

DRAFT MILK RIVER INTEGRATED WATERSHED MANAGEMENT PLAN

Note to Reader: This is a working document. You will note that there are areas that are incomplete or questions remain (generally marked in pink font). Your comments and feedback regarding the content of this plan will be considered in the final version.



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1.0 INTRODUCTION

The Milk River Watershed Council Canada (MRWCC) is a multi-stakeholder, not-for-profit organization operating in the Milk River watershed following their appointment as a designated Watershed Planning and Advisory Council (WPAC) in February 2006 by Alberta Environment and Sustainable Resource Development (AESRD). Membership includes representatives from municipal, provincial and federal governments, agriculture (irrigation, crop production and ranching sectors), environmental organizations, and the general public. The MRWCC is responsible for engaging stakeholders in watershed assessment and watershed management planning, considering existing land and resource management planning processes and decision-making authorities. To accomplish this, the MRWCC strives to provide stakeholders with timely, science-based watershed information that will support sustainable resource management.

In 2005, a survey was completed by the Steering Committee struck to facilitate the establishment of the MRWCC in order to identify valued watershed components in the Milk River region. Seven areas of interest were expressed through the surveys; these were: 1) water supply and management, 2) water quality, 3) conservation of wildlife and plant species diversity, 4) riparian protection, 5) an informed community, 6) good relationships with Saskatchewan and Montana, and 7) economic development. Goals, objectives and outcomes were identified for each of the seven valued watershed components by the MRWCC (Appendix A).

Since appointment, the MRWCC has been working to achieve their objectives. Studies were completed (the reports are available on the MRWCC website) to provide insight and fill data gaps for some of the valued watershed components, including:

- Milk River Instream Flow Needs Study (2009-10)
- Milk River Supplemental Water Supply Investigation (2007-08)
- Economic Evaluation of Water Supply Options (2008)
- Milk River Water Quality Program (2006-12)
- Synoptic Groundwater Survey (2007)
- Erosion and Sedimentation Study (2007-08)
- Streambank Stabilization Project (current)
- Benthic Invertebrates Study (current)
- Evaluation of Milk River Sediments (current)
- Western Silvery Minnow Recovery Plan (approved; DFO/ASRD initiated, MRWCC Board supported)
- St. Mary Sculpin Recovery Plan (DFO/ASRD Initiated, MRWCC Board supported)
- Remote Metering Project (AENV/AARD Initiated, MRWCC Board supported)

In April 2008, the MRWCC released the Milk River State of the Watershed (SOW) Report. The Milk River SOW summarizes the geography, geology and history of the watershed and comments on the current state of valued watershed resources including historical resources, surface and groundwater supply and quality, fisheries and benthic invertebrates, riparian areas and wetlands, range health and wildlife. The SOW report will be updated in 2013.

A number of recommendations were made in the Milk River SOW Report that provided direction for watershed management planning. These recommendations, in combination with the goals

and objectives of the MRWCC, form the basis for moving forward with the development of the Milk River Integrated Watershed Management Plan (IWMP).

2.0 PURPOSE

The Milk River Integrated Watershed Management Plan makes recommendations for adoption by decision making authorities, natural resource managers, basin users and basin residents regarding the management of land and water resources to achieve desired watershed outcomes. The MRWCC will actively provide direction in this plan and pursue partnerships with other entities to implement the plan.

The Milk River IWMP is a guidance document and planning tool and should be considered within broader regional and municipal planning initiatives and resource development strategies.

3.0 STATEMENT OF ISSUES

A survey was conducted during the initial public consultation process in 2005, prior to the formation of the Milk River Watershed Council Canada. The survey asked people to list the issues they believed were most pressing in the Milk River watershed. From the survey, a list of priorities was developed and goals and objectives were formed to address the main issues (Appendix A).

Since this initial input, the Milk River State of the Watershed Report was completed. A technical committee was struck to develop the State of the Watershed Report and prioritize the recommendations that were developed. Similar findings were observed between the original survey in 2005 and the priority recommendations found in the SOW. The following is a list of priority areas that all ranked closely in terms of importance to stakeholders. In summary, the main concerns in the Milk River watershed are:

- Ability to secure a dependable water supply from a limited resource,
- Augmentation of natural flow in the Milk River by the St. Mary River diversion (particularly the impacts associated with timing, duration and volume),
- Ability to maintain surface and groundwater quality,
- Ability to maintain wildlife and biodiversity,
- Potential loss/degradation of wetlands and riparian areas,
- Impact of land use (e.g. recreation, oil and gas, and agriculture) on watershed resources, and
- Limited economic development opportunities due, in part, to the limited, unsecure supply of water resources.

Issues that are of interest but outside of the scope of this IWMP are those related to:

- air quality
- climate change
- Water licensing and transfers within the watershed (See Section 4.0 - Objective 1 that refers to the development of an Approved Water Management Plan)
- Review of the terms and conditions of the Boundary Waters Treaty 1909

Readers should be aware that a separate initiative is currently underway in which Alberta and Montana are working together to improve access to the shared water of the St. Mary and Milk rivers. The *Montana-Alberta St. Mary and Milk Rivers Water Management Initiative* has, as its aim, the exploration and evaluation of options to improve access to the shared water of these two rivers.

4.0 OBJECTIVES¹

The following nine objectives were developed to guide the development of the Milk River IWMP.

A. Water Supply, Allocation and Protection of Aquatic Ecosystems

Objective 1. As one component of the IWMP, develop an abbreviated Approved Water Management Plan (AWMP) under the provincial *Water Act* that:

- a) Authorizes Alberta Environment and Sustainable Resource Development (ESRD) to consider applications for transfers of water allocations in the Milk River basin.
- b) Specifies matters and factors that must be considered by ESRD when reviewing applications for transfers of water allocations.²

Objective 2. Within the IWMP, recommend Water Conservation Objectives (WCOs) for the Milk River.

Objective 3. Recommend strategies that enhance the delivery and use of apportioned shares of water while maintaining environmental integrity in the Milk River watershed for both Alberta and Montana.

Objective 4. Recommend water conservation strategies that promote the efficient use of water for all sectors (i.e., municipal, industrial, irrigation, recreation).

B. Water Quality, Streambank and Riparian Protection

Objective 5. Recommend water quality objectives (WQOs) for four reaches of the Milk River (i.e., North Fork Milk River, Milk River gravel bed reach, Milk River sand bed reach and Milk River proper (South Fork)).

Objective 6. Recommend minimum setback requirements for development from the Milk River and its tributaries and recommend appropriate management strategies to protect and/or enhance riparian and aquatic ecosystems.

¹ Objectives 2-9 are not part of the Approved Water Management Plan, but rather the Integrated Watershed Management Plan that does not require Cabinet approval.

² In a subsequent phase of the planning process, amendments to the Approved Water Management Plan can be made to include other matters that the *Water Act* directs in an Approved Water Management Plan. This might include recommendations for matters and factors that must be considered by Alberta Environment decision makers when considering an application for an approval (see glossary) for construction or other activities that could negatively impact the aquatic ecosystem.

C. Groundwater

Objective 7. Recommend groundwater protection and conservation measures for vulnerable areas, including the Whisky Valley and Milk River aquifers.

D. Land Use

Objective 8. Recommend land use and development practices which are congruent with the objectives and resource management strategies for the Milk River watershed and its unique semi-arid environment.

E. Biodiversity

Objective 9. Recommend strategies to conserve and enhance native wildlife and plant species diversity found within the watershed.

4.1 Targets and Thresholds

Targets and thresholds are numerical or written statements that provide a measurable indication of success in achieving watershed management objectives. They can be used to determine how ecosystem components rate in the watershed compared to acceptable or desired ratings. Thresholds identify when additional management is needed and or/required (based on voluntary or regulatory management) to improve riparian conditions to a functioning state. Scores, ratings or values less than the threshold require additional management action to return the system to a functioning state. Where possible, targets and thresholds were identified throughout this plan.

5.0 GEOGRAPHICAL EXTENT

5.1 MILK RIVER WATERSHED

The Milk River is the smallest of Alberta's 11 major river basins, encompassing an area of 6,664 km² (1,646,710 acres) (Figure 1). The Milk River is also the northern most tributary of the Missouri River. The watershed is a transboundary basin, spanning areas in the Province of Saskatchewan and the State of Montana, U.S.A.

The Milk River is about 1,173 km long and flows through Montana and Alberta. The headwaters originate in northwestern Montana on the Blackfeet Reservation. The Milk River then enters Alberta, flows through the Town of Milk River, eastward and parallel with the southern Canadian border, prior to flowing back into Montana.

The eastern tributaries (i.e., Lodge Creek, Battle Creek and Bare Creek) originate in the eastern part of the watershed and flow through Saskatchewan and south into Montana before joining the Milk River just east of Chinook, Montana.

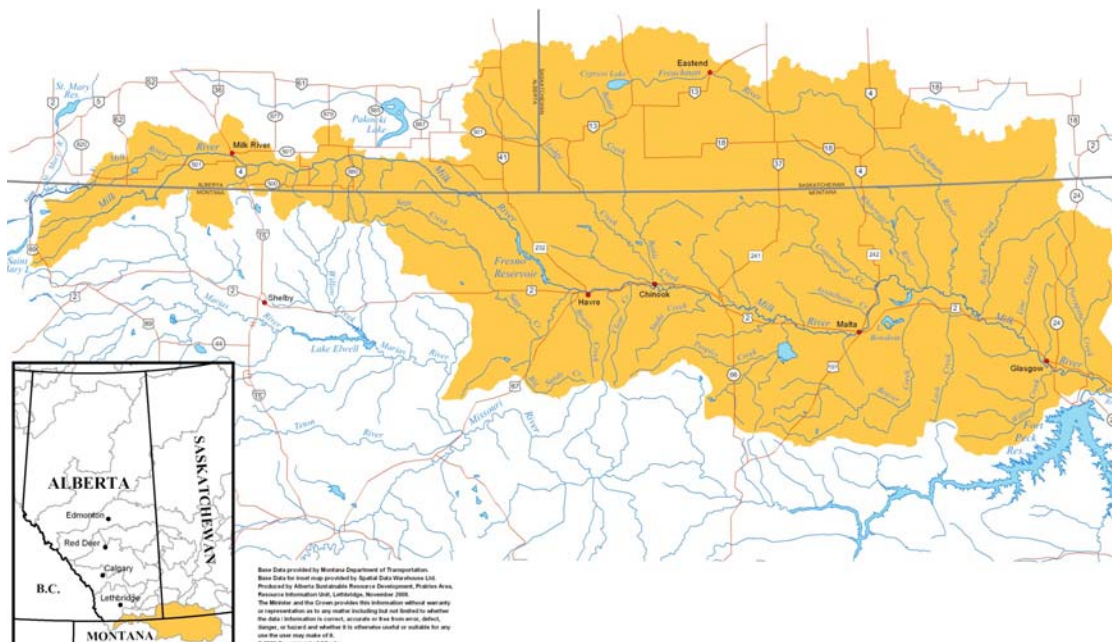


Figure 1. Map of the Milk River watershed and its location in Alberta.

The Boundary Waters Treaty (Article VI) of 1909 was established to apportion the flows of the St. Mary and Milk Rivers between Canada and the United States and resolve water-sharing disputes. The details on how the water was to be shared were developed in the 1921 International Joint Commission (IJC) Order. Today, flows in the Milk River are augmented by water from the St. Mary River annually, typically during the period of April to October to meet the apportionment agreement.

For the purpose of this IWMP, recommendations will apply to the area of the Milk River watershed that is located in Alberta, exclusively. However, some water management recommendations related to the timing, duration and volume of streamflows in the Milk River may be cooperatively implemented with Montana in the future.

5.2 REACH DELINEATION

Four reaches within the Milk River, Alberta, were used as boundaries to explore watershed resources in more detail and establish management objectives for applicable resources (i.e., water quality objectives, riparian management objectives). These reaches are the North Fork Milk River (Reach 1), South Fork Milk River (Reach 2), the Gravel Bed Reach (Reach 3) and the Sand Bed Reach (Reach 4) (Figure 1). These reaches were previously identified in “The Biology and Status of Riparian Poplars in Alberta” (Bradley et al. 1991) and modified in the “Study of Sedimentation and Erosion on the Milk River” (AMEC 2008) to reflect changes in river gradient and bed material in addition to riparian and morphological changes (Figure 1).

5.3 LANDSCAPE MANAGEMENT UNITS

Landscape management units (LMUs) were delineated within the Milk River watershed to assist with watershed management planning (Figure 3). These delineations are summarized in the Milk River State of the Watershed; establishment of LMUs makes it possible to adopt and apply indicators to similar land management units.

The nine LMUs were based on multiple discussions held among the MRWCC State of the Watershed Team members. The delineation of these units was based on:

- watershed geography, including topography and landform characteristics,
- three river channel characteristics (i.e., North Milk River, Milk River gravel reach and Milk River sand reach),
- land management practices (e.g., cropland vs. grazing land),
- location of main tributaries, and
- known fish and wildlife ranges.

The intensity of predominant land use or the vulnerability of environmental components (e.g., water quality) addressed in the State of the Watershed Report can be easily compared across the watershed among the landscape management units. These units will be referred to in the IWMP.

6.0 INTENDED USE AND AUTHORITY

The Milk River Integrated Watershed Management Plan will link the issues of water quality, water quantity, riparian habitat and biodiversity with the watershed's economic and social priorities. The plan provides management direction in the form of recommendations that will help guide the community's activities for the benefit of future generations. The approach seeks to include balanced and representative public consultation. The Milk River IWMP will be presented as a guidance document and planning tool to all watershed stakeholders, including municipal, provincial and federal jurisdictions that have a mandate or management responsibilities in the watershed.

The separate and future Approved Water Management Plan component of the IWMP will give AESRD decision makers the ability to consider applications for water allocation transfers in the Alberta Milk River basin under the provisions of the *Water Act*. The decision makers will be required to consider any "Matters and Factors" that are included in the Approved Water Management Plan.

Although considered a guidance document and planning tool, a recommendation will be put forward by the MRWCC, on behalf of all stakeholders, requesting the adoption of the IWMP by decision makers for consideration when reviewing proposals and applications (approval and/or permits) that may impact land and water resources and their management in the Milk River watershed.

All stakeholders participating in the development of this plan will be asked to endorse and/or support the final Milk River IWMP.

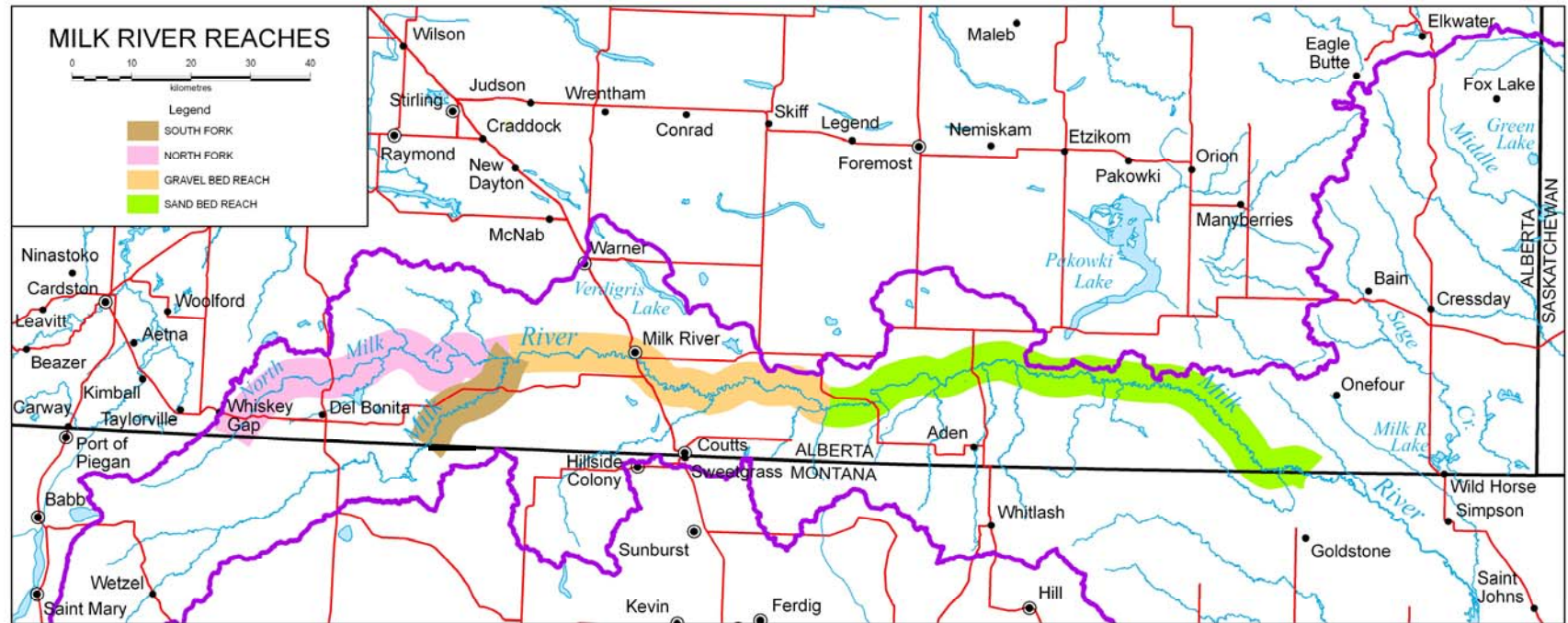


Figure 2. Map showing the four Milk River reaches defined in AMEC (2008) (AESRD 2013).

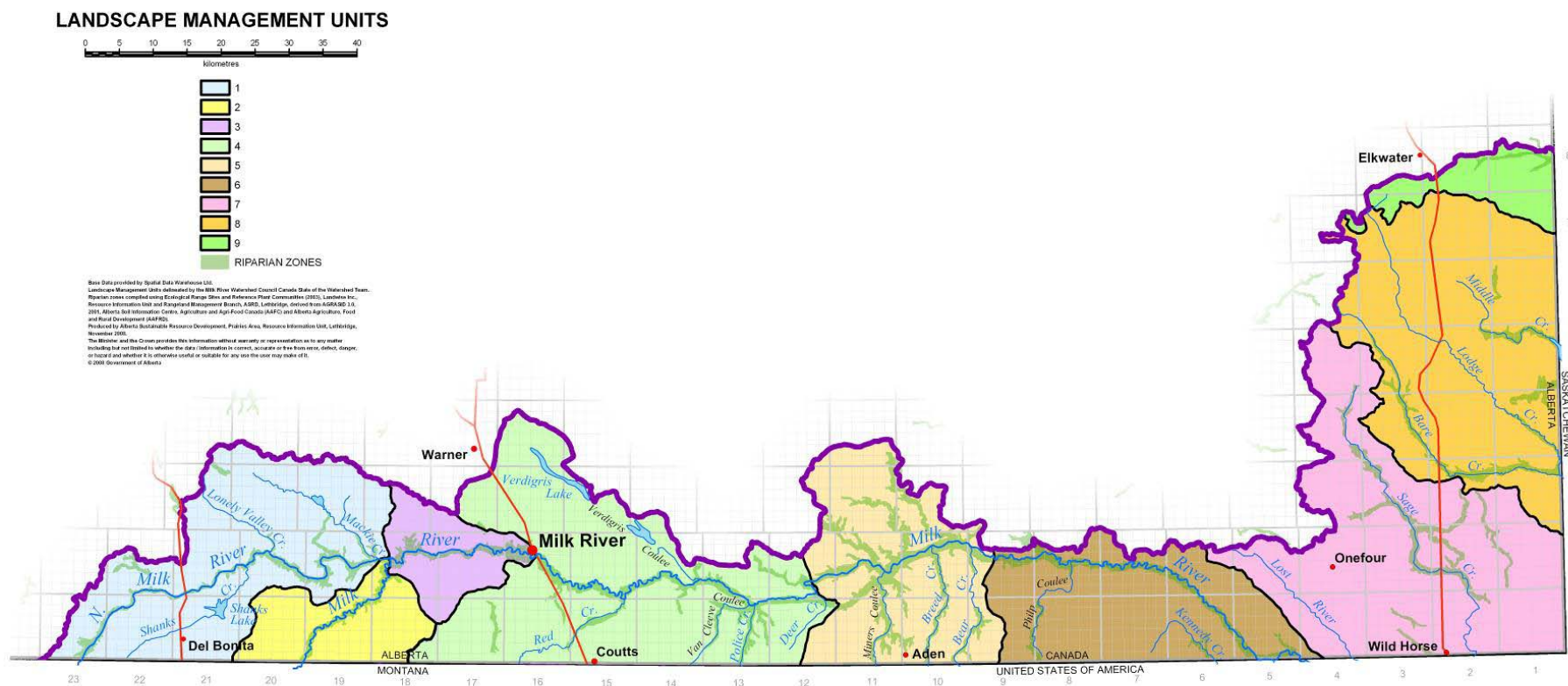


Figure 3. Map showing Landscape Management Units defined for biodiversity management in the Milk River watershed.

7.0 ROLES AND RESPONSIBILITIES

Alberta Environment and Sustainable Resource Development

Alberta Environment and Sustainable Resource Development (AESRD) has a legislated mandate for managing air quality, water resources, waste management, cumulative effects, provincial Crown (also called “public”) lands, the bed and shore of naturally occurring water bodies, and fish and wildlife resources in the Milk River watershed. AESRD’s mandate within the basin is significant because of the natural water bodies which are present, the sizeable public land base that exists and the large diversity of native plant and animal life that is found here. Public lands occupy approximately 60% of the basin (about 4000 Km²). These lands accommodate a variety of different surface and sub-surface land uses that provide wide ranging benefits for basin residents and Albertans.

The oversight and management of provincial Crown assets (by provincial agencies) has been going on for several decades within the watershed. During this period of time, the Government of Alberta has adopted numerous policies, regulations, programs and administrative procedures to allocate and manage public land and natural resources in the basin. These are periodically reviewed and updated to reflect changing times and circumstance, shifting public values, advances in science and knowledge, or in response to particular resource management challenges that arise.

Alberta Tourism, Parks and Recreation

Alberta Tourism, Parks and Recreation – Parks Division manages five protected areas within the Milk River Watershed:

- Writing-on-Stone Provincial Park
- Cypress Hills Interprovincial Park – Alberta
- Milk River Natural Area
- Kennedy Coulee Ecological Reserve
- Twin River Heritage Rangeland

Alberta Parks acts in accordance with the *Provincial Parks Act*, and the *Wilderness Areas, Ecological Reserves, Natural Areas and Heritage Rangelands Act*. In 2009, a 10-year *Plan for Parks* was endorsed, which commits Alberta Parks to achieving the following vision:

Alberta’s parks inspire people to discover, value, protect, and enjoy the natural world and the benefits it provides for current and future generations.

Within the Milk River watershed, Alberta Parks manages its landbases to achieve a diverse variety of natural and cultural heritage objectives. Other key functions include promoting and facilitating appropriate visitor experiences, providing public safety and enforcement services on park lands, and operating and maintaining park facilities.

Alberta Agriculture and Rural Development

Alberta Agriculture and Rural Development is a *Water for Life Strategy* partner and shares responsibility for goals and key actions related to safe, secure drinking water, healthy aquatic

ecosystems, and water conservation. AARD provides technical and research support to WPAC committees throughout the province, including the Milk River basin WPAC. In the Milk River Basin, AARD is supporting research in water quality as related to fecal coliform source tracking. AARD is a member of the Montana-Alberta Joint Water Management Initiative Team, comprised of Alberta and Montana representatives, which is reviewing opportunities for improved water management by both jurisdictions on the St. Mary and Milk rivers.

Agricultural practices in the Milk River watershed have a variety of connections to the department. AARD is responsible for the *Agricultural Operations Practices Act* (AOPA), legislation which sets manure management standards for Alberta operations. AARD promotes the development of improved irrigation water management technologies and practices to increase irrigation water use efficiency, and has been involved in real-time water use monitoring of private irrigators in the Milk River watershed. AARD delivers extension programs to assist producers to develop and implement plans to minimize impacts on the environment through the Environmental Farm Plan, Alberta Environmentally Sustainable Agriculture and Growing Forward programs such as Stewardship Plans, On-Farm Energy Efficiency and On-Farm Water Management.

Municipalities

There are four rural municipalities (Cardston County, County of Warner, County of Forty Mile and Cypress County) and two urban municipalities (Town of Milk River and Village of Coutts) within the Milk River watershed that have jurisdiction for land management within the watershed. Under Part 17 of the *Municipal Government Act*, municipalities have responsibilities in planning, regulating, subdividing and developing land in Alberta. They also have the authority to create planning and regulatory documents that prescribe how the land will be developed. These documents include statutory plans. They describe the planning policies and types of land uses permitted in the municipality and land use bylaws specifying development standards and regulations.

Agricultural Service Boards (ASBs), that form part of rural municipal government, are responsible for administering and developing programs to compliment Provincial legislation, including the *Agricultural Service Board Act*, the *Weed Control Act*, the *Agricultural Pests Act* and the *Soil Conservation Act*. It is generally the role of the Agricultural Fieldman to implement the work plan established by the ASB. Rural Extension Staff and/or Assistant Agricultural Fieldmen may also be employed to work directly with local producers and communities to provide technical assistance and to coordinate education opportunities (e.g., workshops, field tours) for land managers that promote environmental stewardship.

8.0 PUBLIC CONSULTATION PROCESS

The Milk River Watershed Council Canada frequently consulted with stakeholders and the public in accordance with the *Framework for Water Management Planning* (AENV 1999) to ensure that the Milk River Integrated Watershed Management Plan reflects local objectives and ideals. Table 1 summarizes the public process to date.

Table 1. Summary of public consultation undertaken in support of the Milk River IWMP.

Activity	Purpose	Date
Milk River Strategic Watershed Management Planning Workshop	To prioritize the recommendations that were developed by local resource managers in the Milk River State of the Watershed (SOW) Report and set direction for the MRWCC and the Milk River Watershed Management Plan.	December 5, 2008
Public Open House	Presentation of Milk River IWMP Terms of Reference, gather comments and input	March 4, 2010
Municipal Presentations (Cardston County, County of Warner, County of Forty Mile and Cypress County)	Present Milk River IWMP Terms of Reference and seek endorsement.	August 2010 - Town of Milk River
Annual General Meeting	Present update on the Milk River IWMP to membership	April 2011
Municipal Presentations	Present progress on Milk River IWMP	2011 and 2012
Stakeholder Meeting	Present discussion documents that present draft targets, thresholds and recommendations to technical group. Gather feedback.	December 6, 2012
Treaty 7 Water Sub-Table Meeting	Present the draft Milk River IWMP and invite First Nations to participate in planning process.	January 28, 2013
Public Meeting	Present draft Milk River IWMP to the public for input and comment.	March 6, 2013

In addition, periodic updates were provided to the public and stakeholders through the MRWCC's newsletter, The Meander. The MRWCC's website is also a source of useful information on the activities of the Council.

9.0 INTEGRATED WATERSHED MANAGEMENT PLAN

9.1 SURFACE WATER QUANTITY (WATER CONSERVATION OBJECTIVES)

Objective 1. As one component of the IWMP, develop an abbreviated Approved Water Management Plan (AWMP) under the provincial *Water Act* that:

- a) Authorizes Alberta Environment and Sustainable Resource Development to consider applications for transfers of water allocations in the Milk River basin.
- b) Specifies matters and factors that must be considered by Alberta Environment and Sustainable Resource Development when reviewing applications for transfers of water allocations.

Objective 2. Within the IWMP, recommend Water Conservation Objectives (WCOs) for the Milk River.

Objective 3. Recommend strategies that enhance the delivery of apportioned shares of water while maintaining environmental integrity in the Milk River watershed for both Alberta and Montana.

Objective 4. Recommend water conservation strategies that promote the efficient use of water for all sectors (i.e., municipal, industrial, irrigation, recreation).

9.1.1 Outcome and Goals

Water is managed in a manner that benefits communities while meeting the needs of the aquatic and riparian environment.

Goals

- Water sharing disputes are resolved.
- An improved economy in the Milk River watershed exists due to a secure supply of water.
- Information on water use in the Milk River watershed is available to the public.

9.1.2 Targets and Thresholds

A number of studies were completed to support the development of Water Conservation Objectives for the Milk River, including:

- Milk River Instream Flow Needs Study (Golder 2010)
- Milk River Fish Habitat Suitability Criteria Workshop (Riemersma and Watkinson 2011)
- Milk River Open Water Instream Flow Needs (AMEC 2011)
- Milk River Winter Instream Flow Needs Study - Winter River2D Modelling (AMEC 2011)

However, this data is still being considered. Future phases of the Milk River IWMP will work to establish science-based WCOs for the Milk River (Objective 2) and consultation with stakeholders and the public will be undertaken at that time.

Currently, recommended flow targets and thresholds for riparian function and recreation are presented for discussion (Table 2) until the province can assist to address the broader issues.

Table 2. Summary of draft flow regimes required to maintain desired functions.

Desired Function	Flow Regime
Fish Habitat	Not Available.
Channel Maintenance	Not Available.
Water Quality	Not Available.
Riparian Recruitment	30 m ³ /s and 3.5 m ³ /s (Refer to Section 9.4)
Recreation	12 m ³ /s to 26 m ³ /s (Optimum: 18 m ³ /s to 25 m ³ /s)

9.1.3 Recommendations

Approved Water Management Plan and Water Conservation Objectives (WCOs)

- a) MRWCC and AESRD should collaborate to develop an Approved Water Management Plan under the provisions of the *Water Act*, with recommendations related to the use of water license allocation transfers in the basin once the Montana-Alberta Transboundary negotiations are complete.
- b) MRWCC and AESRD should collaborate in the review of how to address desired flow regimes within the context of the 1909 Boundary Waters Treaty once the Montana-Alberta transboundary negotiations are complete. This includes consideration of the development of Water Conservation Objectives.

Timing and Duration of Flows to Enhance Environment and Recreation Opportunities

- a) Flows from the St. Mary River diversion should occur when ice cover has melted on the Alberta reach of the Milk River to reduce ice scour and subsequent erosion impacts to streambanks.
- b) Flows from the St. Mary River diversion should increase and decrease in a manner that will reduce streambank erosion and promote development of functioning riparian areas, if possible.
- c) A St. Mary River diversion shut-down date of October 1st should be considered to extend the recreation usability of the Milk River in Alberta, weather permitting.
- d) Flows from the St. Mary River diversion should be released to maintain a minimum of 12 m³/s and maximum 25 m³/s in the Milk River from May through September, when possible, to support safe river navigation (i.e., allow recreational uses including tubing, canoeing and kayaking). Optimal recreational flows as identified at the Town of Milk River gauging station should be maintained in a range of 18 m³/s to 25 m³/s to provide the greatest opportunity for recreational use from the Town of Milk River to Deer Creek Bridge (the area identified as most commonly used by recreational enthusiasts). See Appendix B for an evaluation of recreational flows.

Securing Water Supplies for Future Generations

- a) Improve the security and volume of water supplies in the Milk River watershed by off-stream storage and/or water pipeline options to attract industry and provide agricultural producers security for expanding operations.
- b) Explore opportunities with Montana for water sharing in lieu of on-stream storage in Alberta.
- c) Any water used in the watershed should be done so with a conservation mindset that minimizes the amount of water required and maximizes water productivity and efficiency.

All sectors should implement and use the Sector-based Water Conservation, Efficiency and Productivity Plans developed with the Alberta Water Council.

- d) Water meters should be used to monitor the use of Milk River water for domestic, industrial and commercial uses.

e) Cost of water use should provide some incentive for the conservation of the resource.

9.2 SURFACE WATER QUALITY OBJECTIVES

Objective 5. Recommend water quality objectives (WQOs) for four reaches of the Milk River (i.e., North Fork Milk River, Milk River gravel bed reach, Milk River sand bed reach and Milk River proper (South Fork)).

9.2.1 Outcomes and Goals

Water and adjacent land uses (that influence water quality) are managed in a manner that benefits communities while meeting the needs of the ecosystem and aquatic and riparian environments.

Water of high quality is available for human use, communities, terrestrial and aquatic life, irrigation farming, and recreational and industrial users in the Milk River watershed.

Goals

- Water quality is maintained, and where possible, improved in all watershed reaches.
- Baseline water quality information is available to the public.
- Water quality and quantity information is used by resource managers to promote sustainable land and water use and to integrate water management with other uses and human activities.

9.2.2 Targets and Thresholds

Tables 3 to 6 summarize draft water quality objectives for four reaches of the Milk River (Figure 1). Refer to the discussion paper “Surface Water Quality Objectives for the Milk River – Open Water Season” (PESL 2012) for more detail on how the WQOs were determined.

Table 3. Water quality objectives for Reach 1: N Milk River at 501.

Parameter	Flow Period	Sample Size ^a	Normal Range (25 th to 75 th Percentile)			Cautionary Range (75 th to 90 th Percentile)	Threshold (>90 th Percentile)	Alberta Surface Water Quality Guidelines ^b
			Lower Limit	Median Target	Upper Limit			
Specific Conductivity (µS/cm)	Diversion	48	149	165	180	181 – 246	>246	≤1000 (Irrigation)
	Natural	19	418	445	485	486 – 512	>512	
pH (Value)	Diversion	46	8.09	8.12	8.19	<6.5 and >8.5	<6.5 and >8.5	>6.5 and <8.5
	Natural	11	8.38	8.39	8.40			

Parameter	Flow Period	Sample Size ^a	Normal Range (25 th to 75 th Percentile)			Cautionary Range (75 th to 90 th Percentile)	Threshold (>90 th Percentile)	Alberta Surface Water Quality Guidelines ^b
			Lower Limit	Median Target	Upper Limit			
Total Dissolved Solids (mg/L)	Diversion	48	81	89	100	101 – 147	>147	≤500 and ≤3500 (Irrigation; Crop Type)
	Natural	19	236	257	273	274 – 294	>294	
Total Suspended Solids (mg/L)	Diversion	48	9	16	28	29 – 59	>59	No Guideline
	Natural	19	1	5	22	23 – 55	>55	
Total Phosphorus (mg/L)	Diversion	48	0.010	0.014	0.021	0.022 – 0.037	>0.037	≤0.05 (Aquatic Life)
	Natural	19	0.007	0.012	0.025	0.026 – 0.100	>0.100	
Total Dissolved Phosphorus (mg/L)	Diversion	48	0.002	0.003	0.005	0.006 – 0.007	>0.007	No Guideline
	Natural	19	0.002	0.005	0.009	0.010 – 0.066	>0.066	
Total Nitrogen (mg/L)	Diversion	47	0.170	0.240	0.365	0.366 – 0.468	>0.468	≤1.0 (Aquatic Life)
	Natural	19	0.725	0.900	1.263	1.264 – 1.578	>1.578	
Nitrate+Nitrite Nitrogen (mg/L)	Diversion	48	0.023	0.057	0.100	0.101 – 0.114	>0.114	No Guideline
	Natural	19	0.307	0.387	0.510	0.511 – 0.729	>0.729	
Nitrite-Nitrogen (mg/L)	Diversion	48	0.002	0.002	0.002	0.002	>0.002	≤0.06 (Aquatic Life)
	Natural	19	0.002	0.003	0.025	0.025	>0.025	
Nitrate-Nitrogen (mg/L)	Diversion	48	0.023	0.057	0.100	0.101 – 0.114	>0.114	≤2.93 (Aquatic Life)
	Natural	19	0.307	0.387	0.510	0.511 – 0.729	>0.729	
Total Ammonia (mg/L)	Diversion	38	0.025	0.025	0.048	0.049 – 0.081	>0.081	Based on pH & Temperature (Appendix A)
	Natural	9	0.025	0.025	0.130	0.131 – 0.165	>0.165	
Fecal Coliforms (cfu/100 mL)	Diversion	45	14	27	98	99 – 140	>140	≤100 (Irrigation)
	Natural	16	8	55	98	99 – 668	>668	
Turbidity (NTU)	Diversion	38	6.4	9.1	21.0	22.1 – 39.2	>39.2	No Guideline
	Natural	9	1.0	1.8	2.3	2.4 – 2.7	>2.7	
Calcium (mg/L)	Diversion	46	20.0	22.0	23.9	24.0 – 30.6	>30.6	≤1000 (Livestock)
	Natural	11	46.2	50.0	53.7	53.8 – 56.0	>56.0	
Chloride (mg/L)	Diversion	46	0.3	0.6	1.0	1.1 – 2.0	>2.0	≤100 (Irrigation)
	Natural	11	1.6	1.9	2.8	2.9 – 4.0	>4.0	
Sulphate (mg/L)	Diversion	46	4.2	5.8	7.0	7.1 – 9.5	>9.5	≤1000 (Livestock)
	Natural	11	6.4	7.4	8.7	8.8 – 9.0	>9.0	

^a Sample size refers to the number of samples on which the WQO is based.

^b Surface Water Quality Guidelines for Use in Alberta (AENV 1999).

Table 4. Reach 2: South Fork Milk River at 501. Note the flow period is from April-October since the South Fork Milk River is not subject to flow augmentation.

Parameter	Flow Period	Sample Size	Normal Range (25 th to 75 th Percentile)			Cautionary Range (75 th to 90 th Percentile)	Threshold (>90 th Percentile)	Alberta Surface Water Quality Guidelines
			Lower Limit	Median Target	Upper Limit			
Specific Conductivity (µS/cm)	Apr-Oct	59	441	510	716	717 - 882	>882	≤1000 (Irrigation)
pH (Value)	Apr-Oct	49	8.32	8.44	8.50	<6.5 and >8.5	<6.5 and >8.5	>6.5 and <8.5
Total Dissolved Solids (mg/L)	Apr-Oct	59	260	304	430	431 - 546	>546	≤500 and ≤3500 (Irrigation; Crop Type)
Total Suspended Solids (mg/L)	Apr-Oct	59	6	14	61	62 - 247	>247	No Guideline
Total Phosphorus (mg/L)	Apr-Oct	59	0.012	0.019	0.049	0.050 - 0.186	>0.186	≤0.05 (Aquatic Life)
Total Dissolved Phosphorus (mg/L)	Apr-Oct	59	0.004	0.006	0.008	0.009 - 0.015	>0.015	No Guideline

Parameter	Flow Period	Sample Size	Normal Range (25 th to 75 th Percentile)			Cautionary Range (75 th to 90 th Percentile)	Threshold (>90 th Percentile)	Alberta Surface Water Quality Guidelines
			Lower Limit	Median Target	Upper Limit			
Total Nitrogen (mg/L)	Apr-Oct	58	0.363	0.600	0.835	0.836 - 1.360	>1.360	≤1.0 (Aquatic Life)
Nitrate+Nitrite Nitrogen (mg/L)	Apr-Oct	59	0.002	0.025	0.120	0.121 - 0.383	>0.383	No Guideline
Nitrite-Nitrogen (mg/L)	Apr-Oct	59	0.002	0.002	0.005	0.006 - 0.025	>0.025	≤0.06 (Aquatic Life)
Nitrate-Nitrogen (mg/L)	Apr-Oct	59	0.002	0.025	0.130	0.131 - 0.440	>0.440	≤2.93 (Aquatic Life)
Total Ammonia (mg/L)	Apr-Oct	39	0.025	0.030	0.070	0.071 - 0.092	>0.092	Based on pH & Temperature (Appendix A)
Fecal Coliforms (cfu/100 mLs)	Apr-Oct	54	15	77	223	224 - 619	>619	≤100 (Irrigation)
Turbidity	Apr-Oct	39	6.8	12.0	23.5	23.6 - 74.0	>74.0	No Guideline
Calcium (mg/L)	Apr-Oct	49.0	29.0	43.0	50.0	50.1 - 53.6	>53.6	≤1000 (Livestock)
Chloride (mg/L)	Apr-Oct	49.0	2.4	4.0	7.0	7.1 - 11.8	>11.8	≤100 (Irrigation)
Sulphate (mg/L)	Apr-Oct	49.0	42.0	76.0	166.0	166.1 - 270.8	>270.8	≤1000 (Livestock)

^a Sample size refers to the number of samples on which the WQO is based.

^b Surface Water Quality Guidelines for Use in Alberta (AENV 1999).

Table 5. Reach 3: Upstream of the Town of Milk River.

Parameter	Flow Period	Sample Size ^a	Normal Range (25 th to 75 th Percentile)			Cautionary Range (75 th to 90 th Percentile)	Threshold (>90 th Percentile)	Alberta Surface Water Quality Guidelines ^b
			Lower Limit	Median Target	Upper Limit			
Specific Conductivity (µS/cm)	Diversion	49	169	210	250	251 – 398	>398	≤1000 (Irrigation)
	Natural	20	477	570	652	653 – 674	>674	
pH (Value)	Diversion	47	8.14	8.20	8.30	<6.5 and >8.5	<6.5 and >8.5	>6.5 and <8.5
	Natural	12	8.39	8.41	8.44			
Total Dissolved Solids (mg/L)	Diversion	49	92	112	150	151 – 240	>240	≤500 and ≤3500 (Irrigation; Crop Type)
	Natural	20	276	342	391	392 – 418	>418	
Total Suspended Solids (mg/L)	Diversion	49	31	56	150	151 – 282	>282	No Guideline
	Natural	20	4	7	117	118 – 267	>267	
Total Phosphorus (mg/L)	Diversion	49	0.028	0.044	0.090	0.091 – 0.148	>0.148	≤0.05 (Aquatic Life)
	Natural	20	0.008	0.013	0.076	0.077 – 0.504	>0.504	
Total Dissolved Phosphorus (mg/L)	Diversion	49	0.002	0.003	0.006	0.007 – 0.010	>0.010	No Guideline
	Natural	20	0.003	0.005	0.015	0.016 – 0.173	>0.173	
Total Nitrogen (mg/L)	Diversion	48	0.220	0.325	0.453	0.453 – 0.667	>0.667	≤1.0 (Aquatic Life)
	Natural	20	0.313	0.680	1.134	1.135 – 1.637	>1.637	
Nitrate+Nitrite Nitrogen (mg/L)	Diversion	49	0.020	0.043	0.086	0.087 – 0.141	>0.141	No Guideline
	Natural	20	0.036	0.096	0.324	0.325 – 0.479	>0.479	
Nitrite-Nitrogen (mg/L)	Diversion	49	0.002	0.002	0.002	0.003 – 0.004	>0.004	≤0.06 (Aquatic Life)
	Natural	20	0.002	0.025	0.025	0.026 – 0.004	>0.004	
Nitrate-Nitrogen (mg/L)	Diversion	49	0.020	0.043	0.086	0.087 – 0.133	>0.133	≤2.93 (Aquatic Life)
	Natural	20	0.025	0.096	0.324	0.324 – 0.478	>0.478	

Parameter	Flow Period	Sample Size ^a	Normal Range (25 th to 75 th Percentile)			Cautionary Range (75 th to 90 th Percentile)	Threshold (>90 th Percentile)	Alberta Surface Water Quality Guidelines ^b
			Lower Limit	Median Target	Upper Limit			
Total Ammonia (mg/L)	Diversion	39	0.025	0.025	0.030	0.031 – 0.084	>0.084	Based on pH & Temperature (Appendix A)
	Natural	10	0.025	0.025	0.059	0.060 – 0.094	>0.094	
Fecal Coliforms (cfu/100 mLs)	Diversion	47	31	68	133	134 – 272	>272	≤100 (Irrigation)
	Natural	20	10	49	207	208 – 522	>522	
Turbidity (NTU)	Diversion	39	20.0	33.0	53.0	53.1 – 148.0	>148.0	No Guideline
	Natural	10	2.3	2.7	4.3	4.4 – 6.2	>6.2	
Calcium (mg/L)	Diversion	47	21.3	24.9	31.5	31.6 – 35.4	>35.4	≤1000 (Livestock)
	Natural	12	37.0	40.5	45.5	45.6 – 47.0	>47.0	
Chloride (mg/L)	Diversion	47	0.7	1.0	1.8	1.9 – 3.1	>3.1	≤100 (Irrigation)
	Natural	12	2.9	4.3	5.2	5.3 – 6.0	>6.0	
Sulphate (mg/L)	Diversion	47	6.9	11.6	18.5	18.6 – 56.0	>56.0	≤1000 (Livestock)
	Natural	12	47.8	62.9	90.9	91.0 – 108.2	>108.2	

^a Sample size refers to the number of samples on which the WQO is based.

^b Surface Water Quality Guidelines for Use in Alberta (AENV 1999).

Table 6. Reach 4: Sand-Bed Reach at Hwy 880.

Parameter	Flow Period	Sample Size ^a	Normal Range (25 th to 75 th Percentile)			Cautionary Range (75 th to 90 th Percentile)	Threshold (>90 th Percentile)	Alberta Surface Water Quality Guidelines ^b
			Lower Limit	Median Target	Upper Limit			
Specific Conductivity (µS/cm)	Diversion	51	200	250	305	306 – 540	>540	≤1000 (Irrigation)
	Natural	17	684	727	770	771 – 936	>936	
pH (Value)	Diversion	51	8.20	8.24	8.30	<6.5 and >8.5	<6.5 and >8.5	>6.5 and <8.5
	Natural	17	8.41	8.46	8.50			
Total Dissolved Solids (mg/L)	Diversion	51	110	140	178	179 – 330	>330	≤500 and ≤3500 (Irrigation; Crop Type)
	Natural	17	415	450	490	491 – 593	>593	
Total Suspended Solids (mg/L)	Diversion	49	64	131	234	235 – 384	>384	No Guideline
	Natural	17	4	13	75	76 – 228	>228	
Total Phosphorus (mg/L)	Diversion	51	0.059	0.088	0.135	0.136 – 0.220	>0.220	≤0.05 (Aquatic Life)
	Natural	17	0.008	0.013	0.030	0.031 – 0.086	>0.086	
Total Dissolved Phosphorus (mg/L)	Diversion	51	0.003	0.004	0.005	0.006 – 0.011	>0.011	No Guideline
	Natural	17	0.002	0.004	0.008	0.009 – 0.021	>0.021	
Total Nitrogen (mg/L)	Diversion	50	0.270	0.365	0.460	0.461 – 0.668	>0.668	≤1.0 (Aquatic Life)
	Natural	17	0.250	0.320	1.170	1.171 – 1.400	>1.400	
Nitrate+Nitrite Nitrogen (mg/L)	Diversion	51	0.014	0.030	0.080	0.081 – 0.120	>0.120	No Guideline
	Natural	17	0.014	0.036	0.140	0.141 – 0.538	>0.538	
Nitrite-Nitrogen (mg/L)	Diversion	51	0.002	0.002	0.002	0.002	>0.002	≤0.06 (Aquatic Life)
	Natural	17	0.002	0.002	0.002	0.002 – 0.003	>0.003	
Nitrate-Nitrogen (mg/L)	Diversion	51	0.014	0.030	0.079	0.080 – 0.120	>0.120	≤2.93 (Aquatic Life)
	Natural	17	0.014	0.036	0.140	0.141 – 0.532	>0.532	
Total Ammonia (mg/L)	Diversion	43	0.025	0.025	0.045	0.046 – 0.068	>0.068	Based on pH & Temperature (Appendix A)
	Natural	15	0.025	0.025	0.045	0.046 – 0.066	>0.066	
Fecal Coliforms (cfu/100 mLs)	Diversion	49	44	78	160	161 – 280	>280	≤100 (Irrigation)
	Natural	16	18	29	50	51 – 163	>163	
Turbidity (NTU)	Diversion	43	39	58	104	105 – 158	>158	No Guideline
	Natural	15	4	12	76	77 – 178	>178	
Calcium (mg/L)	Diversion	51	23.0	27.0	31.0	32.0 – 41.0	>41.0	≤1000 (Livestock)
	Natural	17	44.0	47.4	52.0	53.0 – 55.0	>55.0	
Chloride (mg/L)	Diversion	51	0.8	1.4	2.0	2.1 – 3.0	>3.0	≤100

Parameter	Flow Period	Sample Size ^a	Normal Range (25 th to 75 th Percentile)			Cautionary Range (75 th to 90 th Percentile)	Threshold (>90 th Percentile)	Alberta Surface Water Quality Guidelines ^b
			Lower Limit	Median Target	Upper Limit			
	Natural	17	5.7	6.0	8.6	8.7 – 10.8	>10.8	(Irrigation)
Sulphate (mg/L)	Diversion	51	13.6	21.8	30.5	30.6 – 83.0	>83.0	≤1000
	Natural	17	130.0	146.0	170.0	171.0 – 229.0	>229.0	(Livestock)

^a Sample size refers to the number of samples on which the WQO is based.

^b Surface Water Quality Guidelines for Use in Alberta (AENV 1999).

9.2.3 Recommendations

- a) Continue with the Milk River Long-Term Water Monitoring Program at select locations to assess and evaluate water quality and compare with water quality objectives in this plan.
- b) Continue and expand tributary monitoring in order to establish WQOs for priority tributaries that include:
 - Eastern Tributaries (Inter-provincial streams)
 - Red Creek (support Watershed Stewardship Group activity)
 - Verdigris Coulee (A significant source of poor water quality (i.e., high salts) when flowing).
- c) A fecal coliform source-tracking project (initiated in 2012) should be completed to determine sources of bacteria on the Milk River.
- d) Appropriate river flows should be identified to maintain water quality within the normal range for those parameters influenced by flow augmentation. The MRWCC and Alberta government officials are encouraged to explore with their Montana counterparts how water flows might be managed, under existing treaty requirements and agreements, to achieve environmental and water quality objectives in Canada.
- e) Streambank stabilization measures should be applied, where feasible, to reduce erosion and subsequent sediment transport.
- f) Riparian condition should be improved, where needed, to restore functions that maintain water quality.
- g) Implementation of industry Best Management Practices (agricultural cropping, livestock management, oil and gas activity, sand and gravel operations, subdivision design, etc.) should be promoted to protect water quality:

For Municipalities:

- Stormwater should be captured and treated prior to release into the Milk River.
- For future developments that require the release of stormwater to surface water (either to the Milk River, its tributaries or lakes and wetlands), the release should be made at an appropriate rate and volume (e.g., predevelopment rates and volumes) to reduce the occurrence of streambank and gully erosion, flooding downstream and changes to native vegetation communities.

- Appropriate water body and riparian setbacks should be implemented for developments located adjacent to the Milk River and its tributaries.
- Residential, commercial and industrial areas should be designed using Low Impact Development (LID) principles.

For Agriculture:

- Livestock grazing plans should include the creation of riparian pastures within a rotational grazing system.
- Implementation of offstream watering systems.
- Proper siting for livestock wintering areas to control runoff.
- Minimizing surface runoff of fertilizers and pesticides from cropped fields

For Other Industry:

- To follow best management practices outlined in the *Code of Practice for Watercourse Crossings*.
- To follow best management practices outlined in the *Code of Practice for Pipelines and Telecommunication Lines*.
- Watercourse, waterbody and riparian setbacks should be observed.

- h) Establish a Milk River Water Quality Review Committee within the MRWCC's Research and Monitoring Team to identify and address water quality issues that may arise from the water monitoring program.

9.3 GROUNDWATER

Within the Milk River Integrated Watershed Management Plan planning area, groundwater is associated with water supply and management and the conservation and protection of vulnerable aquifers:

Objective 4. Recommend water conservation strategies that promote the efficient use of water for all sectors (i.e., municipal, industrial, irrigation).

Objective 7. Recommend groundwater protection and conservation measures for vulnerable areas, including the Whisky Valley and Milk River aquifers (Figure 1 and Figure 2).

Note: Objective 5 and Objective 6 are related to water quality, streambank and riparian protection and discussed in Section 9.2 and Section 9.5.

9.3.1 Outcomes and Goals

Groundwater is recognized as a valuable resource in the Milk River watershed and management is in place to provide for its protection and conservation.

Goals

- Groundwater is available and able to provide for domestic and livestock uses, as well as upland functions (e.g., contribution of inflow to the water balance of large permanent wetlands, to streamflow and wildlife habitat where groundwater seeps are prevalent).
- Groundwater quality is not adversely affected by human activities such as land use, extraction of natural gas or gravel, or by activity that leads to contamination.
- Groundwater is mapped, interactions are understood and the resource is properly managed.

9.3.2 Targets and Thresholds

Groundwater Supply Target

Existing and future groundwater and surface water demands are met with no observed decreasing trend in groundwater levels attributed to those demands.

Groundwater Quality Target

Maintain the existing quality of groundwater (i.e., background) throughout the watershed to provide for domestic and livestock drinking water.

Interim groundwater quality targets should be set at a level 10% higher than the seasonally high concentration for key parameters measured at individual wells, or at the drinking water standard concentration, if it represents less than a 10% increase. **Key parameters include:** electrical conductivity nitrate plus nitrite, total dissolved solids, chloride, phenolics, hardness, total organic carbon and BTEX (benzene, toluene, ethylbenzene, xylenes).

Example: If the highest concentration of total dissolved solids is measured at 500 mg/L then the target concentration should be set at ≤ 550 mg/L; seasonal variation of groundwater quality occurs, so separate targets may be necessary to reflect spring vs. fall conditions. If the measured TDS concentration (or the measured TDS concentration + 10%) is higher than the recommended drinking water standard concentration, then the drinking water standard should apply.

Recommend % natural cover overlying highly vulnerable aquifers.

9.3.3 Recommendations³

Significant groundwater resources in the Milk River watershed include the Milk River and Whisky Valley aquifers (Figure 4 and Figure 5). The Milk River and these two aquifers are interconnected; water from the Milk River percolates into the Whisky Valley Aquifer, particularly when withdrawals from the aquifer are significant.

³ Many of the recommendations made for groundwater were taken from "Report on Development of a Management/Protection Plan for the Whisky Valley Aquifer, County of Warner, Alberta" prepared for the Milk River West Water User's Co-op, Milk River, AB (Golder Associates Ltd. 2004).

9.3.3.1 Groundwater Supply

- a) Federal, provincial and municipal decision makers should formally recognize the unique and important inter-connection between the Milk River, the Milk River Sandstone Aquifer and the Whisky Valley Aquifer.
- b) There are some areas on the Whisky Valley Aquifer where the Aquifer may be thicker (Figure 6) and thus have good potential for additional supply. The potential effects of establishing production wells at a particular location should be assessed using the Whisky Valley Aquifer Model, keeping in mind the potential for affecting flow in the Milk River. New producing water wells should not be developed if they **substantially** reduce river flows.
- c) To assess the potential for expanded use of the Aquifer, those areas being targeted for well development should be test drilled to confirm that the quality and volume available are suitable for use and do not impact on existing users.

9.3.3.2 Groundwater Quality

- a) Limit new development within “medium-high” and “high” risk areas as defined on the Aquifer Vulnerability Map (Figure 4) if it is not known how new development would impact the Aquifer (i.e., the precautionary principle will be observed). (Refer to appropriate land uses in Section 9.6).
- b) Appropriate best management practices should be applied when storing or handling hazardous materials that could impact surface waters and inadvertently reach groundwater and vice versa.

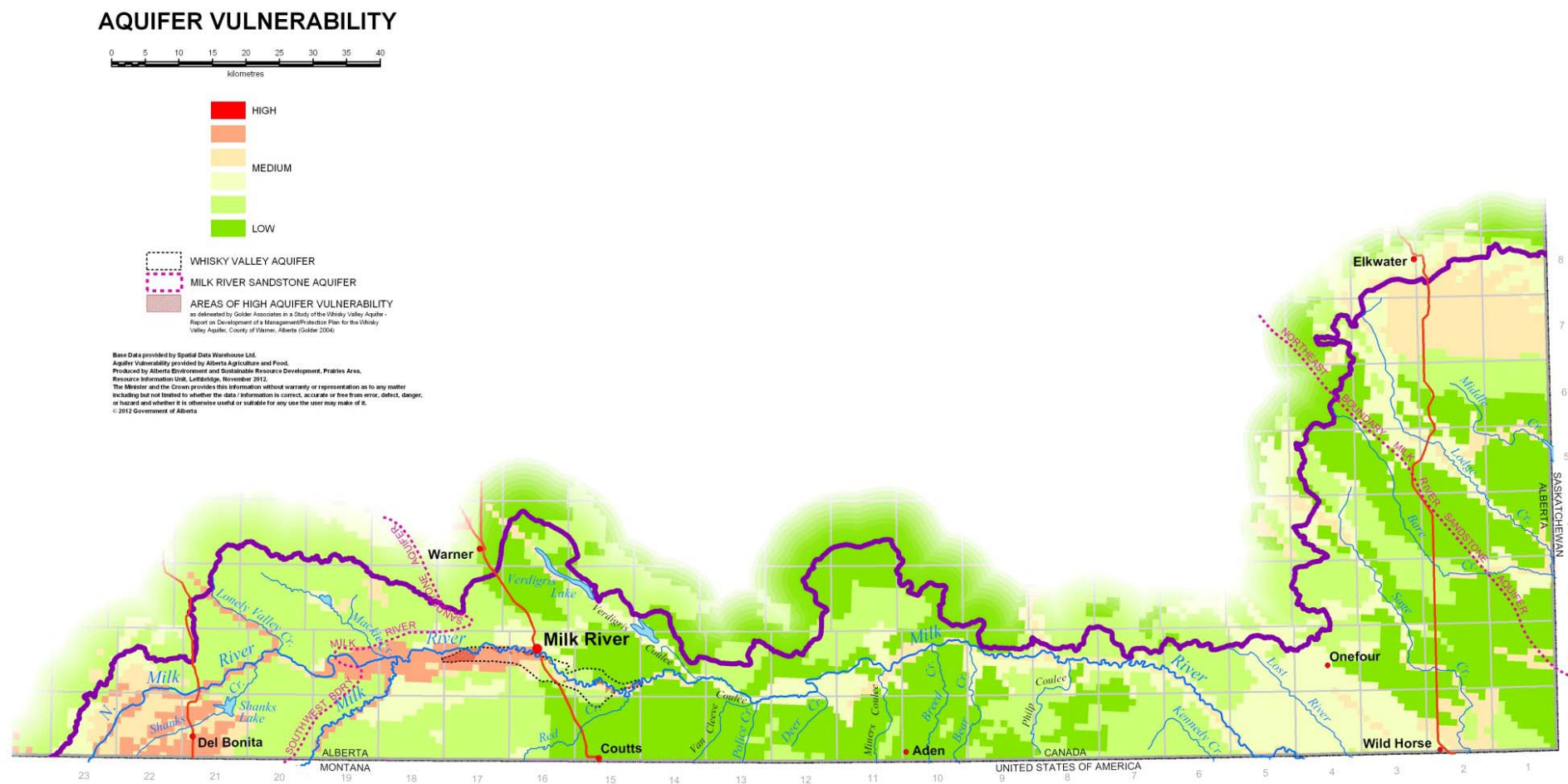


Figure 4. Milk River watershed aquifer vulnerability map showing the Milk River and Whisky Valley Aquifers. (Refer to Appendix B for a second aquifer vulnerability mapped prepared by Golder Associates (2004)).

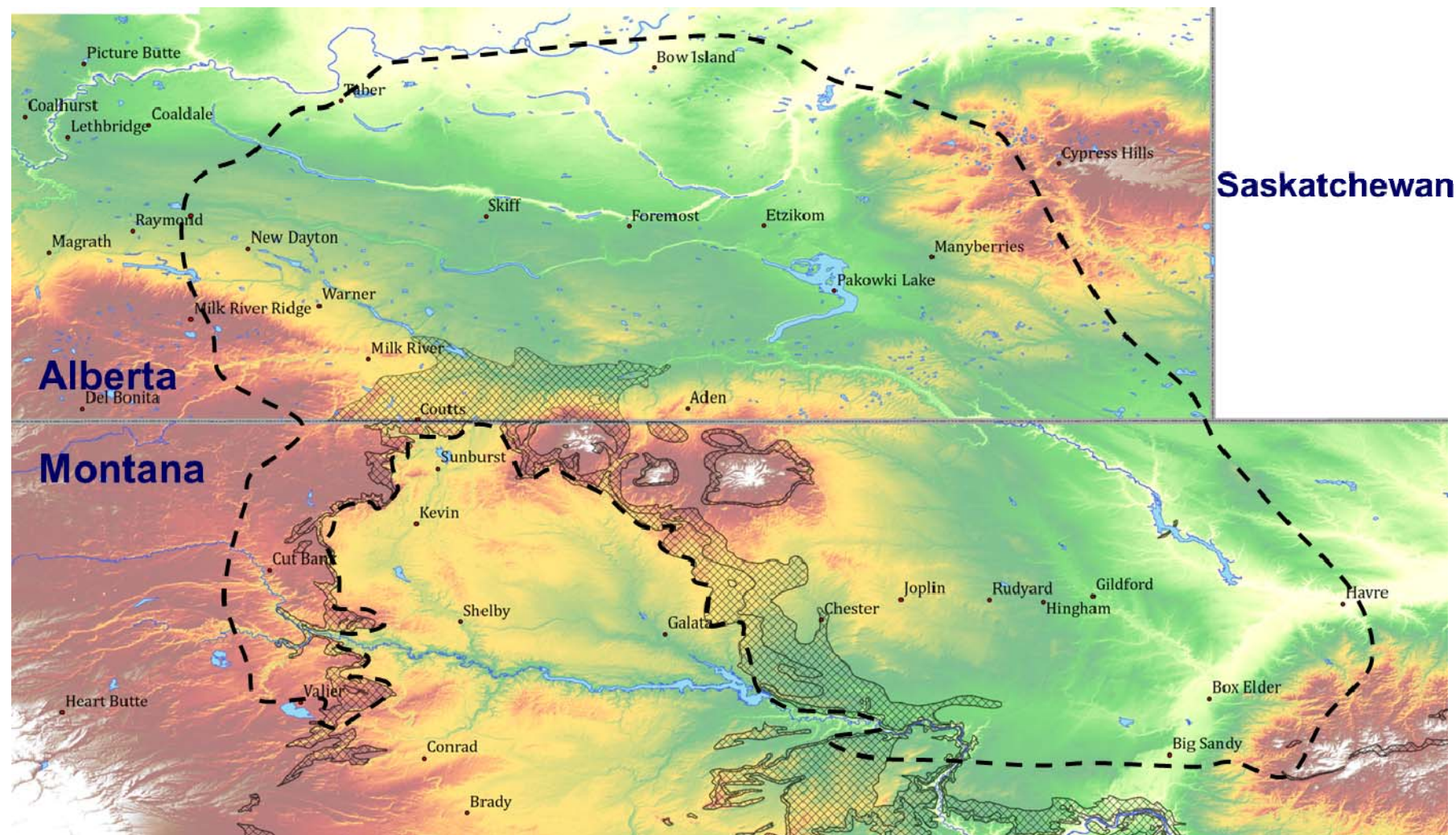


Figure 5. Map showing Alberta and Montana and the extent of the Milk River Aquifer project area (Petre, 2012). The hatched area corresponds to areas where the Milk River Formation outcrops.

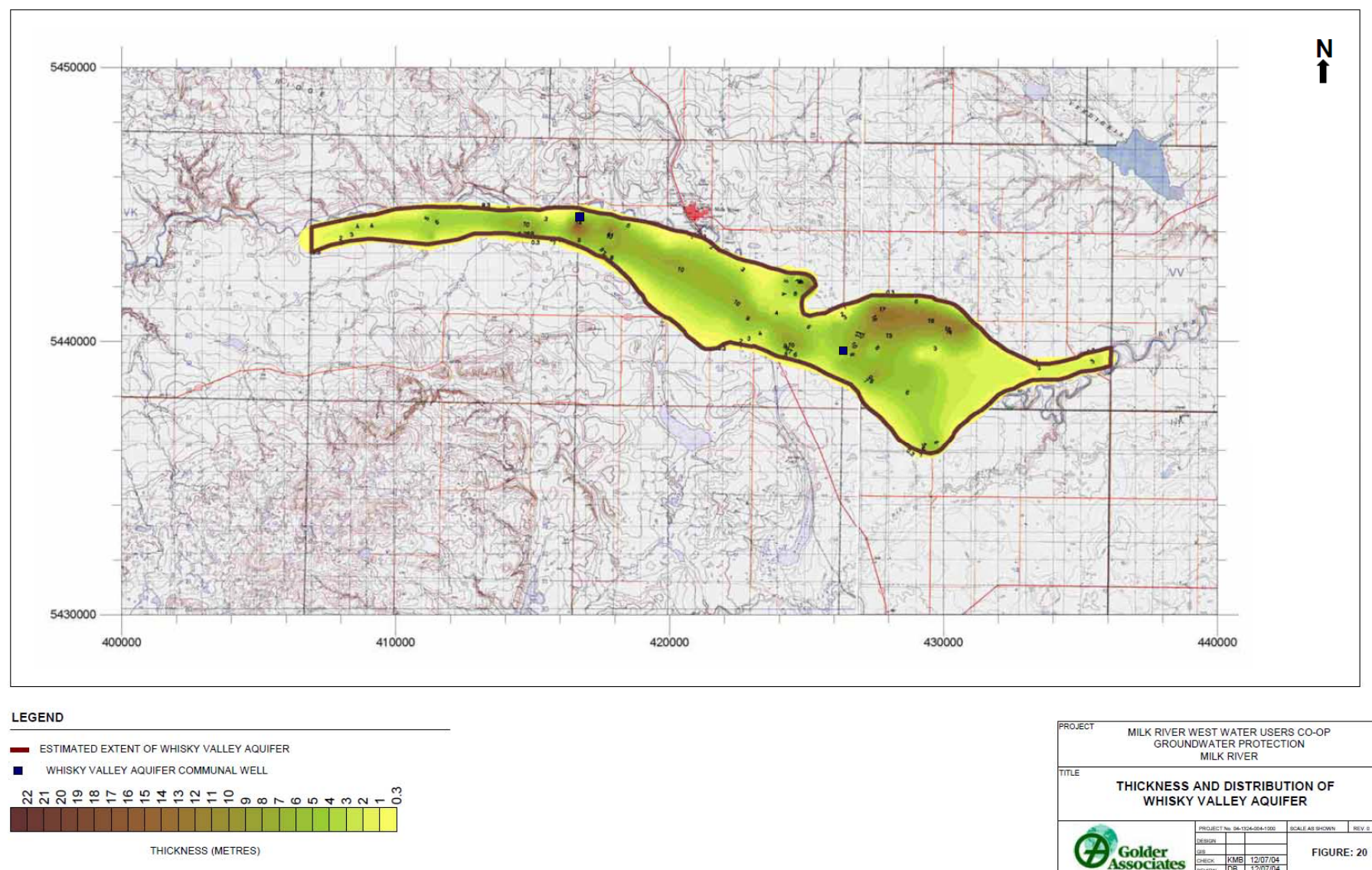


Figure 6. Thickness and distribution of the Whisky Valley Aquifer (Golder Associates 2004).

- c) The location of the highly vulnerable areas and co-op well capture zones shown on Figure 4, should be reviewed when considering changes in land use in areas overlying or adjacent to the Whisky Valley Aquifer. Land uses that should not be permitted within these areas unless safeguards are in place to reduce risks, include:
- Those that require the storage or handling of hazardous substances that could be released into the ground, or
 - Those uses that include high water consumption (e.g., residential developments, confined feeding operations). Table 7 provides examples of the kind of land uses/activities that might be excluded from the Whisky Valley Aquifer area.
- d) Each of the communal well capture zones (Figure 4) should be identified in the County of Warner No.5 Land Use Bylaw as an environmentally sensitive area (Golder Associates 2004); land use safeguards should be adopted to protect such environmentally sensitive areas.
- e) Municipalities are encouraged to revise their Land Use Bylaws to include discretionary and prohibited land uses (identified in Table 1) to protect the Whisky Valley Aquifer.

Table 7. List of discretionary and prohibited land uses⁴ on the Whisky Valley Aquifer as outlined in the County of Warner No. 5 Land Use Bylaw No. 831-03 (Golder Associates 2004).

Discretionary Land Uses	
• Agricultural services	• Kennels
• Airports and airstrips	• Private recreation
• Anhydrous ammonia storage	• Public/institutional
• Autobody repair and paint shop	• Public recreation
• Automotive dealership	• Resource extraction and associated works
• Automotive repair and service shop	• Second or more residences (re: sections 45-47)
• Campgrounds	• Signs of greater than 0.9 square metres
• Cut-off country residential	• Stockpiles
• Farm machinery and industrial vehicle sales and service	• Public or private utilities
• Garden suites	• Wind energy conversion systems
• Grain elevators	
• Highway commercial	Prohibited Uses:
• Home occupations	• Grouped country residential
• Intensive horticulture	• Grouped industrial developments
• Isolated single lot commercial	• Hazardous/noxious uses
• Isolated single lot country residential (for subdivision)	• Stripping and sale of topsoil
• Isolated single lot industry	• Confined Feeding Operations

⁴ The control of land use in the County of Warner No. 5 is guided by its Subdivision and Development Authority (SDA), which is a committee of County Council.

- f) Potential new water contaminant sources overlying the Aquifer and in recharge areas should be identified on an on-going basis primarily through the review of development applications by appropriate authorities.⁵
- g) Changes in land use that may pose a risk to the Aquifer, but do not require a development application, should be identified by the Municipal Special Constables who act as a local bylaw enforcement officer. Issues of concern should be brought to the attention of the Subdivision and Development Authority or the landowner in order to come to an equitable arrangement to mitigate the potential for impacts.
- h) Appropriate Municipal Development Plan policies should be adapted to enhance the protection of the quality and quantity of groundwater in the Whisky Valley Aquifer.
- i) Land use restrictions shown in Figure 7 should be applied to the entire Whisky Valley Aquifer area which also partly coincides with the Milk River floodplain to protect these environmentally sensitive areas. *(Include all restricted land uses on Figure 7)*

9.3.3.3 Public Education and Awareness

- a) An education program should be developed to inform residents of the importance of groundwater to the community and the need for aquifer protection measures, particularly those members of the community who live or work in the area overlying or near the Whisky Valley Aquifer or its recharge area.
- b) The education program should emphasize water management strategies such as:
 - the common sense storage, handling and use of hazardous materials such as pesticides, fertilizers, fuels and lubricants,
 - proper water well location, maintenance, and abandonment,
 - the importance of adopting water conservation measures, and
 - metering water usage from the aquifers.
- c) Inform all water consumers of the status and importance of conserving the communal water supply and encourage the use of beneficial management practices (e.g., the use of low flow facilities, maintaining all taps and stock watering outlets to reduce leaks and overflows)⁶.

⁵ An appropriate authority may include the County of Warner No. 5 Subdivision and Development Authority (SDA) which is a committee of County Council.

⁶ Each of the three water co-ops limit each of their customers to a water withdrawal of approximately 2 gpm by equipping each inlet with a flow control valve. This represents a potential withdrawal of 2880 gpd for domestic use, stock watering and general farm use. While this is a good conservation practice, some consumers may allow their inlets to flow freely and there may still be some wastage of water.

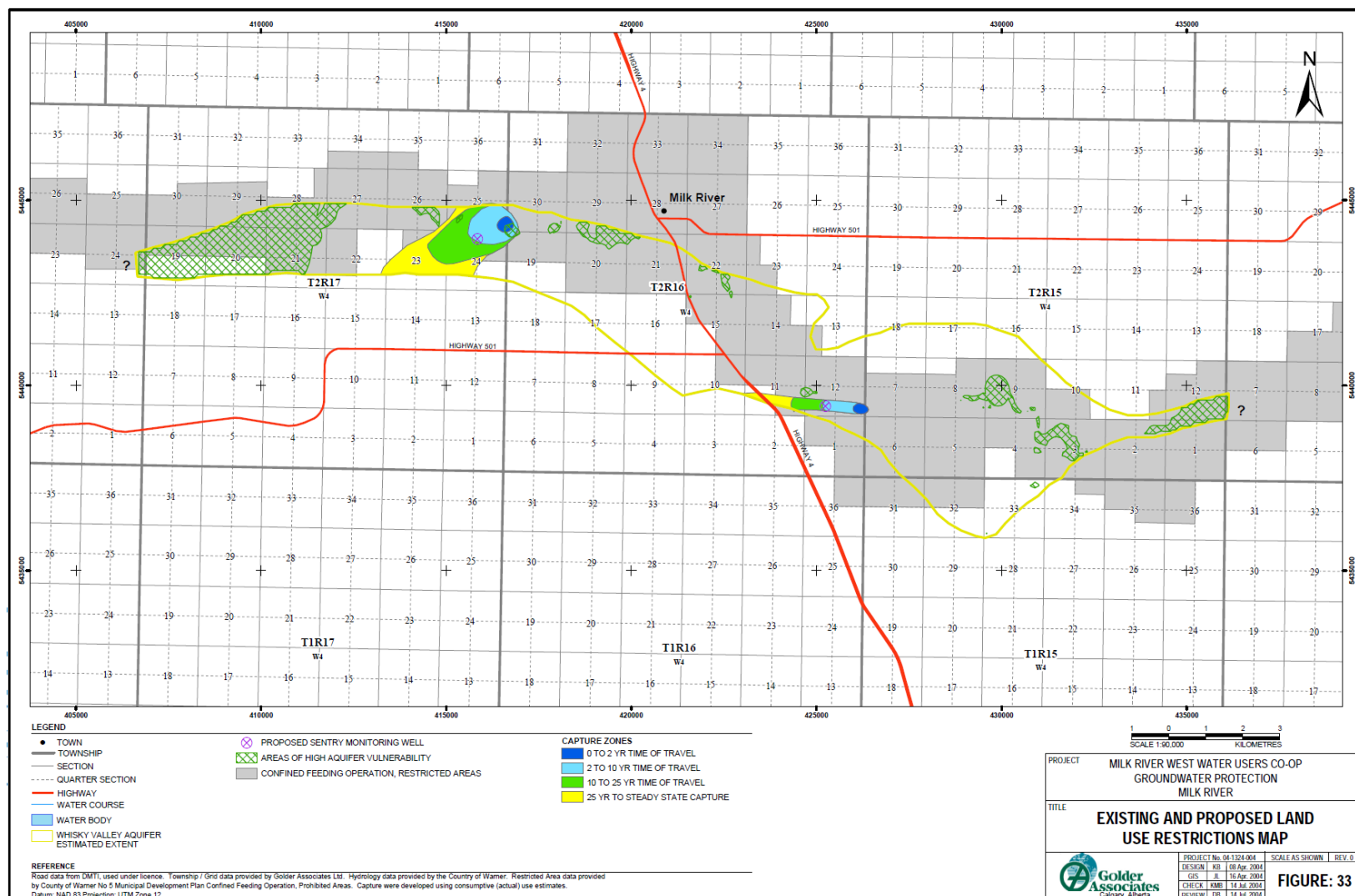


Figure 7. Existing and proposed land use restrictions map.

- d) Communication methods to raise community awareness of groundwater to be used include:
 - News media features and advertisements;
 - preparation of pamphlets and posters;
 - a grade-school program;
 - the placement of signs at strategic locations identifying the Aquifer and recharge areas;
 - presentations and workshops offered to local agricultural and community groups.
- e) Municipal public works and Provincial Transportation department staff should be informed of the risks to groundwater supplies in the Aquifer and recharge areas from the application of road deicing chemicals and other contaminants such as herbicides. They should be made aware of the extent of the aquifer boundary and recharge area and the importance of proper storage, handling and use of chemicals as well as petroleum products, pesticides and other hazardous materials.
- f) In the agricultural community, it is recommended that a cooperative program be developed with those who farm in the Aquifer and recharge areas to encourage use of Environmental Farm Plans and the proper storage, handling and application of fertilizers, farm chemicals, fuels and other hazardous substances that would pose a risk to the aquifer if spilled or leaked to the subsurface or to the Milk River.

9.3.3.4 Monitoring

- a) In addition to on-going monitoring of water quality for the four existing Water Co-op wells, it is recommended that up-gradient “sentry” monitoring wells be established in the Whisky Valley Aquifer and routinely monitored for indicator parameters. This would allow an early warning of the contamination or gradual degradation of the water before it reached any of the four critical water supply wells. The recommended location of the sentry monitoring wells is shown approximately on Figure 4. The recommended parameters for routine, quarterly monitoring include: electrical conductivity nitrate plus nitrite, total dissolved solids, chloride, phenolics, hardness, total organic carbon and BTEX (benzene, toluene, ethylbenzene, xylenes).
- b) Groundwater quantity in the Whisky Valley Aquifer should also be monitored by continuing to measure flow from the communal wells and water level in nearby monitoring wells. On the same quarterly basis, the two new sentry monitoring wells should also be monitored for water level and be properly purged prior to water quality sampling.
- c) The results of the on-going water quality and quantity monitoring programs should be compiled into an electronic database, reviewed on a regular basis and reported in the Milk River State of the Watershed Report, as a minimum. The review should include a comparison with established targets identified in this plan.
- d) Establish critical water levels within the Milk River and Whisky Valley aquifers. If aquifer water levels drop below a specified level, or if a water quality parameter exceeds its target, specific actions such as re-sampling or notifying the Water Co-op or AESRD should be

triggered. If possible, all routine monitoring results should be posted on a Co-op or municipal internet site to allow access by all the water users.

- e) The logs of any new wells drilled in the area, including private wells and those drilled as part of the research and monitoring programs, should be added to the Whisky Valley Aquifer model, along with any water levels etc., to increase its accuracy and value for future use in managing the Whisky Valley Aquifer (Golder Associates 2004). (Implementation: The Whisky Valley Aquifer model should be managed and updated by the Municipality with support from the Province?)
- f) Potential new contaminant sources in the Aquifer and recharge areas should be identified on an on-going basis primarily through the review of development applications by Municipalities.

9.3.3.5 Emergency Preparedness and Contingency Plan

- a) Emergency Preparedness and Contingency Plans (EPCPs) should be developed for each of the co-op water supplies to minimize the impact of disruption⁷, primarily related to the chemical contamination of groundwater, on water users.

The objectives of the EPCP include:

- Documentation of existing well capacities;
 - A monitoring program for early detection of aquifer contamination;
 - Anticipation of potential conditions which could result in loss of water supply;
 - A protocol for notification of appropriate officials and the water consumers;
 - Prevention and emergency procedures for response to groundwater contamination in a communal well capture zone or highly vulnerable aquifer area;
 - Identification of available environmental cleanup or water treatment contractors; and
 - Identification of replacement groundwater supplies or potential alternate water sources for use in the event of well or aquifer contamination.
- b) The Emergency Preparedness and Contingency Plans should use the Aquifer Vulnerability Map (Figure 1) to establish protection and management strategies to help prevent the contamination of co-op water supplies.
 - c) Due to the proximity and increased risk of groundwater contamination associated with three facilities (e.g., the petroleum bulk storage facility on Highway 4 south of Milk River, the ammonium nitrate fertilizer storage facility next to the above tank farm, and the crude oil pipeline that extends across the Whisky Valley Aquifer), the County of Warner #5 and/or AESRD should further investigate the vulnerability of the Aquifer at these locations and discuss with the owners/operators whether appropriate preventive measures are in place

⁷ Periodic emergencies or disruptions of supply may occur due to natural disasters, chemical contamination, or physical disruption. Disruptions may vary in time (a few hours) or an undetermined length of time in the case of contamination. Contamination may interfere with the use of the water supply or its pumping, treatment or supply to consumers.

to protect the Aquifer should a leak or spill occur ([link to commercial and industrial recommendations](#)).

9.3.3.6 Research

- a) The potential interconnection of the Whisky Valley Aquifer with the Milk River is an important factor in the security and further development of the Whisky Valley Aquifer. Further investigation should be carried out to understand this relationship. The drilling of about six test holes, and installation and sampling of monitoring wells, close to the river and along the length of the aquifer would improve the understanding of this relationship.
- b) The baseflow contribution from groundwater to the Milk River should be better evaluated with streamflow measurements.
- c) Further investigation of the extent of the capture zones for the four co-op wells should be made, beginning with the installation of the sentinel wells recommended in Section 9.3.3.4 a.

9.4 RIPARIAN AREAS AND WETLANDS

Objective 6. Recommend minimum setback requirements for development from the Milk River and its tributaries and recommend appropriate management strategies to protect and/or enhance riparian and aquatic ecosystems.

9.4.1 Outcomes and Goals

Healthy, functioning riparian areas contribute to streambank stability, good water quality, forage, shelter and biodiversity in the Milk River watershed.

9.4.2 Targets and Thresholds

Adopt the following recommended targets and thresholds to provide a measurable indication of success in achieving riparian management objectives:

Riparian Health Target: Riparian health scores should fall within the “Healthy” category (i.e., having a score of equal to or greater than 80 for all four river reaches).

Riparian Health Threshold: Riparian health scores should not be less than 70 in all river reaches (70 is the mid-point of the “Healthy with Problems” category) (Table 8).

Table 8. Targets and thresholds for riparian health by Milk River reach.

Reaches	Dominant Land Use	Target (Score)	Threshold (Score)	Actual Average Score (as of 2011)		
				Mainstem Score	Tributary Score	Wetland Score
Lotic						
Reach 1: North Fork	Agricultural	≥ 80	70	65	66	

Reaches	Dominant Land Use	Target (Score)	Threshold (Score)	Actual Average Score (as of 2011)		
				Mainstem Score	Tributary Score	Wetland Score
Reach 2: South Fork Milk River	Agricultural	≥ 80	70	75	-	
Reach 3: Gravel Bed Reach	Agricultural	≥ 80	70	58	70	
Reach 4: Sand Bed Reach	Agricultural	≥ 80	70	62	77 ^a 71 ^b	
Reach 5: Eastern Tributaries	Agricultural	≥ 80	70	-	68	
Lentic						
Wetlands (Entire Watershed)	Agricultural	≥ 80	70			66 ^a 52 ^b

^aAverage score derived from assessments completed by Cows and Fish.

^bAverage score derived from assessments completed by Alberta Conservation Association.

Note: Riparian health score categories are based on methods established by Cows and Fish: Healthy (Score ≥ 80), Healthy with Problems (Score 60-79), Unhealthy (Score < 60).

9.4.3 Recommendations

- a) Riparian management strategies should be adopted to address those river reaches where health indicators were rated in the Healthy with Problems or Unhealthy categories, with top priority assigned to those indicators commonly rating in the Unhealthy category (Table 9 and Table 10). These strategies may include:
 - i. **Vegetative cover of streambanks and floodplain.** Provide rest from grazing or other disturbances during the growing season to allow for regrowth, to reduce the amount of bare ground and enable native vegetation to out-compete disturbance-caused and invasive plants for nutrients and water. Manage other human activity (e.g., recreation, transportation and industrial development) to preserve native plant communities.
 - ii. **Invasive and disturbance-caused plants.** Livestock grazing strategies should consider distribution, timing and stocking rates that fall within the carrying capacity of each pasture. Provide maximum rest during the growing season and use strategies such as skim grazing and time-controlled grazing to maintain an abundance of native species. Other landuse management plans (e.g., industrial development, road construction, sand and gravel extraction) should have reclamation plans and sites should be monitored until reclamation is complete.
 - iii. **Tree/shrub establishment and regeneration.** Maintain existing preferred tree and shrub communities (e.g., poplars, buffaloberry, willows) and prevent the increase of browsing resistant shrub communities (e.g., snowberry, rose,

silverberry) resulting from excessive livestock browsing. Provide adequate rest from continuous browsing pressure to promote regeneration of existing preferred trees and shrub communities and improve future reproduction and establishment. Manage distribution, timing, rotation and stocking rate to maintain and increase preferred trees and shrubs.

- iv. **Streambanks: Root mass protection and alterations.** Rotational grazing, off-stream water developments and other distribution techniques should be used to disperse livestock over large areas of rangeland and prevent cattle from loitering adjacent to the river. Develop riparian pastures, with complementary off-stream watering systems, allow seasonal skim grazing in riparian areas to increase tree and shrub cover and improve streambank stability.
- v. **Bare ground and physical alterations to entire riparian area.** Improvements to industrial reclamation standards and monitoring of disturbed areas should be encouraged and mandated by provincial, municipal and industrial regulators. Maintain livestock distribution throughout the rangeland, provide effective rest during the growing season and avoid vulnerable periods. Avoid use of riparian pastures as wintering areas, rather skim graze these pastures during the summer months.
- vi. **Stream channel incisement and stability.** Maintain and increase native trees and shrubs with deep binding root mass along the river banks. Water management should consider the erosive potential of excessive flows in the Milk River and the timing of these flows at different times of the year.

Table 9. Summary of the condition of riparian health indicators at the various tributary reaches of the Milk River⁸. Note that the colour green denotes a healthy score for the indicator, yellow denotes healthy with problems and red denotes an unhealthy score for the indicator. NC means “not collected”.

Riparian Health Indicator	Tributaries				
	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5
Channel incisement		-			
Human-caused alterations to polygon		-			
Human-caused alterations to banks		-			
Human-caused bare ground		-			
Root mass protection		-			
Disturbance plants		-			
Invasive plants		-			
Woody vegetation removal other than browse		-			NC
Preferred tree/shrub utilisation		-			
Dead and decadent woody material		-			
Preferred tree/shrub regeneration		-			
Vegetative cover		-			

⁸ Refer to Palliser Environmental Services Ltd. (2012) for a full report on riparian health in the Milk River watershed.

Table 10. Summary of the condition of riparian health indicators at the four Milk River mainstem reaches. Note that the colour green denotes a healthy score for the indicator, yellow denotes healthy with problems and red denotes an unhealthy score for the indicator. NC means “not collected” and NA means that the indicator was “not applicable” for the given reach.

Riparian Health Indicator	Mainstem			
	Reach 1	Reach 2	Reach 3	Reach 4
Floodplain accessibility				
Human-caused alterations to polygon			NC	
Human-caused alterations to banks				
Control of flood peak and timing by upstream dam(s)				
Removal or addition of water from/to the river system				
Human-caused bare ground				
Root mass protection				
Disturbance plants				
Invasive plants				
Total canopy cover of woody species				
Woody vegetation removal other than browse			NC	
Preferred tree/shrub utilisation				
Dead and decadent woody material				
Preferred shrub regeneration				
Regeneration of other native tree species	NA	NA		
Cottonwood and poplar regeneration	NA	NA		

- b) Re-establishment of preferred native tree and shrub species should be undertaken, considering species, density and survivability of plants (Refer to Owings and Marlow 2012).
- c) The timing and duration of Milk River flows should be managed (annually or once every five years?) to promote the regeneration of preferred native tree species, including cottonwoods and poplars. Based on the recruitment box model, the river stage that would provide improved riparian recruitment after a major flow event (i.e., the 1 in 5 year flood event or greater) corresponds to flows between 3.5 m³/s and 30 m³/s (during which time of year?). Managing flow recession and providing seasonal flow variability within this range of flows will likely result in improved riparian conditions on the Milk River (Golder Associates 2010) (Figure 8).

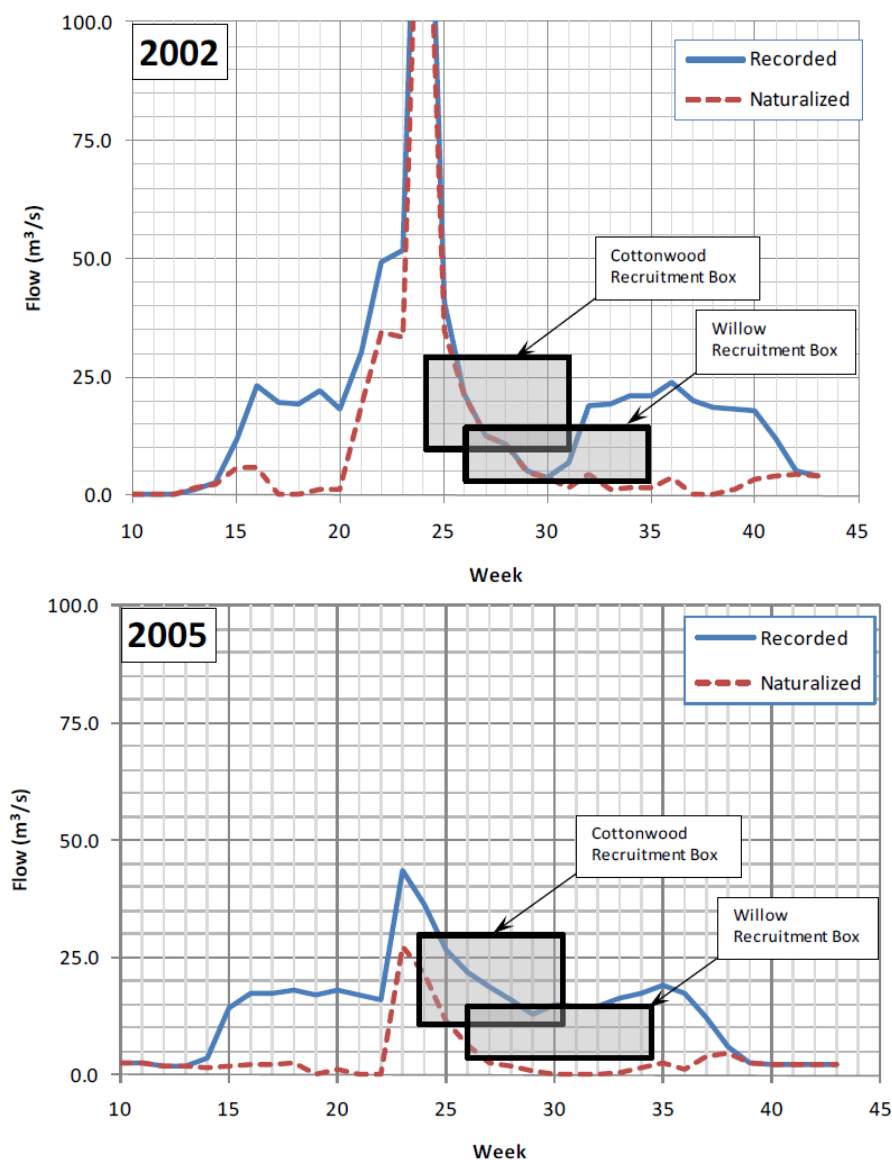


Figure 8. Naturalized and recorded flows for the Milk River at the Eastern Crossing in 2002 and 2005 with riparian recruitment boxes (Golder Associates 2010).

- d) Riparian setbacks, greater than the minimum 6 m setback specified in the *Municipal Government Act*⁹, and steep slope setbacks should be applied to the Milk River and its tributaries according to Table 11.
- e) Permitted and restricted activities in the riparian setback zone should be adopted according to Table 12.

⁹ Currently the *Municipal Government Act* specifies a minimum 6 m setback from waterways.

Table 11. Riparian setback recommendations for the Milk River and its tributaries.¹⁰ (Note: A map is currently being developed that will illustrate the setback recommendation).

Reach	Management Objective	Setback	Notes
Reach 1 – North Fork Milk River (mainstem)	Floodplain Protection, Erosion Control, Biodiversity	50 m In cases where the coarse or fine fluvial sediment is greater than 50 m, the additional width of the fluvial sediment will be considered flood fringe and included in the setback calculation.	Refer to surficial geology map for location of fluvial deposits (Appendix H). Erodible stream banks influenced by St. Mary River Diversion.
Reach 2 – South Fork Milk River (mainstem)	Floodplain Protection, Biodiversity	50 m In cases where the coarse or fine fluvial sediment is greater than 50 m, the additional width of the fluvial sediment will be considered flood fringe and included in the setback calculation.	
Reach 3 – Gravel Bed Reach (Milk River mainstem)	Floodplain Protection, Erosion Control, Biodiversity	100 m In cases where the coarse or fine fluvial sediment is greater than 100 m, the additional width of the fluvial sediment will be considered flood fringe and included in the setback calculation.	Highly erodible stream banks influenced by St. Mary River Diversion. Stream meander belt width should be considered.
Reach 4 – Sand Bed Reach (Milk River mainstem)	Floodplain Protection, Erosion Control, Water Quality, Biodiversity	100 m In cases where the coarse or fine fluvial sediment is greater than 100 m, the additional width of the fluvial sediment will be considered flood fringe and included in the setback calculation.	Highly erodible stream banks. Stream meander belt width should be considered. Consider including the stream and slopewash eroded deposits within the flood fringe calculation.

¹⁰ Based on guidance provided in the Stepping Back from the Water (AESRD 2012) and existing municipal Land Use Bylaws. Cypress County LUB No. 2011/04 – January 2011, Section 56 (Setbacks from water bodies) states:

In all land use districts, development which occurs on land bordering a water body (any lake, pond, reservoir creek or canal whether natural or man-made) shall be regulated. Where the water body:

- (a) is less than 16 hectares (40 acres), development shall be set back from the shoreline by 30 metres (100 feet);
- (b) is greater than 16 hectares (40 acres), development shall be set back from the shoreline by 60 metres (200 feet)

Reach	Management Objective	Setback	Notes								
Reach 5 – Eastern Tributaries	Floodplain Protection, Water Quality, Biodiversity	30 m In cases where the coarse or fine fluvial sediment is greater than 30 m, the additional width of the fluvial sediment will be considered flood fringe and included in the setback calculation.									
Ephemeral and Intermittent Streams, Gullies and Wetlands	Floodplain Protection, Water Quality, Biodiversity	30 m In cases where the coarse or fine fluvial sediment is greater than 30 m, the additional width of the fluvial sediment will be considered flood fringe and included in the setback calculation.	Consider including the stream and slopewash eroded deposits within the flood fringe calculation in Reach 4 (e.g., Verdigris Coulee)								
All	Steep slopes ¹¹ , Protection of Infrastructure, Biodiversity, Water Quality	Where slopes exceed 15%, the setback may be calculated. ¹¹ <table><tr><td>Depth of Valley</td><td>Setback¹²</td></tr><tr><td>0 – 15 m</td><td>25 m</td></tr><tr><td>15 – 30 m</td><td>45 m</td></tr><tr><td>30 m</td><td>60 m</td></tr></table>	Depth of Valley	Setback ¹²	0 – 15 m	25 m	15 – 30 m	45 m	30 m	60 m	A shorter setback may be permitted when it is supported by a site investigation by a qualified geotechnical engineer.
Depth of Valley	Setback ¹²										
0 – 15 m	25 m										
15 – 30 m	45 m										
30 m	60 m										

¹¹ **Cypress County LUB No. 2011/04 – January 2011; Section 55** (Setbacks from River Valleys and Coulees)

In all land use districts, development which occurs on and bordering a coulee or ravine shall be regulated. For the purposes of this section, the term “coulee” is defined as any hill side or escarpment having an average slope of greater than 30% between upper and lower coulee breaks. The term “coulee break” is defined as those points located at the top and bottom of a slope where the angle of depression or the angle of elevation begins to exceed 15%. All coulee and river valley setbacks will be determined in accordance with the following guidelines, where the grade of the adjacent valley bank exceeds 15%:

Slope Factor	H x 1.0	H x 1.5	H X 20
Lateral river erosion of the toe of the slope	No erosion	Minor active erosion	Major active erosion
Slope steepness	>15 to 50% (.8.5 to 26.6 degrees)	51 to 100% (27.0 to 45 degrees)	More than 100%
Slope failure on bank	No failure, minor active	Minor active, major inactive	Major active failure
Past & existing anthropogenic disturbance	No disturbance to moderate	Major disturbance	
Proposed anthropogenic disturbance	Minor to moderate disturbance	Major disturbance	

*H = valley bank height - see bylaw for clarification on table.

¹² County of Forty Mile No. 8 (Proposed – June 2009).

Table 12. Permitted and restricted activities in the riparian setback and flood fringe zones (PESL 2012) – **for discussion**

Activity	Riparian Setback	Flood Fringe
Permitted	<ul style="list-style-type: none"> Existing buildings and structures Existing public and private roads Existing and new public and private linear utilities (mitigation to reduce impacts) Existing public and private non-linear utilities Maintenance and repair of infrastructure Livestock grazing (where BMPs are applied) Passive recreation (depending on wildlife sensitivities) Existing pathways and trails (mitigation to reduce impacts) New pervious pathways and trails (i.e., no concrete) discouraged, but may be considered Public education 	<ul style="list-style-type: none"> Existing buildings and structures Existing public and private roads Existing public and private linear utilities New public and private non-linear utilities (discretionary) Cultivation (using appropriate BMPs) Livestock grazing (where BMPs are applied) Passive recreation (depending on wildlife sensitivities) Recreation infrastructure (discretionary) Pathways and Trails (with mitigation to reduce impacts) Public education
Restricted	<ul style="list-style-type: none"> New buildings and structures New public and private roads New public and private non-linear utilities Stormwater management infrastructure Cultivation Recreation infrastructure Resource extraction Damage to native vegetation 	<ul style="list-style-type: none"> New buildings and structures New public and private roads Stormwater management infrastructure Resource extraction Damage to native vegetation

- f) No industrial activity should take place within 100 m of water bodies (wetlands, ponds, creeks, rivers, lakes, including dry water bodies), or within 100 m of the crest of any coulee associated with riparian areas or unique geographical features like hummocky moraines, because of extensive wildlife use (Alberta Fish and Wildlife Division) (GOA 2011).
- g) Best management practices should be used by the agricultural industry to promote the regeneration of preferred trees and shrubs within riparian areas. These BMPs include:
- Provision of off-stream watering,
 - Use of rotational grazing and riparian pastures in a grazing plan,
 - Application of appropriate timing restrictions to avoid grazing riparian areas when they may be saturated (e.g., spring), and
 - Application of appropriate stocking rates that match livestock to available forage.
- h) Develop a monitoring program to re-assess riparian areas on a 5 to 7 year rotational basis in order to identify trends in riparian health.

- i) Conduct research to increase the understanding of sedimentation rates, erosion rates and plains cottonwood survival in the Milk River valley.

9.5 BIODIVERSITY

9.5.1 Outcomes and Goals

A diverse native fish, wildlife and plant community is present in the Milk River watershed through habitat conservation and enhancement efforts.

Goal

- Preserve biodiversity within the Milk River watershed.
- Maintain and then improve the status of species at risk in the watershed.

Targets and Thresholds

Target

No further loss of critical habitat and/or native grassland within the watershed. Currently, 71% of the Milk River watershed is characterized as native grassland.

Threshold

The current status of fish, wildlife and plant species at risk as listed in *The Alberta Wildlife Act* and Canada's *Species at Risk Act*.

9.5.2 Indicators

Fish

Table 13. Fish species of management concern in the Milk River watershed.

Species	Rationale/Management Concern	LMU
Western Silvery Minnow	Listed Provincially and Federally	
Rocky Mountain Sculpin	Listed Provincially and Federally	
Stonecat	Listed Provincially	
Sauger	Sport fish	
Longnose Dace	Easily monitored	
Longnose Sucker	Easily monitored	
Lake Chub	Easily monitored	
White Sucker	Easily monitored	

Wildlife

Indicator wildlife species for the Milk River watershed were selected based on several criteria:

1. Current information (baseline data) on the species is available,

2. There is potential for monitoring the species in the future,
3. The species is a focal species for a particular habitat,
4. The watershed provides unique habitat for the species, and
5. An increase or decrease in the species population can be tied directly to the overall health of the watershed.

Table 14. Wildlife species of management concern in the Milk River watershed.

Species	Residency	Management Concern	LMU
Northern Leopard Frog	Resident	<i>Threatened</i> under <i>The Alberta Wildlife Act</i> .	All
Plains Spadefoot / Great Plains Toad	Resident	<i>Great Plains Toad: Species of Special Concern</i> as determined by the Minister of Sustainable Resource Development. Plains Spadefoot “May be at Risk” species under Alberta’s General Status Program.	4, 5, 6, 7, 8
Pronghorn	Resident	“Sensitive” species under Alberta’s General Status Program.	All
Prairie Rattlesnake	Resident	“May be at Risk” species under Alberta’s General Status Program and is currently being reviewed to determine its legislative status.	4, 5, 6, 7, 8
Greater Sage Grouse	Resident	Listed as an <i>Endangered</i> species under the <i>Alberta Wildlife Act</i> and the federal <i>Species at Risk Act</i> .	6, 7, 8
Sharp-tailed Grouse	Resident	“Sensitive” species under Alberta’s General Status Program.	All
Burrowing Owl	Migratory	<i>Endangered</i> under the <i>Alberta Wildlife Act</i> and the federal <i>Species at Risk Act</i> .	All
Ferruginous Hawk	Migratory	<i>Endangered</i> under the <i>Alberta Wildlife Act</i> and as <i>Threatened</i> under the federal <i>Species at Risk Act</i> .	All
Loggerhead Shrike	Migratory	“Sensitive” species under the Alberta General Status Program.	All
Grassland Birds (i.e. Sprague’s pipit, Long-billed curlew, Baird’s sparrow, Chestnut-coloured longspur)	Migratory	The grassland bird guild is made up of a variety of species of birds with status designations ranging from “Secure” to “Endangered”. ¹³	All
Resident: Relies on healthy watershed throughout the year Migratory: watershed provides important and unique habitat during spring and summer months			

Vegetation

Indicators for vegetation were selected to represent overall habitat conditions:

- Percent watershed area covered by native grassland
- Lotic and lentic riparian vegetation
- Sage brush
- Cottonwoods

¹³ For a comprehensive list please refer to the *Alberta Wildlife Act* or the federal *Species At Risk Act*.

9.5.3 Targets and Thresholds

Table 15. Summary of critical habitat and habitat conservation targets for wildlife indicators.

Indicator Species	Critical Habitat and Local Threats	Habitat Conservation/Protection Target
Northern Leopard Frog	Wetlands	No further loss of permanent, semi-permanent or ephemeral wetlands.
Plains Spadefoot / Great Plains Toad	Ephemeral wetlands	
Pronghorn	Wintering habitat What is wintering habitat?	
Prairie Rattlesnake	Suitable hibernacula (over-wintering dens) for survival. (Nicholson and Rose 2001, Watson and Russell 1997) and rookeries What is suitable? Threats: Loss of suitable hibernacula; Road mortality (Watson and Russell 1997)	Suitable hibernacula are present to maintain population. Need more description...
Greater Sage Grouse	Sage brush habitat	No further loss of sagebrush habitat.
Sharp-tailed Grouse	A mosaic of plant communities including native grassland and shrub mixtures with extensive ecotone. Native prairie provides nesting, hiding and brood rearing habitat; shrub cover provides a component of nesting and winter habitat (RCS 2004).	% of watershed maintained as native grassland.
Burrowing Owl	Pastures grazed by livestock, short vegetation at nest burrows allows for detection of predators, mixture of short and tall grass prairie for nesting, foraging. Relies on burrows from Richardson's ground squirrels and badgers to excavate nest sites (RCS 2004).	
Ferruginous Hawk	Breeding habitat is comprised of nesting and suitable foraging habitat. 50% native prairie with solitary or small groups of trees (RCS 2004). Mixed grass prairies.	
Loggerhead Shrike	Flat, open habitats with scattered clumps of shrubs or hedgerows. Found close to pastures, meadows, farmsteads and railroad rights-of-ways. Native prairie for surrounding habitat preferred.	
Grassland Birds	Native prairie.	Reduce fragmentation of grassland.

9.5.4 Recommendations

Fish

- a) Inform the public about fish Species at Risk through various media.

- b) Identify appropriate instream flow requirements to maintain healthy fish populations in the Milk River throughout the year.

Wildlife

General

- a) Reduce the threat to wildlife and wildlife habitat by managing the cumulative effect of human activity, disturbance and land use changes by managing:
 - i. the loss, fragmentation and degradation of native grasslands, and
 - ii. the introduction of invasive species.
- b) Adopt no net loss policies for permanent, semi-permanent and ephemeral wetlands.
- c) Continue to encourage and promote the inter-jurisdictional cooperation and coordination in the management of wildlife (among Fish and Wildlife agencies and others) with the adjoining province of Saskatchewan and the state of Montana through initiatives such as the Northern Sage-brush Steppe Initiative (a partnership focused on pronghorn antelope conservation and research and the conservation of Greater Sage Grouse).
- d) Support stewardship groups working within the Milk River watershed that provide information, support and assistance to local producers who wish to conserve northern leopard frogs, Plains Spadefoot, Great Plains Toad, pronghorn wintering habitat, Greater Sage Grouse, Sharp-tailed Grouse, Ferruginous Hawk, Burrowing Owls, Loggerhead Shrike and grassland birds. Where opportunities exist partner on educational initiatives, enhancement projects and demonstration sites. See Table 16 for specific recommendations and implementation actions for indicator species.
- e) The recommended land use guidelines, including restricted activity periods and setback distances, for protection of selected wildlife species and habitat within the grassland region should be observed by industry (Appendix D) (AESRD 2011).

Monitoring

- a) Scientific approaches for wildlife management are dependent on data and information (i.e., monitoring). Data should continue to be collected that will contribute to the better understanding and management of wildlife in the watershed. Appendix XX summarizes some of the data requirements that were outlined in the SOW 2008, the progress made to address gaps and outstanding needs. The following data requirements are in addition to those previously recommended:
 - i. Conduct a detailed inventory of historic, new and active northern leopard frog ponds within the watershed to gain a better understanding of their population and identify differences in habitat between active and non-active sites.
 - ii. The nest success of Ferruginous Hawks should be documented to understand the number of young that actually fledge, in addition to the number of nesting pairs that are currently documented.

- iii. An additional Breeding Bird Survey (BBS) route or driving route in the west (LMUs 1, 2 and 3) and another in the far eastern part of the watershed (LMUs 7 and 8) to monitor grassland birds.
- iv. Analyze existing data to contribute to local knowledge regarding the relationship between grassland birds and the health of different vegetation communities.

Vegetation

- a) Adopt range management principles that maintain or foster healthy productive grasslands; these include: balancing forage demand with available forage supply, managing grazing intensity, timing restrictions to avoid early spring grazing or wet periods.
- b) Implement beneficial management practices to maintain Silver Sagebrush habitat:
 - Encourage practices that increase height and cover of sagebrush and of native grasses at nesting sites.
 - Avoid the use of chemical controls, or other means, to control silver sagebrush on private land.
 - Apply riparian grazing management strategies to overflow range sites to maintain or restore range health levels in silver sagebrush plant communities.
 - Silver sagebrush stands burned by wildfires, should be given additional rest to facilitate recovery (Adams et al. 2004).
- c) Develop approaches for reducing the spread of Invasive Species throughout the watershed. Invasive plant information (i.e., location of weed infestations, species, rate of spread, threats, movement vectors, effective management interventions, etc.) may be shared among resource managers, including the Alberta Invasive Plant Council (AIPC).

Table 16. Specific recommendations related to wildlife indicators.

Indicator Species	Goal	Recommendations ¹⁴	Priority	Implementation Actions
Northern Leopard Frog	To conserve northern leopard frogs and their associated habitat within the Milk River Basin (Northern Leopard Frog Recovery Team 2005).	Advise local landholders of land management practices which enhance the habitat and survival of northern leopard frogs. (Northern Leopard Frog Recovery Team 2005)	medium	Establish partnerships with existing non-government organizations (NGOs) to achieve education and awareness recommendations.
Plains Spadefoot / Great Plains Toad	To conserve ephemeral wetlands from physical destruction and habitat degradation, in order to provide habitat for a unique assemblage of associated species (ASRD 2004).	Maintain ephemeral wetlands and the water quality associated with these wetlands. (Green et al. 2004, Michalsky et al. 2004)	medium	Establish partnerships with existing NGOs to implement best management practices (BMPs) in areas significant for the great plains toad or plains spadefoot (RCS 2004).
Pronghorn	To ensure that viable populations of pronghorn antelope are maintained throughout the Milk River Basin. What is a viable population?	1. Facilitate pronghorn movements throughout the Milk River Basin. (Alberta Fish and Wildlife Division 1990) 2. Maintain habitat quality on all pronghorn wintering areas. (Alberta Fish and Wildlife Division 1990)	medium medium	1. Provide information on wildlife friendly fencing (Paige 2008) to landholders. Partner with government and non-government organizations to implement wildlife friendly fencing demonstration sites. 2. Establish partnerships with existing non-government organizations to implement BMPs for pronghorn (Fish and Wildlife Division 1990).
Prairie Rattlesnake	Maintain the population of prairie rattlesnakes within the Milk River Basin. What is the current population?	1. Protect prairie rattlesnake overwintering sites (hibernacula) and birthing sites (rookeries) through stewardship activities. 2. Identify areas of high road mortality for prairie rattlesnakes and develop and implement methods to mitigate the impacts of roads in these areas.	high medium	1. Identify existing and potential hibernacula sites to Alberta Fish and Wildlife Division. 2. Develop a reporting system for snakes found dead along roadways to determine areas for future mitigation action. The identification of hibernacula sites will assist with industrial development siting and route selection, with municipal planning, and will reduce the number of snake/human conflicts within the basin. High risk road crossings will be identified through a reporting system and

¹⁴ Objectives and action recommendations for listed indicator wildlife species are taken from Minister approved national Recovery Plans, ASRD-FWD approved Management Plans, and existing government planning documents.

Indicator Species	Goal	Recommendations ¹⁴	Priority	Implementation Actions
		3. Participate in research project for burrowing owls survival rates, extent and impact of juvenile dispersal, grazing practices on prey species, and effect of contaminants on survival and reproduction.	high	<ul style="list-style-type: none"> determine what level of acceptance (i.e., social tolerance) landowners have for fossorial mammals. <p>3. Use extension and education programs, to ensure that trapping, poisoning, and hunting do not eradicate local populations of fossorial mammals.</p> <p>4. Maintain small mammal populations to provide an adequate prey source for other species at risk including the ferruginous hawk.</p> <p>5. Balance pest control and the needs of the burrowing owl to ensure the survival of the species while meeting the needs of landholders.</p>
Ferruginous Hawk	Conserve nesting habitats, including nest sites, and foraging habitat for the ferruginous hawk in order to contribute to the provincial population goal. (Alberta Ferruginous Hawk Recovery Team 2009).	<p>1. To maintain existing grasslands on both public and private lands and where opportunity exists, increase the acreage of grasslands. (Alberta Ferruginous Hawk Recovery Team 2009)</p> <p>2. To ensure ferruginous hawk prey availability is considered in range management plans and recommendations. (Alberta Ferruginous Hawk Recovery Team 2009)</p>	<p>high</p> <p>medium</p>	<p>1. Inform private landholders of the importance of naturally-occurring trees and shrubs as important components of the prairie ecosystem, and encourage, through stewardship programs, their protection from destruction, and their careful management.</p> <p>2. Install nest platforms in suitable habitat based on the established nest protocol (Migaj et. al. 2011). Ensure that artificial sites are placed properly to avoid conflicts with other species at risk.</p> <p>3. Provide information on financial incentives to ranchers and farmers who are maintaining natural habitats for species at risk such as ferruginous hawks.</p> <p>4. Market Incentives:</p> <ul style="list-style-type: none"> encourage urban consumers to purchase open range-raised beef. promote market demand for labelling to identify beef produced by “Endangered Species Friendly” producers, leading to a system of market-based incentives to producers for providing species at risk habitat

Indicator Species	Goal	Recommendations ¹⁴	Priority	Implementation Actions
				<p>5. Provide financial incentives to agricultural producers through the Alberta Environmental Farm Plan and other stewardship programs so that producers may realize financial benefits from having species at risk on their lands.</p> <p>6. Educate and increase awareness among the general public that ranchers are retaining native prairie habitats and grazing it in a manner compatible with the habitat needs of the ferruginous hawk in order that ranchers who provide this important service might be rewarded.</p>
Loggerhead Shrike	Maintain a population of loggerhead shrike through habitat management and enhancement.	Implement BMPs designed to maintain and enhance habitat for the loggerhead shrike (RCS 2004).	medium	Establish partnerships with existing NGOs to implement BMPs for the loggerhead shrike. (RCS 2004)
Grassland Birds	Maintain the biodiversity of grassland bird species	Promote native grassland retention. Conserve native grasslands through stewardship actions, BMPs, and the integration of grassland bird recovery needs into prairie conservation programs.	high	Maintain large, contiguous blocks of native habitat. Implement BMPs that maintain healthy rangelands, with the understanding that a mosaic of grazing disturbances (ranging from healthy to unhealthy) will benefit a variety of wildlife species including grassland birds. (Prescott 2010, RCS 2004)

9.6 LANDUSE

9.6.1 AGRICULTURAL ACTIVITY

The agricultural industry is highly valued for its long-standing history in the basin and its contribution to the local economy. Within the Milk River Integrated Watershed Management Plan planning area, agricultural activity falls under the “land use” objectives described in the Terms of Reference.

Objective 3. Recommend water conservation strategies that promote the efficient use of water for all sectors (i.e., municipal, industrial, irrigation)

Objective 7. Recommend land use and development practices which are congruent with the objectives and resource management strategies for the Milk River watershed and its unique semi-arid environment.

9.6.1.1 Outcomes and Goals

The Milk River watershed provides agricultural opportunities while:

- 1) protecting the ecological, scenic and historic values of this unique landscape.

Goals

- Innovative and sustainable land use and development practices take place in the watershed.
- A healthy, vibrant economy that will attract people and investment to the watershed.

9.6.1.2 Targets and Thresholds

Range Health

Table 17. Targets and thresholds for range health within the Milk River watershed. See Appendix C for a summary of the range health assessment process.

Health Category	Current Range Health (% Sites) (2003-07; 1400 sites)	Target (% Sites)	Threshold (% Sites)
Healthy	62	90	80
Healthy with Problems	33	10	20
Unhealthy	5		
No individual site should have more than 5% of the area rating unhealthy, due to natural or unforeseen reasons, at any point in time.			

The target and threshold in Table 18 are proposed for public land rangelands to ensure the future sustainability of public lands under grazing dispositions within the watershed.

Table 18. Proposed target for the percentage of public land in “good standing”.

Measure	Watershed Target (public land)*	Watershed Threshold (public land)*
Percent of SRD managed rangeland grazing leases in “good standing”	90%	80%
<i>* discussion should occur on whether this Target and Threshold should also be voluntarily adopted by owners of private rangelands within the basin</i>		

Key goals of range management on public lands are to maintain:

- A diversity of native plant species, especially deep-rooted and productive forms
- Vigorous healthy plants with well-developed root systems
- Adequate vegetative cover to protect soils from erosion and to conserve scarce moisture

Range managers should strive to meet targets and thresholds for plant community forage and litter biomass (lbs/acre) and apply appropriate stocking rates (AUM/ac) that are published by AESRD for the Rocky Mountains Natural Region (Montane Natural Sub-Region) and Grassland Natural Region (Mixedgrass, Foothills Fescue and Dry Mixedgrass Natural Sub-Regions). An example of range targets by plant community is found in Table 19.

Table 19. Forage and litter biomass target and thresholds for selected plant community types within the Mixedgrass Natural Sub-Region.

Natural Region	Plant Community	Indicator	Target (lbs/acre)	Threshold (lbs/acre)	Stocking Rate (AUM/ac)
Grassland Natural Region					
Mixedgrass Natural Sub-Region	Wheat grass-Needle-and-Thread	Forage Biomass	1510	1090	0.28
		Litter Biomass	1482	549	
	Blue Grama-Needle-and-Thread	Forage Biomass	-	-	0.2
		Litter Biomass	-	-	

9.6.1.3 Recommendations

Water Supply

- a) Any water used in the watershed by agriculture producers should be done so with a conservation mindset (i.e., minimize water wastage; maximize water productivity and efficiency).

Note on Flood Irrigation: Producers flood irrigate because the water supply in most years is only available for a short period during runoff. Furthermore, flood irrigation has no associated energy costs and thus is cheaply done. There is little or no opportunity to store

more water because of the regulatory system and storage would have as much or more loss than what occurs through flood irrigation.

- b) Improve the security and volume of water supplies in the Milk River watershed by implementing viable off-stream storage and/or water pipeline options to provide agricultural producers security for expanding operations.

Water Quality

- a) Encourage offstream watering options for livestock to reduce streambank erosion and nutrient, sediment and bacteria contamination to the river.
- b) For crop lands, the application of organic and inorganic fertilizer on agricultural lands should be consistent with the standards outlined in the Agricultural Operations Practices Act (AOPA) for application on forages or direct seeded crops.

Riparian Areas and Wetlands

- a) Livestock grazing strategies should consider distribution, timing and stocking rates that fall within the carrying capacity of each pasture
- b) Provide maximum rest during the growing season, skim grazing and time-controlled grazing management practices can be applied to reduce the potential for an increase in invasive and disturbance-caused species and maintain an abundance of native species.
- c) Provide adequate rest from continuous browse pressure to promote regeneration of existing native grass, forbs, preferred tree and shrub species and improve future reproduction and establishment of these vegetative communities.
- d) Encourage the development and use of riparian pastures¹⁵ within grazing systems to control access when riparian vegetation is vulnerable (e.g., early spring, wet periods, late fall).

Range Health

- a) Adopt range management principles that maintain or foster healthy productive rangeland. These include:
 - i. Balancing livestock demands with the available forage supply; the rancher harvests forage to produce red meat but leaves adequate un-grazed residue to protect plants and soil and to provide habitat for wildlife
 - ii. Promoting even livestock distribution by using tools like fencing, salt placement and water development to spread grazing over the landscape
 - iii. Avoiding grazing rangeland during vulnerable periods; early spring grazing can stress native range plants when energy reserves are depleted as new growth is initiated
 - iv. Providing effective rest periods after grazing to allow range plants to recover from the stresses of grazing

¹⁵ Riparian pastures are defined by dividing the landscape into pasture units based on similar plant communities and topography; the bottomlands are fenced separately from the uplands (Cows and Fish).

Soil Conservation

- a) Increase awareness of conservation farming and water management.
- b) Mechanical summer fallow still occurs within some areas of the watershed. All farmers should consider chemical fallow as an alternative to mechanical fallow to promote soil conservation. Chemical application should observe appropriate setbacks distances from waterbodies and watercourses.
- c) Best management practices that reduce soil erosion (by wind and water) and protect water quality in cropping systems should be applied to conserve soil, including:

Residue Management: Residue management is the use of conservation tillage practices that leave substantial amounts of plant residue on the soil surface to protect it from erosion.

Direct-seeding (No-till): Direct-seeding or no-till occurs when a crop is seeded into a field that has not been tilled mechanically.

Conservation Tillage: Conservation tillage refers to practices that leave at least 30% plant residue on the soil surface after the new crop has been planted. Conservation tillage is also referred to as minimum tillage or reduced tillage.

Mulching: Mulching is the practice of spreading straw or hay on the soil surface after harvest to protect against soil erosion.

Strip Cropping: Strip cropping consists of growing different crops in alternating strips across the slope to help control soil erosion and filter sediments.

Crop rotation: Crop rotation involves the production of different crop types on the same parcel of land; the type of crop seeded may vary by season or by year. Adequate crop rotation is key to promoting good soil structure and consequently preventing soil erosion. Crop rotations in drier areas can be designed to improve moisture use efficiency. A water-based rotation alternates shallow-rooted crops with deep-rooted crops to make the most efficient use of water over a wide range of moisture conditions.

Cover Crops: A crop planted primarily to manage soil fertility, soil quality, water, weeds, pests, disease and biodiversity. Planting a cover crop after harvest is one of the most effective ways to control soil erosion. For example, after growing a crop that produces very little straw, you may wish to grow a crop that produces more straw.

Terracing: Terracing refers to the construction of a series of vegetated diversion terraces that collect water runoff and divert it to a grassed waterway or other suitable outlet.

Permanent Cover: Permanent cover refers to forage, grass or tree cover and is generally maintained in high risk or problem areas that include erodible and saline soils, steep slopes and waterways. Permanent cover protects the soil and enhances soil organic matter, carbon storage and wildlife habitat. Lands that benefit most from permanent

cover include: waterways, steep slopes, erodible soils and saline soils. Forages or grass grown on the non-irrigated corners of pivot irrigation fields can reduce soil erosion.

Natural Capital

Natural capital refers to the sum of all resources and services provided by nature. The benefits of healthy, functioning ecosystems are often unaccounted for in traditional economics, but they are essential to our quality of life, now and in the future. Ecosystem services can be managed and maintained concurrently with agricultural activity on rangeland and cropland. Examples of services maintained by the agricultural industry include the maintenance of: quality habitat for wildlife, the groundwater recharge function of wetlands, and aesthetically-pleasing landscapes.

- a) Explore incentives for maintaining Alberta's natural capital on private land in the Milk River watershed.
 - i. Investigate the feasibility and implications of applying the Stewardship Credit Program model (which has been adopted at the Nature Conservancy of Canada's Sandstone Ranch in the Milk River watershed) to Public Lands in the basin.
- b) Assess the monetary value of natural capital in the Milk River watershed to inform an incentive program that could be offered to landowners.
- c) Promote best management practices that could be voluntarily adopted by land stewards to increase the value of the Milk River watershed's natural capital on private lands.
- d) Assess the impact of the Alberta Land Stewardship Act on the social and economic conditions in the Milk River watershed.

Land Stewardship

- a) The majority of Public Lands within the Milk River watershed are managed under a grazing disposition. Grazing lessees who adopt a stewardship ethic help to balance the well-being of livestock, the range resource and the ecosystem. **Public Lands within the Milk River watershed should remain under grazing disposition to preserve Alberta's natural capital and maintain agriculture as a viable industry in the watershed.**
- b) Good stewardship and resource management that is consistently applied by ranchers (sometimes in partnership with non-profit organizations) should be recognized and celebrated to encourage its widespread adoption in the basin. Sound range management practices compliment the following desired outcomes within this plan: the retention of biodiversity; maintaining landscape aesthetics; and providing satisfying recreational opportunities.
- c) Opportunities for engaging in land swaps within the basin should be investigated. Under this arrangement, private lands having high conservation values (and which have some degree of habitat continuity with surrounding parcels) would be traded for public lands, in reasonably close proximity, that have agricultural potential and which do not make a significant habitat contribution.

- d) Improved education of the general public should be undertaken regarding access to private agricultural lands and accessing public agricultural lands¹⁶ in the watershed (Refer to Section 9.6.3).

Economy

- a) Municipalities in the watershed should consider developing a Master Plan for Agriculture, similar to the one developed in other rural municipalities¹⁷ to identify a long term vision and policy framework that will support existing agricultural operations and provide new opportunities to the industry.
- b) Unique economic attributes in the watershed should be identified and used to develop a sustainable agricultural growth strategy (as part of a Master Plan). Opportunities that exist include: use of existing available surface water, unique agri-climatic features, (i.e., a soil and climate suitable for specialized crop and livestock production), close proximity to United States markets, and the strategic location serviced by Alberta-Montana Highway 4 and the CP railway.
- c) Adopt population retention initiatives in the Milk River watershed by exploring new ways to employ basin residents in the following sectors: agriculture, tourism, energy industry.

Monitoring

- a) There is limited recent data available on crop production in the watershed. This information should be updated to reflect current conditions and be available to contribute to an agricultural growth strategy (recommended above) and to Milk River State of the Watershed Reporting. Data will also help farmers make management decisions that will sustain and enhance economical crop production in the watershed in the future.
- b) Riparian health should be periodically assessed on private and public lands, using the Riparian Health Inventory or Assessment methods applied by Cows and Fish, to ensure that undesirable impacts on these sensitive areas and on water quality due to human disturbance (i.e., livestock) are prevented or minimized. ([link to riparian and wetland management](#))

9.6.2 INDUSTRIAL AND COMMERCIAL ACTIVITY (OIL AND GAS)

Oil, gas and other resource extraction industries are valued for the contribution they make to the local economy. Within the Milk River Integrated Watershed Management Plan planning area, oil and gas activity is associated with water conservation objectives and land use objective described below.

¹⁷ Rocky View County adopted its Agriculture Master Plan in November 2011. *"Its purpose is to identify a long term vision and policy framework which will support both existing agricultural operations and provide new opportunities for diversification of the agriculture industry in the County."* Rocky View County's master plan can be accessed at <http://www.rockyview.ca/Default.aspx?tabid=1044>

Objective 3. Recommend water conservation strategies that promote the efficient use of water for all sectors (i.e., municipal, industrial, irrigation).

Objective 7. Recommend land use and development practices which are congruent with the objectives and resource management strategies for the Milk River watershed and its unique semi-arid environment.

9.6.2.1 Outcomes and Goals

The Milk River watershed provides for oil and gas development while:

- 1) protecting the ecological, scenic and historic values of this unique landscape, and
- 2) protecting the economic investment of landowners and leaseholders with respect to agricultural production.

Goals

- Innovative and sustainable land use and development practices take place in the watershed.
- A healthy, vibrant economy that will attract people and investment to the watershed.

9.6.2.2 Targets and Thresholds

- Linear fragmentation
- Well densities
- Footprint

More discussion needed here.

9.6.2.3 Recommendations

Best Management Practices

- a) A list of suggested industry practices on Public Lands is contained in the Best Management Guidelines document of the Enhanced Approval Process (AESRD) and should be observed when developing oil and gas resources in the Milk River watershed (see Appendix E). The recommendations apply a minimum disturbance development philosophy. Implementation of non-oil and gas developments such as surface mineral leases, recreational leases, linear power easements, telecommunication towers and wind development sites, should also follow these guidelines. Private landholders should also observe these objectives and recommendations to conserve natural resources and the reduction of impacts associated with industrial land disturbance.

Note: The recommendations do not eliminate the responsibility of developers and resource users to comply with any and all applicable conditions, standards and requirements that are contained in other EAP online documents (for example, developers must observe any prescribed industry set back distances or any seasonal timing constraints that may exist).

- b) The recommendations found in the GOA's Enhanced Approval Process (Appendix XX) are minimum standards. The following revisions should be considered to more accurately support the Milk River watersheds goals regarding riparian areas and wetlands:

Objective 2, Recommendation 2: "Where topography limits the ability to locate roads away from riparian areas, access roads should be located as far from the bed and shore as possible."

Revision: "No access roads should be located within riparian areas". See Section 9.4: Permitted and Restricted Activity in riparian areas.

Objective 2, Recommendation 7: "Culverts can be installed on watercourses provided the following is taken into account: culverts must be maintained and repaired to ensure the integrity of the structure is not compromised, culverts are clearly flagged to identify them and prevent damage by road maintenance activities, culverts must be regularly cleaned to clear blockages of soil/vegetation that might restrict flow."

Revision: Include statement "Culverts should be properly sized and installed correctly so as not to affect the natural flow of water."

- c) To protect vulnerable groundwater aquifers in the Milk River watershed, standard practices for drilling operations should include:
- i. Extension of surface conductive casings beyond the minimum requirements outlined in Directive 8 (ERCB) to a minimum of 25 m below known aquifer depths,
 - ii. Aquifer depths should be determined using available mapping resources and/or consider water well depths within a 1000 m radius (not the 200 m currently recommended in Directive 8, or the nearest well within the production zone,
 - iii. Installation of an intermediate and additional larger diameter drill casing to insure against leakage of oil and fluids into the annulus especially during drilling. Intermediate and production casings should be cemented and a well-integrity test conducted prior to well completion.

Reclamation

- a) Reclamation activity on private lands and Public Lands should be undertaken by industry¹⁸ to achieve site conditions that meet or exceed pre-development site conditions. Site conditions of interest include: vegetation type and density, soil productivity, water quality and quantity, and range productivity. Successful reclamation will result in the progression of natural function of environmental and ecological processes to bring about the eventual restoration of disturbed areas. All dispositions that are linked to activities on Public Lands cannot be cancelled until the development proponent has achieved the required

¹⁸ Reclamation on Public Lands for most industrial activities falls under Alberta's *Environmental Protection and Enhancement Act* administered by AESRD. Activities that fall under this Act include the following land uses: coal operations, mine, pit, borrow, excavation, and peat operations; oil sands and oil sands exploration; railways; sand and gravel operations; telecom tower; transmission lines; upstream oil and gas development.

reclamation goals. On private lands, Reclamation Certificates must be issued before payments are terminated with landowners.

- c) On private lands, drill sites should be assessed a minimum of one year following reclamation by an independent soil scientist, agrologist or other qualified professional who should then apply for a Reclamation Certificate from a Conservation and Reclamation Inspector for Environmental Services, AESRD (Adapted from Cardston County 2009).
- d) Reclamation certificates issued by AESRD, under the *Environmental Protection and Enhancement Act*, are not issued for pipeline activity. For pipeline activity that occurs on private land, a bond held in a Municipal trust should be collected to pay for reclamation activities or pipelines should be included as an activity that requires a Reclamation Certificate.
- e) All companies conducting seismic surveys and developing wells and pipelines on private lands should have an environmental protection and reclamation plan that is signed off by the municipality. Specifics of weed control, stripping and grading, soil stockpiling, seed mixes used in reclamation, restrictions on drilling in sensitive areas near creeks and wetlands should be included in the plan (Adapted from Cardston County 2009).

Access

- a) Because seismic activity occurs on the land surface, landowners are not obligated to provide access to their deeded land for this to occur. Landowners should negotiate with a company to allow access to land, and identify the conditions under which access is to occur, to conduct seismic surveys. (Refer to “Seismic operations and landowner rights” for more information: [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex11511](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex11511)).
- b) Signed surface lease agreements negotiated between energy companies and landowners for resource drilling and development operations should include, but not be limited to (see also Appendix D):
 - Well and road location and use,
 - How road and well site will be managed,
 - How to prevent the spread of weeds,
 - Flare testing, and
 - Compensation for adverse effects to property values (e.g., loss of acreage, loss of productivity from setbacks, loss of property value due to loss of views).

Biodiversity

- a) All companies conducting oil/gas exploration and pipeline transmission development on private land should complete a biodiversity site assessment and submit a Wildlife Habitat and Protection Plan to municipalities for review (Adapted from Cardston County 2009).
- b) The spread of invasive plants should be prevented by taking the following precautions:
 - Remain a minimum of 1.6 km from all known restricted weed patches or areas of crop diseases,

- Contact local Agricultural Fieldmen regarding weed species or crop diseases present in proposed work areas and develop a jobsite plan to ensure minimal disturbance,
 - Create secondary containment dykes for all operations that include the onsite storage of drilling products and other hazardous materials to prevent contamination, and
 - Steam clean all equipment and vehicles pre- and post- moves across property boundaries to prevent the spread of invasive weed seeds and crop diseases.
(Adapted from Cardston County 2009)
- c) In areas identified as critical wildlife habitat on private land or Public Lands, horizontal drilling should be mandatory to minimize surface disturbance and maintain appropriate buffer between habitat and the production area.

Water Supply

- a) To minimize the risk of on-farm water shortages in times of drought, water for the energy industry should be sourced from larger waterbodies like Chin Reservoir or Milk River Ridge Reservoir rather than local dugouts and ponds, provided that the appropriate *Water Act* license is obtained (either within an existing municipal or irrigation district license or by temporary diversion license from AESRD). Note that if a landowner provides a volume of water to an oil and gas company that is within his/her 6250 cubic metres per year allocation as an Exempted Agricultural User, and then requests a temporary diversion license to pump water to refill the dugout or pond, the application may be denied if water is short.
- b) Saline (brackish) water, opposed to fresh water, should be used for all drilling activity in the watershed. Although a *Water Act* license is not required to divert and use saline groundwater (defined as groundwater that has a TDS concentration greater than 4000 mg/L), it is reported to and tracked by the ERCB under the requirements of Directives 17, 47 and 59.
- c) The oil and gas industry should explore commercial and environmentally-friendly options for dust control, other than fresh water. Options may include: lignin tackifiers and other commercial road dust control products.
- d) Increase awareness of water shortages in the Milk River watershed within the oil and gas sector.
- e) Address the disposal of waste water associated with drilling operations or saline/brackish water brought to the surface from producing wells. *The disposal of waste water associated with drilling operations is regulated, reported and tracked by the ERCB under Directives 17, 47 and 59 above. Industry is required to either reuse this water within drilling operations or disposed of the water through deep injection wells or other certified oilfield waste management facility.*

Water Quality

- a) The Milk River Watershed Council Canada should work toward understanding the oil and water separation process to determine risks to surface water and groundwater quality.
- b) Require all potentially affected wells, springs and aquifers be monitored within a 1.6 km radius of a well site. In the absence of domestic water wells within the testing radius (1.6 km), the drilling and testing of shallow aquifer monitoring wells may be required prior to any resource development activity occurring to provide a baseline of water quantity and a quality¹⁹ (Adapted from Cardston County 2009).
- c) Shallow aquifer test monitoring wells should be installed downstream of oil and gas wells and impacted domestic water wells for pre-and post- assessment of water quality. Test wells should be monitored for a period of at least 12 months after drilling or seismic has been completed (Adapted from Cardston County 2009).
- d) Oil and gas developments should not occur in areas where aquifer vulnerability is high (i.e., the two uppermost categories in the legend) (See Figure 4). **Would horizontal drilling be safe in these areas?**

Flaring, Venting and Incineration

- a) In the interest of air quality and resource conservation, flaring should not be permitted within the Milk River watershed. All companies should be required to do drill stem testing with closed chamber testing to confirm reserves and measure flow rates. All hydrocarbons should be captured and disposed of in an environmentally safe manner off site. Inline production tests may be considered post-completion (Adapted from Cardston County 2009).
- b) Companies should have an emergency plan in place in the event of a sour gas leak, and the resources to implement that plan. The emergency plan should be communicated to landowners and communities in order that they understand how the company will communicate a sour gas leak, and how evacuations will occur in the event of a leak.

Education and Awareness

- a) The MRWCC should strive to form a greater partnership with the oil and gas industry in order to share in achieving common goals for the watershed. (Implementation Action: The MRWCC will inform energy companies of pertinent provisions contained the IWMP.)
- b) Municipalities should request and the oil and gas industry should provide build-out plans including potential pipelines, compressors, and well-sites to residents, landowners and other stakeholders in the Milk River watershed.

¹⁹Current regulations require all potentially affected wells (e.g., within an 800 m radius of drilling or seismic) be tested that are within an 800 m radius of drilling or seismic activity (Cardston County 2009).

- c) Adopt/adapt “The Cardston County Protocol for Seismic Surveying, Drilling, Construction and Operation of Oil and Gas Facilities in Cardston County” as standard protocol in all municipalities within the whole basin. Consider revising Cardston County’s protocol to include consistent road and access policies for the oil and gas sector that would be applicable to all municipalities in the watershed.
- d) Encourage the Energy Resources Conservation Board to develop user-friendly guidance documents and improved resources to assist landowners who are involved in negotiations with energy companies.

Monitoring

- a) Confirm the age and number of pipelines crossing the Milk River (See Table 1) and determine when these were last inspected, by whom, and how frequently inspections occur.

Rationale: There has been one known pipeline failure that exports oil from the tank farm to Montana, located at SW9 and NW 4-2-16 W4. The potential for future failures is unknown.

- b) Update the oil and gas map for the Milk River watershed (as presented in the 2008 SOW report), including new projected well and pipeline developments (See Figure 1).
- c) Develop a systematic approach to review the threat of a pipeline failure/incident at the provincial level and develop a proactive preventative process to address incidents. At the very least, a remediation and response plan that takes into consideration the remote nature, unique Milk River watershed conditions, and localized industry best practices should be created.
- d) Abandoned wells make up 66% of the wells associated with oil and gas activity in the watershed. Further studies should be undertaken to understand the status of abandoned wells and if there are any issues associated with these.

Rationale: Little is known about the condition the abandoned wells are in and there are historical wells that may have pre-dated the registration system. There is a potential for aquifer contamination, potential for release of hydrocarbons due to improperly reclaimed wells, and abandoned wells may be re-pressurized and leakage may occur creating potential for localized explosions.

- e) Conduct research to determine the relationship between natural gas extraction and Milk River aquifer groundwater levels and quality.

9.6.3 TOURISM, RECREATION AND ACCESS

Recreational activity is a highly valued land use in the watershed. Relative to other areas in Alberta, the Milk River watershed contains large intact prairie landscapes and offers unobstructed view scapes. Here one can experience big skies, endless sightlines, and solitude in a prairie wilderness setting. Within the Milk River Integrated Watershed Management Plan planning area, tourism and recreation activity falls within the land use objective described below.

Objective 7. Recommend land use and development practices which are congruent with the objectives and resource management strategies for the Milk River watershed and its unique semi-arid environment.

9.6.3.1 Outcomes and Goals

The Milk River watershed provides for public recreational access while:

- 1) protecting the ecological, scenic and historic values of this unique landscape, and
- 2) protecting the economic investment of landowners and leaseholders with respect to agricultural production.

Goals

- Innovative and sustainable land use and development practices take place in the watershed.
- A healthy, vibrant economy that will attract people and investment to the watershed.

9.6.3.2 Targets and Thresholds

Desired recreational uses include, but are not limited to, rafting, tubing, canoeing, kayaking, swimming, hiking, biking, wildlife viewing, fishing and hunting.

1. Milk River water quality meets contact recreation guidelines for fecal coliform bacteria²⁰.
2. Reduced number of Public Health Notices, as posted at Writing-on-Stone Provincial Park, due to elevated fecal coliform bacteria in the Milk River.
3. The number of access points to the Milk River is limited to existing sites (2012). Improvements (e.g., infrastructure upgrades, improved accessibility) may be made to encourage use of existing access sites. Additional river access points may be considered in the future. (Implementation Action: Develop a map showing all “open” river access points, road and trails as of December 2012).

²⁰ Note that this target may not be achievable. A current fecal coliform source-tracking study that aims to identify sources of fecal coliform bacteria (e.g., livestock, wildlife, humans, environmental isolates) is being conducted on the Milk River. Preliminary results suggest that there are multiple sources of fecal coliform bacteria including a substantial wildlife component; humans are however not a significant contributor.

4. The number of designated camp sites should be increased to XXXX sites to reduce the occurrence of random camping in the watershed.
5. Reduced number of conflicts or incidents between landowners/leaseholders and recreational users.

9.6.3.3 Recommendations

Landowner/Lease Holder Considerations²¹

- a) Existing land titles, leases, licenses, and permits, need to be recognized and respected by recreational users in the watershed.
- b) Provide a voluntary general liability waiver form for the use of private landowners who are willing to grant river access to the general public (and can thereby protect themselves should an incident arise).
- c) Provide onsite property access maps which also describe general “Rules of the River and Ethics” as well as property specific considerations such as parking, restricted areas, and other special considerations for voluntary landowner co-operators.

Mapping

- a) Develop an updated detailed area map that clearly identifies legal access points, river distances and timing, camping sites, shelter facilities, potable water availability, wash room facilities, and other features.
- b) In addition to onsite property access maps, a general access map should be developed that describes “Rules of the River and Ethics” and information regarding permission to access private land and leased land, fires, garbage, historical resources, and mechanisms for contacting landowners/lease holders and registration (for walking access and/or overnight camping) if required.

Road Allowances

- a) Standardize road allowance policies and bylaws among rural municipalities in the watershed to provide clear and common information for river users, as well as map available road allowance access points to the Milk River.²²

²¹ Note that a Leaseholder is someone who holds a grazing disposition to use public land for livestock grazing and a Landowner is someone who possesses land title to private land.

²² Currently each municipality in the watershed has different guidelines they use to determine access to right-of-ways. In Cypress County, for example, some road allowances are rented, some are not marked and some are assumed to be a part of the landowner’s parcel of land. There are some “graded trails” or “goat trails” that are fenced on each side that can be easily travelled in dry conditions. Each case needs to be assessed individually. If access onto a road allowance is needed and it appears that it is not meant to be accessible to the public (a closed gate, not much traffic) the adjacent landowner should be contacted for information. In the County of Warner, all developed road allowances are accessible to the public and it is unlawful to obstruct access by way of blocking the road allowance or putting up a gate. However, the County allows farmers to carry out farming activities on undeveloped road allowances.

- b) Identify areas in the watershed , in collaboration with municipal staff, where access via road allowance is a concern.
- c) Clearly mark road allowances that have “no river access” with appropriate signage.
- d) Clearly mark private roads with “no river access” signage where trespassing is a concern.

Bed and Shore Access

- a) Increase understanding among the public on what Public Land is, where it is located, and how to seek permission to access Public Land in the Milk River watershed.²³
- b) Define bed and shore and user responsibilities; develop clear statements on use and responsibility of users, place information and key messages on access signage and mapping products. (Refer to Section 2.1)

Random Camping

- a) Increase the availability of overnight camping sites within designated areas along the Milk River by XXXX number of units.
- b) Develop maps for areas in the watershed where overnight camping is allowed. The map should differentiate among areas where permits are required to camp, where permits are not required and where camping is prohibited to reduce trespassing concerns and safety concerns such as fire.
- c) Provide an information link for access information and contacts for ACA/NCC properties and provincial grazing reserves along the river.

User Education

- d) Develop and disseminate educational information to river users regarding hazards, safety, ethics, water flows, wildlife, traditional landuse/ranching, crossing the international border and other details as identified.

²³ Recreational users need permission from the grazing disposition holder, in accordance with the Public Lands Recreational Access Regulation, before travelling on Public Lands under a grazing disposition. The following website provides further information on how the public can access agricultural public lands in Alberta and how to identify and contact grazing lessees:

<http://srd.alberta.ca/RecreationPublicUse/RecreationOnAgriculturalPublicLand/RecreationalAccessLegislation.aspx>

A brochure that contains essential information on accessing public land under a grazing lease is available at: http://srd.alberta.ca/RecreationPublicUse/RecreationOnAgriculturalPublicLand/documents/Recreation_on_Agricultural_PublicLand_What_You_Need_to_Know.pdf

- e) Enhance river signage to inform users of the value and significance of the local landscape.
- f) Create a Milk River watershed brochure with access information (identified in “a” above) and user responsibilities. The brochure should reference the recreational watershed map and its availability.
- g) Explore opportunities for using social media for providing user education.

User Health and Safety

- a) Improve reporting and communication of user health and safety risks.
 - i. Make water level and water quality advisory information available.
- b) Voluntary River Use Registration Program – establish a program for extended/multi day user trips to register with local authorities prior to departure and follow up check in when complete to reduce the potential for un-prepared users and potential of burden on emergency services.

Protection of Archeological, Historical and Cultural Artifacts

- a) Clearly define restrictions to access, and penalty for vandalism and disruption of significant historical sites along the river (\$50,000.00 fine or 2 years in jail).
- b) Improve signage informing the public about heritage protection, the penalties for vandalism and provide information on how to report vandalism to the proper authorities.

Economy

- a) Investigate the potential for increased promotion and development of sustainable economic activity in the watershed related to Bed and Breakfasts, eco-tourism and other support/service businesses for river recreation.

10.0 SCHEDULE (to be completed)

11.0 GLOSSARY OF TERMS (to be completed)

Aquifer An underground bed or layer of sand, earth, gravel or porous stone that contains water or permits its passage (Armantrout 1998).

Species of management concern 1) those species legally listed as *Endangered* or *Threatened* under the provincial *Wildlife Act*; 2) those designated as a *Species of Special Concern* by the Minister of Sustainable Resource Development or deferred through the provincial detailed status assessment process; and 3) species ranked as *At Risk*, *May Be At Risk*, or *Sensitive* in Alberta by the general status assessment process

Minimum disturbance development

Integrated resource management (IRM)

Integrated Land Management (ILM).

11.0 LITERATURE CITED (to be completed)

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Appendix A. Summary of MRWCC goals and IWMP objectives and environmental outcomes for the Milk River watershed.

MRWCC GOALS	IWMP OBJECTIVES	ENVIRONMENTAL OUTCOMES
A. Water Supply (including C. Groundwater)		
Water Supply and Management To foster the sustainable use and integrated management of land and water resources.	Objective 1. Recommend Water Conservation Objectives ²⁴ (WCOs) for the Milk River that include minimum and maximum flows.	Water is managed in a manner that benefits communities while meeting the needs of the aquatic and riparian environment.
	Objective 2. Recommend the matters and factors which should be considered by federal and provincial decision makers ²⁵ prior to approving a transfer of an allocation of water under a license or issuing an approval for work that may impact on the quality of land and water resources.	Water sharing disputes are resolved.
	Objective 3. Recommend strategies that enhance the delivery of apportioned shares of water while maintaining environmental integrity in Milk River watershed for both Alberta and Montana.	Groundwater is mapped, interactions are understood and the resource is properly managed.
	Objective 4. Recommend water conservation strategies that promote the efficient use of water for all sectors (i.e., municipal, industrial, irrigation).	An improved economy in the Milk River watershed due to a secure supply of water.
	Objective 7. Recommend groundwater protection and conservation measures for vulnerable areas, including the Whisky Valley and Milk River aquifers.	Information on water use in the Milk River watershed is available to the public.
B. Water Quality, Streambank and Riparian Protection		
Quality Water To monitor the quality of water in the Milk River and its tributaries, and promote quality domestic water supplies.	Objective 5. Recommend water quality objectives (WQOs) for four reaches of the Milk River (i.e., North Fork Milk River, Milk River gravel bed reach, Milk River sand bed reach and Milk River proper (South Fork)).	Quality water provides for communities, terrestrial and aquatic life, recreation and industry in the Milk River watershed. Baseline water quality information is available to the public.

²⁴ A WCO pertains to the amount and quality of water established by the Director [under the *Water Act*] to be necessary for the:

- protection of a natural water body or its aquatic environment, or any part of them;
- protection of tourism, recreational, transportation or waste assimilation uses of water;
- or management of fish or wildlife,

and may include water necessary for the rate of flow of water or water level requirements.

²⁴ Valued ecosystem components are appraised, evaluated or estimated elements of a biological community and its non-living environmental surroundings.

²⁵ Fisheries and Oceans Canada, Navigable Waters, Environment Canada, Alberta Agriculture and Food, Alberta Environment, Sustainable Resource Development, Alberta Transportation

MRWCC GOALS	IWMP OBJECTIVES	ENVIRONMENTAL OUTCOMES
		Water quality and quantity information is used to achieve sustainable use and integrated management of water resources.
Riparian Protection To support and initiate programs that protect, maintain and improve riparian areas.	Objective 6. Recommend minimum setback requirements for development from the Milk River and its tributaries and recommend appropriate management strategies to protect and/or enhance riparian and aquatic ecosystems.	Healthy, functioning riparian areas contribute to streambank stability, good water quality, forage, shelter and biodiversity in the Milk River watershed.
D. Land Use		
Economic Development To encourage economic development in the watershed.	Objective 8. Recommend land use and development practices which are congruent with the objectives and resource management strategies for the Milk River watershed and its unique semi-arid environment.	Innovative and sustainable land use and development practices take place in the watershed. A healthy, vibrant economy that will attract people and investment to the watershed.
E. Biodiversity		
Biodiversity To increase knowledge and awareness of conservation initiatives in the watershed and facilitate partnerships that will conserve wildlife and plant species diversity.	Objective 9. Recommend strategies to conserve and enhance native wildlife and plant species diversity found within the watershed.	A diverse native wildlife and plant community is present in the Milk River watershed through habitat protection and enhancement efforts.
ADDITIONAL MRWCC GOALS		
Informed Community To increase community awareness of the watershed.		A community that is informed and actively involved in the Milk River Watershed Council Canada and its initiatives.
National/International Issues To maintain open and accurate dialogue among the Milk River Watershed Council Canada and counterparts in Saskatchewan and Montana.		Good working relationships with Saskatchewan and Montana that create a process and forum to address transboundary watershed concerns.

Appendix B. Evaluation of flows required to safely navigate the Milk River by canoe, raft or tube as identified through scheduled canoe trips.

Scheduled Canoe Trips	Reach Navigated	Reason for Cancellation	Discharge (cms)			
			N. Milk River at Western Boundary (Reach 1)	Milk River at Western Boundary (Reach 2)	Milk River at Milk River (Reach 3)	Milk River at Eastern Boundary (Reach 4)
June 23, 2007	Coffin Bridge to Weir Bridge	-	12.100	0.656	15.900	16.900
June 28, 2008	Weir Bridge To Deer Creek Bridge	-	16.600	2.490	20.100	18.500
June 27, 2009	Coffin Bridge to Weir Bridge	-	18.500	1.310	19.600	22.000
June 12, 2010	N. Fork Milk River to Del Bonita	Low Flow	3.817	3.505	8.518	19.356
June 18, 2010	-	High Flow	36.852	52.060	38.344	19.767
June 19, 2010 (scheduled date)	N. Fork Milk River to Del Bonita		22.279	68.076	149.699	34.863
June 20, 2010	-		11.042	36.546	116.064	107.984
June 21, 2010	-		8.196	12.508	49.035	162.518
June 11, 2011	N. Fork Milk River to Del Bonita	High Flow	4.276	36.429	60.635	96.300

Appendix C. Overview of range health and assessment.

Readers are encouraged to review section 6.1 (“Public Range Health”) in the *Milk River State of the Watershed* report for an explanation of management issues that pertain to rangelands within the basin. Also addressed in this section of the SOW report is a description of the five rangeland health indicators used by SRD and how rangeland health scores are established for public rangelands. The 5 indicators used to determine rangeland health and function are:

1. Integrity and Ecological Status
2. Plant Community Structure
3. Hydrologic Function and Nutrient Cycling
4. Site Stability
5. Noxious Weeds

Once a rangeland site has been assessed, the combined score of the above indicators is expressed as a percent health rating. This figure can then be compared against three range health categories to determine the condition of the assessed rangeland site:

- a score of 75 -100% = Healthy
- a score of 50 – 74% = Healthy with problems (further monitoring is needed; adjustments in grazing practices may be required)
- a score of < 50% = Unhealthy (urgent management action may be required)

A disposition under the *Public Lands Act* is assessed against the following 3 categories and a decision is made whether to renew or not renew a grazing disposition.

1) Disposition Use

- a) “Acceptable” use means that the disposition is being used properly.
- b) “Unacceptable” use could include such things as: severe over-grazing, failure to graze a lease (without approval), and unauthorized subletting of the lease.

2) Health

- a) Range health could be considered “Acceptable” if it was determined to be:
 - i) healthy or healthy with problems on the majority of the grazing lease,
 - ii) lower than healthy with problems but there is an upward trend or identified health problems have been addressed, or
 - iii) affected by external factors beyond the control of the lessee.
- b) Range health is considered to be “Unacceptable” when range condition has been determined to be unhealthy on the majority of the grazing lease.

3) Proper Management

- a) “Acceptable” is considered when the disposition is being used appropriately and conditions of the disposition, range management operation plan (RMOP) or other planning agreements are being followed and the *Public Lands Act* is not being contravened.
- b) “Unacceptable” is considered when the disposition is not being used appropriately, i.e., if conditions of the disposition, RMOP or other planning agreements are not being followed and/or regulations defined in the *Public Lands Act* may have been contravened.

If one of more of the above three categories is not met the grazing lease is considered to be “not in good standing” and is subject to progressive compliance measures as outlined in the *Public Lands Act*.

Appendix D. Recommended restricted activity dates and setback distances by level of disturbance (AESRD 2011).

Species	Location	Time of Year	Level of Disturbance		
			Low	Medium	High
Great Plains Toad and Plains Spadefoot	Class III wetlands on Native Prairie	Year round	100 m	100 m	100 m
Northern Leopard Frog	Breeding ponds	Year round	100 m	100 m	100 m
Eastern Short Horned Lizard*	Habitat	Year Round	100 m	100 m	200 m
Bull Snake, Western Hognose Snake, Prairie Rattlesnake	Hibernacula	Year around	200 m	200 m	500 m
	Rookery	March 15 th – October 31 st	200 m	200 m	200 m
		November 1 st - March 14 th	50 m	50 m	200 m
Greater Sage Grouse*	Leks	Year	3200 m	3200 m	3200 m
	Habitat	Year-	1000m	1000 m	1000m
Sharp-Tail Grouse	Leks	March 15 th – June 15 th	500 m	500 m	500 m
		June 16 th – March 14 th	100m	100 m	500m
Peregrine Falcon, Bald Eagle, Golden Eagle, Prairie Falcon, Ferruginous Hawk	Nesting sites	March 15 th – July 15 th	1000 m	1000 m	1000 m
		July 16 th – March 14 th	50 m	100 m	1000 m
Burrowing Owl	Nesting sites	April 1 st – August 15 th	200 m	500 m	500 m
		August 16 th – October 15 th	200 m	200 m	500 m
		October 16 th – March 31 st	50 m	100 m	500 m
Colonial Nesting Birds: American White Pelican, Great Blue Heron*	Nesting sites	April 1 st – August 31 st	1000 m	1000 m	1000 m
		September 1 st – March 31 st	100 m	100 m	1000 m
Piping Plover waterbodies*	Nesting sites	April 15 th – July 31 st	100 m	200 m	200 m
		August 1 st – April 14 th	100 m	100 m	200 m
Ord's Kangaroo Rat**	Nesting sites (dens)	Year Round	50 m	100 m	250 m
Threatened and Endangered Plants	Habitat	Year Round	30 m	30 m	300 m
Swift Fox	Den	February 16 th – July 31 st	500 m	500m	500 m
		August 1 st – February 15 th	50 m	100 m	500 m
Long-billed Curlew Upland Sandpiper Mountain Plover Short-eared Owl Sprague's Pipit	Active nest and surrounding habitat	April 1 st - July 15 th	100 m	100 m	100 m

*These species habitats are mapped

** All activity should conclude before sunset and not use artificial illumination within 1000 meters of Ord's Kangaroo Rat range.

Fish & Wildlife Division recommends that there be no industrial activity within 100 m of water bodies (wetlands, ponds, creeks, rivers, lakes, including dry water bodies), or within 100 m of the crest of any coulee associated with riparian areas or unique geographical features like hummocky moraines, because of extensive wildlife use.

Appendix E. Enhanced Approval Process recommendations. The recommendations apply a minimum disturbance development philosophy.

Objective	EAP Recommendations
1. Apply an overall land management strategy that emphasizes IRM while allowing compatible industrial and commercial development to occur.	1. Utilize the concept of IRM ²⁶ and ILM ²⁷ when making decisions on the suitability and extent of industrial and commercial development within the watershed.
	Activities should be planned in a manner that minimizes disturbance and adverse environmental effects. Areas that need special consideration include: sensitive soils, unstable slopes, waterbodies, wetlands, streams, areas where rare plants or animals are found, breeding grounds, nesting areas or winter range.
	2. Minimize fragmentation of the landscape and the number of linear features by using shared corridors.
	3. Development should be located to minimize the amount of borrowed material (i.e., subsoil, sand and gravel) needed.
	4. Road design should consider the following: minimize the number of watercourse crossings; minimize the total footprint; minimize new clearings; minimize the grade of roads, and; avoid loop roads.
	5. Minimal disturbance (no strip) access roads/trails should be utilized whenever possible.
	6. Access routes should be planned such that future corridor requirements are considered and integrated.
	7. Industrial activity should be sequenced to avoid repeat operations or multiple entries into an area.
	8. Exploration activity should only utilize minimal disturbance access while keeping corridor width to a minimum.
	9. New development/disturbance must take into account impacts to other users (human and non-human) of the landscape.
	10. Existing sites where on-site contamination issues are present should be avoided for future development.
	11. Selected linear development routes should allow for future field expansion.
	12. Regardless of approved widths, attempts should be made to utilize the least-width for linear features.
	13. Pipeline ROW should not be used as access shortcuts during construction.
	14. Attempts should be made to locate any borrow pits as close to the development as possible and spoil piles from existing dugouts should be utilized where ever possible.
	15. Where multiple pipelines are planned, utilize a common trench and corridor to minimize the industrial footprint.
	16. Utilize existing leases and directional, slant and horizontal drilling techniques to reach subsurface targets and minimize the development footprint.
	17. Constant and ongoing monitoring of industrial developments must occur to ensure negative impacts do not affect landscape resources.
	18. Development planning should consider viewsapes and landscape aesthetics when locating industrial and commercial activities within sensitive or valued landscapes.
2. Maintain and protect water	1. Avoid locating parallel, all-weather access routes within 500m of any waterbody/watercourse.

²⁶ IRM – Integrated Resource Management²⁷ ILM – Integrated Land Management

Objective	EAP Recommendations
quality, waterbodies and watercourses while allowing for industrial and commercial development.	2. Where topography limits the ability to locate roads away from riparian areas, access roads should be located as far from the bed and shore as possible.
	3. Pipelines should be bored through watercourses and waterbodies where possible. If an open trench is deemed less risky, consideration should be given to installing a second pipeline at the crossing point to accommodate future capacity needs.
	4. Stream crossings should be located at stable channel locations, not actively eroding areas. All equipment should be kept clean and not be a source of sediment or contaminants.
	5. Snow fills may be used on ephemeral watercourses during frozen conditions provided that: sufficient snow exists to fill the creek channel, any soil cap on the snow is remove prior to breakup, measures are in place to prevent soil or other debris from entering the watercourse channel, and suitable measures are taken during deactivation to ensure flow is not impeded.
	6. Ice bridges may be used during frozen conditions provided that: no capping of soil or organic material takes place, winter flows are not impeded, snow and ice approaches are sufficiently thick to protect the bed and shore, and measures are taken during deactivation to ensure flows are not impeded.
	7. Culverts can be installed on watercourses provided the following is taken into account: culverts must be maintained and repaired to ensure the integrity of the structure is not compromised, culverts are clearly flagged to identify them and prevent damage by road maintenance activities, culverts must be regularly cleaned to clear blockages of soil/vegetation that might restrict flow.
3. Maintain and protect the soil resource while allowing for industrial and commercial development to occur.	1. Industrial and commercial activities should be routed around sensitive terrain and soils. Sensitive terrain types include: dunes, eroding slopes, coulee breaks and wet, shallow or salt effected soils.
	2. In areas where development cannot avoid sensitive terrain or soils, minimal disturbance (no strip) techniques should be utilized.
	3. Utilize minimal disturbance techniques to minimize damage to the vegetation that anchors and protects the soil resource.
	4. Some soil conditions may require the use of “three-lift stripping” techniques (i.e., separation of: top soil, B and other intermediate horizons, parent material). In order to prevent long term storage and erosion, replacement of the soil should be done within a reasonable time period.
4. Maintain and protect the native vegetation resource while allowing for industrial and commercial development to occur.	1. Utilize minimal disturbance (no strip) techniques to preserve native vegetation.
	2. Where vegetation control is needed, utilize mechanical over chemical control techniques to prevent chemical migration. Chemical control should only be used when spot application treatments are undertaken.
	3. Industrial proponents must have a fire control plan with all necessary fire fighting equipment readily available or on-site. All staff must be trained to use fire fighting equipment.
5. Maintain and protect established grazing operations within the watershed while allowing for industrial and	1. New development will make full and preferential use of existing access and development leases.
	2. After development completion final cleanup of industrial and commercial sites should occur prior to cattle entry in the affected field(s).
	3. Existing access corridors should be used. Fences should not be cut and access should be gained through existing gates.

Objective	EAP Recommendations
commercial development to occur.	4. Pipelines or underground power lines that intersect buffers between roads and fields should be avoided or bored to maintain winter cover.
	5. Gates that receive high levels of use resulting from the industrial activity should be replaced with Texas gates where appropriate and supported by the grazing Lessee.
	6. Consider hanging swing gates over Texas gates where adjacent to high traffic livestock areas.
	7. In order to reduce generation of airborne dust, industrial traffic speed should be kept to a minimum (30-50kph) where the access is located in close proximity to livestock.
	8. Always fence out borrow pits to eliminate livestock injury.
	9. To avoid injury to livestock, eliminate the use of horns and sirens when in close proximity to livestock.

APPENDIX F. Summary of Recreation and Access Sub-Committee notes.



Recreational Access/Flow Management committee

Meeting Minutes

March 15th 2012 – MRWCC Office 1:00pm-3:30pm

Attendance: Tim Romanow, Mary Lupwayi, Ed Sloboda, Ken Brown, Darcy Wills, Greg Ottaway, Will Lindeman, John Ross.

Review of Access Management Recommendations:

Context:

Recreational access to the Milk River is a challenge for many canoeing enthusiasts, private landowners, Public Lands, Alberta Parks, Rural Municipalities, and area Resource Managers. The following management recommendations are designated as potential solutions to identified access management concerns in the Milk River Watershed that fit the context of the MRWCC Integrated Watershed Management Plan.

General Notes

- Limited availability of designated and appointed random camping sites along the river needs to be addressed.
- Outdated Mapping needs to be updated with the possibility of providing improved information regarding infrastructure, access, ethics, etc.
- Trespassing Concerns need to be addresses in all 4 municipalities
- Potential for increased promotion and development of sustainable economic activity in the watershed related to Bed and Breakfasts, and other support businesses for river recreation.
- Adaptive management approaches must be initiated and used as the basis for access management decisions. This will require development of a process to gather and analyze data about usage, watershed integrity, and traditional aboriginal sites. There must be a systematic effort to gather information about the resources in the area, and about best approaches to manage recreational activities in the area in a way that reduces landowner conflicts, improves recreational access, promotes responsible use, provides economic development opportunities, and conserves the area for future generations.
- Existing deeds, licenses, and permits, need to be recognized throughout the watershed.
- No need for additional private access along the river, there are sufficient designated access points.
- Where do private lands start? Clear definition of where you can and can't go.
- Designated sites (negotiated access) need to be identified.
- No need to open up additional access points for day trips.