. Alberta Environment must approve any transfer of this kind and under the *Water Act*, may place conditions on the new licence.

What is a water conservation holdback?

If the Director decides that withholding water is in the public interest to protect the aquatic environment or to implement a water conservation objective, the Director may withhold up to 10 per cent of an allocation of water under a licence that is being transferred.

PHASE TWO

What is the main objective of Phase Two?

The main objective of Phase Two is to identify a publicly acceptable balance in the SSRB between society's need for water consumption and environmental protection. This involved consideration of southern Alberta's surface water needs for development and the needs of the aquatic environment. Recommended Water Conservation Objectives will be a key outcome. A pre-condition of the SSRB water management planning process was that no licence would be cancelled for the sole reason of accomplishing recommended plan outcomes.

What are Water Conservation Objectives?

Water Conservation Objectives (WCOs) are the amount and quality of water to remain in rivers for the protection of a natural water body and its aquatic environment. A complete definition of WCOs is located in the glossary.

WCOs are flow targets for the amount and quality of water to remain in the river under



the First-In-Time, First-In-Right priority water allocation system. The WCO value will be placed on all new licences (in basins where licences are still being accepted). A licence containing a WCO requires there be no withdrawals when the river flows drop to minimum flow. This value may change from day to day.

The recommendations for WCOs contained in the draft plan pertain mostly to water quantity, as this is seen as the most pressing matter. Future water management planning could lead to amendments to the WCOs to incorporate water quality objectives.

A water management plan can only recommend WCOs, because only a designated Director under the Water Act has the authority to establish a WCO. The Director must conduct public consultation before establishing a WCO. The water management planning process will likely be considered sufficient public consultation by the Director.

In the draft plan, WCOs are recommended downstream of major dams and diversions of seven of the main rivers of the SSRB, specifically:

- ☐ Red Deer downstream of the Dickson Dam;
- ☐ Bow River downstream of the Bearspaw Dam;
- ☐ Oldman River downstream of the Oldman River Dam;
- ☐ All of the South Saskatchewan River;
- ☐ St. Mary River downstream of the St. Mary River Dam;
- ☐ Belly River downstream of the uppermost diversion; and
- ☐ Waterton River downstream of the Waterton River Dam.

Future water management planning could lead to further recommendation for WCOs for the upstream sections of these rivers and their tributaries.

WCOs can function in three ways:

1. As a condition on licences defining the minimum rate of flow at which water can be diverted.
 - Minimum flow or instream objectives have been attached as a condition on licences only since the early 1970s.
 - It must be recognized that older licences (which hold the vast majority of the allocated water in the SSRB) are not subject to these conditions. These licences will not be affected by WCOs that are established.
2. As a guideline for flows to be released from dams or passed over weirs.
3. As a guideline in water administration for when flows can be allocated or should be restored, and, in particular, justification for the use of water conservation holdbacks from transfers.

The actual implementation of WCOs in the third way above can be done through the issuance of a licence to hold the withheld water instream. This licence may be referred to as a "water conservation objective licence." However, this licence has a priority like any other licence, so the holder of a senior licence (that is, an older licence with a higher priority) has the right to divert this water for use.

Currently, the Water Act specifies that only the government can apply for and hold a "Water Conservation Objective" licence. However, as a result of public input, the water management plan recommends the Water Act be amended to permit private parties to hold such licences, when obtained through the transfer provisions of the Water Act.

WCOs can be for a variable rate of flow or for a single minimum flow. Variable rate of flow WCOs are calculated daily as a function of the theoretical natural flow to better reflect the variability of natural ecosystems. The recommended WCOs in the plan are a mix of variable flow targets and minimum flows.

KEY FINDINGS

What were the key findings of Phase Two?

To develop the water management plan, a number of reports identified the:

- ☐ extent of water allocation;
- ☐ status of the aquatic environment and river flows required for protecting the aquatic environment;
- ☐ estimates of future human demands for water; and
- ☐ sub-basin flow contributions to the Master Agreement on Apportionment (Alberta's requirement to deliver water to Saskatchewan).

Copies of these reports can be found at

http://www3.gov.ab.ca/env/water/regions/ssrb/draft_plan.html

Master Agreement on Apportionment?

Alberta is required to pass half of the natural annual discharge from the SSRB to Saskatchewan. Check out page 12 for a detailed explanation.

Key findings can be grouped into two main categories: water demand and consumption, and the aquatic environment's needs. A report on computer simulations of water management scenarios helped to explain and illustrate the connections between the findings.

Water demand and consumption

- ☐ SSRB rivers are highly allocated, with the exception of the Red Deer River.
- ☐ The Red Deer River is currently not subsidizing water use in the southern basins to a significant extent, but more water consumption (through existing licences) in the Bow and Oldman River basins could potentially require the Red Deer River to contribute more water, more frequently, to meet apportionment agreement (i.e. sharing of water with Saskatchewan).
- ☐ Newer licences in the Bow and Oldman Basins have significant risk of not receiving water in drier years.
- ☐ More efficient and complete use of existing licences (i.e. using more of their allocated water and reducing return flows) will increase risks to existing junior licences and further reduce instream flows.

- ❑ As southern Alberta continues to grow, there will be large increases in municipal, industrial, and stock-watering demands.
- ❑ Some expansion of irrigated acres in Irrigation Districts is possible within existing allocations. This expansion will increase water withdrawals (within existing licences) and decrease return flows through improved water management.
- ❑ While water development and licensing took place during the past century, First Nations in the SSRB were not in a position to obtain water licences with sufficient priority for a reliable water supply. With the exception of the Piikani Nation, water needs remain unresolved.

Aquatic environment

- ❑ Meeting instream flow needs in the Bow and Oldman Rivers downstream of the major water withdrawals requires more flow than is presently available, after water consumption. With existing allocations, restoring flows to these reaches would be very difficult.
- ❑ The health of the aquatic environment is declining downstream of the major water withdrawals on the Bow and Oldman Rivers.
- ❑ Experts rate 22 of 33 main stem river reaches in the SSRB as 'Moderately Impacted,' five reaches as 'Heavily Impacted,' and three as 'Degraded.' The remaining three reaches overlapped categories in the grading system.
- ❑ Results from a recent Riparian Health Overview for the SSRB found 22 per cent of 94 sites rate as healthy (functioning), 49 per cent rate as healthy, but with problems (functioning, at risk), and 29 per cent are unhealthy (non-functioning).

What does instream flow need mean?
 Instream flow needs are the quantities of water and water quality conditions needed to sustain riverine processes and associated ecosystems over the long term.

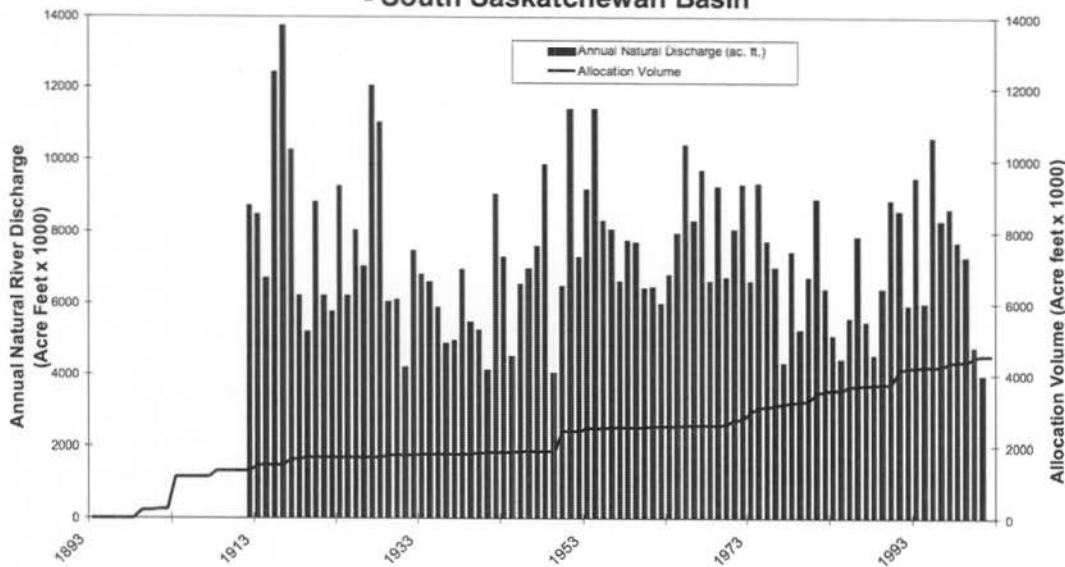
BACKGROUND INFORMATION

Most of the flow of the SSRB originates from spring snowmelt in the Rocky Mountains. Rainfall can also be significant, particularly during May and June. In the late summer, glacial melt water contributes a small amount, generally about 2.5 per cent of the total annual flow in the Bow River upstream of Banff, but in low flow years, it can contribute up to 16 per cent. During the summer months, these contributions are about seven per cent during average flow years, but in the lowest flow year (1970), up to 47 per cent of the August flows upstream of Banff came from glacial meltwater.

How much water is available?

In the Bow and Oldman River sub-basins, new water allocations risk deficits in drier years. This is due to the existing degree of allocation, existing in-stream objectives, and meeting apportionment (50 per cent of the annual natural discharge, but never less than 2.1 million acre-feet available for use in Alberta).

Allocation Volume & Annual Natural Discharge - South Saskatchewan Basin



Computer simulations indicate that, with present allocations and commitments, there would be virtually no water available for new allocation 31 years out of a 68-year period on the lower South Saskatchewan River (assuming the recommended water conservation objective for the Red Deer River). Out of these 31 years, there could be periods of up to seven consecutive years with no water available to allocate.

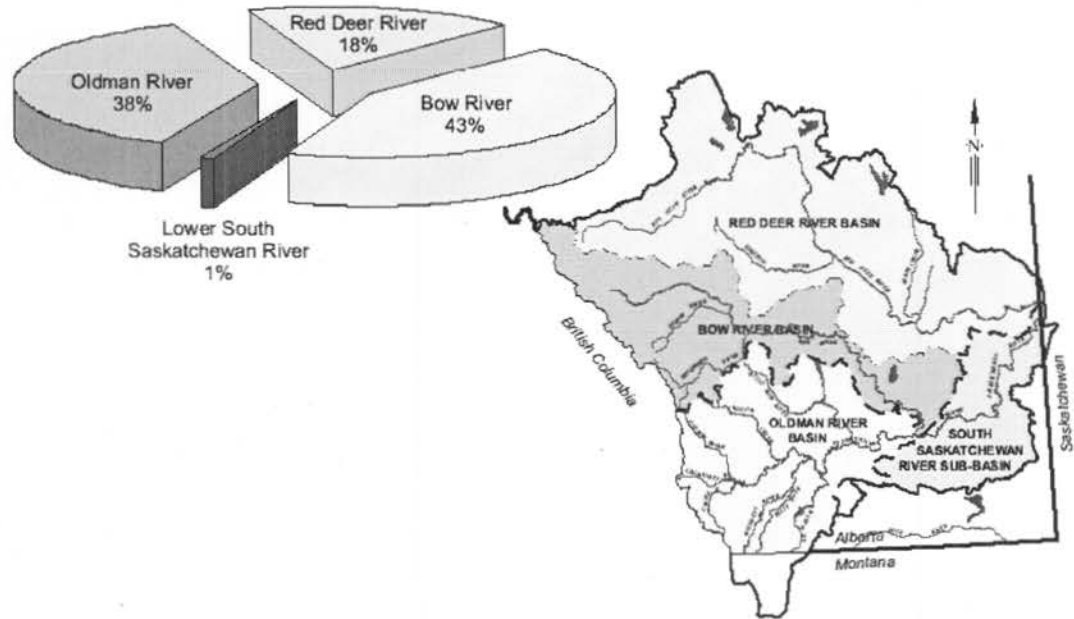
Other water demand modeling shows that if future increasing water demands continue to be accommodated with allocations, the risk of not meeting apportionment or instream commitments will increase. This may require more frequent utilization of our provincial water storage such as Oldman and Dickson Dam to meet these commitments.

How much water do the rivers discharge?

The Bow and Oldman Rivers each have approximately the same discharge (approximately 3.6 and 3.2 million dam^3 respectively), while the Red Deer River discharge is about 50 per cent less (approximately 1.5 million dam^3).



SSRB Natural Flow: 1975 - 2001



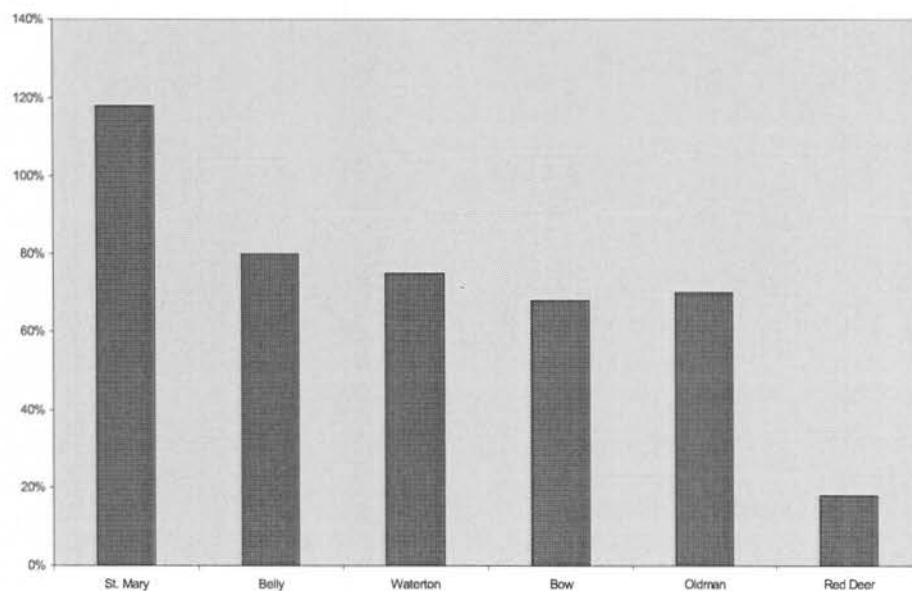
How much water is allocated?

A significant part of the flow of the Bow and Oldman Rivers is allocated: about 68 per cent and 70 per cent of the median annual flow, respectively. The southern tributaries of the Oldman River (Waterton, Belly and St. Mary Rivers) are highly allocated (75 to 118 per cent of the median annual flow). Applications for new allocations are not being accepted in the basins of the St. Mary, Waterton, and Belly Rivers. About 18 per cent of the median annual flow of the Red Deer River is presently allocated.

What is the "median" annual flow?

Median annual flow is comparable to the arithmetic average but differs in that median annual flow has an equal number of years with annual flows higher and lower.

% of Median Annual Flow Allocated by River

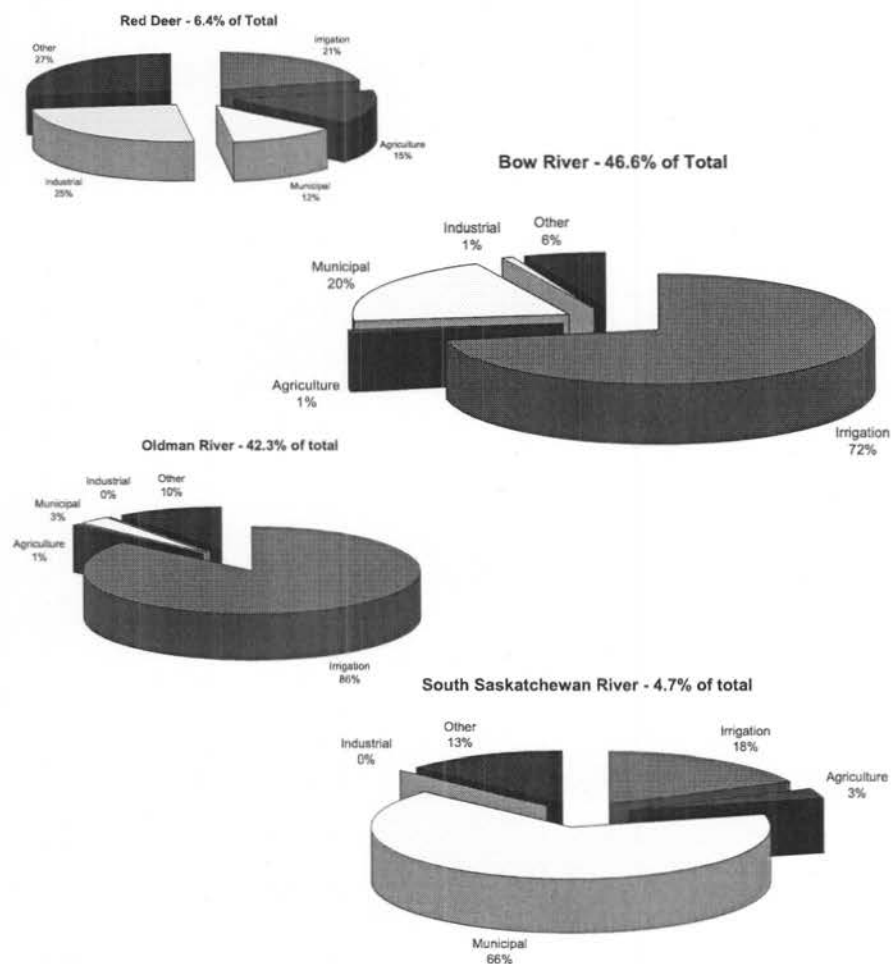


Beyond the numbers, additional factors to be considered when determining the impacts of various levels of allocation include flow patterns, storage capacity, the different purposes for which reservoirs are licenced, apportionment, and the frequency that water shortages occur. Water storage permits greater degrees of allocations since water from wet years can be stored for use in drier years.

Research is underway into possible changes to water supply and demand in the SSRB that may result from climate change.

How is allocated water used?

Most allocated water is used for irrigation (about 75 per cent of the licenced allocations in the SSRB). However, irrigation demand varies, depending on precipitation during the growing season. In wet years, less water is diverted, whereas a greater portion of the licenced allocation is diverted for irrigation in dry years. Under existing practices, irrigation districts typically return 20 to 30 per cent of their withdrawals. However, this return rate is expected to decrease in the future.



Currently, irrigation development occupies four per cent of the cultivated land in Alberta, yet contributes 18 per cent to the agri-food gross domestic product for Alberta.

Other major water users are municipalities, although they typically return more than 80 per cent of their withdrawals to the rivers.

Water consumption contributes significantly to the provincial economy. Benefits include crop and livestock production, food processing industries, petrochemical industries, municipal uses, and recreation on reservoirs.

As in many other jurisdictions around the world, water in Alberta is allocated from rivers under a priority system. Earlier licenses have a higher priority over licences granted at a later date. In order to leave water in the river for the aquatic environment, licences granted in recent years have conditions restricting withdrawals when river flows are less than a stipulated amount (i.e., the "instream objective").

How much water do we pass to Saskatchewan?

Alberta is a party to the Master Agreement on Apportionment between the prairie provinces and the federal government. This agreement requires Alberta to pass half of the natural annual discharge from the SSRB to Saskatchewan. Alberta must also never allow the rate of flow of the South Saskatchewan River (just below the confluence with the Red Deer River) to fall below 42.5 cubic meters per second (1,500 cubic feet per second), except when the natural rate of flow is less.

Alberta has continuously upheld its commitment to meet apportionment and typically has passed about 75 per cent of the annual discharge of the SSRB to Saskatchewan. The Red Deer River has not been required to contribute more than half its natural flow to apportionment, except in 1988 when the contribution was slightly more than 50 per cent, and several days in October 2001, when water was released from Gleniffer Lake to maintain instantaneous discharge. Flows remaining in the river for the aquatic environment have the added benefit of serving as apportionment flows and vice versa.



In 2001, the natural discharge (i.e. the discharge that would have occurred in the absence of any withdrawals) of the SSRB was less than the total amount of water allocated. This was the lowest discharge ever recorded. In that year, about 54 per cent of the natural discharge was passed to Saskatchewan, and water stored in the basin was depleted. Water shortages occurred in the Oldman River sub-basin. However, the impacts were mitigated to a large extent by senior licence holders (irrigation districts) sharing water with more junior licence holders such as towns, villages, industries, and private irrigators.

At the present time, flows from the Bow and Oldman Rivers can generally meet the instantaneous discharge requirements of apportionment (assuming that some water is available in the Oldman River Dam Reservoir to supplement flows). However, as the use of existing licences in these basins increases, more of Red Deer River flows may be required for apportionment.

What is the anticipated future water demand for irrigation?

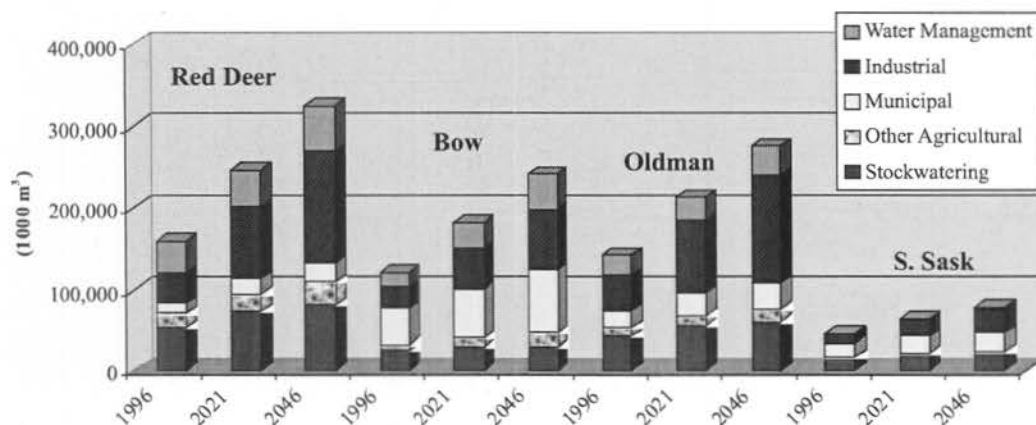
In 1991, in view of limitations on available water, a regulation was approved that placed a "cap" on irrigation development (irrigation districts, private irrigation outside the districts, and a number of "named projects"). Between current irrigation development and applications in process, the "cap" has almost been reached in the Bow and Oldman River basins. Under the Irrigation Districts Act, irrigation districts may expand their irrigated areas with the water available from their licenced allocations. Studies have shown that with present licences (and with increased efficiency), the areas in irrigation districts have the potential to expand by up to about 10 and 20 per cent in the Oldman and Bow River basins, respectively. It is anticipated that irrigation expansion and increased efficiencies will result in more frequent higher use of licenced allocations and decreased return flows. There is potential supply for additional irrigation in the Red Deer River basin.

What is the anticipated future water demand for other uses?

The demand from other uses of water in the SSRB is expected to increase dramatically. This increasing demand for water, in light of a limited supply, represents a great challenge to southern Alberta. For example:

- ❑ The population of the SSRB is expected to grow from approximately 1.3 million (1996) to more than two million by 2021. By 2046, the population of the SSRB is expected to grow to more than 3 million; and
- ❑ By the year 2046, demand for non-irrigation water withdrawals is forecasted to increase between 52 and 136 per cent.

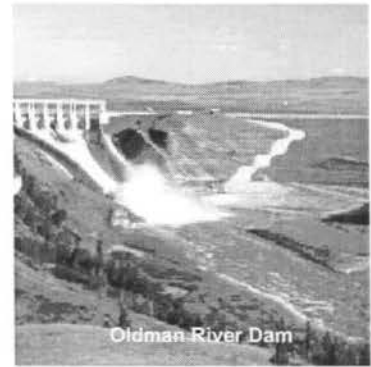
Anticipated Future Demand for Non-irrigation Water Use



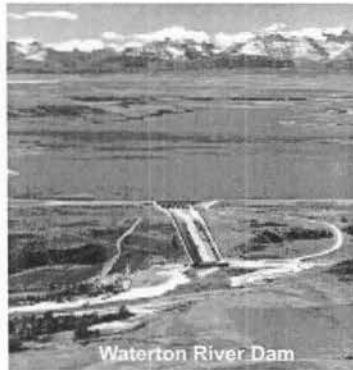
What is the role of dams, canals and reservoirs?

Dams and reservoirs play a major role in water management in the SSRB. They allow water to be captured when it is plentiful (usually in the spring), and stored for use when the need for it is greater (usually in later summer, but also in winter for hydropower). The public and private water storage in the SSRB is approximately 2.9 million acre-feet.

The Dickson Dam on the Red Deer River, owned by Alberta Environment, is operated as a multi-purpose facility. It releases stored water from Glennifer Lake to provide a reliable source of water for downstream licenced water users, to help meet apportionment (if required), and to maintain water quality in the winter months (e.g., for waste assimilation through Red Deer).



Oldman River Dam



Waterton River Dam

The Oldman River Dam and reservoir, owned by Alberta Environment, is also a multi-purpose facility. It releases stored water to help licenced water users avoid shortages, to help meet apportionment, and to maintain flows for the aquatic environment. During certain times of the year, there may be opportunities for flow management to provide benefits for the aquatic and riparian environment. These opportunities are dependent on many things,

including the time of year, reservoir storage levels, the magnitude of releases, and biological benefits.

TransAlta Utilities owns and operates several dams and reservoirs in the upper portion of the Bow River basin. These reservoirs are filled during the summer and water is released during the winter for power generation. Enhanced winter flows prevent ice damming and help dilute wastewater from Calgary.

The Bassano Dam on the Bow River is owned and operated by the Eastern Irrigation District to divert water into the district. Other major diversions are the Western Irrigation District weir located in Calgary, the Carseland weir, which diverts water for the Bow River Irrigation District, and the Lethbridge Northern Irrigation District weir located on the Oldman River near Brocket. The series of dams, weirs, and canals comprising the St. Mary River Project collect and convey water from the Waterton, Belly and St. Mary Rivers for the irrigation districts south of the Oldman River, the largest of which is the St. Mary River Irrigation District. Several of the irrigation districts have significant off-stream storage.

Construction of additional reservoirs to capture high flows may have some potential to improve water supplies. Considerable study is required to assess the cost effectiveness, environmental impacts, and overall water management

benefits of new reservoirs.

What is the role of high flow events?

Periodic high flow events play an important role in the aquatic environments of the SSRB. They help maintain water quality by flushing out accumulations of aquatic vegetation, sediments, and debris. They create fish habitat by sorting and cleaning spawning gravels and create conditions ideal for regeneration of cottonwood forests.

The presence of dams and reservoirs reduces the frequency, magnitude, and duration of these high flow events as water is held in storage. Alberta Environment's Water Management Operations Division manages the Oldman River Dam (and to a lesser extent the Dickson Dam) to take advantage of high flow conditions when they occur to benefit the aquatic environment.

What impacts has water consumption had on the aquatic environment?

The aquatic environment includes both the life in the river water and the river valley or riparian vegetation. Riparian vegetation provides important wildlife habitat, although it occupies a relatively small land area in the grasslands. Healthy riparian areas provide a number of benefits: they help limit erosion, recharge groundwater, improve water quality, and contribute to biodiversity.



The diversion of water from the rivers has had negative effects on the aquatic environment to varying degrees. A study has determined the river flows necessary to maintain a functioning aquatic environment in the long-term. These flows are referred to as "in-stream flow needs" (IFN). They include flows required to maintain riparian vegetation, fish habitat, channel maintenance processes, and water quality. This study concluded the following:

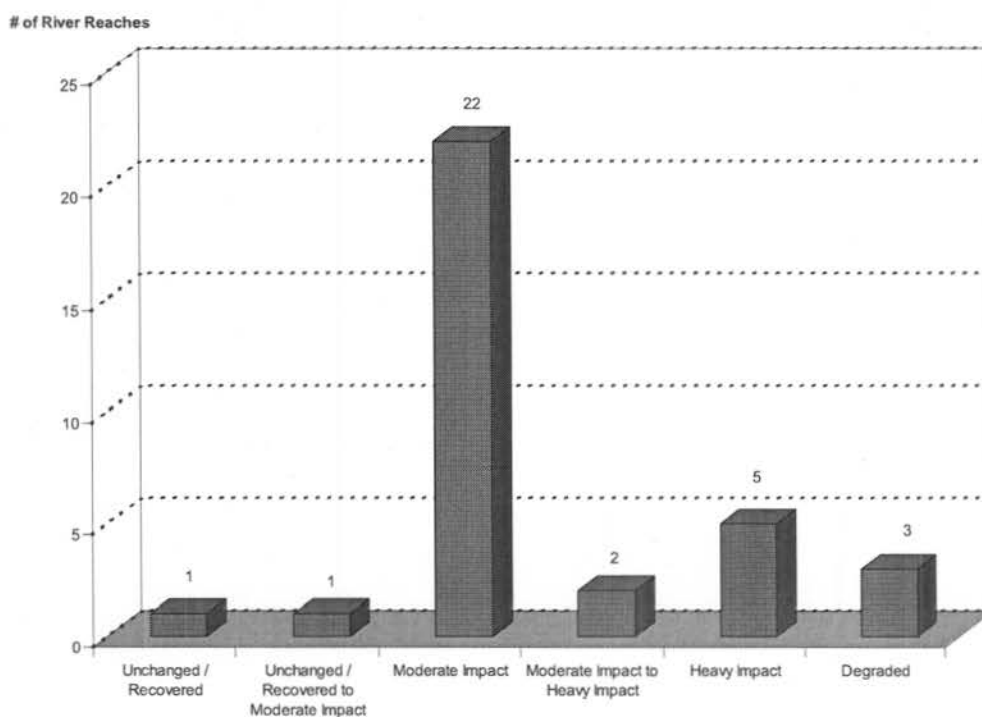
- ☐ Variable flows are important to maintain habitat for fish and to permit cottonwoods to reseed and replenish.
- ☐ Sufficient flow is required to support water quality needs (temperature and dissolved oxygen) for fish and to assimilate wastewater from cities and industries to acceptable standards.

With existing water allocations, there are insufficient flows in the Bow and

Oldman Rivers to meet the IFN. Even if water consumption was reduced by 20 per cent, river flows would still be substantially below IFN. There may, however, be opportunities to mitigate impacts on the aquatic environment in the SSRB, whether they are the result of water quantity, water quality, or land use issues.

There are currently "instream objectives" used in water management that determine the amount of water to remain in the river for the aquatic environment. None assure complete protection of the aquatic environment, and some provide minimal protection. In most rivers of the SSRB, the water supply provides flows above the in-stream objectives for at least part of the year. However, in dry years, river flows may be reduced to or below the in-stream objectives. As more water is allocated or existing allocations are used more completely, the rivers will run closer to the instream objectives. The proposed SSRB plan will replace the instream objectives with water conservation objectives that will permit more water to be dedicated to instream flow when opportunities to do so arise.

Existing Condition: Overview



An expert opinion overview on the riparian and aquatic condition of the SSRB indicated that the aquatic environment has been affected to varying degrees by altered flow regimes, land use, and pollution. As noted in the graph above most river reaches in the SSRB were considered to be "moderately impacted", but some were rated as "heavily impacted" or "degraded." Recent monitoring on the Bow River reinforced the concerns raised by these experts regarding dissolved oxygen in the stream.

Alberta Environment is building on this study by conducting an Aquatic and Riparian Condition Assessment for the main rivers of the SSRB. This assessment is a scientific evaluation of the condition of aquatic and riparian ecosystems. It examines three subjects: riparian health, hydrological alteration (i.e. the degree to which water flows have been altered), and water quality (using the best available water quality measures). Scheduled to be complete in March 2006, this analysis will inform and guide efforts by Watershed Planning and Advisory Councils to understand and identify the reaches where improvements can be made.

The riparian health component of the study is complete, revealing the Red Deer River has the greatest proportion of healthy sites, while the St. Mary and South Saskatchewan Rivers have no healthy sites. Overall, 22 per cent of the sites rate as healthy (functioning), 49 per cent rate as healthy, but with problems (functioning, at risk), and 29 per cent are unhealthy (non-functioning). The Red Deer River has the fewest reductions in riparian health due to hydrologic parameters. Maintaining a healthy aquatic environment is an important consideration for the Red Deer River, along which is located Dinosaur Provincial Park, a World Heritage Site. The plains cottonwood riparian forests are part of the values protected by the park and World Heritage Site.

If Alberta typically passes 75 per cent of the natural flow (total annual volume) of the SSRB to Saskatchewan each year, why is the aquatic environment under stress in the Bow and Oldman River basins? The pattern of flows (frequency, magnitude, and duration) is likely more important to ecosystem health than total annual volumes. The pattern of flows in the Bow and Oldman Rivers has been altered in two significant ways.

1. Due to water withdrawals, there are periods in the summer where flows are lower than natural levels, placing stress on the aquatic environment. As existing licences are more fully utilized, the situation will further deteriorate.
2. Due to hydropower generation on the Bow River, considerable water is passed to Saskatchewan during the winter, when flows have limited benefit for the aquatic environment, but provide the benefit of diluting wastewater from Calgary.

Alberta Environment is responsible for managing river flows, while the management of land use is responsibility of landowners, lease holders, municipalities, and other government agencies. Alberta Environment will continue to work with these parties as part of Watershed Planning and Advisory Councils to prepare watershed management plans to achieve healthy riparian ecosystems.

What is the Water Resources Management Model?

The Water Resources Management Model (WRMM) is a computer simulation model developed by Alberta Environment that compares water supplies and demands in a river basin over a long-term time series. In the SSRB, water supplies during the historical period 1928-1995 are compared on a weekly basis

with demands. The model incorporates all existing major infrastructure in the SSRB. The main basis of the modeling is to allocate the available water supply to the various demands in order of licence priority and to make best use of storage structures to mitigate shortages in times of low water supply and high demand.

Principal inputs to the model are:

- ☐ Historical climatic and river natural flow data (1928 - 1995);
- ☐ Irrigation district and private irrigation consumptive use and return;
- ☐ Non-irrigation withdrawals (municipal, industrial, and other projects);
- ☐ Instream objectives (fish habitat and water quality);
- ☐ Reservoir and canal structure capacities and discharge limitations;
- ☐ Licence priorities, conditions and volume/rate limits;
- ☐ Operating policies for structures; and
- ☐ Master Agreement on Apportionment with Saskatchewan.

For each scenario, results are calculated for all demands, structure storages, and flows. The performance of the demand requirements is determined in terms of deficits; that is, the frequency of deficits (inability to meet the demand requirement due to insufficient water).

What were the results of the "initial" WRMM computer simulations for Phase Two?

With the help of computer simulations, a number of key conclusions have been reached on the status of water management in the SSRB. These are summarized below and in all cases, should be considered as "potential impacts".

In the following, for purposes of the simulations, deficits are defined as follows.

- ☐ For irrigation water demand is not met by a depth of 100 mm or greater in a year. (Crop water requirements can typically range from 400 mm to 700 mm for a year.)
- ☐ For other allocations the allocation receives less than 90 per cent of the allocation.

With the existing allocations

- ☐ In the Red Deer River and Oldman River / South Saskatchewan River mainstems, there are few user deficits. Existing in-stream objectives are always met.
- ☐ In the Bow River sub-basin, junior allocations have frequent, substantial deficits. Above Bassano, existing in-stream objectives are frequently not met. They are always met below Bassano, but in-stream flows are frequently at the in-stream objective value of 11.33 m³/s (400 ft³/sec).
- ☐ In the Oldman River's Southern Tributaries, junior allocations have frequent, substantial deficits. Most of the time, these rivers flow at the minimum flows stipulated by the South Saskatchewan Basin Water Allocation Regulation.

With future increases in allocations

- ☐ In the Red Deer River sub-basin, junior allocations have infrequent, small deficits.
- ☐ In the Bow River sub-basin, with increasing utilization of existing allocations, junior allocations and commitments will have more frequent substantial deficits.
- ☐ In the Oldman River/South Saskatchewan River mainstem (where most of the non-district expansion occurs), deficits to junior allocations increase since the consumptive demand relying on Oldman Reservoir storage is increased.
- ☐ In the Oldman River's Southern Tributaries (where expansion is limited to non-district irrigation applications received), junior allocations have frequent, substantial deficits.

With full possible water use by irrigation districts and 50-year projected non-irrigation increases in water demands

- ☐ There will be substantial negative impacts on junior licences.
- ☐ The 50-year projected non-irrigation water use will have very frequent, large deficits.

Other conclusions:

- ☐ Applying IFN as a condition on existing and future junior licences would render them substantially unusable; therefore retrofit provisions are not recommended.
- ☐ In the Red Deer River sub-basin, there is potential to increase the instream objectives above existing levels and provide for additional allocation. However, the ability to increase in-stream objectives or to issue additional allocations in the Bow River and Oldman River sub-basins is limited.

WHAT ARE THE KEY PROPOSALS OF THE DRAFT PLAN?

The draft plan recognizes there is very little water left to allocate in the sub-basins of the Bow, Oldman and South Saskatchewan Rivers. The draft plan recommends Alberta Environment stop accepting applications for new allocations until the Minister of Environment creates an order (a Crown Reservation) that specifies the purposes for which any water that is unallocated shall be used. The draft plan recommends a maximum allocation volume for the Red Deer River.

The draft plan recommends WCOs for seven major rivers in the SSRB downstream of major dams and diversions. The recommended WCO and allocation limit for the Red Deer River is intended to make water available for economic development, while setting a limit on adverse effects on the aquatic environment. The WCOs for the other rivers are intended to permit Alberta Environment to take advantage of opportunities for gradual flow restoration (primarily water conservation holdbacks from transfers).

What do these recommendations mean for southern Alberta?

- ☐ We are entering a new age of water awareness and water and watershed management. Planning for the management and protection of water will involve repeated cycles of planning to continuously improve water management.
- ☐ In general, the value of water will become better recognized and understood by the residents of the SSRB.
- ☐ The water requirements for economic growth in the Bow, Oldman, and South Saskatchewan River sub-basins will be found through transfers, more precise and intensive water administration by Alberta Environment, voluntary actions by licence holders in the market place, and by more efficient use of water. (This is discussed in more detail in the next pages.)
- ☐ The WCOs recommended for the Bow, Oldman, South Saskatchewan, St. Mary, Belly, and Waterton Rivers, will only be a first step in restoring aquatic environments to a healthy condition. Although the proposed WCOs may not always be met, they do provide a way to take advantage of opportunities to restore some flow, such as water conservation holdbacks. The rate of restoration will be very slow, so no economic impacts are expected. Scientific research is required to determine precise flow restoration targets. These targets could represent a degree of impact on the aquatic environment that the public finds more acceptable, in view of the economic and social benefits of water consumption.
- ☐ Improvements in water quality in rivers could lead to the water presently being used for waste assimilation in rivers becoming available for other purposes. Improvements in water quality can be achieved by upgrading wastewater treatment facilities and improving land use management.
- ☐ The limit on allocation for the Red Deer is intended to limit the degree of degradation of the aquatic environment as compared to what is presently observed in the lower reaches of the rivers in the Bow, Oldman, and South Saskatchewan sub-basins.
- ☐ There will be water available for future consumptive use in the Red Deer River, although it must be recognized the Red Deer River has half the flows of the Bow or Oldman Rivers.
- ☐ The winter minimum flow of 16 cms for the Red Deer River has the implication that new licenses for year round diversion will require storage. Winter flows are usually less than 16 cms so water will likely not be available for diversion then.

What are some of the positive aspects of a decision by Alberta Environment to no longer accept applications for new allocations?

- ☐ Water allocation transfers will be given serious consideration as a way to obtain a reliable water supply. Demand for transfers is expected to increase water use efficiency and effectiveness by providing an incentive to existing licence holders to use less water and for water to become available to the most economically beneficial uses.

- ☐ Water conservation and innovation will be encouraged as licence holders use their allocations as efficiently as possible.
- ☐ As was demonstrated in the Oldman River sub-basin in the very dry summer of 2001, sharing between senior and junior licence holders can help a community weather a drought. If the number of new licences does not continue to expand indefinitely the senior licence holders are more likely to remain favorably inclined to share in times of shortage.
- ☐ Southern Albertans will be able to live within the capacity of the SSRB watershed. One of the principles of the Water for Life strategy is Alberta's water resources must be managed within the capacity of individual watersheds.
- ☐ Future demands on water from the Red Deer River to meet the Master Agreement on Apportionment will not increase as much as they otherwise would.
- ☐ The demands on Alberta Environment for compliance and enforcement actions will not increase indefinitely.
- ☐ Options for meeting the water needs of First Nations will remain.
- ☐ Society will not become even more vulnerable to the risks of possible climate change impacts such as reduced water supply or changes to the timing of flows.

ECONOMIC GROWTH OPPORTUNITIES WITH WATER AVAILABILITY CONSTRAINTS

Water availability constraints need not limit economic growth opportunities, as there are options available for making water available for new uses or expansion of existing ones even when new allocations are no longer available. These options have the potential for making water available that would be more reliable than a new, high risk licence. These options are in two broad categories:

1. Demand-side management
2. Supply-side management

Demand-side Management

1. Improvements and innovations in water administration by Alberta Environment

There are several avenues Alberta Environment can explore to improve its administration of the water resource to ensure water use and allocations are properly and accurately accounted for. These would provide high confidence knowledge on the amount of water actually available for allocation. The overriding goal is to ensure all water licences are appropriately and realistically sized for the needs of water users. Steps that can be taken achieve this include:

- ☐ Intensive monitoring of actual use.
- ☐ Improvements in real-time or near real-time water use and stream flow monitoring and making data available.

- ❑ Investigating unauthorized water use and follow up with education and enforcement to achieve compliance.
- ❑ Exploring options for un-used allocations (e.g. relative to growth and development predictions).
- ❑ Ensuring all licences are in use with up-to-date and accurate records.
- ❑ Exploring innovations in water licencing to precisely match allocations with actual consumption.
- ❑ The Crown Reservation instrument provided by the Water Act is a tool that can lead to water being allocated to specific purposes to achieve societal goals.

2. Development of Water Markets

With the introduction of water allocation transfers in the SSRB, a small number of transfers has taken place and a market in water allocations is starting to develop.

In the long run, water allocation transfers will help water allocations move to the most economically beneficial uses. Concurrently, they will provide an incentive to licence holders to increase efficiency in order to generate surplus water for the market. Restricted access to new licences will allow a market system to develop.

Development of the market will be facilitated by a number of events. One is the creation of water agents, brokers or a trading center. This in itself can be viewed as a new form of economic activity, much as the real estate industry has developed over time. These new services would promote an efficient market place by helping buyers and sellers find each other. They could also be a source of information on prices relative to licence priority, volume, location, and other factors.

3. Improvements and innovations in the efficiency of water use

Restrictions on new water allocations will provide an incentive to licence holders to explore innovations to increase water productivity. This can be expected to lead to: utilization and development of new technologies, incentives for efficiency and disincentives for waste, upgrades to existing infrastructure, and improved risk management planning.

Supply-side Management

The most obvious possibility for action to make more water available is increased water storage in reservoirs. This would enable water to be stored when it is plentiful (primarily during snowmelt in June) for use later when it is not. Storage can be developed and owned privately or by the government for public purposes. Any storage reservoirs developed are most likely to be located "off-stream."

The Water For Life strategy calls for Watershed Planning and Advisory Councils to consider the need for new storage in the development of watershed management plans.

Another option for supply-side management is to increase the use of groundwater. However, the extent of this resource and its connection to surface water is not well understood. Research is planned by Alberta Environment under the Water For Life strategy.

WHERE CAN I GET MORE INFORMATION?

Copies of the full reports can be referenced online at
<http://www.environment.gov.ab.ca>

For additional information, contact Alberta Environment at (403) 297-6250 (toll-free in Alberta by calling 310-000).

THE BASIN ADVISORY COMMITTEES

South Saskatchewan River BAC



SOUTH SASKATCHEWAN RIVER SUB-BASIN BAC

Frank Wetsch, Chair	Urban Municipal	City of Medicine Hat
Grayson Mauch, Vice-chair	Urban Municipal	City of Medicine Hat
Floyd Haas	Rural Municipal and Agriculture (other water users)	Cypress County
Ron Wendling	Industry	Canadian Fertilizers Ltd.
Jim French	Industry	Canadian Fertilizers Ltd.
Cortaine Gardner	Environmental	Grassland Naturalists
Duncan Baldie	Recreation	Redcliff Anglers
Gary Bierback	Irrigation	St. Mary River Irrigation District



Bow River BAC

Name	Sector	Specific Affiliation
BOW RIVER BAC		
Steve Meadows, Chair	General Public	
Lori Brewer-Lawe	General Public	
Gloria Wilkinson	General Public	
Bert van Duin	Industry	Westhoff Engineering Resources Inc.
Gord MacMahon	Industry	APF Energy / Trees Alive Alberta
Chantelle Cardinal	First Nations	First Nations Technical Services Advisory Group
Annette Lonechild	First Nations	Stoney First Nation
Cedric Solway	First Nations	Siksika First Nation
Norm Carlson	Health Authorities	Calgary Health Region
Roger Drury	Water Power	TransAlta Utilities Corporation
Paul Fesko	Urban Municipal	City of Calgary
Melanie Cook	Urban Municipal	City of Calgary
Yin Deong	Urban Municipal	City of Calgary
Judy Stewart	Urban Municipal	Town of Cochrane
Neil Hollands	Urban Municipal	Town of Brooks
Hugh Pepper	Rural Municipal	M.D. of Bighorn No. 8
Vince Fabian	Rural Municipal	County of Newell No. 4
Dr. Derald Smith	Academia	University of Calgary
Gary Kindrat	Ecosystem Protection	Ducks Unlimited
Chris Manderson	Ecosystem Protection	City of Calgary
Heinz Unger, Vice-chair	Ecosystem Protection	Alberta Wildemess Association
Bonnie Kleinmark	Ecosystem Protection	River Valley Committee, Parks Calgary Foundation
Mona Keffer	Fisheries	Alberta Wildemess Association
Richard Phillips, Vice-chair	Irrigation	Bow River Irrigation District
Jim Webber	Irrigation	Western Irrigation District
Earl Wilson	Irrigation	Eastern Irrigation District
Chris Vermeeren	Ranching/Stock Watering	County of Newell No. 4
Robert Everett	Recreation	Sarcee Fish & Game Association
Sheena Majewski	Observer	Dept. of Fisheries and Oceans Canada
Mark Bennett	BRBC Liaison	Bow River Basin Council
Mike Murray	BRBC Liaison	Bow River Basin Council



Red Deer River BAC

RED DEER RIVER BAC

Al Kennedy, Chair
Gordon Musgrove
Dug Major
Art Grenville
Ian Harvie
Allison Williams
Ken Van Dewark
John Van Doesburg
Douglas Fleming
Bill Shaw

Myma Bauman
Greg Conn
Jack Swainson
Colin Kure
Jill Dyck
Margaret Coutts, Vice-chair
Tracy Scott
Todd McBride

Industry
Rural Municipal
Rural Municipal
Rural Municipal
Rural Municipal
Rural Municipal
Rural Municipal
Municipal
Urban Municipal

Urban Municipal
Agriculture
Agriculture
Upstream Recreation
Downstream Recreation
Ecosystem Protection
Ecosystem Protection
Tourism

Nova Chemicals
County of Newell No. 4
Special Areas
Starland County
Mountain View County
Mountain View County
Red Deer County
Mountain View County
Palliser Regional Municipal Services
Represented 23 towns, villages and the City of Red Deer
Town of Three Hills
Alberta Beef Producers
Alberta Conservation Tillage Society
Alberta Fish and Game Association
Alberta Fish and Game Association
Red Deer River Naturalists
Ducks Unlimited



Oldman River BAC

OLDMAN RIVER BAC

Duncan Lloyd, Chair
Barbara Lacey, Vice-chair
Doug Kaupp
Garth Bekkering
Ralph Bourque, Vice-chair
Brian Hammond
Hank Van Beers
Cecil West
Greg Nikles
Ron Renwick
Kevin Haggart
Larry Nolan
Jim Clarke

Cheryl Bradley
Cheryl Fujikawa
Gary Kindrat
Henry Bosman

Andrew Hurly

Urban Municipal
Urban Municipal
Urban Municipal
Urban Municipal
Urban Municipal
Rural Municipal
Rural Municipal
Rural Municipal
Industry
Irrigation
Irrigation
Agriculture (other water users)
Recreation

Ecosystem Protection
Ecosystem Protection
Ecosystem Protection

Town of Coaldale
City of Lethbridge
City of Lethbridge
Town of Taber
Town of Pincher Creek
M.D. of Pincher Creek
M.D. of Taber
M.D. of Taber
Rogers Sugar Ltd.
St. Mary River Irrigation District
Lethbridge Northern Irrigation District

Lethbridge Fish & Game Association
(affiliated with Alberta Fish & Game Association)
Southern Alberta Environmental Group
Southern Alberta Environmental Group
Ducks Unlimited
Oldman Dam Environmental Advisory Committee
Oldman Dam Environmental Advisory Committee

Glossary

AENV ~ Alberta Environment

Allocation ~ The volume, rate and timing of a diversion of water. When water is redirected for a use other than for domestic purposes (use by an owner of property adjacent to a water body or from an aquifer), it is referred to as an allocation. All water users (except for household users) apply to Alberta Environment for a licence to use a set allocation of water.

Apportionment ~ (see Master Agreement on Apportionment)

Approval ~ Under the Water Act, an approval provides authority for constructing works or for undertaking an activity within a water body. The approval includes conditions under which the activity can take place.

Aquatic Environment ~ (As defined in Alberta's Water Act) The components of the earth related to, living in or located in or on water or the beds or shores of a water body, including but not limited to all organic and inorganic matter, and living organisms and their habitat, including fish habitat, and their interacting natural systems.

BAC / Basin Advisory Committee ~ Established in each of the four sub-basins of the South Saskatchewan River Basin to provide advice for the SSRB Water Management Plan. Members of the BACs represented all sectors interested in water management in the sub-basin. Each sector selected its own representatives on the BAC. Typical sectors represented in a BAC include irrigation agriculture, non-irrigation agriculture, ecosystem protection/environmental, First Nations, industry, municipal and recreation.

Crown Reservation ~ Section 35(1) of the Water Act states that "the Minister may by order reserve water that is not currently allocated under a licence or registration or specified in a preliminary certificate

- (a) in order to determine how the water should be used, or
- (b) for any other purpose."

dam³ ~ decametres cubed (1,000 cubic meters). 1 dam³ = 0.81 acre feet.

Director ~ For purposes of administration of the Water Act, certain staff in Alberta Environment, such as Approvals Managers, are designated as "Director". Under the Water Act the Director has sole authority to make decisions concerning a number of specified subjects, e.g., transfers, holdbacks, establishing WCOs.

Dissolved Oxygen ~ Amount of available oxygen contained in the water, but not including the oxygen that is part of the water molecule (H₂O). Expressed as milligrams per litre.

Instream Flow ~ The rate of flow in a river, without reference to its purpose.

Instream Flow Needs (IFN) ~ This is the scientifically determined amount of water, flow rate, water level or water quality that is required in a river or other body of water to sustain a healthy aquatic environment or to meet human needs such as recreation, navigation, waste assimilation, or aesthetics.

Instream Objectives ~ Flows that are to remain in the river via dam operations or as a restriction on licences. Instream Objectives are in place in all SSRB rivers below dams, although some offer limited protection of the aquatic environment. Instream Objectives have usually been set in response to fish habitat instream needs (the Fish Rule Curve) and/or water quality.

Irrigation District ~ An organization that owns and manages a water delivery system for irrigation for a given region. In Alberta, there are 13 irrigation districts. Some districts convey water for other purposes such as municipal use and stockwatering.

Master Agreement on Apportionment ~ Schedule A of the 1969 Master Agreement on Apportionment for the South Saskatchewan River between Alberta and Saskatchewan allows Alberta to "divert, store or consume" from the river system each year, a volume of water equal to one-half of the apportionable flow of the South Saskatchewan River at the Alberta-Saskatchewan boundary. The remaining volume of flow must be allowed to pass downstream into Saskatchewan. The exception to this general rule is that Alberta is entitled to divert, store or consume a minimum of 2.1 million-acre feet in any year. The effect of this exception is that during years when the volume of natural flow is less than 4.2 million-acre feet (a rare occurrence), Alberta may pass less than one-half of the apportionable flow to Saskatchewan. If at any time during a year Alberta wants to divert, store or consume more than half the apportionable flow, a flow rate of 1,500 cubic feet per second (cfs) must be maintained at the Saskatchewan border, unless the natural flow is less than 3,000 cfs, in which case half the natural flow must be passed. (There is no policy in Alberta as to the amount of water each sub-basin of the SSRB must contribute to the Saskatchewan apportionment.)

Minimum Flow ~ The term used in the SSRB Water Allocation Regulation to stipulate the least amount of flow that must remain in the St. Mary, Belly, and Waterton rivers. For purposes of modeling, they are also referred to as Instream Objectives (IOs). These flows offer very limited protection of the aquatic environment.

Natural Flow ~ Natural flow is the flow in rivers that would have occurred in the absence of any man-made effects on, or regulation of, flow. For purposes of water management, natural flow is a calculated value based on the recorded flows of contributing rivers; a number of factors concerning the river reaches (e.g. evaporation, channel losses, etc.); and water diversions. This is also known as "re-constructed flow" and "naturalized flow".

Preliminary Certificates ~ An authorization issued by the Director to issue a licence if certain conditions are met.

Reservoir ~ A man-made structure which collects and stores water for future uses. During periods of low river flow, reservoirs can release additional flow if water is available.

Retrofit Provision ~ Water licenses issued in recent years contain a condition indicating that once a water conservation objective is established, the licence may be amended to include the objective. The licence holder would then not be permitted to withdraw water when river flow is less than the objective.

Riparian Area ~ The area along streams, lakes, and wetlands where water and land interact. These areas support plants and animals, and protect aquatic ecosystems by filtering out sediments and nutrients originating from upland areas.

Riparian Vegetation ~ The vegetation that exists in riparian areas and is supported by the interaction of the water and land.

River Basin ~ An area of land drained by a river and its associated streams or tributaries. Alberta's Water Act identifies seven major river basins within the province:

- Peace/Slave River Basin
- Athabasca River Basin
- North Saskatchewan River Basin
- South Saskatchewan River Basin
- Milk River Basin
- Beaver River Basin
- Hay River Basin

SSRB ~ South Saskatchewan River Basin. The South Saskatchewan River Basin includes the sub-basins of the Red Deer, Bow, and Oldman and the South Saskatchewan Rivers.

Southern Tributaries ~ This term refers to the St. Mary, Belly and Waterton rivers, which are also collectively referred to as the southern tributaries of the Oldman River.

Sub-basin ~ A part of a river basin drained by a tributary or having characteristics that are significantly different from other areas in the basin.

Surface Water ~ Refers to water bodies such as lakes, ponds, wetlands, rivers, and streams. It may also refer to sub-surface water with a direct and immediate hydrological connection to surface water (for example, a water in a well beside a river).

Voluntary Action ~ Performing an activity freely without compulsion.

WCO ~ Water Conservation Objective

WPAC ~ Watershed Planning and Advisory Council (see Water for Life: Alberta's Strategy for Sustainability). In the SSRB (at the time of writing this plan), WPAC's include the Bow River Basin Council and the Oldman Watershed Council. A WPAC is also being formed for the Red Deer River watershed.

Water Act ~ The purpose of Alberta's Water Act is to support and promote the conservation and management of water, including the wise allocation and use of water (s.2).

Water Allocation Transfer ~ A water allocation transfer occurs after the holder of an existing water licence agrees to provide all or part of the amount they are allocated to another person or organization. Alberta Environment must approve any transfer of this kind. When this occurs, the allocation is separated from the original land, and a new licence, with the seniority of the transferred allocation, is issued and attached to the new location. Under the Water Act, Alberta Environment can place conditions on the new licence. Water allocation transfers can occur only if authorized under an approved water management plan, or by the Lieutenant Governor in Council. See Sections 81,82 and 83 of the Water Act.

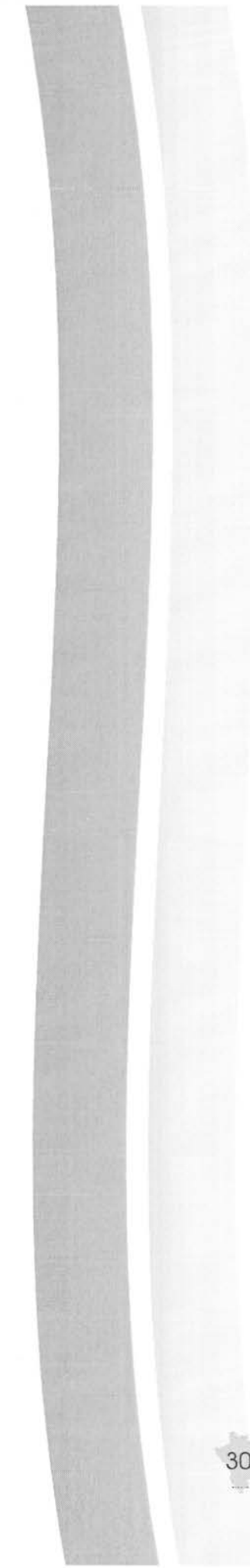
Water Conservation Holdback ~ If the Director is of the opinion that withholding water is in the public interest to protect the aquatic environment or to implement a Water Conservation Objective, and the ability to withhold water has been authorized in an applicable approved water management plan or order of the Lieutenant Governor in Council, the Director may withhold up to 10 per cent of an allocation of water under a licence that is being transferred. The withholding occurs at the time the new licence created for the transferred allocation is issued (section 82(2) of the Water Act).

Water Conservation Objective (WCO) ~ As defined in Alberta's Water Act, a Water Conservation Objective is the amount and quality of water necessary for the protection of a natural water body or its aquatic environment. It may also include water necessary to maintain a rate of flow or water level requirements.

From the Water Act: "Water Conservation Objective" means the amount and quality of water established by the Director under Part 2, based on information available to the Director, to be necessary for the

- (i) protection of a natural water body or its aquatic environment, or any part of them,
 - (ii) protection of tourism, recreational, transportation or waste assimilation uses of water, or
 - (iii) management of fish or wildlife,
- and may include water necessary for the rate of flow of water or water level requirements.

A licence can be issued by the Director to the Government of Alberta for the purpose of implementing a Water Conservation Objective.

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Water Licence ~ A water licence provides the authority for diverting and using surface water or groundwater. The licence identifies the water source; the location of the diversion site; an amount of water to be diverted and used from that source; the priority of the "water right" established by the licence; and the condition under which the diversion and use must take place.

Water Management Plan ~ Alberta's Water Act and Framework for Water Management Planning outlines the process for water management planning and the components required for water management plans in the province.

Watershed ~ An area of land that catches precipitation and drains into a larger body of water such as a marsh, stream, river or lake.

Summary

Draft Water Management Plan for the South Saskatchewan River Basin

This plan reflects the balance that the Government of Alberta is striving to achieve for Albertans between protecting the aquatic environment of the SSRB's main rivers, and the water diversion and consumption that contributes to economic prosperity in southern Alberta. The plan was prepared as a result of receiving Albertans' views on the direction water management should take in the SSRB.

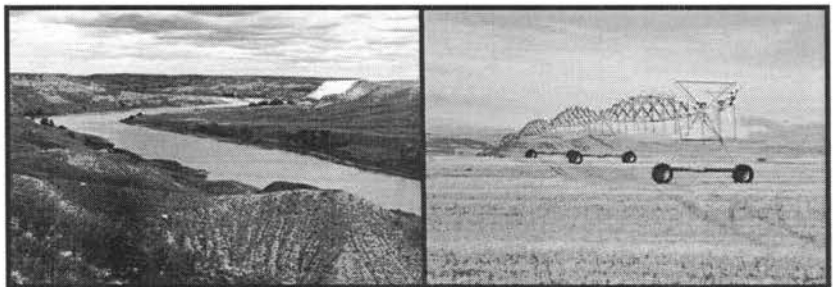
The plan will provide the foundation for future watershed management planning of sub-basins in the SSRB.

Recommendations

The recommendations made in the plan represent advice to the Minister of Environment and the Director, who are responsible for making decisions under the Water Act. The provisions described in the plan are other actions to be taken by Alberta Environment (AENV).

Only the Phase One components of the draft plan have been approved by Cabinet. Once approved by the Lieutenant Governor-in-Council, this 'NEW' plan will be an "Approved Water Management Plan" as defined by the Water Act.

...striving for a balance between protecting the aquatic environment and water consumption in southern Alberta...



The principal recommendation contained in the plan is that:

- Alberta Environment stop accepting applications for new water allocations in the Bow, Oldman and South Saskatchewan River sub-basins until the Minister of Environment specifies how water not currently allocated should be used (in other words, create a Crown reservation of water).

Other recommendations and provisions included are:

- Alberta Environment set the total amount of water available for allocation in the Red Deer River sub-basin at 600,000,000 cubic meters, an amount which would be subject to re-evaluation from time to time with new information on the aquatic environment and the reliability of licences.
Alberta Environment recognizes and accepts that the limits for water allocations are being reached in the Bow, Oldman, and South Saskatchewan River sub-basins.
- Alberta Environment continue to consider the SSRB as a whole in order to meet the Master Agreement on Apportionment. A committee consisting of sub-basin representatives will be formed to provide advice to AENV on how best to meet apportionment on an operational basis.
- Alberta Environment establish the following Water Conservation Objectives (WCOs):

- Bow (Bears paw Dam to Bassano Dam), Oldman, St. Mary, Belly, and Waterton Rivers WCOs:
A rate of flow 10 per cent greater than the existing instream objectives (Bow and Oldman rivers) or 10 per cent greater than the existing WCOs for the St. Mary, Belly, and Waterton Rivers to improve the aquatic environment and riparian health.
- Bow River (Bassano Dam to mouth) WCO:
A rate of flow of 17.1 cms (*cubic meters per second*) to improve the aquatic environment and riparian health.
- South Saskatchewan River WCO:
A rate of flow of 42.5 cms to improve the aquatic environment and riparian health.
- Red Deer River WCO:
Upstream of confluence with Blindman River:
 - A rate of flow that is 45% of the natural rate of flow, or 16 cms, whichever is greater at any point in time, for all future licences and licences with a retrofit provision.

Downstream of confluence with Blindman River:

- For future licences for withdrawals from November to March, inclusive:
A rate of flow that is 45% of the natural rate of flow, or 16 cms, whichever is greater at any point in time.
- For future licences for withdrawals from April to October, inclusive:
A rate of flow that is 45% of the natural rate of flow, or 10 cms, whichever is greater at any point in time.
- For licences with a retrofit provision:
A rate of flow that is 45% of the natural rate of flow, or 10 cms, whichever is greater at any point in time.

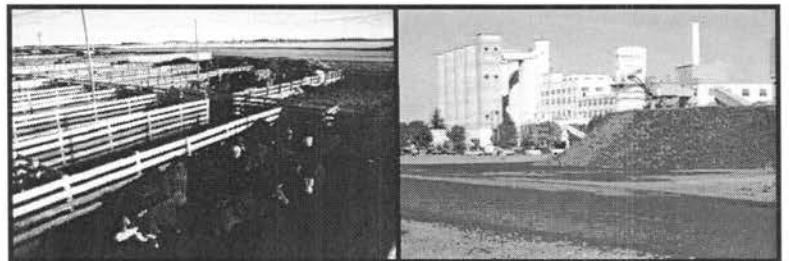


This WCO is designed to permit water diversion while setting a limit on negative impacts on the aquatic environment.

- Alberta Environment apply for licences to permit water to be held for WCOs or protection of the aquatic environment in order to take opportunities to secure water for these purposes.
- The South Saskatchewan Basin Water Allocation Regulation (1991) be repealed.
- The Director is authorized to consider applications for transfers of water allocations.
- The Director is authorized to withhold up to 10 per cent of the volume of water being transferred if it is considered to be in the public interest to protect the aquatic environment or to implement a WCO.
- The Director shall consider the matters and factors provided in this plan in making decisions on applications for licences, preliminary certificates, approvals, or transfers of an allocation of water.
- To improve the efficiency, effectiveness and productivity of water use AENV will act in three broad water management areas:
 - continue to improve water management and administration of water allocations,
 - support the development of water markets for transfers to accommodate re-distribution of water already allocated, and
 - encourage improvements in water conservation by water users.

The Water for Life: Alberta's Strategy for Sustainability is the Government of Alberta's approach to water management. It outlines a comprehensive set of strategies and actions that will ensure Albertans have safe, secure drinking water; healthy aquatic ecosystems; and a reliable supply for a sustainable economy.

...Improve the efficiency, effectiveness and productivity of water use...



- In the Bow, Oldman, and South Saskatchewan River sub-basins, opportunities to restore flows to meet WCOs should be taken. Licence holders will be encouraged to take voluntary action to help restore flows.
- Watershed Planning and Advisory Councils (WPACs) are encouraged to consider the priorities in their watersheds and undertake future watershed management planning with this water management plan as a foundation. A number of priorities are suggested.



- No licence will be cancelled for the sole reason of accomplishing recommended outcomes of this plan. Normal administration of water allocations by Alberta Environment will continue, which may involve canceling licences on grounds under the Water Act.

For More Information

Copies of the plan and background documents can be found at www.environment.gov.ab.ca
For additional information, contact Alberta Environment at (403) 297-6250 (toll-free in Alberta by calling 310-0000).



Alberta
ENVIRONMENT



Questions and Answers on the Draft South Saskatchewan River Basin Water Management Plan

1. What does the draft plan mean for southern Alberta?

We are entering a new age of water awareness and increased appreciation of the importance and value of water. Future planning cycles can be expected to lead to even greater improvements in water management, both for human needs and the needs of aquatic and riparian ecosystems.

2. If Alberta Environment does not accept applications for new allocations in the Bow, Oldman and South Saskatchewan River sub-basins, how will municipalities, industries and others get the water they need?

There are opportunities to make the best use of the large amount of water that has already been allocated in these sub-basins:

- Improvements and innovations by Alberta Environment in water administration and legislation to match allocations with needs.
- Market mechanisms such as water allocation transfers to encourage redistribution of the water already allocated through voluntary actions by licence holders.
- Innovation and creativity of water users to improve water use efficiency.
- Improvements in water quality so less water is required in rivers for waste assimilation, thereby making this water available for consumption.

The Crown Reservation, ordered by the Minister of Environment, will specify some final amount of water is available for some specific purposes.

3. What are some of the expected benefits of a decision to no longer accept applications for water allocations in the sub-basins of the Bow, Oldman and South Saskatchewan River sub-basins?

- Water allocation transfers will be more routinely used to obtain reliable water supplies.
- The potential value of a water allocation transfer will provide an incentive to improve water use efficiency.
- Innovations in water use efficiency will be encouraged.
- With a limit on the amount of water allocated, water sharing in times of shortage will remain a viable option.
- Future demand on the Red Deer River to contribute water to the apportionment agreement with Saskatchewan will not increase as much as it would otherwise.
- Opportunities to meet the water needs of the First Nations will remain.

4. Why does the plan not specify the types of uses for any future allocations?

This was outside the scope of the planning process. Its main goals were to recommend how much water should remain in the rivers, and, conversely, how much water could be allocated. The Crown Reservation to be established for the Bow, Oldman and South Saskatchewan River sub-basins will specify types of uses for some quantity of water.

5. What is a Crown Reservation?

A Crown Reservation is a tool provided by s. 35 of the *Water Act*. The Minister of Environment can specify the purposes for which any unallocated water can be used. The priority of any future allocation of the reserved water can be prescribed, although it cannot have a date earlier than the date of the reservation.

6. How will the Crown Reservation be developed? Who will be involved?

Alberta Environment will lead the process. The Bow River Basin Council, the Oldman Watershed Council and the Watershed Planning and Advisory Council for the Red Deer River sub-basin will be asked for advice. The Treaty Seven First Nations will also be asked for advice. While the Crown Reservation is being developed Alberta Environment will not accept applications for new licences. Applications for transfers of water allocations will be accepted. Once the reservation is in place, applications for licences will be accepted only for the purposes and volumes specified in the Crown Reservation.

7. What relationship does the SSRB plan have with other water management plans in the basin?

The SSRB Water Management Plan is the most senior water management plan for the SSRB. All other water management plans in the basin must conform.

8. Why is this plan only giving recommendations to the Minister and the Director?

The *Water Act* requires the Minister make recommendations in an Approved Water Management Plan. The Act also identifies that only certain people have the authority to make certain decisions, such as the establishment of water conservation objectives.

9. How was the figure of a 10 per cent increase over existing instream objectives and water conservation objectives determined for the water conservation objectives for the St. Mary, Belly, Waterton and Oldman Rivers and parts of the Bow River?

The 10 per cent increase in rate of flow over existing instream objectives and water conservation objectives is intended as an interim value to permit some flow restoration to begin. It is important to start, even though the final target is not determined. Determining the final target will require scientific research to have a better understanding of the aquatic environment.

10. How was the figure of 600,000 cubic decameters for the maximum total allocation in the Red Deer River sub-basin arrived at?

(*one cubic decameter = 1,000 cubic meters*)

This figure is the sum of:

- Existing licences, pending applications and future projections.
- Allowance for future irrigation demand to reach the area specified (39,271 hectares) in the South Saskatchewan Basin Water Allocation Regulation for the Red Deer River sub-basin.

The figure should be re-evaluated periodically as new information become available.

11. The plan states a maximum total allocation for the Red Deer River will set a limit on impacts on the aquatic environment. What does this mean?

The maximum allocation for the Red Deer River of 600,000 cubic decameters is approximately 38 per cent of the median annual natural discharge from the river. The present degree of allocation in the Bow and Oldman River sub-basins is 68 and 70 percent respectively. While this is not a perfect indicator, it can be expected that over the long-term the degree of impact on the Red Deer River will be less than that presently observed for the Bow and Oldman Rivers. (*one cubic decameter = 1,000 cubic meters*)

12. How was the figure of 45% of the natural rate of flow determined for part of the recommended water conservation objective for the Red Deer River?

This figure equates to the recommendation of the Red Deer River Basin Advisory Committee of 50% of the instream flow needs rate of flow. The switch from percentage of the instream flow need rate of flow to a percentage of the natural rate of flow was made because the Steering Committee believes it will help people to visualize and understand the WCO.

The Red Deer River Basin Advisory Committee arrived at its recommendation after considering the amount of water it believed should be available for economic development.

13. How were the figures of 10 and 16 cubic meters per second (cms) determined as the minimum rates of flow components of the Red Deer River WCO?

The figure of 16 cms is a rate of flow necessary to ensure water quality guidelines are met during the winter months based on current data on effluent loadings and the need for dilution flows. This minimum flow during the winter has the implication that new licences for year round diversion will require storage. Winter flows are usually less than 16 cms so water will likely not be available for diversion then.

The figure of 10 cms is a rate of flow determined by computer simulations to permit the same amount of water to be available for economic development as recommended by the Red Deer River Basin Advisory Committee.

14. Why doesn't this plan address water quality?

Water quantity and allocations issues were the most pressing and needed to be addressed immediately. Also, it is necessary to know how much water will be in the rivers to address the water quality factors that are strongly affected by flow: dissolved oxygen and temperature. These factors were considered in the determination of the instream flow needs for the aquatic environment and also in the development of the recommendations for water conservation objectives.

Water quality, particularly as affected by non-point sources, can be expected to be a priority in the watershed management planning to be carried out by the Watershed Planning and Advisory Councils.

15. What does the plan mean by "groundwater that is hydraulically directly connected to surface water is subject to this plan?" Isn't all groundwater connected to surface water?

If subsurface water responds quickly to changes in nearby surface water it is likely considered to be surface water. Water chemistry can also be a factor. The best example is a well beside a river. If the water level in the well rises and falls in correlation with the river, this indicates the river and well water is the same. There are varying degrees of connection between surface and groundwater, and research is required to improve knowledge in this area.

16. Why doesn't the plan stipulate the Director always withhold 10 per cent for holdbacks?

The 10 per cent holdback is a discretionary decision for the Director to make. This allows the Director to assess each transfer application individually and determine what, if any, amount of holdback (up to 10 per cent) is needed.

Recent experience with transfers has shown there are times when the holdback is not justified. For example, if an allocation is being transferred a significant distance downstream, the allocation remains in the river longer to the benefit of the environment.

17. Who decided who should be on the basin advisory committees?

Alberta Environment extended invitations to all municipalities and First Nations, and to all industries and organizations believed or known to have an interest in water management. As a result representatives came forward from municipalities, industries, irrigation agriculture, non-irrigation agriculture, and environmental and recreation groups.

APPLICATIONS

Management Consulting Ltd.

Special Areas Water Supply Project: Economics and Issues

Final Report

Prepared for:
The City of Red Deer

June 2005

Table Of Contents

EXECUTIVE SUMMARY	2
<i>Project Viability</i>	<i>2</i>
<i>Benefit Cost Analysis Deficiencies.....</i>	<i>3</i>
<i>Sensitivity and Risk Analysis</i>	<i>4</i>
<i>Socio-Economic Impact Analysis.....</i>	<i>4</i>
<i>Rural Special Areas Economic Development.....</i>	<i>5</i>
<i>Decision Process Issues.....</i>	<i>6</i>
 1 INTRODUCTION	 9
1.1 Purpose of the Report	11
 2 BENEFIT-COST ANALYSIS OF THE SAWSP	 12
2.1 Benefit-Cost Analysis Framework to Evaluate the Feasibility of the SAWSP	12
<i>Benefit and Cost Components</i>	<i>12</i>
<i>Benefit-Cost Ratio</i>	<i>13</i>
<i>Fairness and Equity Issues</i>	<i>13</i>
<i>Best Practices</i>	<i>14</i>
2.2 Components of the Benefit-Cost Analysis	14
SAWSP Costs.....	15
SAWSP Benefits.....	23
2.3 Results of the Benefit-Cost Analysis	27
<i>Overview of Benefit Cost Analysis Results (5% Discount Rate).....</i>	<i>29</i>
<i>Incomplete Definition and Analysis of Benefit Cost Categories</i>	<i>30</i>
2.4 Sensitivity and Risk Analysis	30
<i>Upside Risks</i>	<i>31</i>
<i>Downside Risks</i>	<i>32</i>
2.5 Socio-economic Impact Analysis of the SAWSP.....	38
2.6 Should SAWSP Proceed?.....	39
 3 REGULATIONS AND PROJECT APPROVAL.....	 41
3.1 Provincial Government	41
<i>Water Act</i>	<i>41</i>
<i>South Saskatchewan River Basin Water Management Plan</i>	<i>41</i>
<i>Historical Resources Act</i>	<i>45</i>
<i>Environmental Impact Assessment</i>	<i>46</i>
3.2 Federal Government.....	49
<i>Canadian Environmental Act</i>	<i>49</i>
<i>Navigable Waters Act and Fisheries Act.....</i>	<i>49</i>
 APPENDICES	 51

Special Areas Water Supply Project: Economics and Issues

Final Report

EXECUTIVE SUMMARY

The Special Areas Water Supply Project (SAWSP) has been proposed by the Special Areas Board (SAB) to improve water supplies to landowners and communities located within the Special Areas in east-central Alberta. The objective of the project is to address the water supply problems experienced over many years in the region, as a result of recurring droughts, by diverting up to 76,000 dam³ of water from the Red Deer River (south of Nevis) and transferring water into the Sounding Creek basin and the Battle River basin (inter-basin transfer).

The City of Red Deer has been invited to review documents describing the proposed SAWSP, and to provide comments on the project to the SAB and Alberta Environment. These comments will be considered by the SAB as it completes its requirements for approval of its license application for the project, and by Alberta Environment as it considers the application. The City of Red Deer engaged Applications Management Consulting Ltd. to provide an analysis of the economics and other process issues related to the project from a provincial public interest perspective. This report is based on a review of the studies that have been conducted on the SAWSP and discussions with various staff and consultants working for the Special Areas Board on this project.

Project Viability

A benefit-cost analysis to assess the economic viability of the SAWSP was undertaken by Watrecon Consulting.¹ The results of this analysis show that SAWSP is not a viable project under any of the agricultural scenarios analyzed. In the base case analysis using a 5% discount rate, the net present value under the most pessimistic agricultural scenario totals -\$115 million, with an associated benefit-cost ratio of 0.552, while the net present value under the most optimistic agricultural scenario totals -\$90 million, with an associated benefit-cost ratio of 0.693.

To address uncertainty, sensitivity analysis was conducted in the Watrecon study using discount rates of 3% and 7%. Lowering the discount rate, which in effect increases the future value of the net benefits of SAWSP, does not make the project viable under any of the agricultural scenarios analyzed. Using a 3%

Special Areas Water Supply Project: Economics and Issues

Final Report

discount rate, the net present value under the most pessimistic agricultural scenario totals -\$95 million, with an associated benefit-cost ratio of 0.697, while the net present value under the most optimistic agricultural scenario totals -\$56 million, with an associated benefit-cost ratio of 0.849. At a 7% discount rate, the stream of future net benefits is further discounted, producing the least desirable benefit-cost analysis results. Using a 7% discount rate, the net present value under the most pessimistic agricultural scenario totals -\$122 million, with an associated benefit-cost ratio of 0.446, while the net present value under the most optimistic agricultural scenario totals -\$105 million, with an associated benefit-cost ratio of 0.571. None of these benefit-cost analysis results meet the test of viability.

The report identifies a number of unquantified benefits that are not included in the benefit cost ratio.² It is concluded in the report that “assessing whether SAWSP is in the public interest, these unquantified benefits must be considered in addition to the quantified benefits...”³ However, the report does not attempt to provide any indication or analysis that would support a conclusion that these “unquantified” benefits would be sufficient to overcome the negative benefit cost analysis results for the project.

Benefit Cost Analysis Deficiencies

This report shows that the Watrecon analysis is incomplete, and could be significantly enhanced to provide a more complete measure of the benefits and costs arising from the project. It was found that the following cost and benefit variables should be included in the analysis:

Benefits:

- Improvements in human health as a result of the project (municipal water supply benefits).
- Non-consumptive use values: habitat support, pollution control, water-based recreation.
- Nonuse values: existence, option and bequest values.
- Reduced government expenditures on drought relief.

¹ Watrecon Consulting, *Socio-Economic Assessment of the Special Areas Water Supply Project*, Submitted to Special Areas Board, April 26, 2005.

² Ibid, pg 102

³ Ibid, page 103.

Special Areas Water Supply Project: Economics and Issues

Final Report

- Aesthetic values of green fields and well tended farmsteads.

Costs:

- On farm transition costs to irrigation agriculture.
- Lost agriculture production attributable to project footprint.
- Environmental costs:
 - during the construction phase,
 - of the project footprint,
 - of instream water flow reduction south of Nevis,
 - of the interbasin transfer of water
 - of increased forage production
- Loss of archaeological, historical and prehistoric resources.
- Project design and construction costs related to mitigation.
- Monitoring costs.

The quantification of these costs requires the completion of an analysis consistent with an Environmental Impact Assessment and a valuation of the losses of ecosystem services as a result of SAWSP. Without having a “complete” definition and analysis of all the relevant benefit and cost categories, the results of the benefit cost analysis and any conclusions based on these results must be considered “preliminary” at best.

Sensitivity and Risk Analysis

The results of the benefit cost analysis could change significantly under alternative assumptions used to arrive at values for the benefits and costs included in the analysis. There are a greater number of downside risks than upside risks to these assumptions used to value the net benefits. **As a result, the benefit cost ratio could be lower, pushing the project to be even less viable than presented in the Watrecon report.**

Socio-Economic Impact Analysis

While the estimated economic benefits to the province and the region associated with the construction and operation of the project are significant, they could be expected to accrue to a similar extent wherever a capital investment of the same

Special Areas Water Supply Project: Economics and Issues

Final Report

magnitude were made. As a result, the value of these socio-economic impacts cannot be considered “incremental”. The “incremental” socio-economic impacts would be those that are over and above a similar investment (presumably the next best use of the capital and operating expenditures) in the region.

The “regional” socio-economic benefits are significant, and would not accrue to this region if a similar investment were made elsewhere in the province. However, it could be expected that these benefits in a similar magnitude would be shifted to the region where that investment were made. Again, in this instance, the estimated socio-economic impacts cannot be considered “incremental”.

Rural Special Areas Economic Development

Given the failure of the benefit-cost analysis to demonstrate the economic viability of the project, the Watrecon report indicates that the need for providing support for the agricultural industry and economic growth of communities in the region is sufficient reason to proceed with the project. The concluding statement in the report is:

“Thus, for the purposes of developing a sustainable and vibrant economy in east-central Alberta providing water to the region via SAWSP appears to be an effective solution.”⁴

The analysis presented in the Watrecon report does not support this conclusion. There is no tangible evidence provided that the economy of the east-central part of the province will be “sustainable” or “vibrant” as a result of this project.

It should be noted that while our view is that the analysis of the SAWSP does not support such an ambitious claim for improving the economic prospects for the region, it does not mean that this is not a laudable goal for the province to pursue. If this is the primary objective of the project, or one of the primary objectives of the project, it should be evaluated using the social benefit cost analysis framework against other alternative programs that could be implemented to achieve this objective (e.g. smaller scale investments to support sustainable dryland farming).

⁴ Ibid, page 107.

Special Areas Water Supply Project: Economics and Issues

Final Report

Decision Process Issues

The report also shows that SAWSP may be subject to numerous provincial and federal regulations and further regulatory processes.

Water Management Plan for the South Saskatchewan River Basin (Provincial)

Before the Alberta Government grants a license to allow SAWSP to divert water from the Red Deer River, a special Act of legislature is required, as per Section 47 of the Water Act, to allow the transfer of water between major river Basins (Red Deer River Basin and Sounding Creek River Basin and Battle River Basin).

Running separate, but in parallel to the passage of a special Act of legislature, Alberta Environment is developing a Water Management Plan for the South Saskatchewan River Basin (SSRB) that includes a public consultation component. This Water Management Plan, scheduled to be submitted to the Minister in December 2005, may serve as a basis for the Minister of Environment to make a decision to grant SAWSP a license to divert water from the Red Deer River.

The Water Management Plan is expected to make a determination on:

- The “in-stream flow needs” (IFN) which is the amount of water that should remain in the rivers for the aquatic environment to be maintained over the long term; and,
- The amount of water required by the Red Deer River so that Alberta will be able to meet its obligation under the Master Agreement on Apportionment between the Prairie Provinces and the federal government.

Once these two determinations are made, Alberta Environment will then decide if there is sufficient water available for the SAWSP, given the existing license holders on the Red Deer River.

It is reasonable to conclude that the SAWSP will have impacts on future water allocations for the entire South Saskatchewan River Basin. In the Bow and Oldman Rivers, IFN generally exceed existing flows, and restoring flows is considered to be impossible under the existing water allocation system. The aquatic environment in these rivers is considered to be in a state of long-term

Special Areas Water Supply Project: Economics and Issues

Final Report

declining health.⁵ Any future water allocations in the Red Deer River Basin that come after pending allocations (includes SAWSP if approved) run a higher risk of not having water available, since they will be subject to the IFN established as a result of the SSRB Water Management Planning process and be junior in priority in these pending allocations.⁶ Post-SAWSP projects will likely require some water storage to ensure a reliable water supply in dry years, an additional cost that could affect business investment decisions in the region in the future.

Historical Resource Act (Provincial)

As stated by AMEC Earth & Environmental, the proposed development will likely affect archaeological and paleontological resources, and may require a Historical Resources Impact Assessment. This requires a qualified paleontologist (holding a paleontological collection permit within the Province of Alberta) to assess the potential impact prior to the issue of a development permit.

Environmental Impact Assessment (Provincial)

Under the Environmental Protection and Enhancement Act (EPEA) of Alberta there is an Environmental Assessment process of which the most comprehensive form is an Environmental Impact Assessment (EIA). At this time there has been no determination if SAWSP falls under the Mandatory Activities subject to an EIA. However SAWSP may still be considered for an Environmental Assessment (EA) where the complexity and scale of the project, technology, resource allocations or siting conditions create a potential for significant adverse environmental effects⁷.

Environmental Assessment Act (Federal)

Based on our review of the Comprehensive Study List Regulations under the Canadian Environmental Assessment Act, this project will likely require a federal environmental assessment.⁸

In addition, the SAWSP project may fall under two Federal Acts: the Navigable Waters Act which is administered by the Department of Transportation; and the

⁵ Kim Lalonde Environmental Consulting, Alberta Environment, Alberta Agriculture, Food and Rural Development, *The State of Southern Alberta's Water Resources*, Published by Alberta Agriculture, Food and Rural Development, 2004, page 10.

⁶ This statement was included in Alberta Environment's materials on the South Saskatchewan River Basin Water Management Plan that were provided at the open houses conducted in June 2005 by the Special Areas Board as part of the public consultation process on the SAWSP.

⁷ Alberta Environment, *Alberta's Environmental Assessment Process*, September 2004, page 4.

⁸ Canadian Environmental Assessment Act, Comprehensive Study List Regulations.
<http://laws.justice.gc.ca/en/C-15.2/SOR-94-638/66167.htm>.

Special Areas Water Supply Project: Economics and Issues

Final Report

Fisheries Act which is administered by the Department of Fisheries and Oceans. Consequently, SAWSP may have to apply for a permit/license, under each Act, prior to commencement of the project.⁹

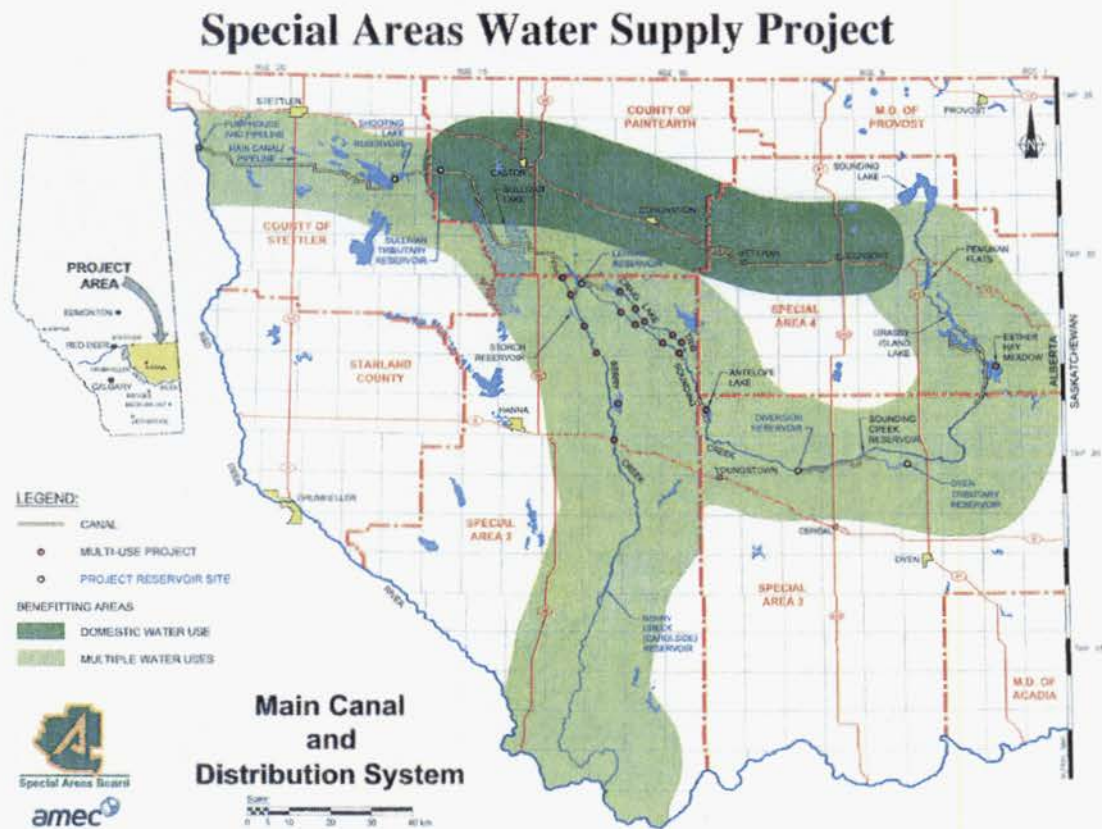
⁹ Personal communication with Keith MacDonald, Senior Program Officer, Canadian Environmental Assessment Agency, Alberta Regional Office June 27, 2005.

Special Areas Water Supply Project: Economics and Issues

Final Report

1 INTRODUCTION

The Special Areas Water Supply Project (SAWSP) has been proposed by the Special Areas Board to improve water supplies to landowners and communities located within the Special Areas in east-central Alberta. The objective of the project is to address the water supply problems experienced over many years in the region, as a result of recurring droughts, by diverting up to 76,500 dam³ of water from the Red Deer River (south of Nevis) and transferring water into the Sounding Creek basin (inter-basin transfer). The project area is indicated in the following map.



The proposed project involves the following components:¹⁰

¹⁰ Special Areas Board. *Special Areas Water Supply Project Project Summary*, May 20, 2005, pages 2-3.

Special Areas Water Supply Project: Economics and Issues

Final Report

- Diversion works consisting of a pump station on the Red Deer River south of the Hamlet of Nevis (SSW 15-38-22-W4) and a 4.5 kilometre pipeline;
- An 84 kilometre main canal or pipeline to convey water to the headwaters of Sounding and Berry Creeks;
- Storage reservoirs along the main canal at Shooting Lake and on a tributary to the northwest arm of Sullivan Lake;
- A distribution system within the Sounding and Berry Creek basins that would involve upgrades of existing works or new construction of about 94 kilometres of canals, channel improvements and two water supply reservoirs (Lehman Development downstream of the Lehman Dam and Oyen Tributary Reservoir); and
- 17 multi-use projects, which will provide wetlands and riparian habitat for wildlife, stockwater availability and water for pumping to dugouts.

The mean annual water supply from the SAWSP is 67,210 dam³, with local runoff comprising 13,770 dam³ and pumped diversion comprising 53,440 dam³. The diverted water would support water supply requirements for the following:¹¹

- Stockwatering, municipal and rural domestic or household needs along the conveyance routes;
- Creation or enhancement of 3,350 hectares (8,280 acres) of wetlands for waterfowl conservation and for a more reliable stockwatering throughout a large portion of the region;
- Sixteen backflood irrigation projects totaling 2,340 hectares (5,780 acres);
- Sprinkler irrigation on 8,090 hectares (20,000 acres); and
- Maintenance of 423 kilometres of flowing streams (canals and natural channels) for wildlife habitat and stockwatering.

Alberta Environment accepted the Special Areas Board's application for a water license (to divert 76,500 dam³), under the Water Act, as complete on November 3, 2003. Although the license has not been approved, the acceptance of the application establishes the project's priority (first-in-time, first-in-right) as of this date.

¹¹ Ibid, page 3.

Special Areas Water Supply Project: Economics and Issues

Final Report

Section (48) of the Water Act requires the Minister of Environment to consult with the public prior to introducing the special Act to allow the interbasin transfer of water between major river basins. The City of Red Deer, as well as other stakeholders directly affected by the project, were invited to attend a series of “open house” sessions in June 2005 in order to review documents describing the proposed diversion and inter-basin transfer, and to provide comments to the Special Areas Board and Alberta Environment. Comments will be considered by the Special Areas Board as it completes its requirements for approval and by Alberta Environment as it considers the application for a water license.

1.1 Purpose of the Report

The City of Red Deer engaged Applications Management Consulting Ltd. to provide an analysis of the economics and other process issues related to the SAWSP from a provincial public interest perspective. This report is based on a review of the studies that have been conducted on the SAWSP and discussions with various staff and consultants working for the Special Areas Board on this project. We attended two public open house sessions (held in Hanna on June 14, 2005 and in Red Deer on June 22, 2005) to obtain additional information on the project.

Based on the review of the studies on the SAWSP, and the information obtained at the open house sessions, the economics and other issues related to the project have been assessed within the context of a comprehensive benefit-cost analysis framework as well as the South Saskatchewan River Basin Water Management Plan.

2 BENEFIT-COST ANALYSIS OF THE SAWSP

Benefit-cost analysis is an analytical tool that provides information to decision-makers on the economic merits of proposed investments. A project is economically feasible to pursue when the benefits exceed the costs. A project is viable when every dollar invested yields at least a dollar in benefits, or the ratio of benefits to costs is greater than one. In determining whether a project is in the public interest, relevant equity considerations could be taken into account in addition to economic efficiency as measured by benefit-cost analysis.

Several steps and a variety of decisions are required to conduct a benefit-cost analysis. Some important theoretical considerations involved in such an analysis are reviewed in this section. As well, the quality and completeness of the analysis prepared by Watrecon Consulting is evaluated.

2.1 Benefit-Cost Analysis Framework to Evaluate the Feasibility of the SAWSP

As background to the review of the Watrecon analysis, it is important to establish some theoretical principles that should guide any benefit cost analysis. These principles have been taken from the federal Treasury Board Benefit Cost Analysis Guide. This is an appropriate source for two reasons: they are comprehensive and address all the relevant methodological issues pertinent to this project, and as it is likely that this project will eventually be part of a federal environmental assessment, these guidelines will be applied against any evidence regarding the benefit cost analysis that would be presented.

Benefit and Cost Components

According to the federal Treasury Board Benefit Cost Analysis Guide, determining and estimating the benefits and costs to be included in the analysis are critical to the credibility of the results:¹²

¹² Treasury Board of Canada, *Benefit Cost Analysis Guide*, http://www.tbs-sct.gc.ca/fin/sigs/Revolving_Funds/bcag/BCA2_E.asp, DRAFT July 1998.

Special Areas Water Supply Project: Economics and Issues

Final Report

"By far the greatest amount of time in a benefit-cost analysis is spent in constructing the tables of costs and benefits over time. To construct these tables, the analyst identifies the full set of relevant costs and benefits, estimates their quantities for each period, and calculates their values by applying their prices to their quantities in each period. This needs to be done carefully. A benefit-cost analysis is no better than its data."

Benefit-Cost Ratio

In evaluating the results of the Watrecon analysis, it is important to understand the appropriate theoretical context of the results. According to the federal Treasury Board Benefit Cost Analysis Guide, the benefit-cost ratio should be interpreted as follows:¹³

"A benefit-cost ratio is the ratio of the present value of benefits to the present value of costs. The decision rule here is that you should reject any project with a benefit-cost ratio of less than 1, and you should rank projects in order of their benefit-cost ratios."

Fairness and Equity Issues

While benefit-cost analysis is valuable for decision-making, the distribution of benefits and costs should also be taken into consideration in investment decisions.¹⁴

*"Net benefit is not the only concern: **distributional effects** are often important."*

Although difficult to evaluate at times, it should be noted that equity or distributional effects should be evaluated, where they are relevant.¹⁵

"Distributional issues should be covered in every benefit-cost analysis but kept separate from the economic-efficiency analysis. If a recommendation to approve a particular alternative hinges on equity objectives, then the net cost of choosing the equity-based recommendation must be made visible to the decision-makers."

¹³ Ibid.

¹⁴ Ibid.

¹⁵ Ibid.

Special Areas Water Supply Project: Economics and Issues

Final Report

Best Practices

The federal Treasury Board Benefit Cost Analysis Guide identifies criteria that should be attained to have a credible analysis.¹⁶

- *The objectives and priorities are clear.*
- *The best alternative ways of achieving the objectives are identified for the analysis.*
- *The alternatives are defined in a way that enables fair comparison.*
- *The 'point of view' of the analysis is stated.*
- *Assumptions and calculations are visible to the reader at every stage of analysis.*
- *Benefits and costs are estimated in detail for every time period, without short cuts.*
- *The technical analysis is well done (in regard to discount rates, inflation adjustments, choice of decision rule, etc.)*
- *Uncertainty and risk are carefully considered.*
- *Distribution effects are clearly set out (who pays, who benefits?); and,*
- *The recommendation is well reasoned and gives fair consideration to all alternatives.*

2.2 Components of the Benefit-Cost Analysis

A benefit-cost analysis of the SAWSP was undertaken by Watrecon Consulting¹⁷ to assess the economic viability of the project. The agricultural-related costs and benefits of the project were calculated based upon a base case farm financial analysis and four scenarios, which can be described as follows.

Base Case: A farm financial assessment of a 6,180 acre farm with 170 cows, 700 acres of wheat and Durum, 80 acres of barley, 320 acres of hay and greenfeed, 280 acres of summerfallow, and no irrigation.

Scenario 1: Assumed that irrigation would be used to produce forage on 132 acres. The increased forage would be fed to the existing cattle

¹⁶ Ibid.

Special Areas Water Supply Project: Economics and Issues

Final Report

herd, and any surplus feed would be sold. This scenario reflects the situation where water from SAWSP would be used to drought-proof existing operations. It is assumed that current beef prices would prevail over the life of the project.

Scenario 2: Assumes that irrigation would be used to produce 56 acres of forage and 76 acres of silage. This would be fed to the existing cattle herd, and any surplus grazing would be sold. This scenario is the same as scenario 1 but with the addition of silage. It is assumed that current beef prices would prevail over the life of the project.

Scenario 3: Assumed that, with 132 acres of irrigated forage, farmers would choose to background their calves (increase weight by 40 percent) and sell any surplus feed. It is assumed that beef prices would return to the average levels achieved for the 5-year period from 1998 to 2002 (pre BSE discovery).

Scenario 4: Assumed that, with increased forage and silage, farmers would choose to background their calves and sell any surplus grazing. The scenario is the same as Scenario 3 but with the addition of silage. It is assumed that beef prices would return to the average levels achieved for the 5-year period from 1998 to 2002 (pre BSE discovery).

In this section, a comprehensive framework to evaluate the costs and benefits arising from the project is presented. A comparison of the costs and benefits included in the comprehensive framework with those evaluated in the Watrecon benefit-cost analysis reveals some significant gaps. There were a number of cost and benefit variables that were not incorporated in the analysis that would need to be evaluated to provide a complete estimate of the net benefits arising from the project.

SAWSP Costs

The table below lists the costs that were included in the benefit-cost analysis of the SAWSP undertaken by Watrecon Consulting. In addition, cost categories that were not included in the benefit-cost analysis are presented in the table

¹⁷ Watrecon Consulting, *Socio-Economic Assessment of the Special Areas Water Supply Project*, Submitted to Special Areas Board, April 26, 2005.

Special Areas Water Supply Project: Economics and Issues

Final Report

below, to provide the complete range of the costs arising from the project that should be taken into consideration in the evaluation of the SAWSP.

Benefit-Cost Analysis Framework: Cost Categories

SAWSP Costs	Included in B/C Analysis	Not included in B/C Analysis
Project capital costs	✓	
Project operating costs	✓	
Irrigation and stockwater infrastructure costs	✓	
Agricultural operating costs: irrigation	✓	
On-farm transition costs to irrigated agriculture		✓
Lost agricultural production attributable to project footprint		✓
<i>Environmental costs: Loss of Environmental Amenities</i>		
• Construction phase		✓
• Project footprint		✓
• Instream flow reduction south of Nevis		✓
• Interbasin transfers		✓
• Increased forage production		✓
Loss of archaeological, historical and prehistorical resources		✓
Project design and construction costs related to mitigation		✓
Monitoring costs		✓

These categories of costs can be described individually as follows:

- **Project capital costs:** these estimated costs total \$192,280,000 measured in 2004 constant dollars, allocated over a 7-year period.¹⁸
- **Project operating costs:** estimated to total \$3.1 million annually, equivalent to 1.6% of project capital costs.
- **Irrigation and stockwater infrastructure costs:** undiscounted irrigation equipment costs total an estimated \$35.2 million, and stockwater capital costs total an estimated \$23.96 million, including replacement of equipment and pipes after 25 years. It is assumed that 25% of land suitable for irrigation would be developed in the first year that water

Special Areas Water Supply Project: Economics and Issues

Final Report

becomes available, and that an additional 15% would be developed in each of the next 5 years. Investment in the stockwatering system, consisting of the construction of permanent underground water lines and additional dugouts and storage tanks, would be spread over five years.

- ***Agricultural operating costs of Irrigation:*** incremental operating costs associated with irrigation agriculture are estimated for the four scenarios included in the analysis of the project. At full development, these undiscounted costs range between \$1,749,520 and \$4,486,584 annually.
- ***On-farm transition costs to irrigated agriculture:*** these costs are not included in the benefit-cost analysis since "...it is unlikely that more intensive farming of hay or cereal crops in the Special Areas would require more equipment or buildings".¹⁹ Potential on-farm transition costs could include the fencing of areas near the water conveyance system to protect water quality from runoff and other one-time costs associated with the changes on the farm.
- ***Lost agricultural production attributable to project footprint:*** these costs are not included in the benefit-cost analysis, but could involve a minimal amount of agricultural land although the area lost has not been specified.
- ***Environmental costs from the loss of environmental amenities:*** these costs are not included in the benefit-cost analysis, and require the completion of a comprehensive Environmental Impact Assessment²⁰ and an economic valuation of the ecosystem services affected by the project. It is in the public interest that a thorough review of the environmental impacts of the SAWSP be undertaken at the planning stage of the project before irrevocable decisions are made. Consideration of the best available and most reliable information about the costs of ecosystem

¹⁸ The project components encompassed by these costs include: the pump station, pipeline, canal to Shooting Lake, Shooting Lake Reservoir, Canal from shooting Lake to Sullivan Lake, the Sullivan Lake reservoir, the Canal from Sullivan Lake to Headwaters, and the In-Basin distribution system (including water supply reservoirs, 17 multi-use projects, canals including several that bypass multi-use projects for economic and water quality purposes, and channel improvements). Watrecon Consulting, *Socio-Economic Assessment of the Special Areas Water Supply Project*, Prepared for Special Areas Board, April 26, 2005, page 111.

¹⁹ Ibid, page 31.

²⁰ An EIA is a provincial government process that allows decision makers to decide if a project is in the public interest. For a description of the process see page 44 Environment Impact Assessment.

Special Areas Water Supply Project: Economics and Issues

Final Report

degradation, as well as the benefits of ecosystem improvements resulting from the project would contribute towards improved decision-making.

Alberta Environmental Protection provided an Environmental Overview of the SAWSP in 1992, but the identification of potential impacts was not comprehensive since the study involved a screening level evaluation.²¹ The study did not include any site-specific data on wildlife species, native prairie plants or rare plants. Since the time this study was undertaken, the project design has changed, and habitat and land use changes may also have occurred.²² Data gaps in the baseline environmental information were identified in a recent feasibility level assessment and cost estimate for the In-Basin Distribution System of the project, and the following recommendations were made in the study to address these gaps:²³

- The data on current fish species distribution and populations should be confirmed.
- Site specific data on wildlife particularly listed species should be updated to confirm current distribution and habitat use.
- The composition and extent of native prairie plant communities should be confirmed from field surveys and mapped.
- A rare plant survey of the project area should be conducted.

Baseline conditions should be assessed for a geographic area that extends beyond the boundaries of the study area, to encompass the potential areas downstream from the diversion (south of Nevis) that will be affected most significantly by the project. A narrow definition of the spatial scale of the ecosystem impacted by the project may mean the exclusion of important linkages and spillover effects²⁴ on environmental amenities.

Against this baseline, the impacts of the project on environmental amenities need to be determined (e.g. loss of habitat, species or genetic diversity as a result of the project on the cost side; and protection of

²¹ Alberta Environmental Protection, *Special Areas Water Supply Project Environmental Overview*, November 1992, page ii.

²² AMEC Earth & Environmental, *Special Areas Water Supply Project In-Basin Distribution Study Summary Report*, Prepared for Special Areas Board, August 2004, page 70.

²³ Ibid, page 71.

Special Areas Water Supply Project: Economics and Issues

Final Report

selected wildlife species due to improved range conditions and wetland creation/enhancement attributable to the project, on the benefit side).

The benefit-cost analysis framework to evaluate the SAWSP should include information about the economic values of changes in ecosystem services, provided by aquatic systems and their adjacent terrestrial environments, as a result of the project's environmental impacts.

Ecosystem services include water purification, provision of habitat for plants and animals, waste decomposition, recreation and support of biodiversity.²⁵ The design of the Environmental Impact Assessment should ensure that the physical impacts of the project are determined and that the outputs derived from the assessment are in a form that can be used as inputs to the economic valuation of the ecological services that are gained (e.g. through wetland creation/enhancement) and lost (e.g. as a result of downstream impacts south of Nevis, the project footprint, and the natural prairie wetlands potentially lost in preparing lands for irrigation). The environmental costs associated with the loss of environmental amenities (and, on the benefit side, the environmental amenities gained by the project) should encompass the range of use values and nonuse values, as indicated in the graphic below.²⁶

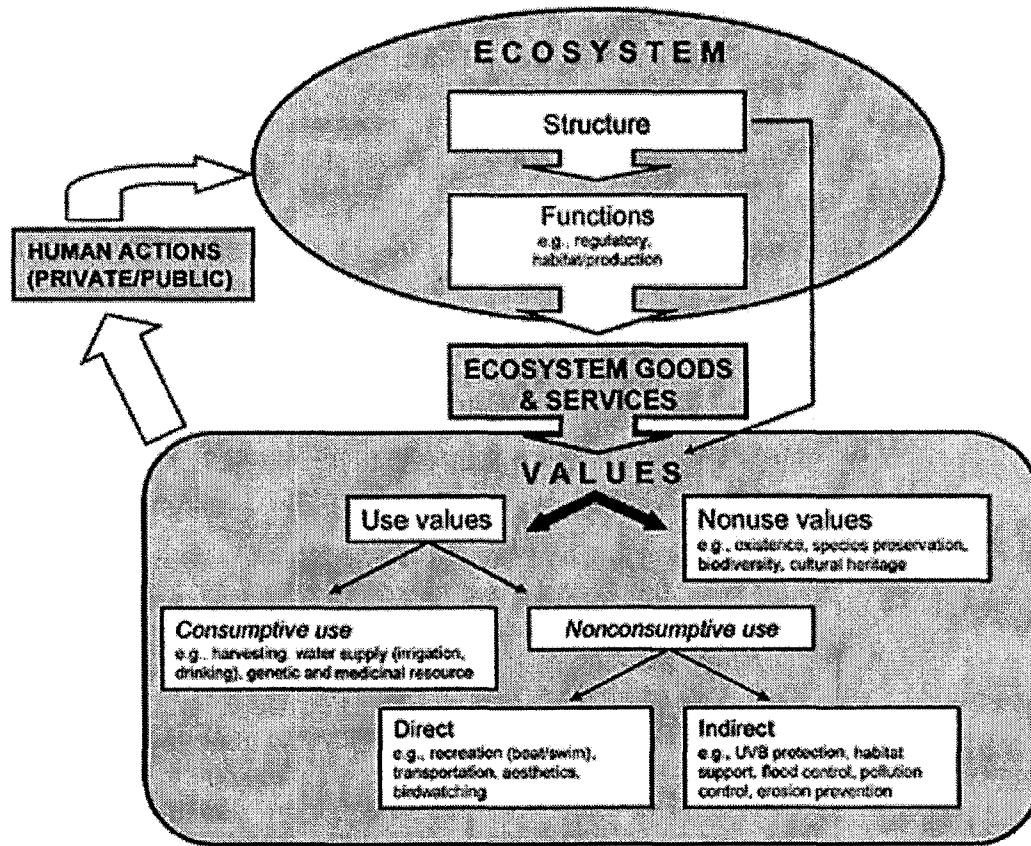
²⁴ National Research Council, *Valuing Ecosystem Services: Toward Better Environmental Decision-Making*, Water Science and Technology Board, 2004, page 251.

²⁵ Ibid, page 243.

²⁶ Ibid, page 241.

Special Areas Water Supply Project: Economics and Issues

Final Report



The use values include consumptive uses of water for municipal, industrial, irrigation and recreational (e.g. hunting) purposes; and nonconsumptive uses of water include direct uses for recreation (e.g. wildlife viewing and water-based recreation) and indirect uses to support habitat, prevent erosion and control pollution.

Nonuse values include existence value,²⁷ option value²⁸ and bequest value.²⁹

“...many people value the existence of aquatic ecosystems for their own sake, or for the role they play in ensuring the preservation of plant and animal species whose existence is important to them. This value can stem from a belief that

²⁷ Existence value is a measure of what people may be willing to pay to maintain or preserve the existence of an aquatic ecosystem, or a particular environmental feature.

²⁸ Option value is a measure of what people might be willing to pay for the option of being able to experience an environmental amenity at some point in the future.

²⁹ Bequest value is a measure of what people might be willing to pay to maintain an environmental feature for future generations.

Special Areas Water Supply Project: Economics and Issues

Final Report

these species or ecosystems have intrinsic value or from the benefits that humans get from their existence, even when that existence is not directly providing goods or services used by human populations. In some cases, this 'nonuse' value may be the primary source of an ecosystem's value to humans."³⁰

The U.S. National Research Council has stated that nonuse values may comprise a large component of the economic value of a change in an aquatic ecosystem and adjacent terrestrial environments.³¹ Since market prices do not exist for nonuse values, "stated-preference" research methodologies have been applied that elicit, through survey response, the willingness to pay, or the willingness to accept compensation, for the changes to aquatic ecosystems resulting from water supply projects.

"Because aquatic ecosystems are complex, dynamic, variable, inter-connected, and often nonlinear, our understanding of the services they provide, as well as how they are affected by human actions, is imperfect and linkages are difficult to quantify. Likewise, information about how people value ecosystem services is imperfect... Nonetheless, the current state of both ecological and economic analysis and modeling in many cases allows for estimation of the values people place on changes in ecosystem services, particularly when focused on a single service or a small subset of total services. Use of the (imperfect) information about these values is preferable to not incorporating any information about ecosystem values into decision-making (i.e., ignoring them), since the latter effectively assigns a value of zero to all ecosystem services."³²

A key issue in the valuation of the change in ecosystem services resulting from a project is the determination of the relevant group of people whose values should be considered. From a public interest point of view, it may be appropriate to consider the values reflecting all Albertans when evaluating a major public sector investment from a provincial perspective.

³⁰ National Research Council, *Valuing Ecosystem Services: Toward Better Environmental Decision-Making*, Water Science and Technology Board 2004, page 240.

³¹ Ibid, page 250.

³² Ibid, pages 241-242.

Special Areas Water Supply Project: Economics and Issues

Final Report

The loss of environmental amenities (that cannot be avoided through mitigation measures) as a result of project impacts should be measured for the following categories in the evaluation of the SAWSP:

- *Construction phase:* impacts of construction activities on fish, wildlife, vegetation and biological diversity;
 - *Project footprint:* impacts on rare and endangered plants and species, including losses of amenities from reservoir development;
 - *Instream flow reduction south of Nevis:* a Water Management Objective for instream flows of the Red Deer River will be established under Alberta Environment's South Saskatchewan River Basin Water Management Plan prior to the Department's consideration of the Special Areas Board's application for a water licence for the SAWSP. However, the environmental impacts of the SAWSP on the aquatic ecosystem and adjacent riparian areas downstream from the diversion (south of Nevis) have not been included in the benefit-cost analysis undertaken by Watrecon Consulting. The lack of information on the project impacts (in terms of lower instream flows) on fish, wildlife, vegetation, biological diversity, water quality and erosion, and a valuation of the losses in ecosystem services brought about by these impacts, is an important gap in the assessment of the costs of the project;
 - *Interbasin transfers:* valuation of the changes in ecosystem services resulting from biota and species transfers;
 - *Increased forage production:* valuation of the marginal reductions in populations of prey species that could result from greater use of herbicides and pesticides,³³ and the loss of natural prairie wetlands in preparing lands for irrigation.
- ***Loss of archaeological, historical and prehistoric resources:*** these costs are not included in the benefit-cost analysis. The Archaeological Survey of Alberta recommended in 1991 that a Historical Resources

³³ Alberta Environmental Protection, *Special Areas Water Supply Project Environmental Overview*, November 1992, page 61.

Special Areas Water Supply Project: Economics and Issues

Final Report

Impact Assessment be undertaken since the proposed canal was deemed to traverse a region of generally high potential for the discovery of archaeological sites.

“Although previous research is sporadic for some areas, site types including bison jumps, effigies, campsites, stone circles and ribstones occur”.³⁴

The project design has changed since 1991, but these potential impacts nonetheless need to be assessed. In addition, the Royal Tyrrell Museum of Paleontology asserted in 1991 that short sections of the proposed development would affect significant paleontological resources.³⁵ In light of these concerns, a Historical Resources Impact Assessment needs to be conducted, and the resource losses that cannot be mitigated should be valued.

- ***Project design and construction costs related to mitigation:*** these costs are not included in the benefit-cost analysis. The results of an Environmental Impact Assessment and a Historical Resources Impact Assessment would provide the information needed to determine the mitigation measures, and their potential costs, to minimize adverse project impacts on the environment. Mitigation requirements could include measures to reduce fish entrainment; wildlife crossing structures near canals; timing of construction to avoid the breeding season for selected bird species; and excavation of archaeological and historical resources along the right of way for canals/pipelines as well as construction of bypass canals to circumvent these resources. The costs of mitigation measures identified in an Environmental Impact Assessment would need to be included in the project capital costs.
- ***Monitoring costs:*** these costs, which are not included in the benefit-cost analysis, encompass, for example, monitoring and evaluation of natural channels; monitoring, evaluation and maintenance of wetland creation / enhancement projects; and monitoring of grazing management systems.

SAWSP Benefits

The table below lists the benefits that were included in the benefit-cost analysis of the SAWSP undertaken by Watrecon Consulting. In addition, benefit

³⁴ Ibid.

Special Areas Water Supply Project: Economics and Issues

Final Report

categories that were not included in the benefit-cost analysis are presented in the table, to provide a complete range of the benefits arising from the project that should be taken into consideration in the evaluation of the SAWSP. Some of these benefit categories were included in the socio-economic impact assessment of the project by Watrecon Consulting, but were not quantified.

Benefit-Cost Analysis Benefit Framework: Benefit Categories

SAWSP Benefits	Included in B/C Analysis	Not included in B/C Analysis
Incremental agricultural revenues from irrigation farming	✓	
Feed transportation cost savings (hay)	✓	
Stockwatering (additional weight gain - calves)	✓	
<i>Municipal water supplies benefits: communities along Highway 12</i>		
• Municipal water treatment cost savings	✓	
• Improvements in human health as a result of improved water quality		✓
<i>Ecosystem services benefits: improved range conditions & wetland creation/enhancement</i>		
• Consumptive use values: incremental extra market benefits associated with waterfowl, upland bird, big game hunting	✓	
• Direct non-consumptive use values: wildlife viewing, water-based recreation	✓	✓
• Indirect non-consumptive use values: habitat support, pollution control		✓
• Nonuse values: existence, option and bequest values		✓
Reduced drought relief government expenditures		✓
Aesthetic values of green fields and well tended farmsteads		✓

These categories of benefits can be described individually as follows:

- ***Incremental agricultural revenues from irrigation farming:***
incremental revenues associated with irrigation agriculture are estimated for the four scenarios. At full development, the total annual undiscounted benefits range between \$4.95 million, with current cattle prices, for Scenario 1; and \$9.2 million, with 5-year average (1998-2002) pre-BSE cattle prices, for Scenario 4.

³⁵ Ibid.

Special Areas Water Supply Project: Economics and Issues

Final Report

- **Feed transportation cost savings:** as a consequence of increased hay production in the region associated with irrigation farming, farmers would no longer need to pay the costs of transporting significant quantities of hay. The benefits are calculated based on a saving of \$20 per tonne of alfalfa / hay produced per quarter-section of irrigation, yielding total annual undiscounted benefits of \$1.14 million at full irrigation development.
- **Stockwatering (additional weight gain – calves):** the development of a stockwater supply system would increase grazing capacity and provide livestock with better quality stockwater that would increase weight gain in calves. The total annual undiscounted benefits associated with stockwatering at full development would range between \$3 million (\$2.61 million associated with increased grazing capacity plus \$444,600 associated with additional weight gain in calves at current cattle prices) and \$3.4 million (\$2.61 million associated with increased grazing capacity plus \$783,900 associated with additional weight gain in calves at 5-year average pre-BSE cattle prices).³⁶
- **Municipal water supplies benefits from communities along Highway 12:** the communities located along Highway 12, including Stettler, Castor, Halkirk, Coronation, Veteran and Consort, currently depend on groundwater and surface water, that is variable in terms of quality and/or quantity, for municipal and domestic water supplies. The development of a regional water pipeline system has been proposed that would tie into the SAWSP at Castor, where water would be treated.³⁷
 - **Municipal water treatment cost savings:** Watrecon Consulting estimated that the capital cost savings associated with this water supply option, in comparison to the next least costly option for communities along Highway 12, would amount to \$9.5 million. In addition, the estimated average annual costs savings (compared to current conditions) amount to nearly \$420,00 as a result of the lower operating costs (estimated at \$1.10 per cubic metre of treated water) associated with having one treatment plant at Castor.

³⁶ Watrecon Consulting, *Socio-Economic Assessment of the Special Areas Water Supply Project*, Submitted to Special Areas Board, April 26, 2005, page 84.

³⁷ Ibid, page 51.

Special Areas Water Supply Project: Economics and Issues

Final Report

- *Improvements in human health as a result of improved water quality:* these benefits are included in the socio-economic impact assessment of the project, but aren't quantified. Benefits associated with improvements in human health could be quantified in terms of savings to the health care system attributable to improved water quality and other measures such as reduced absenteeism from work.
- ***Ecosystem services benefits of improved range conditions and wetland creation/enhancement:*** The categories of ecosystem services benefits are based on those depicted in the Figure included on page 8 of this report.
 - *Consumptive use values:* includes estimates of the incremental non-market values associated with waterfowl, upland bird and big game hunting, as a result of improved range conditions and wetland creation/enhancement associated with the SAWSP.³⁸ Total annual undiscounted benefits related to these non-market hunting values amount to an estimated \$259,200.
 - *Direct non-consumptive use values:* based on the methodology used to estimate consumptive use values for hunting, the incremental annual undiscounted benefits related to wildlife viewing as a result of the project amount to \$129,100. Water-based recreation benefits, which could accrue along the water conveyance system and at the Oyen reservoir, are included in the socio-economic impact assessment, but are not quantified. A valuation of the water-based recreation benefits associated with the SAWSP would require further study on the willingness to pay for the incremental services provided by the project.

³⁸ It is assumed in the analysis that the incremental non-market benefits attributable to SAWSP are equivalent to 20% of the extra-market values associated with a day of hunting in Alberta (for waterfowl, upland bird and big game hunting). This proportion, based on the results of a revealed preference model developed for the Little Bow Project/Highwood Diversion Plan, reflects the transportation costs and travel time savings that would result from switching to recreation sites that offer the desired mix of attributes. The incremental daily non-market values are applied to the total hunter-days for waterfowl, upland bird and big game hunting in the region. The total hunter-days reflect nearly a 30% increase in waterfowl, upland bird and big game hunter days in the region over current levels, as a result of the project. The basis of the assumptions underlying this analysis are not sourced or substantiated, and the steps of the analysis are not transparent.

Special Areas Water Supply Project: Economics and Issues

Final Report

- *Indirect non-consumptive use values:* include ecosystem services provided by wetlands, such as habitat support and pollution control. These benefits are not included in the benefit-cost analysis, but could be estimated on the basis of data collected from a comprehensive Environmental Impact Assessment, and a valuation of the changes in ecosystem services.
- *Nonuse values:* existence, option and bequest values are discussed in the socio-economic impact assessment of the project, but aren't quantified. Data from a comprehensive Environmental Impact Assessment on the extent to which the project will contribute to the protection and enhancement of environmental amenities (e.g. rare and endangered species), and a study on the value of the changes in these amenities or ecosystem services to Albertans would be required to measure these non-market benefits. The nonuse benefits associated with the creation/enhancement of wetlands could potentially comprise a significant share of the total economic value of the benefits attributable to the SAWSP. However, these benefits would be offset by the loss in ecosystem services, and related nonuse benefits, downstream from the diversion (south of Nevis).
- ***Reduced drought relief government expenditures:*** these benefits are discussed in the socio-economic impact assessment of the project, but aren't quantified. These benefits could be estimated on the basis of past government expenditures in the Special Areas related to drought relief.
- ***Aesthetic values of green fields and well tended farmsteads:*** these benefits are not included in the benefit-cost analysis of the project, but could be estimated in conjunction with the valuation of the changes in ecosystem services resulting from the project.

2.3 Results of the Benefit-Cost Analysis

The results of the benefit-cost analysis undertaken by Watrecon Consulting indicate that the project is not economically viable, since the costs outweigh the benefits. The net present value of the project (total discounted benefits less total discounted costs) was calculated based upon the four agricultural scenarios

Special Areas Water Supply Project: Economics and Issues

Final Report

described on pages 13-14 of this report. These four scenarios are intended to provide alternative measures of the potential incremental agricultural operating costs and revenues from irrigation under different assumptions regarding livestock management practices and beef prices.

A 5% discount rate was applied to the future benefits and costs arising from the project, over a 50 year project operating life, and sensitivity analysis was conducted using 3% and 7% discount rates. The benefit-cost analysis results for each of these scenarios under the alternative discount rates are indicated in the following table.

SAWSP Benefit-Cost Analysis Results (Millions of Dollars)			
	Discount Rates		
	5%	3%	7%
Discounted Costs			
Scenario 1	\$257	\$314	\$219
Scenario 2	\$271	\$336	\$229
Scenario 3	\$277	\$346	\$233
Scenario 4	\$293	\$371	\$244
Discounted Benefits			
Scenario 1	\$142	\$219	\$98
Scenario 2	\$161	\$249	\$111
Scenario 3	\$180	\$279	\$124
Scenario 4	\$203	\$315	\$140
Net Present Value			
Scenario 1	(\$115)	(\$95)	(\$122)
Scenario 2	(\$110)	(\$88)	(\$118)
Scenario 3	(\$97)	(\$67)	(\$109)
Scenario 4	(\$90)	(\$56)	(\$105)

Source: Watrecon Consulting Ltd., *Socio-Economic Assessment of the Special Areas Water Supply Project*, April 26, 2005, page 85.

Based on the Watrecon analysis, the project is not viable from an economic efficiency perspective under any scenario or discount rate utilized in the analysis. At the 5% discount rate, the most favorable result is achieved under Scenario 4

Special Areas Water Supply Project: Economics and Issues

Final Report

(the most optimistic agricultural scenario) in which case the project has a net present value of -\$90.1 million and an associated benefit-cost ratio of 0.693.³⁹

To address uncertainty, sensitivity analysis was conducted in the Watrecon study using discount rates of 3% and 7%. Lowering the discount rate, which in effect increases the future value of the net benefits of SAWSP, does not make the project viable under any of the agricultural scenarios analyzed. Using a 3% discount rate, the net present value under the most pessimistic agricultural scenario totals -\$95 million, with an associated benefit-cost ratio of 0.697, while the net present value under the most optimistic agricultural scenario totals -\$56 million, with an associated benefit-cost ratio of 0.849. At a 7% discount rate, the stream of future net benefits is further discounted, producing the least desirable benefit-cost analysis results. Using a 7% discount rate, the net present value under the most pessimistic agricultural scenario totals -\$122 million, with an associated benefit-cost ratio of 0.446, while the net present value under the most optimistic agricultural scenario totals -\$105 million, with an associated benefit-cost ratio of 0.571. None of these benefit-cost analysis results meet the test of viability.

Overview of Benefit Cost Analysis Results (5% Discount Rate)

Scenarios 1 and 2 reflect a continuation over the project life of current unfavorable beef market conditions and beef prices. For the base analysis using a 5% discount rate, the net present value for Scenario 1 is nearly -\$115 million, and the benefit-cost ratio is 0.552. For Scenario 2, the net present value exceeds -\$110 million, and the benefit-cost ratio is 0.593.

Scenarios 3 and 4 reflect more optimistic beef market conditions given the assumption that beef prices return to the average levels achieved for the 5-year period from 1998 to 2002, prior to the discovery of BSE. For the base analysis using a 5% discount rate, the net present value for Scenario 3 is nearly -\$97 million, and the benefit-cost ratio is 0.650. For Scenario 4, the net present value exceeds -\$90 million and the benefit-cost ratio is 0.693.

³⁹ Sensitivity analysis conducted with respect to beef prices (at a 5% discount rate) indicates that using 5-year average pre-BSE prices measured in 2004\$, the net present value is -\$88.7 million and the associated benefit-cost ratio is 0.698, while using 14-year average pre-BSE prices measured in 2004\$ results in a net present value estimated at -\$86 million and an associated benefit-cost ratio of 0.707. Watrecon Consulting, *Socio-Economic Assessment of the Special Areas Water Supply Project*, Submitted to Special Areas Board, April 26, 2005, page 88.

Special Areas Water Supply Project: Economics and Issues

Final Report

Incomplete Definition and Analysis of Benefit Cost Categories

As discussed in Section 2.2, the benefit-cost analysis conducted for the SAWSP does not include all of the costs and benefits that should be considered in evaluating the net benefits of the project. Further work needs to be undertaken to assess the full range of costs arising from the SAWSP prior to making a decision on the project. In particular, the environmental costs and mitigation and monitoring costs need to be quantified, since the consideration of these variables and their potential magnitude could further reduce the net benefits of the SAWSP. The estimation of these categories of costs requires the completion of an analysis equivalent to a comprehensive Environmental Impact Assessment and a valuation of the losses of ecosystem services as a result of the project. In addition, the estimation of non-use ecosystem services benefits, associated with the improved range conditions and wetland creation/enhancement resulting from the SAWSP project, is particularly important given that the costs of the project exceed the benefits.

“If a partial measure of benefits exceeds costs, then it is not necessary to have a measure of total benefits because the additional information (i.e., values associated with the additional ecosystem services) would not change the results of the benefit-cost analysis. However, if focusing on only a subset of services yields a benefit measure that is less than cost, it is necessary to consider the value of other services not previously included to see whether inclusion of these benefits changes the results of the analysis.”⁴⁰

Without having the benefit of a “complete” definition and analysis of all the relevant benefit and cost categories, the results of the benefit cost analysis and any conclusions based on these results must be considered “preliminary” at best.

2.4 Sensitivity and Risk Analysis

The results of the benefit-cost analysis could change significantly under alternative assumptions used to estimate the value of the benefit and cost variables included in this project. Some of the potential risks of the project are addressed in the sensitivity analysis and risk assessment presented in the Watrecon report. The following discussion addresses these and other sensitivity

⁴⁰ National Research Council, *Valuing Ecosystem Services: Toward Better Environmental Decision-Making*, Water Science and Technology Board, 2004, page 247.

Special Areas Water Supply Project: Economics and Issues

Final Report

and risk analysis issues that need to be considered in a complete benefit cost analysis.

Upside Risks

The net benefits of the SAWSP could increase under the following conditions:

- **Higher future beef prices:** A rise in beef prices, over the 5-year average pre-BSE level assumed in Scenarios 3 and 4 of the farm financial analysis of the project, would increase the incremental agricultural revenues from irrigation.
- **The development of intensive livestock operations in the Special Areas:** Large swine operations are located in the Special Areas, but further expansion is constrained by the lack of water. An increase in intensive swine operations and, when market conditions improve, the potential development of confined beef feeding operations could occur as a result of the SAWSP, and this would increase the incremental agricultural revenues from irrigation.⁴¹ However, the additional benefits that would accrue from more intensive land use could be offset by negative environmental impacts (e.g. pollution from runoff and improper grazing management practices to support intensive operations).
- **Conversion to specialty crops:** Some farmers in the Special Areas may convert to growing specialty crops (e.g. grains, vegetables and sugar beets) if market conditions and prices are favourable. The agricultural revenues from irrigation could increase considerably if this conversion occurs, although major capital expenditures on buildings and harvesting equipment would be required.
- **Nonuse benefits of improved range conditions and wetland creation/enhancement:** The estimation of these benefits could bolster the net benefits of the SAWSP. However, consideration of the nonuse values that would be foregone downstream from the diversion, south of Nevis, could offset these environmental benefits. The magnitude of the gains and losses would need to be determined through an Environmental Impact Assessment and valuation of the changes in ecosystem services brought about by the SAWSP.

⁴¹ This conclusion is not supported by evidence or analysis provided in the Watrecon report.

Special Areas Water Supply Project: Economics and Issues

Final Report

- ***Drought relief benefits of the project:*** In the past farmers have received financial assistance from the provincial government to offset the cost of purchasing and transportation of hay during severe drought conditions. If SAWSP were to be completed, it would eliminate the need for government drought relief efforts however only to the extent that the duration of the drought did not extend beyond SAWSP reservoir capacity.

Downside Risks

The net benefits of the SAWSP could decline under the following conditions:

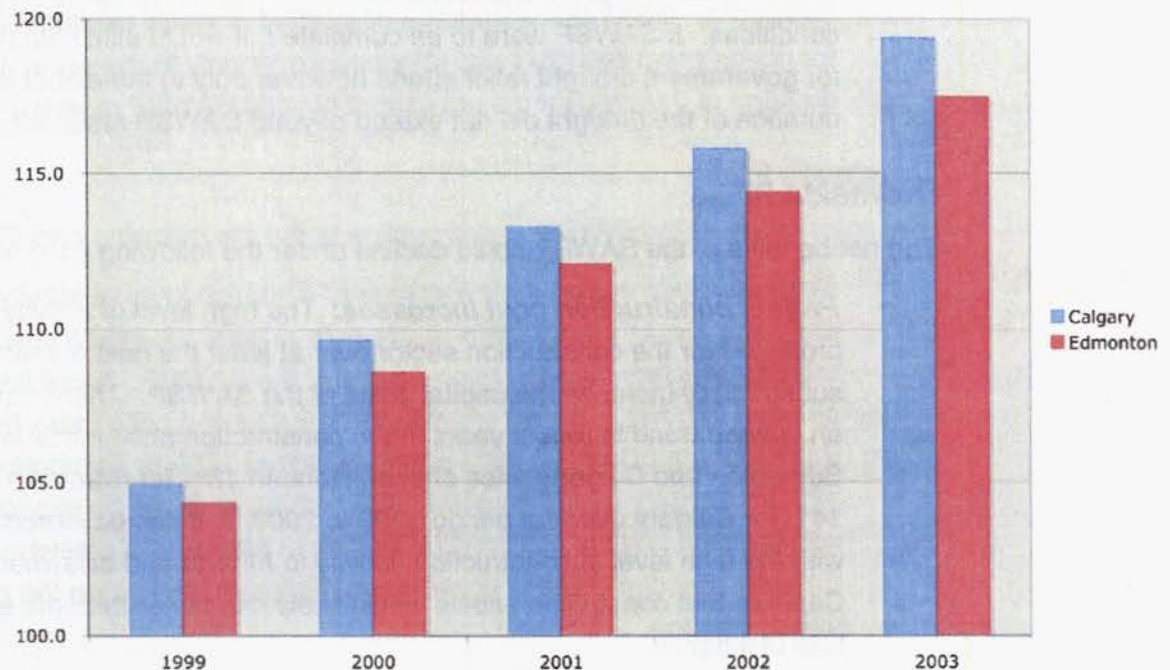
- ***Project construction cost increases:*** The high level of activity projected for the construction sector over at least the next 5 years could substantially increase the capital costs of the SAWSP. There has been an upward trend in recent years in the construction price index for Edmonton and Calgary; price changes totaled 13% for Edmonton and 14% for Calgary over the period 1999 to 2003.⁴² It can be expected that with the high level of construction activity in Alberta and elsewhere in Canada, that construction costs would likely rise faster than the general rate of inflation.

⁴² Statistics Canada, CANSIM Table 327-0039 - Price indexes of non-residential building construction, by class of structure, quarterly (Index, 1997=100).

Special Areas Water Supply Project: Economics and Issues

Final Report

Average Construction Price Index, Non-Residential Construction
Calgary and Edmonton (1997=100)



- **Increased costs of energy:** Project operating costs and agricultural operating costs related to irrigation could increase significantly if the cost of energy increases in the future.
- **Farm investment in irrigation and stockwater infrastructure:** Cash outlays and financing requirements could limit some farmers from investing in irrigation and stockwater infrastructure. It is recognized in the Watrecon report that this could delay investment in irrigation development, and the associated benefits in terms of the incremental agricultural revenues from irrigation. However, the Watrecon report does not seem to recognize the significance of the Farm Financial Analysis presented on page 36, which shows that three of the four scenarios produce a negative return on equity to farm operations, even after the gains resulting from the SAWSP. Only in Scenario 4 do farms receive a marginal positive return on equity (approximately \$3,000). This represents approximately 4% on the capital cost of \$69,570 for this

Special Areas Water Supply Project: Economics and Issues

Final Report

scenario.⁴³ If most farmers would rely on a financial institution for funds to invest in irrigation, it would be reasonable to conclude they would have difficulty in presenting this as a viable business case.⁴⁴

Further, in the benefit-cost analysis undertaken for the SAWSP, it is assumed that 25% of land suitable for irrigation would be developed in the first year that water becomes available, and that an additional 15% would be developed in each of the next 5 years. It will thus take 6 years to build up to the 20,000 acres of land that can be irrigated by the project. By comparison, an evaluation of the economic impact to agriculture of the Oldman River dam, conducted by UMA Engineering Ltd. in 1991, considered a 10-year period to convert from dryland farming to 170,000 acres of irrigation farming.

“Common wisdom in some other regions is that it takes a generation to change a dryland farmer into an irrigation farmer. However, much of the new acres to be converted to irrigation will be managed by experienced irrigation farmers. We expect to witness a fairly rapid conversion of most of the 170 thousand acres, followed by a small proportion coming on after the projected ten years.”⁴⁵

Any delay in uptake of irrigation will delay the stated benefits of the SAWSP and lower the benefit cost ratio pushing the project to be less viable than presented in the Watrecon report.

- **Environmental costs:** Consideration of the environmental costs of the SAWSP, including the value of the loss of environmental amenities related to the project construction phase, the project footprint, the instream flow reduction of the Red Deer River south of Nevis, interbasin transfers, and increased forage production, will increase the costs of the SAWSP. The magnitude of the increase in costs would need to be determined through an analysis similar to a comprehensive

⁴³ The return on the stated “total investment” of \$2.18 million is significantly lower. See page 36 of the Watrecon report.

⁴⁴ The results of the Farm Financial Analysis are not recognized on page 39 of the Watrecon report since it is concluded that: “anecdotal evidence suggests that farmers do have access to the capital needed to develop irrigation from the SAWSP and that the full 20,000 acres of irrigation would be developed within six years of project completion.” This conclusion is not supported by evidence in the report.

⁴⁵ UMA Engineering Ltd., *Review of the Expected Economic Impact to Agriculture of the Oldman River Dam*, Presentation to Federal Environmental Assessment and Review Panel Hearings on the Oldman River Dam on behalf of the Lethbridge Northern Irrigation District, Prepared by UMA Engineering Ltd, November 1991, page 3.

Special Areas Water Supply Project: Economics and Issues

Final Report

Environmental Impact Assessment and a valuation of the negative impacts on ecosystem services brought about by the SAWSP.

- **Mitigation and monitoring costs:** The costs of mitigating the negative impacts of the project on environmental amenities and archaeological and historical/prehistorical resources, as well as on-going monitoring requirements of, for example, the wetland projects and natural channels, will increase project costs.
- **Irrigated acreage:** As discussed above, the total projected irrigated acreage may not be achieved if there is lower conversion of dryland farms than projected because of farm finances. An assessment of the suitability of the entire 20,000 acres proposed for irrigation also needs to be completed. It has been determined that the largest amounts of irrigable land are located along the lower reaches of Sounding Creek and in the lower Berry Creek system; most of these lands suitable for irrigation are currently under cultivation for dryland crops.⁴⁶ However, water quality could possibly pose constraints to irrigation farming in the lower reaches of Sounding Creek. It is recommended by Golder Associates that a contingency plan be developed to address the risk of unacceptable water quality in the system.

“At the project level, for example, project design modifications such as increasing irrigation development in the upstream areas of Sounding Creek where water quality is predicted to be more suitable for irrigation purposes might be considered.”⁴⁷

A detailed “walk through” needs to be completed before the land along the lower reaches of Sounding Creek can be classified as irrigable. Therefore it is reasonable to conclude that the total amount of land that could potentially be converted to irrigation may vary.

- **Low river flows and apportionment:** The Master Agreement on Apportionment requires Alberta to pass 50% of the natural annual discharge from the South Saskatchewan River Basin to Saskatchewan.

⁴⁶ Watrecon Consulting, *Socio-Economic Assessment of the Special Areas Water Supply Project*, Prepared for Special Areas Board, April 26, 2005, page 27.

⁴⁷ Golder Associates, *SAWSP Water Quality Modelling Study*, Prepared for the Special Areas Board, June 2005, page 5.

Special Areas Water Supply Project: Economics and Issues

Final Report

Flows remaining in the Red Deer River to meet in-stream flow needs serve as apportionment flows.

*"At the present time, flows from the Bow and Oldman Rivers meet the requirements of apportionment, with the assistance of stored water released from the Oldman River dam reservoir. However, as the utilization of the existing licences in these basins increases, there will be an increasing requirement for contributions from the Red Deer River."*⁴⁸

*"...the consumption of water from the Oldman River will increase substantially, making it more difficult for Alberta to meet its flow commitments to Saskatchewan. What is a possibility is that meeting this commitment in the post-Oldman Dam era may constrain water-related growth in the Bow and Red Deer basins."*⁴⁹

Agricultural revenues from irrigation, and use and nonuse values associated with the wetlands dependent on water from the SAWSP, will decline during years when water allocation is reduced because of the impact of low river flows on in-stream flow requirements (to maintain healthy aquatic ecosystems) or when a larger contribution to apportionment is required.

- **Drought relief expenditures:** During a severe prolonged drought⁵⁰, water allocations to irrigation may be reduced or even restricted because SAWSP reservoirs may not have a chance to be replenished because of Instream Flow Needs (IFN) and apportionment requirements. Therefore, there may be a requirement for continued drought relief expenditures in the Special Areas in the future in the event of two or more consecutive years of drought.
- **Climate change:** Modeling results of water supply derived from historical weather data may not adequately represent long-term water supply since future weather and stream flow may be different than in the past⁵¹ due to the impacts of climate change.

⁴⁸ Alberta Environment, *South Saskatchewan River Basin Water Management Plan, Phase Two General Overview*, March 2004, page 4.

⁴⁹ Jack Glenn, *Once Upon an Oldman*, UBC Press, 1999, page 261.

⁵⁰ Defined as two or more consecutive years of drought.

⁵¹ Alberta Environment, *South Saskatchewan River Basin Water Management Plan, Phase Two Background Studies*, June 2003, page 10.

Special Areas Water Supply Project: Economics and Issues

Final Report

“While flow rates in the South Saskatchewan River Basin have fluctuated during the years, the average natural flow has not changed much. But such flow volumes cannot be assured in the future, particularly if climate change warnings prove accurate. For example, the 1990s was the warmest decade on record in the southern Canadian prairies, with average temperatures at least one degree Celsius above the historic norm. In the critical headwaters of the SSRB, warmer temperatures mean glaciers are receding, snow packs are melting faster and more winter-spring precipitation is falling as rain instead of snow. On the prairies, higher temperatures mean more evaporation from rivers, reservoirs and fields. Historic records also indicate the 20th century was wetter than usual and that more prolonged droughts might thus be expected in the future.”⁵²

The net benefits of the SAWSP could be significantly affected if flows in the Red Deer River decline in the future, since the availability of water for diversion for irrigation and for the support of wetlands may be reduced.

“Thus, there is some risk that, if climate change results in lower river flows, farmers and other users may not be able to get all the water they need in very dry years, resulting in yields that would be less than assumed in the farm financial analysis. This would reduce revenues and would affect farm financial viability...”⁵³

- **Municipal and domestic water supply:** The same downside risk as described under project construction costs (page 32 of this report) are applicable to the construction cost saving to municipalities of using water from SAWSP over the next best alternative. In addition, there is no supporting evidence as to the timing of the completion of the municipal and domestic water supply project. Therefore it is reasonable to conclude the full annual benefits may not be achieved until several years after the construction completion of the SAWSP. In addition, these benefits may not be as high as estimated for two reasons. If the actual cost of supplied water is higher (due to increased capital costs) the cost savings to

⁵² Kim Lalonde Environmental Consulting, Alberta Environment, Alberta Agriculture, Food and Rural Development, *The State of Southern Alberta's Water Resources*, Published by Alberta Agriculture, Food and Rural Development, 2004, page 14.

⁵³ Watrecon Consulting, *Socio-Economic Assessment of the Special Areas Water Supply Project*, Prepared for Special Areas Board, April 26, 2005, page 90.

Special Areas Water Supply Project: Economics and Issues

Final Report

existing consumers compared to current conditions would be reduced. And if the regional population continues to decline however, and water consumption decreases, the cost savings to the remaining water users would decrease and this would further reduce the net benefits of the project.⁵⁴

2.5 Socio-economic Impact Analysis of the SAWSP

A socio-economic impact assessment of the SAWSP was undertaken by Watrecon Consulting to assess the distributional effects of the project and to determine the extent of the project's contribution to provincial and rural economic goals and objectives. Although the project capital and operating expenditures will have significant impacts on economic activity in the province and the region, it should be noted that comparable investments in alternative capital projects would generate similar economic activity and economic benefits elsewhere in the province.

The estimated "regional" socio-economic benefits are significant, and would not accrue to this region if a similar investment were made elsewhere in the province. However, it could be expected that these benefits would be created in a similar magnitude but would be shifted to the region where that investment were made. Again, in this instance, the estimated socio-economic impacts cannot be considered "incremental".

A regional benefit that is indicated to accrue from the project is the potential for the development of new value-added businesses that could result from increased agricultural output and improved water supplies. The potential this holds has not been quantified in the analysis. It should be noted that other factors that would likely affect the decisions of value-added industries to establish operations include proximity to markets or to major transportation corridors.⁵⁵ The Special Areas would have to compete with other locations in the province with regard to these factors. As such, any potential regional economic development from new value added business activity must be concluded to be speculative.

⁵⁴ Ibid, page 91.

⁵⁵ Report of the Environmental Assessment Panel, *Oldman River Dam*, 1992, page 30.

2.6 Should SAWSP Proceed?

Based on the benefit cost analysis information provided in the Watrecon report, the project has not met any objective test of viability to conclude it should proceed.

- **Benefit Cost Analysis Results:** The benefit cost analysis results for all the scenarios and range of discount rates covered suggest the project fails the test of viability.
- **Incomplete Definition of Benefits and Costs:** The definition and analysis of the benefits and costs included in the analysis is incomplete. The quantification of these benefits and costs requires the completion of an analysis consistent with an Environmental Impact Assessment and a valuation of the losses of ecosystem services as a result of SAWSP. Without having a “complete” definition and analysis of all the relevant benefit and cost categories, the results of the benefit cost analysis and any conclusions based on these results must be considered “preliminary” at best. As a result, it is inappropriate to draw a final conclusion on the viability of the project.
- **Sensitivity & Risk Analysis:** The variables against which the sensitivity and risk analysis were applied are incomplete. As a result, the benefit cost analysis could change significantly under alternative assumptions used to arrive at values for the benefits and costs included in the analysis. There are a greater number of downside risks than upside risks to these assumptions used to value the net benefits. **As a result, the benefit cost ratio could be lower, pushing the project to be even less viable than presented in the Watrecon report.**

The Watrecon report also suggests that the application of the socio-economic impact analysis and the rural development potential of the project should be considered in determining if it should be approved. While it is acknowledged that the potential of regional economic development to be associated with the SAWSP exists, it has not been demonstrated from the presentation of these issues in the Watrecon report.

While the Watrecon report concludes that “this part of rural Alberta has been in economic and social decline for some years”, and that “Without some sort of intervention, continued decline of the Special Areas is inevitable”, it fails to demonstrate that this project will be catalyst to reverse this trend. Further, it does

Special Areas Water Supply Project: Economics and Issues

Final Report

not consider other options that could be evaluated against the SAWSP to determine if SAWSP is the preferred approach to dealing with these issues.

It appears that Watrecon report relies on unstated assumptions to arrive at the conclusion:⁵⁶

“Thus, for purposes of developing a sustainable and vibrant economy in east-central Alberta, providing water to the region via SAWSP appears to be an effective solution.”

The results of the analysis provided in the Watrecon report do not support the conclusion that the SAWSP will result in either a “sustainable” nor “vibrant” economy in east-central Alberta. At best, it shows that there will be a net transfer of income from Albertan’s elsewhere in the province equal to a minimum of \$56 million and, at most, \$122 million considering alternative scenarios and discount rates. It is not demonstrated how this infusion of benefits to the region can be considered “sustainable”.

It is unclear that the farmers in the region will be able to raise the \$59 million (for irrigation and stockwater infrastructure) necessary to achieve the purported benefits of the project.⁵⁷ Even if they can, the Farm Financial Analysis indicates that in three of the four scenarios analyzed, return on equity (ROE) to farmers will be negative. In the only scenario where ROE is positive, it is relatively small, suggesting the net benefit to farmers in the region will be something significantly short of “vibrant”.

Finally, there is no description or analysis of alternatives that could address the economic issues that face the region (e.g. smaller scale investments to support sustainable dryland farming). As a result, it is difficult to rely on the conclusion that SAWSP would be an “effective” solution. As stated in the federal Benefit Cost Analysis Guide’s best practices, project priorities should be clearly stated and the “best alternatives ways” of achieving the objectives should be identified and evaluated to provide a “fair comparison” of the project.⁵⁸

⁵⁶ Watrecon Consulting, *Socio-Economic Assessment of the Special Areas Water Supply Project*, Prepared for Special Areas Board, April 26, 2005, page 107.

⁵⁷ Ibid, page 103.

⁵⁸ Treasury Board of Canada, *Benefit Cost Analysis Guide*, http://www.tbs-sct.gc.ca/fin/sigs/Revolving_Funds/bcag/BCA2_E.asp, DRAFT July 1998.

3 REGULATIONS AND PROJECT APPROVAL

Before the SAWSP project can be undertaken and water diverted from the Red Deer River there are numerous provincial and federal regulatory requirements that the project must meet. These are discussed below.

3.1 Provincial Government

Water Act

SAWSP has applied, under the Alberta Water Act, to Alberta Environment for a license to divert 76,500,000 cubic meters of water per year from the Red Deer River. Under this Act, the Government of Alberta owns the rights to all waters within its borders and allows it to be diverted and used by license holders. Licenses are granted on a first-in-time first-in-right basis, which means that in times of shortage the older the license the higher the priority regardless of the usage or any consideration of the first best use of the resource from a public interest perspective. Before this license is granted a special Act of legislature is required, as per Section 47 of the Water Act, to allow the transfer of water between major river Basins (Red Deer River Basin and Sounding Creek River Basin and Battle River Basin)

Section 48 of the Water Act also requires the Minister of Environment to consult with the public prior to introducing the Special Act. A series of “open houses” in June 2005 were held throughout the Red Deer River Basin to gather input from the public in order to address any concerns they may have regarding the SAWSP, including the inter-basin transfer. In addition, the Special Areas Board has made available an on-line questionnaire that the public can complete and submit by July 29, 2005. The public’s comments, questions and concerns will be documented, and a response will be posted.

South Saskatchewan River Basin Water Management Plan

Running separate, but in parallel to the passage of a special Act of legislature, Alberta Environment is developing a Water Management Plan for the South Saskatchewan River Basin (SSRB) that includes a public consultation component. This Water Management Plan, scheduled to be submitted to the Minister of Environment in December 2005, may serve as a basis for Alberta

Special Areas Water Supply Project: Economics and Issues

Final Report

Environment to make a decision to grant SAWSP a license to divert water from the Red Deer River.

Using a two phased approach, the Water management Plan involves recommendations from the four South Saskatchewan Basin Advisory Committees (BACs - one for each of the four sub-basins⁵⁹) and input from the public and First Nations. Phase 1 was approved in June 2002 and establishes a system for water allocation transfers between users within the SSRB, subject to Alberta Environment approval and conditions. In this report Alberta Environment concluded:⁶⁰

- There is insufficient water in the Oldman River's southern tributaries (Waterton, Belly and St. Mary Rivers) and therefore established an interim closure to new water allocations in these tributaries.⁶¹
- The existing instream objectives (300 cubic feet per second (cfs) in May to September and 150 cfs in October to April), used in computer modeling, did allow existing licenses and commitments to be met as well as future expansion that includes SAWSP, however these instream objectives had no scientific justification relative to the aquatic environment. Furthermore, until water conservation objectives for the Red Deer River are established, the amount of water available for future consumption cannot be defined.⁶²

Increased scarcity of water resources, in the SSRB, in the future could be addressed through water conservation, pricing or demand management strategies. Although trade in water entitlements is currently allowed, without water pricing there is no incentive to trade. The Province of Alberta may need to rely on market signals to allocate water among competing uses in future years. The appropriate pricing of water will result in the allocation of water to higher valued uses and will encourage efficiency in water use through the adoption of improved technology leading to greater water conservation.

⁵⁹ The four sub-basins include those of the Red Deer, Bow, Oldman and South Saskatchewan Rivers.

⁶⁰ Alberta Environment, *South Saskatchewan River Basin Water Management Plan*, June 2002.

⁶¹ Alberta Environment, *South Saskatchewan River Basin Water Management Plan, Phase One Water Allocation Transfers*, June 2002, page ii.

⁶² Ibid, page 2.

Special Areas Water Supply Project: Economics and Issues

Final Report

At this time, the BACs have drafted a preliminary Phase 2 report and conclusions.⁶³ The BAC committees are expected to make a final determination on the balance between:⁶⁴

- The “in-stream flow needs” (IFN) which is the amount of water that should remain in the rivers for the aquatic environment to be maintained over the long term; and
- The amount of water required by the Red Deer River so that Alberta will be able to meet its obligation, under the Master Agreement on Apportionment between the Prairie Provinces and the federal government.

The preliminary report concluded that applying an IFN as a condition on existing and future licenses would render them substantially unusable.⁶⁵

Under the above apportionment agreement, Alberta is required to pass 50% of the natural annual discharge from the SSRB to Saskatchewan and never let the rate of flow of the South Saskatchewan River (just below the confluence with the Red Deer River) fall below 42.8m³/second. This point was selected as the point of apportionment so as to allow Alberta the flexibility in managing its share of flow of the South Saskatchewan River to meet Saskatchewan’s entitlements.

In the past, the Red Deer River has not been required to contribute more than 50% of its natural flow to apportionment, with the exception of two years in which the contribution was slightly over 50%⁶⁶. However, in the preliminary Phase 2 report, the BACs do not recommend that the policy to allow each sub-basin to contribute 50% of the natural flow to apportionment each and every year be adopted.⁶⁷ Although a fixed 50% allocation of natural flow from the Red Deer River sub-basin to apportionment would enable substantial development in the Red Deer River basin, while at the same time meeting its apportionment obligations, this could potentially compromise Alberta’s water management

⁶³ Alberta Environment, *South Saskatchewan River Basin Water Management Plan Phase Two: Background Studies, Finding the balance between water consumption and environmental protection in the SSRB*, June 2003.

⁶⁴ Personal communications with Larry Williams, Regional Approvals Manager, Central Region, Alberta Environment on June 22, 2005 Red Deer Open House.

⁶⁵ Alberta Environment, *South Saskatchewan River Basin, Water Management Plan, Phase Two General Overview*, March 2004, page 22.

⁶⁶ Ibid, page 4.

⁶⁷ Alberta Environment, *South Saskatchewan River Sub-Basin Contributions to International and Interprovincial Water-Sharing Agreements*, October 2002.

Special Areas Water Supply Project: Economics and Issues

Final Report

flexibility in the South Saskatchewan River Basin. There may be situations in which large surplus deliveries (of water) are being made to Saskatchewan while one or more sub-basins are experiencing severe shortages.⁶⁸ Specifically there could potentially be frequent large deficits to junior allocations in the Oldman/South Saskatchewan River mainstems because water availability from the Red Deer River to contribute to apportionment would be reduced.⁶⁹ This is a possibility because the Oldman River receives flow from the Waterton, Belly and St. Mary Rivers, which have their headwaters in Montana, USA. These rivers are governed by the 1909 Boundary Waters Treaty between Great Britain and the United States of America (as stipulated by the 1921 Order of the International Joint Commission – IJC). Under this agreement, during the April 1 to October 31 irrigation season, the U.S. is entitled to 25% of the flow in the St. Mary River for flows less than 666 cubic feet/second (cfs) and 50% of the flow in excess of 666 cfs. On average, Montana has been using 60% of its flow entitlement.⁷⁰ It is reasonable to conclude that since the U.S. diversions are less than their entitlements⁷¹, any improvements to their storage and/or diversion infrastructure will reduce the flow to the Oldman River and further reduce the amount of water that the Oldman can contribute to apportionment.

Furthermore it is reasonable to conclude that SAWSP will have impacts on future water allocations for the entire SSRB. In the Bow and Old Man Rivers, IFN generally exceed existing flows, and restoring flows is considered to be impossible under the existing water allocation system. The aquatic environment in these rivers is believed to be in a state of long-term declining health.⁷² Alberta Environment has stated that any future water allocations in the Red Deer River Basin that come after pending allocations (includes SAWSP if approved) run a higher risk of not having water available, since they will be subject to the IFN established as a result of the SSRB Water Management Planning process and

⁶⁸ Ibid.

⁶⁹ Alberta Environment, *South Saskatchewan River Basin, Water Management Plan, Phase Two General Overview*, March 2004, page 22.

⁷⁰ Kim Lalonde Environmental Consulting, Alberta Environment, Alberta Agriculture, Food and Rural Development, *The State of Southern Alberta's Water Resources*, Published by Alberta Agriculture, Food and Rural Development, 2004, page 7.

⁷¹ Alberta Environment, *South Saskatchewan River Sub-Basin Contributions to International and Interprovincial Water-Sharing Agreements*, October 2002, page 2.

⁷² Kim Lalonde Environmental Consulting, Alberta Environment, Alberta Agriculture, Food and Rural Development, *The State of Southern Alberta's Water Resources*, 2004, page 10.

Special Areas Water Supply Project: Economics and Issues

Final Report

be junior in priority in these pending allocations.⁷³ Post-SAWSP projects will likely require some water storage to ensure a reliable water supply in dry years, an additional cost that could affect business investment decisions in the region in the future.

Once the Phase 2 South Saskatchewan River Basin Water Management Plan is approved, Alberta Environment will determine whether there is sufficient water available for an allocation to the SAWSP given the IFN of the Red Deer River and the existing allocations to water license holders. Alberta Environment's first draft of the Phase 2 Water Management Plan is scheduled to be released in July 2005. This will be followed by a review in July/August 2005 and meetings in September/October 2005 with the public, First Nations and the Basin Advisory Committees. The final draft of Phase 2 of the South Saskatchewan River Basin Water Management Plan is scheduled to be completed in November 2005 and a submission to the Lieutenant Governor-In-Council for approval will follow in December 2005.⁷⁴

Historical Resources Act

The Historical Resources Act of Alberta provides regulatory controls to manage construction and development in areas where the potential loss to historical resources is at risk. Alberta Community Development, Cultural Facilities & Historical Resources Division oversees, and is responsible for, the preservation of fossil material in the province. As stated by AMEC Earth & Environmental, the proposed development will likely affect archaeological and paleontological resources, and may require a Historical Resources Impact Assessment.⁷⁵ This requires a qualified paleontologist (holding a paleontological collection permit within the Province of Alberta) to assess the potential impact prior to the issue of a development permit. This paleontologist usually is involved in the planning, appraisal and construction stages of the project to:⁷⁶

⁷³ This statement was included in Alberta Environment's materials on the South Saskatchewan River Basin Water Management Plan that were provided at the open houses conducted in June 2005 by the Special Areas Board as part of the public consultation process on the SAWSP.

⁷⁴ See Appendix A for Alberta Environment's Saskatchewan River Basin Water Management, Plan Public Consultation Process.

⁷⁵ AMEC Earth & Environmental, *Special Areas Water Supply Project In-Basin Distribution Study Summary Report*, Submitted to Special Areas Board, August 2004, page 70.

⁷⁶ Branta Biostratigraphy Ltd., Paleontological Resource Impact Assessments Guide, <http://www.brantabiostrat.com/>

Special Areas Water Supply Project: Economics and Issues

Final Report

- observe the construction site and study the construction plans and determine the implicated paleontological impact,
- offer advice to preserve the known paleontological sites,
- locate other fossiliferous sites and significant fossils.
- rescue and salvage any significant fossils,
- document photographically the paleontological resources, and
- recommend mitigative steps.

The Royal Tyrrell Museum has, on record, a recommendation that the SAWSP requires a paleontological assessment.⁷⁷ The Museum has a 1991 map of the project footprint, which is outdated since the design of the SAWSP has changed.

Environmental Impact Assessment

At this time it is not clear if the SAWSP is subject to an Environmental Impact Assessment (EIA) under the Environmental Protection and Enhancement Act (EPEA) of Alberta. An EIA is a provincial government process that allows decision makers to decide if a project is in the public interest. Projects that have to go through this process are those that are listed under the EPEA, Schedule 1 Mandatory Activities. This includes the construction, operation or reclamation of a water reservoir with a capacity greater than 30 million m³. SAWSP's total reservoir capacity is 44.25 million m³, however there is no single reservoir that exceeds 30 million m³. Therefore, the project may fall outside the mandatory activities in Schedule 1 of the EPEA.

The project may still be considered for an Environmental Assessment (EA) where the complexity and scale of the project, technology, resource allocations or siting conditions create a potential for significant adverse environmental effects.⁷⁸

Given that this diversion is an inter-basin transfer of water, it will augment flows in one watershed at the expense of another and may alter the hydrological and environmental conditions of both. Such a transfer may facilitate biota exchange, which in turn may threaten unique ecosystems, introduce parasites and undesirable species, and change local and regional economies in both areas. Due to the "uncertainty about the exact nature of these effects, preferred

⁷⁷ Personal communication with Dan Spivak, Head of Resource Management Program at the Tyrrell Museum, June 27, 2005.

⁷⁸ Alberta Environment, *Alberta's Environmental Assessment Process*, September 2004, page 4.

Special Areas Water Supply Project: Economics and Issues

Final Report

alternatives or mitigation strategies is usually a pre-condition to the application of an EA.⁷⁹

The EIA is one stage of the environmental assessment (EA) process. The EA process is a long process that begins when the proponent, another Alberta government department, local authority or other person informs the local regional Alberta Environment office about a new project.⁸⁰ There is an initial review to determine whether an environmental assessment of the project is mandatory or non-mandatory. If it is mandatory then it must go through an EIA process. If it is determined to be a non-mandatory project then Alberta Environment may choose to review the project for approval or recommend that further assessments of environmental effects under Part 2, Division 1, of the EPEA may be warranted before considering the application further. If further assessment is required, the project is sent to the Regional Environmental Manager (REM) for review. The REM then determines if an EIA is not required or if more information is needed to determine whether an EIA is required through the preparation of a screening report. A screening report includes a public notice for consultation and input. The objective is to identify the most appropriate form of an environmental review for the project that may include the need for an EIA report.

If an EIA is required, the project moves to the second stage where the proponent is asked to prepare a Terms of Reference for Public and Alberta Environment's review. The Terms of Reference includes the EPEA general requirements for information that the proponent must include in the EIA. Most EIA reports include:

- A detailed description of the project including the nature and scale of specific activities involved;
- The location and environmental setting for the project, and baseline environmental, social and culture information;
- The potential positive and negative environmental, health, social, economic and cultural impacts of the proposed activity;
- Plans to mitigate potential adverse impacts and to respond to emergencies;

⁷⁹ Ibid

⁸⁰ For a full detailed explanation of Alberta's environmental assessment process, see Appendix B Alberta's Environmental Assessment Process.

Special Areas Water Supply Project: Economics and Issues

Final Report

- Information on public consultation programs undertaken with respect to the proposed activity and actions taken by the proponent to resolve public concerns; and
- An assessment of "cumulative effects", which are the combined effects of the proposed project and other activities that are occurring or may be reasonably expected to occur in the subject area.

It is at this stage that Alberta Environment makes "every reasonable effort" to address the requirements under the Federal Canadian Environmental Assessment Act (CEAA) within the Terms of Reference. In addition, in preparing the EIA report the proponent frequently consults with the public about the project with the assistance of private consultants. In the case of most large resource development projects, the proponent submits the completed EIA report as part of an application to the Natural Resources Conservation Board (NRCB).

The third stage consists of a technical review, where the EIA report is reviewed by Alberta Environment, and any other government body that is impacted by the project. If federal involvement is required, the review is conducted by the terms of the Canada-Alberta Agreement for Environmental Assessment Cooperation. Under this agreement a project is reviewed to determine if both governments have enough information. This agreement also outlines which government authority will lead the environmental assessment.

Specialists from both governments work together to evaluate the EIA report and ensure information is available for decision makers in both governments. These specialists may require the proponent to submit supplemental information if information submitted in the report is incomplete or unclear.

If it is determined that no further supplemental information is required then the report will be formally referred to the NRCB or the Minister for a decision. If the report is part of an application to the NRCB, the Board will then proceed with its normal application review process that may include a public hearing to determine if the project is in the public interest. If the EIA report is referred to the Minister for a decision, it will be considered with or without advice from the Lieutenant Governor in Council.

If at any time during the EA, Alberta Environment decides not to proceed with an EIA then the project may fall under federal jurisdiction. Subsequently, a federal government department will lead the environmental assessment.

3.2 Federal Government

Canadian Environmental Act

Based on our review of the Comprehensive Study List Regulations under the Canadian Environmental Assessment Act, this project will likely require a federal environmental assessment.⁸¹ In 1995, the Federal Government established the Canadian Environmental Assessment Agency (CEAA) to administer the Canadian Environmental Act, a legislative framework for evaluating the potential environmental consequences of projects, activities, programs or plans that fall under federal jurisdiction. The Act states that “the proposed construction, decommissioning or abandonment of a structure for the diversion of 10,000,000 m³/annum or more of water from a natural water body into another natural body” requires the project to go through a Comprehensive Study Assessment. This involves a submission by the federal authority of a detailed report to the CEAA. The report would include:⁸²

- 1) The purpose of the project;
- 2) Alternative means of carrying out the project;
- 3) Public comments; and
- 4) The need for follow-up procedures.

The minister can elect to send the project for further review (Mediation or Panel Review) if:

- 1) The environmental damage is uncertain,
- 2) The damage is probable but it is uncertain whether the effects are justifiable, or
- 3) Public concern is significant.

Navigable Waters Act and Fisheries Act

The SAWSP project may fall under two Federal Acts: the Navigable Waters Act which is administered by the Department of Transportation; and, the Fisheries Act which is administered by the Department of Fisheries and Oceans.

⁸¹ Canadian Environmental Assessment Act, Comprehensive Study List Regulations.
<http://laws.justice.gc.ca/en/C-15.2/SOR-94-638/66167.htm>

⁸² Federal Environmental Assessments Background File, page 1.

Special Areas Water Supply Project: Economics and Issues

Final Report

Consequently, SAWSP may have to apply for a permit/license, under each act, prior to commencement of the project.⁸³

The requirements of the federal Navigable Waters Protection Act, which applies to in-stream work involving construction or placement of structures along navigable waters, may be applicable to SAWSP. Section 5 (1) of the Act states that “no work shall be built or placed in, on, over, under, through or across any navigable water unless (a) the work and the site and plans thereof have been approved by the Minister, on such terms and conditions as the Minister deems fit, prior to commencement of construction”.

The requirements of the federal Fisheries Act that protects fish and fish habitat may also apply to the SAWSP. Section 35 (1) of the Act states that “no person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat”.

Fisheries and Oceans Canada has approached the CEAA about SAWSP.⁸⁴ However, the CEAA has not received a formal report from the proponent and therefore has limited knowledge of SAWSP.⁸⁵ The CEAA has stated that if the federal Acts are applicable to SAWSP then the proponent must apply to the responsible federal Department for federal licenses/permits. As well, there may be a policy concern from Environment Canada with transferring water from one drainage system to another. However, until such time as the proponent sends a formal description of SAWSP to the federal authorities, a determination cannot be made as to whether or not this policy regarding inter-basin transfers is applicable to the project.

⁸³ Personal communication with Keith Macdonald, Senior Program Officer, Canadian Environmental Assessment Agency, Alberta Regional Office June 27, 2005.

⁸⁴ Fisheries and Oceans Canada is on the South Saskatchewan River Basin Water Management Planning – Phase 2 Steering Committee. The contact is Tom Olson, Acting District Manager Lethbridge District, Fisheries and Oceans, Canada Room 204 704 4th Ave South Lethbridge, Alberta T1J 0N8. T: (403) 394-2915 e-mail: Olsont@dfo-mpo.gc.ca

⁸⁵ Personal communication with Keith MacDonald Senior Program Officer, Canadian Environmental Assessment Agency, Alberta Regional Office, Suite 100, Revillon Building 10237-104 Street North-West, Edmonton, Alberta T5J 1B1, Telephone: (780) 422-7701 email: Keith.Macdonald@ceaa-acee.gc.ca

APPENDICES

APPENDIX A

South Saskatchewan River Basin

Water Management Plan

Public Consultation Process

July 2005

Draft Plan Released

July/August
2005

Review of Draft Plan by:

- General Public
- Basin Advisory Committees
- First Nations

September/
October
2005

Meetings to receive comments on draft plan with:

- General Public (8-10 locations)
- Basin Advisory Committees
- First Nations

November
2005

Final draft plan prepared

December
2005

Submit Final Draft Plan for Approval
(by Lieutenant Governor-In-Council)



The South Saskatchewan River Basin includes the sub-basins of:

- Red Deer River
- Bow River
- Oldman River (including the South Saskatchewan)

The planning process is a combined effort of:

- Alberta Environment
- Alberta Agriculture, Food and Rural Development
- Alberta Sustainable Resource Development

Fisheries and Oceans Canada is on the project steering committee

For more information contact:

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Alberta Environment
(403) 297-6462

Dial 310-0000 first to be connected toll-free.

South Saskatchewan River Basin water management plan Web site:
www3.gov.ab.ca/env/water/regions/ssrb/index.asp

Water for Life Web site:
www.waterforlife.gov.ab.ca

Alberta
GOVERNMENT OF ALBERTA

March 2004

APPENDIX B

Alberta's Environmental Assessment Process

September 2004

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Introduction

Alberta's regulatory framework for sustainable industrial development includes six core business functions – project evaluation; approvals; monitoring; enforcement; setting standards, objectives and guidelines; and decommissioning and reclamation.

Project evaluation may be a relatively straightforward process for smaller, routine activities. It is more complex for large projects in environmentally sensitive areas. Environmental assessment is part of the project evaluation function.

The most comprehensive and transparent form of environmental review is the preparation of an Environmental Impact Assessment (EIA) report. It typically considers the activities in the area around the project as well as the project itself and a combination of economic, environmental and social issues, as well as resource sustainability.

Regional Program Delivery

Alberta Environment has a regional approach to program delivery. Alberta is divided into three regions –

Northern, Central and Southern – with offices located strategically across the province. Staff in these regional offices are responsible for managing issues and the delivery of regulatory services related to Environmental Protection and Enhancement Act and Water Act approvals, monitoring and compliance, and environmental management.

Environmental assessment is part of the approval and environmental management processes.

History of Environmental Assessment in Alberta

Alberta's Environmental Assessment process has been in place since 1973. The process was first administered using a set of guidelines. In the early 1990s, the Alberta government undertook a major review of its pollution control and environmental protection legislation with the goal of developing new comprehensive environmental legislation for Alberta. This review, which involved extensive public consultation, resulted in the *Environmental Protection and Enhancement Act* (EPEA) and various associated regulations. As part of this initiative, the Environmental Assessment process was incorporated into EPEA as Part 2, Division 1.

The consolidation of Alberta's environmental legislation represented a major step towards developing a comprehensive and streamlined environmental regulatory system in the province. One of the cornerstones of this regulatory system is a combined project review and approval process for certain activities, which includes public consultation and appeal stages. A potential first step in the process is the preparation of an EIA report by the proponent.

What is the Purpose of Environmental Assessment?

Alberta's Environmental Assessment process has three basic goals:

Information

Environmental assessment is an information-gathering process. The information required in an EIA report focuses on the information needs of regulatory and resource management decision-makers, as well as informing the public, government agencies and industry about environmental matters. After the Environmental Assessment process has been completed, decisions about

whether a project can proceed are made with consideration for the information in an EIA report, as well as other economical and technical information.

Public Involvement

The Environmental Assessment process provides an opportunity for people who may be affected by a proposed activity to express any concerns and provide advice to proponents and government agencies. The consultation process undertaken by a proponent and results achieved are documented in the EIA report.

Support Sustainable Development

The consideration of environmental consequences at early project planning stages and linkages between environmental assessment and project specific or regional management systems is intended to support Alberta's commitment to sustainable development and Alberta Environment's commitment to shared stewardship for the environment. Environmental assessment provides an opportunity to examine the effects that projects may have on the relationship between a sustainable environment, a sustainable economy and a sustainable community – the three components of sustainable development.

Who is Responsible for Environmental Assessment?

The project proponent is responsible for evaluating the project-specific and cumulative impacts that a project may have on the environment and reporting that information to regulatory decision-makers. Alberta Environment is responsible for the administration of Alberta's laws governing environmental assessment.

These responsibilities and opportunities for members of the public to be involved in the environmental assessment or other environmental protection regulatory activities are set out in EPEA and the *Water Act*. The Environmental Assessment Regulation and the Environmental Assessment (Mandatory and Exempted Activities) Regulation provide direction on matters related to the administration of the Environmental Assessment process.

Other provincial departments and levels of government may also have a regulatory interest in a project and may actively participate in reviewing the proponent's EIA report. Cross-department cooperation and work-sharing ensure that environmental and other regulatory services, and public services in general, are efficient, effective and fair and that government-wide goals such as the Alberta Advantage and sustainable environment and resource management are achieved. Environmental assessment was one of the first cross-department initiatives used by the Government of Alberta, having been delivered through inter-departmental collaboration since the early 1970s.

In addition to provincial government departments and associated public agencies, Alberta's industry, municipal governments and citizens are actively involved in regulatory reviews, including environmental assessment. They contribute to the success of Alberta's regulatory framework. Stewardship and shared responsibility for the environment is a part of Alberta's past and future success in environmental management.

Other Environmental Assessment Processes in Alberta

There are environmental assessments conducted in Alberta which do not fall under the responsibility of Alberta Environment and are not mandated by EPEA. The Government of Canada, municipalities, corporations and lending institutions also undertake environmental assessment processes under their own laws and authority and for a variety of purposes. When the Government of Canada applies environmental assessment to projects in Alberta that are also subject to the Alberta regulatory framework, cooperative arrangements are made wherever possible to minimize the overlap and duplication of government services, while undertaking thorough and timely environmental reviews. Provisions for federal involvement in the Alberta Environmental Assessment process are set out in a bilateral agreement, “The Canada – Alberta Agreement for Environmental Assessment Cooperation”.

What Projects are Subject to the Environmental Assessment Process?

Part 2, Division 1 of EPEA governs Alberta’s Environmental Assessment process and sets out the methods used to determine whether an environmental assessment is needed. The intent of EPEA is that the process will be used where the complexity and scale of the project, technology, resource allocation or siting conditions create a potential for significant adverse environmental effects. Uncertainty about the exact nature of the effects, preferred alternatives or mitigation strategies is a pre-condition to the useful application of environmental assessment. The completed environmental assessment assists decision-makers to decide if a project is in the public interest.

Where environmental consequences and mitigative measures are known, as with routine, familiar or readily predictable types of projects, assessments will have a lesser contribution to public understanding or decision-making for the project. The environmental reviews conducted in environmental approval application review processes or the guidance of codes of practice and monitoring/enforcement systems are appropriate regulatory tools to ensure routine activities achieve environmental protection and resource management goals.

Some activities, because of the nature or scale of the development involved, have been designated as activities for which an EIA report is mandatory. Mandatory projects, such as pulp mills, oil refineries, mines and large dams, which are always subject to the Environmental Assessment process, are identified in the Environmental Assessment (Mandatory and Exempted Activities) Regulation. This regulation also identifies certain activities that generally do not require the preparation of an EIA report. For other projects or activities, EPEA provides steps to determine if the Environmental Assessment process should be applied.

What are the Stages of the Environmental Assessment Process?

The process has essentially four stages:

STAGE 1 – Determination of Need

The Environmental Assessment process begins when the proponent, another government department, local authority or other person informs Alberta Environment about a new project. In most cases, the initial point of contact with Alberta Environment is the local regional office. Regional staff ascertain the nature of the project and determine whether the project requires approval under legislation administered by Alberta Environment. Based on information about the project and the applicability of environmental legislation, Alberta Environment will either proceed to review the application or recommend that further assessment of environmental effects under Part 2, Division 1, of EPEA may be warranted before considering the application further. In the latter case, the project is referred to the Director responsible for environmental assessment (the Regional Environmental Manager).

The Regional Environmental Manager considers the available project information, legislative requirements and staff recommendations. If the Regional Environmental Manager agrees to consider the project, the proponent may be advised that the project is being considered for further assessment. There are three potential outcomes to this process:

1. The project is determined to be a mandatory activity and the proponent is directed to prepare and submit an EIA report
2. The Regional Environmental Manager determines that an EIA report is not required, and the proponent is advised to proceed with applying for any approvals that may be required from Alberta Environment
3. The Regional Environmental Manager determines that more information is required to determine if an EIA report is required through the preparation of a Screening report

Preparation of a Screening report includes public disclosure of the project by the proponent and an opportunity for the public to comment to the Regional Environmental Manager on the merits of the project and the need for an EIA report. Government agencies and departments may also be asked to provide comments. The minimum period for public comment is 30 days. After that time, information provided by the proponent, the public and government agencies is used by Alberta Environment to prepare a Screening report that considers the complexity of the project, the nature of technology involved, the sensitivity of the location, the presence of other similar activities, public interest and any other factors the Regional Environmental Manager sees are significant. The objective of the screening is to identify the most appropriate form of environmental review for the project, which may be an EIA report, an approval application review process or even a routine regulatory approach (code of practice, reclamation certificate).

When completed, the Screening report is made available to the public and the Regional Environmental Manager advises the proponent and interested public whether an EIA report is required. As mentioned previously, if an EIA report is not required, the proponent is advised to proceed to apply for any approvals that may be required from Alberta Environment, and if an EIA report is required, the proponent is directed to prepare and submit the necessary documents.

STAGE 2 – Preparation of the EIA report

To help determine the scope of assessment for an EIA report, the proponent prepares proposed Terms of Reference and provides them to the public and to Alberta Environment for review. The procedures for preparing a proposed Terms of Reference, advertising its availability and for Alberta Environment to review the proposal and issue final Terms of Reference are set out in EPEA and the regulations. The proposed Terms of Reference are published with notices of the EIA report requirement and with a project description. Proponents often refer to previous terms of reference issued for similar projects when preparing their own proposed Terms of Reference.

Alberta Environment provides leadership for the participation of other provincial government departments and associated public agencies in the review of the proposed Terms of Reference. The Canadian Environmental Assessment Agency (the Agency), which is responsible for coordinating federal environmental assessments, and where appropriate municipal government agencies with environmental responsibilities, and other provinces are also notified that an EIA report is required. The Agency is requested to coordinate a determination of federal interests and regulatory requirements.

If a cooperative environmental assessment (where both governments require an environmental assessment by law) or federal involvement in Alberta's Environmental Assessment process are identified, the Agency will discuss participation plans and information needs with the Regional Environmental Manager. When a project may be reviewable under the *Canadian Environmental Assessment Act* (CEAA), every reasonable effort is made to ensure that the EIA report Terms of Reference issued under EPEA will also address requirements under CEAA.

The Regional Environmental Manager considers input received from the public and from other government agencies and issues the final Terms of Reference that establish the scope of assessment for the project. The proponent uses the final Terms of Reference to prepare the EIA report. These Terms of Reference are also made available to the public.

The *Environmental Protection and Enhancement Act* sets out general requirements for information to be included in the EIA report. These requirements are confirmed, varied or detailed in the final Terms of Reference issued by the Regional Environmental Manager. Most EIA reports include:

- a detailed description of the project including the nature and scale of specific activities involved
- the location and environmental setting for the project, and baseline environmental, social and culture information
- the potential positive and negative environmental, health, social, economic and cultural impacts of the proposed activity
- plans to mitigate potential adverse impacts and to respond to emergencies
- information on public consultation programs undertaken with respect to the proposed activity and actions taken by the proponent to resolve public concerns

- an assessment of "cumulative effects", which are the combined effects of the proposed project and other activities that are occurring or may be reasonably expected to occur in the subject area

Alberta is a province where industrial development takes place at an active pace. This has increased the number of environmentally-significant activities within the key development regions (spatial and temporal crowding) and the importance of cumulative effects assessment as a key component of an EIA report.

In preparing the EIA report, the proponent frequently consults with the public about the project with the assistance of private consultants. The proponent is also encouraged at this stage to establish a dialogue with government agencies that will be reviewing the EIA report to ensure that the information provided will meet the needs of those agencies.

Once completed, the EIA report is submitted to the Regional Environmental Manager for review. In the case of most large energy or resource development projects, the EIA report is part of the application submitted to the Alberta Energy and Utilities Board (EUB) or the Natural Resources Conservation Board (NRCB), either of which are commonly referred to as "the Board".

STAGE 3 – Technical Review

The purpose of the EIA report is to provide information about the project and its anticipated impacts that is useful for decision-making. The EIA report is made available by the proponent to the public, who may comment on it directly to the proponent or at the project decision stage to the Board, if a public hearing is held.

The EIA report is reviewed by Alberta Environment and associated public agencies. This task is assigned to a multi-disciplinary, integrated team of experts from various government agencies and departments. These teams are usually media-based resulting in specialist review teams for air, water, terrestrial and health issues. Depending upon the nature and location of the project, federal, other provincial governments and municipal governments may also participate in the evaluation of the EIA report. When an environmental assessment is required under both Alberta and federal legislation, a cooperative assessment review is conducted under the terms of the *Canada-Alberta Agreement for Environmental Assessment Cooperation*. Provincial and federal specialists work together on a joint federal-provincial review team to evaluate the EIA report and ensure information is available for decision-makers in both orders of government.

The purpose of the review is to identify any project-related uncertainties or risks and determine that the information provided by the proponent meets the following objectives:

- satisfies the requirements of the Terms of Reference and EPEA
- describes the nature and setting of the proposed activity
- describes the proponent's understanding of possible effects of the proposed activity on the environment in the context of good science
- describes mitigation to reduce negative effects from the proposed activity
- describes how the proponent will monitor and manage residual effects

- shows how the proposed activity relates to existing and future activities with which it may interact
- explains how the proponent consulted with the public and others who may be affected by the project, the key issues discussed, and whether they were resolved

If the information provided is either unclear or insufficient to meet these objectives, the Review Team, through the Regional Environmental Manager, may request additional Supplemental Information. In those cases where the EIA report is part of the application to a Board, the request for Supplemental Information is coordinated through that Board.

Supplemental Information provided by the proponent is considered part of the EIA report, and the proponent is directed to provide this information to anyone who has received the EIA report. This ensures that the public and other interested parties are fully aware of the information that will be used in making decisions about the proposed activity.

STAGE 4 – Completeness Decision

The Supplemental Information is reviewed in the same manner as the EIA report to determine that the information provided by the proponent is complete. When the Review Team is satisfied that they understand the nature of the proposed activity and the proponent's description of potential effects and mitigation, the Review Team will recommend that the EIA report is complete. The Regional Environmental Manager will consider the recommendation and determine if the EIA report is complete. If so, the proponent and the appropriate Board or Minister will be advised that the EIA report is complete and the report will be formally referred to the Board or the Minister for project decision-making.

When the EIA report is part of an application to the EUB or NRCB, the Board will then proceed with its normal application review process that may include a public hearing to determine if the proposed activity is in the public interest. If the EIA report is referred to the Minister, it will be considered by the Minister with or without advice from the Lieutenant Governor in Council (Cabinet).

Public Consultation

Public consultation and involvement in decision-making is required under EPEA. Public involvement principles are reflected in the department's commitment to involving Albertans in environmental decision making. The department continues to adapt the way it delivers its services and carries out its mandate to ensure that public involvement is achieved throughout the environmental regulatory process and in other activities.

The department's Environmental Assessment process has a strong emphasis on public involvement. Following are some examples:

- Project-specific Terms of Reference document expectations and requirements for public consultation and are published in draft form and finalized with public input
- Notification requirements set out in applicable laws and regulations with the needs of the community in mind

- The EIA report Terms of Reference require an analysis of issues in which the proponent documents the issues identified through consultation and outlines whether they have been resolved
- The Review Team considers input from the public at the Terms of Reference stage and in the review of the EIA report with a view to ensuring that appropriate factual information is available to decision-makers
- The Review Team provides advice to the public and proponents about the process, including participation, when requested, in consultation activities
- Public notification and an opportunity to comment on the need for a public hearing, and if a public hearing is held, an opportunity for members of the public to participate in the hearing
- The Department maintains a public Register of information related to projects in the Environmental Assessment process. This contains any information provided by the proponent and input from stakeholders

Environmental Assessment's Role in the Project Approval Process

When complete, an EIA report plays an important role in Alberta Environment's review of applications related to the project. The report summarizes the nature of the activity, its potential local and regional environmental effects, proposed mitigation strategies and issues requiring further monitoring and investigation. The information in an EIA report and decisions that may arise from this information are considered when setting EPEA and/or *Water Act* approval terms and conditions including emission limits, monitoring requirements, research needs, siting and operating criteria, and decommissioning and reclamation requirements.

The EIA report and project-related decisions may also be considered in regional environmental and resource management systems and multi-stakeholder forums.

Need Information?

Alberta Environment maintains a Register of information related to environmental assessments in Alberta. The Register includes the following information:

- names of proponents (detailed contact information is also available)
- disclosure documents or detailed descriptions of proposed projects
- copies of public notices
- copies of statements of concern and other public comments
- Screening reports
- proposed and final Terms of Reference for EIA reports
- locations where EIA reports and Supplemental Information can be obtained or viewed
- Orders-in-Council

The Environmental Assessment Team maintains the Register. Information related to environmental assessments is entered into the Register as it becomes available during various stages of the Environmental Assessment process. A summary of information in the Register is prepared and distributed on a bi-weekly basis.

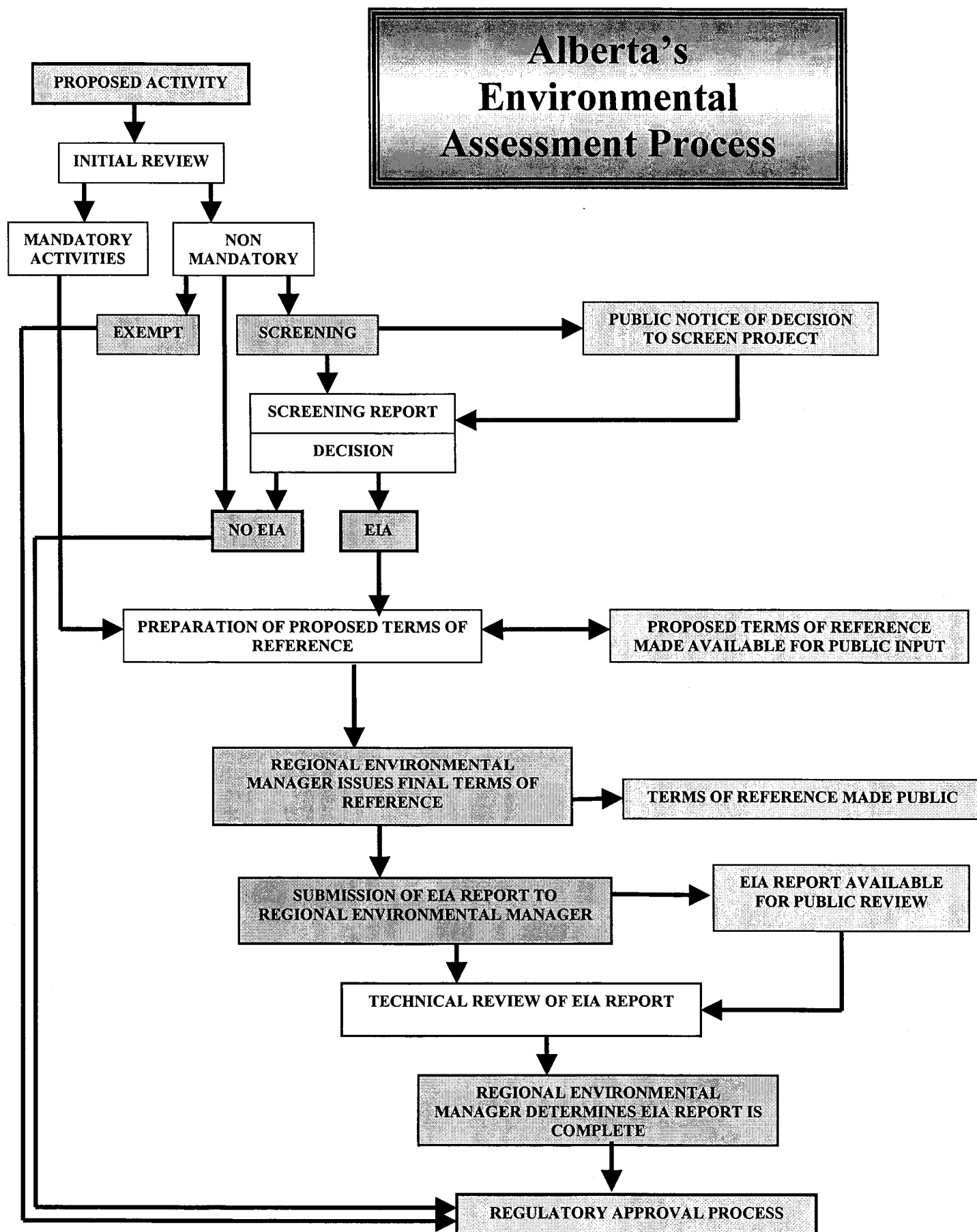
Register information can be accessed in person (address listed below) or by phone (780) 427-5828, fax (780) 427-9102 or e-mail (environmental.assessment@gov.ab.ca). Any person may, during normal business hours, examine information contained in the Register and may obtain one copy of any Register document, free of charge. Register information is also available on Alberta Environment's website at www.gov.ab.ca/env/protenf/assessment/index.html

Further information about Alberta's Environmental Assessment process can be obtained from:

Environmental Assessment Team
Alberta Environment
111 Twin Atria
4999 – 98 Avenue
Edmonton, Alberta
T6B 2X3

Phone: (780) 427-5828
Fax: (780) 427-9102
E-mail: environmental.assessment@gov.ab.ca

or from the nearest Alberta Environment Regional Office.



APPENDIX C

South Saskatchewan River Basin Water Management Planning

PHASE 2

Basin Advisory Committees and Government Staff Directory

Oldman River Basin

South Saskatchewan River Sub-basin

Bow River Basin

Red Deer River Basin



South Saskatchewan River Basin
Water Management Planning – Phase 2
BAC and Government Staff Directory

Compiled October 9, 2001

Updated October 1, 2003

South Saskatchewan River Basin
Water Management Planning – Phase 2
BAC and Government Staff Directory

<i>Directory Contents</i>	
Table of Contents	Page 2
Steering Committee and Approvals Managers	Page 3 - 4
Working Group (including Technical Instream Needs Group and Computer Simulations)	Page 5 - 7
Oldman River Basin Advisory Committee	Page 8 – 10
South Saskatchewan River Sub-basin Advisory Committee	Page 11 – 12
Bow River Basin Advisory Committee	Page 13 – 19
Red Deer River Basin Advisory Committee	Page 20 – 22
Red Deer River Basin Government Technical Team	Page 23 – 24

Project Coordinator

The Project Coordinator will provide integration and coordination services and will report directly to the Steering Committee.

Doug Ohrn
Alberta Environment
3rd Floor Deerfoot Square
2938 – 11 Street NE
Calgary, AB
Telephone: (403) 297- 6462
Fax: (403) 297- 6069
E-mail: Doug.Ohrn@gov.ab.ca

South Saskatchewan River Basin
Water Management Planning – Phase 2
BAC and Government Staff Directory

Steering Committee

This committee consists of senior government managers who will be actively involved in the process to provide direction and to ensure the work in all four sub-basins is proceeding in a consistent, unified and coordinated fashion. They will review and provide comments on drafts of the water management plan and advance it for final approval.

<p>Alan Pentney Regional Approvals Manager, Southern Region Alberta Environment Lethbridge (403) 381-5512</p>	<p>Ian Dyson, Chair Manager, Environmental Management, Southern Region Alberta Environment Lethbridge (403) 381-5430</p>
<p>Larry Williams Regional Approvals Manager, Central Region Alberta Environment Red Deer (403) 340-7747</p>	<p>Brent Paterson Head, Irrigation Branch Alberta Agriculture, Food and Rural Development Lethbridge (403) 381-5143</p>
<p>Bev Yee Director, Environmental Partnerships and Education Alberta Environment Edmonton (780) 427-5025</p>	<p>Trevor Rhodes Regional Fisheries Head, South East Region Alberta Sustainable Resource Development Strathmore (403) 934-3422</p>
<p>Dom Ruggieri Regional Executive Director, South East Region Alberta Sustainable Resource Development Calgary (403) 297-5360</p>	<p>Robert Harrison Section Head, Partnerships and Strategies Environmental Partnerships and Education Alberta Environment Edmonton (780) 427-9288</p>
<p>Tom Olson, Acting District Manager Lethbridge District Fisheries and Oceans, Canada Room 204 704 4th Ave South Lethbridge, Alberta T1J 0N8 T: (403) 394-2915 F: (403) 394 - 2917 e-mail: Olsont@dfo-mpo.gc.ca</p>	

South Saskatchewan River Basin
Water Management Planning – Phase 2
BAC and Government Staff Directory

Approvals Managers

Responsible for water allocations and will be expected to work closely with the Steering Committee and regional staff in all aspects of the development of the first phase water management plan.

Alan Pentney Regional Approvals Manager, Southern Region Alberta Environment Lethbridge (403) 381-5512	May Mah-Paulson Southern Region Alberta Environment Calgary (403) 297-7883
Lawrence Williams Central Region Alberta Environment Red Deer (403) 340-7747	Dave McGee Southern Region Alberta Environment Lethbridge (403) 381-5995

South Saskatchewan River Basin
Water Management Planning – Phase 2
BAC and Government Staff Directory

Working Group	
<i>The working group will provide the day-to-day support and coordination of the process.</i>	
Doug Ohrn Water Resources Planner Project Coordinator Southern Region Alberta Environment Calgary (403) 297-6462	Cheryl Dash Community Relations Officer Southern Region Alberta Environment Lethbridge (403) 381-5562
Douglas Thrussell Water Analyst and Basin Planner Central Region Alberta Environment Red Deer (403) 340-4854	Rob Wolfe Community Relations Officer Southern Region Alberta Environment Calgary (403) 297-5383
Peter Stevens Water Administration Engineer Central Region, Alberta Environment Red Deer (403) 340-7737	Terry Krause Senior Planner Central Region Alberta Environment Red Deer (403) 340-4979
Rod Bennett Section Head, Resource Conservation Alberta Agriculture, Food and Rural Development Lethbridge (403) 381-5880	Wendell Koning, Limnologist Environmental Management Calgary Southern Region Alberta Environment (403) 297-8267
Laurent Conard WRMM Team, Water Resources Analyst/Planning Officer Southern Region, Alberta Environment Lethbridge (403) 381-5168	Sandy Larsen Regional Technical Services, Southern Region Alberta Environment Lethbridge (403) 381-5647
Kent Berg WRMM Team Southern Region Alberta Environment Calgary (403) 297-5893	Tom Tang, Engineer WRMM Team Leader Southern Region Alberta Environment Calgary (403) 297-6563
Terrence Lazarus Oldman Dam Operations Manager Water Management Operations Alberta Environment Lethbridge (403) 382-4415	Rhonda King Environmental Education and Awareness Specialist Central Region Alberta Environment (403) 340-7195

South Saskatchewan River Basin
Water Management Planning – Phase 2
BAC and Government Staff Directory

Working Group Continued...	
Sherri-Dawn Annett Public Affairs Officer, Communications Division Alberta Environment Edmonton (780) 427-5521	Kathleen Murphy Approvals Engineer Southern Region Alberta Environment (403) 382-4000
Randy Poon Approvals Engineer Approvals Branch Calgary District Southern Region Alberta Environment (403) 297-6675	

Technical Instream Needs Group	
<i>Members of the Technical Instream Needs Group may be called upon to explain and interpret the results of the SSRB instream needs report.</i>	
Wendell Koning Water Quality Chair Environmental Management Alberta Environment Calgary (403) 297-8267	Allan Locke – Fish Instream Flow Needs Specialist Fisheries and Wildlife Management Division Alberta Sustainable Resource Development Cochrane (403) 932-2388 ext. 226
John Mahoney – Riparian Vegetation Senior Mitigation Biologist Southern Region Alberta Environment Lethbridge (403) 382-4365	Bob Quazi – Channel Structure River Engineering Branch Environmental Operations Division Alberta Environment Edmonton (780) 427-2613

Computer Simulations	
<i>Water resources management modelers may be called upon to explain and interpret the results of computer simulations. There may also be requests for additional modeling.</i>	
Sandy Larsen Regional Technical Services Southern Region Alberta Environment Lethbridge (403) 381-5647	Kent Berg WRMM Team, Southern Region Alberta Environment Calgary (403) 297-5893
Tom Tang Engineer, WRMM Team Leader Southern Region Alberta Environment Calgary (403) 297-6563	Laurent Conard WRMM Team, Water Resources Analyst/Planning Officer Southern Region, Alberta Environment Lethbridge (403) 381-5168

South Saskatchewan River Basin
Water Management Planning – Phase 2
BAC and Government Staff Directory

<p>Wally Chinn Section Head, Irrigation Development Irrigation Branch Alberta Agriculture, Food and Rural Development Lethbridge (403) 381-5867</p>	
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South Saskatchewan River Basin
Water Management Planning – Phase 2
BAC and Government Staff Directory

Oldman River Basin Advisory Committee

Representing	Member	Alternate
Upstream Rural Municipalities	Brian Hammond MD of Pincher Creek Box 279 Pincher Creek, AB T0K 1W0 W: (403) 627-4994 H: (403) 627-4994 melby@telusplanet.net	Rod Cyr (no faxes) MD of Pincher Creek Box 279 Pincher Creek, AB T0K 1W0 W: (403) 627-3130 H: (403) 627-3007
Downstream Rural Municipalities	Hank Van Beers MD of Taber Box 25 Hays, AB T0K 1B0 W: (403) 223-3541 H: (403) 725-3783 F: (403) 725-3720 Cell: (403) 308-7928 hvb@telusplanet.net	Cecil Wiest MD of Taber 4900B – 50 th Street Taber, AB T1G 1T2 W: (403) 223-3541 H: (403) 739-3920 F: (403) 739-2290
Upstream Towns and Villages	Ralph Bourque Town of Pincher Creek Box 1508 Pincher Creek, AB T0K 1W0 W: (403) 627-4939 or 4931 H: (403) 627-4368 Cell: (403) 627-8304 townpc@telusplanet.net	
Downstream Towns and Villages	Garth Bekkering Town of Taber 4900 'A' – 50 th Street Taber, AB T1G 1T1 Town Office: (403) 223-5519 W: (403) 223-3333 kmundy@town.taber.ab.ca Duncan Lloyd Town of Coaldale 1920 – 17 th Street Coaldale, AB T1M 1M1 Town Office: (403) 345-1300 F: (403) 345-1311 H: (403) 345-4313 W: (403) 345-1316 Cell: (403) 382-7758 mayor@town.coaldale.ab.ca	

South Saskatchewan River Basin
Water Management Planning – Phase 2
BAC and Government Staff Directory

Representing	Member	Alternate
City of Lethbridge	Barbara Lacey City Hall 910 – 4 th Avenue S Lethbridge, AB T1J 0P6 H: (403)328-5462 blacey@shaw.ca	Doug Kaupp Water Utilities Manager City of Lethbridge City Hall 910 – 4 th Avenue South Lethbridge, AB T1J 0P6 W: (403) 320-3078 F: (403) 329-4657 dkaupp@city.lethbridge.ab.ca
First Nations	Vacant	
Industry	Greg Nikles Rogers Sugar Ltd. 5405 – 64 th Street Taber, AB T1G 2C4 W: (403) 345-3535 Cell: (403) 634-1605 gnikles@rogerssugar.ca	
Irrigation Agriculture	Kevin Haggart Manager, LNID 334 – 13 th Street North Lethbridge, AB T1H 2R8 W:(403) 327-3302 FⓈ(403) 320-2457 k_h@telusplanet.net	
Agriculture (other water users)	Larry Nolan Box 1078 Picture Butte, AB T0K 1V0 W: (403) 738-4423 F: (403) 738-4037 tpnolan@telusplanet.net	
Ecosystem Protection	Cheryl Bradley Southern Alberta Environmental Group 625 – 18 th Street S Lethbridge, AB H: (403) 328-1245 cebradley@shaw.ca	Cheryl Fujikawa Southern Alberta Environmental Group 1605 – Lakeshore Road South Lethbridge, AB T1J 3E9 H: (403) 327-6605 Cheryl.Fujikawa@lethbridgecollege.ca
Recreation	Jim Clarke 2418 - 14 Street North Lethbridge, Alberta T1H 4P3 H: (403) 327-8973	Wilco Tymensen 194 Fairmont Garden Road Lethbridge, AB T1K 7L3 H: (403) 381-2463 wilco.tymensen@horizon.ab.ca

South Saskatchewan River Basin
Water Management Planning – Phase 2
BAC and Government Staff Directory

Representing	Member	Alternate
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Ducks Unlimited	Gary Kindrat Watershed Coordinator Ducks Unlimited Canada 3520-114 Ave. S.E., Calgary, Alberta T2Z 3V6 Bus: (403) 201-5577 Fax: (403) 201-5580 Cell: (403) 660-9087 g_kindrat@ducks.ca	

South Saskatchewan River Basin
Water Management Planning – Phase 2
BAC and Government Staff Directory

South Saskatchewan River Sub-basin Advisory Committee

Representing	Member	Alternate
Rural Municipalities	Floyd Haas Cypress County Box 3 Hilda, AB T0J 1R0 H: (403) 838-2280 F: (403) 838-2280 (at home)	Len Mitzel County of Forty Mile P.O. Box 160 Foremost, AB T0K 0X0 W: (403) 867-3530 H: (403) 666-3915 Mobile: (403) 548-5738
Urban Municipalities	Frank Wetsch City of Medicine Hat 717 – 16 Street SW Medicine Hat, AB T1A 8E6 W: (403) 529-8227 frawet@medicinehat.ca	Grayson Mauch City of Medicine Hat 717 – 16 th Street SW Medicine Hat, AB T1A 4X3 W: (403) 502-8097 H: (403) 528-4693 F: (403) 529-8304 gramau@city.medicine-hat.ab.ca
First Nations	Vacant	
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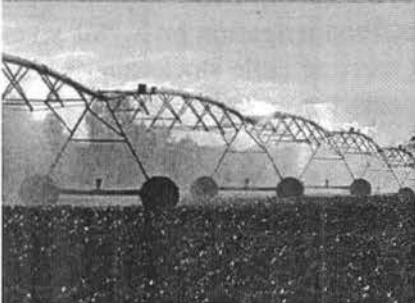
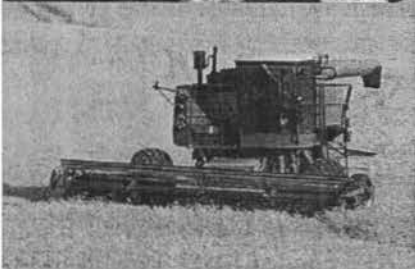
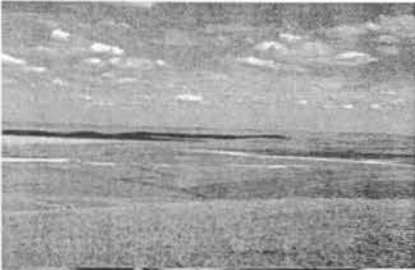
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APPENDIX D



SOCIO-ECONOMIC ASSESSMENT OF THE SPECIAL AREAS WATER SUPPLY PROJECT

Submitted to
Special Areas Board
Hanna, Alberta

Submitted by
Watrecon Consulting
Edmonton, Alberta

April 26, 2005

EXECUTIVE SUMMARY

The Special Areas consists of about 2.1 million hectares of land in east-central Alberta. Agriculture has always been the cornerstone of the regional economy. However, extended droughts in the 1920s and 1930s hit this area particularly hard, causing about half the population to migrate elsewhere. Since then, variable precipitation and agricultural yields have remained problems, and the regional population and economy have continued to decline. According to the 2001 Census, the urban population has dropped by 4.9 per cent since 1996 while the rural population decreased by 7.4 per cent. In 2001 the regional population was 11,300 and regional incomes were only 75 per cent of the Alberta average. The outlook for the region is for continued decline. Young adults and families are leaving the region; very few people are migrating into the area; and by 2010 nearly 25 per cent of the population will be over 65.

The development of a reliable supply of high quality water is seen as the key for future economic development in the Special Areas. In the 1980s, completion of the Sheerness pipeline provided Red Deer River water for thermal power production, some irrigation, and to communities along Highway 9 via the Henry Kroeger Regional Water Supply System. However, many communities and most farms remain without adequate supplies of water.

The Special Areas Water Supply Project (SAWSP) was conceived in the late 1980s as a means of providing water to more of the region. Water would be withdrawn from the Red Deer River and conveyed to the headwaters of Berry and Sounding creeks. At a cost of \$192.3 million, the project would provide 20,000 acres of new irrigation, allow backflood irrigation on 5,780 acres, stabilize 15 existing wetlands and create two new ones, provide more reliable stockwatering in more of the region, and enhance domestic and municipal water supplies.

Project construction would have a significant short term impact on employment and incomes. Construction would be completed over six years and would directly and indirectly provide 1216 person-years of employment for regional residents and about \$54.5 in labour income.

From an agricultural perspective, SAWSP would allow farmers to grow all the forage needed to support existing livestock herds and sell significant quantities of alfalfa/hay to other farmers in the region. And, assuming that cattle prices return to average levels prior to the discovery of BSE in 2003, irrigation would also allow farmers to use the extra feed to background calves and/or expand their herds. Farmers would first need to invest about \$136,000 to install quarter-section low pressure centre-pivot systems. Once irrigation is fully developed it is estimated that the net value of agricultural production in the region would increase by between \$4.3 and \$5.9 million per year. Increased activity in the agricultural sector would create between 49 and 99 new person-years of employment in the region. A more secure water supply would also reduce risks due to climatic variability and would provide opportunities for diversification into new crops or the development of intensive livestock operations.

With SAWSP it is expected that farmers would also invest nearly \$12 million in pipe, dugouts and tanks to provide stockwater to about 10,140 square kilometres of land located within 10 kilometres of the water conveyance system. Improved stockwater supplies would allow

farmers to better manage grazing lands and increase grazing capacity by 104,466 Animal Unit Months. In addition, better quality water would lead to improved weight gain in calves, increasing beef production by 265,900 kilograms (585,000 pounds) per year. The annual stockwatering benefits would range from \$3.4 to \$3.5 million.

Most of the communities located along Highway 12 are currently experiencing problems with their water supplies, either unreliable quantities or poor quality. A regional water supply system has been proposed to address these problems and five alternatives have been investigated. Drawing water from SAWSP was one of the alternatives considered and was determined to be \$9.5 million less costly than the others. Assuming that people benefiting from a regional supply system would face costs similar to those of the Henry Kroeger Regional Water Supply System further south, the annual cost of municipal water service would decrease by about \$0.42 million.

By creating two new wetlands, enhancing 15 existing wetlands and providing 5780 acres of backflood irrigation, SAWSP would benefit numerous species of waterfowl, upland birds, big game, plus nine species at risk. Increased populations of some species would increase hunting activity by about 19,000 hunter-days. The area would also be expected to attract bird watchers and other non-consumptive users of wildlife; an additional 19,000 days of annual visitation would occur. This increased visitation would create about 11.7 person-years of new employment in the regional tourism industry and would generate about \$0.39 million in benefits for Albertans. Development of new water storage reservoirs could also provide opportunities for water-based recreation.

Overall SAWSP would increase total regional labour income by \$8.7 to \$10.3 million. This represents about a 1.5 per cent increase in regional labour income which, in the absence of the project, is predicted to decrease by 1.5 per cent annually. Regional employment as a result of SAWSP would increase by between 66 and 116 person-years, although part-time employment would increase the actual number of new jobs created by the project. The population of the region would be expected to increase by between 140 and 245 people.

From a provincial perspective, the quantified costs would exceed benefits. For the most pessimistic scenario the benefit/cost ratio would be 0.55. However, assuming that beef prices return to historic levels and that farmers use irrigated silage to background cattle, the benefit/cost ratio would increase to 0.70. However, there would be significant unquantified benefits, including improved human and livestock health, opportunities for agricultural diversification and intensification, opportunities for regional value-added businesses, stabilization of regional populations, more effective provision of regional education and health services, reduce demands on governments during drought events, and reduce stress and uncertainty for farm families.

Development of SAWSP is consistent with the Alberta Government's recent Rural Development Initiative and Rural Development Strategy. SAWSP would provide a sustainable supply of water in east-central Alberta that would stabilize and enhance existing agricultural development, provide opportunities for new value-added business opportunities, provide new opportunities for tourism and recreation, and provide upgraded water service to urban and rural communities in the northern half of the Special Areas. Implementation of SAWSP would help ensure establishment of a sustainable and vibrant economy in east-central Alberta.

Table of Contents

EXECUTIVE SUMMARY	i
1. Introduction.....	1
2. Socio-Economic Overview of the Special Areas.....	3
2.1 Population	3
2.2 Employment.....	7
2.3 Income.....	7
2.4 Spending	7
2.5 Agriculture	9
2.6 Future Development.....	17
2.7 Summary	20
3. The Special Areas Water Supply Project.....	23
3.1 Construction Costs	23
3.2 Operating and Maintenance Costs	25
4. Agricultural Impacts	27
4.1 Backflood and Sprinkler Irrigation	27
4.1.1 Capital Costs of Irrigation.....	29
4.1.2 Farm Financial Analysis	31
4.1.3 Feed Transportation Cost Savings	37
4.1.4 Discussion.....	39
4.2 Risk Reduction.....	40
4.3 Stockwater Availability	41
4.4 Agricultural Diversification.....	44
4.4.1 Other Irrigated Crops	44
4.4.2 Confined Feeding Operations – Beef.....	47
4.4.3 Confined Feeding Operations – Hogs.....	49
5. Municipal and Domestic Water Supplies	51
5.1 Current Status.....	51
5.1.1 Town of Castor	51
5.1.2 Town of Coronation.....	52
5.1.3 Village of Consort.....	53
5.1.4 Village of Veteran.....	54
5.1.5 Village of Halkirk	54
5.1.6 County of Paintearth	55
5.1.7 Special Area #4	57
5.1.8 Summary	58
5.2 Regional Water Supply Solutions.....	58
5.3 Effects of SAWSP.....	62
6. Wetlands, Recreation and Tourism.....	65
6.1 Waterfowl Hunting	67
6.2 Upland Bird Hunting.....	71
6.3 Big Game Hunting	73
6.4 Non-Consumptive Recreation.....	75
6.4 Other Recreation	78
6.5 Existence, Option and Bequest Values	78

7.	Benefit/Cost Analysis	81
7.1	Project Costs	82
7.2	Project Benefits.....	83
7.3	Benefit/Cost Assessment	85
7.4	Sensitivity Analysis	86
7.5	Risk Assessment	89
7.5.1	Agricultural Assumptions	89
7.5.2	Climate Change.....	90
7.5.3	Farm Finances.....	90
7.5.4	Municipal Water Supplies.....	91
7.5.5	Summary	91
8.	Socio-Economic Impact Assessment.....	93
8.1	Project Construction.....	95
8.2	Operational Impacts	97
8.3	Economic Diversification	98
8.4	Impacts on Municipalities.....	99
8.5	Other Impacts.....	100
9.	Summary	101
9.1	Socio-Economic Impacts of SAWSP.....	101
9.2	Should SAWSP Be Developed?	103
9.2.1	Government Policy on Rural Development.....	103
9.2.1.1	Government of Alberta 20 Year Strategic Business Plan.....	104
9.2.1.2	MLA Steering Committee Report on Rural Development	104
9.2.1.3	Alberta's Rural Development Strategy	105
9.2.1.4	SAWSP and Rural Development.....	105
9.2.2	The Importance of Water in the Special Areas.....	106
	APPENDIX A – Census of Agricultural Data.....	109
	APPENDIX B – Special Areas Water Supply Project Updated Cost Estimate.....	111
	APPENDIX C: Special Areas Water Supply Project – Economic Analysis Assumptions	113
	APPENDIX D: Results of Benefit/Cost Analysis	127

List of Tables

Table 1	Urban and Rural Population of Census Division 4, 1966 to 2001	4
Table 2	Labour Force and Employment in Census Division, 1996 and 2001	6
Table 3	Estimated Household Expenditures by Regional Residents, 2001	9
Table 4	Classification of Farms Based on Gross Farm Receipts, 2000	13
Table 5	Capital Development in Census Division 4, 1999 to 2003	20
Table 6	SAWSP Construction Cost Estimate	24
Table 7	SAWSP Construction and Cost Schedule	24
Table 8	Regional Distribution of Lands for Sprinkler Irrigation	26
Table 9	Regional Distribution of Lands for Backflood Irrigation	26
Table 10	On-Farm Capital Costs of Irrigation Equipment (Electric)	28
Table 11	Annual On-Farm Operating and Maintenance Costs of Irrigation	28

Table 12	Land Use Assumptions Used in Farm Financial Analysis	30
Table 13	Crop Production and Disposition Assumptions Used in Farm Financial Analysis	30
Table 14	Grazing Assumptions Used in Farm Financial Analysis	32
Table 15	Crop Sales Assumptions Used in Farm Financial Analysis	32
Table 16	Livestock Production and Sales Assumptions Used in Farm Financial Analysis	32
Table 17	Results of the Farm Financial Analysis	36
Table 18	Incremental Impacts of SAWSP on Farm Finances	36
Table 19	Farm Financial Analysis: Sensitivity Analysis on Beef Prices	38
Table 20	Current Municipal and Domestic Water Supply Status and Proposed Solutions	58
Table 21	Current and Future Design Flow Criteria for a Regional Water Supply System	59
Table 22	Proposed Regional Water System Alternatives	61
Table 23	Potential Annual Cost Savings of a Regional Water System	63
Table 24	Biological Benefits of the Special Areas Water Supply Project	65
Table 25	Species At Risk That Would Benefit From SAWSP	77
Table 26	Results of Benefit/Cost Analysis for SAWSP	85
Table 27	Benefit/Cost Analysis Sensitivity Analysis: Increased Beef Prices	88
Table 28	Economic Impacts of Constructing SAWSP	94
Table 29	Provincial Annual Economic Impacts of Operating SAWSP	94
Table 30	Regional Annual Economic Impacts of Operating SAWSP	94
Table 31	Summary of Quantifiable Economic Impacts and Benefits of the Special Areas Water Supply Project	102

List of Figures

Figure 1	Location of Special Areas and Census Division #4	2
Figure 2	Total Population of the Special Areas	2
Figure 3	Urban and Rural Populations in CD 4	2
Figure 4	Population Aged 65 and Older	4
Figure 5	Composition of Labour Force, by Industry, 1996 and 2001	6
Figure 6	Changes in Earned Income, 1996 to 2001	6
Figure 7	Market Areas for Purchases by Residents of Census Division 4	8
Figure 8	Agricultural Activity in CD 4, 1991 to 2001	10
Figure 9	Farm Size and Ownership of Agricultural Land	10
Figure 10	Use of Agricultural Land	10
Figure 11	Crop Mix, Census Division 4, 2001	12
Figure 12	Average Wheat Yields in Census Division 4 and Alberta	12
Figure 13	Average Tame Hay Yields in Census Division 4 and Alberta	12
Figure 14	Changes in Cattle Farming, CD 4	14
Figure 15	Changes in Pig Populations, CD 4	14
Figure 16	Farm Receipts and Expenses per Acres, 2000	14
Figure 17	Net Farm Revenues pr Acre, 1995 - 2000	16
Figure 18	Alberta Cattle Markets – Weekly Average Steer Prices	16

Figure 19	Urban and Rural Populations As Predicted in 1992	18
Figure 20	Population Projections for CD 4, 199 to 2016	18
Figure 21	Projected and Actual Age Distribution	18
Figure 22	Special Areas Water Supply Project	22
Figure 23	Net Gross Margins Under Different Pricing Scenarios	38
Figure 24	Impact of Climate Variability of Average Farm Incomes	40
Figure 25	Layout of the Proposed Stockwatering System	42
Figure 26	Production Costs and Returns for Dryland Irrigated Crops, 2004	46
Figure 27	Townships that Meet Selection Criteria for 20,000 Head Feedlot	48
Figure 28	Henry Kroeger Regional Water Supply System	50
Figure 29	Assessment of Water Quality by Rural Residents	56
Figure 30	Rural Residents Interest in Tying into a Regional Water System	56
Figure 31	Rural Residents Willingness to Pay for a Regional Water System	56
Figure 32	Proposed Regional Water System Alternatives	60
Figure 33	Estimates of Mallards and May Ponds in Southern Prairie Canada, 1969-2003	64
Figure 34	Wildlife Management Units in Alberta	66
Figure 35	Wildlife Management Units in Census Division 4	66
Figure 36	Number of Waterfowl Hunters in CD 4	68
Figure 37	Waterfowl Hunting Activity in CD 4	68
Figure 38	Hunting Activity in Alberta, 1981 to 1996	68
Figure 39	Number of Upland Bird Hunters in CD 4	70
Figure 40	Upland Bird Hunting Activity in CD 4	70
Figure 41	Number of Big Game Hunters in CD 4	74
Figure 42	Big Game Hunting Activity in CD 4	74
Figure 43	Big Game Hunting Success Rate, 2001	74
Figure 44	Big Game Hunter Effort per Kill, 2001	74
Figure 45	Historical Calf (Backgrounded) Prices, 1991 to 2004	87
Figure 46	Impact of Net Returns per Quarter Section on Benefit/Cost Ratios	88
Figure 47	Impact of SAWSP on Regional Income	96
Figure 48	Impact of SAWSP on Regional Employment	96

1. Introduction

In preparation for a public review of the proposed Special Areas Water Supply Project (SAWSP) to be conducted in the Spring of 2005, the Special Areas Board (SAB) requested that an updated assessment of the socio-economic impacts of the project be prepared. Similar assessments of the socio-economic impacts of diverting water from the Red Deer River into Sounding and Berry creeks were undertaken in 1988¹, 1992² and 2000³. However, a review of the most recent of these studies⁴ determined that it would not fully meet the requirements for the social and economic analysis that would be required by the Natural Resources Conservation Board, which is the regulatory agency that may ultimately be charged with determining whether SAWSP would be in the public interest.⁵

In its July 2004 report Watrecon identified 24 work items that could be undertaken to improve the socio-economic analysis and determined that nine of these items should be considered as “high priority” because of changes since 2000. It also found that the 2000 report did not clearly differentiate between project impacts and project benefits, from both a provincial and regional perspective, and concluded that both a benefit-cost analysis and an assessment of socio-economic impacts would be required.

The SAB subsequently accepted the recommendations of the July 2004 assessment and it commissioned Watrecon Consulting to prepare an updated economic and social assessment of SAWSP in accordance with those recommendations. Thus, the purpose of this report is to provide a current description of socio-economic conditions in the Special Areas and to describe how construction and operation of SAWSP would affect both the region and the province in terms of net benefits and socio-economic impacts.

This report is presented in nine sections. Section 1 provides a brief introduction. Section 2 describes current socio-economic conditions in the region, including recent trends. A description of SAWSP is provided in Section 3. Sections 4, 5 and 6 describe how SAWSP would affect regional agricultural, municipal and domestic water supplies, and wetlands, recreation and tourism. In Section 7, the economic efficiency of SAWSP is examined using a formal benefit/cost analysis from a provincial perspective. Section 8 considers the social and economic impacts of SAWSP from a regional perspective. A summary of the social and economic effects of SAWSP is provided in Section 9.

¹ Alberta Environment, Planning Division (1989). *Special Areas: Preliminary Economic Evaluation*.

² Technical Subcommittee, Project Rationale (1992). *Special Areas Water Supply Project: Project Rationale*.

³ Marv Anderson & Associates Ltd. (2000), *Socio-economic Impacts of the Proposed Special Areas Water Supply Project*. Special Areas Board, Hanna, AB.

⁴ Watrecon Consulting (2004). *Socio-Economic Assessment of the Special Areas Water Supply Project: A Critical Review*.

⁵ A public review by the Natural Resources Conservation Board would be required if the project is determined to be large enough to trigger an environmental impact assessment. Under the *Environmental Assessment (Mandatory and Exempted Activities) Regulation*, an environmental impact assessment is mandatory for a project that involves a dam greater than 15 metres in height, a water diversion structure and canals with a capacity greater than 15 cubic metres per second, or a water reservoir with a capacity greater than 30 million cubic metres.

Figure 1

Location of Special Areas and Census Division #4

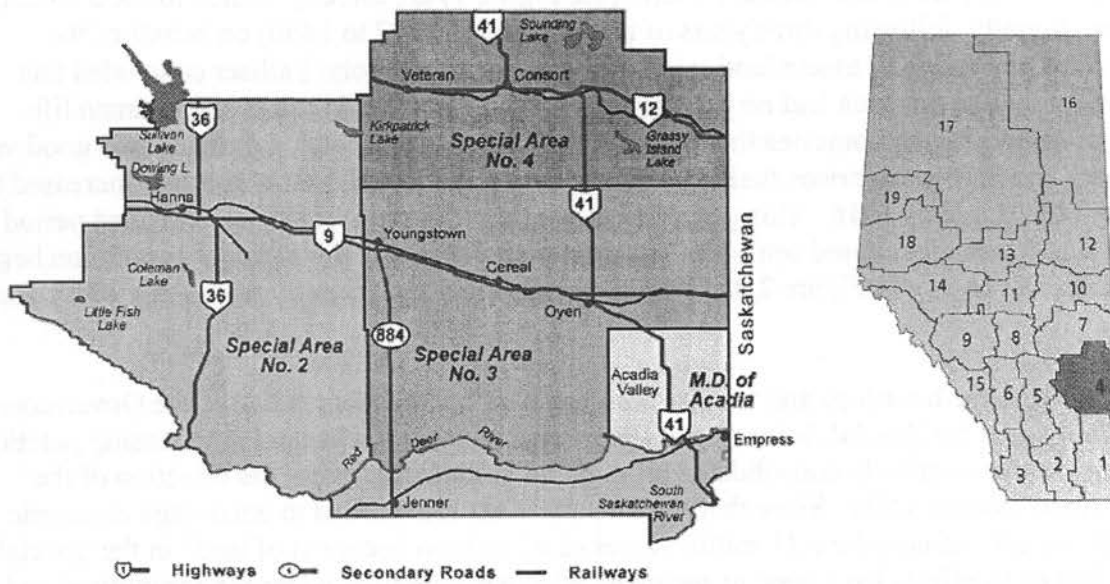


Figure 2

Total Population of the Special Areas

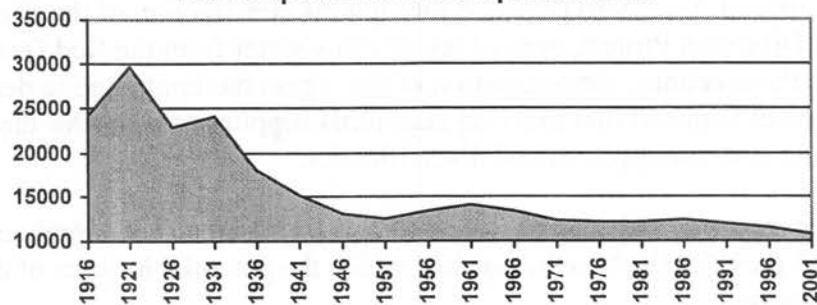
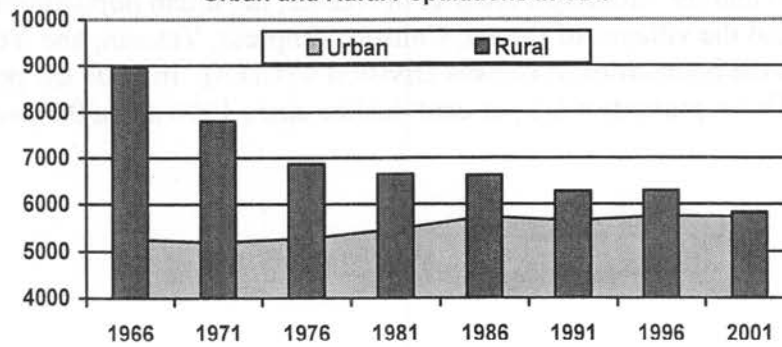


Figure 3

Urban and Rural Populations in CD4



2. Socio-Economic Overview of the Special Areas

A review of the historical development of the Special Areas suggests that social and economic conditions in this part of east central Alberta (see Figure 1) are directly related to the availability of water. Initially, following three years of investigations (1857 to 1860) on behalf of the Government of Canada to assess land suitability for settlement, John Palliser concluded that much of the land in this area had no potential for farming and would not sustain human life. However, settlers began homesteading this area in the early 1900s and, following two good years of farming and high grain prices fueled by World War I, the population of the area increased to about 24,500 people by 1916. This period of abundance was followed by an extended period of drought that eventually caused settlers to abandon their farms and the regional population began to diminish. As shown in Figure 2, the population declined significantly during the 1930s and 1940s.

In response to these hardships and to stem the exodus of people from the area, the Government of Alberta passed the *Special Areas Act* in 1932. This legislation changed land leasing practices in the region and eventually consolidated all regional governance under the direction of the Special Areas Board (SAB). Since that time the SAB has worked to encourage economic development and manage the 5.11 million acres (2.07 million hectares) of land⁶ in the Special Areas. Part of its efforts have been to secure an adequate supply of water for agricultural and other purposes and, over the years, the construction of various impoundment projects has allowed 80 per cent of the mean annual run-off in the basin to be captured and utilized. In the mid-1980s additional water for thermal power production, irrigation use, domestic use, and recreation in the Special Areas was provided through the construction of the Sheerness pipeline and the Deadfish Diversion Project, both of which draw water from the Red Deer River. However, despite these actions, the population of the region has continued to decline (see Figure 2) and the SAB has determined that securing additional supplies of water for the Special Areas is key for future economic development and diversification.

This section of the report provides an overview of current social and economic conditions in the Special Areas, and provides the baseline against which the potential impacts of developing SAWSP can be assessed.

2.1 Population

The area that would be primarily affected by SAWSP consists of the rural populations of Special Areas #2, #3 and #4 and the Municipal District of Acadia, the urban populations of the towns of Hanna and Oyen, and the villages of Cereal, Consort, Empress, Veteran, and Youngstown. This area coincides with the boundaries of Census Division 4 (CD 4). In 2001 the population of this area was 11,300. This represents a 6.2 per cent decline since 1996 and a 9.7 per cent drop from 1991.

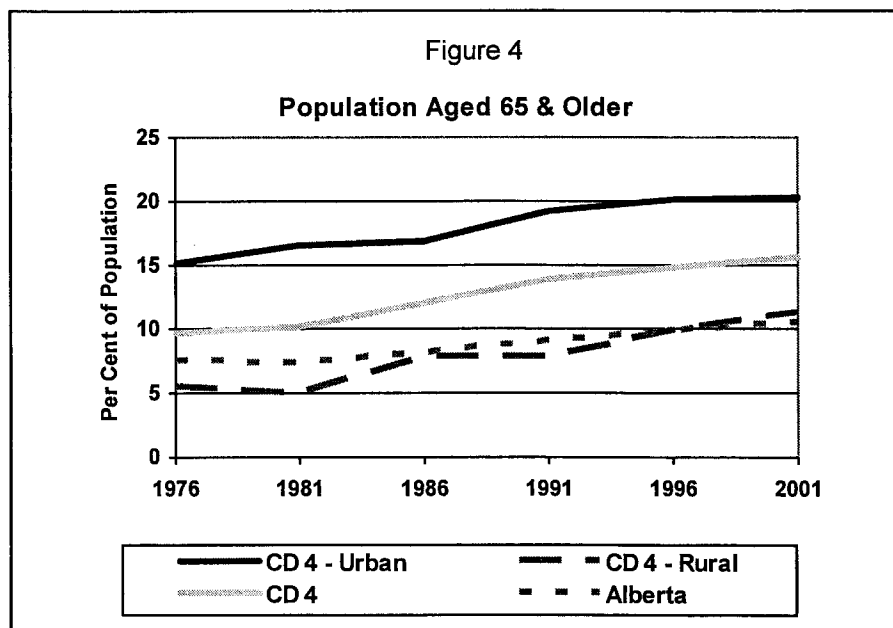
⁶ <http://www.specialareas.ab.ca>.

Table 1

Urban and Rural Population of Census Division 4, 1966 to 2001

	1966	1976	1986	1996	2001	Change	Per Cent Change
Urban							
Hanna	2633	2627	3015	3001	2986	-15	-0.5%
Oyen	846	962	975	1009	1020	+11	+1.1%
Consort	594	609	675	794	634	-160	-20.2%
Other Urban	1186	1072	1075	953	834	-119	-12.5%
Total Urban	5259	5270	5740	5757	5474	-283	-4.9%
Rural							
SA #2	3288	2521	2535	2531	2331	-200	-7.9%
SA #3	2689	2013	1705	1584	1469	-115	-7.3%
SA #4	2092	1684	1770	1641	1514	-127	-7.7%
MD of Acadia	n.a.	n.a.	n.a.	533	512	-19	-3.9%
Total Rural	8069	6218	6010	6289	5826	-463	-7.4%
Census Division 4							
Total	13328	11488	11212	12046	11300	-746	-6.2%
Per Cent Rural	61%	54%	51%	48%	48%		

Source: Statistics Canada. 2001 Community Profiles. <http://www12.statcan.ca/english/profil01/PlaceSearchForm1.cfm>



In 2001, 52 per cent of the regional population was rural; 48 per cent resided in the two towns and five villages. This represents a significant shift from 1961 when 63 per cent of the population was rural. Table 1 and Figure 3 show how rural and urban populations in CD 4 have changed from 1961 to 2001. The data show the urban population has remained fairly constant during this period while the rural population has gradually been declining. However, both the urban and rural populations have declined in the last five years.

Table 1 shows that between 1996 and 2001 the urban population decreased by 4.9 per cent, although this varied considerably from village to village. Major population decreases were noted for Youngstown (-23.0 per cent), Consort (-20.2 per cent), Cereal (-11.4 per cent), Empress (-8.1 per cent) and Veteran (-7.9 per cent). In comparison, the Town of Hanna reported a minor decrease (-0.5 per cent) while the population of Oyen actually increased by 1.1 per cent.

Over the same period the rural population dropped by 7.4 per cent. This trend was consistent among Special Areas #2, #3 and #4 but the population decline in the MD of Acadia was only 3.9 per cent. This reduction in the rural population coincides with a reduction in the number of farms in the region. In 2001 there were 1487 farms in CD 4 compared to 1572 farms in 1996, a reduction of 5.4 per cent.

Earlier assessments suggested that there were two reasons for the rural to urban population shift:

One is the declining profitability of the agricultural sector which offers limited opportunities for on-farm employment, with the result that few young people stay on the farm. Second, an increasing percentage of people in the region are 65 years or older, and they often relocate to the communities to take advantage of housing and medical services.⁷

A review of population statistics for the period since 1991 shows that these trends have continued over the last decade. As noted above, there were 5.4 per cent fewer farms in 2001 compared to 1996 and census information shows that there were 275 fewer people employed in agriculture. Figure 4 also shows that the percentage of the population aged 65 or greater has continued to increase and accounted for more than 20 per cent of the urban population in 2001. The proportion of seniors in Census Division 4 is about five percentage points above the corresponding number for Alberta.

Another factor affecting population growth in the region is immigration. In 2001 about 12 per cent of the Alberta population reported having moved into Alberta within the previous five years. For CD 4, census information suggests that 545 people moved into the region between 1996 and 2001 (five per cent of the population) and very few of these were foreign born.⁸ Considering that the regional population actually decreased by 746 people during this same period, this means that, ignoring the effects of natural population increases, at least 1300 people moved out of the region. This means that more than 10 per cent of the regional population in 1996 left CD 4 prior to the 2001 Census. This high turnover rate is likely indicative of limited and diminishing economic opportunities in the region.

⁷ Technical Subcommittee, Project Rationale (1992). *Special Areas Water Supply Project: Project Rationale*. Page 7.

⁸ Census information shows that only 30 foreign-born people moved into Census Division 4 between 1991 and 2001.

Figure 5

Composition of Labour Force, by Industry, 1996 and 2001

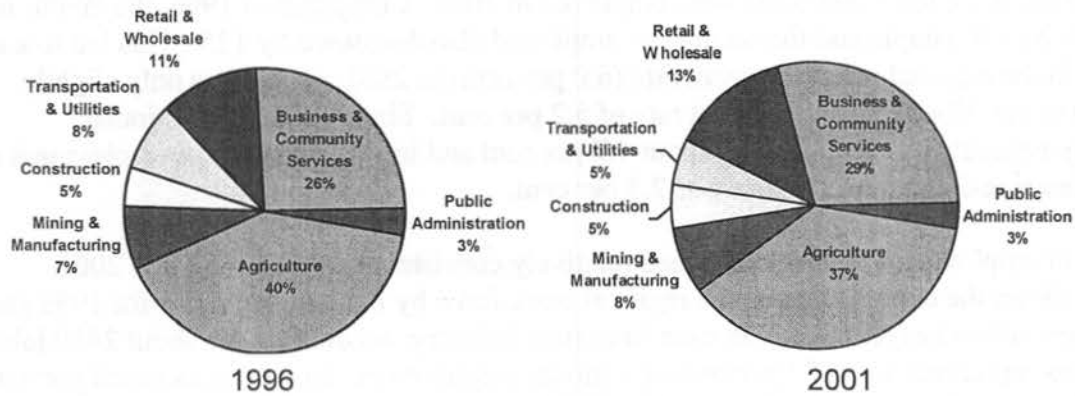


Table 2

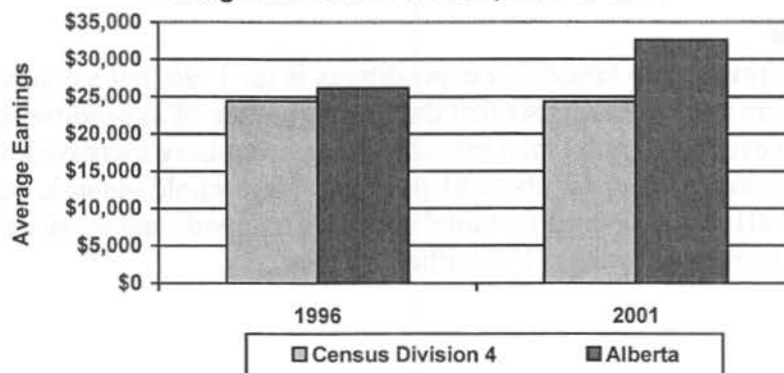
Labour Force and Employment in Census Division 4, 1966 and 2001

	1996	2001
In the labour force, both sexes	6,820	6,690
Not in the labour force, both sexes	2,115	2,020
Total population 15 and over	8,940	8,710
Employed, both sexes	6,640	6,515
Unemployed, both sexes	190	170
Participation rate, both sexes	76.0%	80.0%
Unemployment rate, both sexes	2.0%	6.0%

Source: Statistics Canada 1996 & 2001 Census as reported by <http://www.albertafirst.com>.

Figure 6

Changes in Earned Income, 1996 to 2001



2.2 Employment

Along with the decline in population between 1996 and 2001 there was a decrease in the size of the labour force and the number of employed. As summarized in Table 2, there were about 6700 people in the work force and 6500 were employed in 2001. Compared to 1996, the labour force decreased by 130 people and the number of employed also decreased by 125. This led to a slight increase in the regional unemployment rate (6.0 per cent) in 2001, which was only slightly higher than the Alberta unemployment rate of 5.2 per cent. Since 2001 the provincial unemployment rate has decreased to about 4.7 per cent and in July 2004 the unemployment rate for the Camrose-Drumheller region was 2.5 per cent.

The mix of employment in CD 4 remained relatively consistent between 1996 and 2001. Figure 5 shows the composition of the regional work force by industry for CD 4 for 1996 and 2001. Agriculture has remained the most important industry, accounting for about 2450 jobs in 2001. This represents about 37 per cent of regional employment. However, as noted previously, the number of agricultural jobs decreased by 275 from 1996. Some of this decrease was offset by expansion of employment in the retail/wholesale and business and community sectors. However, there was also a decline in employment in the transportation and utilities sector.

2.3 Income

In 2001, the average earnings by the workforce in CD 4 were \$24,338. This amount represents a slight decrease (-0.3 per cent) from 1996. As shown in Figure 6, average earnings in 1996 were very similar for CD 4 and Alberta. However, since 1996, the average earnings for the Alberta workforce increased by about 25 per cent such that, in 2001, average earnings in CD 4 were only about 75 per cent of average earnings by the provincial workforce.

Once the effects of inflation are considered, the real earnings of residents of CD 4 actually dropped by about eight per cent between 1996 and 2001 while, at a provincial level, average earned incomes actually increased in real terms by about 16 per cent.

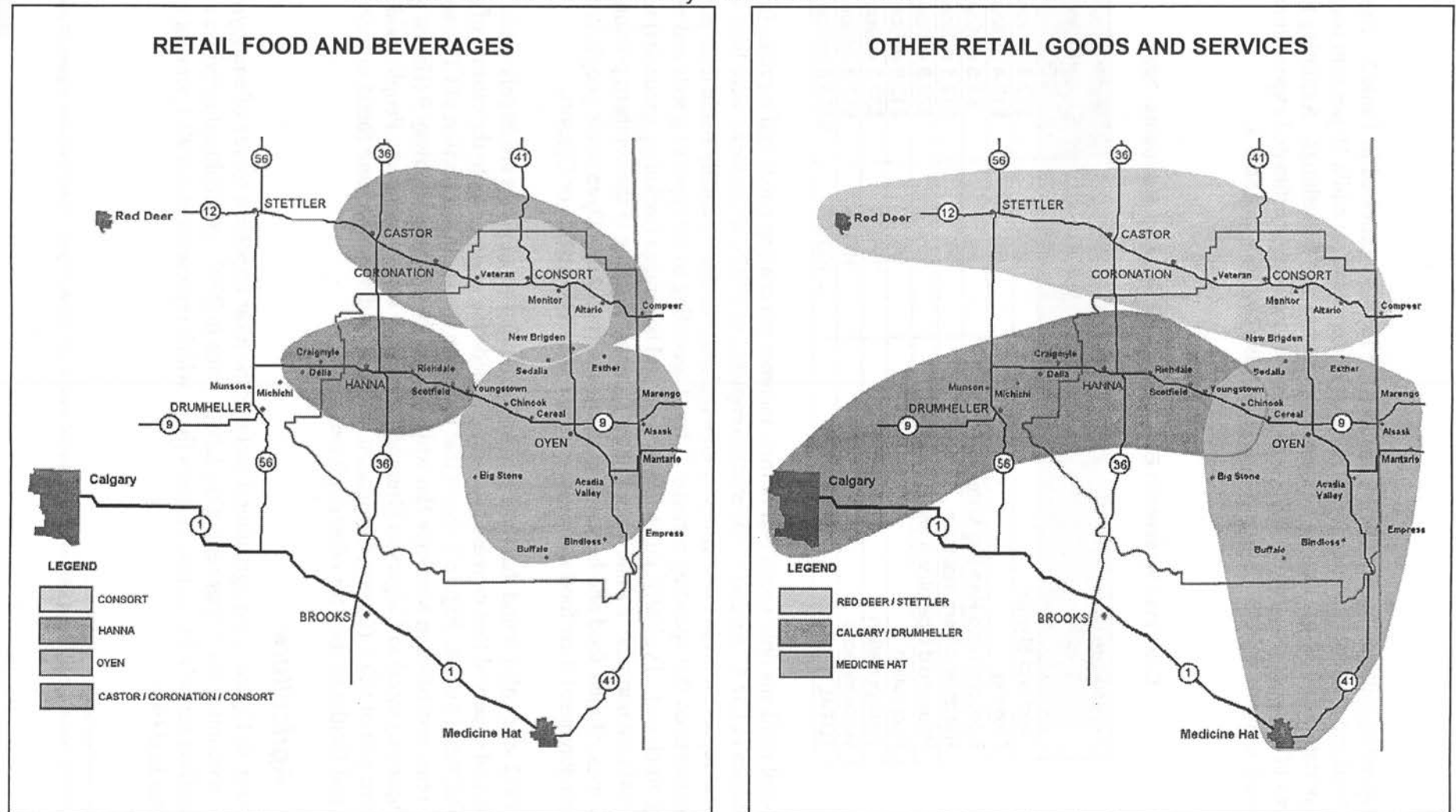
Overall, total earned income for the region amounted to about \$161.6 million in 2001, with 6640 people (59 per cent of the population) reporting earned income. These earnings accounted for 75.6 per cent of total income for the region, with government transfers adding another 14.6 per cent. Thus, total regional income in 2001 amounted to \$213.8 million.

2.4 Spending

The most recent information on household expenditures is for 1996, but a comparison with equivalent information for 1992 suggests that the overall pattern of expenditures is relatively consistent over time even though the total amounts being spent have increased. The 1996 data suggest that expenditures account for about 81 per cent of household income. Assuming a similar pattern for 2001 it is estimated that total spending on goods and services by regional residents amounted to approximately \$173 million in 2001.

Figure 7

Market Areas for Purchases by Residents of Census Division 4



The spending patterns for households in CD 4 for 1996 are provided in Table 3. The table shows that food and shelter accounted for 36 per cent of expenditures while 19 per cent was spent on transportation and 12 per cent on household operations and furnishings. Assuming that a similar pattern of spending occurred in 2001, it is possible to calculate estimated expenditures by regional residents in 2001. These estimates are also provided in Table 3.

Table 3

Estimated Household Expenditures by Regional Residents, 2001

Expenditure Category	Expenditure Distribution 1996	Estimated Expenditures 2001
Food and Shelter	36%	\$62.3 million
Clothing	6%	\$10.4 million
Education and Reading Materials	2%	\$3.5 million
Health and Personal Care	7%	\$12.1 million
Household Operations and Furnishings	12%	\$20.8 million
Recreation	9%	\$15.6 million
Transportation	19%	\$32.9 million
Miscellaneous	10%	\$17.3 million
TOTAL	100%	\$173.0 million

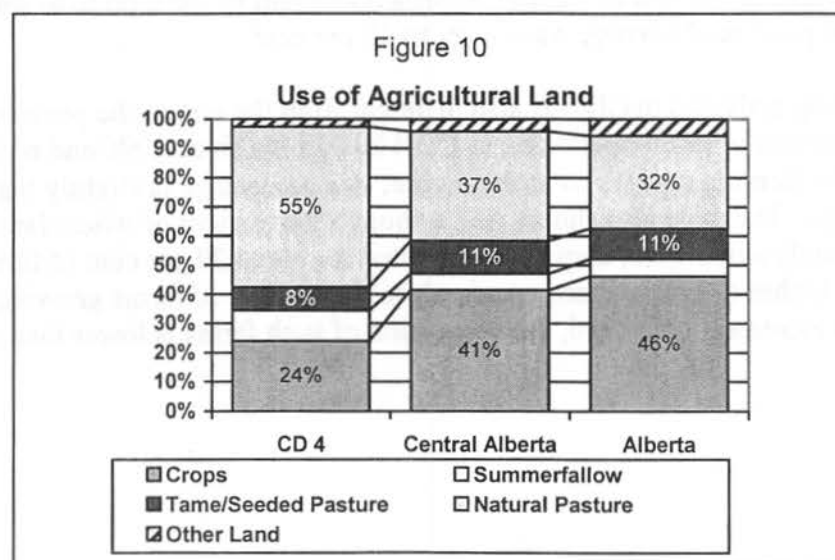
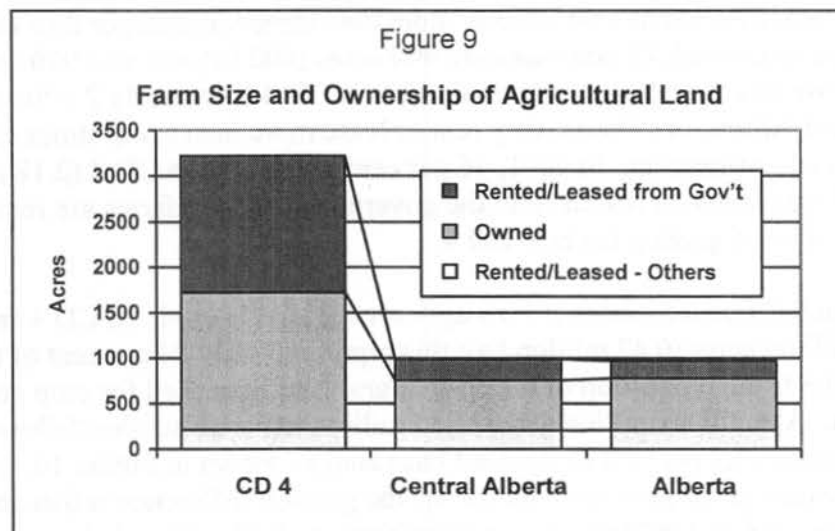
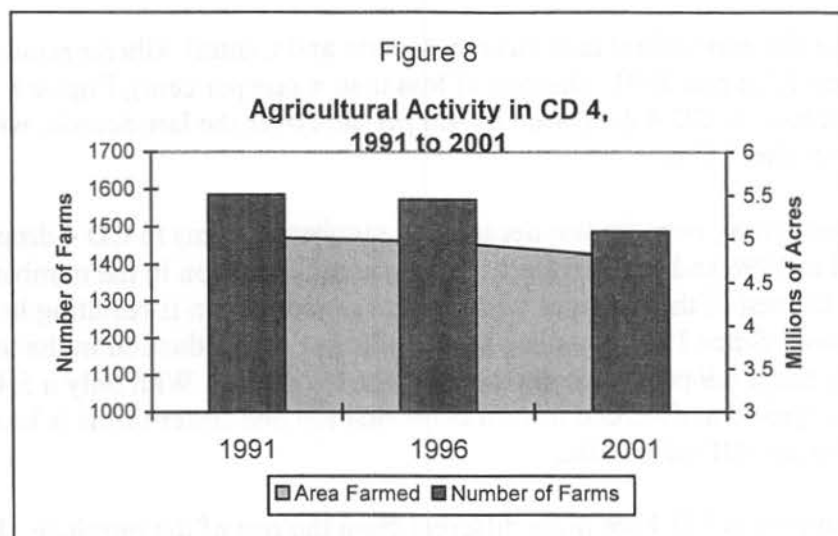
Regional residents only spend part of their incomes purchasing goods and services from businesses in CD 4. As part of the study completed in 1992⁹, discussions were held with regional representatives to determine where regional residents actually made their purchases. It was determined that spending patterns differed according to the types of goods and services being purchased. Typically, purchases of food and beverages (including groceries) were made in the local communities. As shown in Figure 7, people residing in the southern portion of CD 4 made most of their food and beverage purchases in Hanna and Oyen while people in the northern portion purchased their food and beverages in Castor/Coronation or Consort.

The 1992 study also found that most purchases of other retail goods are largely made outside the region and observed that increased spending outside the region lead to the closure of a number of regional retail outlets. Figure 7 shows that people in the southeast portion of CD 4 tend to make other retail purchases in Medicine Hat while people living along Highway 9 (Hanna to Youngstown) travel to Calgary or Drumheller for their other purchases. People residing in the northern part of CD 4 (Castor, Coronation, Consort, and Veteran) were found to travel to Red Deer and Stettler to shop for other retail items.

2.5 Agriculture

As shown in Figure 5, the agricultural sector is the most important source of employment in CD 4, accounting for 37 per cent of the labour force in 2001. Agricultural activities occurred on 4.79 million acres (1.94 million hectares [ha]), which represents about 90.3 per cent of the regional land base.

⁹ Technical Subcommittee, Project Rationale (1992). *Special Areas Water Supply Project: Project Rationale*. Figures 10 and 11.



While the size of the agricultural land base in Alberta and Central Alberta remained relatively constant between 1996 and 2001 (changes of less than \pm one per cent), Figure 8 shows that the agricultural land base in CD 4 decreased by 4.6 per cent over the last decade, with much of this decline occurring after 1996.

Figure 8 also shows that, over the last decade, the number of farms in CD 4 dropped from 1585 in 1991 to 1572 in 1996 and 1487 in 2001. This gradual reduction in the number of farms is consistent with the rest of the province where farms consolidation is resulting in fewer farms on the same land base. Since 1996 there has been a nine per cent reduction in the total number of farms in Alberta and a 6.9 per cent reduction in Central Alberta. With only a 5.4 reduction for CD 4, it would appear that the trend toward consolidation and fewer farms is less pronounced in the Special Areas and MD of Acadia.

Agricultural activities in CD 4 are quite different from the rest of the province. First, average farms in CD 4 are much larger than in the rest of the province. In 2001 the average farm size in CD 4 was 3,220 acres (1,304 ha), which was more than three times larger than elsewhere.¹⁰ The average farm size in Central Alberta was only 990 acres (400 ha) and was 970 acres (393 ha) for Alberta. As shown in Figure 9, not only do farmers in CD 4 own nearly 2.5 times more land as farmers in Central Alberta or Alberta, they rent or lease more than seven times as much land from the provincial government. In 2001, 46 per cent of the land in CD 4 (2.18 million acres or 0.88 million ha) was rented or leased from the government. Large farms are required because of the poor productivity of grazing lands in CD 4.

Another important difference relates to how agricultural land is used. In CD 4 crops were grown on about 1.15 million acres (0.47 million ha); this represents only 24 per cent of the land base. Elsewhere in Alberta the proportion of the agricultural land base used for crop production was at least 40 per cent. About 0.49 million acres (0.20 million ha) were summerfallowed in CD 4 in 2001. This represents 5.9 per cent of the land base and, as shown in Figure 10, was about double the amount elsewhere in the province. However, the greatest difference is that about two-thirds of agricultural land in CD 4 in 2001 (3.02 million acres or 1.22 million ha) was natural and tame/seeded pasture. In the rest of Central Alberta about half of the land base was used as pasture while the provincial average was closer to 40 per cent.

The mix of farming activities in CD 4 is also different from the rest of the province. Table 4 shows that the number of cattle operations in CD 4 has grown since 1996 and now account for more than half the farming operations in the region; this percentage is slightly higher than the provincial average. The table also shows that, although the number of wheat farms in CD 4 has dropped significantly since 1996, they still accounted for about 20 per cent of farm operations and this is much higher than elsewhere. And, while the number of farms growing grain and oilseeds in CD 4 increased after 1996, the proportion of such farms is lower than elsewhere in the province.

¹⁰ See Appendix A for a detailed breakdown of agricultural statistics for CD 4.

Figure 11

Crop Mix, Census Division 4, 2001

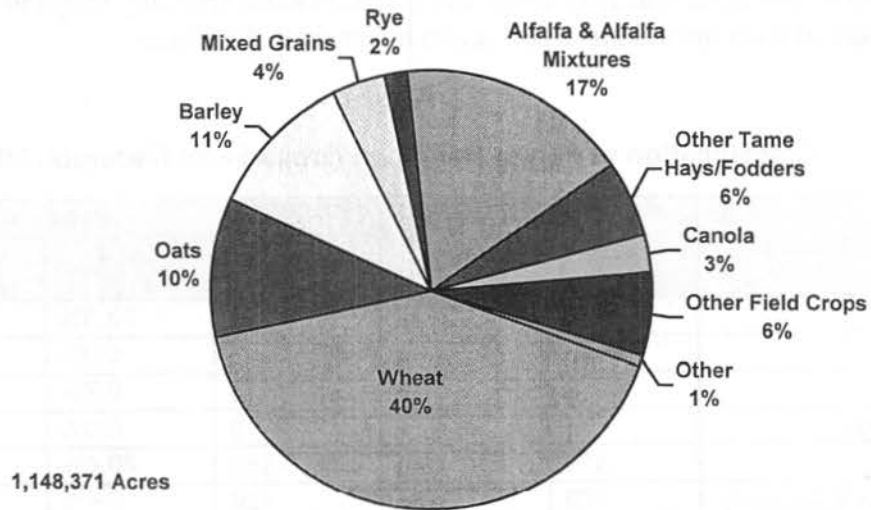


Figure 12

Average Wheat Yields in Census Division 4 and Alberta

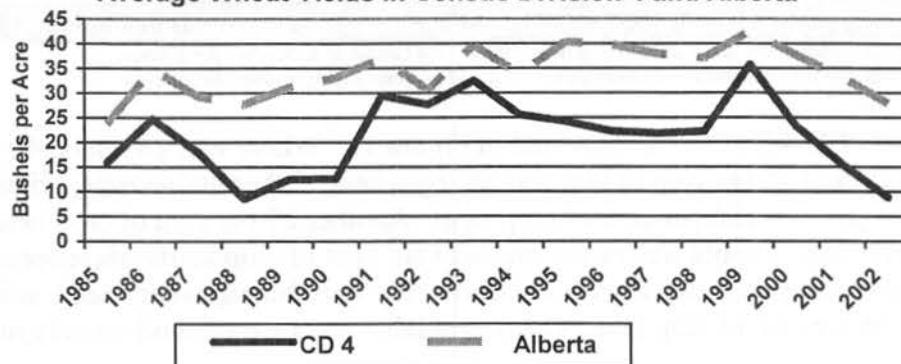
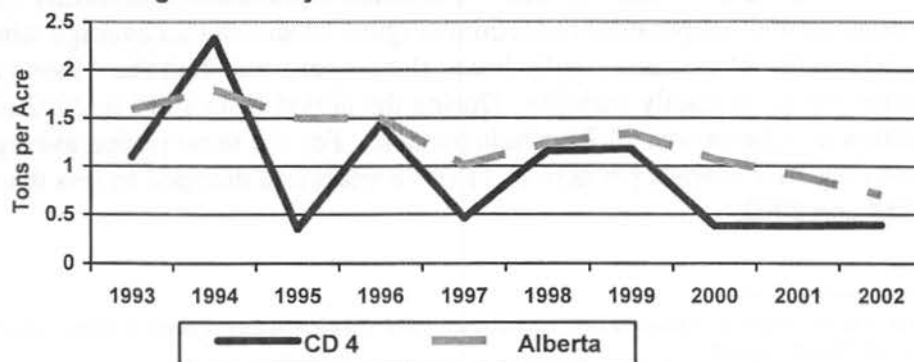


Figure 13

Average Tame Hay Yields in Census Division 4 and Alberta



Perhaps the most striking feature about agriculture in CD 4 compared to the rest of the province is the lack of diversification. There are no longer any dairy operations in the region and the proportions of poultry and hog operations are below the provincial averages. While there has been some diversification into field crops and miscellaneous specialty crops in CD 4 since 1996, the percentage of such operations is still much lower than elsewhere.

Table 4

Classification of Farms Based on Gross Farm Receipts, 2000

Farm Classification ¹¹	CD 4			Per Cent of Total Farms		
	1995	2000	Change	CD 4	Central Alberta	Alberta
Beef Cattle	731	780	+49	53.3%	51.9%	45.4%
Dairy	10	0	-10	0.0%	2.1%	1.5%
Hog	9	10	+1	0.7%	2.2%	1.7%
Poultry & Egg	1	1	0	0.0%	1.0%	0.9%
Wheat	479	299	-180	20.4%	5.7%	7.4%
Other Grains & Oilseeds	170	196	+26	13.4%	14.7%	18.5%
Field Crop	37	61	+24	4.2%	7.3%	9.3%
Miscellaneous Specialty	30	39	+9	2.7%	11.1%	10.9%
Livestock Combination	40	27	-13	1.8%	2.1%	2.3%
Other	28	49	+21	3.3%	1.9%	2.3%
Total Farms	1535	1463	-72	100.0%	100.0%	100.0%

Source: Alberta Agriculture, Food and Rural Development (1998). *1996 Census of Agriculture for Alberta*.
 Alberta Agriculture, Food and Rural Development. (n.d.) *2001 Census of Agriculture for Alberta*.

The crop mix in CD 4 for 2001 is provided in Figure 11. Wheat was grown on 40 per cent of crop land, and about 75 per cent of this was spring wheat. Other grain crops, primarily barley and oats, were grown on 26 per cent of crop land. Another 23 per cent of crop land was used to raise alfalfa and hay. Canola was raised on three per cent of crop lands while specialty field crops such as mustard seed, dry field peas, lentils, dry field beans, canary seed, and triticale were grown on seven per cent of crop land. Other specialty crops were found on only one per cent of crop land.

Another key characteristic of agricultural in CD 4 is the high annual variability in agricultural production. Figures 12 and 13 illustrate the average yields of wheat and tame hay over the last 10 years or more for both CD 4 and Alberta.¹² Although some annual variability is expected due to changing moisture and temperature conditions, Figure 12 shows that average wheat yields in CD 4 (21 bushels per acre) are consistently lower (by 62 per cent) than the Alberta average (34 bushels per acre) and more highly variable. During the period from 1985 to 2002 the poorest annual production in Alberta was 23.7 bushels per acre. For the same period average yields in CD 4 were less than 23.7 bushels per acre in 11 of 18 years and dropped to less than nine bushels per acre in 1988 and 2002.

¹¹ Number of farms with gross receipts of \$2500 or more classified according to the commodity or group of commodities that account for 51 per cent or more of the gross receipts.

¹² Crop yield data are taken from Agricultural Statistics Yearbook at <http://www.agric.gov.ab.ca/app21/rtw/seltopic.jsp>.

Figure 14

Changes in Cattle Farming, CD 4

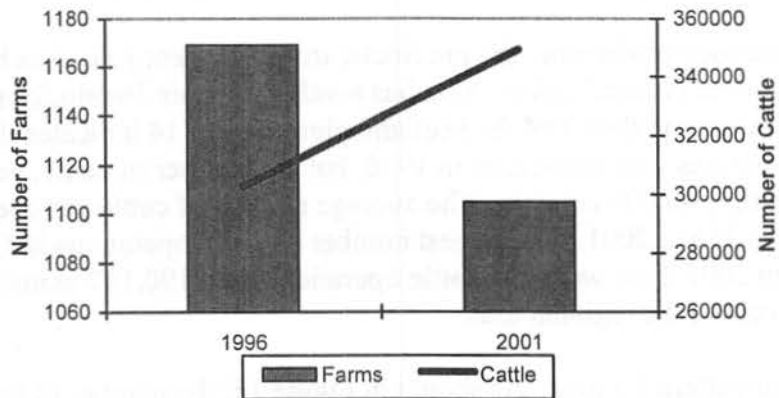


Figure 15

Changes in Pig Populations, CD 4

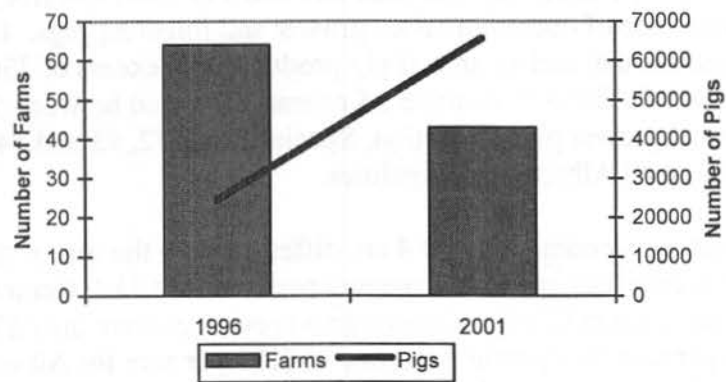
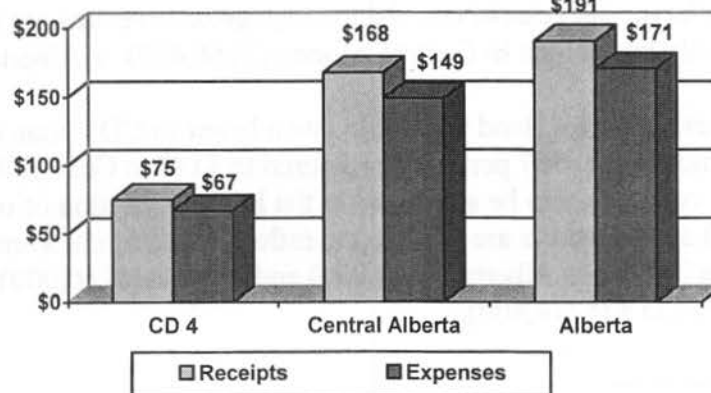


Figure 16

Farm Receipts and Expenses Per Acre, 2000



A similar pattern exists for tame hay production. Average hay yields in CD 4 between 1993 and 2002 were about 73 per cent of the provincial average of 1.25 tons per acre. However, in five of these 10 years, average hay production in CD 4 was less than 0.5 tons per acre.

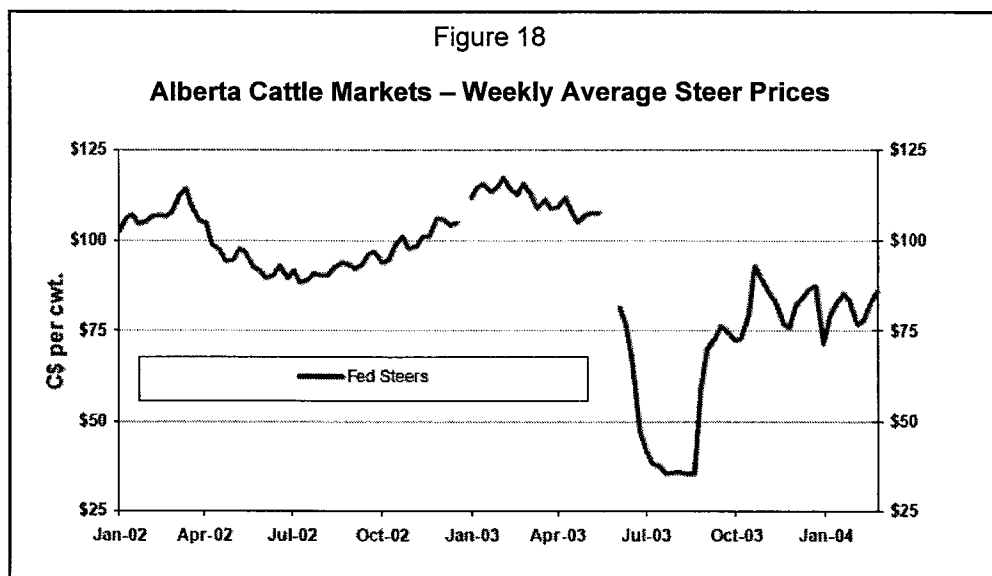
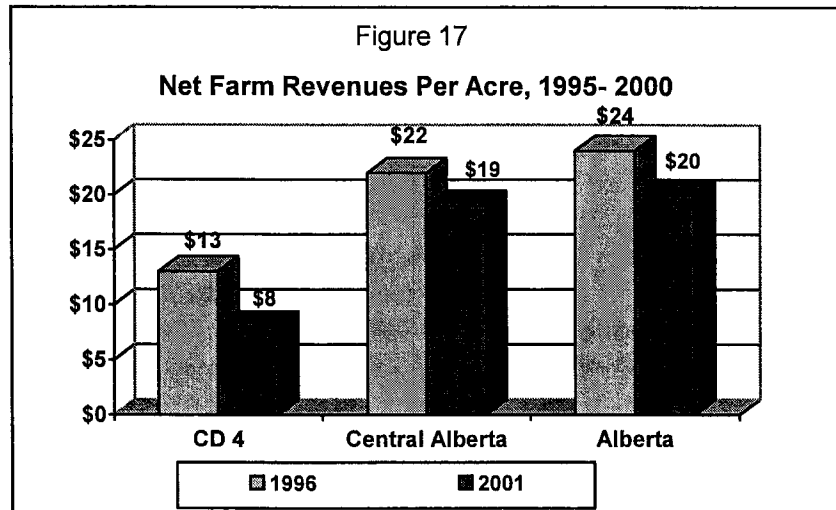
With respect to livestock production, the provincial trend in recent years has been toward more specialization and more intensification. This has resulted in more livestock on fewer farms. This trend is also evident in the CD 4 for beef and pigs. Figure 14 indicates that in 2001 there were 84 fewer operations with cattle than in 1996, but the number of cattle, particularly calves, increased by more than 46,000 animals. The average number of cattle per operation increased from 259 in 1996 to 316 in 2001. The largest number of cattle operations in CD 4 is located in Special Area #2; in 2001 there were 405 cattle operations with 190,127 animals and this represents 54 per cent of the regional total.

There was a similar pattern for pigs. As shown in Figure 15, the number of hog operations dropped by a third to only 43 farms. At the same time the population of pigs increased by more than 41,000. This represents an increase of 123 per cent. The average number of pigs per farm jumped from 383 in 1996 to 1525 in 2001. There are two general types of pig operations. Some are breeding operations that are defined in terms of the number of sows. Data for 2001 show that in CD 4 there was one operation with between 250 and 999 sows and five with between 30 and 249 sows. The other type of operation raises grower and finishing pigs. In Alberta in 2001 there were 66 such operations that had an annual pig production in excess of 3300 head, and 16 of these were located within CD 4.¹³ Another 55 operations raised between 500 and 3299 head per year. In terms of total grower pig production, Special Areas #2, #3 and #4 were ranked third, fourth and fifth among all Alberta municipalities.

Agricultural production economics in CD 4 are different from the rest of the province. Figure 16 shows average gross revenues and total expenses per acre for CD 4, Central Alberta and the entire province. For farms in CD 4, estimated gross revenues were only \$75 per acre in 2000, compared to \$168 per acre for Central Alberta and \$191 per acre for Alberta. This low number reflects the very high percentage of the land base being used for pasture in CD 4 and the relatively low quality of pasture lands for beef production because of poor moisture conditions. For Alberta, the statistics indicate that there were 3.33 acres of pasture land for each head of cattle. In Central Alberta, there were 3.6 acres per head, but in CD 4 there were 10.5 acres per head. This helps explain the low return per acre of land. However, given that farms in CD 4 are more than three times larger than elsewhere, the average gross revenues per farm in CD 4 (\$241,300) were actually larger than in Central Alberta (\$166,600) or Alberta (\$184,900).

Average farm expenses per acre of land were also much lower in CD 4 than elsewhere. In 2000 these average costs amounted to \$67 per acre, compared to \$149 in Central Alberta and \$171 in Alberta. These lower costs can also be attributed to the large proportion of natural pasture found on farms in CD 4. When these costs are adjusted to reflect the different average farm sizes, the average costs per farm in Central Alberta (\$148,000) and Alberta (\$166,000) were significantly lower than for farms in CD 4 (\$214,400).

¹³ Estimates of the number of large livestock operations were prepared by the Natural Resources Conservation Board based on a special run of the agricultural statistics from the 2001 census. The size categories were based on definitions contained in the *Agricultural Operation Practices Act*. Similar statistics could not be generated for the cattle industry because of definitional differences.



Source: Alberta Agriculture, Food and Rural Development (2004). *Review of Pricing in the Beef Industry*. March, 2004

The significance of these regional differences in gross revenues and expenses is reflected in the resulting net returns per acre. As shown in Figure 17, net returns in CD 4 for 2000 were only \$8 per acre, compared to about \$20 per acre elsewhere in Alberta.¹⁴ It is noteworthy that throughout Alberta net revenues have dropped between \$3 and \$5 per acre since 1995. While this decline in net returns represents a significant reduction (17 per cent) for an average Alberta farm, this change translated into a 38 per cent decrease for farms in CD 4.

However, like the rest of the province, cattle producers in CD 4 have also been affected by the changes in the world and North American livestock markets which have changed drastically since one case of Bovine Spongiform Encephalopathy (BSE) was found in Alberta in May 2003. An investigation into the effects of BSE on cattle pricing made the following observations:

The BSE crisis created a situation where fed cattle prices were under pressure as a result of three factors: a lower overall demand for beef products in export markets; an excess supply of domestically produced beef; and higher costs associated with the production of beef due to new regulatory and testing standards.¹⁵

As shown in Figure 18, the price of feeder cattle dropped significantly as foreign borders were closed to exports of Canadian cattle and processed beef. While these prices have rebounded somewhat following the major drop in July 2003, current prices are still only about 75 to 80 per cent of what they were in 2002. However, cattle sales have dropped and inventories are increasing with the result that there are concerns that there could be a significant over-supply of slaughter weight cattle in Canada. The effects of these lower prices and reduced sales volumes are not reflected in the agricultural statistics presented in this section, which are based primarily on the 2001 Census of Agriculture.

Thus, until the beef industry fully recovers from the BSE crisis, cattle producers in CD 4 are facing a period of reduced financial returns and economic hardships that could further exacerbate the risks and uncertainty associated with the highly variable moisture conditions in CD 4.

2.6 Future Development

When the first socio-economic assessment of SAWSP was completed in 1992, it noted that there was a general perception among regional residents that “both present and future opportunities for economic growth are limited by the lack of an ample and secured supply of good quality water”.¹⁶ It noted that completion of the Henry Kroeger Regional Water Supply in the mid-1980s had spurred some economic development and created new recreational opportunities. However, it also noted that water shortages in other parts of the region meant that various business proposals had been unable to proceed.

¹⁴ This average reflects both irrigated and dryland farming.

¹⁵ Alberta Agriculture, Food and Rural Development (2004). *Review of Pricing in the Beef Industry*. March, 2004. Page 2.

¹⁶ Technical Subcommittee, Project Rationale (1992). *Special Areas Water Supply Project: Project Rationale*. Page 17.

Figure 19

Urban and Rural Population As Predicted in 1992

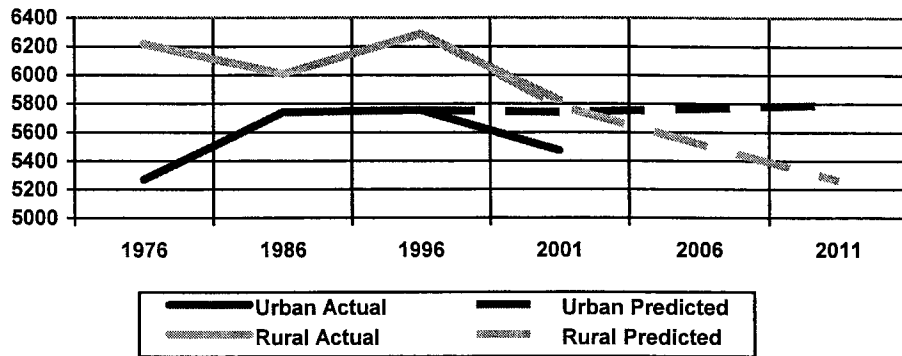
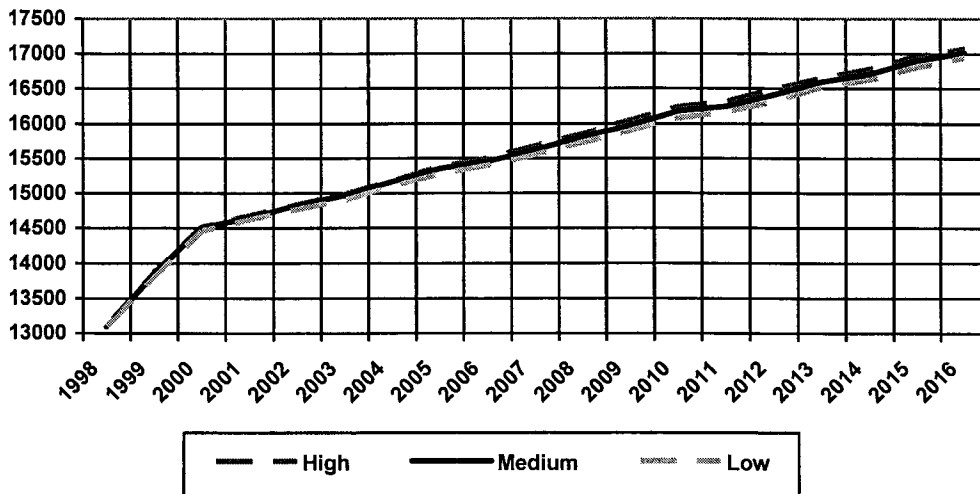


Figure 20

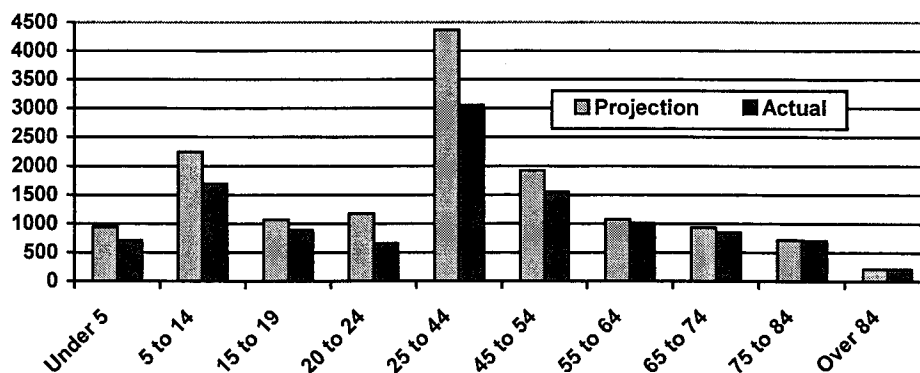
Population Projections for CD 4, 1999 to 2016



Source: Alberta Treasury, Statistics

Figure 21

Projected and Actual Age Distribution CD 4, 2001



The report concluded that “Without some action to address existing water supply problems the opportunities for economic development, diversification or even stabilization within the region are extremely limited.”¹⁷ It predicted that recent population trends were likely to continue and, based on optimistic linear projections, it estimated that by 2011 the regional population would decline by about eight per cent. It also expected that the process of farm consolidation would continue, such that the rural population would decrease by as much as 16 per cent.

Figure 19 illustrates the population predictions made in 1992, and also shows the actual regional populations for 1996 and 2001. In retrospect, the 1992 predictions were generally correct in terms of describing the changes in the rural populations: the number of farms decreased as expected and there was a small decrease in the rural population. However, it underestimated the extent to which the urban population decreased; instead of remaining relatively constant, urban populations actually dropped by five per cent. Thus, the regional population has actually dropped faster than was predicted in 1992.

Population projections for CD 4 for the period 1999 to 2016, as prepared by Alberta Treasury in 1999, are shown in Figure 20. These estimates are based on mathematical projections that consider fertility rates, birth rates, death rates, and migration, and employ low, medium and high growth scenarios. For CD 4, the projections show relatively slow growth (about 1.5 per cent per year) for all three scenarios. Using this method, the population of CD 4 in 2001 was projected to be 14,625 to 14,675.

However, the actual population based on the 2001 Census was only 11,300. The reasons for the difference between the projected and actual populations for 2001 are shown in Figure 21. This figure shows that, although predicted populations for people aged 55 and older closely matched the actual population, the projections seriously overestimated the numbers of people under 55. Since birth, death and fertility rates are relatively consistent over time, it would appear that since 1996 there has been a significant migration of families out of the region. With the loss of these people, there would be fewer births in successive years with the result that the population will continue to decline.

The only way this decline could be slowed or reversed is through migration into the region as a consequence of economic growth. At the present time the prospects for growth are very limited. A listing of major development projects for the Special Areas and the MD of Acadia identifies only two highway realignment, widening and resurfacing projects with a total value of \$19 million.¹⁸ Furthermore, there has been little new capital development, as measured in terms of the value of new building permits, over the last five years. Table 5 shows that, with the exception of 2001, the average value of new construction was only about \$3 million and residential development accounted for the majority of new building permits. During this period the number of new housing starts dropped from 30 in 1999 to only five in 2003, and this is a direct reflection of the declining population.

¹⁷ Technical Subcommittee, Project Rationale (1992). *Special Areas Water Supply Project: Project Rationale*. Page 17.

¹⁸ <http://www.albertafirst.com/profiles/community/>

Table 5

Capital Development in Census Division 4, 1999 to 2003

Value of Building Permits	1999	2000	2001	2002	2003
Commercial	\$157,000	\$383,000	\$1,491,000	\$1,237,000	\$824,000
Industrial	\$118,000	\$238,000	\$2,282,000	\$263,000	\$201,000
Institutional	\$20,000	\$0	\$404,000	\$30,000	\$401,000
Residential	\$2,623,000	\$1,842,000	\$1,655,000	\$1,694,000	\$1,468,000
Total	\$2,918,000	\$2,463,000	\$5,832,000	\$3,224,000	\$2,894,000
Total Housing Starts	29	16	12	10	5

Source: Statistics Canada 1998-2002 Building Permits (numbers may not add due to rounding)

Given the importance of agriculture in the region, it would appear that the greatest opportunities for economic development lie either with continued intensive livestock development and/or value-added agricultural processing. However, information from the SAB indicated that some recent proposals for intensive livestock development have been shelved because of inadequate water supplies. In addition, under the regulatory process for intensive livestock operations, the Natural Resources Conservation Board will not issue approvals or registrations without confirmation that applicants have sufficient water. Thus, it would appear that without additional water supplies in the region, there are very limited opportunities for economic growth and the population of the region will continue to decline as young adults and families move out of the region in search of employment.

2.7 Summary

According to the social and economic characteristics of the region, it is reasonable to conclude that the Special Areas and MD of Acadia have been in social and economic decline for some years and that, without some type of new economic development, this trend will continue. This conclusion is based on the following key points:

- The regional population is shrinking and aging. Young adults and families are leaving the region and few people are migrating into the region. Consequently, the population will continue to decrease and, by 2010, nearly one quarter of the population will be over the age of 65.
- Earned incomes in the region have been dropping relative to provincial incomes and are currently only 75 per cent of the Alberta average.
- Agriculture is the cornerstone of the regional economy and directly accounts for nearly 40 per cent of regional employment. More than half the farms raise beef cattle and they have been hit hard by the repercussions of BSE. While there has been some development of intensive livestock operations in the region, especially grower-hog operations, potential expansion is limited by lack of water and feed. One-third of the farms grow wheat, other grains and oil seeds, but poor moisture conditions have typically resulted in yields that are only 62 per cent of the Alberta average and are much more variable. Compared to the rest of the province very few specialty crops are raised in the region.

These findings are not dissimilar than the conclusions of the socio-economic assessment that was completed in 1992. However, the one significant difference is that the regional population is declining much faster than was predicted 12 years ago.

As was the case in 1992, the lack of an adequate water supply for the region is seen as a major obstacle for economic development in the Special Areas. In February 2004 the East Country Growth and Planning Summit was held in Consort to identify strategies for economic and social development in the region.¹⁹ Participants at the Summit believed that the region offers strong entrepreneurial skills, a variety of tourist attractions, safe basic schooling, a wide range of cultural opportunities and recreational facilities, good health care services, and a strong volunteer base. However, they recognized that barriers to community development include distance from major urban centres and transportation corridors, higher prices for some goods, a small local population, limited financial resources, and lack of water.

With respect to economic development opportunities, the participants at the Summit focused on value-added agriculture and energy development, particularly renewable energy. While they identified opportunities such as co-generation facilities, energy from compost, and expanding the existing killing plant, they also noted that lack of water and financing presented significant barriers.

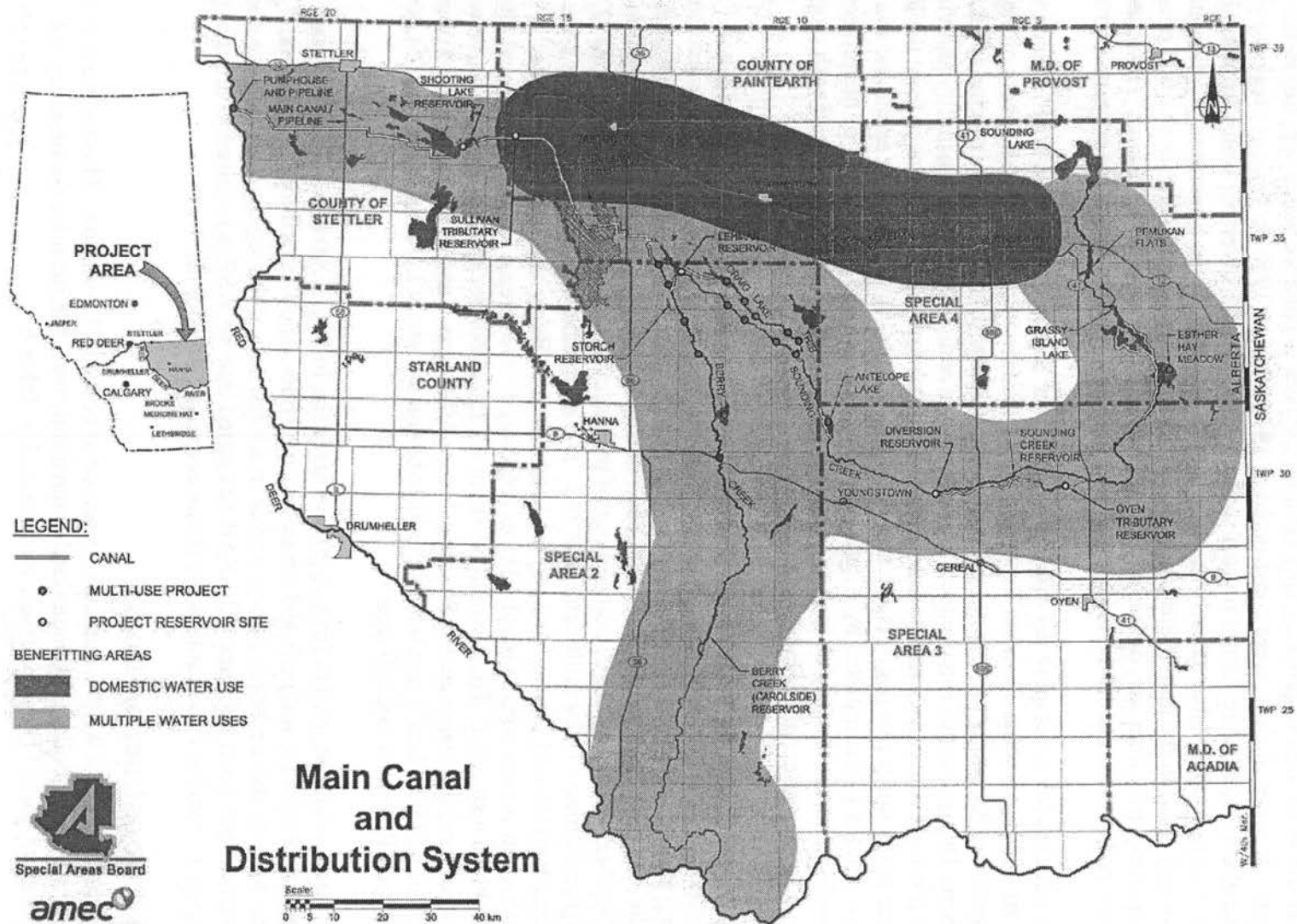
Water availability was one of the eight major themes that were explored. Participants at the Summit recognized the importance of the Henry Kroeger pipeline in supplying good quality water to some parts of the region, and identified SAWSP as key to providing additional water. They saw cost, distance, government regulations, the small population, and apathy as key barriers to future water development and they suggested lobbying the provincial government for water development as the most immediate strategy. The Summit participants also advocated water conservation, increased recycling and saving rain water as part of a long term solution to water shortages.

Thus, residents of the Special Areas are acutely aware of how lack of water has limited economic development in the region. They see the development of new water supplies as being key to both retaining what they have and allowing opportunities for economic expansion and community development.

¹⁹ A summary of the proceedings of the East Country Growth and Planning Summit can be downloaded from <http://www.specialareas.ab.ca/news.htm>.

Figure 22

Special Areas Water Supply Project



3. The Special Areas Water Supply Project

Over the years various projects have been undertaken to enhance water supplies in the Special Areas. A series of dams were constructed in 1948 through 1950 on various creeks to catch and store about 39,000 acre-feet of run-off water.²⁰ Schemes for diverting water from the Red Deer River were contemplated as early as 1914, and completion of the Sheerness pipeline and the Deadfish canal in the mid-1980s made Red Deer River water available for thermal power production, irrigation use, domestic use, and recreation in parts of the region. However, lack of water in the remainder of the region was still seen as a limiting factor for economic growth.

The concept for developing the Special Areas Water Supply Project (SAWSP), which would divert additional water from the Red Deer River, was first presented to Members of the Legislative Assembly of Alberta, the Prairie Farm Rehabilitation Administration (PFRA) and the Alberta Department of Environment in 1988. An investigation of the feasibility and viability of this proposal was conducted for four different options for transporting water from the Red Deer River to the upper reaches of Berry and Sounding creeks. A preliminary economic evaluation of these options was completed by Alberta Environment in 1989. The intent of the project was to provide an assured supply of feed and grazing for livestock, with irrigation of cash crops like wheat, barley or canola being of secondary importance.

The overall design for SAWSP has evolved since it was first presented. As shown in Figure 22, the concept calls for water being pumped from the Red Deer River at a location near Nevis. The pump station would consist of seven vertical turbine pumps that would be capable of diverting up to 7.08 cubic metres of water per second during a 150-day period from mid-April to the end of October. Water would be pumped out of the valley through a 4.5-kilometre (km) (2.8 miles [mi]) pressurized 1,829 millimetre pipeline. The main canal or pipeline would be 84 km (52 mi) in length and would convey water to the headwaters of Berry and Sounding creeks. A water distribution system consisting of 423 km (263 mi) of live stream (canals and natural channels) would be constructed. There would be about 44,250 cubic decametres (dam³) of live water storage along the main canal at Shooting Lake (2,000 dam³) and at Sullivan Lake Tributary reservoirs (4,000 dam³), and within the distribution system at Lehman Reservoir (24,000 dam³), and Oyen Reservoir (14,250 dam³).

The water would be used to irrigate 20,000 acres (including 2,000 acres along the main canal), stabilize 15 existing wetlands and create two new ones, allow backflood irrigation on 5,780 acres, provide more reliable stockwatering in a large part of the region, and enhance domestic and municipal water supplies. The SAB has stated that SAWSP is required to drought proof the area and to provide opportunities for future economic development.

3.1 Construction Costs

Construction of SAWSP is currently expected to cost \$192.3 million. This estimate is expressed in terms of 2004 dollars, excludes land acquisition costs, but includes contingency and engineering costs. These costs are summarized in Table 6.

²⁰ Gorman, Jack (1988). *A Land Reclaimed, the Story of Alberta's Special Areas*. Gorman & Gorman Ltd., Hanna, Alberta.

Table 6

SAWSP Construction Cost Estimate

Component	Description	Estimated Cost (millions 2004\$)
Diversion Works	Pump Station	\$15.23
	Pipeline	\$10.04
	Subtotal	\$25.27
Main Canal and Storage	Canal to Shooting Lake	\$48.45
	Shooting Lake Reservoir	\$3.24
	Canal from Shooting Lake to Sullivan Lake	\$11.10
	Sullivan Lake Reservoir	\$3.70
	Canal from Sullivan Lake to Headwaters	\$32.60
	Subtotal	\$99.09
Distribution System	Water Supply Reservoirs	\$31.73
	Multiple Use Projects	\$10.17
	Canals	\$14.59
	Channel Improvements	\$11.43
	Subtotal	\$67.92
TOTAL COSTS		\$192.28

Source: See Appendix B.

Table 7

SAWSP Construction and Cost Schedule
(Millions 2004\$)

COMPONENT	YEAR							TOTAL
	1	2	3	4	5	6	7	
Field Investigation	\$2.0	\$2.0						\$4.00
Canal/ Pumphouse/ Pipeline			\$35.00	\$35.00	\$35.00	\$16.86		\$121.86
Sounding & Berry Creek, Craig Lake Tributary				\$15.00	\$15.00	\$15.00	\$21.42	\$66.42
TOTAL EXPENDITURES	\$2.00	\$2.00	\$35.00	\$50.00	\$50.00	\$31.86	\$21.42	\$192.28

Project construction would occur over seven years and, in the first years, would focus on the diversion works (the pump station and pipeline) and the main canal. Construction of the distribution system would follow. A schedule of project construction activities and annual costs is provided in Table 7. It is assumed that water pumping would commence in Year 6 and that irrigation along the main canal could also commence at that time.

3.2 Operating and Maintenance Costs

Annual operating and maintenance costs are estimated to be \$3.1 million. Of this amount energy costs for pumping are estimated to be \$1.6 million per year.²¹ Annual maintenance costs are calculated to be about \$1.50 million. This number is based on annual operating and maintenance costs of 2.0 per cent for the pump station, 0.25 per cent for the pipeline, 0.5 per cent for the main canal and storage, and 1.0 per cent for the distribution system.²² It is assumed that pumping costs would commence in Year 6 but only at about 50 per cent capacity, and that the other operating and maintenance costs would commence in Year 7.

²¹ Personal communications, Ab Grover, SAWSP, November 12, 2004.

²² Personal communications, Hart Water Management Consulting, September 17, 2004.

Table 8

Regional Distribution of Lands for Sprinkler Irrigation

Location	Irrigation Area		Water Demand
	(hectares)	(acres)	(cubic decametres)
Main Canal	810	2,000	2,430
Berry Creek System	3,240	8,000	9,705
Craig Lake Tributary	450	1,100	1,335
Sounding Creek			
Upstream of Highway 41	660	1,640	1,990
Downstream of Highway 41	2,930	7,250	8,800
Total	8,090	20,000	24,260

Source: Marv Anderson & Associates Ltd. (2000). *Socio-Economic Impacts of the proposed Special Areas Water Supply Project* and modified to reflect irrigation demands of 300 mm,

Table 9

Regional Distribution of Lands for Backflood Irrigation

Location	Irrigation Area	
	(hectares)	(acres)
Berry Creek System	712	1,759
Craig Lake Tributary	366	904
Sounding Creek		
Upstream of Highway 41	277	684
Downstream of Highway 41	985	2,433
Total	2,340	5,780
New backflood projects	62	152
Existing backflood projects	2,278	5,628

4. Agricultural Impacts

As noted in Section 2.5, agriculture in the region consists primarily of cattle ranches and grain farms where the ability of the land to grow crops and forages is highly variable because of fluctuating moisture conditions. Construction of SAWSP would benefit agricultural production in the region by providing farmers with the opportunity to irrigate up to 20,000 acres of land along Sounding and Berry creeks while creation of various multiple-use wetlands would provide opportunities for backflooding 5,780 acres of native grasses. This would lead to increased production of forages and would reduce the risks of crop failures or low forage yields. It would also make water available for stockwatering and could provide opportunities for agricultural diversification. These effects are described below.

4.1 Backflood and Sprinkler Irrigation

SAWSP is designed to provide sufficient water for about 20,000 acres of land suitable for irrigation. The largest amounts of irrigable land are found along the lower reaches of Sounding Creek and in the lower Berry Creek system. Most of the suitable lands are currently cultivated and are used for dryland crops. The average annual irrigation water requirements would be about 300 millimetres²³ (11.8 inches) and it is expected that low-pressure centre-pivots would be used in order to ensure maximum water use efficiency (about 75 per cent). Since centre pivots can only cover 132 acres per quarter section, it is estimated that sprinkler systems would be installed on about 152 quarter-sections. The location of these irrigable lands and their estimated water demands are summarized in Table 8.

The rate at which irrigation development will occur is dependent on how quickly farmers decide to invest in irrigation equipment, and this in turn will depend on crop prices, costs of production, product markets, their capacity to invest, and farmers' willingness and comfort in adopting new technology. In areas where there is already an established irrigation mentality and a strong interest, a large block of land (about 35 per cent) would be irrigated in the first year following project completion and the balance would be developed at a constant rate over the next five or six years. However, in areas without a history of irrigation, where land productivity is relatively low, and where there may be limited ability to invest in new capital equipment, development would follow a traditional "S" shaped adoption curve or be linear.²⁴

For SAWSP, where there is no history of irrigation and recent low agricultural returns may affect the ability to make major capital investments, it is assumed that irrigation adoption would occur on a linear basis such that available water would be fully subscribed in six years. However, it is believed that, as a result of pent-up demand, about 5,000 acres would be developed in the first year that water becomes available (Year 6) and about 3,000 acres of new irrigation would be added in each of next five years. This translates into 38 quarter-sections with centre-pivot irrigation in the first year, increasing by 23 quarter-sections per year.

²³ AMEC Earth & Environmental (2004). *Special Areas Waster Supply Project: In-Basin Distribution Study Summary Report*.

²⁴ Golder Associates Ltd. (2002). *Meridian Dam Preliminary Feasibility Study*.

Table 10

On-Farm Capital Costs of Irrigation Equipment (Electric) (2000\$)

Type	Item	HAND	Wheel Roll System		Centre Pivot System	
			2 Laterals	4 Laterals	High Pressure	Low Pressure
Pivot 1300'					\$58,600	\$58,600
Electric Engine	125 hp	\$9,850	\$9,850	\$9,850	9,850	9,850
Switching Gear		6,400	6,400	6,400	6,400	6,400
Vert. Turbine Pump	75-125 hp	7,100	7,100	7,100	7,100	7,100
Pump House		5,950	5,950	5,950	5,950	5,950
Suction Pipe	10"	1,330	1,330	1,330	1,330	1,330
Low Pres. Package	1300'					\$4,280
Wheel Roll	1/4 mile		12,700	25,400		
Hand Move - Pipe	1/4 mile	6,000				
TOTAL		\$36,630	\$43,330	\$56,030	\$89,230	\$93,510
Area/Unit (Acres)		160	160	160	132	132
Total/Acre		\$229	\$271	\$350	\$676	\$708
Total/Hectare		\$565	\$669	\$865	\$1,670	\$1,750

Source: Cost data from AAFRD/Irrigation Branch, Lethbridge, 2000.

Table 11

Annual On-Farm Operating and Maintenance Costs of Irrigation (2003\$)

Equipment Type	Cost per millimetre of water per acre			
	Labour	Repairs and Maintenance	Energy	Total
Gravity	\$0.0410	\$0.0026	\$0	\$0.0436
Hand Move/Wheel	\$0.0270	\$0.0230	\$0.0788	\$0.1288
Centre Pivot High Pressure	\$0.0089	\$0.0440	\$0.0890	\$0.1419
Centre Pivot – Low Pressure	\$0.0089	\$0.0450	\$0.0650	\$0.1189

Source: Cost data from AAFRD/Irrigation Branch, Lethbridge, 2003.

SAWSP would also create a series of wetlands that would serve multiple purposes. Aside from creating waterfowl habitat (see Section 6), these wetlands would provide opportunities for backflood irrigation that would increase forage production. These wetlands would be filled in the fall (October) and drawn down by 0.28 to 0.43 metres between April and October in accordance with natural evaporation and evapotranspiration.

It is expected that about 5,780 acres of land (2,340 hectares) are suitable for backflood irrigation. As shown in Table 9, the majority of this land is located adjacent to Sounding Creek downstream from Highway 41, particularly around Esther Hay Meadow. Only 152 acres would be new backflood areas. The other 5,628 acres are lands that are part of existing backflood operations that are fully operational in only about one year in 10 and lack the infrastructure necessary for managing water to optimize grazing capacity. By increasing the reliability and productivity of these existing backflood irrigation projects, it is assumed that SAWSP would effectively create 5,780 additional acres of backflood irrigation each year,

4.1.1 Capital Costs of Irrigation

In order to irrigate, farmers would first have to purchase and install the various components of the irrigation system, including related machinery and buildings. Estimates of the costs of various types of irrigation equipment were developed as part of an economic assessment of irrigation possible water storage projects in the Milk River basin. A summary of these costs in 2000 is provided in Table 7.²⁵ To maximize water use efficiency it is proposed that low pressure centre pivots be used. The total cost of a system that would irrigate 132 acres was about \$93,500 in 2000, or about \$708 per acre. To account for inflation and real price changes since 2000, the costs in Table 10 should be inflated by about 13.5 per cent. Thus, in 2004, the cost of purchasing a new low-pressure centre pivot system for irrigating 132 acres would be about \$106,100. However, this cost could be reduced if farmers were able to purchase used equipment. The equipment has an operating life of about 25 years after which time it would have to be replaced.

These estimates do not include the cost of providing electrical service to the pumps. The cost of installing three-phase power lines is estimated to be about \$30,000 per kilometre. For purposes of this analysis it is assumed that each new centre pivot system would require one kilometre of transmission line. While some farmers in the area might choose to use propane or diesel powered pumps, it is expected that most would use electrical power.²⁶

In some cases, farmers may choose to locate centre pivot systems on adjacent quarters of land and install one larger pump system to serve both quarters. This configuration would cost about \$196,200 in 2004 dollars and would require a single electrical service. This would reduce the capital costs of serving two quarter-sections by about 17 percent. For this analysis it is assumed that 100 quarter-sections would be served by single systems and 52 quarters would be served by double systems (i.e. 26 pumps for 52 centre pivots). On this basis, the total capital cost of irrigation equipment would be \$15.71 million and the cost of electrical service would be \$3.78 million.

²⁵ These costs were confirmed through discussions with Leigh Morrison, Alberta Agriculture, Food and Rural Development.

²⁶ Personal communication, Ab Grover, Special Areas Board.

Table 12

Land Use Assumptions Used in Farm Financial Analysis

Crop/Feed	Base Case	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	(Acres)				
Native Range	3200	3162	3162	3162	3162
Tame Pasture	1600	1534	1534	1534	1534
Dryland tame hay	280	214	214	214	214
Dryland Greenfeed	40	40	40	40	40
Dryland Durum	350	350	350	350	350
Dryland Wheat	350	350	350	350	350
Dryland Barley	80	80	80	80	80
Summerfallow	280	280	280	280	280
Backflooded pasture	0	38	38	38	38
Irrigated Silage	0	0	76	0	76
Irrigated Alfalfa	0	132	56	132	56
TOTAL	6180	6180	6180	6180	6180

Source: See Appendix C

Table 13

Crop Production and Disposition Assumptions Used in Farm Financial Analysis

Crop/Feed	Disposition	Base Case	Scenario 1	Scenario 2	Scenario 3	Scenario 4
		Tonnes				
Barley	Produced	47.0	47.0	47.0	47.0	47.0
	Purchased	0	0	0	0	0
	Fed	47.0	47.0	47.0	47.0	47.0
	Sold	0	0	0	0	0
	Inventory	0	0	0	0	0
Oats	Produced	0	0	0	0	0
	Purchased	44.5	0	0	45.0	45.0
	Fed	44.5	0	0	45.0	45.0
	Sold	0	0	0	0	0
	Inventory	0	0	0	0	0
	Inventory	0	0	0	0	0
Hay	Produced	308.0	684.2	427.5	684.2	374.8
	Purchased	0	0	0	0	0
	Fed	308.0	355.3	0	429.1	0
	Sold	0	328.9	427.5	255.2	374.8
	Inventory	0	0	0	0	0
Greenfeed	Produced	60.0	60.0	60.0	60.0	60.0
	Purchased	5.0	0	0	0	0
	Fed	62.8	60.0	60.0	60.0	60.0
	Sold	0	0	0	0	
	Inventory	2.2	0	0	0	
Silage	Produced	0	0	755.0	0	910.0
	Purchased	0	0	0	0	0
	Fed	0	0	755	0	910.0
	Sold	0	0	0	0	0
	Inventory	0	0	0	0	0

Source: See Appendix C

The costs of operating irrigation equipment are provided in Table 11. The information shows that, although low pressure centre-pivots are more expensive to install, they are less labour intensive and therefore less costly to operate than all but gravity systems. For the Special Areas, annual water requirements would be 300 millimetres per year, which amounts to an annual cost of \$36 per acre. Total annual costs for operating centre pivots on 20,000 acres would then be about \$713,400, including energy costs.

When farmers adopt irrigation, they may also make additional investments in other machinery and buildings. In the analysis of SAWSP conducted in 2000, the additional capital investment resulting from irrigation was \$962 per acre or \$127,000 per farm²⁷ while the corresponding estimate for 1992 was \$28,700 or \$185 per acre. While such investments may occur where adoption of irrigation results in different crop mixes which may require different operating machinery and crop storage facilities, it is unlikely that more intensive farming of hay or cereal crops in the Special Areas would require more equipment or buildings. Consequently, this analysis assumes that, with irrigation, there would be no additional investments in equipment or buildings.

4.1.2 Farm Financial Analysis

To assess the impacts that sprinkler and backflood irrigation would have on farming in the regions, Alberta Agriculture, Food and Rural Development (AAFRD) undertook a farm option analysis similar to the one completed in 1992. Using information from the *AgriProfit\$* data base, AAFRD constructed a “typical” dryland farming operation (the Base Case) and this was then modified to include the additional costs and revenues of adopting irrigation. The Base Case was a 6180-acre farm with 170 cows producing 129 calves per year. While cattle were fed barley, alfalfa/hay and greenfeed produced on the farm, 44.5 tonnes of oats and 5.0 tonnes of greenfeed were purchased.

Four irrigation scenarios were considered:

Scenario 1 assumed that irrigation would be used to produce forage on 132 acres. The increased forage would be fed to the existing cattle herd, and any surplus feed would be sold. This scenario reflects the situation where water from SAWSP would be used to drought-proof existing operations.

Scenario 2 assumed that irrigation would be used to produce 56 acres of forage and 76 acres of silage. This would be fed to the existing cattle herd, and any surplus grazing would be sold. This scenario is the same as Scenario 1 but with the addition of silage.

Scenario 3 assumed that, with 132 acres of irrigated forage, farmers would choose to background their calves (increase the weight by about 40 per cent) and sell any surplus feed.

Scenario 4 assumed that, with increased forage and silage, farmers would choose to background their calves and sell any surplus grazing. This scenario is the same as Scenario 3 but with the addition of silage.

²⁷ Marv Anderson & Associates Ltd. (2000). *Socio-economic Impacts of the Proposed Special Areas Water Supply Project*. Special Areas Board, Hanna, AB.

Table 14

Grazing Assumptions Used in Farm Financial Analysis
Animal-Unit Months (AUMs) Produced

Grazing	Base Case	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Native Range	800	790.5	790.5	790.5	790.5
Tame Pasture	640	613.6	613.6	613.6	613.6
Aftermath	253	236.8	236.8	236.8	236.8
Backflood	0	110.2	110.2	110.2	110.2
TOTAL	1693	1751.1	1751.1	1751.1	1751.1
AUMs required	1692	1692.0	1692.0	1692.0	1692.0
Surplus AUMs	1	59.1	59.1	59.1	59.1

Source: See Appendix C

Table 15

Crop Sales Assumptions Used in Farm Financial Analysis

Crops	Yield		Selling Price	Revenues
	Average bushels/acre	Total Tonnes	\$/tonne	
Durum	18	171.5	\$209.44	\$35,919
Wheat	20	190.5	\$87.10	\$32,968
TOTAL				\$68,887

Source: See Appendix D

Table 16

Livestock Production and Sales Assumptions Used in Farm Financial Analysis

		Base Case	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Livestock	Cows	170	170	170	170	170
	Replacement Heifers	28	28	28	28	28
	Bulls	8	8	8	8	8
Livestock Sales	Steer calves	78	78	78		
	Heifer calves	51	51	51		
	Culls	27	27	27	27	27
	Bulls	2	2	2	2	2
	Feeder Steers				77	77
	Feeder heifers				51	51
	Combined weight (pounds)	102,335	102,335	102,335	130,600	130,600
Livestock Revenues	Current Prices	\$58,383	\$58,383	\$58,383	\$72,187	\$72,187
	5-year Average Prices	\$104,334	\$104,334	\$104,334	\$127,936	\$127,936

Source: See Appendix Cc

Additional scenarios that involved expanding the herd size were considered. However, it was determined that the farm would not be able to provide the grazing requirements of an expanded herd.

As shown in Table 12, Scenarios 1 and 3 assume that 66 acres of tame pasture, 66 acres of dryland tame hay, and 38 acres of native range are converted to 132 acres of sprinkler irrigated alfalfa and 38 acres of backflood irrigation. Scenarios 2 and 4 assume that the tame pasture, dryland tame hay and native range are converted to 56 acres of sprinkler irrigated alfalfa, 76 acres of irrigated silage and 38 acres of backflood irrigation. Native range includes some lands that were farmed in the 1930s, abandoned, and left to revegetate. The remaining agricultural land use was assumed to remain the same so that the farm financial analysis could isolate the effects of adopting irrigation.

AAFRD's analysis employed a series of other assumptions about cropping patterns and yields, feed production and sales, livestock sales, and farm management practices. Some of these key assumptions are provided in Tables 12 to 16. A copy of AAFRD's analysis is provided as Appendix C.

Table 13 shows how crops and feed raised on the farm would be used. Under the Base Case, all barley, hay and greenfeed grown on the farm would be used to feed cattle. However, to sustain the 170 cows, some additional hay and greenfeed and all oats must be purchased. Under Scenario 1, the farm would be able to grow all the hay required for the cattle herd, and would sell 329 tonnes of surplus hay for cash. This hay would generate revenues of \$31,246 per quarter based on an average selling price of \$95 per tonne. No oats or additional greenfeed would be required. All of the irrigated alfalfa produced under Scenario 2 (427.5 tonnes) would be sold and the 755 tonnes of irrigated silage would be fed to the cattle herd. No oats would have to be purchased.

With Scenario 3, the farm would grow all the hay required for backgrounding calves and would also be able to sell 255 tonnes of surplus hay. All oats would have to be purchased. Under Scenario 4, the irrigated silage would be used to background calves and 374.8 tonnes of irrigated alfalfa could be sold.

Table 14 shows how the grazing capacity of the farm would change under the various scenarios. At the present time native pastures in CD 4 have a limited ability to support livestock. About three to five acres of native range are required to produce sufficient forage to support one animal unit month (AUM), which is the amount of forage required to support a single 1000-pound cow with or without calf for one month.²⁸ On the assumption that cattle would be grazed 214 days per year, a herd of 170 cows would require 1692 AUMs and this would be provided under the Base Case. For all of the irrigation scenarios, the 38 acres of backflood irrigation would increase grazing capacity by about 110 AUMs (based on 2.9 AUMs per acre), but 51 AUMs would be lost when tame pasture is converted to irrigation.

²⁸ Alberta Agriculture, Food and Rural Development define an Animal Unit Month (AUM) as being the amount of forage required by an "animal unit" grazing for one month. The standard animal unit is defined as one mature 1000 lb cow with a calf, or equivalent, and is based upon the average daily forage intake of 26 pounds of dry matter per day. That consumption, combined with a factor for trampling and waste of about 25 per cent, results in an estimate of about 1000 pounds of dry matter (DM) from forage to supply one AU each month.

Thus, with backflood irrigation, grazing capacity would increase to 1751 AUMs. Of this, 59 AUMs would be surplus to farm requirements and would be sold at \$25 per AUM or used when additional grazing would normally have been purchased. For these scenarios the incremental grazing benefits resulting from backflood irrigation would be \$1,475 per farm, or \$0.22 million per year once all 5,780 acres of backflood irrigation are fully developed.

For the Base Case and all irrigation scenarios, about 700 acres of land would be devoted to producing grain for sale; half of this would be for dryland wheat and half for durum. Estimates of total yields and farm revenues from crop sales are provided in Table 15. The estimates of crop yields reflect five- and 10-year averages for Special Area 3 as per the Alberta Financial Services Corporation. Thus, total crop sales of \$68,890 are included in the revenue projections for all cases. To determine how changes in crop prices might affect overall farm incomes, revenue projections were prepared assuming prices varied by ± 10 per cent.

Table 16 shows the estimated livestock production and revenues for the five cases. For the Base Case and Scenarios 1 and 2, a herd of 170 cows with 28 replacement heifers and eight bulls was assumed and would produce 158 animals for sale or slaughter each year. The combined weight of these animals would total about 102,335 pounds. Backgrounding of calves, as per Scenarios 3 and 4, would increase annual beef production to 130,600 pounds, an increase of nearly 28 per cent.

The value of this beef production will depend on beef prices. At the present time prices are about \$0.20 per pound for bulls and culls, \$0.70 per pound for heifers and \$0.80 per pound for steers and reflect the impact that BSE has had upon cattle markets. Consequently, current prices probably represent a worst-case scenario for making predictions about future farm revenues. At current prices, annual beef production under the Base Case and Scenarios 1 and 2 would generate revenues of about \$58,400. This would rise to about \$72,200 by backgrounding calves, as per Scenarios 3 and 4.

AAFRD also prepared a more optimistic assessment of livestock revenues using the assumption that prices would return to levels prior to the discovery of BSE. As noted in Figure 23, beef prices at the present time are below the long-term average and farm revenues are lower than observed prior to 2003. This optimistic scenario used average prices observed for the five-year period from 1998 to 2002: \$1.37 per pound for weaned steers, \$1.29 per pound for weaned heifers, \$1.21 per pound for feeder steers, \$1.16 for feeder heifers, and \$0.40 for culls and bulls. Using these five-year average prices, the value of livestock production under the Base Case and Scenarios 1 and 2 would be about \$104,300. The annual revenues from livestock sales would increase to about \$127,900 under Scenarios 3 and 4.

Given the significant effect that different livestock prices has on farm revenues, AAFRD also prepared a sensitivity analysis that employed prices that were between the worst-case and optimistic situations. It estimated farm revenues assuming calf prices that were 25 per cent and 50 per cent higher than current prices. To account for further deterioration of the livestock industry, AAFRD also calculated farm revenues assuming prices that are 10 per cent lower. The results of these sensitivity analyses are described later.

AAFRD also used a number of other assumptions in preparing its analysis and these are listed below:

- All lands are privately owned.
- No government payments are included in the calculations.
- Crop cost and returns are based on the brown soil zones
- Costs are mainly for 2002 and are indexed to 2003.

In interpreting the results, AAFRD cautioned that its analysis represented a snapshot and may not adequately describe how farmers would manage their investments and herd size over several years. It also noted that the budgets used to prepare the analysis are based on irrigation farms that have been operating for some time so any costs or time involved in making the transition from dryland to irrigated farming have not been considered. AAFRD further observed that it did not have any information to determine whether those farmers that could have access to water from SAWSP would be financially able to make the initial capital outlays required to purchase irrigation equipment. However, based on costs reported by existing irrigators using a variety of irrigation technology, AAFRD did include an allowance for the capital costs of irrigation equipment including interest as part of Fixed Costs and included some estimates of operating costs for irrigation as Variable Costs.

The overall results of the farm financial analysis undertaken by AAFRD are provided in Table 17. The analysis shows that, while the introduction of irrigation would increase farm revenues, farm costs would also increase. The cost increases would be relatively small under Scenario 1; the only significant changes would be higher cash costs as a result of the increased fuel and labour required to irrigate, and higher capital costs related to interest and depreciation for the irrigation equipment. Under Scenario 2, the costs would increase by an additional \$7000 to reflect the assumption that half the silage would be produced by custom operators. Farm cash costs would also increase under Scenario 3 because of the added costs of backgrounding calves (feed, veterinary expenses and labour). Scenario 4 would have the highest increase in operating costs that reflect the added costs of backgrounding calves (Scenario 3) and silage production (Scenario 2).

Close examination of Table 17 suggests that a farm operation, as described in AAFRD's analysis, may be uneconomic at the present time. The Base Case shows that cash costs exceed annual revenues by more than \$20,650 per year and there is a significant negative return to unpaid labour (-\$46,400) and equity (-\$65,800). Were this actually the case, farms in the Special Areas would be defaulting on loans, declaring bankruptcy, and making no new capital purchases. Discussions with representatives of the Special Areas Board indicate that, in general, this is not happening. While recent low cattle prices have made farming in the region more difficult, there is evidence that farmers are carefully managing their operations to ensure that revenues at least exceed cash costs and, in some cases, they are still purchasing new capital assets. It is believed that, because of past farming hardships in the Special Areas, farmers have adapted their agro-economic practices to be more conservative and are therefore different from the "typical" farm operations described in AAFRD's *AgriProfit\$* data base.

Table 17

Results of the Farm Financial Analysis

Income Statement		Base Case	Scenario 1	Scenario 2	Scenario 3	Scenario 4
B.	Variable costs	\$129,525	\$138,819	\$146,182	\$149,967	\$158,354
C.	Total capital cost	\$60,693	\$70,579	\$69,326	\$71,080	\$69,570
D.	Total unpaid labour	\$19,393	\$20,384	\$20,633	\$21,689	\$21,988
E.	Total production costs	\$190,218	\$209,398	\$215,507	\$221,048	\$227,924
F.	Total cash costs	\$145,075	\$156,585	\$163,632	\$166,586	\$174,591
Current Livestock Prices						
A.	Value of production	\$124,423	\$156,992	\$166,359	\$163,795	\$175,175
Gross Margin (A-F)		-\$20,651	\$407	\$2,728	-\$2,791	\$566
Return to Unpaid Labour (A-E+D)		-\$46,402	-\$32,021	-\$28,515	-\$35,564	-\$30,778
Return to Equity (A-E)		-\$65,795	-\$52,406	-\$49,148	-\$57,252	-\$52,767
Five-Year Average Livestock Prices						
A.	Value of production	\$170,375	\$202,944	\$212,311	\$219,544	\$230,906
Gross Margin (A-F)		\$25,300	\$46,359	\$48,679	\$52,959	\$56,315
Return to Unpaid Labour (A-E+D)		-\$451	\$13,930	\$17,436	\$20,185	\$24,970
Return to Equity (A-E)		-\$19,843	-\$6,454	-\$3,196	-\$1,504	\$2,982
Investment						
Land		\$1,461,000	\$1,583,100	\$1,583,100	\$1,583,100	\$1,583,100
Buildings		\$87,109	\$89,161	\$89,161	\$89,161	\$89,161
Machinery & Irrigation		\$236,496	\$290,420	\$310,420	\$300,220	\$320,220
Livestock		\$185,400	\$185,400	\$185,400	\$185,400	\$185,400
Total Investment		\$1,970,005	\$2,148,081	\$2,168,081	\$2,157,881	\$2,177,881

Source: See Appendix C

Table 18

Incremental Impacts of SAWSP on Farm Finances

Income Statement		Scenario 1	Scenario 2	Scenario 3	Scenario 4
B.	Variable costs	\$9,294	\$16,657	\$20,442	\$28,829
C.	Total capital cost	\$9,886	\$8,632	\$10,387	\$8,877
D.	Total unpaid labour	\$991	\$1,240	\$2,296	\$2,596
E.	Total production costs	\$19,180	\$25,289	\$30,830	\$37,706
F.	Total cash costs	\$11,510	\$18,557	\$21,511	\$29,517
Current Livestock Prices					
A.	Value of production	\$32,569	\$41,936	\$39,372	\$50,734
Gross Margin (A-F)		\$21,058	\$23,379	\$17,861	\$21,217
Return to Unpaid Labour (A-E+D)		\$14,381	\$17,887	\$10,838	\$15,624
Return to Equity (A-E)		\$13,390	\$16,647	\$8,542	\$13,028
Five-Year Average Livestock Prices					
A.	Value of production	\$32,569	\$41,936	\$49,169	\$60,531
Gross Margin (A-F)		\$21,058	\$23,379	\$27,658	\$31,015
Return to Unpaid Labour (A-E+D)		\$14,381	\$17,887	\$20,636	\$25,421
Return to Equity (A-E)		\$13,390	\$16,647	\$18,340	\$22,826

While the Base Case used by AAFRD may not provide an accurate assessment of actual farm finances in the Special Areas at the present time, it does serve as a useful reference point for assessing the incremental benefits and costs of adopting irrigation. These incremental impacts are summarized in Table 18. The table shows that, under Scenario 1, using irrigation to produce alfalfa would increase annual farm revenues by \$32,569 while cash costs would increase by only \$11,510. The resulting gross margin (\$21,058) would be sufficient to generate significant positive returns to unpaid labour and to equity. If irrigation was used to produce silage to feed the existing herd, as described in Scenario 2, the incremental farm revenues would be \$41,936 and, when additional operating costs of \$18,557 are subtracted, the resulting gross margin would be \$23,379. With current cattle prices, neither Scenarios 3 nor 4 would be as financially viable as Scenarios 1 or 2 because of higher costs and lower net gross margins. Consequently, Scenarios 3 and 4 are not considered to be realistic unless cattle prices rise to the point where backgrounding is more financially viable.

Table 18 also summarizes the incremental benefits and costs of the scenarios if cattle prices were to rise to pre-BSE levels. Higher beef prices would have no impact on Scenarios 1 or 2 because beef production would be the same as the Base Case. However, using irrigated feed to background calves as per Scenario 3 would increase farm revenues by \$49,169, cash costs would increase by \$20,442, and the gross margin would increase by \$27,658. With these higher beef prices there would also be substantial increase in returns to unpaid labour (\$20,636) and equity (\$18,340). And, if irrigation is used to produce silage for backgrounding calves and surplus hay and grazing are sold (Scenario 4), the overall value of production would climb to \$60,531 per farm. The increased gross margin under Scenario 4 would be \$31,015 once the higher operating costs (\$29,517) are subtracted. Scenario 4 would also produce the highest returns to unpaid labour (\$25,421) and equity (\$22,826). Thus, a return to pre-BSE prices would make Scenarios 3 and 4 financially viable and would trigger backgrounding of calves as farmers attempt to maximize their revenues.

4.1.3 Feed Transportation Cost Savings

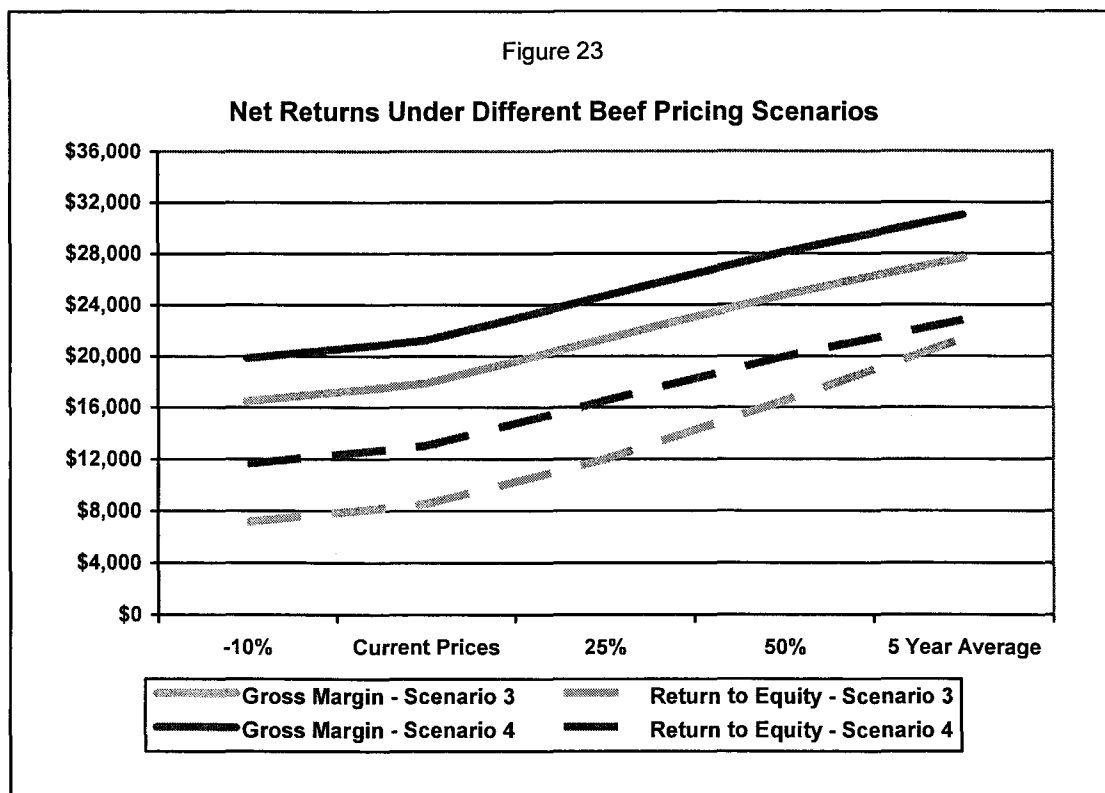
In calculating the value of hay produced by irrigation, AAFRD assumed the price of hay to be \$95 per tonne. However, when feed shortages arise in the Special Areas, farmers are faced with the cost of purchasing hay and then transporting into the region or, alternatively, transporting their cattle to areas where feed is available. During the most recent drought farmers actually relocated their cattle to Saskatchewan. Consequently, the real value of having a reliable supply of locally produced hay is greater than just the selling price.

With SAWSP and irrigation, incremental alfalfa/hay production in the region would increase by an average of 57,182 tonnes per year under Scenarios 1 and 3, based on incremental production of 376.2 tonnes per centre pivot (See Table 13). For Scenarios 2 and 4, a portion of this additional alfalfa production would be converted to silage. Since this additional forage production will preclude the need to transport hay into the region in dry years or move cattle to available forage, a transportation cost savings of \$20 per tonne has been assumed. Thus, the annual feed transportation costs savings would amount to \$7,520 per quarter section or \$1.14 million once all 20,000 acres are being irrigated. This would be the same for all scenarios because irrigation farmers would either use the additional feed for their own herds or would sell to other local farmers.

Table 19

Farm Financial Analysis: Sensitivity Analysis on Beef Prices

Assumption	Income Statement	Base Case	Scenario 3	Impact	Scenario 4	Impact
Current Pricing	Value of Production	\$124,423	\$163,795	\$39,372	\$175,157	\$50,734
	Gross Margin	-\$20,651	-\$2,790	\$17,861	\$566	\$21,217
	Return to Equity	-\$65,795	-\$57,253	\$8,542	-\$52,767	\$13,028
+25 Per Cent	Value of Production	\$137,277	\$180,100	\$42,823	\$191,462	\$54,185
	Gross Margin	-\$7,798	\$13,514	\$21,312	\$16,870	\$24,668
	Return to Equity	-\$52,942	-\$40,948	\$11,994	-\$36,462	\$16,480
+50 Per Cent	Value of Production	\$150,130	\$196,404	\$46,274	\$207,766	\$57,636
	Gross Margin	\$5,055	\$29,818	\$24,763	\$33,175	\$28,120
	Return to Equity	-\$40,089	\$24,644	\$64,733	-\$20,158	\$19,931
-10% Per Cent	Value of Production	\$119,282	\$157,273	\$37,991	\$168,636	\$49,354
	Gross Margin	-\$25,793	-\$9,312	\$16,481	-\$5,956	\$19,837
	Return to Equity	-\$70,936	-\$63,774	\$7,162	-\$59,288	\$11,648
5 Year Avg. Calf Prices (1998-2002)	Value of Production	\$170,375	\$219,544	\$49,169	\$230,906	\$60,531
	Gross Margin	\$25,300	\$52,958	\$27,658	\$56,315	\$31,015
	Return to Equity	-\$19,843	\$1,504	\$21,347	\$2,982	\$22,825



4.1.4 Discussion

According to Table 18, adoption of irrigation to produce hay/alfalfa would benefit farms in the region by about \$21,058 per quarter (Scenario 1). This represents an annual benefit of \$3.20 million once all irrigation development resulting from SAWSP has been completed. With the feed transportation costs savings, the annual benefits would increase to \$4.34 million. As noted previously, this represents a worst-case scenario that reflects the assumption that continuation of current low beef prices would prevent farmers from using the additional feed to expand their beef production.

This worst-case scenario is still dependent on farmers having sufficient access to capital to be able to purchase, install and operate all 152 centre pivots. The farm financial analysis completed using information from the *AgriProfit\$* data base suggests that farmers do not currently have the financial capability to make this investment. However, as reported above, farmers in the Special Areas are not faring as poorly as predicted and are continuing to make capital investments despite low beef prices. Furthermore, the SAB has noted that, despite the moratorium on additional irrigation from the Sheerness-Deadfish system, there are still demands for additional irrigation. This suggests that farmers in the region are willing and able to invest in irrigation equipment. Thus, anecdotal evidence suggests that farmers do have access to the capital needed to develop irrigation from SAWSP and that the full 20,000 acres of irrigation would be developed within six years of project completion.

Table 18 also shows that, if beef prices rebound to pre-2002 levels, the potential benefits of irrigation could be increased as farmers use the additional feed to background cattle. Under Scenario 3 and using five-year average prices for 1998 to 2002, net farm incomes, based on revenues less cash costs (i.e. gross margin), would increase by about \$27,658 per quarter section of irrigation. The total net value of agricultural production would be \$5.34 million per year once all irrigation acres are developed; this number includes feed transportation costs savings. This would increase to \$5.86 million under Scenario 4. Scenarios 3 and 4 represent optimistic assessments of agricultural project revenues and are predicated on all post-BSE restrictions on beef trade being lifted and there are no increased on-farm costs associated with monitoring and managing herds to address BSE concerns.

Given the uncertainty in future cattle prices, AAFRD evaluated a number of intermediate beef price options to determine how farm finances would be affected. For this sensitivity analysis AAFRD used prices that were 10 per cent lower, and 25 and 50 per cent higher. The variable and capital costs remained constant. The results of this sensitivity analysis for Scenarios 3 and 4 are provided in Table 19 and Figure 23. While a similar sensitivity analysis was undertaken for Scenarios 1 and 2, the incremental net revenues remain constant because beef production is the same as the Base Case. The sensitivity analysis shows that, as beef prices rise and farmers choose to background calves, gross margins and returns to equity under Scenarios 3 and 4 would increase.

As part of the sensitivity analysis, AAFRD also evaluated the potential impact of changes in dryland durum and wheat prices. It modeled the effects of changing grain prices by ± 10 per cent and made some minor changes in variable costs to reflect changes in the demand for feeding and

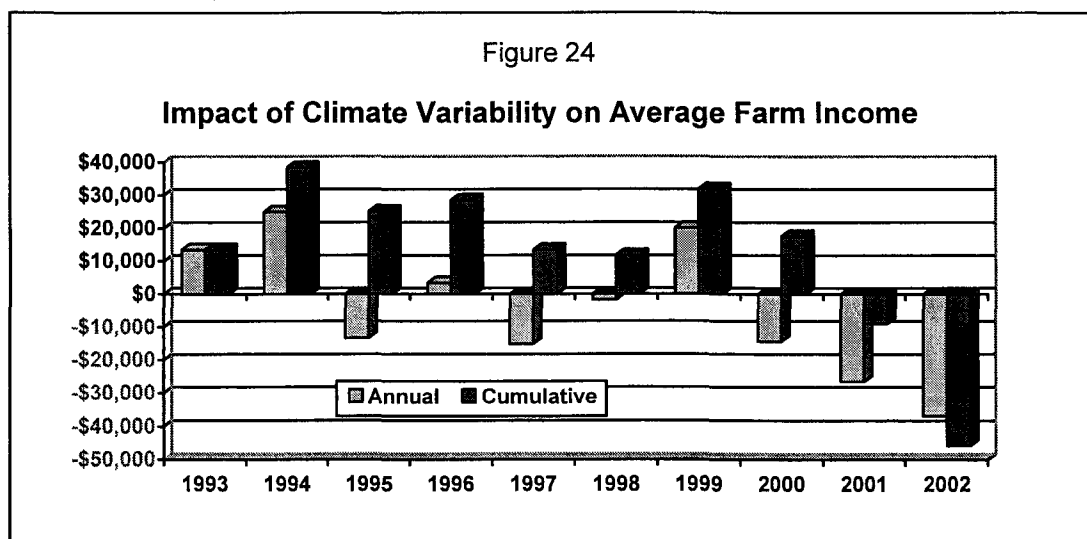
bedding. Since the land area in grain production remains constant for all scenarios and represents only a small portion of the farm, the impacts on net revenues would be fairly small for each scenario ($\pm \$6,890$ per farm) and would have no significant effect on estimates of the incremental revenues and costs of adopting irrigation.

4.2 Risk Reduction

As stated in Section 2.5, agricultural productivity in the Special Areas depends on annual moisture conditions and is therefore highly variable. Figures 12 and 13 show how yields of wheat and hay have changed over the last decade, with years of both above- and below-average production. This variability in yields has a significant impact on farm incomes where annual deficits can accumulate over time. The AAFRD farm financial analysis is based on the assumption of average dryland yields of wheat (20 bushels per acre) and hay (1.1 tonnes per acre). Using actual yields for the period from 1993 to 2002, a crude estimate of annual changes in farm returns to equity can be produced. These estimates are shown in Figure 24 and are based on the assumptions that hay demands in years of low production are met by purchasing hay and that all other costs remain constant. The data show above-average returns to equity in four years and below-average returns in six years.

Figure 24 also shows the cumulative effect that a series of below-average years can have on farm incomes. If an average farm operation commenced 1992 with no net income and carried forward any operating surpluses or deficits, the changes in yields over time would have resulted in a cumulative debt of nearly \$46,000 at the end of 2002.

With irrigation, crop production would be much more reliable, resulting in more stable farm incomes, lower crop insurance costs, and an improved ability to meet production targets that would allow the development of production contracts with agri-business ventures. Using the example in Figure 24 and assuming that irrigation had been able to produce average yields in the six years when there was below-average precipitation, the cumulative farm return to equity could have been \$62,000, which is \$108,000 more than would have occurred under dryland conditions. While this model is very simplistic, it does demonstrate how removing risks due to climatic variability can have major long-term impacts on farm viability and sustainability.



With SAWSP, irrigation would substantially reduce the risk associated with variable regional moisture conditions for the 20,000 acres being irrigated; those acres not irrigated would continue to produce highly variable yields. These risk reduction benefits are captured in the farm financial analysis because it employed average yields for irrigated alfalfa (3.4 tonnes per acre) that reflect the reduced variability associated with irrigation. Consequently, the comparison of average dryland yields with average irrigated yields automatically captures the effects of reduced variability in annual crop production. However, this methodology does quantify the economic or social costs associated with farm bankruptcies that may result from prolonged drought conditions, such as demonstrated in Figure 24.

4.3 Stockwater Availability

Livestock, especially cattle, tend to graze in close proximity to water supplies. Over time the forage lands around water supplies (primary range) become less productive as over-grazing results in the more desirable, more productive forages being replaced by smaller, more grazing-resistant species. Portions of the pastures some distance from water sources are only lightly used (secondary range) or remain totally unused (tertiary range) by livestock, thereby contributing little or nothing to grazing capacity. To enhance grazing capacity in areas where natural water supplies like sloughs or creeks are not available, farmers have constructed dugouts to capture and hold run-off. These dugouts can also be filled by periodic pumping from natural water bodies, including creeks, sloughs and lakes. However, water in dugouts to which livestock have unrestricted access often becomes stale and dirty over time, resulting in reduced weight gain for livestock. Thus, by providing a more reliable supply of higher quality water, SAWSP would allow farmers to better manage their grazing lands, increase livestock carrying capacity, and increase weight gain.

In the Special Areas, farmers rely extensively on constructed dugouts for stockwatering. According to Anderson²⁹, 40 per cent of all pumping into dugouts in Alberta is done in the Special Areas. Farmers are estimated to have constructed 2333 dugouts within a corridor extending about 10 km (6.2 mi) from the proposed conveyance route for SAWSP, including Sounding and Berry creeks.³⁰ These dugouts are typically sized to satisfy the demands of 25 head per section of land for six months and each holds approximately 0.5 million gallons (2.3 cubic decametres). At present, an estimated 20 per cent of the pastures within the 20 km (12.4 mi) wide corridor can be considered secondary or tertiary range, while a further 10 per cent could be considered primary range that is an unhealthy condition

In the past, the common practice has been for farmers to top-up dugouts when half full. This has involved renting pipe and pumping equipment, laying the pipe overland for a distance of one or two kilometres (one mile), running the pumps for 10 hours, then packing up the equipment and moving to the next dugout. In 2000 the estimated total cost of filling a dugout was estimated to about \$750.³¹ This method can be used to fill dugouts within about 10 km (6.2 mi) of a water

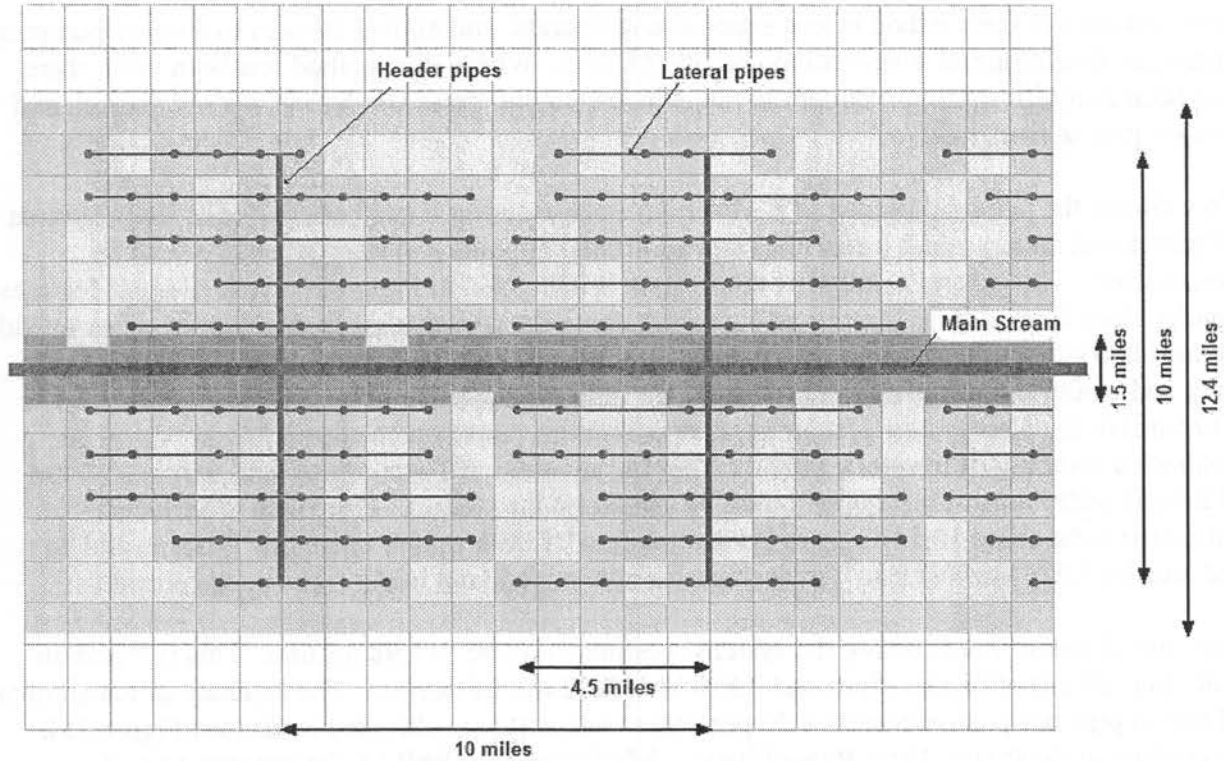
²⁹ Marv Anderson & Associates Ltd. (2000), *Socio-economic Impacts of the Proposed Special Areas Water Supply Project*. Special Areas Board, Hanna, AB.

³⁰ This estimate was based on GIS information obtained from PFRA on dugouts in the Rural Water Development Program and was prepared in May 2001.






³¹ Marv Anderson & Associates Ltd. (2000), *Socio-economic Impacts of the Proposed Special Areas Water Supply Project*. Special Areas Board, Hanna, AB.

Figure 25

Layout of the Proposed Stockwatering System



LEGEND

-  Conveyance Corridor - Direct watering from streams (controlled)
-  Area of influence (12.4 miles/20 kilometres)
-  Section of grazing serviced by pipe with dugout or tank
-  Section of cultivated land
-  Section of cultivated land with pipe to adjacent quarter

source. Pumping beyond 10 km (6.2 mi) is possible but would require two-stage pumping. Two-stage pumping was common during the severe drought of the 1980's.

Recently, some farmers have begun installing permanent underground waterlines for filling dugouts. This has involved ploughing small diameter plastic pipe into the ground and pumping water from permanent sources to supply multiple dugouts and storage tanks. Despite a higher installation cost, this method is less expensive to operate, and allows farmers to employ pumping strategies that minimize evaporation and other losses. Where this method has been used, there has been a significant improvement in range management, grass conditions, upland habitat, and weight gain in livestock.

To estimate the potential impact of SAWSP on stockwatering it has been assumed that a system of permanent underground water lines and additional dugouts and storage tanks would be constructed. The general concept of this system is presented in Figure 25. This concept features header pipes located at 16 km (10 mi) intervals along the conveyance route. Lateral pipes would be installed at 1.6 km (1 mi) intervals along each lateral; each lateral would be 7.2 km (4.5 mi) long and would serve five sections of land. No infrastructure would be installed within 1.2 km (0.75 mi) of the conveyance system because within this conveyance corridor there would be controlled watering of livestock directly from the streams. All sections of land within a 20 km (12.4 mi) wide “area of influence” could be served by the system. This “area of influence” is estimated to be about 10,140 square kilometres (km²) (3898 square miles [mi²]) but would be reduced by 1,220 km² (471 mi²) to account for unserved land in the conveyance corridor.

The capital cost of constructing the system is estimated to be \$11.98 million. This is based on 500 km (310 mi) of header pipes and 3,590 km (2232 mi) of laterals. The estimate of the amount of lateral pipe has been reduced by 20 per cent to account for cultivated lands (see Figure 25). According to the Prairie Farm Rehabilitation Administration (PFRA), the average cost of installing one kilometre of pipe for four recently completed projects in the Special Areas is about \$2,930 (\$1,820 per mile).³² This cost includes expenditures on pipes, pumphouses, power service, fittings, dugouts or tanks, and installation. It is assumed that installation of the system would be conducted over five years, commencing in Year 6 when pumping first starts.

In terms of annual operating costs, the proposed stockwatering system would probably cost less than current practices. There would be little or no pumping costs to existing dugouts within the conveyance corridor; there would be less water leakage, evaporation and seepage; and, less manpower is required because laying and moving pipe would no longer be required.

By providing access to land that is currently secondary and tertiary range and allowing depleted areas in the primary range to recover from over-grazing, the principal benefits of supplying water within the “area of influence” would be improved livestock distribution and more available forage. At present, the grazing capacity of the “area of influence” is estimated to be 417,866 AUMs, based on four acres per AUM and a total land area of 1.67 million acres (0.68 million ha).³³ It is estimated that, with improved stockwatering capability, the grazing capacity would

³² Personal communications, Special Areas Board, November 15, 2004.

³³ The total area of the “zone of influence” is calculated to be 2.49 million acres but this was reduced by one-third to account for cultivated land. Note that, in calculating the costs of the stockwatering system, the amount of pipe was reduced by only 20 per cent to account for

increase by 25 per cent, or about 104,466 AUMs.³⁴ The value of this is calculated to be \$2.61 million per year, based on \$25 per AUM.

An additional benefit of improved stockwatering would be increased weight gain because of improved water quality in the dugouts and tanks. As noted previously, stale and dirty water in dugouts adversely affects weight gain. A study conducted in 1995 in the County of Athabasca found that heifer calves drinking from a stock tank pumped from a fenced dugout gained an average of 6.4 kilograms (14 pounds) more over a 120-day period than did heifer calves drinking directly from a dugout.³⁵ At present, the “area of influence” supports about 41,787 cow-calf pairs, based on 1.67 million acres (0.68 million ha) and 40 acres per head.³⁶

Assuming that, with SAWSP, calves experience the same weight gain as observed in the Athabasca study, the proposed stockwatering system could increase total calf weights by 265,900 kilograms (585,000 pounds) per year. The economic value of this weight gain will depend on beef prices. At current prices of about \$0.76 per pound (see Appendix C), the proposed stockwatering system would generate an additional \$444,600 per year. If calf prices were to return to pre-2002 levels (the five-year average price for calves was \$1.34 per pound), the value of this incremental weight gain would be about \$784,000 per year.

4.4 Agricultural Diversification

In assessing the results of the farm financial analysis in Section 4.1 (Table 18), it is apparent that farmers could increase their annual gross margins by about \$21,058 per quarter section by irrigating and selling alfalfa (Scenario 1). And, if beef prices return to pre-2002 levels, annual gross margins could rise to \$27,658 per quarter section if farmers choose to use irrigated feed to background calves (Scenario 3). These represent just two possible uses for irrigation water. Experience from irrigation districts in southern Alberta shows that, once water is available, some farmers will diversify by raising higher-value grain or specialty irrigation crops or developing intensive livestock feeding operations that would further increase revenues. This section considers other opportunities for using water from SAWSP, including other irrigated crops, beef feedlots and confined hog feeding operations.

4.4.1 Other Irrigated Crops

The farm financial analysis assumes that farmers would use irrigation to grow hay for cattle as a means of drought proofing their existing livestock operations. In other parts of Alberta, however, the availability of irrigation has allowed farmers to switch to higher value specialty crops, including grains, vegetables, and sugar beets.

The likelihood of farmers in the Special Areas switching to specialty crops is dependent on whether the net returns from such crops would exceed the net returns of growing hay for cattle. Figure 26 shows the typical gross margins (revenues less direct cash expenses) for various irrigated crops and dryland crops in the brown soil zone of Alberta, ranked according to the size

cultivated land. The difference is because pipe would be constructed across some cultivated lands to service grazing lands located on the opposite side from the header pipes (see Figure 25).

³⁴ Personal communications, Special Areas Board, November 15, 2004.

³⁵ Buchanan, Bob (1995.). *Clean Water Boosts Cattle Performance*. AAFRD Barrhead.

³⁶ Personal communications, Special Areas Board, November 15, 2004.

of the margin.³⁷ For the most part, the gross margins for irrigated crops exceed \$50 per acre while the margins for dryland crops are less than \$50 per acre.

Figure 26 shows that the gross margins for hay are actually quite high (about \$50 per acre) and exceed the gross margins for other dryland crops like wheat and barley. It also indicates that switching from dryland hay to irrigated alfalfa would only increase net farm revenues from about \$50 per acre to \$55 per acre. This small increase results because the higher costs of irrigation offset most of the additional revenues that would result from tripling hay production.

According to Figure 26 most other irrigated crops would produce gross margins that are greater than those resulting from irrigating alfalfa. For example, switching to irrigated spring or durum wheat would increase margins to \$56 to \$58 per acre. Diversification to crops like irrigated dry beans or Argentine canola could increase margins to \$73 or \$74 per acre. Irrigated soft wheat, H.T. canola, export timothy or cereal silage could generate gross margins in excess of \$82 per acre. In the Special Areas the margins of switching to specialty crops could even be higher because dryland yields are typically 25 to 35 per cent lower than the brown soil zone averages used in Figure 26.

One possible opportunity for crop diversification is the use of irrigation to grow silage crops in support of livestock feeding. This opportunity was evaluated under Scenarios 2 and 4, where AAFRD assessed the impact of using irrigation to grow 41 acres of alfalfa and 91 acres of silage, where half of silage production was done using custom operators. The results showed that, despite higher operating costs, producing silage under Scenario 2 would yield a gross margin that is \$2,321 higher than for Scenario 1. Similarly, gross margins for Scenario 4 would be \$3,356 higher than for Scenario 3. Thus, producing silage would improve increase the net returns from irrigation by about 12 per cent over conventional irrigated alfalfa/hay.

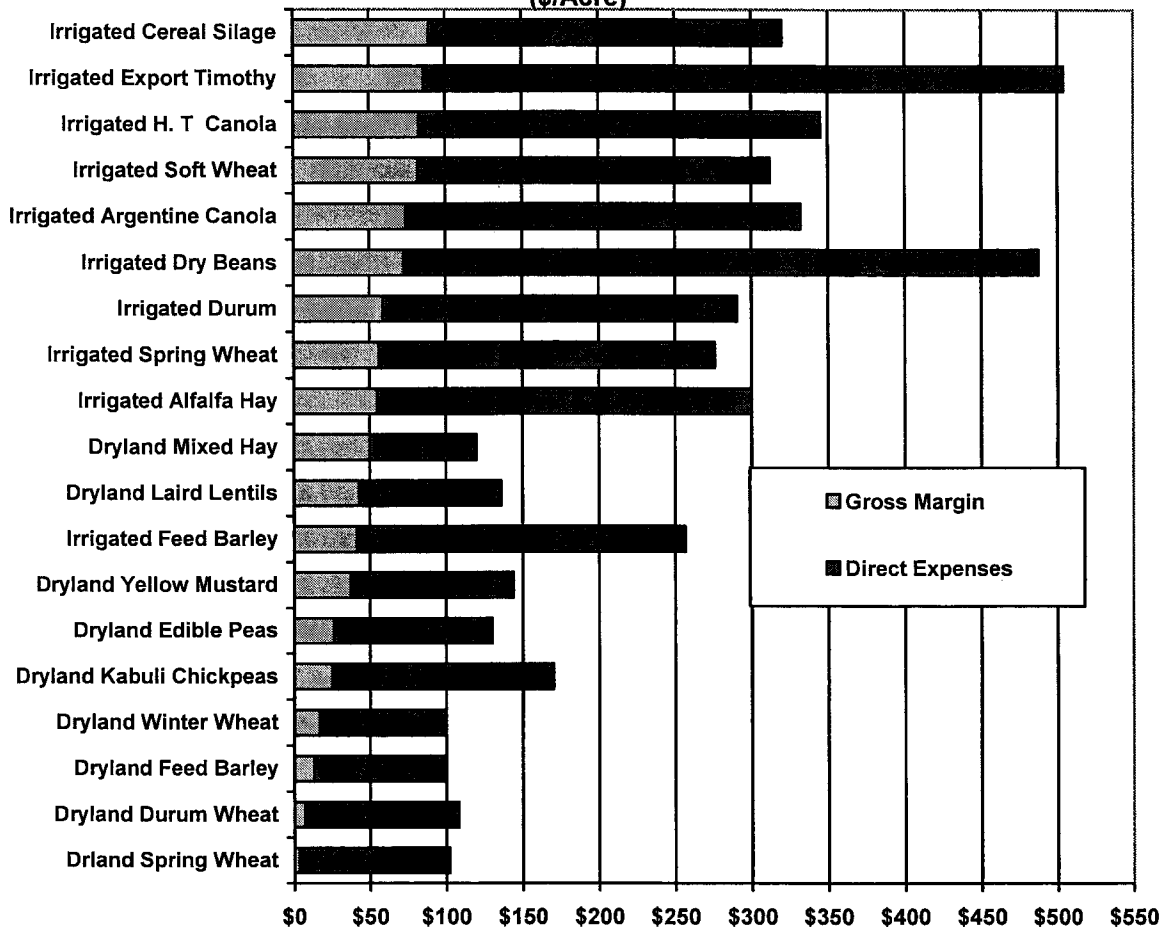
Despite the high margins for specialty crops there are a number of reasons why, for the immediate future, farmers in the Special Areas would choose to irrigate alfalfa or produce silage instead. First, the data in Figure 26 show the value of irrigated alfalfa in terms of its price when sold. In the Special Areas, most of the farms that would benefit from an improved water supply are primarily cattle operations where the additional alfalfa would be fed to cattle in the region, and the resulting margins from livestock sales would exceed the gross margins for many other irrigated crops. For example, under Scenario 1, the gross margin of using irrigated alfalfa to displace purchased feed and for sales to other farmers would increase by about \$150 per acre. This would rise to \$167 per acre if silage is produced (Scenario 2). These gross margins are higher than any other crop shown on in Figure 26.

Second, switching to a different irrigation crop would mean that farmers would still have to import expensive hay, especially in dry years. Third, farmers already have most of the equipment needed for irrigated alfalfa while different irrigation crops may necessitate major capital expenditures on buildings and harvesting equipment in addition to the irrigation equipment. Fourth, until farmers have gained some familiarity with irrigation operations, they are unlikely to switch to other types of agriculture.

³⁷ Alberta Agriculture, Food and Rural Development (2004). 2004 Production Costs and Returns as reported at [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/econ8374?opendocument](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/econ8374?opendocument).

Figure 26

**Production Costs and Returns for Dryland and Irrigated Crops 2004
(\$/Acre)**



Source: [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/econ8374?opendocument](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/econ8374?opendocument)

Thus, in the short term, it is unlikely that farmers would use water from SAWSP to grow any crops other than hay and forage. At some point, some farmers may venture into raising specialty crops and this could ultimately generate agricultural revenues that exceed the total revenues projected under any of the scenarios.

4.4.2 Confined Feeding Operations – Beef

As noted in Section 2.5, the provincial trend in beef farming since 1996 has been increased cattle populations on fewer farms. This pattern of intensification is also occurring in the Special Areas. However, Alberta beef markets are now depressed due to US and world reaction to BSE, and this has lowered beef prices and caused an increase in total herd sizes as farmers wait for more slaughter capacity or a resurgence in export markets. The long term effects of BSE on Alberta cattle populations are impossible to determine, but farmers and the provincial and federal governments are actively working to reestablish stable markets for beef that would be similar to pre-2003 conditions. On the assumption that beef markets do return to “normal”, how might SAWSP affect the potential for the development of confined beef feeding operations in the Special Areas?

In the late 1990s AAFRD undertook an assessment for expansion of the beef industry in Alberta³⁸ and considered both the cow/calf sector and the feedlot sector. With respect to expansion of the feedlot sector, AAFRD identified five key factors:

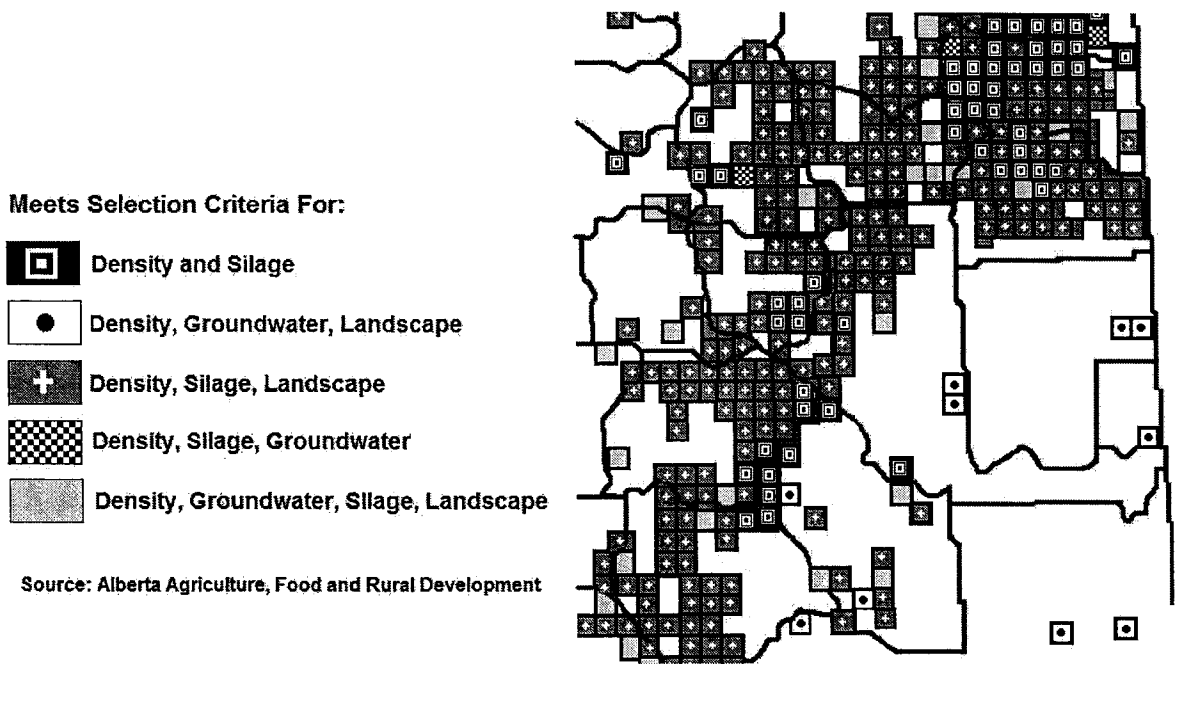
1. **Manure odour and population densities** - Manure odours were considered the most limiting factor in selecting sites for new feedlots, in that feedlots can only be located beyond specific distances from neighbouring residences in order to minimize odour impacts.³⁹ Thus, feedlot development is more likely in areas with low population densities.
2. **Local silage supplies** – Adequate quantities of silage can only be economically produced in parts of Alberta and AAFRD identified areas where sufficient silage could be grown within six miles of the feedlot so that hauling would be economical.
3. **Water supply** – The availability of groundwater was the second most important factor in selecting potential feedlot sites. It is estimated that a 5,000-head feedlot would require 76 acre-feet of water per year while a 20,000-head operation would require 270 acre-feet or twice the amount of water needed to irrigate 132 acres of forage land in the Special Areas. Consequently the study identified areas where sufficient water was available and could reliably be supplied using more than one source (four wells). Surface water sources must be permanently flowing to provide a reliable water supply for feedlots.
4. **Landscape characteristics** – The preferred locations for feedlots are areas with well developed natural drainage to ensure that pens stay dry and drain completely. Suitable areas were identified using slope information from the Soil Landscapes of Canada.

³⁸ Alberta Agriculture, Food and Rural Development. (1997) *Resources for Beef Industry Expansion in Alberta*.

³⁹ In the 1990s these distances were contained in a Code of Practice but setback distances are now specified in the regulations for the *Agricultural Operation Practices Act*.

Figure 27

Townships That Meet Selection Criteria for 20,000 Head Feedlot



5. **Land for manure spreading** – Extensive lands are required for spreading of manure and are similar to land requirements for barley silage. Land requirements for manure spreading are now identified in the *Agricultural Operation Practices Act* but AAFRD determined that about 5.5 sections are required for a 20,000-head feedlot.

Using these selection criteria, AAFRD was able to identify townships where development of a 20,000-head feedlot was possible. Figure 27 shows which townships in east central Alberta met two or more of the criteria. The figure shows that many of the townships around the perimeter of the Special Area met the criteria for density, silage and landscape. However, only two townships in the Special Areas met the criteria for density, silage, landscape and groundwater.

Based on AAFRD's assessment, it would appear that, at the present time, lack of adequate water is the key non-economic factor that would prevent development of feedlots in the Special Areas. Much of the area meets the requirements for silage production, density and landscape. With SAWSP, the availability of reliable supplies of water would make more of the region suitable for feedlot development. If all of the water to be provided by SAWSP for agricultural purposes were to be allocated to feedlots, the project could support a maximum of 75 operations each with 20,000 cattle.

While SAWSP might change the potential for feedlot development, such developments are fairly capital intensive and, based on the farm financial analysis provided by AAFRD, existing farmers

are unlikely to have the capital available for making such an investment. And, with cattle prices depressed and the government now providing financial support to keep farming operations viable until more normal conditions prevail, the likelihood of local farmers or outside investors developing feedlots at this time is quite remote. The potential for feedlot development should be revisited, however, once the cattle industry is more stable. The potential benefits of additional beef feedlots have not been included in the project benefit/cost analysis or impact assessment.

4.4.3 Confined Feeding Operations – Hogs

As with beef, there has been some expansion of intensive hog feeding operation in the Special Area since 1996. Records from the Natural Resources Conservation Board show that since 2002 three operations applied for approvals to build new or expand existing operations in the Special Areas. Two of these operations were approved and one application was withdrawn.

The criteria for selecting sites suitable for large hog operations are almost identical to feedlots. For hog operations containing 1000 sows, the setback distance from neighbours ranges from 524 metres for farrow-to-wean facilities in agricultural areas to more than 2.24 km (1.4 mi) for a farrow-to-finish operation adjacent to a hamlet, town and village.⁴⁰ Hog operations also require access to feed barley and sufficient lands for manure spreading, although some new operations now employ composting to reduce the volume of manure for spreading. Hog operations also need large amounts of water: a 1000 sow farrow-to-finish operation needs 20,000 gallons of water per day or about 27 acre-feet per year.

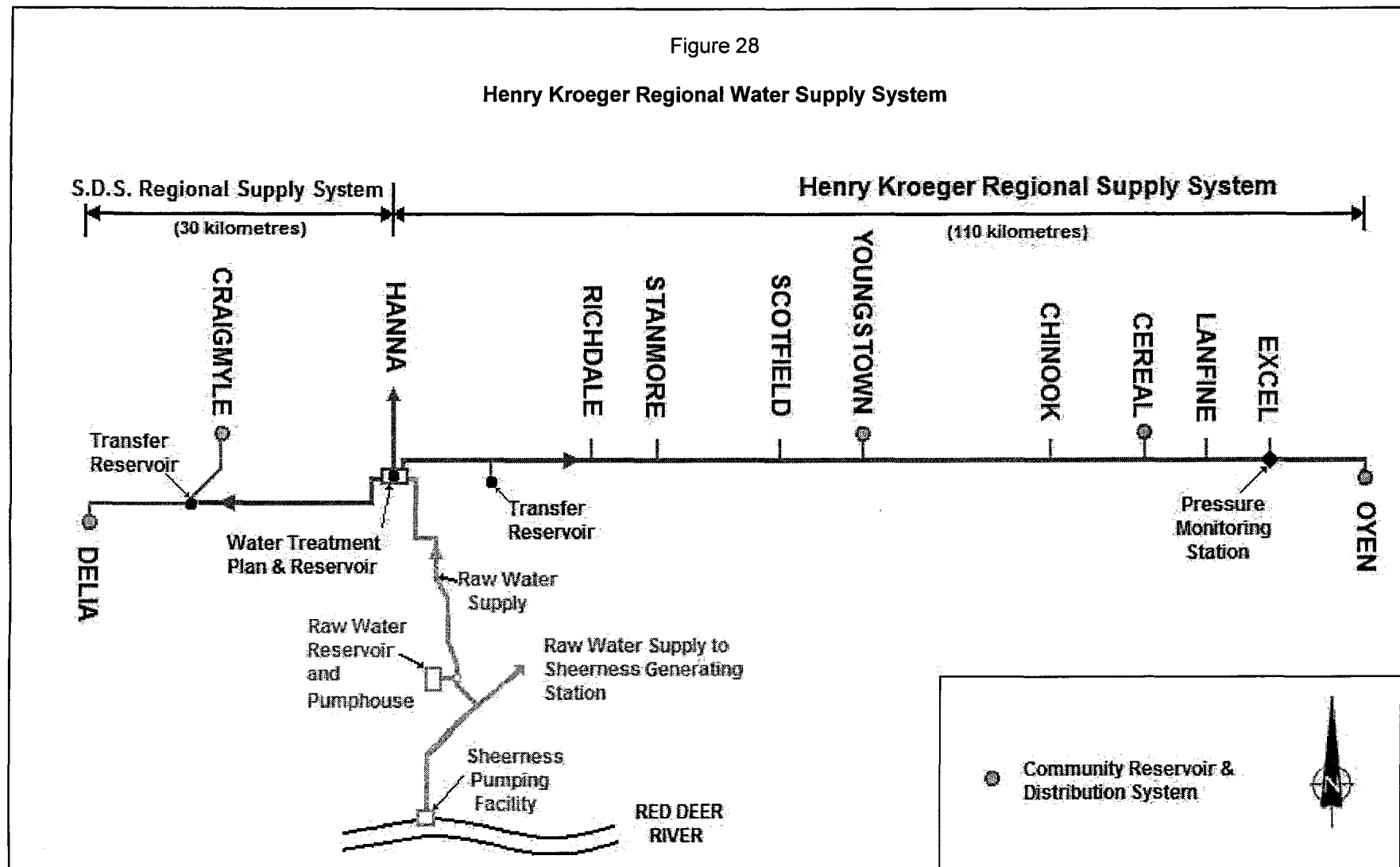
As with beef feedlots, lack of water is the most significant limiting factor for future intensive hog development. Some developers have already cancelled plans to develop new hog barns in the Special Areas because of lack of water. With SAWSP, it is expected that this barrier to additional hog development would be eliminated. However, such development is very capital intensive; the capital cost of a 1,000 head sow operation, excluding breeding stock, is estimated to be about \$4.3 million.⁴¹ Thus, it is unlikely that the average farmer in the region would have the capital resources to be able to make such an investment at this point in time. In addition, only about three per cent of regional farms have hogs at present while 74 per cent raise beef, so lack of familiarity with hogs would likely prevent many existing operators from changing their operations away from beef. With SAWSP, potential new operators may be attracted to the region. The potential benefits of intensive hog development have not been included in the project benefit/cost analysis or impact assessment.

⁴⁰ The minimum distance separation for hog operations are provided in Tables 4 to 13 of the *Standards and Administration Regulation* associated with the *Agricultural Operation Practice Act*.

⁴¹ Alberta Agriculture, food and Rural Development (1998). *Socio-Economic Impact of Hog Operations in Alberta* as reported at [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/epw4868?opendocument](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/epw4868?opendocument).

Figure 28

Henry Kroeger Regional Water Supply System



5. Municipal and Domestic Water Supplies

Until the Henry Kroeger Regional Water Supply System (HKRWS) was completed in 1988, there was a scarcity of reliable surface water or groundwater of sufficient quality for municipal and domestic use in the southern half of the Special Areas. The HKRWS was developed to draw Red Deer River water from the existing Sheerness pipeline (which supplies water to the Sheerness Power Plant), treat it and then distribute it to communities east and west of Hanna (see Figure 28). At the present time the HKRWS provides potable water to residents of Hanna, Delia, Craigmyle, Richdale, Stanmore, Scotfield, Youngstown, Chinook, Cereal, Lanfine, Excel, Oyen, and two water cooperatives (one north of Oyen and one east of Hanna).

The HKRWS is licensed to draw up to 1.2 million cubic metres (m^3) (1,000 acre-feet) per year but currently uses 65 to 70 per cent of this allocation.⁴² Operations commence in May and water is pumped into a raw water storage reservoir with a capacity of about 0.8 million m^3 (700 acre-feet). The reservoir is filled in June and again in September; pumping of raw water ceases in mid-October. Raw water is drawn into the water treatment plant near Hanna where it is physically and chemically treated to remove sediment and organic materials. The treatment plant has an existing capacity of 2612 m^3 (575,000 gallons), but there are plans to double this capacity to meet growing demands. Treated water is then distributed to the communities by pipeline, using a combination of pumping and gravity fed systems. The HKRWS sells water for \$0.96 per cubic metre (0.4 cents/gallon) which reflects the costs of operating plus an allowance for future capital development. Any individuals wishing to tie into the HKRWS must pay an initial cost of \$4000 per gallon per minute. Total water sales revenues for the HKRWS in 2003 amounted to \$787,068.⁴³

While the HKRWS has been effective in supplying treated drinking water to communities along the Highway 9 corridor between Delia and Oyen, communities in the northern half of the region depend on groundwater and surface water that is highly variable in terms of quality and quantity. Several communities along Highway 12, including Stettler, Castor, Halkirk, Coronation, Veteran and Consort, have formed a committee to look into the feasibility of a regional water pipeline. An assessment of water supply options for urban and rural areas along Highway 12 was recently completed by MPE Engineering Ltd.⁴⁴ One proposed scenario would be to tie into SAWSP at Castor, treat the water there, then distribute water to other communities through a regional water pipeline system. An assessment of existing municipal water supplies for these communities and how they might be affected by SAWSP is provided below.

5.1 Current Status

5.1.1 Town of Castor

The Town of Castor has been drawing its water from the Parr Reservoir, fed by Castor Creek, for the last 50 years.⁴⁵ Aside from the past few years of below-average precipitation, the level of the reservoir has never fallen below the crest of the weir for an extended period. The Town of

⁴² Personal communications, Garth Carl, Henry Kroeger Water Services Commission. September 22, 2004.

⁴³ Henry Kroeger Water Services Commission, Financial Statements, December 31, 2003. September 22, 2004.

⁴⁴ MPE Engineering Ltd. (2004) *Paintearth County and Special Areas No. 4 Regional Water Distribution and Needs Study*.

⁴⁵ Personal communications, Michael Yakielashek, Chief Administrative Officer, Town of Castor. September 22, 2004.

Castor produced about 144,700 m³ in 2003, or about 424 litres (93 gallons) per person per day; this is only 48 per cent of the annual volume of the reservoir. While the reservoir has sufficient capacity to accommodate population growth for the next 25 years, the reliability of this water supply is not guaranteed. The Town's water treatment plant was constructed in 1997 and was designed for a population of 1500; in 2001 the population of Castor was 935. The total annual cost of providing water services is approximately \$347,300 or about \$2.40 per m³. Water users are metered and pay \$2.20 per m³ for a fixed volume of water, where the volume depends on the size of the meter.

The major problem faced by the Town of Castor is raw water quality, which has deteriorated in recent years. Because the reservoir is filled by run-off, there are high levels of nutrient ammonia and organic nitrogen in the water, resulting in periodic algal blooms and requiring large amounts of chlorine treatment. This problem is exacerbated by low concentrations of oxygen in the bottom of the reservoir; this prevents oxidation of the ammonia and organic oxygen, increases concentrations of hydrogen sulphide, and makes the water more acidic (lower pH). Thus, water treatment is complicated and expensive, requiring alum to reduce turbidity, potassium permanganate to reduce levels of iron and manganese, and chlorine to treat organic materials. The high levels of chlorine treatment lead to problems with odour and trihalomethanes. Town water periodically exceeds Canadian Drinking Water Quality Guidelines (CDWQG) for total dissolved solids.

The MPE study concluded that the Town of Castor needs a new raw water supply. It determined that the Parr Reservoir does not provide a guaranteed sufficient supply of water for the current population, and improved raw water quality is required if the existing water treatment plant is to be used effectively. It predicted that the cost of drilling a well to supplement surface water would be about \$0.5 million, but noted that there would be no guarantee that the well would be entirely successful. As an alternative source of supply, MPE suggested that raw water could be piped from Stettler at a cost of about \$16.0 million.

The Town of Castor believes that water provided by SAWSP would be of higher quality than Castor Creek and the Parr Reservoir. It expects that water treatment costs would drop significantly if SAWSP water were delivered to its water treatment plant or its raw water reservoir, and its pumping costs might change depending on how the water is delivered. The Town also believes that an additional benefit of SAWSP would be improved reliability of supply since it would no longer be reliant on local precipitation and run-off. It also believed that better supplies of higher quality water would lead to residential, commercial and industrial growth.

Aside from improving the water supply, the Town of Castor expects that SAWSP would create some economic opportunities during project construction, increased irrigation would lead to the development of value-added industries in the community and the County, and recreational opportunities would be provided at Lehmann Reservoir.

5.1.2 Town of Coronation

The Town of Coronation draws water from three wells that can produce water at the rate of 761 litres (167 gallons) per minute. The Town currently treats about 185,000 m³ of water per year,⁴⁶

⁴⁶ Personal communications, John Maine, Chief Administrative Officer, Town of Coronation. September 30, 2004.

or about 470 litres (103 gallons) per person per day. Based on 1999 pump tests, these wells have the capacity to serve current demands; in 2001 the population of Coronation was 1,074. MPE estimated the required design flow for the current population to be 691 litres (152 gallons) per minute but, based on possible average population growth of one per cent per year, it concluded that another well would be required to meet expected demands in 2024 (845 litres per minute or 186 gallons per minute).

In terms of quality, water produced by the Town of Coronation does not satisfy some of the aesthetic objectives of the CDWQG. Testing has shown that well water exceeds the standards for colour, sodium, total dissolved solids, and hardness. Treatment consists of chlorination at each of the wells before the water is pumped to a central water tower for distribution. Current chlorination costs are approximately \$5000 per year. Consumers pay a flat monthly rate of \$21.50 for water but it was noted that many town residents have their own reverse osmosis systems or purchase bottle water for drinking.

MPE determined that the Town of Coronation requires significant upgrades to its water treatment system and suggested that a reverse osmosis plant would be required to treat the poor quality groundwater. It also indicated that treated water storage capacity needed to be expanded. The estimated cost for these upgrades was \$2.7 million.

The Town believes that SAWSP could provide an alternate water source of much higher quality. It did not foresee that drawing water from SAWSP would result in higher water treatment or pumping costs. However, if it were drawing raw water, it expected that some additional water treatment would be required. If a regional water treatment system were developed using water from SAWSP, the Town predicted that it would require additional treated water storage capacity. The Town hoped that a better water supply would attract businesses that require large quantities of water.

5.1.3 Village of Consort

The Village of Consort obtains its water from four wells.⁴⁷ However, one well has been shut in because of color and odor problems and the other two older wells have high bromide levels that result in trihalomethane problems after treatment. The Town relies mainly on a well drilled in 1991 because it produces better quality water than the other three. In terms of water quantity, all wells are reliable and stable at this time. Raw water quality remains a concern for the Village because it is becoming more difficult to meet water quality standards. The water is high in sodium, iron, manganese, and other minerals. Sodium, total dissolved solids and fluoride levels exceed CDWQG. Based on current growth, the water treatment facility should still be able to produce sufficient water to meet demands for the next few years. In case of emergency, small quantities of water could be trucked in from neighboring municipalities, such as Veteran or Monitor.

In 2003 the Town of Consort treated 115,538 m³ of water; this amounts to about 499 litres (110 gallons) per person per day. Total operating costs for water treatment and distribution were \$134,340, resulting in an average cost of \$1.17 per m³. Consumption is metered and rates are \$15 for the first 13.6 m³ (3000 gallons) and \$7 for each additional 4.5 m³ (1000 gallons). A

⁴⁷ Personal communications, Sandra King, Chief Administrative Officer, Village of Consort. September 22, 2004.

capital reserve surcharge of \$10 per month has been levied for residential accounts and \$20 per month for non-residential accounts. This surcharge is being used to create a capital fund for upgrading the existing facility or developing a regional water pipeline at some point in the future. MPE estimated that a reverse osmosis treatment facility costing about \$1.6 million would be required to upgrade the water treatment facility.

While SAWSP would not bring water directly to Consort, it is hoped that a regional water supply system could be used to bring treated water to the community. With improved water quantity and quality, the Town's treatment costs would drop because the current filtration and treatment systems for removal of iron and manganese would no longer be required. It is expected that some additional chlorination might be required prior to distribution, but no major modifications to the existing treatment and distribution facilities would be required. The Town believes that water from SAWSP would have a lower mineral content (i.e. sodium) and would benefit community health. It also expects that a stable water source would benefit the local agricultural sector.

5.1.4 Village of Veteran

The Village of Veteran draws its water from a well that has consistently produced reliable amounts of fairly-high quality water.⁴⁸ The water has high levels of sodium and total dissolved solids and the Village treats the water with potassium permanganate to remove iron and chlorine. Annually, Veteran treats 50,000 m³ (1.1 million gallons) of water at an average cost of \$0.94 per m³ (0.4 cents per gallon). This is equivalent to average per capita consumption of about 457 litres (100 gallons) per day. Consumers are charged a flat rate of \$24 per month. The Village believes that its well and treatment facilities are adequate for its current population and there is capacity to accommodate additional demand. The only significant concern about water is whether the existing well will continue to produce the required volumes of water. The Village does have two back-up wells in case of emergency, and would have to rely on trucked water if these two back-up wells prove to be inadequate. As a long term solution, MPE suggested that a reverse osmosis system was required, with an estimated cost of \$1.1 million.

With respect to SAWSP, the Village would welcome an alternative water supply that might prove to be more reliable in the long run. However, it is unsure about the cost of obtaining water from SAWSP. The Village would only be interested if SAWSP were able to provide water at a cost that is the same or less than its current system. It noted that its treatment facility might have to be modified because treating surface water is different than treating groundwater.

5.1.5 Village of Halkirk

The Village of Halkirk relies on groundwater from two wells.⁴⁹ MPE notes that one well is located on land leased from the Hutterian Brethren of Castor and the current lease expires within five years. The quantity of water supplied by the wells is adequate, although the distribution systems cannot provide adequate flows for fire fighting. Raw water quality is an issue, however, particularly with the newer of the two wells. The groundwater has high sodium content and poor taste so local residents drink bottled water. The water treatment facility has more than sufficient

⁴⁸ Personal communications, Betty Christianson, Municipal Administrator, Village of Veteran. September 23, 2004.

⁴⁹ Personal communications, Kirk Sorenson, Councilor, Village of Halkirk. September 22, 2004.

capacity for the Village's 117 residents and treatment consists of chlorination only. Levels of aluminum, colour, sodium and total dissolved solids exceed CDWQG. The cost of providing water service is currently \$1.42 per m³ or about \$16,000 per year and average per capita consumption amounts to 262 litres (58 gallons) per day. Businesses and residences are charged a monthly flat fee of \$30 for 18.2 m³ (4000 gallons), plus \$2.20 for each additional cubic metre (\$0.01 per gallon). In case of a supply emergency, the Village would have to bring in water by truck. MPE determined that a reverse osmosis system would be required to reduce sodium and total dissolved solids, additional treated water storage was required to meet fire fighting requirements, and the long term rights to one of the wells needed to be acquired. The estimated cost of these upgrades is about \$1.0 million.

The Village of Halkirk believes that it would benefit from SAWSP only if it were to receive treated water from a central treatment facility, as is currently done by the Henry Kroeger Regional Water Supply system. Since surface water requires more extensive treatment than groundwater, the Village would have to substantially upgrade its water treatment facility and increase its water rates if SAWSP were only able to provide raw surface water. Some upgrading of its pumping system may be required to get water into its water tower. The Village does not believe that water from SAWSP would cost less than its current groundwater system, but is concerned about whether it would be able to afford much higher costs given its relatively small population. The Village noted that a secure source of quality water might help attract new residents and businesses, and additional surface water, lakes and wetlands might be an attraction for the area.

5.1.6 County of Paintearth

To assess potential interest in a regional water supply system, MPE Engineering conducted a survey of 677 rural residences in the County of Paintearth. About 34 per cent of these households responded to the survey which showed that the vast majority (95 per cent) of rural residences obtain their water from groundwater sources. The others use surface water sources (three per cent) or municipal sources (two per cent). Survey results showed that groundwater yields throughout the County are highly variable: 59 per cent reported wells producing more than three imperial gallons per minute while 41 per cent had wells flowing at less than three gallons per minute. Agricultural operations with low-flowing wells noted that lack of water was limiting their ability to expand.

The survey also showed that water quality varies across the County. As shown in Figure 29, about 57 per cent of respondents in the County of Paintearth reported good to excellent water quality while 17 per cent noted poor quality and 26 per cent rated their water quality as fair. Water quality concerns in the County include iron, manganese, sodium, taste, odour, total dissolved solids, tannins, and colour.

Figure 29

Assessment of Water Quality by Rural Residents

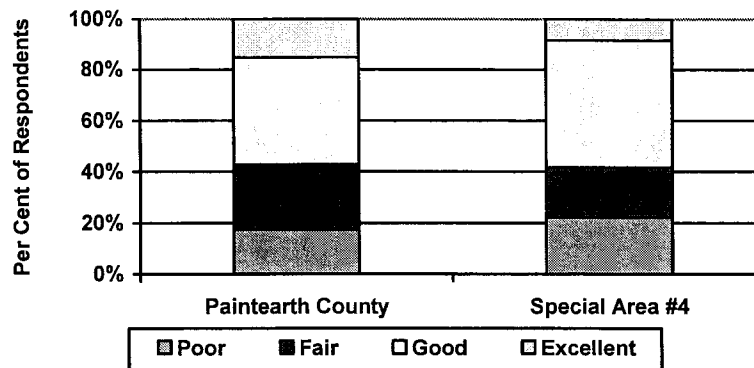


Figure 30

Rural Residents Interest in Tying into a Regional Water System

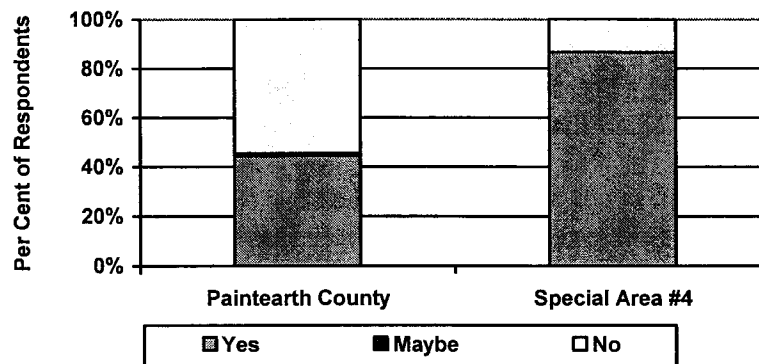
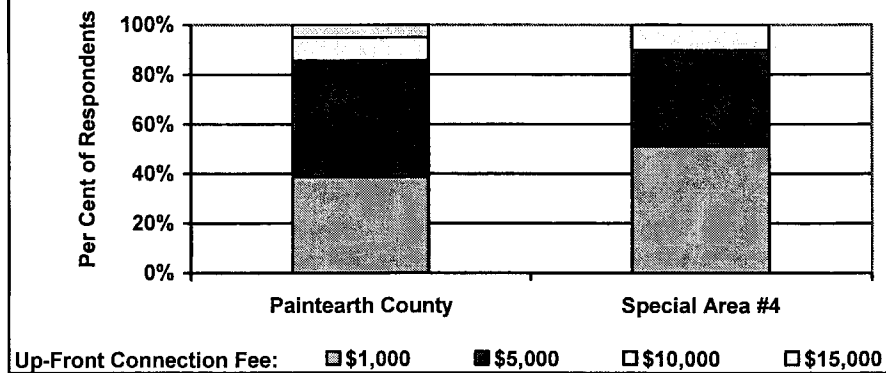


Figure 31

Rural Residents Willingness to Pay For a Regional Water System



Source: MPE Engineering Ltd.

The County noted that it operates a small water system at the Hamlet of Brownfield to service the school and seven residences.⁵⁰ About 1,817 m³ (400,000 gallons) per year of groundwater are chlorinated and distributed via a pressurized system located in the school. The cost of this water is a flat rate of \$20.00 per month for residential consumers and \$160.00 per month for the school.

In assessing potential interest in a regional water supply system, MPE concluded that three hamlets (Fleet, Federal and Throne), two Hutterite colonies, 30 farms in the Brownfield area, and 110 of 667 farms in the County could eventually be served by a regional system. This represents a population of about 600 people in 2004, increasing to about 740 people by 2024. To accommodate water demand for this population and farm use, MPE estimated that a regional supply system should be designed to provide 864 litres (190 gallons) per minute for rural residents in the County of Paintearth.

The County believes that SAWSP represents the best option for water supply in the region. It noted that the MPE study showed groundwater resources in the County were generally low yielding and of poor quality, and that other water supply alternatives were more costly than SAWSP. If SAWSP becomes a reality, the County expects spin-offs from irrigation development and it stated that future growth of this area hinges on the availability of water.

5.1.7 Special Area #4

In assessing water demand for SA #4, the MPE study focused on a corridor 12 kilometres wide along Highway 12. It estimated that there are about 80 rural landowners in this corridor, representing 16 per cent of the 495 farms in SA #4. MPE surveyed 41 of these landowners to determine their current patterns of water use and to assess their interest in a regional water system. Of the landowners surveyed, 71 per cent were farms and 27 per cent were lots or acreages. Almost all of these landowners (98 per cent) reported drawing water from groundwater, with yields ranging from 2.5 to 25 gallons per minute.

As shown in Figure 29, groundwater quality is an issue for landowners along the Highway 12 corridor: 22 per cent reported having poor water quality while fair water quality was reported by 20 per cent. Water quality issues included high levels of sodium, iron, tannins, sulphides, poor taste, and odour. The vast majority of landowners (87 per cent) indicated that they would be interested in tying into a regional water supply system (see Figure 30). Landowner willingness to pay for water is slightly lower than in the County of Paintearth. Figure 31 shows that 51 per cent were willing to pay an initial \$1000 connection fee, with financing of the balance, while 38 per cent were willing to pay a \$5000 up-front fee. Only 10 per cent were willing to pay an initial fee of \$10,000 and no one was prepared to pay \$15,000.

In assessing regional water demand in SA #4, MPE estimated that the Hamlet of Loyalist, 80 farms, and one Hutterite colony would be served by a regional water system. This represents a current population of about 370 people. In designing a regional water system, MPE assumed a water demand of 295 litres (65 gallons) per minute for the rural population of SA #4, based on an estimated population of 450 people in 2024 plus farm demands.

⁵⁰ Personal communications, Julie Falkenberg, County Administrator, County of Paintearth. September 23, 2004.

5.1.8 Summary

In summary, most of the communities along Highway 12 are experiencing some problems with their water supplies. As shown in Table 20 below, most of the communities rely on poor quality groundwater that does not meet the CDWQG while supply reliability is a future issue for Castor, Coronation and possibly Halkirk. While MPE has identified some solutions for addressing the issues for individual communities, the total costs are quite high (\$22.6 million) and they offer no relief to the rural populations in either SA #4 or the County of Paintearth. As a result, a regional water supply system is considered to be the more cost-effective solution for resolving municipal and domestic water supply concerns along Highway 12.

Table 20

Current Municipal and Domestic Water Supply Status and Proposed Solutions

Community	Source	Adequacy of Supply	Water Quality	Proposed Solutions	
				Actions	Cost (millions)
Castor	Surface	Unreliable	Deteriorating	New well (or) Raw water from Stettler	\$0.5 (or) \$16.0
Coronation	Groundwater	Inadequate	Poor	Drill new well Reverse osmosis treatment Expand treated storage Expand lagoon	\$2.9
Consort	Groundwater	Reliable	Poor	Reverse osmosis treatment	\$1.6
Veteran	Groundwater	Reliable	Poor	Upgrade treatment system	\$1.1
Halkirk	Groundwater	Reliable (?)	Poor	Secure existing well Upgrade treatment system Expand treated storage	\$1.0
County of Paintearth	Groundwater	Unreliable	Poor		
Special Area #4	Groundwater	Reliable	Poor		
TOTAL					\$7.1 (or) \$22.6

5.2 Regional Water Supply Solutions

In developing water supply solutions for the region, MPE Engineering Ltd. examined various sources of raw water, including five aquifers, the Battle River, Sullivan Lake, Parr Reservoir (Castor), and the Red Deer River either through the existing Stettler water system or through SAWSP. It also examined various means of providing treated water to the region, including water from the HKRWS, the Stettler water treatment plant, and the Town of Castor water treatment plant. In assessing possible options, MPE used a design flow of 3820 litres (840 gallons) per minute based on the estimated regional population for 2024 and rural agricultural demands summarized in Table 21. MPE determined that none of the existing water supply systems had the capacity to meet an additional demand of 3820 litres (840 gallons) per minute so some upgrading of raw water storage, treated water storage, water treatment facilities and/or pumping capacity would be required.

Table 21

Current and Future Design Flow Criteria for a Regional Water Supply System

	Estimated Population		Design Flow (litres per minute)	
	2004	2024	2004	2024
Castor	963	1175	668	818
Coronation	1107	1350	691	846
Consort	652	800	500	609
Veteran	301	365	232	277
Halkirk	122	165	77	109
Urban Total	3145	3855	2168	2660
County of Paintearth	600	740	0	865
Special Area #4	370	450	0	295
Rural Total	970	1190	0	1160
TOTAL	4115	5045	2168	3820

MPE evaluated seven different options for regional water supply, including the option of upgrading existing treatment facilities for each of the individual towns and villages, as described in Table 20. These seven options are described in Table 22 and Figure 32.

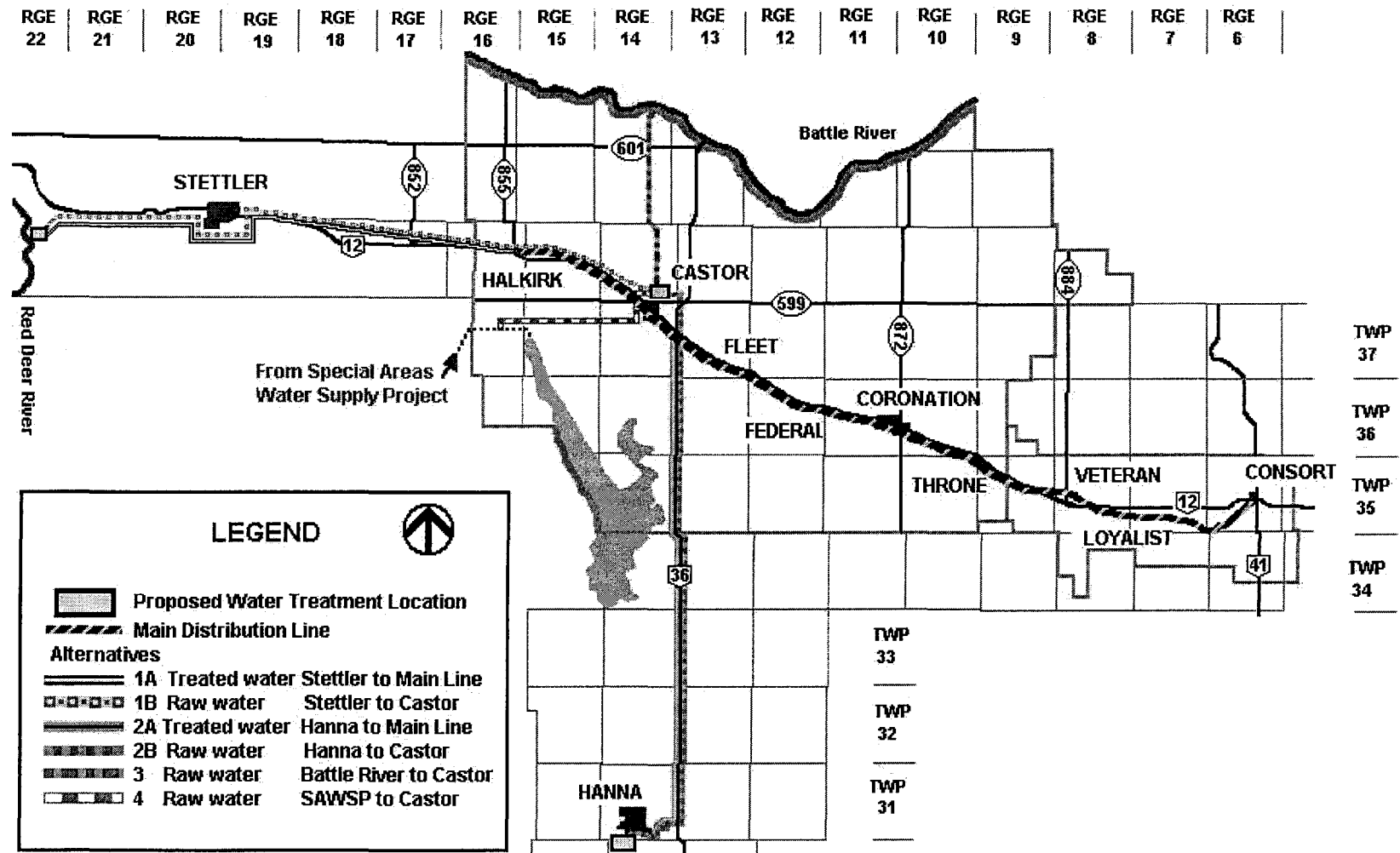
Options 1A and 1B would draw water from the Red Deer River at the existing facility near Stettler. Under Option 1A, water would be treated at an upgraded Stettler water treatment plant and distributed to communities along Highway 12 as well as the Town of Stettler and Stettler County. This option would be cost shared with the other beneficiaries and the share for residents of SA #4 and Paintearth County would be about \$25.7 million. Under Option 1B, raw water would be pumped to the Castor water treatment plant and treated water would then be distributed to communities along Highway 12. This alternative is more expensive (\$31.7 million) and the interbasin transfer of raw water from the Red Deer River, which is in the South Saskatchewan River Basin, to the Battle River, which is in the North Saskatchewan River Basin, may require a special Act of the Legislature.⁵¹

Options 2A and 2B would bring water from the HKRWS into the region. Option 2A calls for water to be treated at the existing water treatment plant at Hanna and then pumped north along Highway 36 and on to communities along Highway 12. Upgrades to the HKRWS would be required to handle the additional demands and this would result in the highest cost of all the alternatives (\$36.7 million). Option 2B would be less expensive (\$34.0 million) and would see raw water from the HKRWS piped to the Castor water treatment plant. Treated water would then be distributed to users along Highway 12. However, this option represents an inter-basin transfer and would also require a special Act of the Legislature.

⁵¹ Section 47 of the *Water Act* states: "A licence shall not be issued that authorizes the transfer of water between major river basins in the Province unless the licence is specifically authorized by a special Act of the Legislature."

Figure 32

Proposed Regional Water System Alternatives



Source: MPE Engineering Ltd.

Table 22

Proposed Regional Water System Alternatives

Option	Raw Water Source	Treatment Facility	Service Area	Design Features	Pipeline Length	Cost	Comments
1A	Red Deer River	Stettler Water Treatment Plant	Highway 12 Stettler County of Stettler	Raw water reservoir (Red Deer River) Upgrade Stettler treatment plant Booster and pressure relief station Treated water reservoir/distribution centre Pressure reducing/monitoring stations (2)	149 kms	\$39.6 million	Costs to SA 4 & County of Paintearth would be \$25.7 million
1B	Red Deer River	Castor Water Treatment Plant	Highway 12	Pump station on Red Deer River Upgrade Castor treatment plant Upgrade Castor treated water storage Pressure reducing/monitoring station	191 kms	\$31.7 million	Interbasin transfer of raw water may not be approved
2A	Henry Kroeger Regional Water Commission	Henry Kroeger Regional Water Commission	Highway 12 Highway 36	Expand existing raw water reservoir Raw water storage reservoir (Hanna) Upgrade HKRWC treatment plant Upgrade HKRWC treated storage Upgrade HKRWC distribution pumps	173 kms	\$36.7 million	Environmental concerns along Highway 36
2B	Henry Kroeger Regional Water Commission	Castor Water Treatment Plant	Highway 12	Upgrade existing raw water reservoir Upgrade Sheerness pumping station Raw water storage reservoir (Hanna)	173 kms	\$34.0 million	Interbasin transfer of raw water may not be approved
3	Battle River	Castor Water Treatment Plant	Highway 12	New raw water intake and pump station Booster station Increase Parr Reservoir capacity Upgrade Castor water treatment plant Upgrade Castor treated water storage Upgrade Castor distribution pumps	130 kms	\$33.1 million	Water may not be available from Battle River or only available five months of the year Environmental concerns.
4	Special Areas Water Supply Project	Castor Water Treatment Plant	Highway 12	Raw water intake and pump station (Sullivan Lake) Expand Castor water treatment plant.	126 kms	\$22.2 million	Lowest cost alternative. Requires interbasin transfer.
5	Existing System Upgrades	See Table 20				\$22.6 million	No benefits for rural residents

Source: MPE Engineering Ltd.

Option 3 would require the construction of a new diversion and pumping station on the Battle River and raw water would be piped to the Castor water treatment plant. Treated water would then be piped to communities along Highway 12. This option is relatively expensive (\$33.1 million) and may not be feasible because the Battle River is currently over-allocated and may not provide a reliable year-round source of water. It is estimated that pumping from the Battle River might only be possible for five months of the year and this would require construction of a large raw water storage reservoir with capacity for seven months of demand.

Option 4 calls for water to be withdrawn from SAWSP near Sullivan Lake and piped to the Castor water treatment plant, only 21 kilometres away. Treated water would then be provided to the communities along Highway 12. This option has the lowest cost of all the options (\$22.2 million) but this would be in addition to the cost of constructing SAWSP.

Option 5 consists of upgrading the existing facilities in the towns and villages and, as described in Table 20, would have a total cost of \$22.6 million. This option would offer no benefits to any rural residents along Highway 12.

Based on its review of these options, MPE concluded that Option 4, taking water from SAWSP, represents the most feasible alternative from a cost perspective, but cautioned that this conclusion is based on timely approval and construction of SAWSP.

5.3 Effects of SAWSP

In terms of providing adequate supplies of municipal and domestic water in SA #4 and the County of Paintearth that meets the objectives of the Canadian Drinking Water Quality Guidelines, SAWSP represents a significant cost savings over the other alternatives. Based on the analysis by MPE, this cost savings would be \$9.5 million over the next best alternative. The second best alternative would be the importation of raw water from the Stettler facility for treatment and distribution from Castor.

By having a single treatment facility at Castor that would treat higher quality surface water, rather than groundwater, it is expected that there would be some costs savings for the other towns and villages. It was noted that water from the HKRWS costs \$0.96 per m³ (0.4 cents per gallon) plus local distribution charges. As shown in Table 23, water treatment costs in the communities along Highway 12 are currently highly variable, ranging from a low of \$0.94 per m³ in Halkirk to \$2.40 per m³ in Castor (0.4 to 1.1 cents per gallon).

Using information on current daily per capita water consumption, treatment costs and the 2001 population, it is estimated that annual treatment costs for communities along Highway 12 total about \$1.12 million per year. This number assumes that water consumption and costs for rural residents are the same as for urban residents, or about \$0.80 per person per day. It is likely that, especially where water quality is poor, rural residents actually consume less water but may be paying much more. For example, the cost of trucked water from the HKRWS is between \$1.91 and \$1.97 per m³ per kilometre, such that a load of 29 cubic metres of water to people living near

Castor would be about \$400 while rural residents near Coronation would be paying about \$500.⁵² The cost of bottled water (\$4 per five gallon container) is about \$176 per cubic metre.

While it is not possible to provide definitive costs of providing water under a regional system because of uncertainty about how the capital costs of the new facilities would be included in the overall rate structure, it is reasonable to assume that there would be considerable costs savings by having one treatment plant for the whole region. For purposes of analysis, the potential cost savings are estimated in Table 23 on the assumption that basic treatment costs (net of distribution costs) would be 15 per cent higher than water from the HKRWS. At a price of \$1.10 per cubic metre and assuming the same annual consumption, total water service costs for the region would drop to \$0.72 million. This represents a total cost savings of about \$0.42 million per year. It should be noted that, with the exception of residents of Halkirk, all residents drawing water from a regional supply system drawing water from SAWSP could be paying less than at present.

Table 23

Potential Annual Cost Savings of a Regional Water System

Community	Population	Current Conditions			Regional Supply System		Estimated Cost Savings
		\$/m ³	Daily Use (litres)	Total Cost	Estimated \$/m ³	Total Cost	
Castor	935	\$2.40	424	\$347,281	\$ 1.10	\$159,171	\$188,111
Coronation	902	\$1.90	470	\$294,002	\$ 1.10	\$170,212	\$123,790
Consort	634	\$1.17	499	\$135,104	\$ 1.10	\$127,021	\$8,083
Veteran	292	\$0.94	457	\$45,785	\$ 1.10	\$53,578	-\$7,793
Halkirk	117	\$1.42	262	\$15,888	\$ 1.10	\$12,308	\$3,580
Urban Total	2880	\$1.72	463	\$838,061		\$522,289	\$315,772
County of Paintearth	600	\$1.72	463	\$174,596	\$ 1.10	\$111,416	\$63,180
Special Area #4	370	\$1.72	463	\$107,667	\$ 1.10	\$68,707	\$38,961
Rural Total	970	\$1.72		\$282,263		\$180,123	\$102,141
TOTAL	3850			\$1,120,324		\$702,412	\$417,912

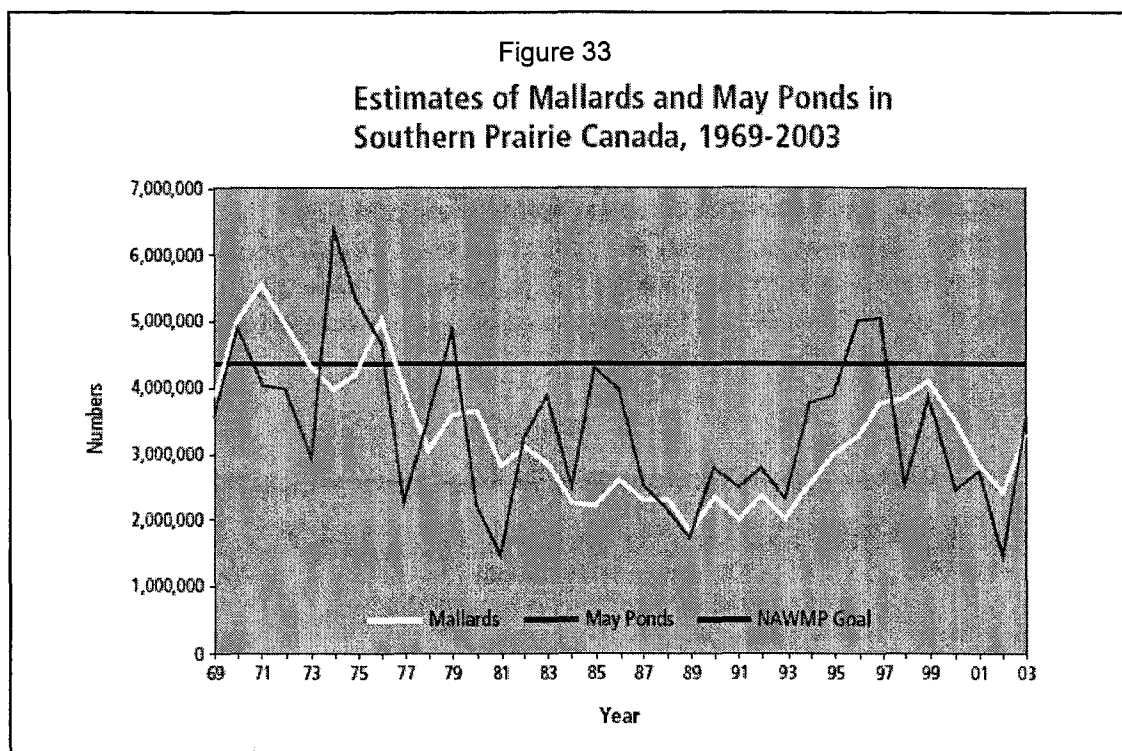
If the actual cost of providing treated water is more than \$1.10 per cubic metre, the resulting costs savings for the region would be reduced. For example, at a price of \$1.25 per cubic metre the annual savings would be \$0.32 million and this would drop to about \$0.15 million if the average price per cubic metre was \$1.50.

It is important to note that an assured supply of high quality water could also benefit regional economic and social stability. Census data show that the population decline for communities drawing water from the HKRWS was only 1.9 per cent between 1996 and 2001 while communities like Consort, Empress and Veteran, which rely on other water sources, experienced a 15.4 per cent decline. If provision of a regional water supply system had the same effect on development along Highway 12, the overall rate of population decline in the region would be reduced, leading to better long-term stability. As noted by the municipal representatives contacted as part of this study, it is hoped that a high-quality reliable water supply would keep

⁵² Personal communications, John Vandervies, Star West Trucking Ltd, Hanna. September 23, 2004

people from leaving the communities and would attract economic activity that is currently not possible because of water scarcity and cost.

It should be noted that since the MPE study was completed, the County of Stettler has indicated that, if the SAWSP alternative was selected, it would be interested in developing a small regional water supply system in the southeast corner of the County, using the proposed Sullivan Lake Tributary Reservoir as the water source. The County is also assessing how other rural parts of the region could be served by water from SAWSP.



Source: North American Waterfowl Management Plan (2004). *Canadian Habitat Matters 2004 Progress Report*.
<http://www.nawmp.ca/pdf/HabMattersE.pdf>

6. Wetlands, Recreation and Tourism

The Special Areas are considered to be among the most productive duck-producing areas in North America. However, this productivity is highly variable and correlates with moisture conditions. Historical observations show that the numbers of geese observed in the Special Areas during fall migrations ranged from 150,000 in wet years (1985 and 1986) to less than 60,000 in dry years (1988 and 1989). To help buffer the effects of drought, Ducks Unlimited has already developed 235 projects in the Special Areas, representing 37,000 acres (15,030 hectares), where coulees are dammed to create wetlands that provide breeding and nesting habitat. In addition, the Special Areas is one of 14 target areas identified by the North American Waterfowl Management Plan (NAWMP) for restoring continental waterfowl populations. As shown in Figure 33, the efforts of NAWMP were partially successful in increasing the number of Spring ponds and restoring mallard populations during the 1990s, but severe drought conditions in recent years has meant that waterfowl populations in the southwest prairies have not yet consistently attained NAWMP goals for the region.

One of the objectives of SAWSP is the enhancement and creation of additional wetland and riparian habitat in the region. Plans call for developing two new wetlands and improving the productivity and stability of 15 existing wetlands. In total, about 5,780 acres (2,340 hectares) of new and improved wetland habitat would be created.⁵³ In addition, there would be habitat benefits for waterfowl and other species as a result of increased flows through natural stream channel, backflood irrigation, and water storage reservoirs. A description of the wildlife species would benefit from various aspects of SAWSP is provided in Table 24. It is expected that these increased wildlife populations would then support increase consumptive (hunting) and non-consumptive wildlife activities in the region.

Table 24

Biological Benefits of the Special Areas Water Supply Project

Impacts on Wetlands	Affected Area	Benefiting Species
Canals and Creeks	<ul style="list-style-type: none"> • 180 kilometres of new canals • 330 kilometres of flowing natural channels 	Waterfowl, Ungulates, Amphibians Reptiles
Backflood Irrigation	<ul style="list-style-type: none"> • 5,780 acres (2,340 hectares) 	Waterfowl, Shorebirds, some Grassland Birds
Multiple-Use Wetlands (17)	<ul style="list-style-type: none"> • 23,346 acres (9,448 hectares) 	Waterfowl, and other water birds, Shorebirds, Amphibians Reptiles
Reservoirs (4)	<ul style="list-style-type: none"> • 2,990 acres (1,210 hectares) 	Waterfowl and other water birds, Shorebirds
Impacts on Uplands	Affected Area	Benefiting Species
Irrigation Croplands	<ul style="list-style-type: none"> • 20,000 acres (8,100 hectares) of alfalfa 	Upland Game Bird, Grassland Birds, Ungulates
Backflood Irrigated Natural Grasslands	<ul style="list-style-type: none"> • 5,780 acres (2,340 hectares) 	Upland Birds, Birds of Prey

Source: Ducks Unlimited Canada, Edmonton, June 2000; AMEC, Calgary, August 2004

⁵³ AMEC Earth & Environmental (2004). *Special Areas Water Supply Project In-Basin Distribution Study Summary Report*.

Figure 34

Wildlife Management Units in Alberta

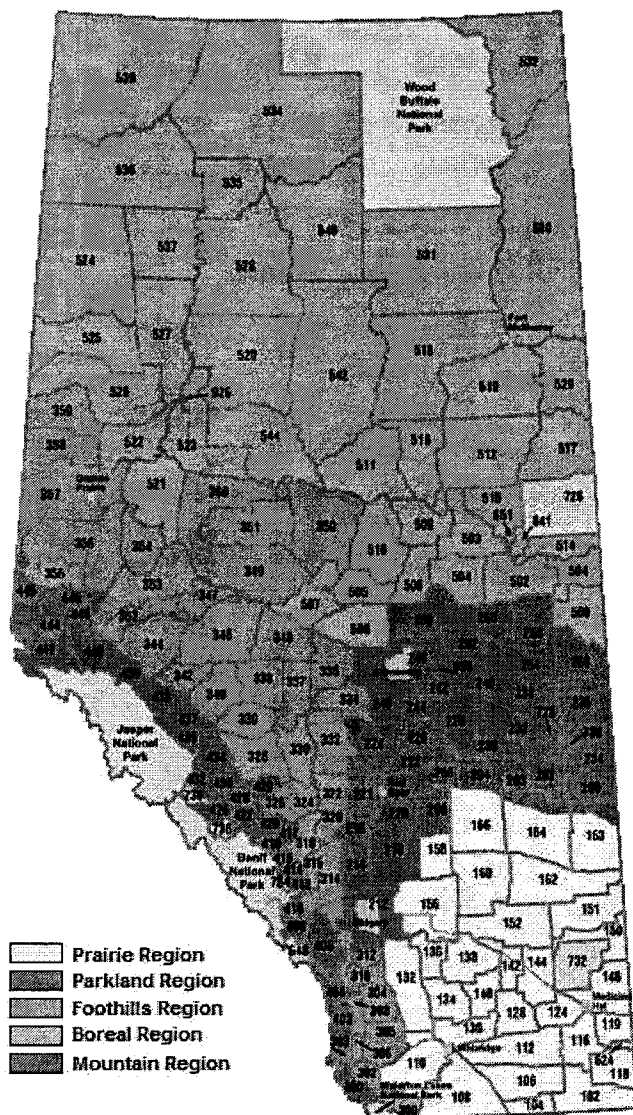
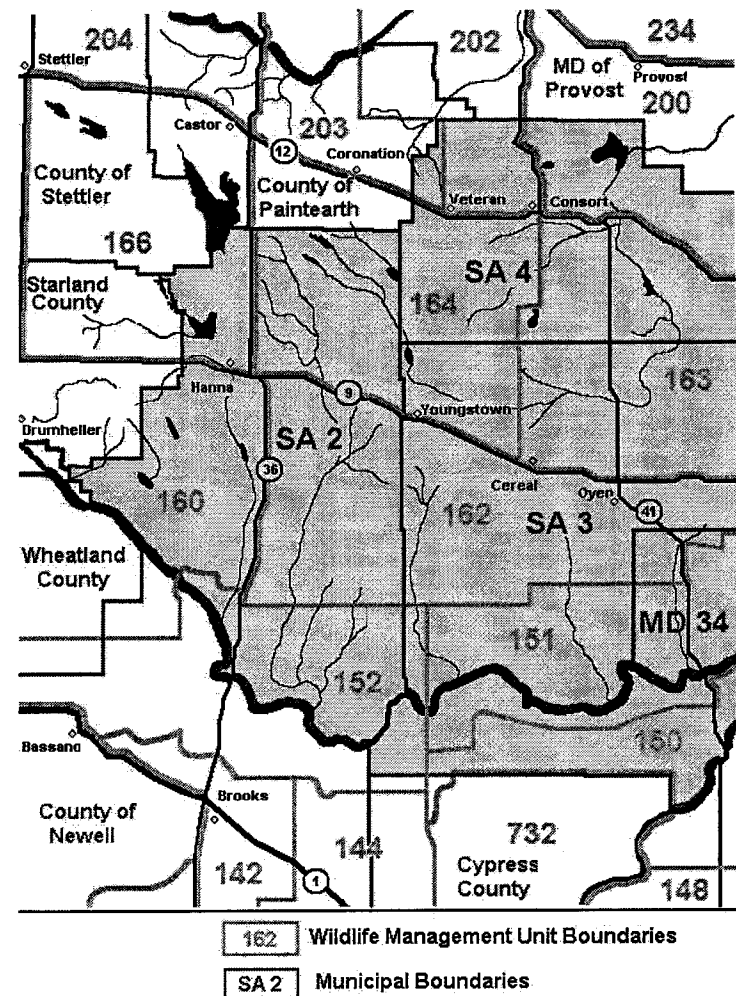


Figure 35

Wildlife Management Unit Boundaries in Census Division 4



6.1 Waterfowl Hunting

The most recent estimates of waterfowl hunting in east-central Alberta were prepared by Alberta Sustainable Resource Development for 2000. Estimates of the number of hunters and harvests are available for individual Wildlife Management Units (WMUs) and, as shown in Figure 34, WMU boundaries tend to follow highway corridors rather than municipal boundaries. Parts of CD 4 fall within 11 WMUs located in the Prairie and Parkland zones (see Figure 35) and regional hunting activity has been estimated using the combined values for these 11 WMUs.

For 2000 it is estimated that 2336 people hunted waterfowl in the region. This includes 941 duck hunters and 1395 people hunting geese (see Figure 36). Total waterfowl hunting activity amounted to 8487 hunter days. Hunter success for 2000 was 1.6 ducks per hunter-day and 1.4 geese per day. These success rates were slightly below the average for the Prairie and Parkland zones in Alberta, however, hunting in these 11 WMUs accounted for 7.0 per cent of all duck hunting in these two zones and 15.4 per cent of all goose hunting.

As shown in Figures 36 and 37, the extent of waterfowl hunting in the region has been declining over time. Data for 1995 indicate that waterfowl hunting involved 2941 hunters and 10,383 hunter-days. This indicates that hunting in the region declined by about 20 per cent between 1995 and 2000. However, data for the mid-1980s indicated that there was an average of about 4900 waterfowl hunters in the region with hunter effort amounting to 17,250 hunter-days. This downward trend is consistent with overall patterns of hunting in Alberta. Statistics indicate that between 1996 and 1991 the number of Alberta hunters dropped by 40 per cent, resident hunting effort declined by 33 per cent, and declining participation in hunting has occurred since at least 1981⁵⁴ (see Figure 38). It should be noted that the study region accounted for 7.0 per cent of duck hunting in the Prairie and Parkland zones in 1995 and 10.2 per cent of goose hunting. Thus, within the Prairie and Parkland zones, the region has remained an important area for duck hunting and has gained in importance for geese.

At the present time Ducks Unlimited Canada estimates that, on average, there are between 40 to 80 breeding duck pairs per square mile in the Special Areas, but this number can drop by half during drought conditions. It is expected that SAWSP would provide important habitats for waterfowl, especially during dry years. Anderson (2000) notes that SAWSP would substantially improve waterfowl production at the Esther Hay Meadow which is potentially one of the most productive waterfowl areas anywhere in the world, especially for Northern Pintails which are in decline. It is estimated that, by creating and enhancing wetlands and increasing creek flows, SAWSP would provide habitat for about 32,000 breeding pairs of waterfowl annually.

With more waterfowl in the region it is expected that hunting activities would increase. Past studies predicted that, with SAWSP, levels of waterfowl hunting would return to historically-high levels (about 31,250 days per year)⁵⁵ and that the additional hunting activity (14,000 hunter days) would be “new” days of hunting. However, this estimate did not factor in the declining

⁵⁴ Canadian Wildlife Service (1993). *The Importance of Wildlife to Canadians: Highlights of the 1991 Survey* and Canadian Wildlife Services (2000). *Survey on the Importance of Nature to Canadians*.

⁵⁵ Technical Subcommittee, Project Rationale (1992). *Special Areas Water Supply Project: Project Rationale*.

Figure 36

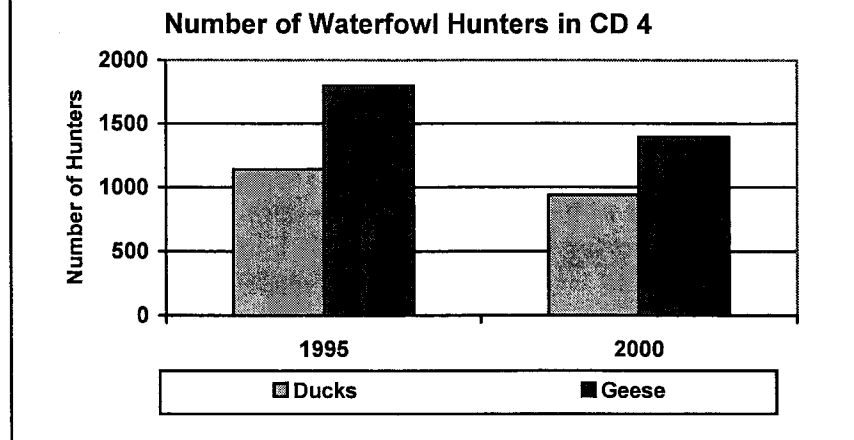


Figure 37

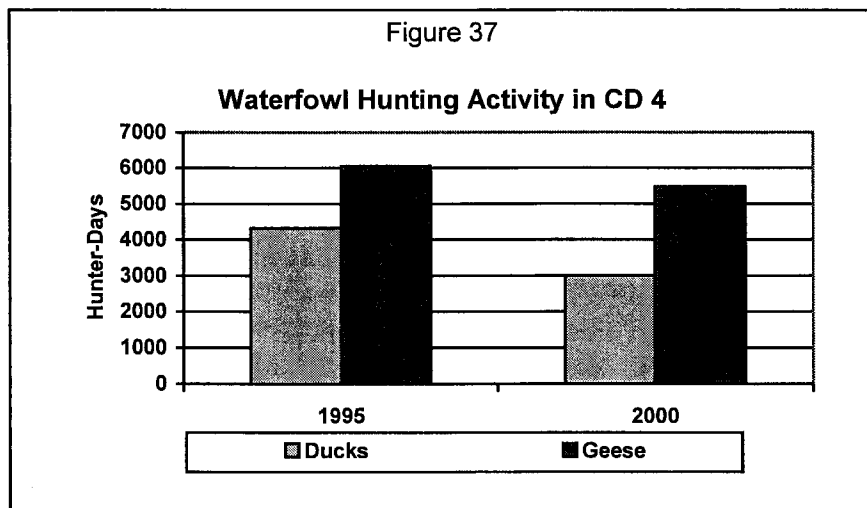
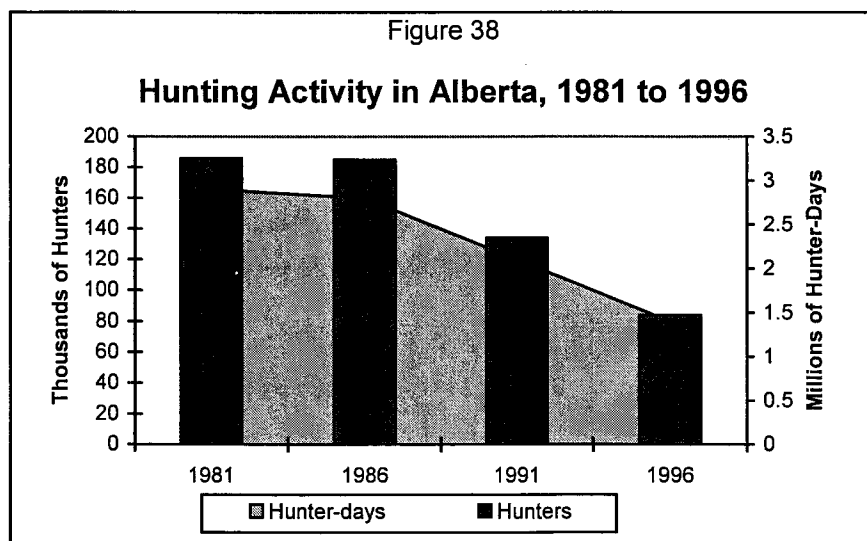


Figure 38



Source: Canadian Wildlife Service (1993). *The Importance of Wildlife to Canadians: Highlights of the 1991 Survey*
 Canadian Wildlife Services (2000). *Survey on the Importance of Nature to Canadians*.

participation in hunting experienced throughout the province over the last two decades. It is also inconsistent with the results of a subsequent study of a water management project in southern Alberta that showed that new or improved recreational features tend to draw people away from existing sites rather than create “new” days of recreation.⁵⁶

For this assessment it is assumed that improved waterfowl hunting in the region would draw hunters who would normally hunt in other parts of the Prairie and Parkland zones. As shown in Figure 35, these zones are home to the majority of the Alberta population, and wildlife statistics indicate that the zones accounted for 83 per cent of all duck hunting and 93 per cent of all goose hunting in Alberta. With SAWSP it is assumed that the regional share of the duck hunting market would increase from 7.0 per cent to 12 per cent while the share of the goose hunting market would increase from 15.4 per cent to 20 per cent. On this basis, total waterfowl hunting activity in the region would amount to about 12,240 hunter-days; this represents an increase of 3750 hunter-days or 28 per cent over current levels.

In terms of economic effects, hunters in Alberta spent an average of \$51 per day in 1996, primarily on equipment and other items (59 per cent) and transportation (29 per cent) with lesser amounts on food (10 per cent) and accommodation (two per cent).⁵⁷ This would be equivalent to about \$62 per day in 2004.⁵⁸ The proportion of hunter spending that occurs at home, en route to hunting and in the area hunted is not known. However, a 1994 study of licensed Alberta fishermen indicated that about 24 per cent of expenditures were made within 25 kilometres of where they fished, and this consisted mainly of accommodation, transportation costs, and food.⁵⁹ Assuming that a similar expenditure pattern exists for hunters and that the majority of waterfowl (90 per cent) live outside the region, it is estimated that waterfowl hunters currently spend about \$166,000 in CD 4. With SAWSP this would rise to about \$240,000, representing an increase to local businesses of about \$73,500. Since SAWSP is predicted to draw hunters from other areas, the increased spending can be counted as a benefit to local businesses but, at a provincial level, would represent a transfer of spending from one region to another.

A second measure of value is the benefit that hunters derive from hunting over and above what they actually paid to participate. In 1996, this value was determined to be \$18.30 per day for waterfowl hunters in Alberta⁶⁰ or about \$23.50 in 2004 dollars. These extra-market benefits for waterfowl hunters in the Special Areas would then be about \$200,000 under current conditions and would increase to about \$288,000 with SAWSP. Again, since improved hunting success rates as a result of SAWSP would attract hunters from other areas of the province, some of the \$88,000 difference would be considered a transfer rather than a net gain. Without more detailed information on hunting activities in CD 4, quantification of the net gain in extra-market benefits associated with increased waterfowl populations is quite difficult.

⁵⁶ Alberta Public Works, Supply and Services (1996). *Little Bow Project/Highwood Diversion Plan: Environmental Impact Assessment*. See Appendix P.

⁵⁷ Canadian Wildlife Services (2000). *Survey on the Importance of Nature to Canadians*.

⁵⁸ Adjusted for inflation using the Consumer Price Index which shows a 22 per cent increase since 1996.

⁵⁹ Kozlowski, Anna and John P. Thompson (1996). *The Economic Importance of the Alberta Licenced Resident Sport Fishery in 1995 Alberta*. Alberta Environmental Protection. See Table 2.

⁶⁰ Canadian Wildlife Services (2000). *Survey on the Importance of Nature to Canadians*.

Figure 39

Number of Upland Bird Hunters in CD 4

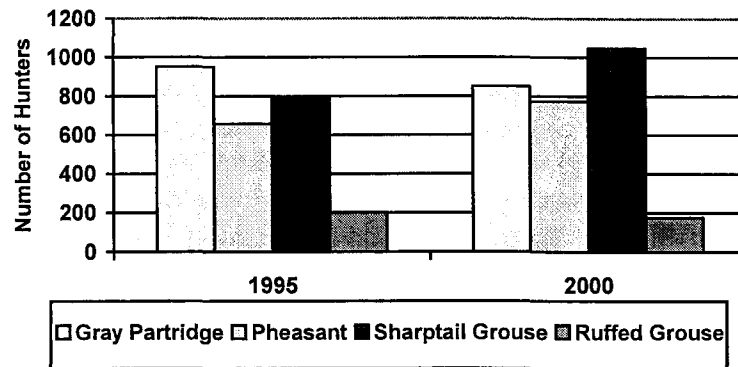
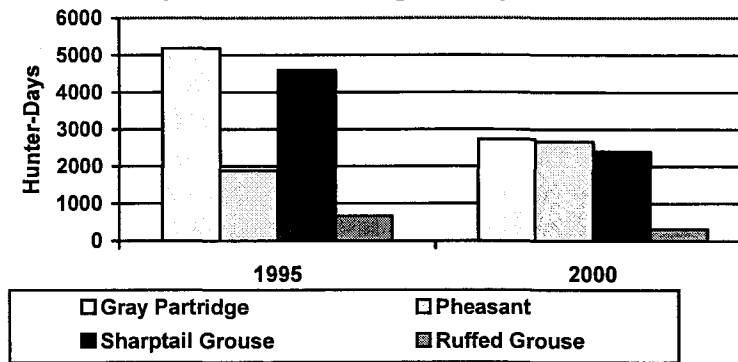


Figure 40

Upland Bird Hunting Activity in CD 4



Over time economists have used various approaches to measure the effects of improvements in recreational quality, but the preferred current practice is to correlate peoples' choices of recreational site with the characteristics of that site. By assuming that recreationists attempt to maximize benefits by comparing site attributes against the costs of travel, a model can be developed to reveal recreational preferences. The revealed preference model can then be used to estimate the change in utility or welfare that would result if the attributes of selected recreational sites are modified. The model can also measure the cost savings (travel costs and/or time) that would result from switching from one site to another that offers the desired mix of recreational attributes. In Alberta this approach was used to quantify the benefits of providing new recreational facilities and improving flows in the Highwood River as part of the 1996 assessment of the Little Bow Project/Highwood Diversion Plan. For that evaluation the average costs savings amounted to \$1.20 to \$2.00 per visit, depending on whether travel time savings were included.⁶¹ Given that the average value of a day of outdoor recreation in natural areas in Alberta was determined to be \$10.20 in 1996,⁶² the marginal values reported for the assessment of the Little Bow Project/Highwood Diversion Plan were equivalent to 12 to 20 per cent of the reported average provincial value.

Without the benefit of a revealed preference model of waterfowl hunting in east central Alberta, the evaluation of the net benefits of SAWSP assumes that the travel cost savings associated with increased waterfowl populations would be equivalent to 12 to 20 per cent of the average extra-market value of day of waterfowl hunting in Alberta. This average value was previously determined to be \$23.50 in 2004 dollars. Consequently, the marginal travel cost savings per hunter would be \$2.80 to \$4.70 per day and, when applied to all 12,240 days of hunting, the resulting annual benefits would be \$34,500 to \$57,500 per year.

6.2 Upland Bird Hunting

The region is also an important area for upland bird hunting. Hunting statistics show that in 2000 about 2847 people hunted upland birds in the 11 WMUs. As shown in Figure 39, the number of people hunting gray partridge, pheasant and ruffed grouse in the region actually dropped from 1995, but this was offset by a significant increase (32 per cent) in the number of people hunting sharptail grouse. In terms of total upland bird hunting activity, there were 8126 hunter days in 2000 compared to 10,455 hunter-days in 1995. Figure 40 shows that there was a considerable decline in hunting for all upland bird species but this is consistent with the overall drop in hunting activity in Alberta since the early 1980s.

The study region is an important area for upland bird hunting within the Prairie and Parkland zones. In 2000 the region accounted for only 4.4 per cent of ruffed grouse hunting, about 14 per cent of hunter-days for both gray partridge and pheasants, and 35 per cent of hunting for sharptail grouse. For sharptail grouse, the hunting success rate in the region was 1.2 birds per day and this was well above the 0.7 birds per day reported for the Prairie and Parkland zones. The region actually attracted about half of all the sharptail grouse hunters in the two zones and accounted for 61 per cent of the total harvest. For pheasant and ruffed grouse, the hunting

⁶¹ Alberta Public Works, Supply and Services (1996). *Little Bow Project/Highwood Diversion Plan: Environmental Impact Assessment*. See Appendix P.

⁶² Canadian Wildlife Services (2000). *Survey on the Importance of Nature to Canadians*.

success rates were slightly above the average for the two zones while lower success rates were reported for gray partridge.

SAWSP is expected to have a beneficial impact on upland bird populations. As noted in Table 19, upland birds in general would benefit from the 20,000 acres (8,100 hectares) of new irrigation (alfalfa), backflood irrigation of natural grasslands, and improved management of grazing lands. Some upland species are expected to benefit more than others.⁶³ SAWSP should benefit populations of gray partridge because this species uses windbreaks and straw piles for winter shelter and eats grains and other seeds. Pheasants should also benefit because the dense cover bordering irrigation ditches and creeks and the nearby grain fields provide ideal habitat. SAWSP would also benefit populations of sharptail grouse because the grasslands created through backflood irrigation would provide additional habitat, particularly those under managed grazing regimes that ensure sufficient carryover cover for spring nesting. SAWSP would provide limited benefits for ruffed grouse since this species prefers farm woodlots and treed prairie coulees where poplar and willow buds make up the bulk of their winter diet.

To assess the impacts on hunting it is again assumed that increased upland bird populations in the region would draw hunters who would normally hunt in other parts of the Prairie and Parkland zones. With SAWSP it is assumed that the regional share of both gray partridge and pheasant hunting would increase from 14 per cent to 19 per cent. For sharptail grouse the regional market share is predicted to increase from 35 per cent to 40 per cent. Only minor increases are assumed for ruffed grouse: the regional market share is predicted to rise from four per cent to five percent. Based on these assumptions upland bird hunting activity in the region with SAWSP is expected to increase by about 2330 hunter-days. Total hunting effort would be about 10,455 hunter-days, and this represents an increase of 29 per cent over current levels.

Assuming that upland bird hunters and waterfowl hunters have similar spending patterns and that 90 per cent of upland bird hunters live outside the region, total expenditures in the region are currently about \$159,200 per year. With SAWSP, regional expenditures by upland bird hunters would increase to \$204,900. While the additional \$45,600 in spending would benefit local businesses, businesses in other regions would experience an equivalent loss.

Total extra-market benefits for upland bird hunters are predicted to increase from \$113,000 to \$145,300 per year with SAWSP, assuming an average value of \$13.90 per hunter-day. This value is based on a reported value of \$11.40 per day for upland bird hunters in Alberta in 1996⁶⁴ inflated to 2004 dollars. As per Section 6.1 only a portion of these extra-market benefits can be counted as benefits of SAWSP. Assuming that the marginal benefits would be equivalent to 12 to 20 per cent of average daily values, the net benefit of SAWSP would range from \$17,400 to \$29,100 per year, depending on whether the value of travel time savings is included.

⁶³ Descriptions of habitat requirements for upland bird species are based on information on the website of Alberta Sustainable Resource Development (<http://www3.gov.ab.ca/srd/fw/hunting/s.html>) and Manzer, Doug (2001). "Sharptails" in *Biodiversity Makes It Work*. Volume 3. North American Waterfowl Management Plan.

⁶⁴ Canadian Wildlife Services (2000). *Survey on the Importance of Nature to Canadians*.

6.3 Big Game Hunting

The Special Areas attract a significant amount of big game hunting, particularly for white-tail and mule deer. There is also some hunting of moose and elk in the region. Hunting statistics show that, in 2001, about 11,180 people hunted in the 11 WMUs and total hunting effort for deer and moose amounted to about 44,600 hunter-days. As shown in Figures 41 and 42, white-tail deer was the most heavily hunted species, accounting for 52 per cent of hunters and 56 per cent of hunting activity. On the other hand, moose hunting is limited to seven of the 11 WMUs and accounted for only two per cent of hunting activity. For 2001, the region accounted for 6.0 per cent of moose hunting in the Prairie and Parkland zones, 12.1 per cent of hunting for white-tailed deer, and 20.3 per cent of mule deer hunting.

While provincial trends show a decline in hunting activity over the past two decades, statistics for the region show that hunting activity has actually increased over time (see Figure 42). Total hunter effort in 2001 was 14 per cent greater than in 1995. The reason for this apparent inconsistency with overall trends is that ungulate hunting in the region is highly regulated, with quotas and limited entry hunts. For example, there are quotas for both antlered and antlerless mule deer for each of the 11 WMUs. There are quotas for antlerless white-tail deer in eight WMUs, and quotas for moose (antlered and antlerless) in five WMUs. Furthermore, hunting seasons are quite short. In general, archery hunting is allowed during September and October and conventional hunting is limited to November. However, for WMUs 150 to 164, deer hunting is only allowed on Thursdays, Fridays and Saturdays during November.

The net result of these regulations is that hunter success rates are typically higher than reported in the Prairie and Parkland regions and much higher than the Alberta average, especially for moose and mule deer (see Figure 43). Furthermore, the average effort per kill for most ungulate species is well below the provincial average. As shown in Figure 44, the average days per mule deer kill was only 5.1 days, compared to 9.0 days in the Prairie and Parkland zones and 12.8 days for Alberta. Thus, hunters that are lucky enough to acquire permits to hunt in the Special Areas have a much higher probability of shooting an animal for significantly less effort than in much of the rest of the province. This explains why the amount of hunting activity in the region has been increasing in recent years.

According to the environmental analysis completed in 1992⁶⁵, SAWSP would benefit both deer species. The development of riparian forests and shrubland would increase mule deer habitat, although this species may abandon areas that are heavily stocked with cattle. White-tail deer would benefit even more from the development of riparian forest as this species is more heavily reliant on woody cover. While the environmental analysis did not address project impacts on moose, it is anticipated that SAWSP provide additional habitat since preferred habitat for moose consists of muskegs, brushy meadows and small groves of aspen or coniferous trees, particularly where such habitat adjoins lakes, ponds or streams.⁶⁶ For this analysis it is assumed that SAWSP would increase regional populations of white-tail deer by five per cent, mule deer populations by three per cent and moose populations by two percent. It is further assumed that the region's share of hunting activities in the Prairie and Parkland zones would increase by a similar amount.

⁶⁵ Wagner, Greg and Richard Chabaylo (1992). *Special Areas Water Supply Project Environmental Overview*. Planning Division, Alberta Environmental Protection.

⁶⁶ Alberta Sustainable Resource Development website (<http://www3.gov.ab.ca/srd/fw/hunting/s.html>).

Figure 41

Number of Big Game Hunters in CD 4

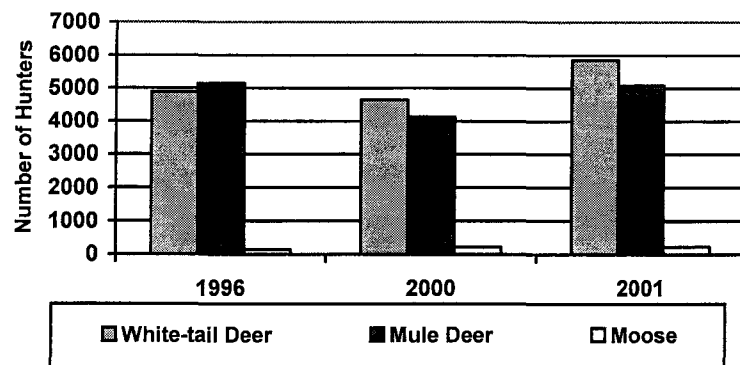


Figure 43

Big Game Hunting Success Rate, 2001

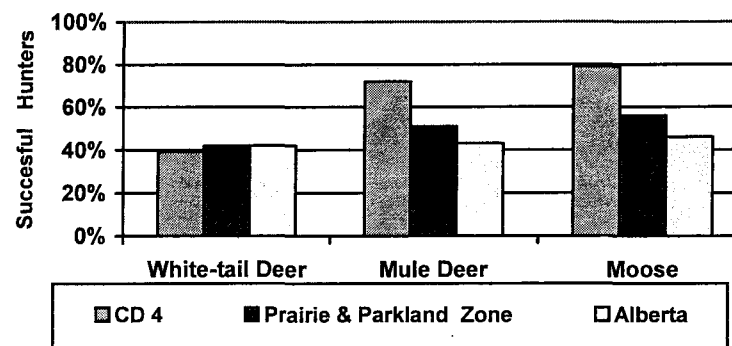


Figure 42

Big Game Hunting Activity in CD 4

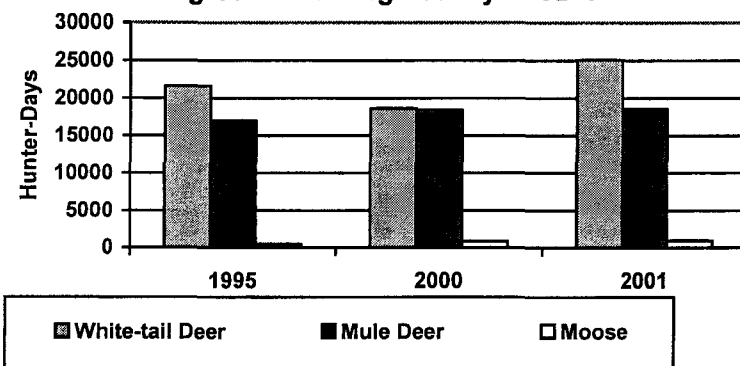
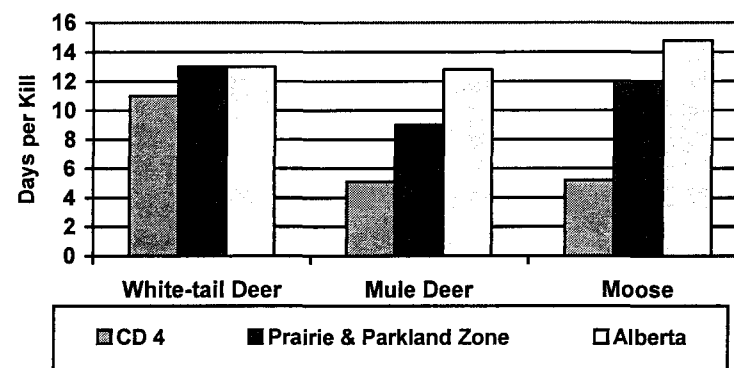


Figure 44

Big Game Hunters Effort per Kill, 2001



Using these assumptions, total big game hunting in the region is predicted to increase to about 57,500 hunter days, an increase of 12,950 hunter-days or 29 per cent. It should be noted that if the increase in ungulate populations as a result of SAWSP allows relaxation of some of the restrictions on hunting in the region, the increase in hunting activity could be even greater although success rates would decline.

The methodology used to assess the economic effects of SAWSP on big game hunting is the same as for waterfowl and upland bird hunting. It is again assumed that 90 per cent of big game hunters live outside the region and that their expenditure patterns are the same as for other types of hunting. On this basis it is estimated that big game hunters currently spend about \$873,600 in the region, primarily on accommodation, food and transportation. With SAWSP, this would be expected to increase to \$1,127,400, an increase of \$253,800. As noted previously, regional businesses would see this increased spending as a benefit while businesses elsewhere in the province would experience an equivalent reduction,

With respect to extra-market benefits, it was determined that, for people hunting large mammals in Alberta in 1996, these amounted to \$12.30 per day⁶⁷ or \$15.00 per day in 2004 dollars. For current levels of big game hunting in the region, these extra-market benefits totaled about \$668,900. This would rise to \$863,200 as a result of SAWSP. The marginal benefits of more, higher quality hunting in the region are estimated to be \$103,600 to \$172,600 per year, based on the assumption that marginal values were equivalent to 12 per cent or 20 per cent of the average daily value. The higher of these values assumes that hunters would place a positive value on reduced travel time in addition to reduced transportation costs to an equivalent site.

6.4 Non-Consumptive Recreation

While implementation of SAWSP would increase populations of wildlife species that attract hunters, it would also provide habitat for a wide variety of other wildlife species of interest to bird watchers, eco-tourists and others who travel to view wildlife.

There is no information on the number of people who currently visit CD 4 for such non-consumptive purposes. However, the results of a survey conducted in 1996 to assess the importance of nature to Canadians⁶⁸ provided the following observations about wildlife viewing activities by Albertans:

- 18.6 per cent of Albertans go on trips to view wildlife while only 4.9 per cent hunted.
- Albertans spent 19.1 days per year viewing wildlife compared to 16.6 days for hunters.
- Albertans spent 7.57 million days on trips to view wildlife; they spent 1.40 million days hunting.
- Albertans viewing wildlife spent an average of \$23 per day while hunters spent \$51 per day.
- Transportation costs for Albertans viewing wildlife averaged \$3.10 per trip compared to \$18.13 per hunting trip.
- Extra-market benefits for Albertans viewing wildlife amounted to \$6.60 per day and for all hunting activities the average was \$15.20.

⁶⁷ Canadian Wildlife Services (2000). *Survey on the Importance of Nature to Canadians*.

⁶⁸ Canadian Wildlife Services (2000). *Survey on the Importance of Nature to Canadians*.

In determining how this provincial information might be used to estimate non-consumptive wildlife activities in CD 4, two of these observations are important. The first observation is that, on average, there were 5.4 days of non-consumptive activities for every day of hunting. This would suggest that non-consumptive wildlife activities in the Special Areas could amount to over 330,000 visitor days, assuming that hunting and wildlife viewing activities are evenly distributed throughout the province. The second observation is that people on trips to view wildlife did not travel very far compared to hunters; transportation costs per day for hunters were 5.8 times greater than travel costs for people on trips to view wildlife. This means that wildlife hunting and viewing is not evenly distributed and, given that the Special Areas are located a considerable distance away from major population centres in Alberta, it is unlikely that wildlife viewing activities would exceed hunting.

For purposes of this assessment, it is assumed that the amounts of wildlife viewing activities and hunting in CD 4 are approximately equal. Thus, under current conditions, there are estimated to be approximately 61,200 days of wildlife viewing in the Special Areas. This would be equivalent to a 0.8 per cent share of the Alberta market for wildlife viewing in 1996.

With SAWSP, the amount of wetland habitat would increase: existing wetlands would be stabilized; there would be increased riparian vegetation and shrub cover; native vegetative cover and grasses would be enhanced; and improved structural diversity and habitat conditions would support a more diverse prairie wildlife community. As described in the environmental overview of the project⁶⁹, the benefits to wildlife would be as follows:

- Rest-rotation and deferred grazing practices can enhance habitat conditions for wildlife species that require relatively undisturbed grassland for portions of their life cycle (e.g. pronghorn antelope, upland nesting waterfowl, upland sandpiper, Baird's sparrow and Sprague's pipit).
- Continuous moderate to heavy grazing pressure at certain times of the year would promote use by the ferruginous hawk, burrowing owl, long-billed curlew, horned lark and chestnut-collared longspur.
- The majority of the wetlands would be located in shallow basins, allowing the establishment of aquatic plant and invertebrate species (critical for nesting and brood rearing ducks) found in productive marsh/slough ecosystems. This would provide significant net benefits to waterfowl, especially the northern pintail, as well as semi-aquatic mammals, upland game birds, songbirds and species of frogs and toads with the addition of spawning and rearing habitat.
- Shallow backflood basins would lead to significant increases in the number of waterfowl breeding pairs and broods (especially dabbling ducks), and provide wetland areas for herons, shorebirds and amphibians. When exposed, the lush growth would provide dense cover for upland nesting birds, as well as foraging areas for the long-tailed weasel, burrowing owl and loggerhead shrike.
- The resulting increase in tall shrub cover would greatly enhance existing habitats for deer, particularly in areas devoid of tree cover. Other species that would benefit from increased shrub cover and habitat diversity include long-tailed weasel, loggerhead shrike, other songbirds, frogs and toads, snakes and perhaps species of rare plants.

⁶⁹ Wagner, Greg and Richard Chabaylo (1992). *Special Areas Water Supply Project Environmental Overview*. Planning Division, Alberta Environmental Protection. Executive Summary.

SAWSP is also predicted to have a beneficial impact on some rare and endangered species. Anderson (2000) indicates that 20 sensitive species may benefit through habitat improvements or improved foraging opportunities, and specifically listed the nine species identified in Table 25.

Table 25

Species at Risk That Would Benefit From SAWSP

Species	Federal Status	Alberta Status⁷⁰
Piping Plover	Endangered	At Risk
Burrowing Owl	Endangered	At Risk
Loggerhead Shrike	Threatened	Sensitive
Sprague's Pipit	Threatened	Sensitive
Canadian Toad	Not Listed	May Be At Risk
Northern Leopard Frog	Special Concern	At Risk
Ferruginous Hawk	Special Concern	At Risk
Long-billed Curlew	Special Concern	May Be At Risk
Short-eared Owl	Special Concern	May Be At Risk

Thus, completion of SAWSP would increase the frequency with which people could view common wildlife species like deer, waterfowl and upland birds, while providing new opportunities for people to see a variety of wildlife species that are rare or at risk in Alberta.

It is difficult to predict the extent to which the habitat improvements resulting from SAWSP would attract people to the region to view wildlife. While the region could offer some unique wildlife viewing experiences, there is no information indicating whether people in major population centres would be prepared drive long distances for these opportunities. For this analysis it is assumed that the increase in non-consumptive wildlife activities would match the increase in hunting activity.⁷¹ Thus, some 19,000 additional visitor-days would be expected, with total visitation amounting to 80,200 visitor days. From a provincial perspective, the region's share of the market would increase to 1.1 per cent, an increase of 0.3 percentage points.

The methodology and assumptions used to estimate the economic effects of increased non-consumptive wildlife activity in CD 4 are the same as those employed to estimate the economic impacts of hunting. Based on information from the 1996 survey, average daily expenditures for people viewing wildlife were estimated to be \$28.06 in 2004 dollars, while extra-market benefits were equivalent to \$8.05 per day. This means that regional spending by people viewing wildlife is currently about \$542,700 and would increase to \$711,200 as a consequence of SAWSP. While the additional \$168,000 in visitor spending represents a benefit for regional businesses, this would be considered as a redistribution of spending from a provincial perspective. Total annual extra-market values are predicted to increase from \$492,700 to \$645,700 as a result of SAWSP. The incremental extra-market benefits are calculated to range from \$77,200 to \$129,100 per year.

⁷⁰ Alberta Sustainable Resource Development (2001). *General Status of Alberta Wildlife Species 2000*.

⁷¹ A similar assumption was used in the 2000 analysis completed by Marv Anderson & Associates Ltd. In that report the incremental visitation resulting from SAWSP was predicted to be 20,000 visitor days.

6.4 Other Recreation

The Special Areas also provides opportunities for a variety of other recreational activities, some of which may be affected by SAWSP. A study completed by the IBI Group in 1993⁷² identified 24 recreational sites in the region, half of which are operated by the Special Areas Board.

Twelve sites offered water-based recreation activities: five of these sites are located along the Red Deer River while the other seven are distributed on lakes and reservoirs throughout the region. The other 12 sites were land-based recreational facilities. More than 80 per cent of camping facilities were located at the water-based recreational sites. Two of the key water-based sites, Blood Indian Park on the Blood Indian Reservoir and Prairie Oasis Park adjacent to the Sheerness Cooling Pond, were developed as a result of previous water management projects in the region.

The IBI Group study assessed the potential impacts of SAWSP on recreational activities in the region and concluded that there would be some benefits. It noted that the proposed reservoir sites on Sounding Creek would not support fish populations because of draw-down but could be used for other types of water-based recreation. The IBI Group also concluded that additional flows in the creek systems would benefit adjacent land-based activities but would have little effect on improving water-based activities. It suggested that the most significant benefits of SAWSP related to hunting/wildlife viewing, nature interpretation, and opportunities for walking and hiking. It also concluded that there may be some opportunities for fishing and the development of cottages. With respect to potential development that would be supported by SAWSP, the IBI Group proposed small-scale lodges that would cater to hunters and eco-tourists, the provision of guiding services, more nature interpretation facilities, and a regional marketing strategy that targeted people interested in nature interpretation, wildlife viewing, hiking, and bird watching.

For activities other than hunting and wildlife viewing there is no information on current levels of visitation or usage, and there are no estimates of how this might be affected by implementation of SAWSP. The current project design indicates that, while drawdown on the proposed Lehman would limit opportunities for recreation, the proposed Oyen tributary reservoir would have some recreational potential in an area where there are no other opportunities for water-based recreation. While SAWSP could provide some increased opportunities for both water- and land-based recreation in the region, this would require some development of infrastructure and promotion and, at this time, there are no commitments to do so. Consequently, the potential impacts of SAWSP on other recreational activities have not been quantified.

6.5 Existence, Option and Bequest Values

Within the economics literature there is evidence that people can benefit from an environmental amenity even if they do not actually use them. Existence value refers to a willingness of some people to pay to maintain or preserve the existence of a particular environmental feature. Option value is a measure of what people might pay for the option of being able to experience an environmental amenity at some point in the future. Bequest value is what people might pay to maintain an environmental feature for potential use by future generations.

⁷² IBI Group (1993). *Special Areas Water Supply Project Recreation Study*.

There is some evidence that measures of existence, option and bequest values are embedded in the extra-market values that people ascribe to recreational features that they use⁷³. However, to capture the full value of an environmental amenity, it is also necessary to canvas people who do not actually use that particular amenity. Such studies are uncommon, however, and tend to capture the value of an entire species or environmental amenity rather than measuring the public's willingness to pay for incrementally protecting or enhancing the survival or existence of a species or feature. For example, Young and Thompson (1990) conducted a survey to determine existence and option values for wetlands in southern Saskatchewan by asking a sample of households what they would be willing to pay into a fund to conserve and preserve wetlands.⁷⁴ The study found that 42 per cent of households would be willing to pay an average of \$42 per year, thereby establishing the annual existence of all wetlands at about \$6.5 million. However, the study did not ascertain the existence value for protecting specific wetlands. Other studies have attempted to measure existence values for various wildlife species, such as the spotted owl, grizzly bear, bald eagle, bighorn sheep and whooping crane⁷⁵, but the resulting values were not intended to quantify the potential benefits of specific initiatives that would help preserve part of the species populations.

For these reasons it is not possible to measure the existence, option or bequest values associated with the effects that SAWSP would have on the landscape and wildlife in the Special Areas. Although the evaluation of SAWSP conducted in 2000 estimated an annual value of \$2.0 million based on 979,175 Alberta households being willing to pay \$2 per year to sustain the nine species identified in Table 20, it is not clear that all Alberta households would be willing to pay this much for the habitat improvements that may result from SAWSP. In addition, the \$2 million annual benefit for SAWSP appears to be very large considering that the existence value for all wetlands in Southern Saskatchewan in 1990 was determined to only be about \$6.5 million.

This is not to say that there would be no existence, option or bequest values associated with SAWSP. The problem is that, without any data on the extent to which SAWSP may contribute to the protection of selected wildlife species in the Special Areas or on the value of these contributions to Albertans, any estimates would be highly speculative.

⁷³ Walsh, Richard G. (1986). *Recreation Economic Decisions: Comparing Benefits and Costs*. Venture Publishing Inc., State College, Pennsylvania.

⁷⁴ Young, Don A. and John P. Thompson (1990). *Prairie Pothole Wetlands: Functions and Evaluation*. Wetlands Are Not Wastelands Report 7. Prepared for State of the Environment Reporting, Canadian Wildlife Service and Wildlife Habitat Canada.

⁷⁵ See Mary Anderson & Associates Ltd. (2000). *Socio-Economic Impacts of the Special Areas Water Supply Project*. Footnote 18.

7. Benefit/Cost Analysis

Benefit-cost analysis is a tool used by economists to assess the economic efficiency of proposed investments. It compares quantifiable benefits and costs in the foreseeable future to determine whether benefits would exceed costs. Four different criteria can be used to assess economic efficiency:

CRITERIA		DESCRIPTION
1	Benefit-Cost Ratio (B/C Ratio)	The ratio of cumulative discounted benefits to cumulative discounted costs over a given time period for a particular interest rate. There are no units and the ratio measures the relative efficiency ("bang for the buck") but does not reflect different scales of projects. Projects are not considered efficient if the benefit/cost ratio is less than 1.
2	Net Present Value (NPV) of Incremental Socio-Economic Benefits	Calculated as the cumulative discounted benefits minus cumulative discounted costs over a given time period for a particular interest rate. The NPV measures the incremental cumulative absolute dollar benefits over time and is the best economic measure when selecting between investments that may have B/C ratios that exceed 1.
3	Internal Rate of Return (IRR)	The interest (i.e. discount) rate where the cumulative discounted benefits are exactly equal to the cumulative discounted costs over a given time period. Projects are considered efficient if the IRR exceeds an identified minimum rate of return (usually the discount rate).
4	Pay-back Period	The number of years required to recover the capital and on-going discounted cost of a proposed investment.

To deal with risk and uncertainty, future costs and benefits are discounted into present value equivalents which can then be added and compared. Choice of a discount rate is critical to the analysis and usually reflects the interest rate at which consumers are indifferent between spending now and saving to spend later. For public sector projects the discount rate typically reflects the interest rate on the Government of Alberta long term bonds (currently five per cent) adjusted to exclude inflation (two per cent) or about three per cent per year. For private sector projects, the cost of capital is higher (reflecting greater risk) resulting in borrowing rates of between six and eight per cent (including inflation).

Since the irrigation benefits associated with SAWSP can only be obtained through a combination of public and private capital expenditures, a blended discount rate of five per cent (net of inflation) has been used. This means that the present value of \$1 one year from now is \$0.95 while \$1 to be received in 10 years would have a present value of only \$0.63.⁷⁶ A discount rate of five per cent has been employed on other recent evaluations of other water management projects, and an independent audit of one of these studies determined that such a rate was reasonable for financial discounting. To address uncertainty, sensitivity analysis has been conducted using discount rates of three and seven per cent.

Benefit/cost analysis also employs a number of other important assumptions. One assumption is that, in the future, the prices of various goods and services are relatively the same so the effects

⁷⁶ The present value of \$1 at some point in the future can be calculated using the formula $1/(1+r)^n$, where r is the interest rate and n is the number of years in the future.

of inflation are ignored; this assumption means that it is not necessary to speculate on how the values of different items may change over time. Thus, all costs and benefits are presented as 2004 dollars. A second assumption is that the project has a 50-year life. This was done for calculation purposes, but the present value of benefits and costs beyond 50 years is relatively insignificant. A third assumption is that capital items are paid for in the year they are purchased; this means that the analysis ignores the costs of borrowing. While it was questioned in Section 4 whether farmers in the Special Areas would have access to the capital necessary to purchase irrigation equipment, this analysis assumes that irrigation proceeds regardless of how the irrigation equipment would actually be acquired. Fourth, no value is assigned to the water that would be diverted from the Red Deer River. While water should at least have an opportunity cost (its value in the next best use), there is no information as to what its value in competing uses in the basin would be.

It should be noted that benefit/cost analysis only assesses economic efficiency. It does not address whether a project is fair or socially desirable or warranted for reasons other than efficiency. In determining whether a project is in the public interest, economic efficiency is only one of several factors that are considered.

7.1 Project Costs

The costs used in the benefit/cost analysis are summarized as follows:

- The capital cost of the project is \$192.3 million and would be spread over seven years, as described in Table 7.
- Pumping would commence in Year 6 but only at about 50 per cent capacity, and annual pumping costs thereafter would be \$1.6 million. Maintenance costs would commence in Year 7 and would be \$1.5 million per year.
- Irrigation would commence in Year 6 with irrigation on 38 quarter-sections. Thereafter irrigation would be added at the rate of 23 quarter-sections per year until the maximum of 20,000 acres (152 quarter-sections) is reached. On the assumption that 100 quarter-sections would be served by single systems and 52 quarters would be served by double systems, the average cost of a new centre pivots would be \$103,385 per farm and the cost of providing electrical service to the pumps would be \$24,868. Irrigation equipment would be replaced after 25 years. It is assumed that farmers are financially able to make these investments such that all 152 quarter-sections are being irrigated within six years of the commencement of water diversions.
- The additional cash costs of operating under Scenario 1 (irrigation of alfalfa for sale) at current beef prices, as compared to the Base Case (dryland), were determined to be \$11,510 per quarter-section of irrigation per year (see Table 18). This includes the costs of operating and maintaining the irrigation equipment which were determined to be \$98.50 per acre per year.
- Table 18 shows that the additional agricultural operating costs under Scenario 2 (silage production) would be \$18,557.
- Agricultural operating costs for Scenario 3 (backgrounding of calves) would increase by \$21,511.
- With backgrounding calves and silage production, the incremental operating costs for Scenario 4 would be \$29,517.

- Installation of the stockwatering system described in Section 4.3 would cost \$11.98 million and would be spread over five years, starting in Year 6 when SAWSP first starts pumping. The pipes are assumed to have a 25-year life and would be replaced at that time. No allowance is made for annual pumping costs because they would be the same as under current conditions.

Not included in the analysis are the costs of acquiring the land needed for project construction, as measured in terms of the value of lost production from that land. The analysis also assumes that there is no cost associated with operating backflood irrigation. Also excluded is the \$22.2 million cost of constructing the municipal water supply system along Highway 12. This analysis assumes that this municipal water supply would be constructed regardless of whether SAWSP is constructed and, by being the least-cost alternative, drawing water from SAWSP would save \$9.5 million compared to the next least costly alternative. This cost-savings is included as a benefit.

A detailed description of the annual costs of the project under all four scenarios is provided in Appendix D. This information shows that, over the 50-year life of the project, construction costs would account for between 31 and 39 per cent of cumulative costs (undiscounted), while capital costs associated with irrigation development represent six to seven per cent of total costs. Operating costs associated with the diversion works would account for 25 to 35 per cent of total costs while incremental farm operating costs would range from 17 per cent under Scenario 1 to 35 per cent under Scenario 4. The capital cost of the stockwatering system would only account for about four or five percent of total cumulative costs.

7.2 Project Benefits

The benefits used in the benefit/cost analysis are as follows:

- The incremental revenues of adopting irrigation under Scenario 1 are estimated to be \$32,569 per quarter-section per year, based on sales of irrigated alfalfa and additional grazing resulting from backflood irrigation (see Table 18). The farm financial analysis indicates that each quarter-section of sprinkler irrigation would be able to produce 376 additional tonnes of alfalfa/hay per year. This additional production would mean that farmers would no longer have to purchase oats or greenfeed each year and would be able to sell surplus production (329 tonnes). There would also be 59.1 additional AUMs of grazing that would be sold.
- With Scenario 2 farm revenues would increase by \$41,936 as silage would be sold to the existing cattle herd and 427 tonnes of surplus hay would be sold.
- Under Scenario 3, much of the additional forage production would be used to background cattle, increasing annual beef production by 42 per cent. Farmers would also be able to sell about 255 tonnes of surplus alfalfa/hay each year and 59.1 AUMs of surplus grazing. While this scenario does not appear viable at current beef prices, a return to average prices prior to the discovery of BSE in Alberta would result in increased annual farm revenues of about \$49,169.
- Increased farm revenues under Scenario 4, which features backgrounding cattle on produced silage, would amount to \$60,531 based on pre-BSE cattle prices.
- Increased hay production in the region would mean that farmers no longer have to import significant quantities of hay, especially during dry years, and they would no longer have

to pay the costs of transporting that hay. As noted in Section 4.1.3, these transportation cost savings are assumed to be \$20 for each tonne of hay/alfalfa produced per quarter-section of irrigation. This represents an annual benefit of \$7,524 per quarter section or \$1.14 million once all 20,000 acres are being irrigated.

- The development of a stockwater supply system would allow improved grazing management, increase grazing capacity in a 20-km corridor along the conveyance route by 25 per cent, and provide livestock with cleaner water that increases weight gain in calves. As explained in Section 4.3, grazing capacity is estimated to increase by 104,466 AUMs, with a total value of \$2.61 million per year, based on \$25 per AUM, once the system is fully operational. The additional weight gain resulting from better quality stockwater is estimated to be 265,900 kilograms (585,000 pounds) per year. This would have an annual value of \$444,600 at current beef prices and would increase to \$783,900 if prices are to return to average levels prior to 2003.
- Municipal and domestic water supply benefits are estimated to be \$9.5 million in the first year of operation (Year 6). This is based on the cost savings that would result from not having to develop the next least costly regional water supply system for communities along Highway 12. In addition, an average annual cost savings of \$0.42 million is included to reflect the lower operating costs associated with having one treatment plant, as per Table 23.
- With increased waterfowl populations, the non-market benefits for waterfowl hunters calculated based on time and travel costs savings of sites, as explained in Section 6.1, would be \$57,500 per year.
- The equivalent non-market benefits for people hunting upland bird are estimated to be \$29,100 per year.
- For big game hunters, the non-market benefits of increased ungulate populations would be \$172,600 per year.
- For people participating in various types of non consumptive recreation in the region, the changes in landscapes and wildlife populations would generate annual benefits of \$129,100.

When SAWSP is fully operational and irrigation development has been completed, the total annual benefits would range from about \$10.0 million per year under Scenario 1 to \$14.5 million under Scenario 4. More than half of these benefits (60 to 70 per cent) would be the additional sales of alfalfa and livestock. Improved stockwatering would account for between 23 and 30 per cent of project benefits. About four to six per cent of the benefits would arise in the form or reduced costs for municipal and domestic water supplies. Hunting and non-consumptive use of wildlife would generate about two to four per cent of annual project benefits.

Some project benefits have not been quantified. These include such things as new employment resulting from project construction and operations, increased opportunities for water-based recreation (proposed Oyen Reservoir), expanded opportunities for crop diversification or intensive livestock development, development of value-added businesses in the region, protection of species at risk, and increased regional economic and social stability

7.3 Benefit/Cost Assessment

Detailed summaries of annual project costs and benefits for each year of the project's 50-year operating life are provided for each scenario in Appendix D.

When the costs and benefits of SAWSP, as detailed above, are compared and future values are discounted to present value equivalents at five per cent per year, the resulting benefit/cost ratio for Scenario 1 is 0.552 (see Table D-1). This means that, for every dollar spent, there are 55.2 cents in quantified benefits. Over the life of the project, total project costs would exceed benefits by about \$115 million. It is not possible to calculate either an internal rate of return or a payback period because predicted costs would exceed benefits.

As shown in Table 26, changing the rate of discount has a significant effect on the results of the benefit/cost analysis. Decreasing the discount rate to three per cent gives more weight to future benefits and costs so the benefit/cost ratio for Scenario 1 would increase to 0.697. A higher discount rate, which puts more importance on short term benefits and costs, would decrease the benefit/cost ratio to 0.446. In all cases the present value of future costs under Scenario 1 would always exceed the present value of future benefits by \$95 million.

Table 26

Results of Benefit/Cost Analysis for SAWSP

Discount Rate	Total Benefits	Total Costs	B/C Ratio	Net Present Value
5% Discount Rate				
Scenario 1	\$141,639,285	\$256,592,366	0.552	-\$114,953,081
Scenario 2	\$160,679,816	\$270,916,976	0.593	-\$110,237,160
Scenario 3	\$179,971,682	\$276,921,645	0.650	-\$96,949,962
Scenario 4	\$203,067,499	\$293,195,637	0.693	-\$90,128,139
3% Discount Rate				
Scenario 1	\$218,559,830	\$313,773,736	0.697	-\$95,213,907
Scenario 2	\$248,464,747	\$336,271,863	0.739	-\$87,807,116
Scenario 3	\$278,744,930	\$345,702,750	0.806	-\$66,957,820
Scenario 4	\$315,019,049	\$371,262,563	0.849	-\$56,243,514
7% Discount Rate				
Scenario 1	\$97,918,278	\$219,442,457	0.446	-\$121,524,178
Scenario 2	\$110,825,199	\$229,152,617	0.484	-\$118,327,418
Scenario 3	\$123,910,869	\$233,222,975	0.531	-\$109,312,106
Scenario 4	\$139,566,729	\$244,254,555	0.571	-\$104,687,826

Source: Tables D-1 to D-4 in Appendix D.

The benefit/cost ratio for Scenario 2, which includes the benefits of producing and feeding silage to the existing cattle herd, would increase to 0.593 using the five per cent discount rate, and calculated costs would exceed benefits by \$110 million.

For Scenario 3 the benefit/cost ratio is calculated to be 0.650, or 65.0 cents of quantified benefit for each dollar spent. This benefit/cost ratio is higher than for Scenarios 1 and 2 because it is assumed that, once cattle prices rebound to pre-2003 levels, farmers would background calves and revenues would be significantly higher because of increased beef production at these higher prices. Under Scenario 3, total project costs would exceed cumulative benefits by \$97 million.

The benefit/cost ratio for Scenario 4, which combines the benefits of backgrounding cattle and producing silage, would be 0.693 using the five per cent discount rate, and calculated costs would exceed benefits by \$90 million.

To put the results of the analysis into perspective, these benefit/cost ratios are lower than for some other water management projects that have been evaluated in recent years. While the result for SAWSP falls below the corresponding results for the Oldman River dam (1.17), the Pine Coulee Project (1.18), the Little Bow Project/Highwood Diversion Plan (0.9) and the Milk River dam (0.8), it is significantly higher than the benefit/cost ratio for the proposed Meridian Dam (0.33 to 0.35). Such comparisons should be interpreted with considerable caution, however, because the economic assessments of other water storage projects employed different crop mixes and yields that reflect local soil conditions and agricultural practices, different commodity prices and discount rates, and assumed very different mixes of non-irrigation benefits and costs.

The results of the benefit/cost analysis suggest that, under the most pessimistic conditions (no change in current beef prices), the benefit/cost ratio would only be 0.552. If beef prices return to the long-term average prices prior to 2003 and farmers choose to background calves on irrigated silage, as per Scenario 4, the benefit/cost ratio could increase to 0.693.

In considering the results of the benefit/cost analysis it should be noted it only includes quantified benefits and costs from a provincial perspective. Development of SAWSP would provide additional benefits for the region that are not included in the benefit/cost analysis. Some of these benefits can be quantified and these are addressed in Section 8. Some regional benefits and costs cannot be quantified, however; these are discussed in qualitative terms in Section 9.

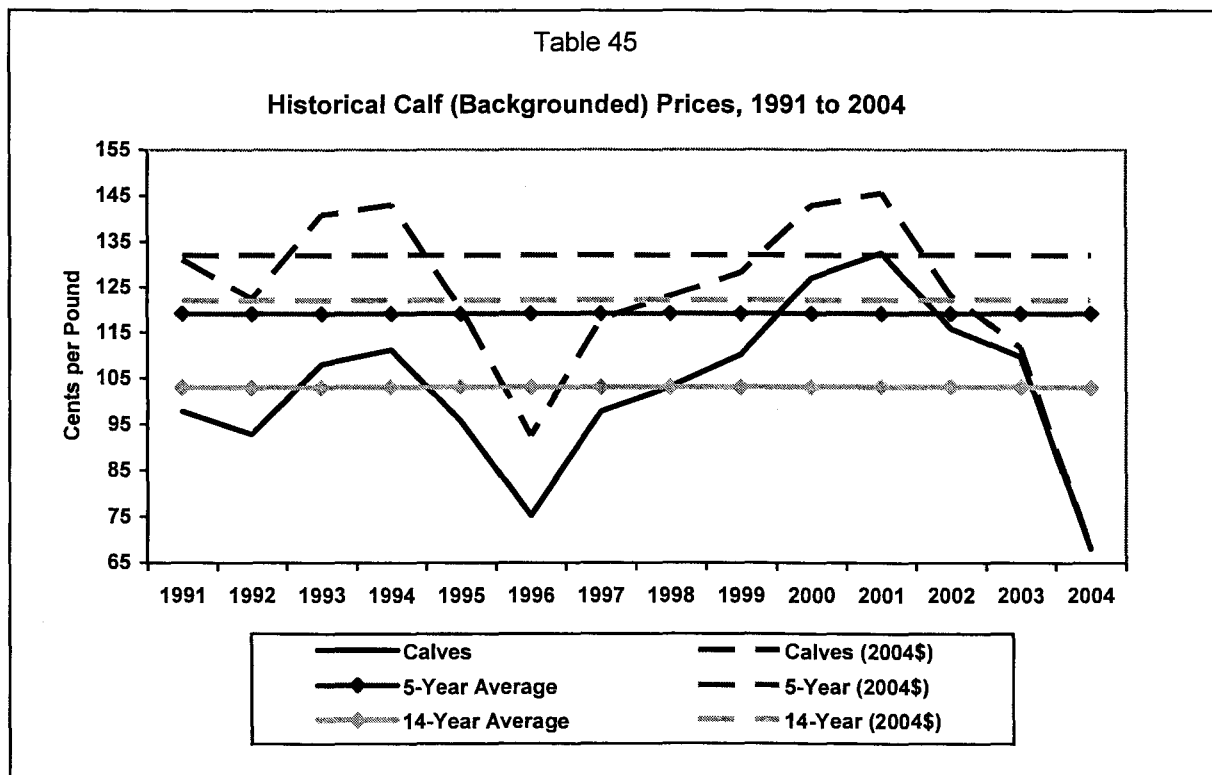
7.4 Sensitivity Analysis

The results in Table 26 are based on two assumptions about future beef prices: that current prices continue or that they return to average levels prior to 2003. Scenarios 1 and 2 assume that current prices continue and this means that, even with irrigation, there would be no financial reasons for farmers to change their current livestock populations or to background calves for sale. This scenario must be considered “pessimistic” given that the provincial and federal governments are currently endeavouring to find ways of supporting and developing both beef production and processing sectors in the hope that prices will return to more normal levels. And, while Scenarios 3 and 4 assume that calf prices would return to average levels for the five-year period from 1998 to 2002, prompting farmers to use irrigated feed for backgrounding calves and/or expanding herds, there is some uncertainty as to whether these prices will ever be attained.

Both the farm financial analysis and the benefit/cost analysis are very sensitive to the assumptions about future beef prices, and this warrants some additional assessment. In assessing

farm finances, AAFRD conducted a sensitivity analysis using a range of prices, including the current price, the current price +25 per cent, the current price +50 per cent, and the five-year average price for 1998 to 2003. To put these prices into context, Figure 45 illustrates the recorded average calf prices since 1991.⁷⁷ During this period prices have been highly variable, increasing from a low of about 75 cents per pound in 1996 to a high of \$1.32 in 2001 and then dropping to 68 cents per pound in 2004. Over the 14-year period, the average price was \$1.03 per pound, and this corresponds to the +50 per cent price scenario used by AAFRD. Using calf prices for the five years prior to 2003 results in the average price of about \$1.19 per pound used by AAFRD; this value is about 75 per cent higher than the current price (see Table 27).

Some of the observed changes in historical prices are due to the effects of inflation, however. And, in forecasting future prices, these inflationary effects should be excluded. Figure 45 also shows historical calf prices in real 2004 dollars. When adjusted for inflation, the 14-year average price is about \$1.22 per pound, which is slightly higher than the unadjusted five-year average price used by AAFRD in the farm financial analysis. This means that the “optimistic” price assumptions used by AAFRD actually reflect average real prices since 1991. The inflation-adjusted average calf price for the five years prior to 2003 is actually \$1.33 per pound, or nearly twice the current price. This higher price is a better approximation of real calf prices in the five years prior to 2003, and should be used as the “optimistic” beef pricing scenario.



⁷⁷ The prices shown for backgrounded calves (60 per cent steers and 40 per cent heifer calves) in the 700 to 800 pound weight range, and prices in 2004\$ are calculated using the consumer price index.

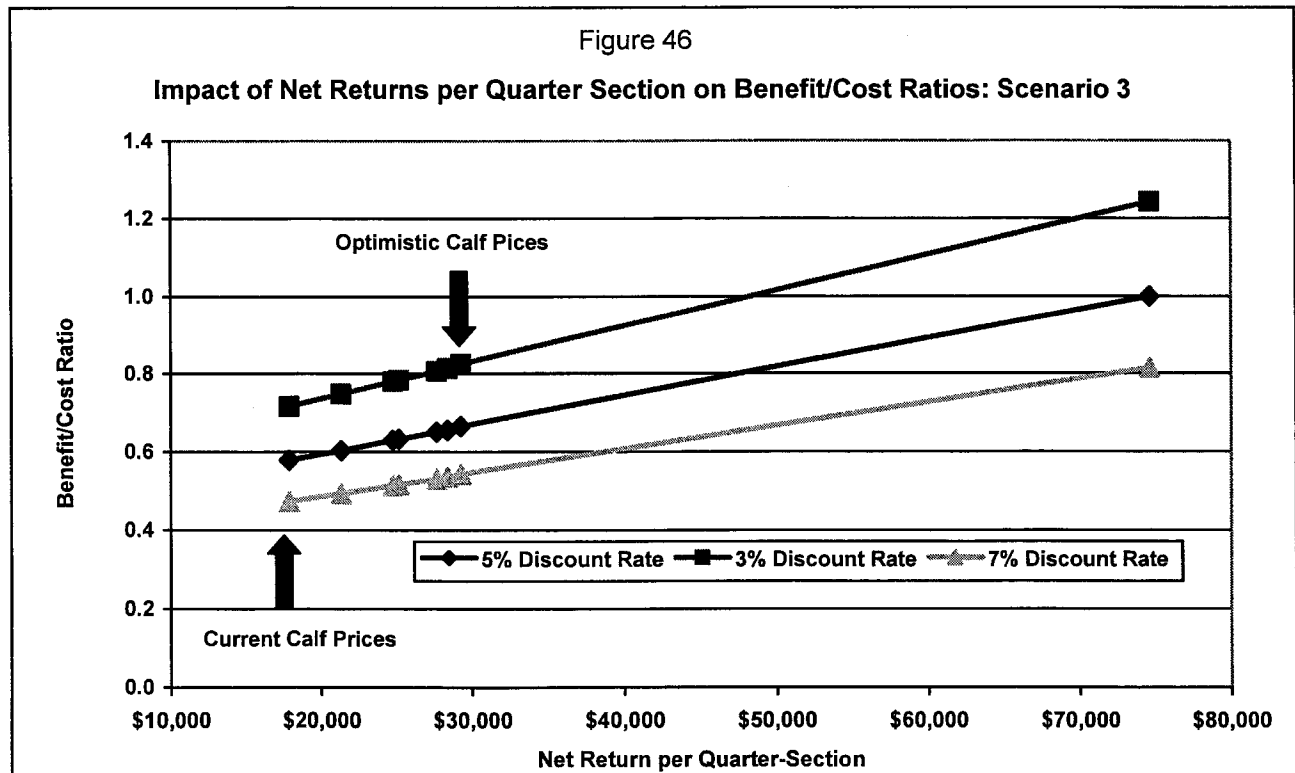
Table 27

**Benefit/Cost Analysis Sensitivity Analysis: Increased Beef Prices
(Discount Rate: 5%)**

Price Scenario	Average Price (\$/per pound)		Scenario 3		Scenario 4	
	Calves (500 to 600 lbs)	Backgrounders (700 to 800 lbs)	Benefit/ Cost Ratio	Net Present Value (millions)	Benefit/ Cost Ratio	Net Present Value (millions)
Current Prices	\$0.76	\$0.68	0.578	-\$116.9	0.625	-\$110.0
25% Increase	\$0.95	\$0.85	0.603	-\$109.9	0.649	-\$103.0
50% Increase	\$1.14	\$1.02	0.629	-\$102.8	0.673	-\$96.0
14-Year Average	\$1.14	\$1.03	0.632	-\$102.0	0.675	-\$95.2
5-Year Average	\$1.34	\$1.18	0.650	-\$96.9	0.693	-\$90.1
5-Year Average (2004\$)	\$1.52	\$1.33	0.660	-\$94.0	0.698	-\$88.7
14-Year Average (2004\$)	\$1.35	\$1.22	0.665	-\$92.8	0.707	-\$86.0

Note: Beef pricing is not the only factor affecting the benefit/cost ratios. The benefit/cost ratios also reflect differences between calf prices and backgrounder prices, as well as the differences in operating costs.

Figure 46



Use of this higher real price for calves does not affect the calculation of the net benefits of Scenarios 1 or 2 since beef production is the same as the Base Case. For Scenario 3, the beef production from backgrounding calves under this “optimistic” price assumption would increase net farm net revenues by about \$49,895 per year over the Base Case. Use of this “optimistic” price assumption would then yield a benefit/cost ratio of 0.660 with a net present value of -\$94.0 million (See Table D-3 in Appendix D). However, based on the price differential between calves and backgrounders, the highest benefit/cost ratio (0.665) results when 14-year average prices expressed in 2004 dollars are used.

For Scenario 4, the most optimistic pricing assumption (five-year average prices in 2004 dollars) produces a benefit/cost ratio of 0.698 with a net present value of -\$88.7 million. As was the case for Scenario 3, the highest ratio of benefits to costs occurs when 14-year average prices expressed in 2004 dollars are used. Under these prices, the benefit/cost ratio rises to 0.707 and the net present value is -\$86.0 million.

Table 27 shows the benefit/cost ratios for Scenario 3 for the full range of long- and short-term average prices in both current and constant (2004\$) terms. Given all the agricultural development scenarios and the beef price assumptions used in the analysis, the benefit/cost ratio for SAWSP reflecting best use of irrigation in support of beef production likely falls in the range of 0.65 to 0.70.

If quantified benefits are to exceed costs, the analysis suggests that net returns from irrigation would have to be larger than under Scenarios 3 or 4. Under Scenario 4, the gross margin is estimated to increase by about \$33,053 per quarter section under the most optimistic cattle pricing assumptions. As shown in Figure 46, total benefits would equal total costs if the gross margins were to increase by about \$74,600 per quarter-section. This is about 2.25 times the incremental gross margin generated under Scenario 4.

7.5 Risk Assessment

Since a benefit/cost analysis is based on a series of assumptions, it is necessary to consider whether the outcome of the analysis would change significantly if some of these assumptions proved to be incorrect. Thus, this section assesses the risk of error in the calculation of project benefits and costs.

7.5.1 Agricultural Assumptions

The most significant potential source of risk relates to the predictions of future agricultural production, prices, and costs. It should be noted that agricultural benefits would not start until six years after project construction commences and, as observed for the last two years, the agricultural industry can go through considerable changes in a short time.

In the medium term, however, Agriculture Canada notes that “A review of the EU Common Agricultural Policy in 2003, and the US farm legislation in 2002, combined with the current World Trade Organization (WTO) negotiations on agriculture and services indicate the uncertainties for agricultural markets”.⁷⁸ Agriculture Canada also notes that because of various

⁷⁸ Agriculture Canada (2002). *Medium Term policy baseline international and domestic markets from September 2001*.

policies and programs, the real cost of food (net of inflation) will continue to fall over time while farm input costs are likely to rise at the rate of inflation or even faster, thereby continuing the cost squeeze experienced by Canadian farmers over the past decade. This trend may be exacerbated by the recent very significant increase in world energy prices.

A key assumption used in the benefit/cost calculations for this study is that, in real terms, agricultural prices and costs would remain relatively constant over the next 56 years. While such an assumption is highly unlikely, the use of 5-year (2004\$) calf prices for the period immediately prior to the impact of BSE on Canadian cattle markets provides a reasonably optimistic assessment of future conditions. Thus, considering future uncertainty in world agricultural markets, this assessment provides a reasonable range of possible future agricultural market conditions.

7.5.2 Climate Change

The assessment is based on the assumption that historical precipitation patterns and flows in the Red Deer River will continue throughout the forecast period. This implicitly means that water from the Red Deer River will always be available for diversion by SAWSP, as long as instream flow requirements are met.

While the potential effects of climate change are being debated, future changes in precipitation and river flows could significantly affect the results of the economic analysis of SAWSP. Drier conditions in the region could increase demands for water from SAWSP, and the costs and values of agricultural production could increase accordingly. However, if flows in the Red Deer River gradually decline, the availability of water for diversion to SAWSP may decline because it would have a water licence that has a junior priority compared to all existing water licence priorities in the basin. Thus, there is some risk that, if climate change results in lower river flows, farmers and other users may not be able to get all the water they need in very dry years, resulting in yields that would be less than assumed in the farm financial analysis. This would reduce revenues and would affect farm financial viability, especially with the higher costs associated with borrowing to purchase irrigation equipment. This might affect the rate at which the additional 20,000 acres of potential new irrigation are developed and this, too, could affect the results of the benefit/cost analysis.

7.5.3 Farm Finances

Another critical assumption is that farmers in the Special Areas will have access to the capital required in six years after project construction commences to make the necessary investments to realize the benefits. This is a key assumption because approximately 10 to 12 per cent of project costs are dependent on farmers making an initial investment in irrigation equipment. Another 17 to 28 per cent of costs will be borne by farmers as they pay to operate these irrigation systems over a 50-year period. And, depending on the assumptions about future beef prices, agricultural benefits account for about 90 per cent of quantified project benefits.

As to whether farmers located along the SAWSP conveyance system are in a financial position to invest \$100,000 or more in a new low-pressure centre-pivot system, anecdotal information suggests that they are more resilient and adaptive than was modeled in AAFRD's farm financial assessment and are still showing positive returns from farming despite poor livestock markets.

There is also anecdotal information that it is lack of water, rather than lack of money, that is preventing further irrigation expansion in areas adjacent to the Sheerness-Deadfish system. For these reasons, the projections of agricultural revenues used in the benefit/cost analysis assume that there are no financial barriers to making this investment and, from this perspective, this assessment must be considered optimistic. If financial barriers do prevent investment in irrigation from proceeding as rapidly as predicted, project benefits would drop, resulting in a lower benefit/cost ratio.

7.5.4 Municipal Water Supplies

The assessment of benefits for municipal water supplies was based on the assumption that, with a new regional water supply system, local residents would be paying about 15 per cent more per cubic metre of water than do current customers of the HKRWS. Thus, new water rates were estimated to be about \$1.10 per cubic metre and this would generate cost savings for most of the consumers who would tie into a regional system. However, as noted in Section 5.3, the actual costs of water under a regional water supply system are difficult to predict and will depend on how the capital costs of the project are allocated among users. If the actual cost of supplied water is higher, the cost savings to existing consumers would be reduced. For example, if the cost of water were to increase from \$1.10 to \$1.25 per cubic metre, the annual savings would be \$0.32 million. The cost savings would drop to about \$0.16 million if the average cost per cubic metre was \$1.50. This would have the effect of reducing the benefit/cost ratio for Scenario 4 from 0.707 to 0.702 at \$1.25 per cubic metre or 0.694 at \$1.50 per cubic metre.

A second assumption included in the calculations is that current water use in the communities along Highway 12 would remain constant over time. Section 5.3 noted that, over the period from 1996 to 2001, the population of the region currently not served by a regional water supply system dropped by 15.4 per cent while communities serviced by the HKRWS only decreased by 1.9 per cent. The benefit/cost analysis implicitly assumes that, with a regional system, the population along Highway 12 would stabilize such that total water use would remain the same. If the regional population continues to decline however, and water consumption decreases, the costs savings to the remaining water users would decrease and this would further reduce the benefit/cost ratio by a small amount.

7.5.5 Summary

Given the range of assumptions used in the benefit/cost analysis and the associated risk and uncertainty, it is not possible to select one specific benefit/cost ratio that best describes the economic efficiency of developing SAWSP. As shown in Table 27, the ratio of quantified benefits to quantified costs is likely in the range of 0.65 to 0.070. Development of SAWSP will also generate other benefits and costs that cannot be quantified, and some of these are addressed in Section 8.

The most pessimistic scenario, which assumes that current beef prices continue throughout the forecast period and that farmers would irrigate hay for sale and would not change their livestock operations, would produce a benefit/cost ratio of 0.552. However, current prices reflect what is hoped to be temporary situation where Alberta beef exports are significantly restricted. As both the federal and provincial governments move to correct this situation, there is a general expectation that beef prices will eventually rise, but it is not clear when this will occur or to what

extent prices will rebound. Scenario 4 shows how farmers might change their livestock management practices in response to beef prices that rise to average levels prior to the discovery of BSE. The resulting benefit/cost ratios at the high end of the range represent the most optimistic assessment of SAWSP. The most likely prediction is that beef prices (net of inflation) will rise but that market conditions will never be quite the same as prior to 2003. Based on this conclusion, the probable benefit/cost ratio for SAWSP is in the range of 0.70.

While there is some uncertainty associated with the non-agricultural components of the analysis, the significance of this uncertainty is relatively small because, as noted previously, agriculture accounts for about 90 per cent of benefits. Consequently, the non-agricultural benefits could double without having a significant impact on the results of the benefit/cost analysis.

8. Socio-Economic Impact Assessment

While benefit/cost analysis assesses whether a project is economically efficient, the purpose of a socio-economic impact assessment is to quantify how a proposed project would affect regional and provincial economies in terms of total economic output, earned income and employment. This information can be used to demonstrate the distributional effects of a proposed project and to assess whether a project would contribute to provincial and regional economic goals and objectives.

In assessing impacts three different measures are considered:

- Direct impacts arise when firms expand their output to supply the goods and services needed to construct and operate the project.
- Indirect impacts occur when these firms purchase goods and supplies from other companies.
- Induced impacts occur when construction and operational workers spend their project-related income on consumer goods and services.

It should be noted that impacts are not always benefits, since committing resources to one project might simply draw resources away from another region or project and only the net change between projects would be considered a benefit.

Estimation of the provincial total, direct, and indirect impacts of constructing and operating SAWSP was done using the *Alberta Economic Multipliers 2000*, prepared by Alberta Finance. These multipliers describe the linkages among the various sectors of the economy and estimate the extent to which additional expenditures in one sector would influence the other sectors. The report characterizes impacts using three measures:

- gross domestic product (GDP) which measures the value of all final business transactions that would arise from the investment in project development and operations;
- employment, which is measured in person-years; and,
- labour income.

The provincial multipliers are calculated for 2002 but, for purposes of this analysis, are assumed to apply in 2004.

Estimation of the regional impacts was based on Appendix C of the 1992 assessment of SAWSP.⁷⁹ Normally, regional multipliers are simply not available, but the 1992 study constructed a regional input-output model that reflected economic conditions at that time and was able to calculate the extent to which activity in one regional sector would affect the other sectors. While the absolute value of these regional multipliers changes over time due to inflation and other factors, it is expected that the ratio of the regional to provincial multipliers would remain fairly similar over time. Thus, regional multipliers for 2002 were calculated by applying this ratio to the 2002 provincial impacts.

⁷⁹ Technical Subcommittee, Project Rationale (1992). *Special Areas Water Supply Project: Project Rationale*.

Table 28

Economic Impacts of Constructing SAWSP

	Economic Activity (GDP) (millions)		Employment (person-years)		Labour Income (millions)	
	Province	Region	Province	Region	Province	Region
Total Construction Period						
Direct Impacts	\$117.3	\$82.1	1,240.5	784.5	\$56.4	\$35.1
Indirect and Induced			720.8	431.5	\$31.5	\$19.4
Total Impacts			1,961.3	1,216.0	\$87.9	\$54.5
Peak Year of Construction						
Direct Impacts	\$30.5	\$21.4	322.6	204.0	\$14.7	\$9.1
Indirect and Induced			187.4	112.2	\$8.2	\$5.1
Total Impacts			510.0	316.2	\$22.9	\$14.2
Stockwater Supply System (Annual)						
Direct Impacts	\$1.5	\$1.0	15.5	9.8	\$0.7	\$0.4
Indirect and Induced			8.9	5.4	\$0.4	\$0.3
Total Impacts			24.4	15.2	\$1.1	\$0.7

Table 29

Provincial Annual Economic Impacts of Operating SAWSP

	Economic Activity (GDP) (millions)	Employment (person-years)		Labour Income (millions)	
	Total	Direct	Total	Direct	Total
Agricultural Investment Phase					
Irrigation Equipment	\$1.93	7.2	16.9	\$0.69	\$0.85
Operational Phase					
Project Operations & Maintenance	\$1.22	4.7	8.9	\$0.32	\$0.44
Agricultural Operations – Scenario 1	\$3.37	35.7	61.2	\$0.41	\$1.22
Agricultural Operations – Scenario 4	\$6.77	71.7	122.8	\$0.83	\$2.45
Tourism	\$0.39	11.4	13.0	\$0.20	\$0.26
Total Impacts	\$4.98 to \$8.38	51.8 to 87.8	83.1 to 144.7	\$0.93 to \$1.34	\$1.92 to \$3.15

Table 30

Regional Annual Economic Impacts of Operating SAWSP

	Economic Activity (GDP) (millions)	Employment (person-years)		Labour Income (millions)	
	Total	Direct	Total	Direct	Total
Agricultural Investment Phase					
Irrigation Equipment	\$0.67	2.1	5.9	\$0.10	\$0.30
Operational Phase					
Project Operations & Maintenance	\$0.85	3.0	4.9	\$0.15	\$0.25
Agricultural Operations – Scenario 1	\$2.63	30.8	49.3	\$0.33	\$0.98
Agricultural Operations – Scenario 4	\$5.28	61.9	99.0	\$0.67	\$1.97
Tourism	\$0.24	10.2	11.7	\$0.18	\$0.24
Total Impacts	\$4.36 to \$5.67	44.0 to 75.1	65.9 to 115.6	\$0.66 to \$0.99	\$1.46 to \$2.45

It should be noted that economic multipliers provide a very simplistic and static assessment of how new economic activity in one sector might generate new activity elsewhere in the economy, based on a “snapshot” of existing conditions in the region. Regional economies tend to be very vigorous and change over time. However, more dynamic approaches to measuring impacts require regional economic data and the development of such models is beyond the scope of this study.

8.1 Project Construction

Initial construction would create significant economic activity in Alberta and the region. As shown in Table 7, a total of \$192.3 million would be spent over a period of seven years, with peak construction activity amounting to about \$50.0 million in Years 4 and 5.

The provincial impacts of project construction were estimated using multipliers for the non-residential construction sector and the resulting estimates of cumulative and peak year impacts are presented in Table 28. The table shows that, over the entire construction period, project construction would generate about \$117.3 million in economic activity in Alberta, both directly and indirectly. The difference between this number and the total value of construction reflects amounts that would be spent outside the province for labour, goods or services. It is estimated that about 70 per cent of this activity (\$82.1 million) would occur in CD 4. In terms of employment, project construction would generate a total of 1,961.3 person-years, including 1,240.5 person-years directly on project construction. About 63 per cent of employment would be in CD 4. It should be noted that once adjustments are made for differences in construction costs between this study and the assessment completed in 1992, the estimates of employment impacts in Table 28 are very similar to the previous estimates.

During the peak year of construction, the project would directly generate 323 person-years of employment in Alberta and 203 person-years for regional residents. There would be another 187.4 person-years of employment in spin-off jobs in the province; 112.2 person-years of this would be in the region. The labour income generated by project construction in the peak year would amount to \$22.9 million for Alberta and \$14.2 million for CD 4. Based on recent regional economic conditions (2001), project construction during the two peak years could account for as much as three per cent of total regional employment and increase total regional labour income by more than eight per cent.

Since the capital costs of the project would likely come from the provincial government, it is assumed that if SAWSP were not constructed, the money would be spent on other capital items elsewhere in the province. Thus, the provincial impacts are distributional effects, not benefits, while the regional impacts would be considered benefits.

Stockwater benefits resulting from SAWSP are predicated on the construction of a stockwatering system. As described in Section 4.3, this component would be constructed over five years at an average annual cost of \$2.4 million. The annual impacts associated with this construction are also presented in Table 28. This element of construction would create about 24.4 person-years of employment provincially of which 15.2 man-years would be regional employment. Annual labour income would amount to \$1.1 million in Alberta and \$0.7 million in the region.

Figure 47

Impact of SAWSP on Regional Income

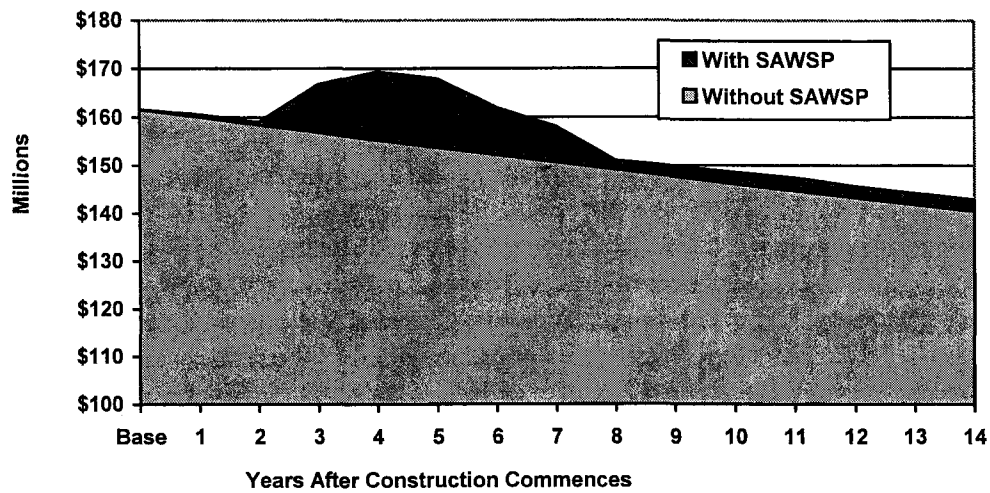
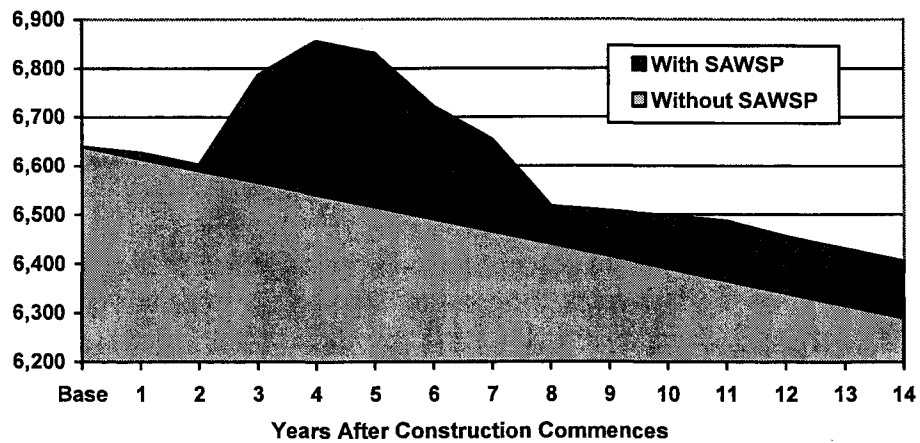


Figure 48

Impact of SAWSP on Regional Employment



8.2 Operational Impacts

As construction activity starts to drop off, agricultural development would commence with an agricultural investment phase where farmers would purchase and install irrigation equipment. There would be several additional agricultural investment phases over the life of the project when farmers replace their irrigation and other equipment. Each agricultural investment phase would last about six years. .

Estimates of the provincial and regional impacts of the agricultural investment phase of the project are provided in Tables 29 and 30. Table 29 shows that during each year of the agricultural investment phase, there would be about \$1.93 million in additional economic activity, producing 7.2 person-years of employment in manufacturing and selling irrigation and other capital equipment. This would generate an additional 9.7 person-years of indirect and induced employment. The total annual impact on provincial labour income would be \$0.85 million. The corresponding regional impacts of this agricultural investment phase are provided in Table 30. About one-third of the employment impacts (5.9 person-years) would occur in the region, likely associated with sales and installation of equipment since there is little regional manufacturing. The additional annual labour income would be \$0.30 million. On the assumption that, without SAWSP, most of the spending on irrigation and related equipment would not otherwise have occurred in the region, the regional impacts listed in Table 30 can be considered as benefits.

Project operations would commence once irrigation equipment has been installed. Farmers would start buying more bedding and feed, veterinarian services, and fuel. Under Scenario 1, farmers would spend an additional \$1.75 million per year on these items. This would increase to \$4.49 million under Scenario 4. Additional employment and labour income is expected as a result of increased visitation and tourist spending associated with increased wildlife populations. Operation and maintenance of the pipeline and canals would also lead to additional employment and labour income.

Once in full operation, SAWSP would account for between \$5.0 and \$8.4 million in annual economic activity in Alberta. This range reflects the different levels of agricultural activity that would result from irrigation, using Scenario 1 for the lower estimate and Scenario 4 for the higher estimate. Actual impacts are likely to fall somewhere in this range. Provincial employment impacts would range from 83.1 to 144.7 person-years. This includes 4.7 person-years directly for project operation and maintenance, between 35.7 and 71.7 person-years in directly providing goods and services to irrigation farmers, and 11.4 person-years directly involved with providing goods and services to hunters and tourists. The other 31.3 to 56.9 person-years of employment would be indirect and induced employment distributed throughout the provincial economy. The on-going provincial labour income resulting from operations would range from \$1.92 to \$3.15 million per year.

Table 30 summarizes the regional impacts of operating SAWSP and shows that the majority of operation impacts would occur in the region, including 80 per cent of employment and 75 per cent of labour income. On an ongoing basis SAWSP is expected to create between 65.9 and 115.6 person-years of employment per year and additional labour income ranging from of \$1.46

to \$2.45 million. About two-thirds of the employment impacts would be directly associated with SAWSP, either through project operations (3.0 person-years), tourism (10.2 person-years), or increased agricultural activity (30.8 to 61.9 person-years). The other 21.9 to 40.5 person-years would be spin-off employment.

The regional significance of these income and employment benefits is demonstrated in Figures 47 and 48. In terms of impacts on labour income, Figure 47 shows that, using total earned income for CD 4 in 2001 as a base, income would rise substantially during project construction and would stabilize after the agricultural investment phase in Year 12. The additional labour income over the long term represents a 1.5 per cent increase over 2001 levels. However, as noted in Section 2.3, regional earned incomes have actually been declining in real terms (net of inflation) over time. Between 1996 and 2001 this decrease averaged 1.55 per cent per year. Without SAWSP this trend is expected to continue as working age people migrate out of the region. Thus, the ongoing operations of SAWSP would offset much of the predicted decrease in earned income for the region and would also reduce annual variability in regional incomes associated with fluctuating dryland agriculture.

Figure 48 shows a similar pattern for regional employment, assuming that each person-year of employment is equivalent to one full time job. Over the long term total employment in the region would also increase by 1.7 per cent over 2001 levels. If some of the employment results in part-time jobs, the total number of regional residents benefiting from the project could be substantially larger. As noted in Section 2.2, the number of people in the regional workforce has been declining in recent years. Between 1996 and 2001 the number of employed regional residents dropped by 1.9 per cent, or about 25 people per year. Development of SAWSP would substantially increase regional employment during project construction and, in the long term, would slow the rate of decline in regional employment and population.

8.3 Economic Diversification

With SAWSP there would be a limited amount of economic diversification in the region. Since most of the project benefits would result from expansion and stabilization of the regional livestock sector, many of the new jobs created as a result of SAWSP would be in those market segments that traditionally supply goods and services to the farm community. However, with increased consumptive and non-consumptive uses of regional wildlife resources, there would be some expansion of the tourism industry. In addition, communities located along Highway 12 expect that improved water quantity and quality from a regional water supply would catalyze economic growth and diversification by attracting agricultural value-added processing and other industries that are currently unable to develop due to lack of water.

Perhaps the greatest potential for economic diversification rests with the development of intensive livestock operations in the region. As noted earlier, a considerable number of large swine operations have developed throughout the Special Areas but further expansion is hindered by lack of water. With SAWSP, intensive swine operations in the Special Areas could expand to the point where companies that provide goods and services to these operations decide to set up regional operations. Similar potential may also exist for the beef industry although the timing of this would be uncertain because of current market conditions.

8.4 Impacts on Municipalities

The census information provided in Section 2 showed that the population in most of the municipalities in the Special Areas is declining. Between 1996 and 2001 the population of Consort and Youngstown dropped by more than 20 per cent; a decrease of more than 10 per cent was reported for Cereal; the populations of Veteran and Hanna declined by less than 10 per cent. Only Oyen reported a moderate population increase (1.1 per cent). Based on demographic and economic characteristics, this downward trend in regional populations, particularly young people with families, is predicted to continue unless there is significant new economic development in the region.

Continuation of these trends will pose considerable difficulties for municipal governments. For example, as young people leave communities, there will be fewer students. Prairie Land Regional School Division #25 currently serves 1625 students in grades one to twelve, as well as approximately 112 kindergarten students.⁸⁰ The Division operates 18 schools scattered widely throughout the jurisdiction. Ten of these schools, one of which is an Outreach School, are located in towns and hamlets, while eight are located in colonies of Hutterian Brethren. School utilization rates are already very low, ranging from 38 per cent at Hanna primary school to 58 per cent at Consort⁸¹, so further reductions in the number of school-age children will increase per capita schooling costs, possibly leading to staff cuts, and could eventually precipitate school closures. As a result, the costs of providing schooling for the remaining population would increase, including the financial costs of maintaining school programs and the social costs arising from increased travel times for students.

The opposite problem occurs for seniors. As noted in Section 2, the regional population of people over 65 is expected to increase dramatically in the near future, leading to increased demands on hospitals and long term care facilities. At the present time utilization of the Hanna and Oyen acute care ranges between 61 and 65 per cent, but utilization of the long term care facilities is between 85 and 93 per cent.⁸² These utilization rates can be expected to increase over time as the population ages, but staffing may become a significant issue as young adults migrate out of the region.

Another problem is that the rising costs of municipal governments will be borne by a declining population. While the urban population of the Special Areas decreased by five percent between 1996 and 2001, total municipal property taxes increased by 11.7 per cent between 2001 and 2003. Thus, the remaining population will likely face increasing property taxes to maintain the same levels of municipal services or will have to accept reductions in municipal services.

Development of SAWSP would partially address some of the concerns about municipal government finances and services in the Special Areas. The regional urban population is small enough that any increase in employment can have a significant effect. And, for every new job created, it is expected that the regional population would increase by 1.7 to 2.0 people. Thus, the 70.6 to 95.3 new person-years of employment directly and indirectly resulting from SAWSP could translate into a population increase of 140 to 190 people, most likely in the larger

⁸⁰ As reported at <http://www.plrd.ab.ca/>.

⁸¹ Utilization rates for schools in the Prairie Land Regional School Division #25 were provided by Jay Slempp, Chair, Special Areas Board.

⁸² Utilization rates for hospitals were provided by Jay Slempp, Chair, Special Areas Board.

communities of Hanna and Oyen, and would include some school age children. With additional economic diversification, the regional population could increase even more. And, with a better quality water supply pipeline to communities along Highway 12, the number of people leaving these communities may decline. Thus, by keeping taxpayers and their families in the region and possible attracting new workers, SAWSP would have a beneficial impact on local government finances and the provision of educational and health services.

8.5 Other Impacts

While this report has quantified the benefits of SAWSP for the agricultural sector and for the region as a whole, the project would also improve economic and social well-being of farm families. As noted in Section 2, agriculture and farm families are the mainstay of the regional economy. Yet, the statistics indicate farm families in the Special Areas are under stress:

- In 2001 there were 85 fewer farms in CD 4 than in 1996.
- Between 1995 and 2000 farm operating expenses in CD 4 increased by 66 per cent while gross revenues only increased by 41 per cent.
- In CD 4, the gross return (receipts less expenses) per acre of owned land for farmers in 2001 was 45 per cent lower than for farmers in Central Alberta.
- In 2004 the average capital investment per acre of owned land for farmers in CD 4 was 55 per cent lower than for farmers in Central Alberta.
- As shown in Figure 25, climatic variability causes significant fluctuations in crop yields and revenues in CD 4.
- Market response to the discovery of BSE caused livestock prices to drop by 43 per cent since 2002.
- About 22 per cent of farm families report using poor quality groundwater.

Given these stresses and uncertainties, farm families in CD 4 have had to adopt a very cautious and conservative approach to their operations in order to survive: cutting costs, deferring capital investments, and taking employment in the non-agricultural sectors to supplement farm incomes. At the same time, outmigration from urban areas has led to closures of local businesses, requiring farm families to travel farther to access the full range of goods and services.

SAWSP would remove some of the stress and uncertainty for many farm families in the region, either by providing better quality drinking water, allowing sprinkler or backflood irrigation development, or providing direct employment in project construction or maintenance. By drought proofing the region, the significant variability in crop production would be reduced, farm incomes would be more stable, and there would be opportunities for agricultural diversification and intensification. And, as economic conditions for agricultural families improve, it is expected that urban populations would also benefit through increased employment in response to increased demand for goods and services and levels of outmigration might decline, leading to greater regional stability.

9. Summary

Based on the analysis of current conditions in the Special Areas, it is apparent that this part of rural Alberta has been in economic and social decline for some years. The regional population is shrinking and aging; young adults and families are leaving the region; few people are migrating into the region. Earned incomes in the region are currently only 75 per cent of the Alberta average. And, while agriculture remains the cornerstone of the regional economy, the stability of existing operations and possibilities for further expansion of this sector and associated diversification are limited by lack of reliable supplies of water and feed. Without some sort of intervention, continued decline of the Special Areas is inevitable.

9.1 Socio-Economic Impacts of SAWSP

This assessment of the social and economic impacts of implementing SAWSP demonstrates that this project would help stabilize the regional economy and would provide opportunities for future economic growth and diversification. A summary of the quantifiable provincial and regional economic impacts and benefits is provided in Table 31. It should be noted that benefits represent net gains to the provincial or regional economies whereas impacts occur when economic activity is redistributed within the provincial economy, with the Special Areas region drawing resources from other parts of the province.

Table 31 shows that, from a provincial perspective, the operation of SAWSP would generate annual benefits in the range of \$8.6 to \$10.2 million, with between 61.2 and 122.8 person-years of new employment. While the project would annually create an additional 21.9 person-years of employment and between \$1.9 and \$3.2 million in income, these are classified as impacts because SAWSP would be drawing these resources from other parts of the province. The higher numbers are more likely and are based on Scenario 4, which assumes that beef prices would return to average levels experienced prior to the discovery of BSE in Alberta in 2003 and that farmers would background cattle using irrigated silage.

From a regional perspective, the employment and income benefits would exceed the provincial numbers because SAWSP would draw resources into the region from elsewhere. New employment once SAWSP is in full operation would range between 65.9 and 115.6 person-years per year. Regional income would increase by between \$8.7 and \$10.3 million.

Table 31 also shows that construction of SAWSP and related facilities would generate considerable short-term impacts and benefits for both the province and the region. The cumulative regional impacts during construction of the project, the stockwatering system and municipal water supply system would amount to 1237 person-years of employment and \$65 million in labour income.

SAWSP is also expected to provide the region with other types of benefits that are not amenable to quantification. A partial list of these includes the following:

- Improvements in human and livestock health as a result of improved water quality in communities along Highway 12.
- Creation of opportunities for farmers to diversify and intensify agricultural operations, resulting in greater net revenues for farm families and regional businesses.

Table 31

Summary of Quantifiable Economic Impacts and Benefits of the Special Areas Water Supply Project

	Type of Effect	Time Frame	Alberta				Special Areas Region	
			Impacts		Benefits		Benefits	
			Employment Person-years	Income (Millions)	Employment Person-years	Income (Millions)	Employment Person-years	Income (Millions)
Project Construction	Employment/income with spin-off effects	Cumulative for 7 years	1961.3	\$87.9			1216.0	\$54.5
Operations & Maintenance	Employment/income with spin-off effects	Annual for project life	8.9	\$0.44			4.9	\$0.25
Irrigation Infrastructure	Employment/ income with spin-off effects	Annual for 6 years	16.9	\$0.85			5.9	\$0.30
Agriculture Scenario 1 Scenario 4	Net change in production	Annual for project life				\$4.34/ \$5.85		\$4.34/ \$5.85
	Employment /income with spin-off effects	Annual for project life		\$1.22/ \$2.45	61.2/ 122.8		49.3/ 99.0	
Stockwatering Scenario 1 Scenario 4	Construction with spin-off effects	Annual for 5 years			24.4	\$1.10	15.2	\$0.70
	Net change in production	Annual for project life				\$3.40/ \$3.50		\$3.40/ \$3.50
Municipal Water Supplies	Cost savings to consumers	Annual for project life				\$0.42		\$0.42
	Capital cost savings over alternatives	One time benefit				\$9.50		\$9.50
Recreation & Tourism Industry	Extra-market benefits to visitors	Annual for project life				\$0.39		\$0.04
	Employment /income with spin-off effects	Annual for project life	13.0	\$0.26			11.7	\$0.24
TOTAL	Cumulative effects of all construction		1978.2	\$88.8	24.4	\$16.10	1237.1	\$65.0
	Annual effects post construction		21.9	\$1.92/ \$3.15	61.2/ 122.8	\$8.55/ \$10.16	65.9/ 115.6	\$8.69/ \$10.30

- Increasing the potential for the development of new value-added businesses due to increased agricultural productivity and improved reliability of water.
- Effective utilization of existing health and education infrastructure due to stabilization of the regional population.
- Increasing the municipal tax base so that the increase in tax revenues would allow existing services to be maintained without major tax rate increases.
- Increasing opportunities for water-based recreation along the conveyance system and particularly at the proposed Oyen reservoir.
- Improving protection and creation of habitats for threatened and endangered species.
- Providing increased existence, option and bequest values for Albertans and others through the creation, protection and enhancement of habitats.
- Stabilizing the regional population and, by doing so, maintaining or increasing demands for goods and services from regional companies, resulting in fewer business closures.
- Reducing stress and uncertainty for farm families as a result of drought proofing many farms.
- Reducing demands on government and from other sources during drought events.
- Improving the quality of life for regional residents through increased landscape diversity.

In assessing whether SAWSP is in the public interest, these unquantified benefits must be considered in addition to the quantified benefits identified in Table 31.

9.2 *Should SAWSP Be Developed?*

The assessment indicates that construction of SAWSP would require a significant investment of resources. A total investment of about \$250 million would be required, with farmers being expected to account for \$59 million (24 per cent of the total) through the purchase of irrigation and stockwatering infrastructure. However, given the high costs that farmers have faced to feed and water livestock through recent drought events, it is believed that farmers are willing and able to make this investment. Thus, the success is dependent on whether the Alberta Government will commit the resources necessary to construct the project.

In assessing whether the Alberta Government should develop SAWSP, two questions need be considered. Should the provincial government provide economic support to the Special Areas to stabilize or enhance economic and social conditions in the region? The second question is whether the investment in a regional water system represents the best means of providing this support.

9.2.1 Government Policy on Rural Development

With respect to whether the Alberta Government should provide economic support for stabilizing or enhancing economic and social conditions in the Special Areas, a review of current Alberta government policies and business plans shows that rural development is a high priority item.

9.2.1.1 Government of Alberta 20 Year Strategic Business Plan

One of the objectives in the Government of Alberta 20 Year Strategic Business Plan is “To build a rural Alberta that has vibrant and sustainable communities”.⁸³ Strategies in support of this objective include working to implement the Rural Development Framework, implementing a collaborative approach to regional economic development, and actively participating in watershed management on a provincial, regional and community basis. Provincial targets include developing baseline data on the satisfaction of rural Albertans with regards to health, education, economic development, community infrastructure and other elements of sustainability and undertaking eight significant regional economic development projects in rural Alberta.

9.2.1.2 MLA Steering Committee Report on Rural Development

The MLA report was completed in March 2004⁸⁴ in response to questions from rural Albertans regarding the future of their communities and their potential role in Alberta’s overall economic development strategy. Included in this report is a vision for future rural development in Alberta that was developed by the MLA Steering Committee in association with rural stakeholders:

A rural Alberta that has vibrant and sustainable communities in which rural and urban families, individuals, organizations, businesses and governments are vital contributors to the growth, prosperity and quality of life for Albertans.

The Committee recommended a framework for rural development that called for strengthening of the four pillars of rural communities: health, learning and skill development, economic growth, and community infrastructure.

With regard to the Special Areas, the weakest of the four pillars is perceived to be economic growth. In general, declining economic activity and diminishing populations will actually reduce demands on education and health services and community infrastructure over time, potentially resulting in closure of facilities and elimination of programs that can no longer be supported by the remaining population. With respect to seniors, demands for services will continue to grow, but the region may eventually have neither the workforce nor the business services required to satisfy this demand. Thus, the key to the sustainability of the Special Areas is economic growth; a stable or increasing regional population will help ensure the effective and efficient use of existing education and health services and community infrastructure

Concerning rural economic growth, the MLA Steering Committee made the following recommendations:

- Encourage rural partnerships and regional cooperation as a driving force for rural growth and sustainability.
- Increase flexibility in policies and regulations to respond to rural needs and regional uniqueness.
- Increase access to venture capital and loans targeted at rural Alberta.
- Encourage and support value adding of rural resources to maximize rural growth and sustainability.
- Encourage and support small business projects in rural Alberta.

⁸³ As stated at <http://www.finance.gov.ab.ca/publications/budget/budget2004/govbp.html>.

⁸⁴ MLA Steering Committee Report on Rural Development (2004). *Rural Alberta: Land of Opportunity*.

- Increase the recognition of tourism as a high-growth potential sector of the economy, particularly the rural economy.

9.2.1.3 Alberta's Rural Development Strategy

This strategy was completed in February 2005⁸⁵ and makes the following commitment:

The Government of Alberta officially recognizes the importance of rural Alberta and its contributions to the Alberta Advantage and is committed to work together with rural communities and rural Albertans to foster a vibrant and sustainable rural Alberta.

The strategy identifies nine priority actions. One of these actions is the promotion of economic growth in rural Alberta. It notes that, without a secure rural economy, businesses are not able to survive, there are limited employment opportunities for young people, and it is increasingly difficult to attract and hold entrepreneurs, professionals and highly skilled employees in rural communities. As a result, the strategy commits to securing a more positive future for Alberta's agriculture industry, noting that one of the key provincial government strategies is to achieve a goal of \$10 billion in primary agricultural production and \$20 billion in value-added production by 2010. Of the various tasks to support economic growth in rural Alberta, the strategy identifies three that relate directly to SAWSP:

- Work with communities, industries and others to ensure that there is a sustainable supply of water to support a broad range of development in rural Alberta.
- Expand innovative and value-added business opportunities in rural Alberta.
- Expand tourism opportunities in rural communities by developing new tourism destinations in rural Alberta.

A second priority action is to sustain and enhance the quality of Alberta's rural environment. It notes that a first priority will be to implement Alberta's *Water for Life* strategy and work with rural communities to maintain a safe and secure water supply. Accordingly, the *Rural Development Strategy* commits to:

- Increasing funding to upgrade water and sewage treatment systems and establishing a long-term capital development fund to support regional water and waste water management systems.

Other priority actions of the *Rural Development Strategy* include improving access to health care and expanding learning and skill development opportunities.

9.2.1.4 SAWSP and Rural Development

Based on these three initiatives, it is clear that SAWSP is consistent with rural development policies and strategies in Alberta. SAWSP addresses four of the six recommendations made by the MLA Steering Committee on Rural Development:

- SAWSP is a cooperative solution for water and economic growth issues throughout a very large region that includes rural and urban populations in the Special Areas as well as the County of Paintearth and the County of Stettler. Support for the project is broadly based.

⁸⁵ A copy of this strategy, entitled "A Place to Grow" can be obtained from <http://www.rural.gov.ab.ca/strategy/grow-feb2005.pdf>.

- The project would also maintain existing value-added businesses and would provide support for new ventures. It was noted earlier that some proposed value-added enterprises have been cancelled because of a lack of a reliable water supply.
- SAWSP would benefit numerous existing small businesses in the region, including those farmers who choose to adopt irrigation and well as the businesses that develop to supply, service, and maintain irrigation equipment.
- By developing new wetlands and increasing waterfowl, upland bird and ungulate habitat, SAWSP will provide increased tourism opportunities, and lead to increased employment for those sectors of the regional economy that support tourism.

With respect to the new *Alberta Rural Development Strategy*, SAWSP would provide a sustainable supply of water to east-central Alberta that would:

- stabilize and enhance existing agricultural development,
- provide opportunities for new value-added business opportunities,
- provide new opportunities for tourism and recreation, and,
- provide upgraded water service to urban and rural communities in the northern half of the Special areas.

Thus, implementation of SAWSP is consistent with Alberta's rural development policies and would help ensure establishment of a sustainable and vibrant economy in east-central Alberta.

9.2.2 The Importance of Water in the Special Areas

With respect to whether investing in a regional water system is the best means of providing economic support to the Special Areas and adjacent counties, the evidence suggests that, at the present time, lack of reliable, high-quality water is the most significant limiting factor.

As noted in Section 2.7, an improved water supply was one of eight major themes discussed at the East Country Growth and Planning Summit held in February 2004. Regional residents are highly aware of the role that the Henry Kroeger Regional Water Supply system has played in sustaining population and economic growth in urban and rural communities along Highway 9 and SAWSP appears to be the most cost-effective means of benefiting communities in the northern part of the region along Highway 36. It was observed in Section 5.3 that the populations of communities served by the Henry Kroeger Regional Water Supply system remained relatively stable between 1996 and 2001 (a decline of only 1.9 per cent) while communities not served by a regional water system declined by 15.4 per cent. This statistic clearly demonstrates the importance of a reliable high-quality water supply.

From an agricultural perspective, recent history has shown that, in times of drought, farmers have incurred high costs to feed and water their livestock, even transporting them considerable distances to find suitable pasturage. And, while farmers in the region have been following the provincial trend toward increased intensification of the livestock sector, it appears that without a more reliable water source, livestock expansion in the Special Areas may be near or at its limit. Thus, for the major economic driver of the regional economy (agriculture directly accounts for about 40 per cent of regional employment), lack of water is currently preventing regional agricultural expansion and, without some drought proofing through enhancement of water supplies, regional farmers continue to face a significant risk of crop failure. With SAWSP about

10 per cent of the farms in CD 4 would have a more secure future. This would translate into more stability for businesses that provide goods and services to agriculture and would offer the potential for both expansion and agricultural diversification in the region.

Thus, for purposes of developing a sustainable and vibrant economy in east-central Alberta, providing water to the region via SAWSP appears to be an effective solution.

APPENDIX A – Census of Agricultural Data

Table A-1

Farm Size and Ownership Characteristics in Census Division 4

	SA #2	SA #3 & Acadia	SA #4	Total
Total Farms	571	573	343	1,487
Farm Area (acres)	2,067,350	1,730,911	991,992	4,790,253
Owned	883,052	785,812	524,654	2,193,518
Rented/Leased from Government	1,035,698	754,703	390,987	2,181,388
Rented/Leased from Others	112,700	136,256	58,779	307,735
Average Farm Size (acres)	3,621	3,021	2,892	3,221

Table A-2

Farm Land Use Characteristics

	Census Division 4				Central Alberta	Alberta
	1996	2001	Change	Per Cent of Total	Per Cent of Total	Per Cent of Total
Crops	1,119,148	1,148,371	29,223	24.0%	41.4%	46.2%
Summerfallow	559,511	494,358	-65,153	10.3%	5.6%	5.9%
Tame/Seeded Pasture	360,446	386,145	25,699	8.1%	11.3%	10.6%
Natural Pasture	2,815,120	2,634,926	-180,194	55.0%	37.4%	31.7%
Other Land	114,374	126,453	12,079	2.6%	4.2%	5.7%
Total	4,968,599	4,790,253	-178,346	100.0%	100.0%	100.0%

Table A-3

Use of Farm Lands for Crop Production (Acres)

Crop Type	1996	2001	Change	Per Cent of Total
Total Wheat	575,324	472,959	-102,365	41.2%
Spring Wheat	482,500	356,336	-126,164	31.0%
Durum Wheat	91,368	5,727	-85,641	0.5%
Winter Wheat	1,456	0	-1,456	0.0%
Oats	108,328	117,070	8,742	10.2%
Barley	102,258	123,275	21,017	10.7%
Mixed Grains	23,753	46,270	22,517	4.0%
Rye	21,046	20,011	-1,035	1.7%
Alfalfa & Alfalfa Mixtures	138,708	191,738	53,030	16.7%
Other Tame Hays/Fodders	49,226	65,546	16,320	5.7%
Canola	63,951	32,238	-31,713	2.8%
Mustard Seed	14,785	22,281	7,496	1.9%
Dry Field Peas	675	20,479	19,804	1.8%
Dry Field Beans	0	13,209	13,209	1.2%
Canary Seed	8,055	880	-7,175	0.1%
Triticale	4,704	12,722	8018	1.1%

Table A-4

Livestock Populations in Census Division 4

Species	Number of Farms				Number of Animals			
	1996	2001	Change	Per Cent Change	1996	2001	Change	Per Cent Change
Total Hens & Chickens	104	91	-13	-13%	73,178	65,821	-7,357	-10%
Turkeys	17	17	0	0%	1604	127	-1,477	-92%
Cattle & Calves	1,169	1,105	-64	-5%	302,794	349,259	46,465	15%
Bulls	985	925	-60	-6%	8,000	7,412	-588	-7%
Total Cows	1,121	1,062	-59	-5%	131,529	129,874	-1,655	-1%
Milk Cows	44	16	-28	-64%	953	296	-657	-69%
Beef Cows	1,105	1,062	-43	-4%	130,576	59,159	-71,417	-55%
Heifers	756	690	-66	-9%	23,311	32,685	9,374	40%
Steers	471	253	-218	-46%	20,704	26,127	5,423	26%
Calves - under 1 year	1,037	1,054	17	2%	109,250	153,161	43,911	40%
Total Pigs	64	43	-21	-33%	24,487	65,591	41,104	168%
Total Sheep & Lambs	37	65	28	76%	5,364	5,204	-160	-3%
Horses & Ponies	579	558	-21	-4%	4,479	4,081	-398	-9%
Goats	38	38	0	0%	383	749	366	96%
Bison	6	13	7	117%	62	626	564	910%

Table A-5

Farm Receipts and Expenses

	Census Division 4		Central Alberta		Alberta	
	1996	2001	1996	2001	1996	2001
Farms	1,572	1,487	14,563	13,561	59,007	53,652
Acres	4,968,599	4,790,253	13,448,780	13,437,954	51,964,360	52,058,898
Gross Receipts (000s)	\$251,128	\$358,884	\$1,781,223	\$2,259,358	\$7,911,131	\$9,919,447
Expenses (000s)	\$189,203	\$318,882	\$1,481,809	\$2,006,584	\$6,669,475	\$8,908,533
Farm Capital (000s)	\$1,528,926	\$2,081,866	\$10,977,357	\$16,017,479	\$40,150,414	\$55,256,378
Average Per Farm						
Receipts	\$159,751	\$241,347	\$122,312	\$166,607	\$134,071	\$184,885
Expenses	\$120,358	\$214,447	\$101,752	\$147,967	\$113,029	\$166,043
Net Return	\$39,393	\$26,900	\$20,560	\$18,640	\$21,042	\$18,842
Capital	\$972,599	\$1,400,044	\$753,784	\$1,181,143	\$680,435	\$1,029,903
Average Per Acre						
Receipts	\$51	\$75	\$132	\$168	\$152	\$191
Expenses	\$38	\$67	\$110	\$149	\$128	\$171
Net Return	\$13	\$8	\$22	\$19	\$24	\$20
Capital	\$308	\$435	\$816	\$1,192	\$773	\$1,061
Average Per Acre of Owned Land						
Receipts	\$116	\$164	\$233	\$299	\$252	\$323
Expenses	\$88	\$145	\$194	\$266	\$213	\$290
Net Return	\$29	\$18	\$39	\$33	\$40	\$33
Capital	\$708	\$949	\$1,436	\$2,120	\$1,281	\$1,800

APPENDIX B – Special Areas Water Supply Project Updated Cost Estimate

Component	Year 2000 Cost Estimate (\$Millions)	Year 2004 Cost Estimate (\$Millions)
Pump Station ¹	15.23	15.23
Pipeline ¹	10.04	10.04
Canal to Shooting Lake ¹	48.45	48.45
Shooting Lake Reservoir ²	2.88	3.24
Canal – Shooting Lake to Sullivan Lake ³	11.82	11.1
Sullivan Lake Reservoir (30,000 dam ³ capacity)	27.68	
(4000 dam ³ capacity) ³		3.7
Canal – Sullivan Lake (30,000 dam ³) to Headwaters ⁴	26.33	
– Sullivan Lake (4000 dam ³) to Headwaters ³		32.6
Distribution System		
Water Supply Reservoirs ⁵	7.99	31.73
Multi-use Projects ³	9.67	10.17
Canals ⁶	3.92	14.59
Channel Improvements ³	4.69	11.43
Total Cost ⁷	168.7	192.28

Notes:

1. Costs based on Year 2000 estimates prepared by MPE (2000) with no adjustments. Based on work conducted by AMEC (2004), inflationary increases would be approximately offset by reduced costs due to design criteria modifications.
2. Year 2004 costs for Shooting Lake Dam based on Year 2000 costs inflated by 3 percent per year.
3. Year 2004 costs estimated by AMEC (2004). Canal costs based on updated design criteria and lower capacity.
4. Year 2004 canal cost (highlighted) estimated by AMEC and shown here for comparison purposes. The cost is not included in the total.
5. Reservoirs for the 2004 estimate include an enlarged Lehman Reservoir (25,000 dam³) and an offstream reservoir (16,000 dam³), diversion works and a delivery canal north of Oyen.
6. Distribution system canal costs include several canals that bypass multi-use projects for economic and water quality purposes.
7. All costs shown include a 20 percent contingency allowance and 15 percent engineering costs.

References:

AMEC 2004. SAWSP In-basin Distribution System – Summary Report. Special Areas Board. Hanna.

AMRC 2004. Letter to Mr. Abner Grover providing canal and reservoir costs in the Sullivan Lake area. Special Areas Board. Hanna.

MPE 2000. SAWSP Cost Estimate Update Study. Special Areas Board. Hanna.

APPENDIX C: Special Areas Water Supply Project – Economic Analysis Assumptions⁸⁶

The focus of the farm irrigation projects was to reduce the risk and income effects of feed and grazing shortages. There were also trials related to slightly increasing the cow-herd as well. Irrigation was used to irrigate 132 acres alfalfa, which was used to feed cattle, or sold when in excess. There was also 38 acres of backflooded land available for grazing to these farms. For the analysis when cow-herds were not expanded, the grazing was valued at market value of \$25/AUM because it would either be sold, or used when additional grazing would have been bought.

There are three scenarios analyzed for this project:

Base Case:

- A farm financial assessment of a 6180 acre farm with 170 cows, 700 acres of wheat and Durum, 80 acres of barley, 320 acres of hay and greenfeed, 280 acres of summerfallow, and no irrigation.

Scenario 1:

- The same farm as the base case except with 132 acres of irrigation and 38 acres of back flood. The cow herd is the same, and all the calves are sold at weaning. Excess feed and grazing was sold.

Scenario 2

- The same farm as scenario 1 except with the addition of silage. 75.5 acres of silage are required to feed the cow herd and the additional land is used to produce dry feed which is sold. It was also assumed that half the silage was done by a custom silage crew.

Scenario 3

- The same farm as the base case except with irrigation, and 38 acres of back flood. The cow herd remained the same but the calves were backgrounded on the farm and sold later. Some additional irrigated alfalfa was also sold, as well as some grazing.

Scenario 4

- The same farm as scenario 3 with irrigation and back flood, but silage is used as the main source of feed for the cattle. 75.5 acres of silage is required to feed the cows and the backgrounders. It was assumed half the silage was made by a custom crew. Additional land is used to produce dry feed which is sold.

More specific details of land use, cattle weights sale prices, etc. are found for each scenario on the 'Farm Structure' page.

Limitations

One of the bigger limitations to this study is that the budgets are for 'established' irrigation farms. These budgets are for specific farms that have been operating with irrigation for a period of time. Most of the numbers are based on irrigation operations in southern Alberta. There is no consideration in the farm budgets for the transition time and money required to invest

⁸⁶ Adapted from the analysis prepared by the Economics Unit, Alberta Agriculture, Food and Rural Development on November 22, 2004.

in the irrigation system, as well as any of the other one time costs associated with the changes on the farm. Cash outlays and financing requirements could limit producers from participating even if the investment has long term profit potential.

These budgets are 'snapshots' of a farm under these different assumptions. How specific aspects of financing and production/costs impact each farmer's operation are best done with the specific data for each investment situation. Analyzing the investment in building an irrigation system and retained ownership strategies is best served under a multi-year farm expansion study, rather than a simple profitability study.

Other important assumptions to consider are:

- It was assumed that all of the land was owned
- Government payments were not included in the calculations

Cropping Assumptions

Cost and return profiles are from AgriProfit\$ data for brown soils from the year 2002 and indexed forward to 2003.

*Yields are:

Wheat	20	bu/ac
Durum	18	bu/ac
Barley	27	bu/ac
Tame Hay	1.1	tonne/ac
Dryland Greenfeed	1.5	tonne/ac
Irrigated Alfalfa	3.4	tonne/ac

*Yields are estimated from AFSC five and ten year averages for Special Areas 3.

Selling prices are:

Alfalfa hay	\$95/tonne
Wheat	\$209.44/tonne
Durum	\$173.06/tonne

Cow-calf and Drylot Enterprises

- 1) The cow-calf, and pasture benchmarks (Cost profiles) are based on *AgriProfit\$* benchmarks with estimates used to represent 2003.
- 2) Drylot costs are from 2002, and indexed forward to 2003.
- 3) Prices and livestock weights are estimates for current conditions, and are shown on the, "Farm Structure" pages.

Sensitivity Analysis

There was a sensitivity analysis completed which is shown on the income statement pages. In the one set, grain prices were adjusted 10% above and below the prices used, which affected the sale and purchase price of all grains.

For the cattle sensitivity, there were three scenarios: a decrease of 10%, an increase of 10% and 50%. In the first three cases, these price changes were only applied to the weaned or feeder calf prices. The changes were for the respective increase in price for both the stated heifer and steer prices. There were no adjustments made on the cull cow prices. Given the prices used, it does not seem unrealistic to have a 50% increase in calf prices in the future.

One last sensitivity case was done with respect to the cattle enterprise. Historical average prices were used for the calf prices, and the cull cattle prices were also adjusted.

- For weaned calf prices, the average selling price for October and November from 1998 – 2002 were used.
 - This worked out to \$1.37/lb for weaned steers and \$1.29/lb for weaned heifers.
- For feeder calf prices, the average selling price for April and May from 1999 – 2003 were used.
 - This worked out to \$1.21/lb for the steers, and \$1.16/lb for the heifers.
- Cull bull and cow prices were increased from \$0.20/lb to \$0.40/lb.

NOTE: On the income statement there is an average calf selling price as well as a breakeven calf selling price at the bottom. I would like to note that this is a “rough” breakeven price since it is the breakeven price for the entire farm. Therefore, it is influenced by a change in the grain enterprise as well, and should be used with caution.

Financial Summary Special Areas Water Project

	Base Case 170 cows	Scenario 1 (Irrigation) 170 cows – Sell Excess feed	Scenario 2 (Irrigation) 170 cows with Silage	Scenario 3 (Irrigation) 170 cows & Backgrounding	Scenario 4 (Irrigation) Backgrounding with Silage
A. Value of production	\$124,423.39	\$156,992.39	\$166,359.39	\$163,795.39	\$175,157.39
B. Variable Costs	\$129,525.16	\$138,819.06	\$146,181.71	\$149,967.63	\$158,354.21
C. Total capital cost	\$60,693.25	\$70,578.83	\$69,325.69	\$71,080.29	\$69,569.89
D. Total Unpaid Labour	\$19,392.80	\$20,384.02	\$20,632.80	\$21,688.55	\$21,988.40
E. Total production costs	\$190,218.40	\$209,397.89	\$215,507.40	\$221,047.92	\$227,924.10
F. Total cash costs	\$145,074.68	\$156,585.30	\$163,631.70	\$166,585.92	\$174,591.33
Gross Margin (A-F)	-\$20,651.29	\$407.09	\$2,727.69	-\$2,790.53	\$566.06
Return to Unpaid Labour (A-E+D)	-\$46,402.21	-\$32,021.48	-\$28,515.22	-\$35,563.98	-\$30,778.31
Return to Equity (A-E)	-\$65,795.01	-\$52,405.50	-\$49,148.01	-\$57,252.53	-\$52,766.71
Investment					
Land	\$1,461,000.00	\$1,583,100.00	\$1,583,100.00	\$1,583,100.00	\$1,583,100.00
Buildings	\$87,108.50	\$89,161.18	\$89,161.18	\$89,161.18	\$89,161.18
Machinery & Irrigation	\$191,469.00	\$290,419.52	\$310,419.52	\$300,219.52	\$320,219.52
Breeding Stock	\$185,400.00	\$185,400.00	\$185,400.00	\$185,400.00	\$185,400.00
Total Investment	\$1,970,004.50	\$2,148,080.70	\$2,168,080.70	\$2,157,880.70	\$2,177,880.70
5 Year Average Calf Prices (1998 - 2002 calf crops)					
A. Value of production	\$170,374.94	\$202,943.94	\$212,310.94	\$219,544.39	\$230,906.39
B. Variable Costs	\$129,525.16	\$138,819.06	\$146,181.71	\$149,967.63	\$158,354.21
C. Total capital cost	\$60,693.25	\$70,578.83	\$69,325.69	\$71,080.29	\$69,569.89
D. Total Unpaid Labour	\$19,392.80	\$20,384.02	\$20,632.80	\$21,688.55	\$21,988.40
E. Total production costs	\$190,218.40	\$209,397.89	\$215,507.40	\$221,047.92	\$227,924.10
F. Total cash costs	\$145,074.68	\$156,585.30	\$163,631.70	\$166,585.92	\$174,591.33
Gross Margin (A-F)	\$25,300.26	\$46,358.64	\$48,679.24	\$52,958.47	\$56,315.06
Return to Unpaid Labour (A-E+D)	-\$450.66	\$13,930.07	\$17,436.33	\$20,185.02	\$24,970.69
Return to Equity (A-E)	-\$19,843.46	-\$6,453.95	-\$3,196.46	-\$1,503.53	\$2,982.29
Investment					
Land	\$1,461,000.00	\$1,583,100.00	\$1,583,100.00	\$1,583,100.00	\$1,583,100.00
Buildings	\$87,108.50	\$89,161.18	\$89,161.18	\$89,161.18	\$89,161.18
Machinery & Irrigation	\$191,469.00	\$290,419.52	\$310,419.52	\$300,219.52	\$320,219.52
Breeding Stock	\$185,400.00	\$185,400.00	\$185,400.00	\$185,400.00	\$185,400.00
Total Investment	\$1,970,004.50	\$2,148,081.70	\$2,168,080.70	\$2,157,880.70	\$2,177,880.70

Farm Structure (Base Case)

	Acres	Livestock				
Native Range	3200	Cows	170			
Tame Pasture	1600	Replacement Heifers	28			
Backflooded						
Pasture	0	Bulls	8			
Dryland tame hay	280					
Dryland Greenfeed	40				2004	5yr avg
						prices
						\$/lb
Dryland Durum	350	Cash Sales	# sold	Weight	\$/lb	\$/lb
Dryland Wheat	350	steers	78	535	\$0.80	\$1.37
Dryland Barley	80	Heifers	51	505	\$0.70	\$1.29
Summerfallow	280	Culls	27	1150	\$0.20	\$0.40
Irrigated						
Greenfeed	0	Bulls	2	1900	\$0.20	\$0.40
Irrigated Alfalfa	0					
Total Acreage	6180					
Days on feed	151					
Days Grazing	214					

	Tonnes or \$/Tonne					
Feed	Produced	Purchased	Fed cows	Sold	Selling Price	Inventory
Barley	47	0	47	0	\$0.00	0
Oats	0	44.5	44.5	0	\$0.00	0
Durum	171.5	0	0	171.5	\$209.44	0
Wheat	190.5	0	0	190.5	\$173.06	0
Alfalfa/Hay	308	0	308	0	\$0.00	0
Greenfeed	60	5	62.8	0	\$0.00	2.2

Grazing

	AUM's Produced
Native	800
Tame	640
Backflooded	0
Aftermath	253
Total	1693
AUM's required	1692

Income Statement (Base Case)

	Standard		Calves	Calves	Calves	Grain	Grain	5yr avg
	Budget	\$/Ac	Down 10%	up 25%	up 50%	down 10%	up 10%	Prices
Income								
Crop Sales	\$68,886.89	\$11.15	\$68,886.89	\$68,886.89	\$68,886.89	\$61,998.20	\$75,775.58	\$68,886.89
Livestock Sales	\$58,382.50	\$9.45	\$53,241.25	\$71,235.63	\$84,088.75	\$58,382.50	\$58,382.50	\$104,334.05
Adjustments - Product inventory	\$154.00	\$0.02	\$154.00	\$154.00	\$154.00	\$154.00	\$154.00	\$154.00
Accounts receivable	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Less Livestock Purchases	\$3,000.00	\$0.49	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00
Value of Production	\$124,423.39	\$20.13	\$119,282.14	\$137,276.52	\$150,129.64	\$117,534.70	\$131,312.08	\$170,374.94
Expenses								
Seed	\$7,550.04	\$1.22	\$7,550.04	\$7,550.04	\$7,550.04	\$7,550.04	\$7,550.04	\$7,550.04
Fertilizer	\$12,626.07	\$2.04	\$12,626.07	\$12,626.07	\$12,626.07	\$12,626.07	\$12,626.07	\$12,626.07
Chemicals	\$11,778.42	\$1.91	\$11,778.42	\$11,778.42	\$11,778.42	\$11,778.42	\$11,778.42	\$11,778.42
Crop Insurance/Program Premiums	\$9,530.10	\$1.54	\$9,530.10	\$9,530.10	\$9,530.10	\$9,530.10	\$9,530.10	\$9,530.10
Feed and Bedding	\$4,800.00	\$0.78	\$4,800.00	\$4,800.00	\$4,800.00	\$4,355.00	\$5,245.00	\$4,800.00
Veterinary, Medicine & Breeding	\$3,712.80	\$0.60	\$3,712.80	\$3,712.80	\$3,712.80	\$3,712.80	\$3,712.80	\$3,712.80
Trucking and Marketing	\$4,096.97	\$0.66	\$4,096.97	\$4,096.97	\$4,096.97	\$4,096.97	\$4,096.97	\$4,096.97
Fuel	\$10,419.44	\$1.69	\$10,419.44	\$10,419.44	\$10,419.44	\$10,419.44	\$10,419.44	\$10,419.44
Repairs and Maintenance	\$15,364.20	\$2.49	\$15,364.20	\$15,364.20	\$15,364.20	\$15,364.20	\$15,364.20	\$15,364.20
Utilities and Miscellaneous	\$18,350.45	\$2.97	\$18,350.45	\$18,350.45	\$18,350.45	\$18,350.45	\$18,350.45	\$18,350.45
Custom Work & Specialized Labour	\$6,481.00	\$1.05	\$6,481.00	\$6,481.00	\$6,481.00	\$6,481.00	\$6,481.00	\$6,481.00
Operating Interest Paid	\$1,414.88	\$0.23	\$1,414.88	\$1,414.88	\$1,414.88	\$1,414.88	\$1,414.88	\$1,414.88
Paid Labour and Benefits	\$4,008.00	\$0.65	\$4,008.00	\$4,008.00	\$4,008.00	\$4,008.00	\$4,008.00	\$4,008.00
Unpaid Labour	\$19,392.80	\$3.14	\$19,392.80	\$19,392.80	\$19,392.80	\$19,392.80	\$19,392.80	\$19,392.80
Total Variable Cost	\$129,525.16	\$20.96	\$129,525.16	\$129,525.16	\$129,525.16	\$129,080.16	\$129,970.16	\$129,525.16
Fixed Costs								
Land Rent/Livestock Lease	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Taxes, water rates, Lic. & Insurance	\$17,924.07	\$2.90	\$17,924.07	\$17,924.07	\$17,924.07	\$17,924.07	\$17,924.07	\$17,924.07
Equip & Building Depreciation	\$25,750.92	\$4.17	\$25,750.92	\$25,750.92	\$25,750.92	\$25,750.92	\$25,750.92	\$25,750.92
Paid Capital Interest	\$17,018.26	\$2.75	\$17,018.26	\$17,018.26	\$17,018.26	\$17,018.26	\$17,018.26	\$17,018.26
Total Capital Costs	\$60,693.25	\$9.82	\$60,693.25	\$60,693.25	\$60,693.25	\$60,693.25	\$60,693.25	\$60,693.25
Total Cash Costs	\$145,074.68	\$26.61	\$145,074.68	\$145,074.68	\$145,074.68	\$144,629.68	\$145,519.68	\$145,074.68
Total Production Cost	\$190,218.40	\$30.78	\$190,218.40	\$190,218.40	\$190,218.40	\$189,773.40	\$190,663.40	\$190,218.40
Gross Margin	-\$20,651.29	-\$6.48	-\$25,792.54	-\$7,798.17	\$5,054.96	-\$27,094.98	-\$14,207.61	\$25,300.26
Return to Management	-\$65,795.01	-\$10.65	-\$70,936.26	-\$52,941.89	-\$40,088.76	-\$72,238.70	-\$59,351.33	-\$19,843.46
Average Calf Sale Value	\$398.55		\$358.69	\$498.18	\$597.82	\$398.55	\$398.55	\$700.73
Break-even Value (\$/calf sold)	\$908.59		\$908.59	\$908.59	\$908.59	\$958.54	\$858.63	\$854.55

Farm Structure (Option 1)

	Acres	Livestock				
Native Range	3162	Cows	170			
Tame Pasture	1534	Replacement Heifers	28			
Backflooded Pasture	38	Bulls	8			
Dryland tame hay	214					
Dryland Greenfeed	40				2004	5yr avg prices
Dryland Durum	350	Cash Sales	# sold	Weight	\$/lb	\$/lb
Dryland Wheat	350	steers	78	535	\$0.80	\$1.37
Dryland Barley	80	Heifers	51	505	\$0.70	\$1.29
Summerfallow	280	Culls	27	1150	\$0.20	\$0.40
Irrigated Greenfeed	0	Bulls	2	1900	\$0.20	\$0.40
Irrigated Alfalfa	132					
Total Acreage	6180					
Days on feed	151					
Days Grazing	214					

			Tonnes or \$/Tonne			
Feed	Produced	Purchased	Fed cows	Sold	Selling Price	Inventory
Barley	47	0	47	0	\$0.00	0
Oats	0	0	0	0	\$0.00	0
Durum	171.5	0	0	171.5	\$209.44	0
Wheat	190.5	0	0	190.5	\$173.06	0
Alfalfa/Hay	684.2	0	355.3	328.9	\$95.00	0
Greenfeed	60	0	60	0	\$0.00	0

Grazing

	AUM's Produced
Native	790.5
Tame	613.6
Aftermath	236.8
Backflood	110.2
Backflooded (sold)	59.1
Total Available	1692
AUM's required	1692

Income Statement - Scenario 1

	Standard		Calves	Calves	Calves	Grain	Grain	5yr avg
Income	Budget	\$/Ac	Down 10%	up 25%	up 50%	down 10%	up 10%	Prices
Crop Sales	\$100,132.39	\$16.20	\$100,132.39	\$100,132.39	\$100,132.39	\$93,243.70	\$107,021.08	\$100,132.39
Grazing	\$1,477.50	\$0.24	\$1,477.50	\$1,477.50	\$1,477.50	\$1,477.50	\$1,477.50	\$1,477.50
Livestock Sales	\$58,382.50	\$9.45	\$53,241.25	\$71,235.63	\$84,088.75	\$58,382.50	\$58,382.50	\$104,334.05
Adjustments - Product inventory	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Accounts receivable	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Less Livestock Purchases	\$3,000.00	\$0.49	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00
Value of Production	\$156,992.39	\$25.40	\$151,851.14	\$169,845.52	\$182,698.64	\$150,103.70	\$163,881.08	\$202,943.94
Expenses								
Seed	\$7,550.04	\$1.22	\$7,550.04	\$7,550.04	\$7,550.04	\$7,550.04	\$7,550.04	\$7,550.04
Fertilizer	\$12,626.07	\$2.04	\$12,626.07	\$12,626.07	\$12,626.07	\$12,626.07	\$12,626.07	\$12,626.07
Chemicals	\$11,778.42	\$1.91	\$11,778.42	\$11,778.42	\$11,778.42	\$11,778.42	\$11,778.42	\$11,778.42
Crop Insurance/Program Premiums	\$9,530.10	\$1.54	\$9,530.10	\$9,530.10	\$9,530.10	\$9,530.10	\$9,530.10	\$9,530.10
Feed and Bedding	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Veterinary, Medicine & Breeding	\$3,712.80	\$0.60	\$3,712.80	\$3,712.80	\$3,712.80	\$3,712.80	\$3,712.80	\$3,712.80
Trucking and Marketing	\$4,033.42	\$0.65	\$4,033.42	\$4,033.42	\$4,033.42	\$4,033.42	\$4,033.42	\$4,033.42
Fuel	\$17,223.03	\$2.79	\$17,223.03	\$17,223.03	\$17,223.03	\$17,223.03	\$17,223.03	\$17,223.03
Repairs and Maintenance	\$17,120.06	\$2.77	\$17,120.06	\$17,120.06	\$17,120.06	\$17,120.06	\$17,120.06	\$17,120.06
Utilities and Miscellaneous	\$20,476.18	\$3.31	\$20,476.18	\$20,476.18	\$20,476.18	\$20,476.18	\$20,476.18	\$20,476.18
Custom Work & Specialized Labour	\$7,366.71	\$1.19	\$7,366.71	\$7,366.71	\$7,366.71	\$7,366.71	\$7,366.71	\$7,366.71
Operating Interest Paid	\$1,753.15	\$0.28	\$1,753.15	\$1,753.15	\$1,753.15	\$1,753.15	\$1,753.15	\$1,753.15
Paid Labour and Benefits	\$5,265.06	\$0.85	\$5,265.06	\$5,265.06	\$5,265.06	\$5,265.06	\$5,265.06	\$5,265.06
Unpaid Labour	\$20,384.02	\$3.30	\$20,384.02	\$20,384.02	\$20,384.02	\$20,384.02	\$20,384.02	\$20,384.02
Total Variable Costs	\$138,819.06	\$22.46	\$138,819.06	\$138,819.06	\$138,819.06	\$138,819.06	\$138,819.06	\$138,819.06
Fixed Costs								
Land Rent/Livestock Lease	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Taxes, water rates, Lic. & Insurance	\$19,438.75	\$3.15	\$19,438.75	\$19,438.75	\$19,438.75	\$19,438.75	\$19,438.75	\$19,438.75
Equip & Building Depreciation	\$32,428.57	\$5.25	\$32,428.57	\$32,428.57	\$32,428.57	\$32,428.57	\$32,428.57	\$32,428.57
Paid Capital Interest	\$18,711.50	\$3.03	\$18,711.50	\$18,711.50	\$18,711.50	\$18,711.50	\$18,711.50	\$18,711.50
Total Capital Costs	\$70,578.83	\$11.42	\$70,578.83	\$70,578.83	\$70,578.83	\$70,578.83	\$70,578.83	\$70,578.83
Total Cash Costs	\$156,585.30	\$28.64	\$156,585.30	\$156,585.30	\$156,585.30	\$156,585.30	\$156,585.30	\$156,585.30
Total Production Costs	\$209,397.89	\$33.88	\$209,397.89	\$209,397.89	\$209,397.89	\$209,397.89	\$209,397.89	\$209,397.89
Gross Margin	\$407.09	-\$3.23	-\$4,734.16	\$13,260.21	\$26,113.34	-\$6,481.60	\$7,295.78	\$46,358.64
Return to Management	-\$52,405.50	-\$8.48	-\$57,546.75	-\$39,552.38	-\$26,699.25	-\$59,294.19	-\$45,516.81	-\$6,453.95
Average Calf Sale Value	\$398.55		\$358.69	\$498.18	\$597.82	\$398.55	\$398.55	\$700.73
Break-Even Value (\$/calf sold)	\$804.79		\$804.79	\$804.79	\$804.79	\$858.19	\$751.39	\$750.76

Farm Structure (Scenario 2)

	Acres	Livestock			
Native Range	3162	Cows	170		
Tame Pasture	1534	Replacement Heifers	28		
Backflooded Pasture	38	Bulls	8		
Dryland tame hay	214				
Dryland Greenfeed	40				
Dryland Durum	350	Cash Sales	# sold	Weight	\$/lb
Dryland Wheat	350	steers	78	535	\$0.80
Dryland Barley	80	Heifers	51	505	\$0.70
Summerfallow	280	Culls	27	1150	\$0.20
Irrigated Silage	75.5	Bulls	2	1900	\$0.20
Irrigated Greenfeed	0				
Irrigated Alfalfa	56.5				
Total Acreage	6180				
Days on feed	151				
Days Grazing	214				

	Tonnes or \$/Tonne					
Feed	Produced	Purchased	Fed cows	Sold	Selling Price	Inventory
Barley	47	0	47	0	\$0.00	0
Oats	0	0	0	0	\$0.00	0
Durum	171.5	0	0	171.5	\$209.44	0
Wheat	190.5	0	0	190.5	\$173.06	0
Alfalfa/Hay	427.5	0	0	427.5	\$95.00	0
Greenfeed	60	0	60	0	\$0.00	0
Silage	755	0	755	0	\$0.00	0

Grazing

	AUM's Produced
Native	790.5
Tame	613.6
Backflood	110.2
Backflooded (Sold)	59.1
Aftermath	236.8
Total	1692.0
AUM's required	1692.0

Income Statement - Scenario 2

	Standard	Calves	Calves	Calves	Grain	Grain	2002	
Income	Budget	\$/Ac	Down 10%	up 25%	up 50%	down 10%	up 10%	Prices
Crop Sales	\$109,499.39	\$17.72	\$109,499.39	\$109,499.39	\$109,499.39	\$102,610.70	\$116,388.08	\$109,499.39
Grazing	\$1,477.50	\$0.24	\$1,477.50	\$1,477.50	\$1,477.50	\$1,477.50	\$1,477.50	\$1,477.50
Livestock Sales	\$58,382.50	\$9.45	\$53,241.25	\$71,235.63	\$84,088.75	\$58,382.50	\$58,382.50	\$104,334.05
Adjustments - Product inventory	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Accounts receivable	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Less Livestock Purchases	\$3,000.00	\$0.49	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00
Value of Production	\$166,359.39	\$26.92	\$161,218.14	\$179,212.52	\$192,065.64	\$159,470.70	\$173,248.08	\$212,310.94
Expenses								
Seed	\$8,305.04	\$1.34	\$8,305.04	\$8,305.04	\$8,305.04	\$8,305.04	\$8,305.04	\$8,305.04
Fertilizer	\$15,001.17	\$2.43	\$15,001.17	\$15,001.17	\$15,001.17	\$15,001.17	\$15,001.17	\$15,001.17
Chemicals	\$12,344.67	\$2.00	\$12,344.67	\$12,344.67	\$12,344.67	\$12,344.67	\$12,344.67	\$12,344.67
Crop Insurance/Program Premiums	\$9,530.10	\$1.54	\$9,530.10	\$9,530.10	\$9,530.10	\$9,530.10	\$9,530.10	\$9,530.10
Feed and Bedding	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Veterinary, Medicine & Breeding	\$3,712.80	\$0.60	\$3,712.80	\$3,712.80	\$3,712.80	\$3,712.80	\$3,712.80	\$3,712.80
Trucking and Marketing	\$4,410.92	\$0.71	\$4,410.92	\$4,410.92	\$4,410.92	\$4,410.92	\$4,410.92	\$4,410.92
Fuel	\$15,312.88	\$2.48	\$15,312.88	\$15,312.88	\$15,312.88	\$15,312.88	\$15,312.88	\$15,312.88
Repairs and Maintenance	\$16,950.55	\$2.74	\$16,950.55	\$16,950.55	\$16,950.55	\$16,950.55	\$16,950.55	\$16,950.55
Utilities and Miscellaneous	\$21,006.19	\$3.40	\$21,006.19	\$21,006.19	\$21,006.19	\$21,006.19	\$21,006.19	\$21,006.19
Custom Work & Specialized Labour	\$12,196.45	\$1.97	\$12,196.45	\$12,196.45	\$12,196.45	\$12,196.45	\$12,196.45	\$12,196.45
Operating Interest Paid	\$1,798.45	\$0.29	\$1,798.45	\$1,798.45	\$1,798.45	\$1,798.45	\$1,798.45	\$1,798.45
Paid Labour and Benefits	\$4,979.69	\$0.81	\$4,979.69	\$4,979.69	\$4,979.69	\$4,979.69	\$4,979.69	\$4,979.69
Unpaid Labour	\$20,632.80	\$3.34	\$20,632.80	\$20,632.80	\$20,632.80	\$20,632.80	\$20,632.80	\$20,632.80
Total Variable Costs	\$146,181.71	\$23.65	\$146,181.71	\$146,181.71	\$146,181.71	\$146,181.71	\$146,181.71	\$146,181.71
Fixed Costs								
Land Rent/Livestock Lease	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Taxes, water rates, Lic. & Insurance	\$19,439.48	\$3.15	\$19,439.48	\$19,439.48	\$19,439.48	\$19,439.48	\$19,439.48	\$19,439.48
Equip & Building Depreciation	\$31,242.90	\$5.06	\$31,242.90	\$31,242.90	\$31,242.90	\$31,242.90	\$31,242.90	\$31,242.90
Paid Capital Interest	\$18,643.31	\$3.02	\$18,643.31	\$18,643.31	\$18,643.31	\$18,643.31	\$18,643.31	\$18,643.31
Total Capital Costs	\$69,325.69	\$11.22	\$69,325.69	\$69,325.69	\$69,325.69	\$69,325.69	\$69,325.69	\$69,325.69
Total Cash Costs	\$163,631.70	\$29.82	\$163,631.70	\$163,631.70	\$163,631.70	\$163,631.70	\$163,631.70	\$163,631.70
Total Production Costs	\$215,507.40	\$34.87	\$215,507.40	\$215,507.40	\$215,507.40	\$215,507.40	\$215,507.40	\$215,507.40
Gross Margin	\$2,727.69	-\$2.90	-\$2,413.56	\$15,580.81	\$28,433.94	-\$4,161.00	\$9,616.38	\$48,679.24
Return to Management	-\$49,148.01	-\$7.95	-\$54,289.26	-\$36,294.89	-\$23,441.76	-\$56,036.70	-\$42,259.32	-\$3,196.46
Average Calf Sale Value	\$398.55		\$358.69	\$498.18	\$597.82	\$398.55	\$398.55	\$700.73
Break-Even Value (\$/calf sold)	\$779.54		\$779.54	\$779.54	\$779.54	\$832.94	\$726.14	\$725.51

Farm Structure (Scenario 3)

Acres		Livestock				
Native Range	3162	Cows	170			
Tame Pasture	1534	Replacement Heifers	28			
Backflooded Pasture	38	Bulls	8			
Dryland tame hay	214				2004	5yr avg prices
Dryland Greenfeed	40					
Dryland Durum	350	Cash Sales	# sold	Weight	\$/lb	\$/lb
Dryland Wheat	350	Culls	27	1150	\$0.20	\$0.40
Dryland Barley	80	Bulls	2	1900	\$0.20	\$0.40
Summerfallow	280	Feeder Steers	77	760	\$0.72	\$1.21
Irrigated Greenfeed	0	Feeder Heifers	51	730	\$0.62	\$1.16
Irrigated Alfalfa	132					
Total Acreage	6180					
Backgrounding						
A.D.G. lbs/day	1.6					
Days on Feed	141					

Tonnes or \$/Tonne						
Feed	Produced	Purchased	Fed out	Sold	Selling Price	Inventory
Barley	47	0	47	0	\$0.00	0
Oats	0	45	45	0	\$0.00	0
Durum	171.5	0	0	171.5	\$209.44	0
Wheat	190.5	0	0	190.5	\$173.06	0
Alfalfa/Hay	684.2	0	429.1	255.2	\$95.00	0
Greenfeed	60	0	60	0	\$0.00	0

Days on feed	151
Days Grazing	214

Grazing

AUM's Produced	
Native	790.5
Tame	613.6
Aftermath	236.8
Backflood	110.2
Backflooded (sold)	59.1
Total	1692.0

AUM's required	1692
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Income Statement - Scenario 3

	Standard		Calves	Calves	Calves	Grain	Grain	5yr avg
Income	Budget	\$/Ac	Down 10%	up 25%	up 50%	down 10%	up 10%	Calf Prices
Crop Sales	\$93,130.89	\$15.07	\$93,130.89	\$93,130.89	\$93,130.89	\$86,242.20	\$100,019.58	\$93,130.89
Grazing	\$1,477.50	\$0.24	\$1,477.50	\$1,477.50	\$1,477.50	\$1,477.50	\$1,477.50	\$1,477.50
Livestock Sales	\$72,187.00	\$11.68	\$65,665.30	\$88,491.25	\$104,795.50	\$72,187.00	\$72,187.00	\$127,936.00
Adjustments - Product inventory	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Accounts receivable	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Less Livestock Purchases	\$3,000.00	\$0.49	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00
Value of Production	\$163,795.39	\$26.50	\$157,273.69	\$180,099.64	\$196,403.89	\$156,906.70	\$170,684.08	\$219,544.39
Expenses								
Seed	\$7,550.04	\$1.22	\$7,550.04	\$7,550.04	\$7,550.04	\$7,550.04	\$7,550.04	\$7,550.04
Fertilizer	\$12,626.07	\$2.04	\$12,626.07	\$12,626.07	\$12,626.07	\$12,626.07	\$12,626.07	\$12,626.07
Chemicals	\$11,778.42	\$1.91	\$11,778.42	\$11,778.42	\$11,778.42	\$11,778.42	\$11,778.42	\$11,778.42
Crop Insurance/Program Premiums	\$9,530.10	\$1.54	\$9,530.10	\$9,530.10	\$9,530.10	\$9,530.10	\$9,530.10	\$9,530.10
Feed and Bedding	\$4,500.00	\$0.73	\$4,500.00	\$4,500.00	\$4,500.00	\$4,050.00	\$4,950.00	\$4,500.00
Veterinary, Medicine & Breeding	\$5,364.03	\$0.87	\$5,364.03	\$5,364.03	\$5,364.03	\$5,364.03	\$5,364.03	\$5,364.03
Trucking and Marketing	\$3,791.05	\$0.61	\$3,791.05	\$3,791.05	\$3,791.05	\$3,791.05	\$3,791.05	\$3,791.05
Fuel	\$17,853.55	\$2.89	\$17,853.55	\$17,853.55	\$17,853.55	\$17,853.55	\$17,853.55	\$17,853.55
Repairs and Maintenance	\$17,844.80	\$2.89	\$17,844.80	\$17,844.80	\$17,844.80	\$17,844.80	\$17,844.80	\$17,844.80
Utilities and Miscellaneous	\$20,736.93	\$3.36	\$20,736.93	\$20,736.93	\$20,736.93	\$20,736.93	\$20,736.93	\$20,736.93
Custom Work & Specialized Labour	\$7,547.89	\$1.22	\$7,547.89	\$7,547.89	\$7,547.89	\$7,547.89	\$7,547.89	\$7,547.89
Operating Interest Paid	\$3,565.00	\$0.58	\$3,565.00	\$3,565.00	\$3,565.00	\$3,565.00	\$3,565.00	\$3,565.00
Paid Labour and Benefits	\$5,591.20	\$0.90	\$5,591.20	\$5,591.20	\$5,591.20	\$5,591.20	\$5,591.20	\$5,591.20
Unpaid Labour	\$21,688.55	\$3.51	\$21,688.55	\$21,688.55	\$21,688.55	\$21,688.55	\$21,688.55	\$21,688.55
Total Variable Costs	\$149,967.63	\$24.27	\$149,967.63	\$149,967.63	\$149,967.63	\$149,517.63	\$150,417.63	\$149,967.63
Fixed Costs								
Land Rent/Livestock Lease	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Taxes, water rates, Lic. & Insurance	\$19,367.05	\$3.13	\$19,367.05	\$19,367.05	\$19,367.05	\$19,367.05	\$19,367.05	\$19,367.05
Equip & Building Depreciation	\$32,773.45	\$5.30	\$32,773.45	\$32,773.45	\$32,773.45	\$32,773.45	\$32,773.45	\$32,773.45
Paid Capital Interest	\$18,939.80	\$3.06	\$18,939.80	\$18,939.80	\$18,939.80	\$18,939.80	\$18,939.80	\$18,939.80
Total Capital Costs	\$71,080.29	\$11.50	\$71,080.29	\$71,080.29	\$71,080.29	\$71,080.29	\$71,080.29	\$71,080.29
Total Cash Costs	\$166,585.92	\$30.47	\$166,585.92	\$166,585.92	\$166,585.92	\$166,135.92	\$167,035.92	\$166,585.92
Total Production Costs	\$221,047.92	\$35.77	\$221,047.92	\$221,047.92	\$221,047.92	\$220,597.92	\$221,497.92	\$221,047.92
Gross Margin	-\$2,790.53	-\$3.96	-\$9,312.23	\$13,513.72	\$29,817.97	-\$9,229.22	\$3,648.16	\$52,958.47
Return to Management	-\$57,252.53	-\$9.26	-\$63,774.23	-\$40,948.28	-\$24,644.03	-\$63,691.22	-\$50,813.84	-\$1,503.53
Average Calf Sale Value	\$509.51		\$458.56	\$636.88	\$764.26	\$509.51	\$509.51	\$890.59
Break Even Value (\$/ Feeder Calf sold)	\$956.79		\$956.79	\$956.79	\$956.79	\$1,007.10	\$906.49	\$902.34

Farm Structure (Option 4)

	Acres
Native Range	3162
Tame Pasture	1534
Backflooded	
Pasture	38
Dryland tame hay	214
Dryland Greenfeed	40
Dryland Durum	350
Dryland Wheat	350
Dryland Barley	80
Summerfallow	280
Irrigate Silage	91
Irrigated	
Greenfeed	0
Irrigated Alfalfa	41
Total Acreage	6180

Livestock

Cows	170
Replacement Heifers	28
Bulls	8

Cash Sales	# sold	Weight	\$/lb
Culls	27	1150	\$0.20
Bulls	2	1900	\$0.20
Feeder Steers	77	760	\$0.72
Feeder Heifers	51	730	\$0.62

Backgrounding

A.D.G. lbs/day	1.6
Days on Feed	141

Tonnes or \$/Tonne

Feed	Produced	Purchased	Fed out	Sold	Selling Price	Inventory
Barley	47	0	47	0	\$0.00	0
Oats	0	45	45	0	\$0.00	0
Durum	171.5	0	0	171.5	\$209.44	0
Wheat	190.5	0	0	190.5	\$173.06	0
Alfalfa/Hay	374.8	0	0	374.8	\$95.00	0
Greenfeed	60	0	60	0	\$0.00	0
Silage	910	0	910	0	\$0.00	0

Days on feed	151
Days Grazing	214

Grazing

AUM's Produced	
Native	790.5
Tame	613.6
Backflood	110.2
Backflooded (sold)	59.1
Aftermath Grazing	236.8
Total	1,692.0

AUM's required	1,692.0
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Income Statement - Scenario 4

	Standard	Calves	Calves	Calves	Grain	Grain	5 Yr avg	
Income	Budget	\$/Ac	Down 10%	up 25%	up 50%	down 10%	up 10%	Calf Prices
Crop Sales	\$104,492.89	\$16.91	\$104,492.89	\$104,492.89	\$104,492.89	\$97,604.20	\$111,381.58	\$104,492.89
Grazing	\$1,477.50	\$0.24	\$1,477.50	\$1,477.50	\$1,477.50	\$1,477.50	\$1,477.50	\$1,477.50
Livestock Sales	\$72,187.00	\$11.68	\$65,665.30	\$88,491.25	\$104,795.50	\$72,187.00	\$72,187.00	\$127,936.00
Adjustments - Product inventory	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Accounts receivable	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Less Livestock Purchases	\$3,000.00	\$0.49	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00
Value of Production	\$175,157.39	\$28.34	\$168,635.69	\$191,461.64	\$207,765.89	\$168,268.70	\$182,046.08	\$230,906.39
Expenses								
Seed	\$8,460.04	\$1.37	\$8,460.04	\$8,460.04	\$8,460.04	\$8,460.04	\$8,460.04	\$8,460.04
Fertilizer	\$15,001.17	\$2.43	\$15,001.17	\$15,001.17	\$15,001.17	\$15,001.17	\$15,001.17	\$15,001.17
Chemicals	\$12,460.92	\$2.02	\$12,460.92	\$12,460.92	\$12,460.92	\$12,460.92	\$12,460.92	\$12,460.92
Crop Insurance/Program Premiums	\$9,530.10	\$1.54	\$9,530.10	\$9,530.10	\$9,530.10	\$9,530.10	\$9,530.10	\$9,530.10
Feed and Bedding	\$4,500.00	\$0.73	\$4,500.00	\$4,500.00	\$4,500.00	\$4,050.00	\$4,950.00	\$4,500.00
Veterinary, Medicine & Breeding	\$5,364.03	\$0.87	\$5,364.03	\$5,364.03	\$5,364.03	\$5,364.03	\$5,364.03	\$5,364.03
Trucking and Marketing	\$4,246.05	\$0.69	\$4,246.05	\$4,246.05	\$4,246.05	\$4,246.05	\$4,246.05	\$4,246.05
Fuel	\$15,551.25	\$2.52	\$15,551.25	\$15,551.25	\$15,551.25	\$15,551.25	\$15,551.25	\$15,551.25
Repairs and Maintenance	\$17,640.49	\$2.85	\$17,640.49	\$17,640.49	\$17,640.49	\$17,640.49	\$17,640.49	\$17,640.49
Utilities and Miscellaneous	\$21,375.75	\$3.46	\$21,375.75	\$21,375.75	\$21,375.75	\$21,375.75	\$21,375.75	\$21,375.75
Custom Work & Specialized Labour	\$13,369.17	\$2.16	\$13,369.17	\$13,369.17	\$13,369.17	\$13,369.17	\$13,369.17	\$13,369.17
Operating Interest Paid	\$3,619.60	\$0.59	\$3,619.60	\$3,619.60	\$3,619.60	\$3,619.60	\$3,619.60	\$3,619.60
Paid Labour and Benefits	\$5,247.23	\$0.85	\$5,247.23	\$5,247.23	\$5,247.23	\$5,247.23	\$5,247.23	\$5,247.23
Unpaid Labour	\$21,988.40	\$3.56	\$21,988.40	\$21,988.40	\$21,988.40	\$21,988.40	\$21,988.40	\$21,988.40
Total Variable Costs	\$158,354.21	\$25.62	\$158,354.21	\$158,354.21	\$158,354.21	\$157,904.21	\$158,804.21	\$158,354.21
Fixed Costs								
Land Rent/Livestock Lease	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Taxes, water rates, Lic. & Insurance	\$19,367.92	\$3.13	\$19,367.92	\$19,367.92	\$19,367.92	\$19,367.92	\$19,367.92	\$19,367.92
Equip & Building Depreciation	\$31,344.37	\$5.07	\$31,344.37	\$31,344.37	\$31,344.37	\$31,344.37	\$31,344.37	\$31,344.37
Paid Capital Interest	\$18,857.61	\$3.05	\$18,857.61	\$18,857.61	\$18,857.61	\$18,857.61	\$18,857.61	\$18,857.61
Total Capital Costs	\$69,569.89	\$11.26	\$69,569.89	\$69,569.89	\$69,569.89	\$69,569.89	\$69,569.89	\$69,569.89
Total Cash Costs	\$174,591.33	\$31.81	\$174,591.33	\$174,591.33	\$174,591.33	\$174,141.33	\$175,041.33	\$174,591.33
Total Production Costs	\$227,924.10	\$36.88	\$227,924.10	\$227,924.10	\$227,924.10	\$227,474.10	\$228,374.10	\$227,924.10
Gross Margin	\$566.06	-\$3.47	-\$5,955.64	\$16,870.31	\$33,174.56	-\$5,872.63	\$7,004.75	\$56,315.06
Return to Management	-\$52,766.71	-\$8.54	-\$59,288.41	-\$36,462.46	-\$20,158.21	-\$59,205.40	-\$46,328.02	\$2,982.29
Average Calf Sale Value	\$509.51		\$458.56	\$636.88	\$764.26	\$509.51	\$509.51	\$890.59
Break Even Value (\$/ Feeder Calf sold)	\$921.75		\$921.75	\$921.75	\$921.75	\$972.05	\$871.45	\$867.29

APPENDIX D: Results of Benefit/Cost Analysis

Table D-1: Benefit/Cost Analysis for SAWSP – Agricultural Scenario 1 – Current Pricing

Table D-2: Benefit/Cost Analysis for SAWSP – Agricultural Scenario 2 – Current Pricing

Table D-3: Benefit/Cost Analysis for SAWSP – Agricultural Scenario 3 – 5-Year Average Calf Prices

Table D-4: Benefit/Cost Analysis for SAWSP – Agricultural Scenario 4 – 5-Year Average Calf Prices

Table D-5: Benefit/Cost Analysis for SAWSP – Agricultural Scenario 4 – 14-Year Average (2004\$) Calf Prices

Table D-1
BENEFIT/COST ANALYSIS FOR SAWSP - Agricultural Scenario 1 - Current Pricing

PROJECT YEAR	INCREMENTAL COSTS					INCREMENTAL BENEFITS										NET CASH FLOW	ASSUMPTIONS			
	Capital Costs	Operating Costs	Irrigation Equipment Capital	Additional Production Costs	Stockwater Capital Costs	TOTAL	New Sprinkler Irrigation	Transportation Cost Savings	Livestock Watering	Municipal Water	Waterfowl Hunting	Upland Bird Hunting	Big Game Hunting	Non Consumptive	TOTAL		Irrigation Farms	Irrigation Development	Stockwater Development	Stockwater Development
1	\$ 2,000,000					\$ 2,000,000									\$ -	\$ 2,000,000				
2	\$ 2,000,000					\$ 2,000,000									\$ -	\$ 2,000,000				
3	\$ 35,000,000					\$ 35,000,000									\$ -	\$ 35,000,000				
4	\$ 50,000,000					\$ 50,000,000									\$ -	\$ 50,000,000				
5	\$ 50,000,000					\$ 50,000,000									\$ -	\$ 50,000,000				
6	\$ 31,860,000	\$ 800,000	\$ 4,873,614	\$ 437,360	\$ 2,396,000	\$ 40,366,994	\$ 1,237,622	\$ 285,812	\$ 611,253	\$ 9,500,000	\$ -	\$ -	\$ -	\$ -	\$ 11,634,787	\$ 28,732,207		36	0.2	0.2
7	\$ 21,420,000	\$ 2,350,000	\$ 2,949,819	\$ 702,110	\$ 2,396,000	\$ 29,817,929	\$ 1,986,709	\$ 458,964	\$ 1,222,506	\$ 420,000	\$ 28,750	\$ 14,550	\$ 86,300	\$ 84,500	\$ 4,282,279	\$ 25,535,650	61	23	0.2	0.4
8		\$ 3,100,000	\$ 2,949,819	\$ 866,840	\$ 2,396,000	\$ 9,412,659	\$ 2,735,796	\$ 632,016	\$ 1,833,758	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 6,009,870	\$ 3,402,789	84	23	0.2	0.6
9		\$ 3,100,000	\$ 2,949,819	\$ 1,231,570	\$ 2,396,000	\$ 9,677,389	\$ 3,484,883	\$ 805,068	\$ 2,445,011	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 7,543,282	\$ 2,134,127	107	23	0.2	0.8
10		\$ 3,100,000	\$ 2,949,819	\$ 1,496,300	\$ 2,396,000	\$ 9,942,119	\$ 4,233,970	\$ 978,120	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 8,076,654	\$ 865,465	130	23	0.2	1
11		\$ 3,100,000	\$ 2,821,566	\$ 1,749,520		\$ 7,671,086	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 2,287,614	152	22		
12		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
13		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
14		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
15		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
16		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
17		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
18		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
19		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
20		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
21		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
22		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
23		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
24		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
25		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
26		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
27		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
28		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
29		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
30		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
31		\$ 3,100,000	\$ 3,928,630		\$ 2,396,000	\$ 11,174,150	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 1,215,460	152			0.2
32		\$ 3,100,000	\$ 2,377,855	\$ 1,749,520	\$ 2,396,000	\$ 9,623,375	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 335,325	152			0.2
33		\$ 3,100,000	\$ 2,377,855	\$ 1,749,520	\$ 2,396,000	\$ 9,623,375	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 335,325	152			0.2
34		\$ 3,100,000	\$ 2,377,855	\$ 1,749,520	\$ 2,396,000	\$ 9,623,375	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 335,325	152			0.2
35		\$ 3,100,000	\$ 2,377,855	\$ 1,749,520	\$ 2,396,000	\$ 9,623,375	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 335,325	152			0.2
36		\$ 3,100,000	\$ 2,274,470	\$ 1,749,520		\$ 7,123,690	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 2,834,710	152			1
37		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
38		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
39		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
40		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
41		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
42		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
43		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
44		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
45		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
46		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
47		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
48		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
49		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
50		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
51		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
52		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1
53		\$ 3,100,000		\$ 1,749,520		\$ 4,849,520	\$ 4,950,488	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,958,700	\$ 5,106,180	152			1

Table D-2
BENEFIT/COST ANALYSIS FOR SAWSP - Agricultural Scenario 2 - Current Pricing

PROJECT YEAR	INCREMENTAL COSTS						INCREMENTAL BENEFITS										ASSUMPTIONS			
	Capital Costs	Operating Costs	Irrigation Equipment Capital	Additional Production Costs	Livestock Capital Costs	TOTAL	New Sprinkler Irrigation	Transportation Cost Savings	Livestock Watering	Municipal Water	Waterfowl Hunting	Upland Bird Hunting	Big Game Hunting	Non Consumptive	TOTAL	NET CASH FLOW	Irrigation Farms	Irrigation Development	Stockwater Development	Stockwater Development
1	\$ 2,000,000					\$ 2,000,000									\$ -	\$ 2,000,000				
2	\$ 2,000,000					\$ 2,000,000									\$ -	\$ 2,000,000				
3	\$ 35,000,000					\$ 35,000,000									\$ -	\$ 35,000,000				
4	\$ 50,000,000					\$ 50,000,000									\$ -	\$ 50,000,000				
5	\$ 50,000,000					\$ 50,000,000									\$ -	\$ 50,000,000				
6	\$ 31,860,000	\$ 800,000	\$ 4,873,614	\$ 705,166	\$ 2,396,000	\$ 40,634,780	\$ 1,593,568	\$ 285,912	\$ 611,253	\$ 9,500,000	\$ -	\$ -	\$ -	\$ -	\$ 11,990,733	\$ 28,644,047	38	38	0.2	0.2
7	\$ 21,420,000	\$ 2,350,000	\$ 2,949,819	\$ 1,131,977	\$ 2,396,000	\$ 30,247,796	\$ 2,558,086	\$ 456,964	\$ 1,222,506	\$ 420,000	\$ 28,750	\$ 14,550	\$ 66,300	\$ 64,500	\$ 4,853,666	\$ 25,384,130	61	23	0.2	0.4
8		\$ 3,100,000	\$ 2,949,819	\$ 1,558,788	\$ 2,396,000	\$ 10,004,897	\$ 3,522,624	\$ 632,016	\$ 1,833,758	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 6,796,898	\$ 3,207,909	84	23	0.2	0.6
9		\$ 3,100,000	\$ 2,949,819	\$ 1,985,589	\$ 2,396,000	\$ 10,431,418	\$ 4,487,152	\$ 805,068	\$ 2,445,011	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 8,645,531	\$ 1,885,587	107	23	0.2	0.8
10		\$ 3,100,000	\$ 2,949,819	\$ 2,412,410	\$ 2,396,000	\$ 10,868,228	\$ 5,451,680	\$ 978,120	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 10,294,364	\$ 563,865	130	23	0.2	1
11		\$ 3,100,000	\$ 2,821,566	\$ 2,820,664		\$ 8,742,238	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 2,640,254	152	22		1
12		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
13		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
14		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
15		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
16		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
17		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
18		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
19		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
20		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
21		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
22		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
23		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
24		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
25		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
26		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
27		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
28		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
29		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
30		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
31		\$ 3,100,000	\$ 3,928,630	\$ 2,820,664	\$ 2,396,000	\$ 12,248,284	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 862,810	152		0.2	1
32		\$ 3,100,000	\$ 2,377,855	\$ 2,820,664	\$ 2,396,000	\$ 10,684,518	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 687,965	152		0.2	1
33		\$ 3,100,000	\$ 2,377,855	\$ 2,820,664	\$ 2,396,000	\$ 10,684,518	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 687,965	152		0.2	1
34		\$ 3,100,000	\$ 2,377,855	\$ 2,820,664	\$ 2,396,000	\$ 10,684,518	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 687,965	152		0.2	1
35		\$ 3,100,000	\$ 2,377,855	\$ 2,820,664	\$ 2,396,000	\$ 10,684,518	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 687,965	152		0.2	1
36		\$ 3,100,000	\$ 2,274,470	\$ 2,820,664		\$ 8,188,134	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 3,187,350	152			1
37		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
38		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
39		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
40		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
41		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
42		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
43		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
44		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
45		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
46		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
47		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
48		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
49		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
50		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
51		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
52		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,382,484	\$ 5,461,820	152			1
53		\$ 3,100,000		\$ 2,820,664		\$ 8,820,664	\$ 6,374,272	\$ 1,143,648	\$ 3,056,264	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172							

Table D-3

BENEFIT/COST ANALYSIS FOR SAWSP - Agricultural Scenario 3 - 5-Year Average Calf Prices

PROJECT YEAR	INCREMENTAL COSTS					INCREMENTAL BENEFITS										ASSUMPTIONS				
	Capital Costs	Operating Costs	Irrigation Equipment Capital	Additional Production Costs	Stockwater Capital Costs	TOTAL	New Sprinkler Irrigation	Transportation Cost Savings	Livestock Watering	Municipal Water	Waterfowl Hunting	Upland Bird Hunting	Big Game Hunting	Net Consumptive	TOTAL	CASH FLOW	Irrigation Farms	Irrigation Development	Stockwater Development	Stockwater Development
1	\$ 2,000,000					\$ 2,000,000									\$ -	\$ 2,000,000				
2	\$ 2,000,000					\$ 2,000,000									\$ -	\$ 2,000,000				
3	\$ 35,000,000					\$ 35,000,000									\$ -	\$ 35,000,000				
4	\$ 50,000,000					\$ 50,000,000									\$ -	\$ 50,000,000				
5	\$ 50,000,000					\$ 50,000,000									\$ -	\$ 50,000,000				
6	\$ 31,860,000	\$ 800,000	\$ 4,873,614	\$ 617,418	\$ 2,396,000	\$ 40,747,832	\$ 1,868,422	\$ 285,912	\$ 679,115	\$ 9,500,000	\$ -	\$ -	\$ -	\$ -	\$ 12,333,449	\$ 28,413,683	38	38	0.2	0.2
7	\$ 21,420,000	\$ 2,350,000	\$ 2,949,819	\$ 1,312,171	\$ 2,396,000	\$ 30,427,990	\$ 2,999,309	\$ 458,964	\$ 1,358,230	\$ 420,000	\$ 28,750	\$ 14,550	\$ 86,300	\$ 64,500	\$ 5,430,603	\$ 24,897,387	61	23	0.2	0.4
8		\$ 3,100,000	\$ 2,949,819	\$ 1,806,924	\$ 2,396,000	\$ 10,282,743	\$ 4,130,196	\$ 632,016	\$ 2,037,344	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 7,607,866	\$ 2,644,887	84	23	0.2	0.6
9		\$ 3,100,000	\$ 2,949,819	\$ 2,301,677	\$ 2,396,000	\$ 10,747,486	\$ 5,261,083	\$ 805,068	\$ 2,716,469	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 9,590,910	\$ 1,196,686	107	23	0.2	0.8
10		\$ 3,100,000	\$ 2,949,819	\$ 2,796,430	\$ 2,396,000	\$ 11,242,248	\$ 6,391,970	\$ 978,120	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,673,964	\$ 331,716	130	23	0.2	1
11		\$ 3,100,000	\$ 2,821,566	\$ 3,269,672		\$ 9,191,238	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 3,629,972	152	22		1
12		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
13		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
14		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
15		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
16		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
17		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
18		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
19		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
20		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
21		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
22		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
23		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
24		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
25		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
26		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
27		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
28		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
29		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
30		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
31		\$ 3,100,000	\$ 3,928,630	\$ 3,269,672	\$ 2,396,000	\$ 12,694,302	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 126,900	152			0.2
32		\$ 3,100,000	\$ 2,377,855	\$ 3,269,672	\$ 2,396,000	\$ 11,143,827	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 1,677,663	152			0.2
33		\$ 3,100,000	\$ 2,377,855	\$ 3,269,672	\$ 2,396,000	\$ 11,143,827	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 1,677,663	152			0.2
34		\$ 3,100,000	\$ 2,377,855	\$ 3,269,672	\$ 2,396,000	\$ 11,143,827	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 1,677,663	152			0.2
35		\$ 3,100,000	\$ 2,377,855	\$ 3,269,672	\$ 2,396,000	\$ 11,143,827	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 1,677,663	152			0.2
36		\$ 3,100,000	\$ 2,274,470	\$ 3,269,672		\$ 8,644,142	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 4,177,069	152			1
37		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
38		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
39		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
40		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
41		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
42		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
43		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
44		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
45		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
46		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
47		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
48		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
49		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
50		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
51		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
52		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 12,821,210	\$ 6,461,638	152			1
53		\$ 3,100,000		\$ 3,269,672		\$ 6,369,672	\$ 7,473,688	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 1							

Table D-4
BENEFIT/COST ANALYSIS FOR SAWSP - Agricultural Scenario 4 - 5-Year Average Calf Prices

PROJECT YEAR	INCREMENTAL COSTS					INCREMENTAL BENEFITS										ASSUMPTIONS				
	Capital Costs	Operating Costs	Irrigation Equipment Capital	Additional Production Costs	Livestock Capital Costs	TOTAL	New Sprinkler Irrigation	Transportation Cost Savings	Livestock Watering	Municipal Water	Waterfowl Hunting	Upland Bird Hunting	Big Game Hunting	Non Consumptive	TOTAL	NET CASH FLOW	Irrigation Farms	Irrigation Development	Stockwater Development	Stockwater Development
1	\$ 2,000,000					\$ 2,000,000									\$ -	\$ -				
2	\$ 2,000,000					\$ 2,000,000									\$ -	\$ -				
3	\$ 35,000,000					\$ 35,000,000									\$ -	\$ -				
4	\$ 50,000,000					\$ 50,000,000									\$ -	\$ -				
5	\$ 50,000,000					\$ 50,000,000									\$ -	\$ -				
6	\$ 31,800,000	\$ 800,000	\$ 4,873,614	\$ 1,121,646	\$ 2,306,000	\$ 41,911,260	\$ 2,300,178	\$ 285,912	\$ 679,115	\$ 9,500,000	\$ -	\$ -	\$ -	\$ 84,500	\$ 12,765,205	\$ 28,286,055	38	38	0.2	0.2
7	\$ 21,420,000	\$ 2,350,000	\$ 2,949,819	\$ 1,800,537	\$ 2,306,000	\$ 30,916,256	\$ 3,692,381	\$ 458,964	\$ 1,358,230	\$ 420,000	\$ 28,750	\$ 14,550	\$ 86,300	\$ 84,500	\$ 6,123,685	\$ 24,792,671	61	23	0.2	0.4
8		\$ 3,100,000	\$ 2,949,819	\$ 2,479,428	\$ 2,306,000	\$ 10,925,247	\$ 5,084,604	\$ 632,016	\$ 2,037,344	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 8,662,264	\$ 2,382,983	84	23	0.2	0.6
9		\$ 3,100,000	\$ 2,949,819	\$ 3,158,319	\$ 2,306,000	\$ 11,604,138	\$ 6,478,817	\$ 805,068	\$ 2,716,459	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 10,806,844	\$ 797,484	107	23	0.2	0.8
10		\$ 3,100,000	\$ 2,949,819	\$ 3,837,210	\$ 2,306,000	\$ 12,283,028	\$ 7,869,030	\$ 978,120	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 13,651,824	\$ 767,895	130	23	0.2	1
11		\$ 3,100,000	\$ 2,821,566	\$ 4,486,584		\$ 10,408,160	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 4,140,084	152	22		
12		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
13		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
14		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
15		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
16		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
17		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
18		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
19		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
20		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
21		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
22		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
23		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
24		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
25		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
26		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
27		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
28		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
29		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
30		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
31		\$ 3,100,000	\$ 3,928,630	\$ 4,486,584	\$ 2,306,000	\$ 19,111,214	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 637,020	152		0.2	1
32		\$ 3,100,000	\$ 2,377,855	\$ 4,486,584	\$ 2,306,000	\$ 12,368,438	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 2,187,795	152		0.2	1
33		\$ 3,100,000	\$ 2,377,855	\$ 4,486,584	\$ 2,306,000	\$ 12,368,438	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 2,187,795	152		0.2	1
34		\$ 3,100,000	\$ 2,377,855	\$ 4,486,584	\$ 2,306,000	\$ 12,368,438	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 2,187,795	152		0.2	1
35		\$ 3,100,000	\$ 2,377,855	\$ 4,486,584	\$ 2,306,000	\$ 12,368,438	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 2,187,795	152		0.2	1
36		\$ 3,100,000	\$ 2,274,470	\$ 4,486,584		\$ 9,861,084	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 4,687,180	152			1
37		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
38		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
39		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
40		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
41		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
42		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
43		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
44		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
45		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
46		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
47		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
48		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
49		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
50		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
51		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
52		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234	\$ 6,961,650	152			1
53		\$ 3,100,000		\$ 4,486,584		\$ 7,588,584	\$ 9,200,712	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,548,234					

Table D-5

BENEFIT/COST ANALYSIS FOR SAWSP - Agricultural Scenario 4 - 14-Year Average (2004\$) Calf Prices

PROJECT YEAR	INCREMENTAL COSTS					TOTAL	INCREMENTAL BENEFITS								TOTAL	NET CASH FLOW	ASSUMPTIONS			
	Capital Costs	Operating Costs	Irrigation Equipment Capital	Additional Production Costs	Stockwater Capital Costs		New Sprinkler Irrigation	Transportation Cost Savings	Livestock Watering	Municipal Water	Waterfowl Hunting	Upland Bird Hunting	Big Game Hunting	Non Consumptive			Irrigation Farms	Irrigation Development	Stockwater Development	Stockwater Development
1	\$ 2,000,000					\$ 2,000,000								\$ -	\$ -	2,000,000				
2	\$ 2,000,000					\$ 2,000,000								\$ -	\$ -	2,000,000				
3	\$ 35,000,000					\$ 35,000,000								\$ -	\$ -	35,000,000				
4	\$ 50,000,000					\$ 50,000,000								\$ -	\$ -	50,000,000				
5	\$ 50,000,000					\$ 50,000,000								\$ -	\$ -	50,000,000				
6	\$ 31,860,000	\$ 800,000	\$ 4,873,614	\$ 1,121,646	\$ 2,396,000	\$ 41,051,260	\$ 2,377,622	\$ 285,912	\$ 679,115	\$ 9,500,000	\$ -	\$ -	\$ 86,300	\$ 64,500	\$ 12,842,649	\$ 28,268,611	38	38	0.2	0.2
7	\$ 21,420,000	\$ 2,350,000	\$ 2,949,819	\$ 1,800,537	\$ 2,396,000	\$ 30,915,356	\$ 3,815,709	\$ 458,964	\$ 1,358,230	\$ 420,000	\$ 28,750	\$ 14,550	\$ 86,300	\$ 64,500	\$ 6,248,003	\$ 24,668,353	61	23	0.2	0.4
8		\$ 3,100,000	\$ 2,949,819	\$ 2,479,426	\$ 2,396,000	\$ 10,925,247	\$ 5,255,796	\$ 632,016	\$ 2,037,344	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 8,733,456	\$ 2,191,791	84	23	0.2	0.6
9		\$ 3,100,000	\$ 2,949,819	\$ 3,158,319	\$ 2,396,000	\$ 11,604,138	\$ 6,694,983	\$ 805,068	\$ 2,716,459	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 11,024,710	\$ 679,429	107	23	0.2	0.8
10		\$ 3,100,000	\$ 2,949,819	\$ 3,837,210	\$ 2,396,000	\$ 12,283,928	\$ 8,133,970	\$ 978,120	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 13,316,964	\$ 1,032,836	130	23	0.2	1
11		\$ 3,100,000	\$ 2,821,566	\$ 4,486,584		\$ 10,408,150	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 4,449,960	152	22		1
12		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
13		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
14		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
15		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
16		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
17		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
18		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
19		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
20		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
21		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
22		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
23		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
24		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
25		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
26		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
27		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
28		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
29		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
30		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
31		\$ 3,100,000	\$ 3,928,630	\$ 4,486,584	\$ 2,396,000	\$ 13,911,214	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 946,796	152		0.2	1
32		\$ 3,100,000	\$ 2,377,855	\$ 4,486,584	\$ 2,396,000	\$ 12,360,439	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 2,497,571	152		0.2	1
33		\$ 3,100,000	\$ 2,377,855	\$ 4,486,584	\$ 2,396,000	\$ 12,360,439	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 2,497,571	152		0.2	1
34		\$ 3,100,000	\$ 2,377,855	\$ 4,486,584	\$ 2,396,000	\$ 12,360,439	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 2,497,571	152		0.2	1
35		\$ 3,100,000	\$ 2,377,855	\$ 4,486,584	\$ 2,396,000	\$ 12,360,439	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 4,996,956	152			1
36		\$ 3,100,000	\$ 2,274,470	\$ 4,486,584		\$ 9,861,054	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
37		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
38		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
39		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
40		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
41		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
42		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
43		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
44		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
45		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,100	\$ 172,600	\$ 129,100	\$ 14,858,010	\$ 7,271,426	152			1
46		\$ 3,100,000		\$ 4,486,584		\$ 7,586,584	\$ 9,510,488	\$ 1,143,648	\$ 3,395,574	\$ 420,000	\$ 57,500	\$ 29,								