

Municipal Guide

Planning for a Healthy
and Sustainable
North Saskatchewan River
Watershed



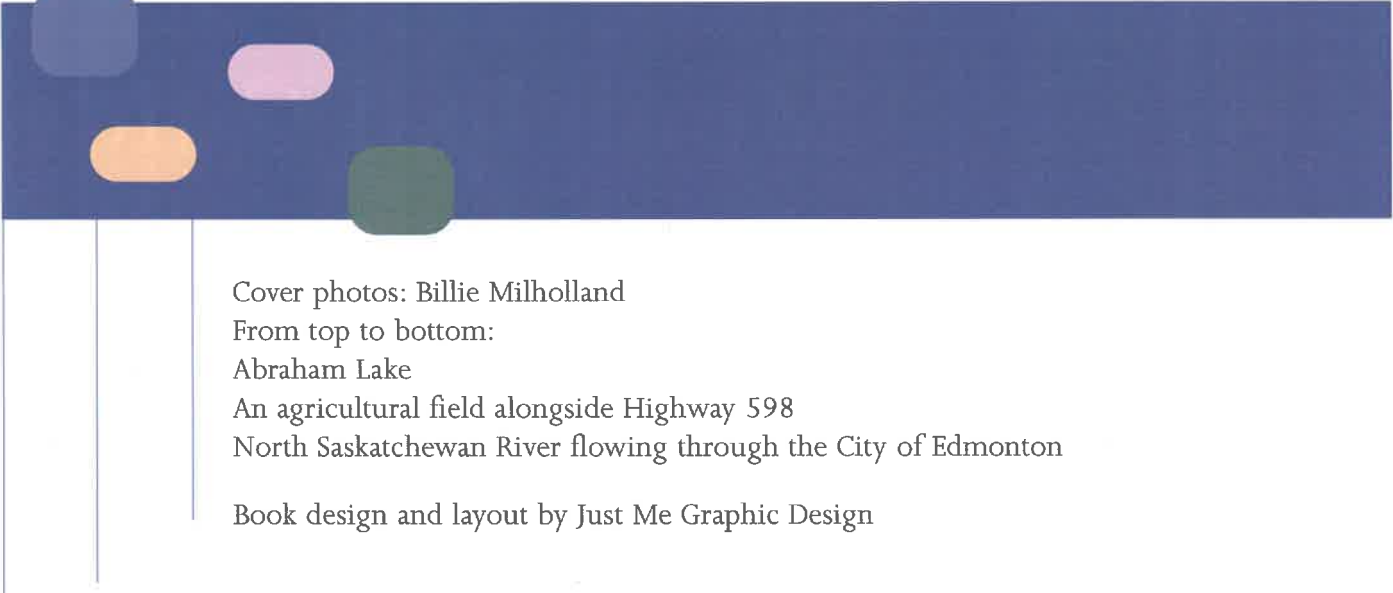
North
Saskatchewan
Watershed
Alliance

Municipal Guide

Planning for a Healthy
and Sustainable
North Saskatchewan River
Watershed



North
Saskatchewan
Watershed
Alliance



Cover photos: Billie Milholland

From top to bottom:

Abraham Lake

An agricultural field alongside Highway 598

North Saskatchewan River flowing through the City of Edmonton

Book design and layout by Just Me Graphic Design

Municipal Guide: Planning for a Healthy and Sustainable North Saskatchewan River Watershed

prepared for the North Saskatchewan Watershed Alliance by Giselle Beaudry

Reprinted November 2008



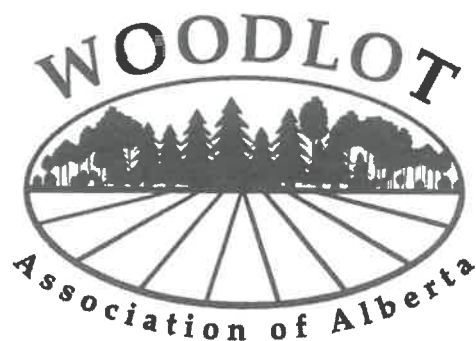
Acknowledgements

The North Saskatchewan Watershed Alliance would like to thank the following for their generous contributions to this Municipal Guide through grants and in-kind support.



Fisheries and Oceans
Canada

Pêches et Océans
Canada



Acknowledgements

The North Saskatchewan Watershed Alliance would like to thank the following individuals who dedicated many hours to the Municipal Guide project. Their voluntary contributions in the development of this guide are greatly appreciated.

Municipal Guide Steering Committee

Andrew Schoepf, Alberta Environment
Bill Symonds, Alberta Municipal Affairs
David Curran, Alberta Environment
Delaney Anderson, St. Paul & Smoky Lake Counties
Doug Thrussell, Alberta Environment
Gabrielle Kosmider, Fisheries and Oceans Canada
George Turk, Councillor, Lac Ste. Anne County
Graham Beck, Leduc County and City of Edmonton
Irvin Frank, Councillor, Camrose County
Jolee Gillies, Town of Devon
Kim Nielsen, Clearwater County
Lorraine Sawdon, Fisheries and Oceans Canada
Lyndsay Waddingham, Alberta Municipal Affairs
Murray Klutz, Ducks Unlimited Canada
Rod McDermid, Councillor, Lacombe County

Municipal Guide Reviewers

Celeste Nicholson, North East Alberta Water Management Coalition
Douwe Vanderwel, City of Edmonton
Doug Major, Special Areas Board
Frank Vagi, Petro-Canada
Jaimie Wuite, Alberta Agriculture Food and Rural Development
Jason Unger, Environmental Law Centre
Karen Leibovici, Councillor, City of Edmonton, Alberta Urban Municipalities Association
Ken Glover, Woodlot Association of Alberta & Model Forest Network PWSI
Ken Kalirai, Leduc County
Melanie Gray, Epcor
Neil Hollands, Alberta Environment
Peter Apedaile, Councillor, Smoky Lake County
Sarah Depoe, Alberta Agriculture Food and Rural Development
Scott Jones, Alberta Community Development
Scott Millar, Alberta Sustainable Resource Development



North Saskatchewan Watershed Alliance

9504 – 49th Street, Edmonton, Alberta T6B 2M9

Phone: 780-442-6363 Fax: 780-495-0610

water@nswa.ab.ca

<http://www.nswa.ab.ca>

Please accept this copy of the “**Municipal Guide: Planning for a Healthy and Sustainable North Saskatchewan River Watershed**”. When it was published in 2006, every municipality in the NSR watershed received a copy and it is available on our website.

In response to recent requests for an additional hard copy of this guide, we decided to make it available once again to all NSR watershed municipalities.

This publication was the result of a year long project sponsored by the North Saskatchewan Watershed Alliance, NSR watershed municipalities and Alberta Municipal Affairs.

Members of the Municipal Guide Steering Committee and Review Group:

The City of Edmonton; Town of Devon; Clearwater County, the North East Alberta Water Management Coalition (multi municipal group); the Environmental Law Centre; Lac Ste. Anne County; Camrose County; Leduc County; St. Paul County; Smoky Lake County; AUMA; the Woodlot Association of Alberta; the Model Forest Network; EPCOR; Ducks Unlimited Canada; Alberta Environment; Alberta Sustainable Resource Development; Alberta Agriculture; Alberta Community Development; Fisheries and Oceans Canada.

The NSWA is completing a Draft Integrated Watershed Management Plan (IWMP) and when it has been reviewed by the NSWA Board of Directors, we will send it out for your review and comment. We hope the Municipal Guide will be a valuable resource for this exercise.



Table of Contents

1	Introduction	1
1.1.	Introduction	1
1.2.	Who is the North Saskatchewan Watershed Alliance?	5
1.3.	How this Guide Was Created	6
1.4.	Purpose of this Guide	6
1.5.	How to use this Guide	7
1.6.	Limitations of this Guide	9
2	Watershed Overview	11
2-1	What is a Watershed?	11
2-2	Watershed Components	14
2-2.1.	Riparian Areas and Floodplains	14
2-2.2.	Water Bodies	15
2-2.3.	Upland Areas	17
2-2.4.	Ground Water Recharge, Discharge and Storage Areas	18
2-2.5.	Biodiversity	19
2-2.6.	Interdependency Between Components	19
2-3	Benchmarks for Watershed Health	22
2-4	Value of a Healthy Watershed	23
	Green Infrastructure	23
	Natural Capital	24
2-4.1.	Economic Benefits	25
2-4.2.	Human Health and Social Benefits	29
2-4.3.	Ecological Benefits	31

Table of Contents

2-5	Current Threats to Watershed Health	32
2-5.1.	Land Use	32
2-5.2.	Water Demand	34
2-5.3.	Pollution	34
2-6	Watershed Management	35
2-6.1.	Why Manage at a Watershed Level?	35
	<i>A Watershed Perspective</i>	35
	<i>Cumulative Impacts</i>	35
2-6.2.	Watershed Management	36
	<i>Integrated Watershed Management Planning in the NSRW</i>	36
2-7	The North Saskatchewan River Watershed (NSRW)	38
2-7.1.	General Overview	38
2-7.2.	State of the Watershed	42
3	Overview of Legislation and Government Bodies	45
	Relevant to Watershed Health	
3-1	Cross Government Issues	46
	<i>Overlapping Jurisdiction</i>	46
	<i>Unclear Jurisdiction</i>	47
	<i>Inter-governmental Cooperation</i>	48
3-2	A Quick Reference: Watershed Issues and Related Acts	48
3-3	Federal Jurisdiction	57
3-3.1.	Federal Legislation and Policies	58
3-3.2.	Federal Departments and Agencies	60
3-4	Provincial Jurisdiction	62
3-4.1.	Provincial Legislation and Policies	63
3-4.2.	Provincial Departments and Agencies	67
3-5	Municipal Jurisdiction	70
	<i>The Municipal Government Act</i>	70
	<i>Other Statutes and Responsibilities</i>	71
3-6	Additional Information	72
4	Municipal Planning and Development	73
4-1	Planning and Development and Watershed Health	73
4-2	Making a Commitment to the Environment	74
	<i>Setting Measurable Goals and Objectives</i>	77
4-3	Gathering Information	78

4-4	Statutory Plans	84
4-4.1.	The Municipal Development Plan (MDP)	85
4-4.2.	The Area Structure Plan (ASP)	88
	Off-Site Levy Bylaws	89
4-4.3.	The Area Redevelopment Plan (ARP)	90
4-5	The Land Use Bylaw (LUB)	91
4-5.1.	Zoning	92
4-5.2.	Subdivision and Development Standards	93
4-5.3.	Subdivision Approvals and Development Permits	96
	The Approval Process	96
	Environmental Suitability of Land	97
	Environmental and Municipal Reserves	98
	Conservation Easements	99
4-6	Non-Statutory Plans, Policies, Strategies and Initiatives	101
	Smart Growth	101
4-6.1.	Environmental Planning	103
4-6.2.	Natural Area Planning	104
4-6.3.	Community Planning	108
4-6.4.	Growth Management Planning	109
4-7	Working with the Development Industry	110
	Communication and Education	110
	Municipal Grants	112
	Conservation Easements and Purchase of Development Rights	112
	Transfer of Development Rights	112
4-8	Environmental Assessments for Municipal Projects	113
5	Water, Wastewater and Stormwater Operations	115
5-1	Water Quality Guidelines	115
5-2	Stormwater Management	116
	Why is Stormwater Management Important?	116
	Integrated Stormwater Management	120
5-2.1.	Stormwater Pollution Prevention	122
5-2.2.	Structural Best Management Practices (BMPs)	123
5-2.3.	More Resources: Stormwater Management	130
5-3	Potable Water	131
5-3.1.	Water Conservation	132
	Demand Management	132
	Public Awareness and Education	132

Table of Contents

5-3.2.	Source Protection	134
5-3.3.	Potable Water Treatment	135
	Water and Wastewater Operators	136
5-3.4.	Distribution of Potable Water	136
5-3.5.	Ground Water Protection and Use	137
5-4	Wastewater	138
5-4.1.	Municipal Wastewater and the Environment	139
5-4.2.	Wastewater Collection Systems and Source Control	140
5-4.3.	Treating Wastewater	142
5-4.4.	Use of Biosolids (Wastewater Sludge)	149
5-4.5.	Private Sewage Systems and Sewer Service Connection - the Safety Codes Act	150
5-5	Additional References for Water, Wastewater and Stormwater Systems	151
6	Municipal Infrastructure, Property and Operations	153
6-1	Green Spaces	153
6-1.1.	Components of a Green Space Network	153
	Green Spaces on Public Lands	153
	Green Spaces on Private Lands	154
6-1.2.	Tools for Conserving Natural Areas	154
6-1.3.	Green Space Management	158
	Pesticide Management	158
	Fertilizer Use	161
	Vegetation	161
6-1.4.	Water Body and Riparian Area Stewardship	162
	Riparian Areas	163
	Wetlands	163
	Off-Road Vehicles in Riparian Areas	165
6-2	Transportation and Road Maintenance	166
6-2.1.	Transportation Infrastructure	166
6-2.2.	Dangerous Goods Routes and Designated Truck Routes	167
6-2.3.	Snow Disposal and Road Salts	168
6-3	Solid Waste Disposal	170
6-3.1.	Hazardous Waste	170
	Household Hazardous Waste	170
	Industrial Hazardous Waste	172
6-3.2.	Household and Industrial Waste	173

6-4	Agriculture Services	175
6-4.1.	Protecting Agricultural Lands	175
6-4.2.	Confined Feeding Operations	176
6-4.3.	Watershed Stewardship on Agricultural Lands	177
6-5	Woodlots and Agro-Forestry	183
6-5.1	Protecting Woodlots and Best Management Practices	183
6-6	The Oil and Gas Industry	185
6-6.1.	Overview	185
6-6.2.	The Role of Municipal Governments	187
	Working with the EUB	187
	Working with Landowners	187
	Working with the Oil and Gas Industry	189
7	Municipal Bylaws	191
7-1	Municipal Jurisdiction to Pass Bylaws	191
7-2	Bylaws as a Tool for Promoting Watershed Health	194
7-2.1.	Protecting Natural Areas	194
	Parks and Protected Areas Bylaw	194
	Environmental Reserves Bylaw	194
	Off Highway Vehicles Bylaw	195
7-2.2.	Protecting Trees on Public Lands	196
7-2.3.	Wastewater and Stormwater Pollution Prevention	196
	Sewer Use Bylaw	196
	Sewer Bylaw	198
	Considerations for Creating or Upgrading Sewer Bylaws	199
	Pesticide Bylaw	199
7-2.4.	Water Conservation	200
	Sewer and Water Rates Established in a Bylaw	200
	Lawn Watering Bylaw	201
	Low Flow Fixtures Required in a Bylaw	202
7-3	Bylaw Enforcement	202
8	Cooperation and Collaboration in the Watershed	205
8-1	Intermunicipal Cooperation	205
8-1.1.	Intermunicipal Planning	205
	The Intermunicipal Development Plan	206
	Statutory Plans	208
	Intermunicipal Planning Bodies	208

Table of Contents

	Regional Forums	209
	Other Planning Strategies	210
8-1.2.	Sharing Resources	213
8-1.3.	Intermunicipal Bylaws	215
8-2	Intra-municipal Capacity and Cooperation	216
8-3	Community Outreach	217
	Community-Based Social Marketing (CBSM)	217
8-3.1.	Education and Awareness	218
	Education Mediums	218
	Community Education Topics	220
8-3.2.	Community Programs	224
8-3.3.	Community Consultation	226
	Components of Effective Community Consultation	227
	Environmental Advisory Committees	229
8-4	Partnerships with Other Groups	232
8-4.1.	Partnership Opportunities	232
8-4.2.	Tips for Creating Effective Partnerships	240
8-5	Dispute Resolution	241
9	Funding Watershed Stewardship	245
9-1	Allocating Municipal Funds	246
9-2	Seeking External Funds	247
	Grants Available for Municipal Initiatives	247
	Funding Available for Stewardship Initiatives	251
	Developing Partnerships	252
Appendix A	.....	253
A-1	Federal Acts	253
A-1.1.	Canada National Parks Act	253
A-1.2.	Canada Water Act	254
A-1.3.	Canada Wildlife Act	255
A-1.4.	Canadian Environmental Assessment Act	256
A-1.5.	Canadian Environmental Protection Act	257
A-1.6.	Fisheries Act	259
A-1.7.	Navigable Waters Protection Act	260
A-1.8.	Migratory Bird Convention Act	261
A-1.9.	Pest Control Products Act	262
A-1.10.	Species at Risk Act	263

Table of Contents

A-2	Federal Policies and Strategies	265
A-2.1.	Canadian Biodiversity Strategy	265
A-2.2.	Federal Policy on Wetland Conservation	266
A-2.3.	Federal Water Policy	267
A-2.4.	Department of Fisheries and Oceans Policy for the Management of Fish Habitat	268
A-2.5.	Wildlife Policy for Canada	269
A-3	Provincial Legislation	270
A-3.1.	Agricultural Operation Practices Act	270
A-3.2.	Agricultural Pests Act	272
A-3.3.	Dangerous Goods Transportation and Handling Act	272
A-3.4.	Energy Resources Conservation Act	273
A-3.5.	Environmental Protection and Enhancement Act	274
A-3.6.	Fisheries (Alberta) Act	277
A-3.7.	Forest and Prairie Protection Act	277
A-3.8.	Forests Act	278
A-3.9.	Forest Reserves Act	278
A-3.10.	Government Organization Act	279
A-3.11.	Hydro and Electric Energy Act	280
A-3.12.	Mines and Minerals Act	280
A-3.13.	Municipal Government Act	280
A-3.14.	North Red Deer Water Authorization Act	287
A-3.15.	Oil & Gas Conservation Act	287
A-3.16.	Oil Sands Conservation Act	288
A-3.17.	Pipeline Act	288
A-3.18.	Provincial Parks Act	289
A-3.19.	Public Health Act	289
A-3.20.	Public Lands Act	290
A-3.21.	Safety Codes Act	291
A-3.22.	Soil Conservation Act	291
A-3.23.	Special Areas Act	292
A-3.24.	Water Act	293
A-3.25.	Weed Control Act	295
A-3.26.	Wilderness Areas, Ecological Reserves, Natural Areas and Heritage Rangeland Act	295
A-3.27.	Wildlife Act	297

Table of Contents

A-4	Provincial Policies and Frameworks	297
A-4.1.	Alberta's Commitment to Sustainable Resource and Environmental Management	297
A-4.2.	Framework for Water Management Planning	298
A-4.3.	Land Use Policies	298
A-4.4.	Water for Life: Alberta's Strategy for Sustainability	300
A-4.5.	Wetland Management in the Settled Area of Alberta - An Interim Policy	302
A-5	Federal - Provincial Agreements	303
A-5.1.	Canada-Alberta Agreement for Environmental Assessment Cooperation	303
A-5.2.	Master Agreement of Apportionment	304
A-6	International Agreements	305
Appendix B	.....	307
B-1	Lac Ste. Anne County's "No-Spray Agreement" for Pesticides	307
B-2	Building an Environmental Reserve Bylaw	309
B-3	Example: Prohibited Discharges into Sanitary Sewers	314
B-4	Example: Restricted Discharges into Sanitary Sewers	316
B-5	Example: Overstrength Charges of Some Canadian Municipalities	317
B-6	Insert from the City of Edmonton's Sewers Bylaw	318
B-7	Bed & Shore Activities Requiring Approvals / Permits From Various Government Agencies	319
B-8	NSWA Membership Form - insert	
B-9	Fundraising Opportunities for Watershed Groups in Alberta - insert	
B-10	Watershed Stewardship in Alberta: A Directory of Stewardship Groups, Support Agencies and Resources - insert	
Glossary	.....	321
Bibliography	.....	327

1-1

Introduction

The health of every community, whether rural or urban or small or large, depends on the health of the watershed in which it resides. Watersheds supply a number of goods and services that are intricately linked to economic health, the health of residents and overall community health. In Alberta, current lifestyles and the economic activity that maintains these lifestyles depend on the availability of reliable quantities of clean water. Albertans rely on water for municipal uses, agriculture, thermal power generation, manufacturing, petroleum production, mining and recreation. In addition to water, Albertans rely on a number of other goods and services provided by watersheds such as storm water management, water filtration, precipitation, air quality and recreational opportunities.

Many human activities are having adverse impacts on the state of the North Saskatchewan River Watershed (NSRW) and ignoring these impacts will put the health of our water supply and the natural processes that maintain it in jeopardy. Furthermore, if left unmanaged, population growth and growing economic pressures have the potential to amplify these impacts and put increasing stresses on watershed health. If we do not act now to protect the health of the NSRW, we are putting the economic, social and environmental health and sustainability of our communities at risk.

The quality and quantity of water available to individuals in the NSRW is directly affected by land uses and activities occurring locally. Municipal governments have many opportunities to promote environmental stewardship as a means of protecting their local water supply and other valued goods and services provided by the watershed. Municipal stewardship does not mean stopping growth but rather taking into account watershed needs when making decisions about the type of activities, growth and development occurring in a community. It involves long term thinking and proactive decision-making that serves to sustain the long-term health of the watersheds on which communities rely.

As community leaders, municipalities have an important role to play in guiding watershed stewardship in their cities, towns, villages, counties, districts, special areas and summer villages. By working together to ensure a healthy NSRW all municipalities will gain from the associated economic, social and environmental health benefits.

As leaders in the NSRW, municipalities have a shared responsibility to practice good stewardship!

This guide is a resource to help municipalities do just this.

The focus of this guide is the NSRW that exists in Alberta. Figure 1 is a map of municipal districts and counties that are part of the NSRW. Below it is a list of towns, villages and summer villages and a list of cities that are part of the watershed (see boxes 1 and 2). In



Every community in the world exists in a watershed, which is the area of land that drains into a shared destination, such as a river, lake or ocean. Everybody uses the watershed in some way shape or form and therefore stands to benefit from its health.

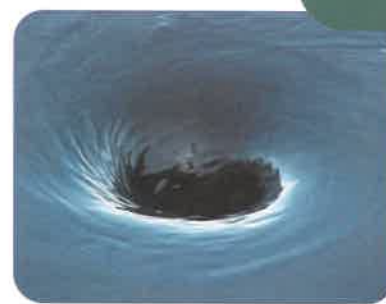


Photo credit:
Shayne Steffen

Chapter 1 - Introduction

in addition to municipal lands, there are many lands belonging to First Nations and Métis in the NSRW (see section 2-7.1 for a list of reserves and settlements).

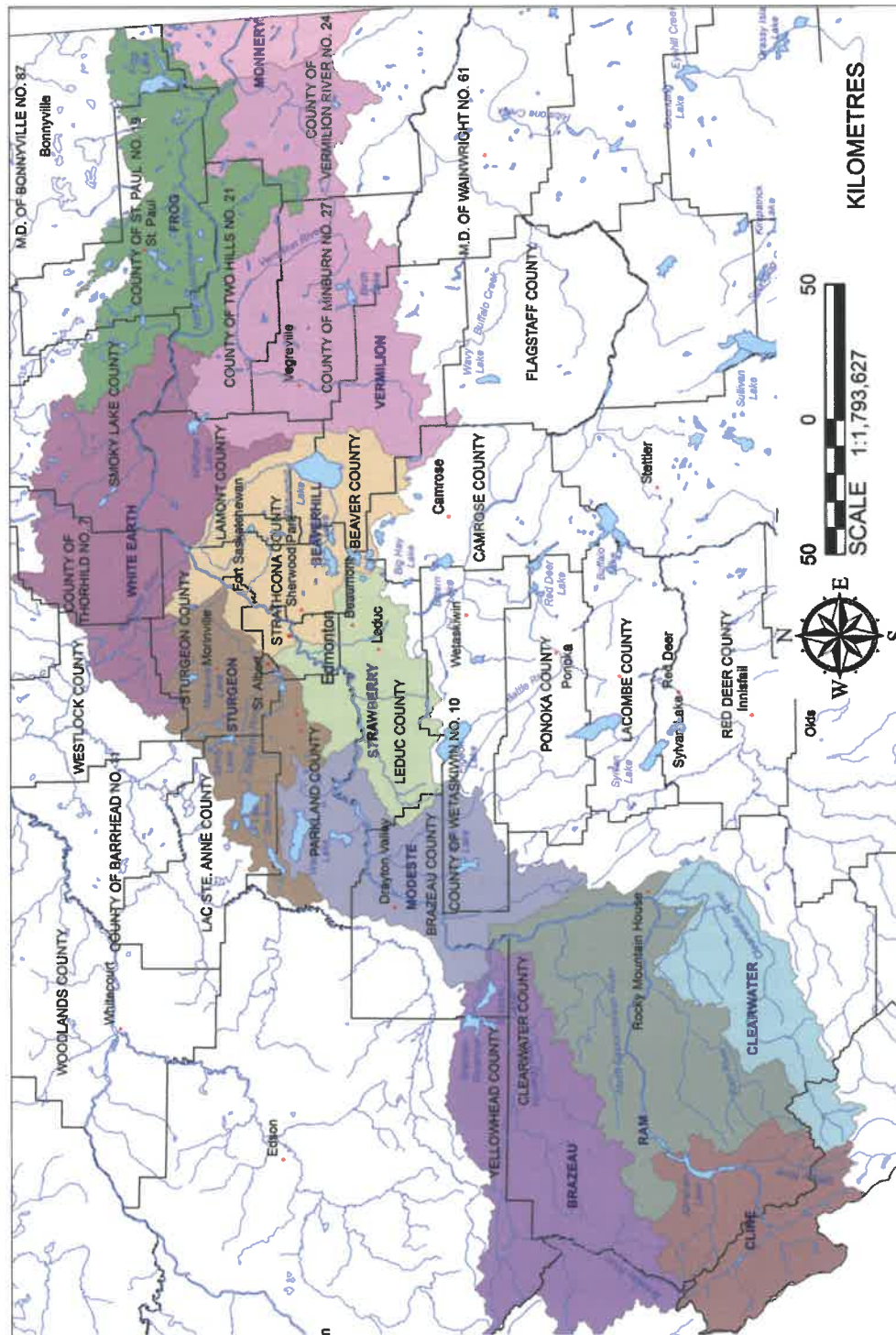


Figure 1. Municipal Districts and Counties in the North Saskatchewan Watershed.

Source: Prairie Farms Rehabilitation Administration - Agriculture and Agri-Food Canada

Box 1. Towns, Villages and Summer Villages (S.V.) in the North Saskatchewan River Watershed – Listed by Municipal District and County Borders*
Beaver County

Town of Tofield
Town of Viking
Village of Holden
Village of Ryley

Brazeau County

Town of Drayton Valley
Village of Breton

County of Barrhead
County of Camrose

Village of Bawlf
Village of Bittern Lake
Village of Edberg
Village of Ferintosh
Village of Hay Lakes
Village of New Norway
Village of Rosalind

County of Minburn

Town of Vegreville
Village of Innisfree
Village of Mannville
Village of Minburn

County of Paintearth

Town of Castor
Town of Coronation
Village of Halkirk

County of St. Paul

S.V. of Horseshoe Bay
Town of Elk Point
Town of St. Paul

County of Stettler

Town of Stettler
Village of Botha
Village of Donalda
Village of Gadsby

County of Thorhild

Village of Thorhild

County of Two Hills

Town of Two Hills
Village of Derwen
Village of Myrnam
Village of Willington

County of Vermilion River

Town of Vermilion
Village of Dewberry
Village of Kitscoty
Village of Marwayne
Village of Paradise Valley

County of Wetaskiwin

S.V. of Argentic Beach
S.V. of Crystal Springs
S.V. of Grandview
S.V. of Ma-Me-O Beach
S.V. of Norris Beach
S.V. of Poplar Bay
S.V. of Silver Beach
Town of Millet

Clearwater County

Town of Rocky Mountain House

Flagstaff County

Town of Daysland
Town of Hardisty
Town of Killam
Town of Sedgewick
Village of Alliance
Village of Forestburg
Village of Heisler
Village of Loughheed
Village of Strome

Lacombe County

Town of Blackfalds (on NSRW border)
Town of Lacombe

Lac Ste Anne County

S.V. of Castle Island
S.V. of Ross Haven
S.V. of Sandy Beach
S.V. of Silver Sands
S.V. of South View
S.V. of Sunset Point
S.V. of Val Quentin
S.V. of West Cove
S.V. of Yellowstone
Alberta Beach
Town of Onoway

Lamont County

Town of Bruderheim
Town of Lamont
Town of Mundare
Village of Andrew
Village of Chipman



Chapter 1 - Introduction

Leduc County

S.V. of Golden Days
 S.V. of Itaska Beach
 S.V. of Sundance Beach
 S.V. of Sunrise Beach
 Town of Beaumont
 Town of Calmar
 Town of Devon
 Village of New Serepta
 Village of Thorsby
 Village of Warburg

M.D. of Bonnyville**M.D. of Provost**

Town of Provost
 Village of Amisk
 Village of Czar
 Village of Hughenden

M.D. of Wainwright

Town of Wainwright
 Village of Chauvin
 Village of Edgerton
 Village of Irma

Parkland County

S.V. of Betula Beach
 S.V. of Kapasiwin
 S.V. of Lakeview
 S.V. of Point Alison
 S.V. of Seba Beach
 Town of Stony Plain
 Village of Spring Lake
 Village of Wabamun

Ponoka County

Town of Ponoka

Special Area 2**Special Area 3**

Village of Cereal
 Village of Youngstone

Special Area 4

Village of Consort
 Village of Veteran

Smoky Lake County

Town of Smoky Lake
 Village of Vilna
 Village of Waskatenau

Strathcona County**Sturgeon County**

Town of Bon Accord
 Town of Gibbons
 Town of Legal
 Town of Morinville
 Town of Redwater

Westlock County

Village of Clyde

*Some of the municipalities listed fall entirely in the NSRW while others fall only partially in the NSRW

Box 2. Cities in the North Saskatchewan Watershed

Camrose
 Leduc
 St. Albert

Edmonton
 Lloydminster
 Wetaskiwin

Fort Saskatchewan
 Spruce Grove

1-2

Who is the North Saskatchewan Watershed Alliance?

The North Saskatchewan Watershed Alliance (NSWA) is a not-for-profit society made up of over 200 stakeholder groups and individuals interested in the healthy functioning of the North Saskatchewan River Watershed in Alberta. These stakeholders include government (municipal, provincial and federal), agriculture, industry, recreation/tourism, nongovernmental organizations, education groups, community groups, First Nations, Métis Nation and watershed residents.

The NSWA understands that all those who use the watershed have a role to play in its protection. By bringing together representatives from various stakeholder groups throughout the watershed, the NSWA aims to collectively identify watershed concerns and methods for protecting the health of the NSRW watershed.

The NSWA believes that municipalities have a unique opportunity to lead watershed stewardship in their communities and throughout the province. In 2004 NSWA members identified that there was a need for a publication that would provide municipalities with information and resources to guide municipal watershed stewardship. This guide has been developed as a result of direction from NSWA members from throughout the NSRW.

For more information about the NSWA, its projects, publications and other resources contact:

North Saskatchewan Watershed Alliance
Website: www.nswa.ab.ca

The Battle River Watershed Alliance is the WPAC for the Battle River Watershed, a tributary joining the North Saskatchewan River in Saskatchewan. For information about the Battle River Watershed Alliance, please visit www.battleriverwatershed.ca



The NSWA has been designated by Alberta Environment as the Watershed Planning and Advisory Council (WPAC) for the North Saskatchewan River Basin under Alberta's *Water for Life* Strategy. As the regional WPAC the NSWA is responsible for involving communities and stakeholders in watershed management by leading watershed planning, developing best management practices, fostering stewardship activities, reporting on the state of the watershed and educating users of water resources.

Chapter 1 - Introduction

1-3

How This Guide was Created

A Steering Committee made up of representatives from various municipalities, provincial and federal government bodies and non-government organizations was responsible for directing the Municipal Guide project. Municipal workshops were also held in the spring of 2005 to gather information from municipalities about their needs relating to the Municipal Guide. Representatives from large rural and urban municipalities were invited to participate in one of three workshops and a total of 48 participants from 20 municipalities attended. At the workshop participants were presented with an overview of the project and with a Draft Table of Contents for the Municipal Guide. They were asked to share what they liked about the project, what concerns they had with the project, what implications the guide might have in their municipality and what suggestions they had for the guide. Much of the information in this guide has been shaped by the feedback provided at these workshops.

After being reviewed by the Steering Committee, the draft Municipal Guide was also reviewed by representatives from municipal, provincial and federal government and nongovernmental organizations.

1-4

Purpose of this Guide

This guide is a resource for municipalities and other land managers interested in voluntary watershed stewardship. Its primary purpose is to provide an educational and planning tool for municipalities interested in examining their role in the management of a healthy and sustainable watershed. Contacts and resources have been listed throughout this guide and serve as a starting point for municipalities who are encouraged to take advantage of the wealth of information available to them.

The target audience for this guide is elected officials, administrators and other municipal staff in the NSRW. Individuals and groups working with municipalities such as industry, developers, residents and other stakeholders may also find the guide a valuable tool. Cooperation and collaboration between municipalities and other stakeholders is essential for achieving watershed stewardship success at the municipal level.

While this guide focuses on issues that are most pertinent to municipalities within the NSRW, the information herein is also applicable to most other municipalities throughout

Chapter 1 - Introduction

Alberta. Furthermore, many of the current threats to watershed health resulting from population growth and development pressures are similar in communities around the globe and much of the information in this guide is relevant beyond Albertan and Canadian borders.

Both urban and rural municipal issues have been combined in this guide to facilitate understanding and cooperation between the two. While the concerns and needs of rural and urban municipalities are often different, watershed management may be most effective when there is cooperation across municipal borders.

The information in this guide can be useful to municipalities whether they are just beginning to explore their role in watershed stewardship or if they are already active stewards. There are always opportunities for municipalities to improve and further develop their role as watershed stewards as new information and resources become available.



"It is clear that no municipality, even those considered world leaders, feels it has fully or adequately addressed all the sustainability issues facing it."

- National Guide to Sustainable Municipal Infrastructure 2003

1-5

How to use this Guide

This guide can be used as a reference for answering questions, finding contact information or for gathering ideas about what a municipality can do to protect their watershed. No two municipalities are the same as each municipality has its own history, economy, social and environmental conditions, values and visions of how to best protect their environment. Therefore approaches to watershed planning will vary from one municipality to the next and a document with detailed procedures for planning for watershed health would be ineffective. Instead, this guide offers information on various options for municipal watershed stewardship and from this information municipalities are encouraged to develop approaches that are best suited to them.

The guide has nine chapters and two appendices:

Chapter 1: Introduction

This chapter provides an overview of the purpose, uses and limitations of this guide.

Chapter 2: Watershed Overview

This chapter provides an overview of watershed issues. It includes information about the components of and values of a healthy watershed and how decisions made and activities occurring in individual municipalities affect the overall watershed. It also provides an overview of the current state of the North Saskatchewan River Watershed and threats to its health.

Chapter 1 - Introduction

Chapter 3: Overview of Legislation and Government Bodies Relevant to Watershed Health

This chapter provides a summary of federal and provincial statutes (acts), policies and government bodies that deal with various aspects of watershed health. Appendix A provides a further examination of many of the statutes discussed in this Chapter.

Chapter 4: Municipal Planning and Development

This chapter provides a review of the relationship between municipal decisions about land use and development and watershed health. It examines a number of opportunities for incorporating watershed considerations into statutory and non-statutory planning.

Chapter 5: Water, Wastewater and Stormwater Operations

This chapter provides an examination of a number of municipal roles relating to watershed health, which include: source water protection, the management and treatment of stormwater, the treatment and distribution of potable water and the collection and treatment of wastewater.

Chapter 6: Municipal Infrastructure, Property and Operations

This chapter provides an overview of a number of municipal responsibilities relating to the design of municipal infrastructure, the management of municipal property and the execution of municipal operations relating to watershed health. Topics include: green spaces, transportation and road maintenance, waste disposal, agriculture services, woodlots and the oil and gas industry.

Chapter 7: Municipal Bylaws

This chapter provides an overview of the use of municipal bylaws as tools for protecting watershed health. Bylaws discussed in this chapter include those to protect natural areas and trees, to prevent pollution and to conserve water.

Chapter 8: Cooperation and Collaboration in the Watershed

This chapter provides a summary of the value of and the strategies for municipal cooperation and collaboration with other stakeholders in the watershed. These stakeholders include departments within a municipality, neighbouring municipalities, residents, community groups, industry groups, nongovernmental groups and federal and provincial government bodies.

Chapter 9: Funding Watershed Stewardship

This chapter provides a summary of funding opportunities for municipalities interested in attaining funds for watershed stewardship projects.

Appendix A

This appendix provides an examination of federal and provincial legislation and policies relevant watershed health.

Appendix B

This appendix is a collection of documents from various sources referred to throughout the guide.

There is a glossary at the end of this guide with definitions for terms used as well a list of acronyms used. A bibliography is also found at the end of this guide which is an excellent source for additional resources.



1-6

Limitations of this Guide

Municipal governments have a large range of roles and responsibilities and each municipality has its own unique needs. It is not the intention of this guide to provide an exhaustive list of all watershed-related topics relevant to municipal governments. Instead, this guide is meant to focus on the topics that have been identified by municipal representatives throughout the NSRW as the most important and valuable to municipalities.

This guide is advisory in nature and is intended to provide general direction. It is each municipality's responsibility to make decisions as to the applicability of the information in this guide to their municipality. This guide is not meant to provide specific technical or professional advice or services and those seeking such should consult a professional for advice specific to their municipality.

The information in this document is subject to change as laws and government policies are amended and changed and as information and watershed Best Management Practices (BMPs) are developed. In the event of conflict between this guide and any legislation, it is the user's responsibility to interpret and act in compliance with legislation.

The focus of this guide is the NSRW in Alberta, but the watershed does not end at the Alberta boarder. It stretches far beyond Alberta into Saskatchewan and Manitoba, where it is known as the Saskatchewan River Basin. While much of the information in this guide may be relevant to municipalities in Saskatchewan and Manitoba, the NSWA's responsibility is over the NSRW in Alberta which is the focus of this guide.

Chapter 1 - Introduction

First Nation and Métis communities are important landowners and stakeholder groups active in the NSRW and their decisions and activities have important implications for the health of the NSRW. However, the focus of this guide is municipal lands and issues specific to First Nation and Métis communities are not addressed.

2-1

What is a Watershed?

While water bodies immediately come to mind when most people imagine a watershed, most of the area that makes up a watershed is in fact land. Wherever you are on earth, you are in a watershed (except if you are in an ocean of course). A watershed is an area of land that drains into a shared destination such as a river, stream, lake, pond or ocean. The size of a watershed can be tiny or immense and its boundaries and speed of flow are determined by landforms such as mountain ranges, hills and slopes that direct and channel water. Within each large watershed, there are many smaller watersheds. For example, a small creek that flows into the Vermillion River has its own watershed, but is also part of the larger Vermillion River subwatershed, which is part of the much larger North Saskatchewan River Watershed (NSRW).

Water plays a central role in a watershed. All life depends on water for survival and water is an important medium for the transportation of many nutrients vital to plant and animal life such as carbon, nitrogen, and phosphorus. Water is constantly moving throughout the watershed and between watersheds in surface water flows (e.g., rivers, streams, overland flow), subsurface water flows (just below the surface), groundwater flows and through the hydrological cycle (see box on right).

While the physical boundaries of a watershed are straightforward, the dynamics of watershed health are complex. Watersheds are home to a variety of complex and resilient ecological and geophysical processes that are interconnected with one another. Together these processes are essential to the health of a watershed and its ability to provide the ecological goods and services discussed in section 2-2.

Watersheds are resilient systems that are continually adapting to natural variations (e.g., flooding, droughts, weathering, natural nutrient fluctuations) and human induced environmental changes (e.g., land development, modification of water regimes, pollution). While watersheds have an astounding ability to adapt to these changes, there is a limit to the magnitude of human induced modifications that a healthy watershed can withstand. Understanding and respecting these limitations is part of watershed stewardship.



The Hydrological Cycle is a process that involves precipitation, evaporation, evapo-transpiration (from plants), condensation, infiltration and percolation (through the ground), water storage (in water bodies and in the ground) and surface runoff.



Photo credit:
Billie Milholland

Chapter 2 - Watershed Overview

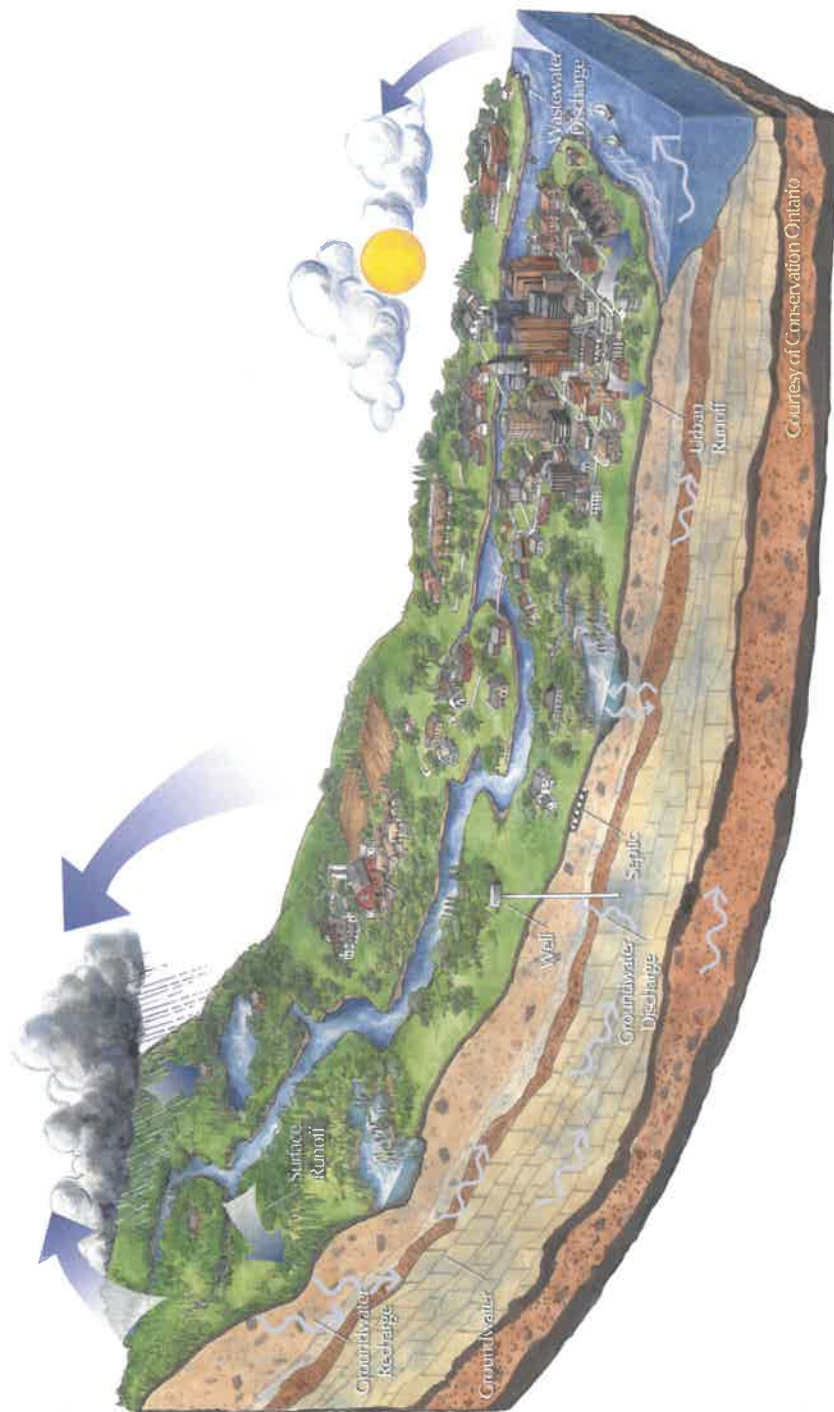
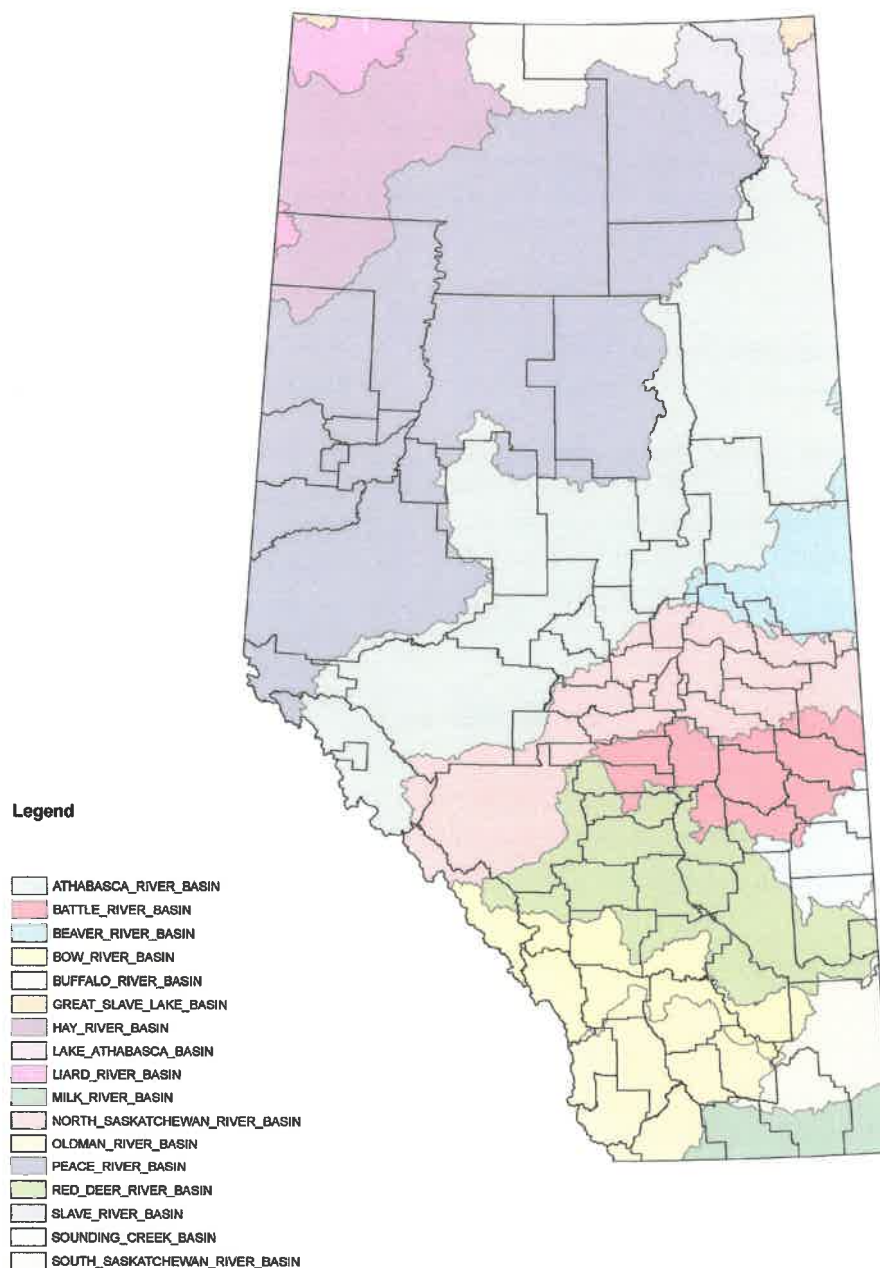
Figure 2.1 Watershed Diagram

Figure 2.2 is a map of the major watersheds (sometimes referred to as 'basins') in Alberta. These large watersheds can be further divided into a number of smaller watersheds, which can be divided further into subwatersheds. [For a map of the subwatersheds in the North Saskatchewan River Watershed see section 2-7.1.](#)

Figure 2.2 Watersheds in Alberta with Rural Municipal Boundaries

Source: Alberta Environment



Chapter 2 - Watershed Overview

2-2

Watershed Components

All watersheds have in common a number of components, which include: riparian areas and floodplains, water bodies, upland areas, ground water areas and biodiversity. While these components exist in every watershed, each watershed is unique and no two components are alike.

2-2.1. Riparian Areas and Floodplains

Riparian areas are the transitional zones between water bodies and upland areas and can be an indication of a healthy water body. They appear as emerald bands of water-loving vegetation around lakes, wetlands and ponds and along rivers. Many riparian areas serve as floodplains and water retention areas that take on water when lakes and rivers spill over their banks.

Riparian Areas**Ecological Goods and Services Provided**
(Adapted from Fitch and Ambrose 2003)

- Maintenance of clean water - vegetation in riparian areas builds and maintains stream banks and shorelines, traps and stores sediment, excretes and/or breaks down contaminants (e.g., pesticides), nutrients (e.g., phosphorous) and pathogens in surface water
- Source of water
- Water and energy storage - water can be stored in floodplain
- Reduced flood damage - vegetation slows water and reduces erosion and sediment transportation
- Soil creation through deposition from stream flows
- Ecosystem products (e.g., food, timber)
- Plant production - provide food, shade and shelter for fish and wildlife; moderate stream temperatures
- Aesthetics
- Recreation (e.g., wildlife viewing, hiking, boating, fishing)
- Climate control
- Aquifer recharge
- Biodiversity maintenance

Human Activities Effecting Riparian Area Health

- Destruction of vegetation
- Changes to the types of plants present (introduced species that take over a riparian area may not be as effective in removing pollutants and nutrients from water as native vegetation)
- Soil compaction
- Disturbances that destroy root mass (which stabilize banks)
- Water channel manipulation and shoreline alteration

Approximately 80% of Alberta's wildlife relies in whole or in part on riparian areas to survive.

- Bow River Project
2002

2-2.2. Water Bodies

The most evident component of a watershed is the water bodies that carry and store surface water. These include rivers, streams, lakes, wetlands, reservoirs and ponds and can be natural or man made. Because water bodies contain water that has come from throughout the watershed, the quality and quantity of water in them can be a powerful indication of overall watershed health. There are three main types of water bodies found in a watershed:

1) Rivers and Streams

The quality and quantity of water found in rivers is the result of physical, chemical, and biological factors, as well as human use and management in the watershed. While the quantity of water flowing in any given river naturally fluctuates over time, every river requires a minimum quantity of water flow to maintain ecosystem functions. The minimum quantity is referred to as **instream flow needs** (IFN) and determining IFNs is difficult due to a combination of natural and human induced variations.

2) Lakes

Lakes are fed by a combination of precipitation, surface water runoff, river inflows and ground water and are therefore directly impacted by the quality and quantity of water coming from these sources. Water from many lakes discharges through outflow rivers and ground water where it continues to travel throughout the watershed.

3) Wetlands

A wetland is land where the water table is at, near or above the surface or which is saturated for a long enough period to promote such features as wet-altered soils and water tolerant vegetation (Canadian Wildlife Service 1996). Under the Canadian Wetland Classification system, wetlands can be classified into five types: bog, fen, swamp, marsh and ponds (National Wetlands Working Group 1997). Wetlands are critical to watershed health because of their roles in water storage, water filtration and ground water recharge (among others).



Photo credit:
Randy Perkins

Chapter 2 - Watershed Overview

Water Bodies**Ecological Goods and Services Provided**

- Source of water
- Water storage
- Waste treatment and water filtration (provided by biotic components)
- Ecosystem products (e.g., fish and shellfish, blueberries, cranberries, timber, wild rice, medicines)
- Recreation (e.g., fishing, boating, swimming, hiking, bird watching, hunting)
- Aesthetics
- Biodiversity maintenance
- Medium for the transportation of water, nutrients, organic matter, aquatic life and people
- Climate control (high thermal inertia of water moderates high and low air temperatures)
- Groundwater recharge
- Flow stabilization and disturbance regulation - storage and eventual release of water
- Increased livestock productivity (as a result of good water quality)
- Sediment retention
- Dissipation of pesticides

Wetland-specific (Olewiler 2004)

- Nutrient filtration - wetlands can reduce nitrate and phosphorus up to 80 and 94% respectively
- Reduction of some potentially harmful microbial populations
- Removal of toxic compounds such as heavy metals and pesticides by wetland plants

Human Activities Effecting Water Body Health

- Extraction or deposition of large quantities of water
- Shoreline alteration (e.g., removal of natural aquatic vegetation)
- **Point and non-point source pollution** - e.g., excessive nutrient loads can cause **algal blooms**, which lead to decreased levels of **dissolved oxygen**, resulting in fish kills, unpleasant or impossible recreation and unsafe drinking water. In some water bodies the lack of oxygen has results in dead zones where fish and other aquatic life are almost non-existent (e.g., Gulf of Mexico).

Lake-specific

- Untreated sewage leaking or being discharged into lakes can cause **algal blooms**, an increase in **Total Suspended Solids (TSS)** or **water turbidity** and fecal contamination of lakes

River-specific

- Alteration of water channels (e.g., to divert water away from an area or move it through an area more quickly)
- Construction of dams and levees

Wetland-specific

- A large portion of wetlands throughout the NSRW have been drained as a result of the demand for various land uses such as agriculture and residential development

2-2.3. Upland Areas

Land uses and activities occurring throughout the watershed affect water quality in the watershed, and consequently the existence of healthy upland areas that maintain critical ecological processes are important for watershed health. Centuries ago most of the land in the NSRW consisted of boreal forests, aspen parkland and grassland, much of which has since been converted into agricultural, urban and industrial areas. There are, however a significant number of natural areas remaining in the watershed and during heavy rains these act as sponges, absorbing rainfall into vegetation and slowly releasing water through transpiration and evaporation. Vegetation in these areas also removes nutrients and other substances from water and slows surface water runoff allowing runoff to filter through the soil and become subsurface flow (which is carried to surface or groundwater recharge areas).

Well managed agricultural lands, rangelands and woodlots can be an important component of upland areas in a healthy watershed. Just as in natural areas, vegetation on agriculture lands absorbs stormwater and slows surface runoff, which protects against erosion and promotes water percolation into the soil and groundwater. See [section 6-4 for information on good stewardship on agricultural lands.](#)

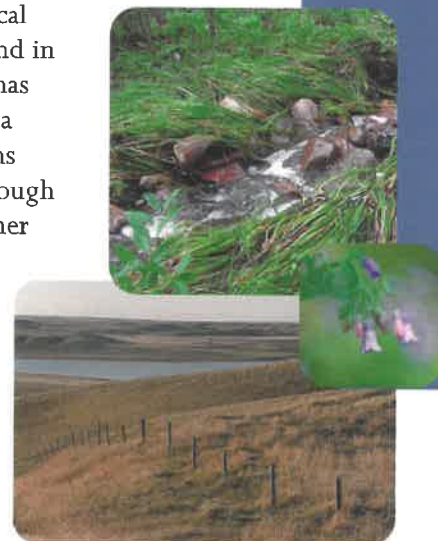


Photo credit:
Alan Stewart

Upland Areas

Ecological Goods and Services Provided

- Waste treatment
- Stormwater and erosion control
- Soil formation
- Biological control
- Aesthetics
- Recreation
- Ecosystem products (e.g., food, timber)
- Genetic resources
- Biodiversity maintenance
- Air quality
- Carbon storage and sequestration

Human Activities Effecting the Health of Upland Areas

- Loss of forest, parkland and grassland vegetation as a result of demands for a number of land uses and products (e.g., agriculture production, urban development, harvesting trees for timber)
- Compaction of soil and paving of land
- Fragmentation of the forest ecosystem (e.g. by the forestry and oil & gas sectors, by roads used by residents and by recreational users), which impedes ecosystem functions
- Poor practices by industry and residents are a source of **point** and **non-point source pollution**

Chapter 2 - Watershed Overview

Photo credit:
Ducks
Unlimited
Canada



2-2.4. Ground Water Recharge, Discharge and Storage Areas

Water is transported and stored in many areas under the earth's surface. Groundwater areas are connected to each other and with other watershed components through the movement of water. Surface runoff percolates into the ground in gaps between rocks and pores in soil where it moves through the soil and becomes subsurface flow. From here it travels to surface water recharge areas, shallow groundwater storage areas or to deep groundwater **aquifers**. Many wetlands recharge ground water and some lakes are fed by groundwater. These are just some examples of the interconnections between surface water and ground water.

Aquifers are underground layers of porous rock, sand or gravel containing large amounts of water.

- Alberta Environment
2002

Ground Water Discharge, Recharge and Storage Areas

Ecological Goods and Services Provided

- Source of water
- Water storage
- Subsurface flows filter water

Human Activities Effecting the Groundwater Quality and Quantity

- Groundwater quality is directly impacted by the environmental state of the land base and the water bodies that feed groundwater recharge areas (e.g., leaching of harmful substances from farming areas, feedlots, landfills, oil & gas, industrial lagoons, etc. are a source of groundwater contamination)
- Concerns regarding the effect that removing and using groundwater has on its availability (monitoring groundwater supplies is difficult and made more difficult by the many data gaps as to the quantity, quality and exact location of groundwater sources in Alberta)
- Recent concern regarding the impact of processes used by the oil and gas industry such as dewatering and oilfield injection (see section 6-6 for more information)

2-2.5. Biodiversity

Biodiversity is measured as the number of different living creatures residing in an area (Briony & Yakimishyn 2002). It includes both the diversity of species in an area and genetic diversity within a species. Biodiversity is directly related to the ability of an ecosystem to adapt to natural and human-induced changes and disturbances.

Human activities can be detrimental to biodiversity. Alterations to the habitats in which various plant and animal species live can decrease biodiversity in an area. Also, in a healthy **ecosystem** there are a number of interactions between living things and human activities that change the population of any one species can significantly disturb the populations of many other species and the ecological processes they maintain.

2-2.6. Interdependency Between Components

While breaking down the watershed into components is valuable for understanding the significance of each of its parts, a watershed is more than the sum of these parts. There are a number of important interactions between watershed components that involve, for example, the exchange of air, water and matter. These interactions are essential to the production of the ecological goods and services associated with each watershed component discussed in this section. Table 2.1 is an overview of many services produced by all watershed components when functioning together as a healthy ecosystem. While science has helped identify the roles of various watershed components and their relationships to one another, it is worth noting that these roles and relationships are complex and are not fully understood.



The benefits of maintaining or enhancing biodiversity on agriculture lands:

- Maintaining the full complement of native plant, animal, insect, and microbe populations helps stabilize the environment, improving the land's ability to deal with environmental stresses like floods and drought
- Having greater biodiversity provides more land management choices and flexibility, ensuring the longevity of agricultural operations and industry
- Plant and animal genetic diversity ensures that farmers and ranchers have the resources to continue to improve crop and livestock breeds

- AESA 2005

Chapter 2 - Watershed Overview

Table 2.1 Ecosystem Services

Sources as referenced by Olewiler 2004:

Amanda Sauer. 2002. *The Values of Conservation Easements* discussion paper. World Resources Institute presented by West Hill Foundation for Nature, December 2002.

Costanza, R. et al. 1997. The Value of the World's Ecosystem Services and Natural Capital. *Nature*: 387:253-260.

Ecosystem Service	Ecosystem Function	Examples of Services
Atmospheric stabilization	Stabilization of atmospheric chemical composition	CO ₂ /O ₂ balance, stratospheric ozone, SO ₂ levels
Climate stabilization	Regulation of global temperature, precipitation and other climate processes affected by land use	Greenhouse gas production, cloud formation
Disturbance avoidance	Integrity of ecosystem responses to environmental fluctuations	Storm protection, flood control, drought recovery and how vegetation structure helps control environmental variability
Water stabilization	Stabilization of hydrological flows	Supply water for agriculture use (irrigation), industrial use or transportation
Water supply	Storage and retention of water	Water storage by watersheds, reservoirs and aquifers
Erosion control & sediment retention	Retention of soil within an ecosystem	Prevention of soil loss by wind, runoff, other processes, storage of silt in lakes, wetlands, drainage
Soil formation	Soil formation process	Weathering of rock and accumulation of organic material
Nutrient cycling	Storage, internal cycling, processing and acquisition of nutrients	Nitrogen fixation, nitrogen/phosphorous, etc. nutrient cycles
Waste treatment	Recovery of mobile nutrients and removal or breakdown of excess nutrients and compounds	Waste treatment, pollution control, detoxification
Pollination	Movement of floral pollinators	Providing pollinators for plants
Biological control	Regulation of pest populations	Predator control of prey species
Habitat	Habitat for resident and transient populations	Nurseries, habitat for migratory species, regional habitats for locally harvested species, wintering grounds

Chapter 2 - Watershed Overview

Ecosystem Service	Ecosystem Function	Examples of Services
Raw materials	Natural resource primary production	Lumber, fuels, fodder, crops, fisheries
Genetic resources	Sources of unique biological materials and products	Medicine, products for materials, science genes for plant resistance and crop pests, ornamental species
Recreation	Provides opportunities for recreation	Ecotourism, sportfishing, swimming, boating, etc.
Cultural	Opportunities for non-commercial uses	Aesthetic, artistic, education, spiritual, scientific, aboriginal sites

Chapter 2 - Watershed Overview

2-3

Benchmarks for Watershed Health

As of yet there are no widely established benchmarks for determining watershed health. However, many groups have defined a number of measures for watershed health based on a combination of watershed needs and local values. A list of some measures that have been used by groups in their watershed health reports (NSWA 2005, Humble Watershed Alliance 2003 and Don Watershed Regeneration Council 2000) are presented in Table 2.2.

Table 2.2 Watershed Health Measures

Topic	Examples of Watershed Health Measures
Water	• Surface water quality - e.g., <i>E.coli</i>, phosphorous, pesticides, bacteria levels, suspended solids, nitrogen, ammonia, chlorides, heavy metals • Stormwater management - e.g., stormwater quality, erosion • Effluent point sources and inputs - e.g., outflows • Aquatic communities - e.g., populations of target fish species, aquatic plants, benthic invertebrates • River and stream flow patterns • Surface water use • Groundwater quantity - e.g., rate of groundwater extraction, groundwater recharge rates • Groundwater quality - e.g., groundwater mapping, level of contamination, types of development in groundwater recharge areas
Land Use	• Protected areas - e.g., size of area of land protected, state/health of these areas • Wetlands - e.g., wetland inventory, area of land covered by wetlands, wetland restoration • Riparian health - e.g., vegetative cover, type of vegetation, depth of plant roots • Woodlands forest cover - e.g., percent forest cover, loss of forests • Street canopy • Meadows • Other significant landforms - e.g., type and size of development in these areas, protection of these areas • Regeneration/reclamation projects • Human population distribution • Linear development - e.g., roads, seismic, pipelines • Livestock density

Topic	Examples of Watershed Health Measures
People	• Public understanding and support of watershed health and initiatives • Responsible use and enjoyment of natural areas • Stewardship - e.g., personal stewardship, community stewardship, business and institutional stewardship, municipal stewardship • Classroom and outdoor environmental education - e.g., number of students taking part in environmental education • Public green space - e.g., total area of public green space • Trails - e.g., total kilometers of public trails • Heritage resources - e.g., protection of archaeological sites

All watersheds are unique and it is up to each municipality to work with municipal staff, stakeholders from throughout the watershed (residents, other municipalities, industry, local groups and organizations) and outside experts to define what measures will be used to determine watershed health and to establish watershed health goals. This guide is meant to provide municipalities with some tools to help them achieve these goals.



2-4 Value of a Healthy Watershed

In discussing the value of a healthy watershed, it is worth first examining the concepts of green infrastructure and natural capital. These concepts provide two similar perspectives on how natural areas can be valued from not only an ecological perspective, but an economic and social perspective as well.

Green Infrastructure

Green infrastructure is used in many contexts and has a number of definitions. Some people refer to trees and built structures such as constructed wetlands and green roofs as green infrastructure because of their “green” values. Others see green infrastructure as nothing less than the “interconnected networks of green space that conserves natural ecosystem values and functions and provides associated benefits to human populations... (Green infrastructure) is the ecological framework needed for environmental, social and economic stability” (Benedict and McMahon 2001).

For the purpose of this guide, green infrastructure is defined as the ecological processes, both natural and engineered, that act as natural infrastructure. Examples of green infrastructure include (Curran 2003b):

Chapter 2 - Watershed Overview

- Ditches, rivers, creeks, streams and wetlands that retain and carry stormwater, improve water quality and provide habitat
- Parks and greenways that link habitat and provide recreation opportunities
- Working lands such as agricultural or forested areas
- Aquifers and watersheds that provide drinking water
- Engineered wetlands and stormwater detention ponds that retain stormwater and improve infiltration
- Trees, rooftop gardens and community gardens that clean air and cool urbanized areas in the summer



Photo credit:
City of Edmonton

More
Information

[More Information: Green Infrastructure](#)

Website: www.greeninfrastructure.net

Natural Capital

Natural capital is another concept that aims to recognize the values of the goods and services associated with natural features. Natural capital is the stock of natural and environmental resources that yields goods and services essential to the sustained health of the environment, communities and the economy. It consists of three components (Olewiler 2004):

1. Natural resource capital - stocks of renewable and non renewable resources (e.g., minerals and energy, forests, water, fisheries)
2. Environmental and ecosystem capital - systems that provide essential environmental goods and services such as our atmosphere and waste assimilation provided by wetlands
3. Land - the space in which human activities take place

There is a growing body of support for the need to acknowledge the true environmental, social and economic value of natural capital as a means for conserving it. However, putting a dollar value on natural capital is difficult for a number of reasons: 1) in most cases natural capital is a public good and individuals receive benefits without paying a cent; 2) the time period for realizing the full benefits of environmental health is typically long; and 3) the scope of benefits is very broad.

There are however many methods that are used and many are being developed to measure the dollar value of natural capital. One method of valuing natural capital is to measure the economic damages resulting from the loss of natural capital or the costs avoided by preserving natural capital. For example, to determine the value of a wetland, the municipal costs of supplying wetland services can be measured such as the building costs of infrastructure for water purification, waste assimilation, flood prevention, soil retention and alternative recreation services. Another method for measuring natural capital is to measure the willingness of individuals to pay for its protection, such as: personal or community expenditures to offset water pollution, the impact that proximity to natural

areas has on property values and individual expenditures for traveling to nature sites (Olewiler 2004).

The use of a number of economic instruments has provided a means for creating a monetary value for natural capital and in some areas markets for environmental goods and services have emerged. The economic instruments being used by governments, businesses and organization vary greatly and include the following (The Ag Summit Collection of Action Team Reports 2002a):

- Environmental fees, charges and taxes (green tax reform)
- Specialty markets
- Deposit-refund system
- Tradable permits (greenhouse gases, air pollution, effluents, nutrients, etc.)
- Incentives for environmental actions (provider gets)
- Liability (polluter pays)
- Information disclosure on environmental performance

By using and supporting economic instruments municipalities can help create a market for the conservation of natural capital.



“For leading municipalities, consideration for the environment goes beyond compliance with regulations to include pollution prevention and a precautionary approach. These municipalities now recognize that the cost of protecting the environment is dwarfed by the long-term cost of not protecting it.”

- National Guide to Sustainable Municipal Infrastructure 2003 (p.ix)

More Information

More Information: Measuring the Value of Ecological Goods and Services

Accounting for Environmental and Social Outcomes in Decision Making

(National Guide to Sustainable Municipal Infrastructure 2003) - summarizes new ways to estimate the value of services provided by nature and to integrate them in cost-benefit analysis. Available online: http://www.sustainablecommunities.fcm.ca/files/Infraguide/Environmental_Protocols/Accounting_Environm_Soc_Outc_Dec_Mak.pdf

State of Maine (U.S.) - Maine's Department of Environmental Protection has conducted a number of studies on the economic values of their lakes. Website: www.state.me.us/dep/blwq/doclake/research.htm.

2-4.1. Economic Benefits

A healthy watershed is an essential component of a community's economic health and sustainability. It provides communities with a number of goods and services which are presented in Table 2.3. Protecting the **green infrastructure** that supplies these goods and services is often less costly than creating the technology, systems and infrastructure to mitigate them.

Chapter 2 - Watershed Overview

As suggested by Environment Canada, "water is the lifeblood of industry." It is used as a raw material, a coolant, a solvent, a transport agent and as a source of energy.

- Wilkie 2005



Photo credit:
Kelsey Spicer-Rowe

Shoreline vegetation, such as bulrush and cattail remove and store nutrients and contaminants from runoff and floods.

Table 2.3 Economic Benefits of Watershed Health

Economic Benefit	Description
Reliable Water Supply	Humans depend on large quantities of clean water not only to sustain their lives and lifestyles, but to maintain economic activity and growth in their communities. While much can be done to decrease the quantity of water needed to meet various economic needs, long-term economic health and stability depends on reliable quantities of water.
Water Quality	Having clean water available for use is associated with many economic gains. These include reduced costs from human illness caused by polluted water (e.g., medical costs, time off work), decreased water treatment costs and healthier livestock and greater livestock weight gains (Fitch and Ambrose 2003). While technology has been developed to clean contaminants out of water, the development of these technologies and the construction of infrastructure come with a high cost. Protecting and maintaining healthy watersheds is often the most economical and secure way of protecting water quality. Furthermore, water quality directly affects water availability - if water is highly polluted, the potential uses for it are limited.
Stormwater Drainage	The natural stormwater drainage system in a healthy watershed is often far more effective and less expensive than constructed drainage infrastructure. Furthermore, if constructed infrastructure does not meet stormwater drainage needs, flood damage can result in significant cost to municipalities who may be held responsible. See section 5-2 for information on stormwater management.
Tourism	Healthy natural areas create spaces conducive to a number of recreational activities such as hiking, boating, biking, bird watching, quading, hunting and fishing. Many tourists may be attracted to these areas from throughout the province, country and around the globe. In addition to spending money for accommodations, attractions and restaurants, tourists may also contribute to local economies by spending money on equipment associated with recreational activities in these natural areas (e.g. hiking gear, bikes, kayaks, canoes, fishing equipment, hunting gear).

In 2004, total tourism revenue in Alberta were an estimated \$4.96 billion and tourism supports just over 83,000 Albertan jobs.

- Alberta Economic Development 2005

Chapter 2 - Watershed Overview

Economic Benefit	Description
Real Estate	Healthy watersheds are often noted for the aesthetic beauty of their water bodies and natural areas. These areas not only attract people seeking recreation, but also interest prospective property buyers. Prices for land and buildings are generally higher where property is close to healthy natural areas. Examples of increased property values resulting from watershed health include (as referenced by Evergreen b): • A study in four British Columbia urban communities found that a 10 to 15 percent increase in property values could be attributed to the land's proximity to a riparian greenway system. (Quayle and Hamilton 1999) • 81 percent of residents in Okotoks, Alberta said they would pay \$2,000 to \$5,000 more for a home in a neighbourhood that includes linked open spaces and habitat features. (Canada Mortgage and Housing Corporation 2002) • In Boulder Colorado, the presence of a greenbelt was found to add approximately \$500,000 in property tax revenue annually.
Attracting People and Business	A healthy watershed can be an important feature for attracting residents, businesses and an innovative workforce to a community. When determining if and where to relocate, individuals and businesses often consider the quality of place in an area, which can be heightened by environmental health. "...recent research supports the importance of quality of place as a key to competition in the New Economy... Jobs are a necessary but insufficient condition to attract young knowledge workers (and support leading edge high-tech firms and industries). Furthermore, a 1998 KPMG survey of 1200 high-technology workers found that 'community quality of life' was the second most important factor associated with the attractiveness of a new job." - Federation of Canadian Municipalities 2002 (p.7)
Ecosystem Products	Watershed ecosystems support many products that have a prominent place in local economies. These include: grasses that sustain livestock; rich soil that yields high agricultural production and increased property value for agricultural lands; animals and plants that are suitable for human consumption; plants that create barriers to wind and water erosion of agricultural soils; vegetation that controls local climates; lumber for building; peat and firewood that are sources of energy; and plants that have medicinal values.



Photo credit:
City of Edmonton

Chapter 2 - Watershed Overview

"Comprehensive and systematic municipal management that includes environmental factors reduces liability and increases credibility, both of which can affect insurance and borrowing rates."

- National Guide to Sustainable Municipal Infrastructure 2003

Economic Benefit	Description
Liability	In many cases municipalities are held liable for events that a healthy watershed may have prevented. The destruction of property resulting from flooding and human illness resulting from unsafe drinking water are two examples of costly occurrences for which municipalities may be liable. Protecting the watershed and the ecological processes that buffer flooding events and clean water is one way to avoid these potentially devastating and costly occurrences.

Alberta's economy depends largely on access to a reliable water supply. There are two types of water users: instream users and withdrawal users. **Instream users** do not take water out of the environment but instead use it in the environment in which it is found. The main instream water use of humans in Alberta is hydropower production. Recreation is also a form of instream use.

Withdrawal users remove water from the watercourse and then return all or part of it to the watershed. Most industry users withdraw water from the environment. In Alberta, withdrawal users include (Wilkie 2005):

- Agriculture - crop growth, livestock watering
- Thermal power generation - fossil fuel generated electricity (second largest water withdrawer in the province)
- Manufacturing - food and beverage, pulp and paper, chemicals, primary metal (e.g., washing, transporting materials, cooling, part of the final product)
- Municipal - residential, commercial, industrial
- Petroleum production - conventional enhanced oil recovery, thermal enhanced oil recovery (e.g., extraction, maintenance, cleaning, reclamation of former drilling areas, testing pipelines, water injection)
- Mining - dominated by the coal industry but also includes mineral mining such as sand and gravel, cement, salt, silica, limestone and sandstone
- Tourism and recreation - golf courses and ski hills

Among withdrawal users, there are two types of water use: consumptive and non-consumptive users. In consumptive use, water taken from a source is not entirely or directly returned to that source. In non-consumptive use all the water used is directly returned to the source from which it came. It is important to differentiate between the two when making water management decisions.

More Information about Economic Benefits

Economic Benefits of Natural Greenspace Protection (Curran 2001) - available online at www.smartgrowth.bc.ca (click on "Reports and Publications"). Phone: (604)915-5234 (Smart Growth BC's Vancouver office).

2-4.2. Human Health and Social Benefits

Watershed health is important for the health of individuals and communities. Human health is directly linked to water quality and to overall environmental health as is outlined in Table 2.4.

Table 2.4 Human Health and Social Benefits of Watershed Health

Human Health / Social Benefit	Description
Clean Water	There are a number of natural and manmade substances that if present in water used for drinking, washing, cooking and recreation can make humans very sick. These include: infectious diseases and waterborne pathogens, heavy metals, household chemicals, hydrocarbons and pesticides. A healthy watershed has the ability (although limited) to clean water of these substances. For example the natural environment is able to remove pathogens through natural die-off, sedimentation, predation and adsorption (Falabi et al. 2002 as referenced by Gabor et al. 2004).
Recreation	Natural areas provide havens for recreation that promote active living, which is linked to both physical and mental health. A healthy watershed offers many natural areas where individuals can enjoy activities such as boating, walking, running, biking, camping, wildlife viewing, cross-country skiing, fishing and hunting. These activities and places can serve to increase the quality of life of residents, relieve the stresses of urban living and create a sense of well-being. Furthermore, when it comes to recreational activities around water, poor water quality can be a health risk and a clean water body, free of harmful chemicals and pathogens, makes for safer recreation.



Photo credit:
Billie Milholland

Chapter 2 - Watershed Overview

Human Health /
Social Benefit

Description

Food



Photo credit:
David Fairless

A healthy watershed produces many goods that are a source of food for humans. These include: deer, moose, water fowl, fish, agricultural crops and wild foods such as berries and mushrooms. Fish are particularly vulnerable to human activities in and around water such as land uses that harm spawning sites, the leaching of nutrients from fertilizers and animal manure into the water (which promote algae blooms that consume oxygen in the water) and erosion (which increases water turbidity). Pollutants such as heavy metals found in water may also be found in fish tissues and in high concentrations they can pose human health risks.

Community Health

A healthy watershed can be a source of pride for residents and can help build a sense of community. Natural areas such as parks also give people a space for getting out in their communities and meeting their neighbours. Interest in the health and beauty of the natural environment may also spark community action geared towards watershed stewardship, which may develop leadership skills and build stronger communities and social cohesion.



Photo credit:
Phil Boehme

Air Quality

A healthy watershed helps to maintain air quality. The trees and vegetation in forests and natural areas remove common pollutants such as carbon monoxide, nitrogen dioxide, sulfur dioxide, ozone and particulate matter from the air.

Natural and Cultural
Heritage

Natural areas existing in watersheds may also have significant natural and cultural heritage values. Protecting these areas can serve to create awareness of an area's history and pride among residents. The Canadian Heritage Rivers System (CHRS) is a program that offers recognition to rivers with significant natural, recreational and/or cultural heritage. For information about the North Saskatchewan River's nomination as a Canadian Heritage River visit www.nswa.ab.ca.

2-4.3. Ecological Benefits

A healthy watershed has many ecological benefits. Some of these worth noting include water filtration, buffering extreme weather events, an ability to recover from disruptions and habitat and biodiversity conservation (see Table 2.5).

Table 2.5 Ecological Benefits of Watershed Health

Ecological Benefit	Description
Natural Filters	There are many natural areas that act as natural water filters. These include vegetated areas around water bodies that slow surface water runoff and remove sediments and other contaminants. Wetlands are also excellent natural filters whose plants excrete nutrients (e.g., phosphorus) and contaminants (e.g., heavy metals) from water.
Buffering Extreme Weather Events	Healthy watersheds have an abundance of water storage areas such as wetlands, floodplains and lakes that buffer the natural environment from the negative impacts of large floods and long droughts. By diverting floodwaters to these areas the undesirable ecological effects of flooding (e.g., erosion of shorelines and riverbanks, erosion of soil and washout or siltation of fish spawning area) are decreased. These natural water storage areas release water slowly, which is particularly valuable during times of drought when water is scarce.
Recovery from Disruptions	Healthy watersheds have an increased capacity to recover from human induced disruptions. For example, a river with healthy riparian areas and whose instream flow needs are being met or a wetland lush with natural vegetation and with a healthy functioning ecosystem will have a higher capacity to filter and/or breakdown substances that are harmful to ecosystem life.
Habitat and Biodiversity	Watersheds are home to a number of plant and animal species that range from single celled organisms to large mammals. Each of these species has unique habitat needs and small habitat disturbances can be enough to significantly impact a species' survival. Ensuring that natural areas exist where plants and animals can thrive in their natural environment helps to ensure the survival of many species. Biodiversity is important for the integrity of a natural ecosystem and for its ability to adapt to environmental changes.



Photo credit:
Sarah Depoe



Photo credit:
Delaney Anderson

Chapter 2 - Watershed Overview

2-5

Current Threats to Watershed Health

There are a number of human activities that are having detrimental impacts on watershed health in the NSRW. While ecosystem processes in a watershed are fairly resilient, they can only withstand a limited amount of human alteration. Currently, the largest threats to watershed health caused by humans include land use, water demand and pollution.

2-5.1. Land Use

The modification of lands by humans is having considerable impacts on the health of the NSRW. With a growing population, Albertans are demanding larger areas of land to meet growing residential, industrial, commercial and recreational needs. In many cases **urban sprawl** and **rural sprawl** is consuming large tracts of once natural areas and impacting the ability of the watershed to supply the goods and services discussed in section 2-2. This alteration of the natural landscape has impacted watershed health in many ways, which include:

- Removal of native vegetation
- Increased loss of natural hydrological functions
- Alternation of environmentally significant areas
- Habitat fragmentation and degradation
- Loss of biodiversity
- Destabilization of banks and increased runoff

There is no simple solution for protecting the watershed from land uses that may impede the ability of the watershed to supply important goods and services. It is inevitable that in order to address the demands of a growing population, many natural areas will need to be modified. However, the challenge is to develop Best Management Practices (BMPs) that address both the needs of the watershed and those of residents, businesses and industry. Figure 2.3 is an illustration of land uses that can have a negative impact on watershed health (illustrated on the left side of the river) and BMPs that promote watershed health (illustrated on the right side of the river).

While riparian areas are one of the most valuable and productive components of the watershed they are also the most vulnerable to destruction.

Chapter 2 - Watershed Overview

Figure 2.3 Land uses in a Watershed

Credit: Alberta NAWMP Partnership



Chapter 2 - Watershed Overview

From a global perspective, Canada is a water-rich nation as it contains 20% of the global supply of fresh water and only about 0.5% of the world's population. However most of this water remains inaccessible locked in glaciers or deep aquifers.

- Wilkie 2005

2-5.2. Water Demand

Population increases and economic growth in Alberta have meant an increase in demand for water in the NSRW, which is a limited resource. This growing demand may have serious implications for watershed health. Every river has an instream flow need (IFN) which is the quantity of water and water quality conditions needed to sustain riverine processes and associated ecosystems over the long term (Alberta Environment a). Studies in the South Saskatchewan River Basin in southern Alberta have determined that the instream flow requirements for the Bow, Oldman, St. Mary and Waterton rivers already exceed current flows such that "the aquatic environment is believed to be in a state of long-term declining health" (Alberta Environment 2003 as cited by Alberta Institute of Agrologists 2005). Ecosystem needs such as IFNs mean that there are limitations to the quantity of water that can be extracted from rivers and other water bodies if ecological functions are to be kept healthy.

Several municipalities in Alberta already have to decide between residential growth and industrial development because they do not have enough water for both (Wilkie 2005). As a result of limited water availability, concerns are growing regarding issues such as interbasin transfers and water exports, which have the potential to create significant watershed disturbances. In order to protect watershed health municipalities must take into account the impact that proposed water uses will have on overall watershed health. Finding a balance between nature's need for water to remain in the natural environment and human needs to remove and use water is not simple and involves a thorough understanding of watershed needs as well as the participation of a diversity of water users.

2-5.3. Pollution

There are a number of pollutants that end up in the natural environment as a result of human activities. These include sewage, household cleaners and pharmaceuticals from residential areas, pesticides and fertilizers from agricultural lands, bacteria from ranching lands, road salts from rural and urban areas, automobile and machinery fluids from urban centers and hazardous chemicals from industrial areas. Many of these substances are slow to break down, tend to accumulate downstream and not only affect water quality but also affect the overall health of natural ecosystem.

Residents of the NSRW in Alberta are fortunate that water in their watershed originates within their province and therefore, the number of upstream users is limited (this in not the case in, for example, in many watersheds in Saskatchewan). As a result, Albertans in the NSRW have the ability to take full responsibility for the quality of their water because, it depends largely on the actions of people residing within the NSRW.

2-6

Watershed Management

2-6.1. Why Manage at a Watershed Level?

A Watershed Perspective

The connections between land and water issues are fundamental to a watershed perspective. While many of the indicators of watershed health are based on the quality and quantity of water and the areas in which water is found, the state of both the water bodies and land in a watershed is the ultimate determinant of overall watershed health.

A watershed perspective also connects all users in a watershed. From a watershed perspective everyone lives and works in a watershed and uses the goods and services it provided in some way. Consequently, everyone is affected by both negative and positive impacts on their watershed (e.g., one person's wastewater is another's source of drinking water) and everyone stands to gain from a healthy and sustainable watershed. While humans have created many borders that separate countries, provinces and municipalities, the natural environment is not confined to these boundaries. A community that is doing everything it can to maintain a clean watershed is not likely to achieve much success unless communities throughout the watershed are doing the same. For this reason, it is important that water and general environmental issues are tackled at a watershed level, involving all who live, work and play in the watershed.

Cumulative Impacts

Watersheds are the most effective unit for managing water resources because impacts accumulate at the watershed level. At any given time there are a number of activities going on in the watershed and the impacts of these as well as past activities result in significant **cumulative impacts**. While the impact of one activity may not be noticeable, the incremental accumulation of many seemingly small impacts can be considerable.

For example, **non-point source pollution** comes from surface runoff from agriculture, forestry, urban areas, mining, construction sites and other sites which carry sediment, nutrients, organic matter and toxic substances to lakes and streams. As water in a river flows from one municipality to the next these pollutants accumulate. When considered individually the impacts of pollutants from one landowner may be small, but by the time river water arrives to downstream communities water quality may be extremely contaminated as a result of cumulative impacts.

The same is true for the cumulative impacts of the destruction of natural areas. The loss of one wetland, for example, may not noticeably affect the ability of the watershed to collect, store and filter stormwater. However, the destruction of a number of wetlands, forests and riparian areas will significantly affect the ability of the watershed to provide these and other watershed services.



“The Watershed is the most logical unit for resource planning and land use decision making.”

- John Wesley Powell in his report to Congress in 1877 (as referenced by Heathcote 1998)

Chapter 2 - Watershed Overview

2-6.2. Watershed Management

Watershed management involves the analysis, protection, development, operation and/or maintenance of the land, vegetation and water resources of a drainage basin for the conservation of all its resources for the benefit of its residents (Nevada Division of Water Planning). Watershed management involves a number of components, which include (Ewaschuk):

- Identifying issues and objectives
- Data collection and analysis
- Synthesis
- Planning
- Decision making
- Implementation
- Monitoring and reporting

While watershed management requires the involvement of many municipalities and other stakeholder groups, watershed management approaches will vary from one subwatershed to the next and from one municipality to the next. Every subwatershed is unique and physical variations in, for example, topography, ecological regions and vegetation require unique watershed management approaches. At the same time every municipality is unique in terms of watershed-related values, attitudes, uses and needs and watershed management approaches may reflect these differences.

A central component of watershed management is **adaptive management**. Human values, needs and desires are always changing as is our understanding of watershed functioning and the impacts various activities on the watershed. Watershed management should adapt to these changes.

Integrated Watershed Management Planning in the NSRW

Integrated watershed management planning is a comprehensive multi-resource management planning process involving all stakeholders within the watershed. Together as a group, these stakeholders work cooperatively to identify a watershed's resource issues and concerns as well as to develop and implement a watershed plan with solutions that are environmentally, socially and economically sustainable (Gabor et al. 2004).

An Integrated Watershed Management Plan (IWMP) for the NSRW is currently being developed by the NSWA. The main goal or function of the IWMP is to provide a framework to protect, maintain and restore a healthy, natural watershed system where economic and social needs will be in balance with the ecological needs of the watershed. This includes the protection of the aquatic environment and its associated necessary flow needs. The management plan will address surface water, groundwater, existing and proposed land use, as well as social, cultural and economic issues.

How the plan develops? The plan develops using a combined sub-watershed and basin-wide approach. Engagement with regional stakeholders provides advice and direction to the NSWA in the preparation and implementation of the IWMP. Representation come from a broad range of interest groups residing within or holding jurisdiction for their respective sub-watershed region, including: industry, agriculture, municipal, provincial and federal governments, local watershed stewardship groups, Métis and First Nations communities, recreation groups, education and research organizations, public health and other groups and organizations with an interest in their watershed.

Table 2.6 Geographic Regions for Regional Engagement

Regional Engagement Areas	Sub-watersheds Represented*
Headwaters	Cline, Clearwater, Ram, Brazeau, Modeste
Central	Sturgeon, Strawberry, White Earth, Beaverhill
Lakeland	Frog, Vermilion, Monnery,

* see page 39 for a map of subwatersheds in the NSRW

Consultants under the guidance of Technical Advisory Committees (TACs) will assemble the data and analysis needed to document the plan. The RACs will perform a synthesis function, ensuring that input to the IWMP gathered from across the entire watershed makes sense.

The IWMP process includes three phases that will occur over and eight to ten year period:

Phase 1 - Watershed characterization and IWMP initiation (complete)

Phase 2 - Plan preparation and approval

Phase 3 - Implementation, monitoring and evaluation

Following Phase 3, watershed conditions, goals and objectives will be subject to re-evaluation in the context of new demands from economic growth and new knowledge about how to manage watersheds. The process is a cycle that should therefore repeat itself every 8 to 10 years.

What will the IWMP achieve? Development of an IWMP for the NSRW will ensure that everyone living in the watershed enjoys clean drinking water, healthy aquatic ecosystems and strong economies for generations to come. Land use practices that could positively or negatively impact water resources will be identified. Strategies should emerge to reinforce positive results and reduce negative impacts. The plan will also identify critical gaps in watershed knowledge and identify agencies or programs that could address these gaps. The IWMP will help create a sustainable watershed that meets economic, social, health and environmental needs in an ever growing and changing world.



Chapter 2 - Watershed Overview

More Information

For more information about the IWMP for the NSRW contact:

IWMP Coordinator
North Saskatchewan Watershed Alliance
www.nswa.ab.ca

2-7

The North Saskatchewan River Watershed (NSRW)

Most of the information in this section has been taken from NSWA's *State of the North Saskatchewan Watershed Report 2005*.

2-7.1. General Overview

Physical Size and Layout

The NSRW covers approximately 12.5% of Alberta's landmass and is about 80,000 km² in size¹. The North Saskatchewan River makes up the main stem of the watershed and flows over 1,000 kilometres from its headwaters at the Saskatchewan Glacier in the Columbia Icefields in Banff National Park to the Alberta/Saskatchewan border. In addition to the main stem, there are about 3,600 kilometres of streams that gather water from throughout the watershed.

Subwatersheds

The NSRW is made up of 18 subwatersheds (see Figure 2.4). Of these 18 subwatersheds, 12 flow into the North Saskatchewan River in Alberta. In the south east portion of the watershed are 5 subwatersheds that flow into the Battle River (Bigstone, Paintearth, Iron, Ribstone and Blackfoot) which meets with the North Saskatchewan River in Saskatchewan where the two join with the South Saskatchewan River and eventually empty into Hudson Bay. The southern most subwatershed on the east side of the NSRW is the Sounding Subwatershed, which is considered a closed basin by provincial and federal governments, because it rarely flows into the Battle River at its confluence in Saskatchewan.

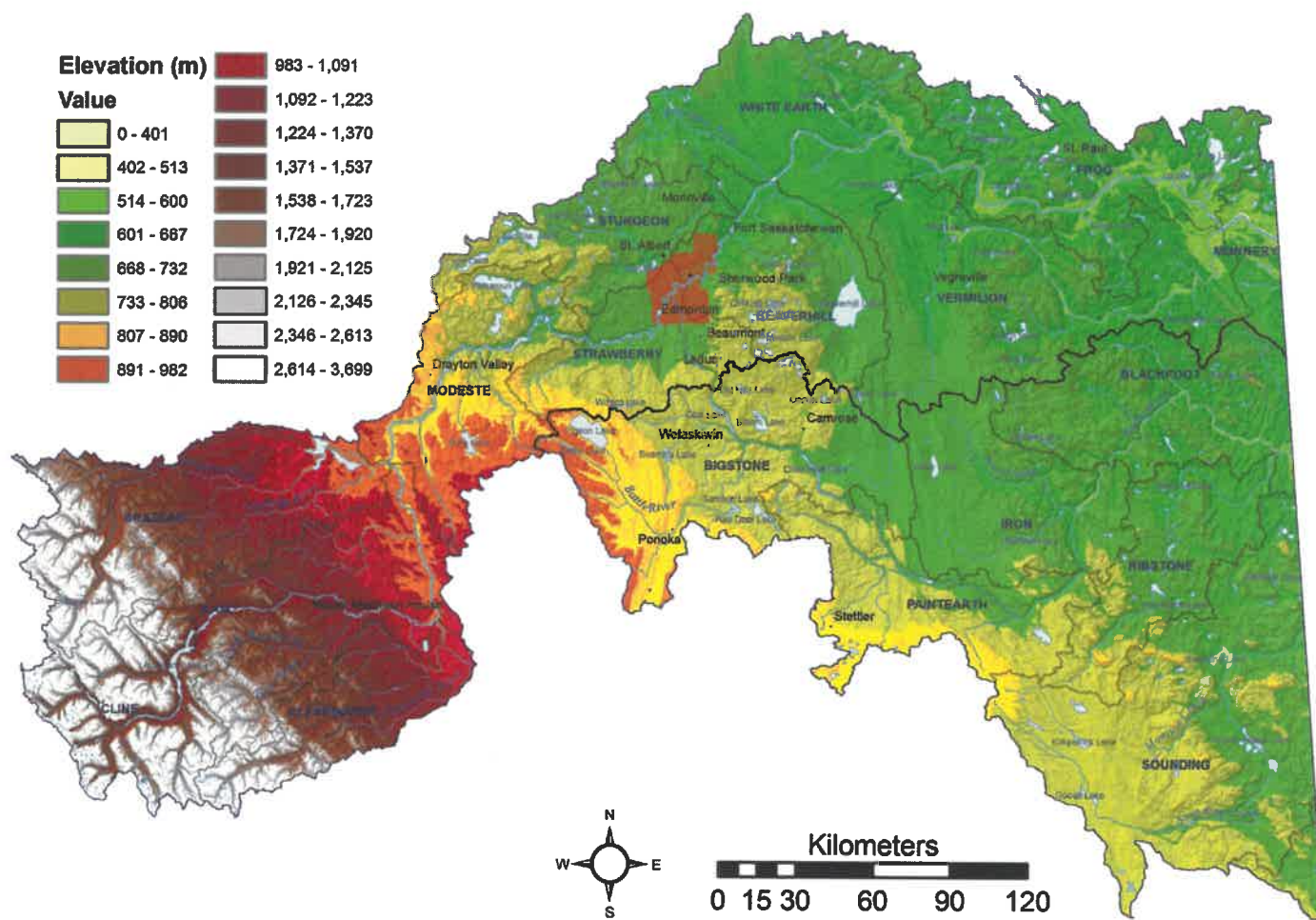
¹ The NSRW goes beyond the Alberta border into Saskatchewan and Manitoba but because the focus this guide is the NSRW in Alberta, only the NSRW as it exists in Alberta is discussed in this section.

Figure 2.4 Subwatersheds in the North Saskatchewan River Watershed**Natural Regions**

The NSRW traverses a diversity of natural and physiographic regions. Five natural regions are present within the watershed, which include Rocky Mountain, Foothills, Boreal Forests, Parkland, and Grassland. Each of these natural regions has unique biophysical features. The three major physiographic regions that make up the watershed are mountains, foothills and plains.

Protected Areas, Aboriginal Reserves and Métis Settlements

The NSRW is home to fourteen provincial parks, three national parks, three ecological reserves, two wilderness areas and eight provincial grazing reserves. There are eighteen aboriginal reserves that represent fourteen tribes and one Métis settlement within the watershed.



Chapter 2 - Watershed Overview

Table 2.7 Protected Areas, Aboriginal Reserves and Métis Settlements in the NSRW

Type of Land Designation	Areas Within the NSRW
Provincial Park	Big Knife, Brazeau Canyon Wildland, Crimson Lake, Dillberry Lake, Gooseberry Lake, Lois Hole Centennial, Long Lake, Ma-Me-O, Miquelon Lake, Pigeon Lake, Strathcona Science, Vermillion, Wabamun Lake and Whitney Lakes
National Park	Banff, Elk Island and Jasper
Ecological Reserve	Kootenay Plains, Marshybank and Wainwright Dunes
Wilderness Area	Siffleur and White Goat
Provincial Grazing Reserve	Buck Mountain, Jack Pine, Medicine Lake, Minburn, Rannack, Smoky Lake, St. Paul and Thorhild
First Nations Reserve	Alexander 134, Alexis 133, Bighorn 144A, Buck Lake 133C, Ermineskin 138, Louis Bull 138B, Makaoo 120, Montana (Bobtail) 139, O'Chiese 203, Pigeon Lake 138A, Puckiakiwenin 122, Saddle Lake 125, Samson 137, Samson 137A, Stoney Plain 135, Sunchild 202, Unipouheous 121 and Wabamun Lake 133A
Métis Settlement	Fishing Lake

Water Quantity and Quality

Between the North Saskatchewan and Battle River, 7,435 million cubic meters of water flows into Saskatchewan every year (Alberta Environment 2002). While this flow is significant it makes up only about 5.7 percent of total river flow going out of Alberta (Alberta Environment 2002). While the Battle River drains approximately 40% of the land base of the NSRW in Alberta, it only contributes 3% to the flow of the North Saskatchewan River (at the Alberta-Saskatchewan border). These low flows are due in part to the fact the Battle River is fed by groundwater and runoff from local snowmelt and rains. This water enters the river at its headwaters at Battle Lake. The North Saskatchewan River on the other hand is fed by glacier melt and precipitation in the Rocky Mountains, which make up a significant portion of its flow.

Water quality of the North Saskatchewan River is highly variable. While human activities have some influence on this variation, much of it is the result of natural processes. Many of the riverbanks have silty, alluvial, floodplain deposits that are sensitive to disturbance and subject to erosion. This gives rise to a mix of sand and mud, which results in a naturally turbid river. In general, water quality in upper portions of the watershed is better than in lower portions.

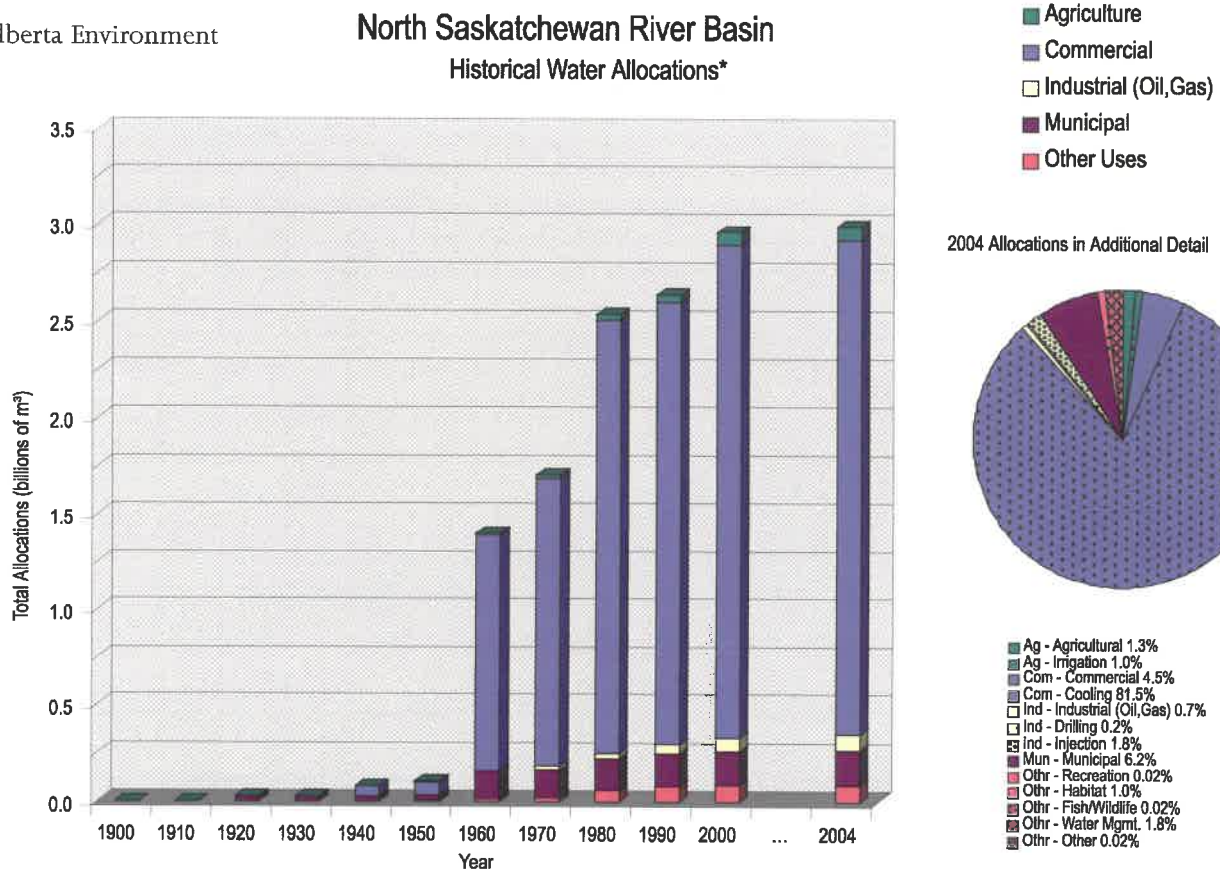
Human Activities

Land uses within the NSRW vary by region and include agriculture, resource exploration and extraction, forestry, oil & gas, recreation, commercial, protected areas, urban residential and country residential. The vast majority of residents in the NSRW reside in the greater Edmonton area. While the upper basin is sparsely populated, there is ever increasing pressure for more tourism development, mining, forestry, and petroleum exploration. Land uses occurring in the Green Zone (crown land) include seismic activity, pipelines, service infrastructure, road networks, forestry related activities, power lines and other resource exploration and extraction activities. All of these land uses have a cumulative effect on the health of the NSRW.

There are many types of water demands on the North Saskatchewan River. These include hydroelectric generation, human consumption, waste assimilation, oil and gas extraction, mining, and agricultural uses such as irrigation and livestock watering (see Figure 2.5). In the NSRW there are two major dams: the Bighorn Dam, which was commissioned in 1972 and forms Abraham Lake and the Brazeau Dam which was commissioned in 1965 and is located on the Brazeau River which flows into the North Saskatchewan River south of Lodgepole. Both dams are owned and operated by TransAlta Utilities for the purpose of hydroelectric generation and are regulated by Alberta Environment and the Alberta Energy and Utilities Board.

Figure 2.5 Water Allocations

Source: Alberta Environment



* Water Allocations do not measure actual water use; rather, they are the maximum water volumes that can be diverted annually under the terms of a licence.



Chapter 2 - Watershed Overview

2-7.2. State of the Watershed

In the *State of the North Saskatchewan Watershed Report 2005* released by the NSWA, the NSRW was given a rating of generally fair (on a scale of excellent, good, fair and poor). This rating was based on the indicators presented in Table 2.8, many of which relate to land use and activities that municipalities have some control over. The report's findings can be used by municipalities to help them identify priority issues in their subwatershed and to develop stewardship initiatives based on these.

Table 2.8 Watershed Health Indicators Used in the State of the Watershed Report

Land Use	Water Quality	Biological Indicators
Riparian health	Surface water quality	Aquatic macrophytes
Linear development (roads, seismic , pipelines, etc.)	E. coli Phosphorus	Fish populations Vegetation types
Land use inventory	Pesticides	Benthic invertebrates
Livestock density		
Wetland inventory		

While the overall health of the entire NSRW is generally fair, there were variations between subwatersheds. In some subwatersheds ecosystem function has been significantly impaired by human activity. Table 2.9 is a summary of the health ratings given to subwatershed in the report. Because of significant data gaps, not all indicators of watershed health could be rated. For more information about the basis of these ratings see the reference to the report at the end of this section.

Chapter 2 - Watershed Overview

Table 2.9 Summary of Subwatershed Health Ratings

Subwatershed	Total Number of Indicators Assessed	Number of Indicators Rated Good	Number of Indicators Rated Fair	Overall Indicators Rated Poor	Subjective Ratings
Cline	5	3	1	1	Good
Brazeau	7	5	1	1	Good
Ram	8	6	2	0	Good
Clearwater	6	4	2	0	Good
Modeste	10	0	6	4	Fair
Strawberry	11	3	3	5	Poor
Sturgeon	9	2	5	2	Fair
Beaverhill	7	0	4	3	Fair
White Earth	7	2	3	2	Fair
Vermilion	7	0	2	5	Poor
Frog	7	1	6	0	Fair
Monnery	6	0	5	1	Fair
Bigstone	9	1	4	4	Poor
Paintearth	8	2	4	2	Fair
Iron	7	0	4	3	Fair
Ribstone	8	2	3	3	Poor
Blackfoot	5	0	1	4	Poor
Sounding	5	2	2	1	Fair



Chapter 2 - Watershed Overview

The following is an insert from the *State of the North Saskatchewan Watershed Report 2005*:

On a watershed scale, for the indicators where data were available, watershed health tends to decrease as you move towards the Modeste, Sturgeon and Strawberry subwatersheds, where livestock density, human activity and populations are greatest. Linear development, intensive land uses and livestock densities are highest in these watersheds, while riparian health scores and wetland cover based on the maps generated are lowest.

Disturbances to note include the Capital Region's impacts on the river main stem from treated wastewater and stormwater outfalls. For example, the Surface Water Quality Index drops downstream of Edmonton due to increases in both *E. coli* counts and phosphorus concentrations. However, the impact of the City has been lessened considerably by the recent improvements in wastewater treatment technology (see section 5-4.3) and should continue to improve as the City of Edmonton moves forward with proposed stormwater treatment strategies.

The impacts of high agricultural intensity in the Bigstone, Iron, Ribstone, Blackfoot, and Paintearth subwatersheds may be reflected in higher phosphorus and lowered riparian health scores and wetland densities. In these Battle River subwatersheds, water quantity will continue to be an issue, as will water quality.

Pesticides did not appear to be a major concern anywhere within the watershed. Pesticides were detected in several subwatersheds, but concentrations never exceeded the CCME Surface Water Quality Guidelines for the Protection of Aquatic Life. "Based on the research and monitoring work conducted, the risk of water quality degradation appears to be significant for areas of the province where intensive agriculture is practiced, as measured by fertilizer or herbicide inputs or by animal unit density" (CAESA 1998). However, several types of pesticides identified do not have guidelines established.

Biological indicators and water quantity were most poorly represented in this study, and available data were not adequate to properly address these indicators. For example, none of the biological indicators (aquatic macrophytes, fish population estimates, vegetation types and benthic invertebrates) were comprehensive enough to allow for a prediction of watershed health. Pharmaceuticals (animal and human) were found to be of concern to watershed residents. Effects on humans and aquatic life are not well known or documented in the watershed and this presents a data gap of interest to the public.

The *State of the North Saskatchewan Watershed Report* did not evaluate other industries such as forestry and oil and gas in any great detail - so it is unknown as to the degree of impairment caused by these and other industries.

Note: for more information on legislation listed in this chapter see Appendix A. For more information on government departments and agencies involved in watershed issues see *Watershed Stewardship in Alberta: A Directory of Stewardship Groups, Support Agencies and Resources* in Appendix B.

No legislation exists that assigns the responsibility of managing our watersheds to any one government. Instead this responsibility is shared between federal and provincial authorities through the powers designated under the *Constitution Act, 1867* and the responsibilities assigned through various statutes (acts), policies and regulations. Municipal powers are in turn delegated through a number of these statutes. Consequently, legislated responsibilities with the potential to impact watershed health are distributed widely across federal, provincial and municipal governments.

In some cases municipal efforts to avoid conflicting with federal or provincial law can be a source of municipal hesitance to act on watershed matters. Understanding federal and provincial law and how they apply to watershed health is an important tool for municipal stewardship. Municipalities that understand the powers they have to protect the health of their local watersheds and that understand when to consult with other government bodies are better equipped to make confident decisions relating to the health of their watersheds.

Furthermore, municipalities can take advantage of provincial and legislation already in place to protect their local watersheds by alerting the appropriate government body when a law is being broken. For example, municipalities can alert Alberta Sustainable Resource Development, Alberta Environment and/or Fisheries and Oceans Canada when a permanent and naturally-occurring wetland or waterbody is under threat. The involvement of these and other departments in the protection of a waterbody may be triggered under a number of statutes. Practically speaking, the active involvement of these departments is more likely where a councilor or senior planner has requested it (Mallet 2005).

Both federal and provincial governments have a number of responsibilities relating specifically to water (Table 3.1). Watershed management however is much more than water management alone. It involves responsibilities for a variety of matters such as land use, natural area designation and management and pollution prevention. This chapter provides a brief overview of the powers and watershed-related responsibilities assigned to each level of government.



Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

Table 3.1 - Division of Responsibilities for Water

Jurisdiction	Water-Related Responsibilities
Provincial Government	• primarily responsibility for the management of water resources (surface and groundwater) which includes: flow regulation; authorization of water use development; and authority to legislate areas of water supply, pollution control and thermal and hydroelectric power development
Federal Government	• responsibilities are in areas that have the potential for significant national economic impact: navigation and fisheries • water on federal lands (e.g. National Parks), in the territories and on the reserves of Canada's aboriginal peoples • boundary and transboundary waters
Shared federal-provincial responsibilities	• interprovincial water issues • agriculture • significant national water issues • health

Source: Environment Canada webpage. Accessed January 22, 2006.
http://www.ec.gc.ca/water/en/policy/coop/e_juris.htm

There are many overlapping jurisdictional responsibilities relating to waste water discharge for small on-site private sewage systems:

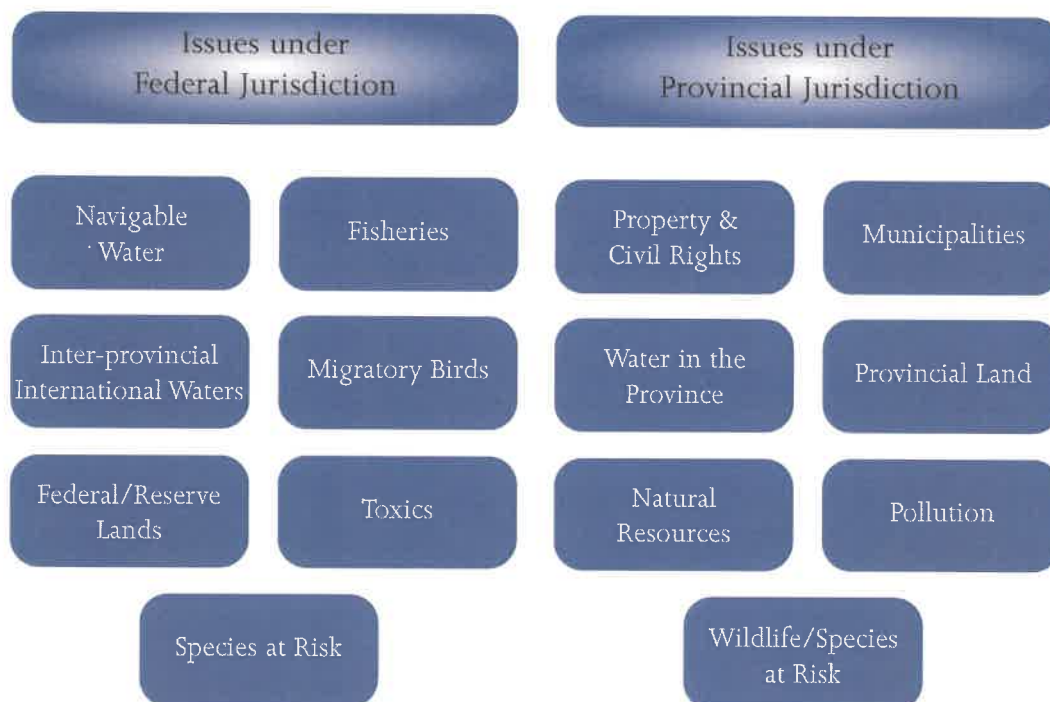
- **Municipal Affairs** - sets sewage standards which set out design standards, installation standards and material requirements
- **Municipal governments** - responsible for ensuring standards are met (in most communities)
- **Alberta Environment and the local health authority** - responsible for handling problems or complaints regarding private systems

3-1 Cross Government Issues

Overlapping Jurisdiction

While watershed-related authority can be loosely broken down into federal, provincial and municipal jurisdictions, there is much overlap and some uncertainty regarding these powers. Figure 3.1 outlines a number of responsibilities that federal and provincial governments are constitutionally empowered to regulate. In reality many of the roles represented by each of the boxes in Figure 3.1 overlap with one another, creating a jurisdictional "tangle" that can be a significant source of uncertainty and confusion regarding watershed-related responsibilities. In addition to the overlap between federal and provincial jurisdiction, there is often overlap between the roles and responsibilities of government departments and agencies within the provincial and federal governments. As a result of these overlaps, ensuring that decisions made by municipal governments and activities occurring within municipal boundaries meet provincial and federal requirements is often not as simple as consulting any one government body.

Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

Figure 3-1 - The Jurisdictional Tangle**Water Pollution**

“Provincial legislatures may pass legislation regulating activities that cause water pollution, under their powers over property and civil rights. However, federal parliament is also authorized to regulate water pollution that affects fish under its power over inland and coastal fisheries. In this case, both federal and provincial laws may operate concurrently meaning that both federal and provincial laws will apply”.

- Environmental Law Centre 2003 (p20)

Source: Jason Unger. Environmental Law Centre.

In most cases, if there is ever a conflict between municipal powers and that of the provincial or federal government, one of the latter would prevail. Municipal powers are limited to those given to them by the province and the province's powers are limited by federal law. Therefore, generally speaking, when there is a conflict between federal and provincial law, federal law will prevail. However, when the law does not clearly define jurisdiction, both levels of government may be empowered to legislate some aspect of the matter (Environmental Law Centre 2003). The box to the right provides an example of shared jurisdictions regarding water pollution.

Unclear Jurisdiction

While overlapping responsibilities can sometimes be a source of confusion between governments, uncertainty regarding which government body is responsible for various issues can also be problematic for watershed health. In some cases responsibilities for watershed matters have not been assigned to any one government. The following are two examples:

- **Cumulative effects** - the cumulative effects of various land uses and activities have the potential to seriously impact watershed health, yet there is no legislation that assigns the responsibility of addressing cumulative effects to any one government body. Municipal governments, for example, make many decisions regarding land uses but there is no government body responsible for inter-municipal coordination regarding the cumulative impacts of these decisions at the watershed level.

Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

- **Total loading capacity of waterways** - individual approval holders monitor local waterways to meet their assigned loading limits, but no government body is responsible for monitoring the impact that all upstream contributors are having on water quality for downstream users.

Inter-governmental Cooperation

Federal, provincial and municipal governments can avoid jurisdictional overlap and uncertainties by working together to clarify responsibilities and assign watershed related responsibilities to various departments as needed. By maintaining open lines of communication, cooperating on various initiatives, updating old policies, statutes or regulations and identifying areas where new legislation is needed, governments can help avoid conflict, wasted resources and frustration. The following are examples of federal-provincial cooperation that address overlapping responsibilities relating to watershed health:

- **Master Agreement on Apportionment** - agreement signed by Saskatchewan, Alberta, Manitoba and Canada for sharing water. It is built on a simple formula based on the principle of equal sharing of available water in the prairies.
- **Canada Ministers of the Environment (CCME)** - comprised of environment ministers from the federal, provincial and territorial governments. CCME members collectively establish nationally-consistent environmental standards, strategies and objectives so as to achieve a high level of environmental quality across the country.
- **Canada-Alberta Agreement for Environmental Assessment Cooperation** - establishes a process for a single, cooperative environmental assessment to avoid duplication when an environmental assessment for a proposed project is required under the *Canadian Environmental Assessment Act* and *Alberta's Environmental Protection and Enhancement Act*.

3-2

A Quick Reference: Watershed Issues and Related Acts

This section provides a quick reference to some important watershed-related legislation. In Table 3.2 legislation is broken down into a number of broad environmental issues, which are listed in alphabetical order. [For more information on any of the statutes listed see section 3-3 \(federal overview\), section 3-4 \(provincial overview\) or Appendix A \(description of federal and provincial acts and policies\).](#)

Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

Table 3.2 - Watershed Issues and Related Acts ¹

Source (of most but not all information in the following table): Environmental Law Centre. 2003. *The ABC's of Environmental Jurisdiction: An Alberta guide to federal, provincial and municipal responsibility*. Edmonton, Alberta.

Issue	Jurisdiction	Legislation (administered and/of enforced by ²)
Agriculture - Crop and Pasture Management (See also Intensive Livestock Operations, Pesticides, Woodlots and Agro-forestry, Bush and Shelterbelts)	• federal • provincial • municipal	• <i>Fisheries Act</i> (DFO) • <i>Environmental Protection and Enhancement Act</i> - Activities Designation Regulation, Waste Control Regulation (AENV) • <i>Water Act</i> (AENV) • <i>Agriculture Operation Practices Act</i> (AAFRD) • <i>Soil Conservation Act</i> (AAFRD) • <i>Weed Control Act</i> (AAFRD) • <i>Agricultural Pests Act</i> (AAFRD) • <i>Public Lands Act</i> (ASRD) • <i>Municipal Government Act</i> - municipal bylaws (Agriculture Service Board, Bylaw Officers, local police or RCMP)
Conservation Easements	• provincial	• <i>Environmental Protection and Enhancement Act</i> - Conservation Easement Registration Regulation (AENV; conservation easements are enforced by the holder of the easement or by another qualified organization)
Contaminated Land	• provincial	• <i>Environmental Protection and Enhancement Act</i> (AENV) • <i>Safety Codes Act</i> - <i>Alberta Fire Code 1997</i> (Safety Codes Officers) • <i>Oil and Gas Conservation Act</i>
Dams (see also Environmental Assessment)	• federal • provincial	• <i>Fisheries Act</i> (DFO) • <i>Navigable Waters Protection Act</i> (Transport Canada) • <i>Prairie Farm Rehabilitation Act</i> (PFRA) • <i>Water Act</i> (AENV) • <i>Hydro and Electric Energy Act</i> • may trigger an environmental assessment
Drinking (Treated) Water Quality	• federal - develop drinking water policy • provincial - regulate drinking water quality	• <i>Guidelines for Drinking Water Quality</i> (Health Canada) • <i>Environmental Protection and Enhancement Act</i> - Potable Water Regulation (AENV)
Endangered Species Protection	• federal • provincial	• <i>Species at Risk Act</i> (Canadian Wildlife Service of EC) • <i>Canada Wildlife Act</i> (Canadian Wildlife Service of EC) • <i>Alberta Wildlife Act</i> - Wildlife Regulation (ASRD, Alberta Conservation Association)

¹ Issues relating to Indian reserves or lands are not addressed in this table.

² The federal or provincial body that administers/enforces the portion of the Act related to in this table is not necessarily responsible for the administration/enforcement of the entire Act. See the end of Table 3.2 for a breakdown of abbreviations used.

Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

Issue	Jurisdiction	Legislation (administered and/of enforced by) ²
Environmental Assessment	• federal • provincial	• Canadian Environmental Assessment Act (Canadian Environmental Assessment Agency) • Environmental Protection and Enhancement Act (AENV) • Canada-Alberta Agreement for Environmental Assessment Cooperation (EC and AENV)
Expropriation	• federal • provincial • municipal	• Expropriation Act (Minister of Public Works and Government Services Canada) • Alberta Expropriation Act (Alberta Justice and ASRD) • Municipal Government Act
Fisheries Management (See also Water Quality)	• federal • provincial	• Fisheries Act (DFO) • Fisheries (Alberta) Act (Fish and Wildlife Division of ASRD)
Forestry	• federal - forestry on federal lands • provincial - activity on provincial public lands	• Forestry Act (Natural Resources Canada) • Forests Act (ASRD) • Public Lands Act (ASRD)
Grazing Dispositions (See also Recreational Use of Public Lands)	• federal - regulation of grazing on federal land • provincial - regulation of grazing on provincial public land	• Public Lands Act (Public Lands Division of ASRD)
Hazardous Waste Management (See also Waste Management, Transportation of Hazardous Waste and Oilfield Waste)	• federal - regulates specific types of waste and waste management on federal lands • provincial (primarily)	• Nuclear Safety and Control Act (Nuclear Safety Commission)³ • Canadian Environmental Protection Act, 1999 (EC) • Environmental Protection and Enhancement Act - Waste Control Regulation (AENV) • Occupational Health and Safety Act - Chemical Hazards Regulation (Workplace Health and Safety, a division of Alberta Resources and Employment)
Historic Resources	• federal • provincial	• Historic Sites and Monuments Act (Canadian Heritage) • Department of Canadian Heritage Act (Canadian Heritage) • Historical Resources Act (ACD)

³ Mines or processing facilities for nuclear energy do not currently exist in Alberta and the Nuclear Energy Act is not discussed further in this guide.

Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

Issue	Jurisdiction	Legislation (administered and/of enforced by) ²
Intensive Livestock Operations (See also Water Quality and Water Rights)	• federal - regulates animal health and aspects of water pollution that may be caused by livestock operations, and is involved in policy development • provincial (primarily)	• <i>Health of Animals Act</i> (Animal Health Division of the Canadian Food Inspection Agency) • <i>Fisheries Act</i> (DFO) • <i>Environmental Protection and Enhancement Act</i> (AENV) • <i>Agricultural Operation Practices Act</i> (NRCB) • <i>Water Act</i> (AENV) • <i>Public Health Act - Nuisance and General Sanitation Regulation</i> (regional health authorities) • <i>Animal Protection Act</i> (AAFRD)
Invasive Species	• federal • provincial	• <i>Fisheries Act</i> • <i>Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act</i> (EC)⁴ • <i>Plant Protection Act - Plant Protection Regulations</i> (Canadian Food Inspection Agency)⁵ • <i>Canadian Environmental Protection Act - New Substance Notification Regulations</i> (EC, Health Canada, DFO) • <i>Pest Control Products Act</i> (Health Canada) • <i>Fisheries (Alberta) Act</i> (ASRD) • <i>Wildlife Act</i> (ASRD)
Landfills (See also Waste Management)	• provincial • municipal - regulate the siting of landfills	• <i>Environmental Protection and Enhancement Act - Waste Control Regulation and the Code of Practice for Landfills</i> (AENV) • <i>Municipal Government Act - municipal bylaws</i>
Litter (See also Waste Management)	• provincial • municipal	• <i>Environmental Protection and Enhancement Act</i> (AENV, municipalities enforce litter provisions) • <i>Municipal Government Act - municipal bylaws</i> (bylaw officers, local police or RCMP)
Migratory Birds	• federal • provincial	• <i>Migratory Birds Convention Act</i> (Wildlife Enforcement Division of EC) • <i>Wildlife Act - Wildlife Regulation</i> (Fish and Wildlife Division of ASRD)

⁴ The *Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act* is not discussed in further in this guide.

⁵ The *Plant Protection Act* is not discussed in further in this guide.

Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

Issue	Jurisdiction	Legislation (administered and/of enforced by) ²
Mines and Mining (See also Environmental Assessment, Oil And Gas Development, Surface Materials Extraction and Water Quality)	• federal - regulate minerals used in the production of nuclear energy⁶ • provincial (primarily) - regulate mining of coal and other minerals	• Nuclear Energy Act (Natural Resources Canada) • Nuclear Safety and Control Act (Canadian Nuclear Safety Commission) • Fisheries Act (DFO) • Mines and Minerals Act (AE, AENV, ASRD) • Coal Conservation Act (AE) • Oil Sands Conservation Act (AEUB regulates energy resource development; NRCB administers and enforces approvals for metallic and industrial mineral developments) • Environmental Protection and Enhancement Act (AENV) • Water Act (AENV) • may trigger federal environmental assessment process
Oil and Gas Development (See also Oil and Gas Exploration, Oilfield Waste and Pipelines)	• federal - regulation of toxic substances that may be associated with oil and gas • provincial - drilling, production and processing of oil and gas	• Canadian Environmental Protection Act (EC) • Oil and Gas Conservation Act • Energy Resources Conservation Act • Environmental Protection and Enhancement Act and the Activities Designation Regulation (AENV)
Oil and Gas Exploration	• primarily provincial (federal lands are both a federal and provincial responsibility)	• Mines and Minerals Act (ASRD)
Oilfield Waste (See also Environmental Assessment)	• federal - oilfield waste on federal lands • provincial	• Oil and Gas Conservation Act - Oil and Gas Conservation Regulations • Environmental Protection and Enhancement Act (AENV)
Organic Agriculture and Foods (See also Packaging and Labelling)	• provincial and federal - regulation of organic farm certification • federal - standards for organic food products	• Food and Drugs Act and Consumer Packaging and Labelling Act (Canadian Food Inspection Agency reporting to the Minister of Agriculture and Agri-Food) • Marketing of Agricultural Products Act - Alberta Chicken Producers Marketing Regulation (AAFRD)

⁶ Mines or processing facilities for nuclear energy do not currently exist in Alberta and the associated statutes are not discussed further in this guide.

Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

Issue	Jurisdiction	Legislation (administered and/of enforced by) ²
Pesticides	• federal • provincial • municipal - empowered to regulate the use of pesticides	• Pest Control Products Act (Pest Management Regulatory Agency under Health Canada) • Environmental Protection and Enhancement Act - Pesticide Sales, Handling, Use and Application Regulation and Pesticide (Ministerial) Regulation (AENV) • Municipal Government Act - municipal bylaws (bylaw officers, local police or RCMP)
Pipelines (See also Environmental Assessment)	• federal - regulates inter-provincial and international pipelines and pipelines for federal projects • provincial - regulates Alberta pipelines	• National Energy Board Act (National Energy Board) • Canadian Environmental Assessment Act (EC) • Fisheries Act (DFO) • Pipeline Act • may trigger an Environmental Assessment
Power Transmission Lines (See also Environmental Assessment)	• federal - where lines cross provincial or international boundaries • provincial (primarily) • municipal - powers over power transmission lines in the municipality	• National Energy Board Act (National Energy Board) • Hydro and Electric Energy Act - Hydro and Electric Energy Regulation • Environmental Protection and Enhancement Act - certain transmission lines require an approval under this Act (AENV) • Municipal Government Act - municipal bylaws (bylaw officers, local police or RCMP) • may trigger an Environmental Assessment
Protection of Natural Areas (See also Conservation Easements and Migratory Birds)	• federal • provincial • municipal	• Canada National Parks Act (Parks Canada) • Canada Wildlife Act (Canadian Wildlife Service of EC) • Migratory Birds Convention Act (Canadian Wildlife Service of EC) • Provincial Parks Act (Parks and Protected Areas Division of ACD) • Wilderness Areas, Ecological Reserves Natural Areas and Heritage Rangelands Act (Parks and Protected Areas Division of ACD) • Municipal Government Act - provides Alberta municipalities with many tools to protect natural areas
Pulp and Paper Mill Emissions	• federal • provincial	• Canadian Environmental Protection Act (EC) • Fisheries Act - Pulp and Paper Effluent Regulations (DFO, EC) • Environmental Protection and Enhancement Act (AENV)

Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

Issue	Jurisdiction	Legislation (administered and/of enforced by) ²
Recreational Use of Public Lands	• federal - federal lands • provincial - provincial lands • municipal - municipal lands	• Canada National Parks Act (Parks Canada) • Canada Wildlife Act (Canadian Wildlife Service of EC) • Canada Shipping Act - Boating Restriction Regulation (Transport Canada, DFO) • Provincial Parks Act (Parks and Protected Areas Division of ACD) • Wilderness Areas, Ecological Reserves Natural Areas and Heritage Rangelands Act (Parks and Protected Areas Division of ACD) • Wildlife Act (Fish and Wildlife Division of ASRD) • Forest and Prairie Protection Act (Fish and Wildlife Division of ASRD) • Forest Reserves Act (ASRD) • Forests Act (ASRD) • Public Lands Act (ASRD) • Municipal Government Act - municipal bylaws (bylaw officers, local police or RCMP)
Recycling (See also Waste Management)	• provincial • municipal - local recycling programs	• Environmental Protection and Enhancement Act - Beverage Container Recycling Regulation, Tire Recycling and Management Regulation and Lubricating Oil Material Recycling and Management Regulation (AENV) • Municipal Government Act
Roads e.g. removal of vegetation, soil erosion, wetland drainage, bridges, road salts, habitat fragmentation (See also Water Quality)	• federal • provincial • municipal - exercise management and control over most roads	• Canadian Environmental Protection Act - road salts (EC) • Fisheries Act (DFO) • Public Highways Development Act (Alberta Transportation) • Environmental Protection and Enhancement Act - Conservation and Reclamation Regulation (AENV) • Municipal Government Act
Sewage	• federal • provincial - primary regulator of sewage treatment and discharge	• Fisheries Act (DFO) • Environmental Protection and Enhancement Act (AENV) • Safety Codes Act - Private Sewage Disposal Systems Regulation (Safety Codes Officers)
Surface Materials Extraction e.g. gravel, sand, marl, clay, peat and topsoil (See also Environmental Assessment)	• provincial • (federal)	• Law of Property Act • Environmental Protection and Enhancement Act - Activities Designation Regulation (AENV) • Public Lands Act (Public Lands Division of ASRD) • Special Areas Act - Special Areas Disposition Regulation (Alberta Municipal Affairs, Special Areas Board) • Water Act (AENV) • (Fisheries Act (DFO))

Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

Issue	Jurisdiction	Legislation (administered and/of enforced by) ²
Transport of Dangerous Goods (See also Transportation Of Hazardous Waste)	• federal - transportation across provincial and national borders and on federal lands • provincial - transportation within Alberta • municipal	• <i>Transportation of Dangerous Goods Act</i> (Transport Dangerous Goods Directorate of Transport Canada, EC) • <i>Dangerous Goods Transportation and Handling Act</i> (Dangerous Goods and Rail Safety Branch of Alberta Transportation) - also empowers municipalities to pass bylaws designating dangerous goods routes and restricting the transportation of such goods within the municipality • <i>Environmental Protection and Enhancement Act</i> (AENV)
Transport of Hazardous Waste	• federal • provincial	• <i>Canadian Environmental Protection Act - Export and Import of Hazardous Waste Regulations</i> (Transboundary Movement Branch of EC) • <i>Environmental Protection and Enhancement Act - Waste Control Regulation</i> (AENV)
Underground Storage Tanks (See also Contaminated Land)	• federal - regulates storage tanks on federal lands • provincial • municipal	• <i>Safety Codes Act - Alberta Fire Code 1997</i> (Department of Municipal Affairs, Safety Codes Officers, Petroleum Tank Management Association of Alberta, municipalities) • <i>Environmental Protection and Enhancement Act</i> (AENV)
Waste Management (See also Hazardous Waste Management, Landfills, Litter, Oilfield Waste, and Transportation of Hazardous Waste)	• federal - regulates specific types of waste and waste management on federal lands • provincial • municipal	• <i>Canadian Environmental Protection Act</i> (EC) • <i>Environmental Protection and Enhancement Act - Waste Control Regulation and Code of Practice for Landfills</i> (AENV) • <i>Public Health Act</i> (regional health authorities)
Water Quality (See also Water Rights and Drinking Water Quality)	• federal • provincial • common law	• <i>Fisheries Act</i> (DFO) • <i>Canadian Environmental Protection Act</i> (EC) • <i>Environmental Protection and Enhancement Act - Substance Release Regulation, Pesticide Sales, Handling, Use and Application Regulation, Potable Water Regulation and Waste Control Regulation</i> (AENV) • <i>Surface Water Quality Guidelines for Use in Alberta</i> (AENV) • common law (riparian rights) - an owner of land that abuts a natural water course or body is entitled to have the water flow through his or her land without alteration in quality (applies to surface and ground water)

Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

Issue	Jurisdiction	Legislation (administered and/of enforced by) ²
Water Rights (See also Water Quality and Drinking (Treated) Water Quality)	• provincial • common law	• <i>Water Act</i> (AENV) • common law (riparian rights) - an owner of land adjacent to a natural watercourse or body (or, in some cases, under which groundwater exists), has rights concerning the water; riparian owners are entitled to its access and the water's quality
Woodlots, Agro-Forestry, Bush and Shelterbelts	• federal • provincial • municipal	• <i>Fisheries Act</i> (DFO) • <i>Forest and Prairie Protection Act</i> (ASRD) • <i>Soil Conservation Act</i> (AAFRD) • <i>Environmental Protection and Enhancement Act</i> (AENV) • <i>Water Act</i> (AENV) • <i>Forests Act - Alberta Timber Management Regulations</i> (ASRD) • <i>Wildlife Act</i> (ASRD) • <i>Municipal Government Act</i> (Municipal Affairs) • <i>Municipal Government Act - bylaws</i> (bylaw officers, local police or RCMP)

Legend - Abbreviations Used in Table 3.2

AAFRD	Alberta Agriculture, Food, and Rural Development
ATPR	Alberta Tourism, Parks and Recreation
AE	Alberta Energy
AENV	Alberta Environment
ERCB	Alberta Energy Resources Conservation Board
ASRD	Alberta Sustainable Resource Development
DFO	Department of Fisheries and Oceans (Fisheries and Oceans Canada)
EC	Environment Canada
NRCB	Natural Resources Conservation Board
PFRA	Prairie Farm Rehabilitation Administration - Agriculture and Agri-food Canada
RCMP	Royal Canadian Mounted Police

3-3

Federal Jurisdiction

The Government of Canada has a number of powers that relate to watershed health. Under the *Constitution Act, 1867*, it has the power to make laws relating to a number of issues, which include (Environmental Law Centre 2003):

- Federal property
- Trade and commerce
- Revenue generation through taxation
- Navigation and shipping
- Seacoast and inland fisheries
- Indians and lands reserved for Indians
- Criminal law
- Inter-provincial works and undertakings (includes the regulation of pipelines and other means of interprovincial transportation)
- Works for the general advantage of Canada
- The implementation of treaties entered into by Great Britain on behalf of Canada
- Matters not specifically assigned to the provinces under the *Constitution Act, 1867*

In addition to these powers the courts have interpreted the legislative heads of power, which give the federal governments the power to regulate the following environmental matters (Environmental Law Centre 2003):

- Federal lands (e.g., national parks or other federal reserved lands) and all resources on these lands
- Natural commercial, sport or recreational fishery habitat (whether on federal or non-federal lands or on privately owned or public lands)
- Inter-provincial waters
- Migratory birds and, to a limited degree, migratory bird habitat (whether on federal or non-federal lands or on privately owned or public lands)
- Regulation of toxic substances (as part of criminal law power)

All of the above listed powers have the potential to impact watershed health in some way, shape or form. For example, the federal government can use these powers to promote watershed health by: protecting ecologically important natural areas on federal lands, controlling the international trade of water, generating revenues to be spent on watershed stewardship initiatives or research, protecting water bodies for navigation or fisheries and coordinating provincial management of interprovincial waters.



Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

3-3.1. Federal Legislation and Policies

According to the powers allocated to it under the *Constitution Act, 1867*, the Government of Canada has created a number of statutes that have the potential to impact watersheds throughout the country. Table 3.3 is a summary of federal statutes that are important to watershed health. [For more information on the acts and policies listed in this section see Appendix A.](#)

Table 3.3 Federal Legislation that Relates to Watershed Health

Legislation	Description and Connection to Watershed Health
<i>Canada Water Act</i>	• Administered by Environment Canada • This Act provides the framework for cooperation with provinces and territories in the conservation, development and utilization of Canada's water resources. Joint projects under this Act involve the regulation, the apportionment, the monitoring or survey of water resources, and the pre-planning, planning or implementation of sustainable water resource programs. Agreements for specific water programs provide for the participating governments to contribute funding, information and expertise in agreed ratios, such as the Prairie Provinces Water Board Agreement.
<i>Canadian Environmental Protection Act</i>	• Administered by Environment Canada • This Act aims to contribute to sustainable development through pollution prevention and to protect the environment, human life and health from the risks associated with toxic substances.
<i>Canadian Environmental Assessment Act</i>	• Administered by Environment Canada • This Act aims to ensure that a proposed project (where the federal government is the proponent) does not cause significant adverse environmental effects. This is done through the environmental assessment process.
<i>Fisheries Act (Canada)</i>	• Administered by Fisheries and Oceans Canada • This Act provides for the protection of fish and fish habitat of all waters frequented by fish. The Act includes provisions for habitat protection and provides for the establishment of regulations for pollution prevention and control. Federal Fishery Officers and Alberta Fish and Wildlife Officers (Alberta Sustainable Resources Development) designated by the Minister of Fisheries and Oceans can enforce the Act.

Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

Legislation**Description and Connection to Watershed Health****Navigable Waters
Protection Act**

- Administered by Transport Canada
- This Act ensures a balance between the public right of navigation and the need to build works, such as bridges, dams or docks in navigable waters. A navigable water is any body of water capable of being navigated by any type of floating vessel for the purpose of transportation, recreation, or commerce.

In addition to the legislation outlined in Table 3.3, watershed health is also addressed to varying degrees in the following statutes:

- *Canada National Parks Act* - allows for the protection of designated natural areas.
- *Canada Wildlife Act* - under this Act lands can be acquired or purchased by the federal government for the purpose of wildlife conservation.
- *Migratory Bird Convention Act* - offers protection for migratory birds and their nests, prohibits the deposit of oil, oil wastes or any other substances harmful to migratory birds in any waters frequented by them and allows for the creation of Migratory Bird Sanctuaries.
- *Pest Control Products Act* - regulates the use of pest control products. Before registering a pest control product, an applicant must satisfy the Minister of Health that the product will not lead to an unacceptable risk of harm to public health, plants, animals and the environment.
- *Species at Risk Act* - can be used to protect critical habitat for species at risk.

The Government of Canada has also created some important policies that directly or indirectly relate to watershed health. These include:

- *Canadian Biodiversity Strategy* - guide for conserving biodiversity and ensuring the sustainable use of biological resources.
- *Federal Water Policy* - the focus of this policy is the water-related activities of all federal departments. Its objective is to encourage the use of freshwater in an efficient and equitable manner consistent with the social, economic and environmental needs of present and future generations.
- *Federal Policy on Wetland Conservation* - the objective of this policy is to promote the conservation of Canada's wetlands to sustain their ecological and socio-economic function, now and in the future.
- *Department of Fisheries and Oceans Policy for the Management of Fish Habitat* - the objective of this policy is the net gain of habitat for Canada's fisheries resources.
- *Wildlife Policy for Canada* - the goal of this policy is to maintain and enhance the health and diversity of Canada's wildlife. Achieving this goal requires the maintenance and restoration of a number of ecological processes which are also important to watershed health.



Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

3-3.2. Federal Departments and Agencies

Table 3.4 provides an overview of the departments and agencies of the Government of Canada which are responsible for decisions and activities that impact watershed health. For more information on departments or agencies of the Government of Canada see Watershed Stewardship in Alberta in Appendix B.

Table 3.4 Federal Government Departments and Agencies Involved in Watershed Related Activities

Department / Agency	Description
Agriculture and Agri-Food Canada (AAFC)	• Federal department • Mandate: to provide information, research and technology, and policies and programs to achieve security of the food system, health of the environment and innovation for growth • Prairie Farm Rehabilitation Administration (PFRA) - PRFA is a division of AAFC that works with Prairie people to build a viable agricultural industry, and to support a sound rural economy, healthy environment and a high quality of life
Canadian Environmental Assessment Agency	• Federal department (reports to the Minister of the Environment) • Created to administer the federal environmental assessment process under the <i>Canadian Environmental Assessment Act</i> • Mission: to provide Canadians with high quality federal environmental assessments that contribute to informed decision making in support of sustainable development
Canadian Heritage Rivers System	• Intergovernmental agency (Parks Canada provides the Secretariat) • Strives to promote, protect and enhance Canada's river heritage and to ensure that Canada's leading rivers are managed in a sustainable manner
Environment Canada	• Federal department • Mission: to make sustainable development a reality in Canada by helping Canadians live and prosper in an environment that needs to be respected, protected and conserved • Roles: meteorology; wildlife and habitat conservation; pollution prevention; enforcement and compliance promotion; and preservation and enhancement of the quality of the natural environment (including water, air, soil and renewable resources)

Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

Department / Agency	Description
Environmental Protection Review Canada	• Group of expert adjudicators that are separate from Environment Canada • Conduct reviews of Environmental Protection Compliance Orders given under the <i>Canadian Environmental Protection Act</i>
Fisheries and Oceans Canada	• Federal department • Mandate: responsible for developing and implementing policies and programs in support of Canada's economic, ecological and scientific interests in oceans and inland waters • Responsible for the conservation and sustainable use of Canada's fisheries resources while continuing to provide safe, effective, and environmentally sound marine services that are responsive to the needs of Canadians in a global economy
Health Canada	• Federal department • Roles: work to protect the health of Canadians from environmental risks which relate to air quality, climate change, contaminated sites, environmental contaminants, environmental health assessment and water quality
Infrastructure Canada	• Federal department • Invests in sustainable infrastructure projects • Coordinates federal efforts to build a "New Deal for Cities and Communities"
National Energy Board	• Independent federal agency • Regulates several aspects of Canada's energy industry
Natural Resources Canada	• Federal department • Specializes in the sustainable development and use of natural resources, energy, minerals and metals and forests and in earth sciences
Parks Canada Agency	• Agency (under the Minister of Canadian Heritage) • Mandate: to protect and present nationally significant examples of Canada's natural and cultural heritage and to foster public understanding, appreciation and enjoyment in ways that ensure their ecological and commemorative integrity for present and future generations



Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

3-4 Provincial Jurisdiction

The Province of Alberta has many jurisdictional powers that directly or indirectly relate to environmental matters. These powers are delegated to the Province under the Constitution Act, 1867 and include (Environmental Law Centre 2003):

- The management of natural resources
- The management and sale of provincial public lands including the timber and wood thereon
- Local works and undertakings
- Property and civil rights in the province and local or private matters
- Penalties for violating provincial law

In addition to the above listed powers laid out in the Constitution Act, 1867, the courts have interpreted a number of provincial powers throughout the years. These include the power to regulate environmental matters which include (Environmental Law Centre 2003):

- Provincially owned lands and all resources on those lands
- Activities relating to the beds and shores of all naturally occurring, permanent wetlands
- Wildlife on private or public land, anywhere in the province except on federal land
- The conservation and management of non-renewable natural resources and forestry resources in the province

Through the powers stated above, the Province of Alberta can impact watershed health in a number of ways. The most apparent connection of the province to watershed health is through its ownerships of natural resources, which include water. The Province has the power to deal with, or regulate, water as any private owner would, subject of course to federal law (Environmental Law Centre 2003). Other examples of provincial powers relating to watershed health include the Province's ability to protect environmentally significant natural areas on public lands, to conserve forests and to restrict activities around wetlands.

"Several jurisdictions across Canada have begun the process of developing water strategies and identifying watershed functions in order to develop management plans to protect and enhance these functions while providing guidance for future development (e.g. Conservation Ontario, Saskatchewan Watershed Authority, Manitoba Water Strategy, Alberta Water for Life)."

- Gabor et al. 2004 (p7)

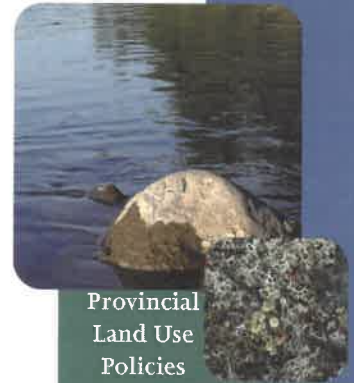
Chapter 3 – Overview of Legislation and Government Bodies Relevant to Watershed Health

In terms of provincial jurisdiction that directly impacts municipal efforts related to watershed stewardship, the province has a number of powers. These include (as outlined by Mallet 2005):

- The provincial legislature has the ultimate authority to extend, restrict or vary powers granted to municipalities under the MGA.
- The Province has broad jurisdiction to control and manage municipal growth through provincial Land Use Policies (see box on right).
- Alberta Environment sets policies for municipal site-condition evaluation in the subdivision process and they regulate industrial facilities and other activities in municipalities.
- The Province influences municipal development priorities through its funding of municipal service and infrastructure projects.

3-4.1. Provincial Legislation and Policies

The Province of Alberta has created a number of statutes and regulations that address a diversity of issues which impact watersheds throughout the province. These are presented in Table 3.5. For more information on the acts and policies listed in this section see Appendix A.



Provincial Land Use Policies

The current provincial Land Use Policies address a number of watershed health issues such as: appropriate land use patterns, subdivision and development, water quality and availability, public access and habitat (see Appendix A).

For watershed stewardship to be achieved provincially there would be value in a land use policy that offers additional support for municipal watershed stewardship. Such a policy could help ensure that municipalities working to incorporate watershed stewardship into planning and municipal operations are not at a disadvantage. This policy could also facilitate regional and intermunicipal planning efforts.

Alberta Sustainable Resource Development (ASRD) is currently leading an initiative to develop a provincial land use policy framework. This framework is not specifically tied to the Land Use Policies identified in the MGA but will have a number of implications for them. This initiative will include a public consultation process which is to be held in 2006-2007.

Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

Table 3.5 Provincial Legislation that Relates to Watershed Health*

Legislation	Description (in relation to Watershed Health)
Agricultural Operation Practices Act / Regulations	• Administered by Alberta Agriculture, Food and Rural Development • This Act provides standards for management of new and expanding confined feeding operations and manure storage facilities to ensure a sustainable environment. The regulations address siting requirements, managing run-on and runoff water and groundwater protection.
Energy Resources Conservation Act, Oil & Gas Conservation Act, Oilsands Conservation Act, Pipeline Act, Hydro and Electric Energy Act	• Administered by the Alberta Energy and Utilities Board (reports to Alberta Energy) • These Acts seek to ensure responsible energy development occurs in the public interest and that there is an opportunity for the review of public concerns. Along with the Acts, several regulations and guides provide regulatory controls which are meant to ensure effective energy conservation and protection of the environment. This includes the protection of water (surface water and groundwater) by the prevention of contamination from oilfield operations including drilling, production facilities, pipelines, river crossings, setbacks to bodies of water, oilsands water recycling, waste management and subsurface produced water disposal. The use of water by utilities for electrical generation facilities is also managed through these acts.
Environmental Protection & Enhancement Act	• Administered by Alberta Environment • This Act sets up the regulatory framework to ensure problems are identified and addressed before a development project is given approval, that conditions are applied to operations where required and that activities are monitored to stringent environmental standards. It takes an integrated approach to the protection of Alberta's air, land and water. It guarantees public participation in decisions affecting the environment. Public involvement includes increased access to information, participation in the Environmental Assessment and Approval Process and the right, when directly affected to appeal certain decisions.
Fisheries Act (Alberta)	• Administered by Alberta Sustainable Resource Development • This Act provides a mechanism to enter into agreements with the federal government regarding the licensing of the use of fish for different purposes and the culture, use and marketing of fish for commercial purposes within the province. While it does not manage water directly, the management of fisheries can impact how we manage for in-stream flow and other ecological needs of our water bodies.
Forests Act	• Administered by Alberta Sustainable Resource Development • This Act deals with the allocation of crown timber on public land. It also prohibits persons from damaging the forest in any way, allows the Minister to

Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

Legislation	Description (in relation to Watershed Health)
	construct and maintain forest recreation areas and establishes Forest Land Use Zones. Forest Management Agreements, administered under the provisions of the Act, provide the framework whereby public consultation can occur, issues can be identified, and other forest values, such as watershed protection, can be taken into account in management plans.
Mines and Minerals Act/ Exploration Regulation	• Administered by Alberta Energy (administers the majority of the Act) and Alberta Sustainable Resource Development (administers part 8 of this Act and Exploration Regulation Administration) • This Act outlines required actions when water is encountered during exploration activities or when conducting exploration activities in the area of water bodies, water supplies and/or water infrastructure.
Municipal Government Act / Land Use Policies	• Administered by Alberta Municipal Affairs • This Act provides the primary statute governing the affairs of Municipalities. Pursuant to the Act, the Land Use Policies identify those matters that the Province feels that municipalities should address in their land-use planning decisions. Each municipality is expected to incorporate the Land Use Policies into its planning documents and planning practices. A goal of the Policies is to contribute to the protection and sustainable use of the province's water resources.
Natural Resource Conservation Board Act / Regulations	• Administered by the Natural Resources Conservation Board (reports to Alberta Sustainable Resources Development) • This Act provides the framework for an impartial process to review projects that will or may affect the natural resources of Alberta (including: confined feeding operations; forest, recreation and tourism, and mining industries; water management projects; and projects referred to the NRCB by the provincial cabinet) in order to determine whether, in the Board's opinion, the projects are in the public interest, having regard to the social and economic effects of the projects and the effect of the projects on the environment.
Provincial Parks Act	• Administered by Alberta Tourism, Parks and Recreation • This Act provides for designation and management of Provincial Parks, Wildland Provincial Parks and Provincial Recreation Areas, including the bed and shores of naturally occurring rivers, streams, watercourses and lakes. It also deals with the management of natural heritage values and activities permitted on lands designated in these categories.
Public Health Act / Regulations	• Administered by Regional Health Units • This Act provides for the protection of public health including issues related to protection of potable water supplies.

Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

Legislation	Description (in relation to Watershed Health)
Public Lands Act	- Administered by Alberta Sustainable Resource Development (Public Lands Division) - This Act governs the administration and use of all public lands. It regulates development and activities that might affect the bed and shore of crown water bodies.
Water Act	- Administered by Alberta Environment - This Act is meant to ensure support and promotion of the conservation and management of water, including the wise allocation and use of water to sustain the environment and quality of life in the present and the future. This Act regulates all developments and activities that might affect streams, rivers, lakes, wetlands and aquifers.
Wilderness Areas, Ecological Reserves, Natural Areas and Heritage Rangeland Act	- Administered by Alberta Tourism, Parks and Recreation - This Act provides for the designation and management of Wilderness Areas, Ecological Reserves, Natural Areas and Heritage Rangelands including the bed and shores of naturally occurring rivers, streams, watercourses and lakes. It also deals with the management of natural heritage values and activities permitted on lands designated in these categories.

In addition to the statutes summarized in Table 3.5, there are others which although less directly related to watershed health, have important links to watershed health. These include:

- [Agricultural Pests Act](#) - provides the legal authority to deal with native and introduced pests which affect agricultural production.
- [Forest Reserves Act](#) - provides a process for the acquisition of land in order to sustain a forest reserve for the purpose of: the conservation of the forests and other vegetation in the forests and the maintenance of conditions favourable to an optimum water supply in a reserve.
- [Government Organization Act](#) - establishes a process for organizing and establishing departments and ministerial powers and includes a number of powers relating to the environment.
- [North Red Deer Water Authorization Act](#) - authorizes the diversion of treated water from the Red Deer River to the towns of Blackfalds, Ponoka and Lacombe. "Return" flows are released into the Battle River.
- [Safety Codes Act](#) - under this Act the Plumbing Code Regulation and the Private Sewage Disposal Systems Regulation set standards that defend against the release of untreated sewage or other wastes into the natural environment.
- [Soil Conservation Act](#) - gives municipal councils the authority to protect land from soil loss or deterioration.

Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

- *Special Areas Act* - establishes a Special Areas Board to administer the three Special Areas located in Alberta.
- *Weed Control Act* - provides the legal authority to deal with native and introduced weed species which affect agricultural production.
- *Wildlife Act* - addresses the conservation of species at risk.

The Province of Alberta has also created policies, frameworks and strategies that serve to guide the Province on a diversity of issues relating to the environment. These include:

- *Alberta's Commitment to Sustainable Resource and Environmental Management* - describes a sustainable collaborative approach to environmental and natural resource management. It seeks to ensure environmental health and economic prosperity continue to coexist.
- *Framework for Water Management Planning* - outlines the process for water management planning and the components required for water management plans in the province.
- *Water for Life: Alberta's Strategy for Sustainability* - outlines a number of actions that will be carried out to reach the strategy's goals of: 1) safe, drinking water supply; 2) healthy aquatic ecosystems; and 3) reliable, quality water supplies for a sustainable economy.
- *Wetland Management in the Settled Area of Alberta: An Interim Policy* - goal of the policy is to sustain the social, economic and environmental benefits that functioning wetlands provide, now and in the future. It proposes that this will be done through wetland conservation, mitigation and wetland restoration.

3-4.2. Provincial Departments and Agencies

Table 3.6 is an overview of ministries and agencies of the Province of Alberta that are involved in decisions and activities that impact various aspects of watershed health. For more information on departments and agencies of the Province of Alberta see Watershed Stewardship in Alberta in Appendix B.



Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

Table 3.6 Provincial Government Departments and Agencies Involved in Watershed Related Activities

Department / Agency	Description
Alberta Agriculture and Rural Development (AARD)	• Provincial department • Works to foster development and growth in Alberta's agriculture and food and agriculture processing industries. • AAFRD's Alberta Environmentally Sustainable Agriculture (AESAs) program - goal is to develop and deliver collaborative environmental stewardship initiatives that result in sustainable growth of Alberta's farm, ranch, and agri-food processing industry.
Alberta Environment	• Provincial department • Mission: to steward and protect Alberta's environment, to sustain diverse ecosystems, healthy Albertans, strong communities and a prosperous economy. • Responsible for water policy and legislation to ensure the quality and quantity of water resources and to ensure thriving ecosystems now and in the future.
Alberta Tourism, Parks and Recreation	• Provincial Department • Mission: to supports the development and marketing of the province as a world-class tourism destination; manages a network of provincial parks and protected areas to preserve important ecological areas and provide opportunities to enjoy and learn about Alberta's natural heritage; and promotes active, healthy lifestyles and athletic excellence by supporting sport, recreation and training facilities. • Responsible for provincial parks.
Alberta Energy	• Provincial department • Seeks to contribute to the social and economic well being of Albertans by managing the sustained and responsible development of the province's oil, natural gas and other mineral resources in a manner that ensures long term benefits to Albertans. • Includes the Resource Land Access Business Unit, which ensures fair and timely access to develop Alberta's resources, while at the same time understanding the significant issues associated with access to resources located in environmentally sensitive areas.
Alberta Energy Resources Conservation Boards (ERCB) and Alberta Utilities Commission	• Independent, quasi-judicial agency • Regulates the safe, responsible, and efficient development of Alberta's energy resources (oil, natural gas, oil sands, coal, and electrical energy) and the pipelines and transmission lines that move the resources to market.
Alberta Health and Wellness: Environmental Public Health	• Provincial department • Help protect the health of Albertans through environmental health monitoring and interventions.

Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

Department / Agency	Description
Alberta Infrastructure and Alberta Transportation	• Provincial department • Mission: to contribute to Alberta's economic prosperity and quality of life through the provision and support of effective and safe transportation, public buildings, and environmentally safe water and wastewater infrastructure.
Alberta Municipal Affairs	• Provincial department • Provides support services, advice and other assistance to help municipalities operate efficiently and preserve public safety.
Alberta Sport, Recreation, Parks & Wildlife Foundation (ASRPWF)	• Non-Profit Crown Corporation • Mission: to facilitate and enhance activities, lifestyles and legacies through the development of active partnerships in sport, recreation, parks and wildlife programs. • Manages a Volunteer Steward Program (jointly with ASRD).
Alberta Sustainable Resources Development (ASRD)	• Provincial department • Works with Albertans across the province to ensure a balance between the economic, environmental and social values of the province. • Fights forest fires, manages fish and wildlife, oversees the development of Alberta's forests and manages the use of public lands. • Rangeland Management Branch of ASRD - vision is to sustain and conserve healthy rangeland ecosystems that maintain biodiversity, while providing resource values, including economic and social benefits for Albertans. • Runs a Species at Risk program. • Manages a Volunteer Steward Program (jointly with ASRPWF).
Environmental Appeals Board	• Government agency; independent board of impartial professionals • Reviews certain decisions made by Alberta Environment under the <i>Environmental Protection and Enhancement Act</i> and the <i>Water Act</i>.
Natural Resource Conservation Board	• Quasi-judicial provincial regulatory agency • Mission: works to ensure that the development of Alberta's natural resources occurs in a socially, economically and environmentally responsible manner. • Regulates Alberta's natural resources and confined feeding industry.
Special Areas Board	• Responsible for the administration of Special Areas No. 2, 3 and 4 as it relates to providing all municipal services as well as the leasing of public lands within the area.

Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

3-5 Municipal Jurisdiction

Municipalities are not allocated any powers under the *Constitution Act, 1867* and instead their powers are delegated under provincial legislation. Municipalities therefore have no greater authority to manage watershed matters than is designated to them by the Province. However, the Province of Alberta has given municipalities many watershed-related powers through a variety of statutes and regulations.

The Municipal Government Act

The main source of municipal government power in Alberta is the *Municipal Government Act* (MGA). There is an implicit relationship between the purpose of a municipal government as stated in the MGA and watershed health. The purpose of a municipality is states as follows [MGA 1(3)]:

- (a) to provide good governance,
- (b) to provide services, facilities or other things that, in the opinion of council, are necessary or desirable for all or part of the municipality, and
- (c) to develop and maintain safe and viable communities.

As discussed in Chapter 2 healthy functioning watersheds provide many “services and facilities” that are desirable to communities. For example, wetlands and riparian areas filter out harmful materials from water and provide water storage localities (which mitigate flood damage during heavy rains and are a source of water during droughts). They also provide recreation areas for boating, swimming and relaxing. By promoting watershed health municipalities can indirectly provide these and other watershed services and facilities in their communities.

A healthy watershed is also an important characteristic of a “safe and viable community” because of its link to human and economic health. A watershed that is managed well will maintain reliable quantities of cleaner water for human consumption, agriculture, industry and recreation. Economic sustainability depends on the availability of reliable quantities of water over the long term, which depends on good watershed management. Through well thought out watershed stewardship municipalities can protect the long-term safety and viability of their communities.

In terms of specific municipal responsibilities, the MGA gives municipalities a variety of powers to impact environmental health. These include (adapted from Environmental Law Centre 2003):

- “Natural person” power - permits municipalities to do anything a natural person may do (e.g. borrow money, lend money, buy land sell land and enter into leases without specific legislative authority) unless it conflicts with another statute
- General powers to pass bylaws

Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

- Control over rivers, streams, lakes and other natural water bodies within the municipality [MGA 60(1)] (although water bodies on municipal lands are the property of the Province)
- Municipal planning and development - the power to create statutory plans (e.g. MDP, ASP) and land use bylaws and to make decision on subdivision and development proposals
- Conservation of natural areas - the MGA provides municipalities with many tools for conserving natural areas
- Taxation

These powers provide municipalities with many opportunities to promote and demonstrate watershed stewardship and are discussed throughout this guide.

Other Statutes and Responsibilities

In addition to the MGA, there are a number of Provincial Statutes that provide municipalities with additional environment-related powers (as outlined by Mallet 2005):

- *Environmental Protection and Enhancement Act* - gives municipalities the power to accept, hold and enforce conservation easements (s.22-24).
- *Historical Resources Act* - gives municipalities the power to make designations or enter into agreements with landowners to protect historic resources (s.26-27). A “historic resource” is defined broadly and includes sites and features of historic, cultural, natural, scientific or esthetic interest.
- *Traffic Safety Act* - gives municipalities powers to regulate the use of highways and roads under their jurisdiction and related traffic management issues (s.13-14).
- *Dangerous Goods Transportation and Handling Act* - provides municipalities with a limited authority to designate dangerous goods routes (s.17).

Aside from municipal powers and responsibilities assigned in provincial legislation, municipalities also have opportunities to provide input when the federal or provincial government is making changes to policies and legislation. For example, when the province is changing an old policy or legislation or creating a new one, they often seek direct input from municipalities and in many cases from all stakeholder groups. Input is often encouraged through a variety of public consultation processes which include written requests for feedback, workshops and open houses. It is important that municipalities take advantage of these opportunities as they are a means for ensuring local needs and watershed considerations are addressed.

Municipalities also have the power to initiate their own processes for suggesting changes in policies and legislation so that watershed considerations are incorporated. For example, every year municipalities bring forth resolutions to the province regarding changes they would like to see in policies and legislation. Municipalities can send these resolutions directly to the province or they can seek province-wide municipal support at meetings run by the Alberta Urban Municipalities Association (AUMA) and the Alberta Association



Public consultation was an important component in the development of Alberta's *Water for Life* strategy. In the spring of 2002, the Province asked key stakeholders and Albertans to respond to ideas regarding water management (which were generated by a small, diverse group of Albertans) and to offer their own advice, opinions and ideas (see Appendix A).

Chapter 3 - Overview of Legislation and Government Bodies Relevant to Watershed Health

of Municipal Districts and Counties (AAMD&C), prior to submitting them to the province. Submitting resolutions to the provincial and federal governments is a means of voicing municipal concerns regarding watershed health.

3-6 Additional Information

The Environmental Law Centre has created three publications with information about environmental law. For more information visit their website at <http://www.elc.ab.ca/publications/index.cfm> or call their Edmonton office at (780)424-5099 (or 1-800-661-4238 toll free).

- **The ABC's of Environmental Jurisdiction: an Alberta guide to federal, provincial and municipal responsibility** (2003) - provides a description of jurisdictions and legislations according to a range of environmental topics
- **Alberta's Wetlands: A Law and Policy Guide** (2001) - provides a general instruction on law and jurisdiction as well as specific information on areas of law that can impact wetlands
- **Reconciling Ecosystem and Political Borders: A Legal Map** (1998) - identifies and describes all the ways those with a legal right to affect an ecosystem may do so - from pipe line rights-of-way to timber permits to mineral surface leases to national park dispositions. This document investigates existing models where public and private interests have cooperated to conserve ecosystems.

The Law and the Lake: Navigating Alberta's Regulatory Framework - what everyone should know before working around water (Haekel 2002) - provides information on legislation and government agencies involved in activities around water bodies. This publication was put together by the Public Lands Division of ASRD. For a copy visit [http://alms.ca/DwnldDocs/Environmental/LakeLaw\(2002\).pdf](http://alms.ca/DwnldDocs/Environmental/LakeLaw(2002).pdf) or contact the Alberta Lake Management Society (ALMS) at their Edmonton office at (780) 492-1294.

4-1

Planning and Development and Watershed Health

Integrating watershed planning into land use planning is at the very root of municipal watershed stewardship. It sets the stage for watershed management because the physical state of land is a major determinant of watershed health. Accounting for watershed needs when determining land uses may be one of the most important contributions a municipality can make to the health of their watershed.

Legislation

Legislation: The purpose of municipal planning and development as stated in the Municipal Government Act (MGA) is indirectly linked with watershed stewardship. Its purpose is:

...to provide a means whereby plans and related matters may be prepared and adopted:

- a) to achieve the orderly, economical and beneficial development, use of land and patterns of human settlement, and
- b) to maintain and improve the quality of the physical environment within which patterns of human settlement are situated in Alberta,

without infringing on the rights of individuals for any public interest except to the extent that is necessary for the overall greater public interest (s.617).

The above statement has significant implications regarding the importance of watershed stewardship. The manner in which land is developed and used and the patterns in which humans settle can have considerable effects on watershed health. At the same time, a healthy watershed is an important indicator of the “quality of the physical environment” on which human health, community health and economic health depend.

This Chapter provides a brief overview of some watershed considerations that can be addressed in municipal decisions and activities relating to planning and development.



Photo credit:
City of Edmonton

Chapter 4 - Municipal Planning and Development

4-2

Making a Commitment to the Environment

An important component of municipal watershed stewardship is making a commitment to the environment. Sustaining healthy watersheds requires long-term thinking but without an officially endorsed statement of watershed stewardship priorities, there may be limited long-term support for environmental initiatives and programs.

A municipal commitment to the environment can take many forms. Depending on local needs and desires and available resources, commitments and will vary from one municipality to the next. The following is a list of characteristic for municipalities to consider when developing a commitment to the environment:

- **Issues to be addressed** - A municipality's commitment to the environment can address very specific issues important in their communities or they can be general in nature and address broad environmental concerns.
- **Physical layout** - Municipal commitments to the environment come in many forms. For example, some are a vision statement with well-defined terms which provide a basis for goals and objectives, while others are a series of statements that underpin goals and objectives (National Guide to Sustainable Municipal Infrastructure 2003). Environmental commitments can be embedded in a variety of policies and strategies or be policies in and of themselves.
- **Level of commitment** - There are many levels of environmental commitment that municipalities can commit to. Table 4.1 presents a breakdown of four tiers of environmental management approaches that occur in corporations and governments. "Comprehensive Management is the minimum tier for cost-effective and efficient management of environmental protocols. Few, if any, organizations have achieved the fourth tier, but many have established a strategic commitment to approach it" [National Guide to Sustainable Municipal Infrastructure 2003 (p.10)].

Chapter 4 - Municipal Planning and Development

Table 4.1 Environmental Management Approach Tiers

Source: National Guide to Sustainable Municipal Infrastructure. 2003. *Strategic Commitment to the Environment by Municipal Corporations*. A Best Practice by the National Guide to Sustainable Municipal Infrastructure.



Tier	Description
1. Fixing problems	• Short-term focus on financial performance • Ad hoc approach to social concerns and to resolving environmental non-compliance (e.g. as a result of spills or complaints)
2. Compliance	• Due diligence with respect to risks and liabilities • Environmental and social responsibilities are seen as imposed costs
3. Comprehensive Management	• Long-term approach that includes pollution prevention • Sophisticated management systems in place (e.g. an environmental management system) • Some integration of environmental factors into traditional performance measures
4. Sustainable Development	• Long-term planning taking full account of internal and societal interests in an integrated decision-making framework, including economic, social, and environmental factors for current and future generations

Below are some general questions for municipalities (as corporations) to consider when developing a commitment to the environment (National Guide to Sustainable Municipal Infrastructure 2003):

1. Does the corporation have a vision with respect to the environment? What type of commitment is needed to achieve the vision?
2. What approvals process is needed to develop and secure ongoing support for the commitment by the organization?
3. Who should be involved in the development of the commitment (political leaders, senior management, public advisers, academic advisers)? What is the process and forum for involvement?
4. Are there areas of focus of particular importance to the corporation or community...?
5. Is terminology in use clearly defined? What does sustainability mean to the organization?

Chapter 4 - Municipal Planning and Development

6. What are the goals resulting from the commitment as they relate to the business of the corporation?
7. What current initiatives are under way that support the commitment? Who are the corporation's champions for environmental commitment? How is staff participating in these initiatives?
8. What indicators should be measured, and how would these apply to various parts of the corporation? What is being measured now and what do the measurements indicate?
9. How should accountability for developing plans and initiating action be structured (e.g. by department or through special terms)? What authority is needed to match the accountability?
10. What processes are in place to ensure communication, measurement and reporting occur as part of ongoing normal business practices?

Once a municipality has made a commitment to the environment or during the development of one, they may also wish to ask themselves watershed-specific questions to help set more specific priorities and goals. To start, a municipality may ask itself:

1. What is the state of various watershed components?
 - surface water (e.g., water quality, water availability, current uses)
 - groundwater (e.g., water quality, water availability, current uses)
 - natural areas and the corridors that connect them (e.g. the state and quantity of existing wetlands and riparian areas)
2. What are the major economic and social factors currently impacting watershed health (positively and negatively)? What are the predicted future trends?
 - current and proposed land uses
 - population growth
 - agricultural, commercial and industry activity
 - predicted future trends regarding land use and industry growth
3. What are the environmental impacts of current municipal services and operations (e.g. wastewater and stormwater management, municipal parks)?
4. What are the benefits being received as a result of watershed health? Identify important green infrastructure and the specific benefits they provide (see [section 2-4 for a description of the following benefits](#)).
 - human health and social benefits
 - economic benefits
 - environmental benefits

Chapter 4 - Municipal Planning and Development

More Information

More Information: Developing a Commitment to the Environment**Strategic Commitment to the Environment by Municipal Corporations**

(National Guide to Sustainable Municipal Infrastructure 2003) - many of the ideas in this chapter came from this publication. Available online:

http://www.sustainablecommunities.fcm.ca/files/Infraguide/Environmental_Protocols/Accounting_Environm_Soc_Outc_Dec_Mak.pdf

International Council for Local Environmental Initiatives (ICLEI) - ICLEI is an international association of local governments implementing sustainable development. They provide technical consulting, training, and information services to build capacity, share knowledge, and support local government in the implementation of sustainable development at the local level. Their basic premise is that locally designed initiatives can provide an effective and cost-efficient way to achieve local, national, and global sustainability objectives. Website: www.iclei.org. Phone: (416)392-1462 (Toronto office).

International Institute for Sustainable Development (IISD) - the IISD has identified steps for business enterprises looking to adopt sustainable practices (see publication entitled Business Strategies for Sustainable Development at http://www.bsddglobal.com/pdf/business_strategy.pdf). IISD engages decision-makers in government, business, NGOs and other sectors to develop and implement policies that are simultaneously beneficial to the global economy, the global environment and to social well-being. Website: www.iisd.org. Phone: (204)958-7700 (Winnipeg office).

**Setting Measurable Goals and Objectives**

Having measurable goals and objectives is essential both for determining the effectiveness of municipal efforts and for the continual improvement of municipal efforts. Measuring the impact of municipal decisions and initiatives is an important component of **adaptive management**, a results-based approach to management. Adaptive management involves the tracking of progress over time, the identification of successes and failures and the identification of methods for improvement. Measurable goals and objectives provide opportunities for learning and they contribute to the creations of bodies of knowledge that can be used to support current or future efforts based on past experiences. In this regard, measurable goals and objectives can serve to build confidence regarding new practices for protecting watershed health, whether they are entirely new or simply new to a community.

There is a range of environmental indicators that can be used to measure goals and objectives and to monitor progress. They can be divided into three basic categories (National Guide to Sustainable Municipal Infrastructure 2003):

- **performance indicators** - operational considerations such as resource inputs, outputs, contracted service providers and corporate facilities and equipment

Chapter 4 - Municipal Planning and Development

- **management indicators** - associated with policies and programs (e.g., number of targets achieved, suggestions from employees), conformity, financial performance and community relations
- **condition indicators** - air and water quality, land preservation, preservation of fauna and flora, human health, cultural preservation

Additional examples of indicators relating to watershed health include: water usage rates, staff awareness of watershed issues, storm water quantity and quality, percentage green space per capita and number of visitors to outdoor recreational areas. Environmental indicators will vary greatly depending on the nature of municipal goals and objectives and the resources available to measure them.

“Municipalities...have to watch that they don't overreact to the noise generated by a changing decision making environment, and instead, must deal with the facts and sound supportable data, rather than hype and emotion.”

-The Ag Summit
Collection of Action
Team Reports
2002(b)

4-3 Gathering Information

A wide range of information is needed to help municipalities set watershed-related goals and priorities, to determine management strategies and to measure the success of watershed efforts.

Every municipality and every **sub-watershed** within the NSRW has unique needs and consequently the effectiveness of various approaches to watershed stewardship will differ from one municipality to the next. Without up-to-date information municipal decision makers may make blind conclusions about what is needed to improve or maintain watershed health in their communities.



Photo credit:
Sarah Depoe

Information for watershed planning and management can come from a number of sources, which include the following:

- Information that has already been collected by government and non-government groups
- Information gathered by developers (e.g. as required by municipalities as part of subdivision and development approvals or ASPs, as provided to convince a municipality to change a Land Use Bylaw)
- Information that is routinely gathered by municipalities prior to making statutory and non-statutory land-use plans (e.g. information gathered in a municipal development plan review or before making changes to a land use bylaw)
- Environmental studies conducted by a municipality independent of statutory plans

Chapter 4 - Municipal Planning and Development

Table 4.1 is an overview of some sources of watershed-related information, some where information is already available and some that municipalities may wish to consider gathering themselves. Municipalities can adapt their information gathering processes as needed to meet local information needs.

Table 4.1 Sources of Watershed-Related Information

Information Source	Description	More Information
The State of the Watershed Report (North Saskatchewan Watershed Alliance 2005)	This report provides information about the state of the NSRW and each of its subwatersheds based on thirteen indicators of watershed health.	Available online: www.nswa.ab.ca For an overview of the report's findings see Chapter 2.
Regional Groundwater Studies	- Groundwater assessments have been completed or are currently being conducted in over 75 percent of Alberta's municipalities. This has been a joint effort between municipalities and the Prairie Farm Rehabilitation Administration (PFRA) - Agriculture and Agri-Food Canada. - Studies are intended to help municipal councillors with planning or project-siting and to identify areas where groundwater levels are falling. They include mapping which shows groundwater discharge and recharge areas and areas subject to high water table conditions.	To find out if a regional groundwater assessment has been completed in your municipality visit http://www.hcl.ca/reports.asp
Water Quality Reports	- Alberta Environment has published water quality reports on a number of lakes and rivers throughout Alberta. - The Alberta Lake Management Society runs a volunteer lake monitoring program which collects water quality data for lakes throughout Alberta.	Alberta Environment - for a list of water quality reports visit http://environment.alberta.ca/2024.html or phone (780)427-5870. Alberta Lake Management Society - for more information on the Lake Watch program and its reports visit http://alms.ca.

Chapter 4 - Municipal Planning and Development

Issue	Description	More Information
Environmental Resource Inventory (ERI)	• Having an inventory of environmental resources or natural capital can help a municipality make decisions regarding the types of development and activities that should be permitted in areas throughout their municipality. • An ERI involves: identifying types of environmental resources or natural capital, establishing a method for measuring them and tracking changes over time. • Often uses Geographic Information System (GIS) mapping.	The Environmental Resource Inventory: ERI (Association of New Jersey Environmental Commissions 2004) - this paper provides an overview of how to conduct an ERI and what information should be considered for inclusion. Available online: http://www.anjec.org/pdfs/EnvironmentalResource04.pdf. Phone: (973)539-7547.
Environmentally Significant Area (ESA) Studies	• ESAs may include wetlands, riparian areas, groundwater recharge/discharge areas and other natural areas whose protection is important to watershed health. • Through their own studies, a number of municipalities have identified ESAs of local significance. • The Alberta Natural Heritage Information Centre (ANHIC) has identified a number of ESAs of provincial, national and international significance.	Alberta Natural Heritage Information Centre (ANHIC) - for information on methodology used for identifying provincial ESAs, definitions of ESAs and significance levels, the criteria to identify sites and individual site descriptions, see the report entitled <i>Environmentally Significant Areas of Alberta Vol 1-3</i>. Available online: http://tpr.alberta.ca/parks/heritageinfocentre/.
State of the Environment Reports	• Many municipalities throughout Canada are undergoing independent studies to determine the state of their environment. These studies provide municipal decision-makers with accurate measure of environmental performance on which to base their decisions. • Conducting a State of the Environment report is a good starting point for municipalities. These can be followed by watershed plans with measurable objectives and targets, which are followed by report cards that chart progress.	Alberta Environment's State of the Environment Reporting - for a list of factors the Province uses in its environmental reporting visit their website at http://www3.gov.ab.ca/env/soe/index.html.

Chapter 4 - Municipal Planning and Development

Issue	Description	More Information
Riparian Health Inventories	• Healthy riparian areas are critical to watershed health and having information about their existence and state is important for watershed planning. Inventory information can be used to assist municipalities in developing strategies for addressing riparian land use issues, monitoring riparian health progress and identifying environmental risks and integrating them into urban planning (Cows and Fish 2005). • Riparian Health Inventories are being conducted by a number of municipalities (see box below for an example).	Cows and Fish - offer many resources to municipalities and landowners interested in conducting riparian health assessments. Website: http://www.cowsandfish.org/health.html. Phone: (780) 427-7940 (Edmonton office). Water for Life Strategy - as part of the Healthy Aquatic Ecosystem component of this strategy, the Province is currently working to develop more tools for the assessment of health in the aquatic environment.

When information from municipal studies or independent studies is incorporated into municipal decisions, the sources of information can be referenced in the associated plan, policy, strategy, etc. This can serve as a notice to the public, developers and other interested individuals of the rationale for municipal decisions.

Chapter 4 - Municipal Planning and Development

Municipal Success Story**Riparian Health in the City of Camrose**

In 2005 the City of Camrose completed a Riparian Health Inventory (RHI) of the entire riparian area within its municipal boundary (which includes Camrose Creek and Mirror Lake). It is one of the first urban municipalities in Alberta to complete a comprehensive study of this kind. The inventory of the riparian area within the City has allowed the collection of baseline information to bring awareness of the condition of riparian areas and will assist the City in making decisions about management practices carried out within these areas.

The Results

The results of the RHI in the City of Camrose state that the overall health of the riparian areas were healthy but with problems (see table below). The areas graded as unhealthy were mostly in green urban areas that are maintained for recreation and that citizens considered to appear healthy. These areas included recreational areas such as paved trails, park benches, gazebos and other aesthetics that are not natural to the area but requested by the citizens of Camrose. The City continues to work to educate staff and the public about riparian health. The RHI also included a number of recommendations that went to council as to how the City could work with the results of the inventory to maintain and improve riparian health.

	City of Camrose(11 sites)	Alberta Average*
healthy	36%	18%
healthy but with problems	46%	52%
unhealthy	18%	30%

*1000 sites on 50 streams, lakes and rivers from 1998-2003

The Process

The City's RHI project was a joint effort between the City and Cows and Fish. Meetings were held to discuss what areas the City would like to include in the Riparian Health Inventory and Cows and Fish delineated each study area. There were joint discussions on what the City would like to attain with the project and Cows and Fish explained how they could assist with those goals. The majority of the research was completed by Cows and Fish as they were contracted to collect data, analyze the results and provide the City with a report and recommendations. With expertise from Cows and Fish limited research was required by the City. The Alberta Riparian Habitat Management Society was also involved in the RHI.

Chapter 4 - Municipal Planning and Development

Resources

A total budget of \$10,000 was set aside for the project. This allotment included the costs for having Cows and Fish complete the project along with staffing, advertisements and general expenses related to the project. Cows and Fish attended a City Council meeting and presented what the RHI would entail and what it would do for the City. Council approved the inventory in their 2004 annual budget.

As for the involvement of municipal staff in the inventory, Cows and Fish completed the majority of the work on the project. Municipal staff involvement was limited to one main individual who was involved with implementing the inventory and providing background data and resources to Cows and Fish throughout the project.

There are no on-going costs in relation to the RHI project. However there may be some costs related to the results and recommendations of the report for management in riparian areas and adjacent green spaces. There were also recommendations to complete another RHI in three to five years to monitor the trend in the health of riparian areas.

Contact Information

Jeremy Enarson
Assistant Municipal Engineer
City of Camrose
Phone: (780)672-4428
Email: jenarson@camrose.ca

Cows and Fish
Alberta Riparian Habitat
Management Society
Phone: (403)340-7607



Municipal Examples

Municipal Example: State of the Environment Reporting

City of St. Albert - published its first annual Report on the Environment in 2003. The City recognizes that if they are to achieve sustainability, the City and its citizens must be able to accurately measure environmental performance, and regular reporting on the state of the environment is the best way to track this. One section in the report is dedicated to water and looks at drinking water, water consumption, water conservation, water quality and the aquatic environment, wastewater, stormwater management, road salts and watershed management. The other sections of the report cover topics including air quality, land and energy, population growth and urban development, contaminated sites, open spaces and natural areas, urban forestry, pesticide use, waste and resource management, recreation and social resources. Available online: <http://www.stalbert.ca/report-on-the-environment>
Phone: (780)459-1500.

Chapter 4 - Municipal Planning and Development

4-4

Statutory Plans*

*Many of the ideas expressed in this section have been adapted from *Municipal Powers, Land Use Planning, and the Environment: Understanding the Public's Role* (Mallet 2005).

Watershed health is greatly affected by the physical state of land and therefore there is a need to address watershed health in municipal land use policies and plans. Under the MGA, a municipality is responsible for developing a number of land use planning documents, all of which can incorporate watershed needs (see Table 4.2). These documents can provide direction on a variety of watershed-related issues, which range from local to regional in scale.

Table 4.2. Land Use Planning Documents as a Tool for Watershed Stewardship

Planning Document	Watershed Considerations
Intermunicipal Development Plan	• Tool for coordinating watershed stewardship efforts with adjacent municipalities • See section 8-1.1 for more information
Municipal Development Plan	• Tool for addressing watershed issues on a municipal wide scale • See section 4-3.1 for more information
Area Structure Plan	• Tool for addressing watershed issues at a local scale • See section 4-3.2 for more information
Area Redevelopment Plan	• Tool for alleviating development pressures on undeveloped lands or previously developed lands (by steering development to a redevelopment area) • Tool for reclaiming contaminated lands • See section 4-3.3 for more information
Land Use Bylaw (not statutory)	• Tool for steering land use and development to incorporate watershed health • See section 4-4 for more information

"Without strong policy direction from council, experience shows that most planning departments are unlikely to require developers to move beyond the status quo of low-density sprawl in large-scale raw land development."

- Mallet 2005 (p34)

Chapter 4 - Municipal Planning and Development

Many municipalities are already beginning to create environmental conservation sections within their land use planning documents, which indirectly address many watershed health issues. In addition to these sections, municipalities may consider creating watershed sections to address specific watershed issues. New environmental/watershed policies may be added to existing land use plans or plans may be redeveloped to incorporate watershed needs. When these changes are made it is also important that other plans and policies are updated so that they are consistent with one another.

The updating or redevelopment of land use plans involves a number of activities, all of which can be used to help determine watershed-related priorities and policies. These activities include data collection, council meetings, public consultation, collaboration between municipal staff and council and the physical creation of documents. Municipal efforts to protect watershed health will achieve optimal results when all of these activities are used to develop watershed policies to be included in land use plans.



More Information

More Information: Municipal Land Use Planning

The Legislative Framework for Municipal Planning, Subdivision and Development Control (Alberta Municipal Affairs 2002) - provides a discussion of the legislated municipal planning framework, outlines the legislated steps in the subdivision and development control process and notes the statutory exemptions and limitations to municipal planning authority. Available online: <http://www.municipalaffairs.gov.ab.ca/documents/ms/legframework.pdf>. Phone: (780)427-2732 - dial 310-0000 for a toll-free connection (Edmonton office).

4-4.1. The Municipal Development Plan (MDP)

A Municipal Development Plan (MDP) is a unique tool for watershed planning because of its broad scope. Understanding watershed issues and planning for watershed health requires looking at the larger picture, and the MDP is a means for addressing the largest picture possible within municipal boundaries.

An MDP review provides an opportunity for gathering the information needed to make land use policy decisions that incorporate watershed needs. It usually involves detailed assessments of the physical state of municipal lands, extensive community consultations and studies of current trends regarding population growth, land use and industry growth. It is important that these information-gathering processes are thorough and yield the wealth of information needed to create MDPs that address watershed health and community needs.

A typical MDP will propose general conservation measures for significant natural areas owned or acquired by a municipality (Mallet 2005). This is a good start, but municipalities can go beyond this status quo and incorporate watershed stewardship into an MDP from many additional angles (see Table 4.3). While most MDPs address broad issues with general language there is no reason that they cannot address specific policy issues relating to environmental and/or watershed health. It is argued that specific language can strengthen an MDP and increase accountability without preventing flexible responses to emerging issues (Mallet 2005).

Table 4.3 Considerations for Addressing Watershed Health in an MDP

Issues that can be Addressed in an MDP*	Watershed Considerations for Inclusion in an MDP
Future land use within a municipality and the manner of and the proposals for future development in a municipality	• Identifying and protecting (and/or restoring) important open spaces and green corridors between them • Limiting development in environmentally sensitive areas • Requiring watershed impacts be considered when making decisions about the location, type and intensity of land uses in a municipality • Relieving development pressures on natural areas at the urban fringe by promoting infill development and downtown redevelopment • Setting Urban Growth Boundaries** • Encouraging the appropriate development of land with a history of contamination (brownfields) and promoting land reclamation • Promoting mitigation where the development of natural areas is a priority • Identifying areas where confined feeding operations will not be permitted (see section 6-4.2)
Policies respecting the protection of agricultural operations	• Developing comprehensive policies for the protection of agricultural land (which contribute to watershed health if managed well) • Creating guidelines to protect land at the urban fringe from development (to create a buffer between urban and agriculture lands)
The coordination of land use, future growth patterns and other infrastructure with adjacent municipalities (if there is no IDP)	• Setting priorities or creating policies that extend watershed stewardship initiatives across municipal boundaries • See Chapter 8 for information on intermunicipal cooperation and IDPs
The provision of the required transportation systems either generally or specifically	• Requiring that environmental impacts are considered when making decisions about transportation infrastructure (see section 6-2) • Decreasing demands for impermeable road infrastructure by promoting public transportation and community walkability

*as listed in the MGA section 632 (3)

** Urban Growth Boundaries (UGBs)

The use of Urban Growth Boundaries (UGBs) is a controversial topic. Theoretically UGBs are a means to prevent urban sprawl by limiting the physical space available for urban areas, thereby forcing communities to maximize land use in existing neighbourhoods through infill development. This leads to efficient, compact design and growing up instead of out (i.e. urban sprawl). Among the criticisms of UGBs is that they are an infringement on an owner's property rights (bylaws for no growth zones in some U.S. cases have been challenged in court) and that they limit land supply and thus increase lot costs.

Chapter 4 - Municipal Planning and Development

Issues that can be Addressed in an MDP*	Watershed Considerations for Inclusion in an MDP
Environmental matters within a municipality	• Including proposed measures for the development and implementation of conservation plans for environmentally significant areas • Setting priorities to identify important natural areas and areas for restoration (<i>before</i> development pressures grow) • Specifying a lower limit on the amount of land that can be taken as a municipal reserve (e.g., for public parks and open spaces)
The coordination of municipal programs relating to the physical, social and economic development of a municipality	• Developing municipal programs and initiatives to guide economic development that promotes watershed health (e.g., attracting environmentally-responsible business)

*as listed in the MGA section 632 (3)

Municipal Examples

Municipal Examples: MDPs with Environmental Considerations

Strathcona County - is currently reviewing their MDP. The draft MDP addresses a number of environmental considerations in areas which include environmental management, growth management, agriculture, transportation and industry. Website: www.strathcona.ab.ca (click on "Municipal Development Plan Review"). Phone: (780) 464-8080.

City of Edmonton - in their 1998 MDP, the City has included "preservation and enhancement of the natural environment and open spaces" and the "protection of the natural environment" as priorities. Available online: http://www.edmonton.ca/city_government/documents/CityGov/02059_Natural_Areas.pdf (click on "Infrastructure and Planning," then "Planning" and then "Plan Edmonton"). Phone: (780) 496-6160 (Planning and Development Department).

Woodland County (northern Alberta) - has incorporated the protection of private woodlots into their MDP. They have created a bylaw (bylaw 176/04) that requires that when examining potential lands for agriculture expansion, the loss of land which may have a potential for forestry or private woodlot management must be considered (section 2.1.4 Agriculture Expansion). This is the first MDP bylaw of its kind that provides protection for woodlots. For a copy call their office at (780) 778-8400.

Parkland County - 1998 MDP. Available online: http://www.parklandcounty.com/About_Us/Reports/Municipal_Development_Plan.htm. Phone: (780) 968-8443 (Planning and Development Services).

Municipal District of Foothills - 1998 MDP. Available online: <http://www.mdfoothills.com/mdp.pdf>. Phone: (403) 652-2341 (Development and Land Use Information).

Chapter 4 - Municipal Planning and Development

4-4.2. The Area Structure Plan (ASP)

Area Structure Plans (ASPs) focus on previously undeveloped areas slated for development and may be one of the strongest tools for watershed planning at a local level. ASPs provide an opportunity for turning broad watershed health-related development visions (as defined in an MDP), into more concrete design and development policies for specific parcels of land. There are a number of watershed issues that can be addressed in an ASP (see Table 4.4).

Table 4.4 Considerations for Addressing Watershed Health in an ASP

Issues to be addressed in an ASP*	Watershed Considerations for Inclusion in an ASP
Proposed land uses	• Ensuring development is environmentally appropriate in an area (e.g., may not be appropriate near wetlands, waterways and groundwater recharge areas; soil conditions may impact suitability for development) • Requiring environmental information or impact statements prior to decisions about land uses being made • Identifying critical natural areas and confining development and construction activities to the least critical areas (allowing existing green infrastructure to shape the block) • Encouraging development that prevents, mitigates or minimizes environmental impacts • Preserving important green infrastructure (e.g., natural drainage systems) • Prohibiting new or expansion nonagricultural uses in an agriculture community wishing to retain its agricultural identity • Identify environmentally sensitive areas that will be targeted for environmental reserves (or conservation easements) and municipal reserves when subdivision occurs • Creating incentives to developers for environmentally responsible development (see Section 4-7)
Population densities	• Promoting green cluster development (see below)
Location of major transportation routes and public utilities	• Considering the conservation of important natural areas when determining the location of roads, pipelines and other infrastructure • Creating efficient public transportation and walkable communities, which decreases demands for road infrastructure
Any other matters council considers necessary	• Addressing other watershed issues and priorities (which may be set out in other policies) on a site-specific level

*as indicated in the MGA section 633(2)

Chapter 4 - Municipal Planning and Development

Cluster development refers to a form of development characterized by clusters of high density development mixed with open spaces. Through cluster development, municipalities can address development needs without consuming large tracts of undeveloped land. Cluster development is fundamental to Conservation Subdivision Design (CSD), which is a growing body of knowledge currently guiding green development. Conservation design is based on rearranging development on each parcel of land as it is being planned so that half (or more) of the buildable land is set aside as open space. See section 4-4.2 for references on CSD.

Municipalities are responsible for approving ASPs, which are usually prepared by developers and expensive to create. The most effective way of ensuring that watershed priorities set out in municipal policies are addressed in ASPs is for municipalities to maintain open lines of communication with developers. This involves providing them with guidance and feedback throughout the ASP process. Municipal policies that set out procedures that guide the involvement of council and/or municipal planners in the development of an ASP (by a developer) can be an important tool for watershed management. (See section 4-7 for information on working with developers.)

Where possible, it may also be beneficial to set the boundaries of an ASP to follow natural boundaries. For example, the boundaries for an ASP for a proposed development around a lake can be set as the lake's sub-watershed. Aligning ASP boundaries with watershed boundaries (or other environmentally relevant boundaries) facilitates the reflection of larger watershed considerations into local development decisions and encourages developers to consider the impacts of their proposed developments on the greater watershed.

Off-Site Levy Bylaws

A municipality is authorized to create an off-site levy bylaw to cover the costs related to water, stormwater and roads [MGA 648(2)]. Through the creation of an off-site levy bylaw, a municipality can make subdivision and development costs on unserviced zones reflect the true costs of development. An off-site levy bylaw creates a higher cost for subdivision and development on green spaces, which are not yet serviced by a municipality, thus providing an incentive for infill development in areas where municipal services are already established. In this way, off-site levies can help decrease development pressures on green spaces. Furthermore, infrastructure and servicing costs for an area decrease as the density of development increases and reflecting these differences in an off-site levy can encourage high density development (Curran 2003 a). High density development can contribute to decreased pressures on green spaces and can encourage green cluster development.



"Compact, green residential development can yield an average development cost savings of 30 percent compared with conventional development. Key areas of savings include reducing road area and stormwater and sewage drainage pipes."

- Land Development Magazine 2000 as referenced by Evergreen b

Chapter 4 - Municipal Planning and Development

4-4.3. The Area Redevelopment Plan (ARP)

An Area Redevelopment Plan (ARP) can be used by a municipality to preserve or improve land and buildings, to rehabilitate, remove, construct, and replace buildings, to establish or improve roads, public utilities and other services and to facilitate any other development in the area (MGA 634(a)). Redeveloping already developed areas can be a tool for addressing a number of watershed health issues (see Table 4.5).

Table 4.5 Area Redevelopment as a Tool for Watershed Stewardship

Potential Outcomes of Area Redevelopment	Examples
Improving environmental health	Reclaiming contaminated lands improves environmental health (which may also decrease human health risks)
Addressing growing development pressures	- Redirecting development pressures away from undeveloped (and unserved) green spaces to already developed areas such as: - grayfields (aging strip malls and shopping centers) - brownfields (unused industrial lands) - already developed residential areas (e.g., neighbourhood revitalization)
Adapting land uses as desired	Areas can be redeveloped to incorporate new strategies, priorities, policies and information regarding watershed issues
Saving municipal dollars	- Development in areas where infrastructure such as roads and pipelines already exist not only decreases development pressures on Greenfields, but saves money that would have been spent designing and constructing these in undeveloped areas - The cost of expanding existing infrastructure is often significantly lower than the cost of building new infrastructure

Municipal Example: ARP**City of Edmonton: North Saskatchewan River Valley Area Redevelopment Plan**
(Bylaw 7188) - major goals:

1. To ensure preservation of the natural character and environment of the North Saskatchewan River Valley and Ravine System
2. To establish a public metropolitan recreation area
3. To provide the opportunity for recreational, aesthetic and cultural activities in the Plan area for the benefit of Edmontonians and visitors of Edmonton
4. To ensure the retention and enhancement of the Rosedale and Cloverdale communities in the River Valley

This plan ensures the application of an environmental impact screening and assessment to all proposed public development and development on public land within the area. Available online: http://www.edmonton.ca/environmental/natural_areas/resources-and-publications.aspx.



4-5

The Land Use Bylaw (LUB)*

*Many of the ideas expressed in this section have been adapted from *Municipal Powers, Land Use Planning, and the Environment: Understanding the Public's Role* (Mallet 2005).

The LUB is an important regulatory tool by which municipalities carry out their statutory plans and should therefore be consistent with environmental policies outlined in these plans. However, statutory plans are given liberal interpretation (MGA 637) and consequently municipalities have the flexibility to adapt to changing circumstances. In terms of watershed management, this flexibility can provide room for a municipality to adapt their LUB to growing knowledge regarding the state of their watershed, watershed functioning and watershed management in general.

There are three main components of a LUB in which watershed health can be addressed: 1) zoning, 2) the creation of development standards and 3) the granting of subdivision approvals and development permits.

Chapter 4 - Municipal Planning and Development

4-5.1. Zoning

The process of dividing a municipality into zones or districts is an important part of watershed stewardship. Municipalities must consider a variety of factors when making decisions about a zone's location, size, boundaries and permitted land uses. One factor to consider is watershed health in terms of green infrastructure (e.g. green open spaces) and the potential environmental effects of current and future land uses. Table 4.6 outlines some examples of how zoning can be used as a tool for watershed stewardship.

Table 4.6 Zoning as a Tool for Watershed Stewardship

Type of Zoning	Watershed Considerations for Incorporation into an LUB
Open-Space and Conservation Zoning	• Maintaining already existing open-space zoning areas for the protection of natural areas from development that may harm important watershed processes
Direct Control Districts	• Tool for controlling development on environmentally sensitive lands (and on lands that provide a buffer between incompatible land uses) • Decisions are made on a site-specific basis - flexibility allows decision-makers to adapt to growing knowledge about the area and watershed health in general and to be open to innovative forms of land use and development that do not disturb watershed processes on protected lands • Weaknesses: flexibility is also a danger because decisions about the use and development of direct control districts can be subject to political, social and economic pressures
Agricultural Protection Districts	• Tool for protecting agriculture land by ensuring agriculture is the primary land use in an area • Can be protected using buffers between agriculture and incompatible land uses such as: - natural areas and/or municipal reserve parcels as buffers - transitional land uses as buffers (e.g., adjacent to large farms could be a land use zone that allows for smaller farms, followed by a zone allowing larger country residential development, then a zone for smaller-lot country residential development and eventually urban development)

Chapter 4 - Municipal Planning and Development

Type of Zoning	Watershed Considerations for Incorporation into an LUB
Downzoning	• Tool for restricting specific types of development that may have negative impacts on the ecological health of an area • Strengths: property taxes usually decrease, making maintaining land less costly • Weaknesses: if landowners do not support downzoning there is likely to be strong opposition because of the resultant loss in property value and developmental freedom; compensation may be necessary • Precautions: to ensure that there will be an appropriate supply of land for development, downzoning can be balanced with areas that are targeted for municipal growth (for information about Growth Strategies see section 4-5.4)



Creating open space and conservation zones where natural areas will be protected for conservation and recreation can be beneficial in many ways. Being proactive and designating these areas before they are slated for development can help avoid future conflict over land uses. Furthermore, while municipalities and developers can construct natural areas after development needs have been addressed, construction is expensive and constructed natural areas often do not function as well as natural areas that have had decades to establish complex ecological functions that clean the soil, water and air. Small and mid-sized municipalities are in a particularly good position to plan for the protection of already existing green spaces prior to the onset of predicted urban expansion pressures.

4-5.2. Subdivision and Development Standards

In an LUB, developing subdivision and development standards is a means for controlling the type of development occurring in a district. Standards can be used to ensure that development occurs in a manner that diminishes or eliminates negative impacts on the watershed (see Table 4.7). Many current subdivision and development standards are not conducive to watershed health. For example, current standards facilitate urban sprawl, which creates pressure for development in green spaces and problems with stormwater management.

Chapter 4 - Municipal Planning and Development

Table 4.7 Subdivision and Development Standards that Promote Watershed Health

Matters that can be Addressed in a LUB*	Watershed Standards to Consider
Subdivision design standards	• Preserve and complement green infrastructure and limit development in environmentally sensitive areas • Minimize paved surfaces and maximize surfaces with natural vegetation • Utilize BMPs for reducing stormwater quality impacts • Promote walkable design and access to transit options (to decrease demands for road infrastructure)
The density of population	• Allow high density development (residential and commercial) to create space for green areas (i.e. cluster development) • Allow multi-unit dwellings (e.g., duplex, triplex and four-plex structures, townhouses, conversion of single family homes and properties to multi-unit dwellings and secondary suites) so that higher residential densities are possible to allow more area for green spaces • See references at the end of this section on Conservation Subdivision Design
Landscaping	• Landscaping that allows for water infiltration into the soil and/or stormwater retention (e.g., rock gardens) • Require the planting of one or more trees in yards • Use of drought tolerant vegetation to decrease water consumption • Maintain natural vegetation where possible
Development on land subject to flooding or that is low lying, marshy or unstable or on land that is in close proximity to the bed and shore of any lake, river, stream or other body of water	• Prohibit development that will negatively impact ecological health and water quality on these lands • Evaluate the appropriate setback for water bodies based on ecological function rather than relying on the minimum setback provided for in the legislation • Require a natural vegetation buffer between development and high water levels
Building size, design and location	• Build up rather than out (to decrease the size of impermeable surface area in a lot)
Amount of land between buildings	• Set low minimum distances between buildings to allow for high density development which can allow for green space in other areas

* as listed in the MGA section 640(4)



Photo credit:
City of Edmonton

Chapter 4 - Municipal Planning and Development

While it is clear that in order to account for watershed needs many subdivision and development standards would need to be changed, reinventing them is not an easy task. Current subdivision and development standards and guidelines have evolved over many years and community members that like the current style of development may be very resistant to new styles. Municipalities can also receive opposition from developers who are faced with increased costs for adapting their developments to meet new standards (however, these changes can also give innovative developers an opportunity to succeed). Furthermore, developing new standards that will be compatible with innovative development ideas that have not been imagined yet is a difficult task for municipalities.

However, in the long run, municipal efforts to develop subdivision and development standards that protect watershed health are well worth it. Not only will communities benefit from watershed goods and services but there are often direct economic benefits associated with development that incorporates watershed needs. The following are some examples of cost savings from subdivision developments designed to protect environmental health:

- The Regional Municipality of Ottawa-Carleton created an alternative development plan that generates life-cycle savings of about \$11,000/unit over a 75-year period (compared with conventional development patterns). Over 70 percent of these are public savings, captured in lower costs for roads, utilities, sewer, water and stormwater management (Canadian Mortgage and Housing Corporation 1996 as referenced by Evergreen b).
- In Surrey's East Clayton development, green infrastructure cost savings are \$12,000 per unit over a conventional subdivision model (University of British Columbia 2000 as referenced by Evergreen b).
- In Seattle, prototype 'green streets' have reduced runoff by 98 percent over a three year study period, and cost the same as a typical curb-and-gutter design to install (Seattle Public Utilities as referenced by Evergreen b).



Municipal Examples

Municipal Example: Landscaping Restrictions

City of Edmonton - in their zoning bylaw, the city specifies tree-planting requirements in their Planned Lot Residential Zone (small lot Single Detached). One deciduous tree, one coniferous tree and four shrubs are required for each dwelling [130 4(17)(a)]. Available online:
http://webdocs.edmonton.ca/InfraPlan/ZoningBylaw/Bylaw_12800.htm.

Chapter 4 - Municipal Planning and Development

More Information

More Information: Design Guidelines and Standards

Green Building Design & Construction Guidelines (City of Santa Monica, California) - includes a set of requirements and recommendations to encourage the development of “green” buildings without forcing excessive costs or other burdens upon developers, building owners or occupants. Website: <http://greenbuildings.santa-monica.org/>.

James Taylor Chair in Landscape and Liveable Environments (University of British Columbia) - for a copy of either of the following publications visit <http://www.jtc.sala.ubc.ca/>.
Phone: (604)822 5148.

- Alternative Development Standards for Sustainable Communities: Design Workbook (Condon & Teed 1998)
- Sustainable Urban Landscapes: Site Design Manual for BC Communities (Condon et al. 2002)

More Information: Conservation Subdivision Design (CSD)

Randall Arendt - is an expert on CSD and has written a number of publications on the topic. Website: www.greenerprospects.com.

- Conservation Design for Subdivisions: A practical Guide to Creating Open Space Networks (1996)
- Rural by Design: Maintaining Small Town Character (1944)
- Growing Greener: Putting Conservation into Local Plans and Ordinances (1997) - available online at <http://www.greenerprospects.com/growinggreener.pdf>.
- Growing Greener Language: Visually Enhanced Zoning and Subdivision Models (an interactive CD ROM)

Land Choices website - <http://www.landchoices.org/conservationsubs.htm>

4-5.3. Subdivision Approvals and Development Permits**The Approval Process**

The process for obtaining subdivision approvals and development permits is another tool for promoting watershed health. A municipality can grant a conditional approval to land developers as a means of tailoring a proposed subdivision or development to watershed priorities laid out in an LUB or statutory or non-statutory plan. Conditional approval is a useful tool when an application only needs small changes to fulfill requirements. It can be used to encourage environmentally sound development without driving developers to other communities (as often happens when applications are refused).

Chapter 4 - Municipal Planning and Development

In some cases, however, the only way to protect against a proposed development or a subdivision that may be deleterious to watershed health is to refuse it. Refusal by a development or subdivision authority can be based on the proposed development or subdivision not meeting standards or guidelines laid out in an LUB or municipal policies laid out in other documents. In this regard it is important that development or subdivision authorities are kept up-to-date on new watershed-related policies that may be grounds for the refusal of a subdivision and/or development application.

Municipal Example

Municipal Example: Conditional Approval

Leduc County - in a subdivision around Pigeon Lake Leduc County has passed a requirement that a restricted covenant be registered on each title as a condition of subdivision in this area. Prior to development, the site was treed and residents with lakeshore properties next to this site wanted tree-cutting restrictions on the site. The restricted covenant limits tree cutting to that needed for a road approach (driveway to the public roadway), plus area needed for the construction and placement of principle and accessory buildings and utility crossings.

**Environmental Suitability of Land**

In addition to having to conform to the provisions of the LUB and statutory plans, land proposed for subdivision must, in the opinion of the subdivision authority, be suitable for the purpose for which the subdivision is intended [MGA 654 (1)(a)]. Environmental impacts should be considered when determining if land is suitable for a proposed subdivision. In this regard a subdivision authority can reject an application to subdivide land exclusively on the grounds that it would have significant negative impacts on the watershed.

Guidelines that subdivision authorities can consider when making decisions about the suitability of land for a proposed residential subdivision include (Alberta Environment 1998):

- River flooding and erosion hazards for residential subdivisions
- Hazards to residential subdivisions from valley slopes
- Environmental impacts of lake residential subdivisions (see box on the next page)
- Threat of groundwater shortages and contamination of unserviced residential subdivisions using ground water (this threat grows with the increase in density of wells)
- Water table conditions and soil percolation rates for unserviced residential subdivisions with private sewage disposal systems

Municipalities can require that information about the biophysical state of an area and potential environmental impacts of a proposed development is provided to subdivision and development authorities as part of the subdivision and development application processes. Biophysical information may include the identification of streams, wetlands and other water bodies (and their buffers), 100-year flood plains, soil types, areas with slopes

Chapter 4 - Municipal Planning and Development

over 15% and other important green infrastructure. Developers can also be required to share stormwater management plans, traffic impact assessments and infrastructure improvement plans, all of which can impact watershed health.

The discretionary power of a subdivision authority to refuse an application on the basis that the land is not environmentally suitable for the purpose intended requires a good understanding of the relationship between the proposed development and watershed health. Watersheds are complex and our understanding of human impacts on them is forever growing. Ensuring that subdivision and development authorities are kept up-to-date on watershed health issues as well as municipal watershed policies and priorities is important for the use of this discretionary power as a means for watershed protection.

More Information

More Information: Environmental Considerations for Subdivision Approvals

Draft Environmental Guidelines for the Review of Subdivisions in Alberta

(Alberta Environment 1998) - provides an overview of environmental issues that subdivision authorities should consider and a summary of what and how information can be gathered. Website: <http://www.environment.gov.ab.ca/info/library/6710.pdf>. Phone: (780)427-2700 - toll free by first dialing 310-0000 (Alberta Environment's Information Centre).

Environmental Reference Manual for the Review of Subdivisions in Alberta

(Alberta Environment 1996) - overview of environmental considerations regarding subdivisions. This document addresses issues which include environmental implications of a variety of land uses, advice on servicing arrangements, land use conflicts relating to public health or quality of life and legislation. Available online: <http://environment.gov.ab.ca/info/library/6296.pdf>. Phone: (780)427-2700 - toll free by first dialing 310-0000 (Alberta Environment's Information Centre).

Environmental and Municipal Reserves

The power of a subdivision authority to require land being subdivided to include an environmental reserve [MGA 664(1)] and/or a municipal reserve (MGA 666) is an important tool for protecting watershed health. Environmental reserves can be used to protect wetlands, ravines, riparian areas, flood plains and natural drainage courses from development. Municipal reserves can be used to preserve natural areas and open spaces. See section 7-2.1 for information on creating an environmental reserve bylaw.

However, the strength of environmental and municipal reserves in protecting natural lands important to watershed health is limited by some restrictions. While environmental reserves have no restrictions in terms of the proportion of a land parcel that can be required for reserve, only lands with water bodies, subject to flooding or with natural drainage courses can be protected under an environmental reserve. This excludes many natural areas that play an integral role in holding rainwater in vegetation and filtering stormwater through soil percolation. As for municipal reserves, their strength is limited in that only up to ten percent of a parcel of land can be required for the purpose of a municipal reserve, less the land required to be provided as environmental reserve [MGA

Chapter 4 - Municipal Planning and Development

666(2)]. For higher density development projects, additional municipal reserves of up to 5% of the developable land can be taken (MGA 668). In areas subject to subdivision that have natural areas with high watershed-related values, these limited proportions may not be enough to protect important ecological functions.

Conservation Easements

Legislation

Legislation: Under the *Environmental Protection and Enhancement Act* (EPEA) a registered owner of land may, through an agreement, grant to a qualified organization a conservation easement for one or more of the following purposes [s.22(2)]:

- a) the protection, conservation and enhancement of the environment, including, without limitation, the protection, conservation and enhancement of biological diversity
- b) the protection, conservation and enhancement of natural scenic or esthetic values
- c) providing for any or all of the following uses of the land that are consistent with purposes set out in clause (a) or (b): recreational use, open space use, environmental education use or use for research and scientific studies of natural ecosystems

A conservation easement is subject to EPEA's Conservation Easement Registration Regulation and is registered under the *Land Titles Act* with the Registrar of Land Titles.

Conservation easements are a tool that allow for any type and size of land to be protected from development, and as such are an alternative to environmental and municipal reserves and their limitations (as discussed previously). A conservation easement is a voluntary agreement between a land owner and a municipality or qualified organization to protect a piece of land in its natural state. It is sometimes referred to as an environmental reserve easement or conservation covenant. On land subject to a conservation easement, a landowner agrees to restrict certain activities, development and/or subdivision for one of the purposes listed above. The landowner maintains the land title but hands over rights related to activities that will negatively affect the designated purpose of the easements.

Where a municipality and landowner agree, land that would be normally taken as environmental reserve may instead be subject to a conservation easement held between the municipality and landowner. Municipalities can encourage the use of conservation easements during subdivision development and can offer extra development or subdivision rights (on a portion of land not covered by an easement) to developers putting conservation easements on their lands.

Holding conservation easements can be costly, which may be why they remain underutilized by municipalities. Conservation easements require planning, negotiation, acquisition, monitoring and often enforcement, all of which require considerable amounts of time and money. As a means of avoiding the cost associated with holding



Chapter 4 - Municipal Planning and Development

conservation easements, a municipality may wish to encourage landowners to grant conservation easements to other qualified organizations. This way, the municipality avoids having direct responsibility and liability over the land as they do with environmental reserves, municipal reserves or conservation easements held by the municipality itself.

There are a number of organizations working in the North Saskatchewan Watershed to help landowners place conservation easements on their land. These include: Ducks Unlimited Canada, the Nature Conservancy of Canada, the Alberta Fish and Game Association and the Alberta Conservation Association. Funding for conservation easements in Alberta has also come from Alberta Sport, Recreation, Parks and Wildlife Foundation (<http://www.tpr.alberta.ca/asrpwf/index.asp>) and Environment Canada's EcoAction Funding Program (http://www.ec.gc.ca/ecoaction/what_is_e.html).

Municipal Example

Municipal Example: Conservation Easements

Strathcona County - over 90 Conservation Easement Agreements have been signed in Strathcona County which offer protection for over 1,200 hectares of land. In addition to promoting the use of conservation easements to assist landowners who want to protect natural areas on their property into the future, the county uses conservation easements as a tool to protect natural areas prior to subdivision. They actively promote the use of conservation easements for protecting natural habitat contained in community common areas within condominium subdivisions and for resolving site specific issues with developers regarding reserve dedication, public ownership and access, land use, etc. The County has also created a publication that answers many frequently asked questions about conservation easements. Phone: (780)464-8092 (Lock Girvan).

More Information

More Information: Conservation Easements

Conservation Easements in Alberta: Programs and Possibilities (Greenaway 2003) - this guidebook describes each conservation easement program in the province and some creative and expansive ways that conservation easements can be used. This is a publication by Corvus Conservation and is available online: http://www.corvus.ca/gen_frameset3.htm. Phone: (403)835-4891.

Environmental Reserve Easement - AAMD&C has a sample environmental reserve agreement for granting land under a subdivision plan. Available online: <http://www.aamdc.com/>.

Conservation Easement Guide for Alberta (Kwasniak 1997) - written by the Environmental Law Centre, this guide answers questions about how to use a conservation easement to legally preserve the natural values of land. To order visit: <http://www.elc.ab.ca/publications/Books.cfm>. Phone: 1-800-661-4238 (ELC's Edmonton office).

West Coast Environmental Law Research Foundation (WCELRF) - has created a number of publications relating to conservation covenants. While these documents are directed at conservation covenants in B.C., much information is applicable in Alberta. Available online: <http://www.wcel.org/resources/publications/> (search "conservation covenants"). Phone: 1-800-330-WCEL (Vancouver office).



4-6

Non-Statutory Plans, Policies, Strategies and Initiatives

In addition to statutory plans and the LUB, there are a number of municipal plans that can be used in watershed planning. While these plans do not have legal effect, they can provide important direction to council and municipal staff regarding watershed management. These plans are typically long-range policies and can address a variety of issues relating to the environment and the watershed. For some of these plans environmental or watershed health is only a small component and for others it the focus. Each of these plans has a role to play in the protection of watershed health.

This section outlines a variety of types of plans, policies and strategies and provides a number of municipal examples of these. Topics include: environmental planning, natural area planning, community planning and growth management planning. In addition to the creation of these non-statutory plans, their integration with one another and with statutory plans is also important for successful watershed management. In many cases, parts of one plan will overlap with parts of another (e.g., the protection of natural areas may be part of a parks plan, a stormwater management plan and a community plan) and consequently there is value in promoting communication and collaboration across departments. (For information about capacity building between municipal departments see section 8-2.)

Smart Growth

Before exploring the opportunities for addressing watershed issues in non-statutory plans, the concept of smart growth is worth examining. Smart growth is a collection of development strategies for reducing sprawl in urban and rural areas, enhancing quality of life, protecting the environment and using tax revenues wisely. Smart growth provides many practical ideas for addressing watershed health and can be incorporated into many aspects of municipal planning. Smart growth recognizes that community health is dependent on economic, social and ecological health and that these are intricately connected to one another. Planning for smart growth requires a systems approach that involves the integration of plans that address, for example, watershed health,

"Municipalities are increasingly adopting a systems approach to planning because all land use decisions have implications for economic development, the green infrastructure, transportation, community health and the environment."

- Curran 2003b

Chapter 4 - Municipal Planning and Development

transportation infrastructure, green infrastructure, community design and economic development.

The principles of smart growth vary depending on the group defining them. Below are some common principles that also serve to protect watershed health (as outlined by Curran 2003a):

1. Incorporating green infrastructure into communities
2. Promoting urban revitalization and a healthy working land base through rural preservation and by containing urban areas, channeling development into existing neighborhoods and adopting integrated planning and management approaches
3. Creating compact complete communities by mixing land uses and using land more efficiently
4. Increasing transportation choices through land use decisions
5. Supporting municipal goals through cost recovery by ensuring that development cost charges and other taxes and fees reflect the true cost of different types of growth.



Photo credit:
City of Edmonton

Unprecedented urban sprawl is occurring throughout Canada. Characterized by low density development, urban sprawl creates an elevated demand for the development of green spaces.

An examination of smart growth development strategies may give municipalities ideas about how lands in their communities can be developed with economic, social and ecological health in mind. A number of ideas throughout this chapter are smart growth principles.

More Information

More Information: Smart Growth

The Smart Bylaws Guide (West Coast Environmental Law) - a resource for urban municipalities interested in promoting smart growth in their communities. This guide offers information on the benefits of smart growth, the elements of smart growth, a discussion of smart growth tools and municipal examples of bylaws, policies and checklists for promoting smart growth. Available Online: <http://www.wcel.org/issues/urban/sbg/>.

The Alberta Smart Growth Report (2005) - examines the impediments to smart growth in Alberta and provides a number of steps and recommendations for achieving smart growth in Alberta. This report was written by Allan Bolestad, who served as a City of Edmonton Councillor for 12 years and is published by the Sierra Club of Canada Prairie Chapter. Available online: <http://www.sierraclub.ca/prairie/SierraReport.pdf>. Phone: (780) 439-1160.

Online Resources:

- Smart Growth Canada - www.smartgrowth.ca/home_e.html
- Smart Growth Online - www.smartgrowth.org

4-6.1. Environmental Planning

Many municipalities are concerned about overall environmental health in their communities and have created a diversity of plans, policies and initiatives to ensure these concerns are addressed (see Table 4.8). Within many of these documents there are opportunities to address watershed issues such as water pollution, the identification and protection of important natural places and public outreach about watershed stewardship.

Table 4.8 Watershed-Related Environmental Plans and Policies

Environmental Plan/Policy

e.g. City of Edmonton: Environmental Strategic Plan (1999)

Provides direction in nineteen areas of environmental concern which include: sustainable urban form, agriculture lands, waste management, drinking water, surface water, industrial releases, hazardous material, contaminated lands, pesticides and acid rain. The plan provides overall environmental direction for the City and a framework for reporting on environmental issues. This plan is currently being updated. Website: http://www.edmonton.ca/environmental/documents/2006_ESP.pdf (click on "Environment" and then "Environment").
Phone: (780)496-2791

e.g. Leduc County: Environmental Policy

States the County's commitment to "environmental leadership to conserve, protect and enhance the environment for the benefit of its residents." Leadership will be demonstrated by:

- Recognizing the need for compliance with environmental laws
- Ensuring that environmental considerations are part of the Leduc County's decision making process
- Developing a framework for an environmental management system that will enable the County to exercise due diligence in attempting to prevent incidents that may adversely affect the environment and in responding to such incidents if they do occur
- Promoting environmental stewardship through the work carried out by the County's Environmental Committee
- Communicating and consulting with its citizens, businesses and other governments regarding the various ways of setting Leduc County's environmental objectives
Website: <http://www.leduc-county.com/council/Committees/Environment%20Committee.html>.



Chapter 4 - Municipal Planning and Development

e.g. City of Calgary: Environmental Policy - addresses the following:

- Ensuring environmental considerations are part of all City decisions respecting planning for growth, development and operations
- Encouraging and demonstrating resource conservation and pollution prevention
- Implementing and continually improving an environmental management system for operational effectiveness to fulfill the City's environmental policy and objectives

Servicing Concept Design Brief (SCDB)

A municipality can incorporate the following into a SCDB (which provides a framework for municipal infrastructure, servicing and major developments in new neighbourhoods):

- The protection of green infrastructure
 - The design of roads, pipelines and other infrastructure and major developments that maintain watershed health
-

Committees

e.g. City of Edmonton: Environmental Policy Coordinating Committee (2002)

Mandate includes all matters, activities and operations of every city department that impact the environment, as well as all related regulatory and enforcement functions of the city administration. Considers the environment in its broadest possible terms. Website: <http://www.edmonton.ca/environmental/policies/environmental-policy-leadershi.aspx>.

No Net Loss Policy

- Requires that development occurs in a manner in which there is no net loss of specified natural areas (e.g. where a project threatens a wetland, a no net loss wetlands policy will either justify a refusal to approve the project or will mandate mitigation to ensure that total wetland area will not be diminished)
- Usually embedded in a larger environmental plan or policy

4-6.2. Natural Area Planning



Photo credit:
City of Edmonton

Developing comprehensive plans to guide the designation, protection and management of natural areas owned by a municipality is an important tool for watershed health. These plans can take many forms and address a variety of issues (see Table 4.9). *See section 6-1 for more information on green spaces.*

Table 4.9 Watershed-Related Natural Areas Plans**Urban Parks Plan****e.g. City of Edmonton: Urban Parks Management Plan (2006-2016)**

Provides strategic direction for all river valley and ravine parkland as well as all school and park sites outside the river valley. Available online: http://www.edmonton.ca/attractions_recreation/parks_rivervalley/urban-parks-management-plan.aspx.

Open Space Plan**e.g. Leduc County: Parks and Open Space Master Plan**

Provides policy direction on the future management of the parks and open spaces owned by the County, addresses the role of existing sites and provides direction on potential additions to the County's system of parks and open spaces over the next 20 years. Website: <http://www.leduc-county.com/services/parks/MasterPlan/Master%20Plan2pdf.pdf>. Phone: (780) 955-6410.

e.g. City of Calgary: Open Space Plan

Forms the foundation for other, more specific policies, plans and procedures. Also provides broad policy direction for decision-making on individual community plans, area redevelopment plans and development proposals. Website: http://www.calgary.ca/docgallery/bu/parks_operations/Open_Space_Plan.pdf.

Natural Space Management Plan**e.g. Town of Lacombe: Natural Spaces Management Plan**

- Goal is to create a balance between development and the need for the preservation of natural eco-spaces on the urban landscape
- Inventories, prioritizes and ranks lands suitable for development or preservation based on the integration of ecological and development factors
- Site profiles will guide future land use planning decisions, subdivision and development proposals, open space and trail policy
- Available online: http://www.town.lacombe.ab.ca/75/912-natspaces/NSMP_main.htm. Phone: (403)782-1238 (Carol-Lynn Gilchrist).

River Valley Plan**e.g. City of Edmonton: Ribbon of Green North Saskatchewan River Valley and Ravine System Concept Plan**

Propose is extending the present urban park and divides it into three land management zones: preservation, conservation and extensive use. Website: http://www.edmonton.ca/city_government/city_organization/river-valley-concept.aspx. Phone: (780)496-4781 (Gabriele Barry).



Chapter 4 - Municipal Planning and Development

Municipal Success Story**City of Edmonton Creates Policy to Protect Natural Areas**

In 1995 the City of Edmonton passed Policy C467 - Conservation of Natural Sites in Edmonton's Table Lands. The Policy encourages voluntary conservation of environmentally sensitive and significant natural areas in Edmonton's table lands. It provides a process for dealing with the 85 sites identified in the City's 1993 Inventory of Natural Areas, which includes wetlands, woodlands and grasslands. The policy requires that natural areas identified in the Inventory are addressed in plan-making. It also requires additional information for some activities which is used to help decision-making regarding land use. This includes the development of Natural Site Assessments and Natural Area Management Plans for identified natural areas. A "Tool Kit" of conservation initiatives and funding sources for conserving natural sites is appended to the Policy.

Purpose

The purpose of Policy C467 is to enhance the liveability, attractiveness and bio-diversity of Edmonton and to ensure consistent, uniform and equitable conservation of natural sites by:

- Directing the Corporation to conserve environmentally sensitive areas and significant natural areas in discharging their duties
- Encouraging the retention and integration of natural areas through the physical planning and development process recognizing the environmental and municipal reserve commitments contained within the MGA
- Encouraging voluntary conservation and corporate and private sponsorship of natural sites
- Promoting the awareness and participation of landowners, the general public and special interest groups in conserving natural sites
- Seeking to conserve in a proactive fashion, with the landowners, the four regionally significant environmentally sensitive areas identified on Edmonton's table lands and encouraging conservation of the nationally, provincially and regionally significant environmentally sensitive areas identified in Edmonton's river valley

Who Is Involved?

Policy C467 was a priority of the City Manager, and came down as a directive from Council. The senior planners for Corporate Policy and Environmental Planning (Planning and Development Department) were and continue to be instrumental in the development and implementation of this policy.

Chapter 4 - Municipal Planning and Development

As part of Policy C467 a governance model was developed for natural area conservation. Internal stakeholders were brought together at the branch manager level and the following groups were identified as key to the policy:

- Natural Areas Policy Implementation Committee - made up of management representatives from Planning and Policy Services, Parkland Services, Office of Natural Areas, Transportation Planning, Land and Buildings and Drainage Services
- Office of the Conservation Coordinator (now Office of Natural Areas) - Policy C467 dictates the role of the Office of the Conservation Coordinator including the development of management guidelines and management plans for conserved sites
- Natural Areas Advisory Committee - created by Policy C467 and is responsible for advising Council on Natural Area protection within City boundaries

Successes and Challenges

To date 30 of the natural areas identified in the 1993 inventory have been successfully preserved wholly or in part. The Policy has also been instrumental in providing certainty to developers regarding requirements and processes for development on and around these lands.

The City has currently allocated \$1.25 million/year for the acquisition of natural areas in its boundaries. While this is a significant allocation, the cost of acquiring sites continues to be a limitation for the City. The acquisition of land by the City must therefore be paired with alternate means of protecting sites.

What Now?

The City of Edmonton continues to integrate Policy C467 into new plans. In 2005 the City approved a new Conservation Plan and the policy was incorporated into this plan to ensure the ongoing conservation of identified natural areas. Plan Edmonton, the City's MDP, has also been amended to include Policy C467.

Contacts

Grant Pearsell
Office of Natural Areas
City of Edmonton
Phone: 496-6080

Email: Grant.Pearsell@edmonton.ca

Angela Hobson
Office of Natural Areas
City of Edmonton
Phone: 496-6147

Email: Angela.Hobson@edmonton.ca

Policy C467 is available online at <http://www.edmonton.ca/citygov/policy/C467.doc>.



Chapter 4 - Municipal Planning and Development

4-6.3. Community Planning

Watershed and community health are closely connected and thus the protection of watershed health can be an important component of community plans. Community plans can include community design that supports watershed health such as **cluster development**, infill development (which increases density and thus decreases the need for Greenfield development) and walkable communities (which decreases demands for impermeable road networks). Table 4.10 provides some examples of community plans and initiatives that address watershed health.

Table 4.10 Watershed-Related Community Plans and Initiatives**Community Development Plans**

e.g. City of Edmonton: Smart Choices for Developing Our Community (Recommendations) - approved in 2004. Council will direct administration in nine areas:

- Develop a comprehensive transit-oriented development strategy
- Consider pedestrian-friendly alternatives when making Infrastructure and Development decisions
- Develop a neighbourhood re-investment program
- Develop a small scale and medium density residential in-fill strategy
- Improve planning and development consultation processes
- Develop an approach to re-development of under-utilized commercial and industrial lands
- Develop a comprehensive growth scenario with the next MDP review
- Develop urban design guidelines
- Establish a Smart Choices communication strategy

Website: http://www.edmonton.ca/city_government/city_organization/smart-choices.aspx. Phone: (780) 496-6127 (Planning and Development).

Sustainable Development Initiatives**e.g. City of Spruce Grove: Sustainable Development Charter**

- Provides a decision-making framework to guide City staff and Council in developing and delivering programs and services that incorporate environmental, social and economic factors.
- Website: http://www.sprucegrove.org/Residents/Sustainable_Development.htm. Phone: (780)962-7634 ext. 164 (Sustainable Development Coordinator).

Chapter 4 - Municipal Planning and Development

e.g. City of Calgary: Sustainable Suburbs Study (1995)

Study sets out a package of planning policies, requirements and guidelines and seeks to encourage developers, City departments and others to find new ways of designing more sustainable communities. The purpose of the study is to promote more fiscally, socially and environmentally sustainable communities. Available online:

http://www.calgary.ca/portal/server.pt/gateway/PTARGS_0_2_527217_0_0_18/Sustainable+Suburbs+Study.htm. Phone: (403) 268-8065 (Paul Cochrane).

Community Service Department Plans**e.g. City of Edmonton: Integrated Service Strategy**

This is a strategy for the City's Community Services department and highlights the river valley as one of the six key service themes in their long term plan. The document outlines targets, success indicators and actions to preserve and enhance the City's river valley system and system of parks and natural areas. Website:

<http://www.edmonton.ca/CommPeople/StrategicServicesBranch/ISSReport.pdf>.

Phone: (780) 496-5884.

**4-6.4. Growth Management Planning**

Managing growth is an important part of watershed stewardship, especially for urban and rural municipalities experiencing severe pressures from high residential, commercial, industrial or recreational growth. Municipalities can protect watershed health through the development of Growth Management Strategies, which direct the location and type of future growth that will occur in a municipality.

Many Growth Management Strategies are based on predicted future growth intensities derived from a variety of scenarios. Results can be mapped to create visual scenarios to help municipalities and the public understand what the future might look like, make decisions about the type of growth they want and ensure watershed needs are addressed. For example, in their Growth Management Strategy a municipality may identify preferred locations for various types of development that steer development away from environmentally sensitive areas. Developing these plans may require making trade-offs between needs for various land uses and watershed needs.

Chapter 4 - Municipal Planning and Development

“When developers are asked why they do not bring forward innovative projects more often, they respond that they cannot afford the added time involved in securing municipal approvals...Some local governments...are taking an integrated project management approach to more complex developments so that approvals can be worked out collaboratively. The municipal team meets with the developer's team on a regular basis to solve problems and move the project forward on schedule.”

- Curran 2003b

In addition to working with the development industry, working with residents and potential residents to promote development that meet municipal watershed priorities is also vital to municipal success (see Chapter 8).

4-7

Working with the Development Industry

An important component in planning for the type of land development that supports watershed needs is municipal cooperation and collaboration with the development industry. While municipalities are responsible for overseeing land development, in some respects the development industry is the primary driver of land development. Developers create opportunities for municipal governments who have the power to accept, conditionally accept or reject these opportunities through the process of granting development permits and subdivision approvals (as discussed in section 4-4.3). While prohibiting a development can mean lost revenues for a municipality in the short term (which can create pressure on a municipality to grant a permit) approving an inappropriate development can lead to lost revenues for a municipality in the long term.

By communicating their needs, desires and priorities to the development industry early in the process, municipalities can encourage professionals in the development industry to tailor their development proposals to municipal desires. As a result all parties benefit: municipalities are approached by developers with proposals that meet municipal watershed priorities, and developers can be more confident that their proposals are more likely to be approved.



Photo credit:
City of Edmonton

Communication and Education

Developing positive relationships with developers is important and can be done by maintaining open lines of communication from the very beginning. Without a clear understanding of what municipalities want, developers do not have the knowledge needed to create development proposals that meet the needs and desires of both the municipality and the developer. Creating standards and policies with clear watershed priorities and communicating these to the development industry is one way to clarify the tasks of development professionals.

There are many ways municipalities can communicate their needs and priorities to the development industry. These include:

- Developing documents for prospective developers that outline important policies, guidelines and priorities outlined in statutory and non-statutory plans that relate to development and subdivision
- Creating resources for the development industry to help them make their practices more environmentally sustainable

Chapter 4 - Municipal Planning and Development

- Meeting with prospective developers before the commencement and throughout the process of creating detailed ASPs and development and subdivision proposals to ensure municipal priorities are in line with those of developers
- Hosting seminars with developers that address topics such as cluster development, conservation easements and the benefits of healthy watersheds (it is also beneficial to invite realtors who can then communicate the benefits of these types of developments to their clients)
- Develop a 'screening map' that identifies areas where a municipality will scrutinize developments according to any environmental/watershed policies. This map can be used by developers and staff so that they are aware of the municipality's intentions in various areas



Municipal Examples

Municipal Examples: Resources Created by Municipalities for Developers

City of Edmonton: Erosion and Sediment Control Field Manual - developed as an accompaniment to the City's Erosion and Sediment Control Guidelines. The objective of this manual is to assist field representatives in carrying out their respective roles in the development of a site in order to:

- minimize erosion and release of sediment from the site
- minimize the risk of environmental damage
- protect adjacent areas, watercourses and other environmentally sensitive receptors
- comply with all applicable environmental regulatory requirements

Available online: http://www.edmonton.ca/city_government/planning_development/erosion-and-sedimentation-cont.aspx.

City of Edmonton: A Guide to Environmental Review Requirements in the North Saskatchewan River Valley and Ravine System - developed to provide project managers and their consultants with general guidelines regarding the environmental review process required under North Saskatchewan River Valley Area Redevelopment Plan bylaw. Available online: http://www.edmonton.ca/environmental/documents/Environmental_Review_NSRVRS.pdf. Phone: (780) 496-6209 (Garth Clyburn, Principal Planner).

City of New Westminster (BC): A Smart Growth Development Checklist - developed for architects, engineers, landscape architects and investors seeking a zoning amendment or development permit. The checklist provides options for measuring social, environmental and economic sustainability and is a method for ensuring that proposed developments will advance city objectives. It was developed by city staff in consultation with local architects and developers, city advisory committees, municipal staff and Smart Growth BC. Available online: http://www.newwestcity.ca/cityhall/dev_services/publications/10Housing/pdf/Smart%20Growth%20Development%20-%20Checklist%202004.pdf.

Chapter 4 - Municipal Planning and Development

Municipal Grants

Municipalities can encourage development that meets priorities set out in municipal plans by offering grants or loans to landowners who help municipalities achieve watershed-related goals. These small grants often repay themselves through the long-term economic benefits associated with a healthier environment. Municipalities can also take advantage of grants offered by Alberta Municipal Affairs and other groups as a source of funding for these types of grants (see Chapter 9).

Municipal Examples

Municipal Example: Municipal Grants

City of Edmonton: Brownfield Redevelopment Grant Pilot Program Extension

- the City has made reducing land contamination an environmental and strategic priority. To help the City realize this priority they have created the Brownfield Redevelopment Grant Pilot Program, which provides a financial incentive for landowners to restore their contaminated site back to an uncontaminated condition. The property owner receives a grant equivalent to the increase in the municipal portions of property taxes over a five year period, not exceeding the actual costs of remediation. Website: <http://www.edmonton.ca/environmental/policies/brownfield-redevelopment-grant.aspx>. Phone: (780)496-5994 (Gary Woloshyniuk - Office of the Environment).

“Considered the most successful PDR

program in the United States, Lancaster County, Pennsylvania has protected over 45,000 acres of farmland through 529 conservation easements from 1983 to 2003. This was done, moreover, while the county continued to grow and prosper.”

-Ryan and Wilkie 2005

Conservation Easements and Purchase of Development Rights

As an incentive to conserve natural areas, a municipality may grant a developer extra development or subdivision rights on another portion of land owned by the same developer (e.g., smaller lot sizes, higher densities), if the developer puts a conservation easement on one portion of land owned by them. Any extra development rights would normally be beyond those covered by any plan in effect.

Another way municipalities can use conservation easements to encourage developers to protect green spaces is through the Purchase of Development Rights (PDR). In a PDR, a developer can attain extra development rights in his/her property by purchasing development rights from landowners of another property. This can be done through a conservation easement that limits subdivision and development on the land. The value of the easement is usually the difference between the maximum value of the land and its value as agriculture land. The weakness of PRDs is the cost associated with the monitoring, administration, enforcement and purchasing of easements.

For more information on conservation easements see Section 4-4.3.

Transfer of Development Rights

While their use has not yet been legally established, Transfer of Development Rights (TDR) may be a future tool for municipalities wishing to protect green infrastructure from development. In a TDR, the rights to develop a piece of land are transferred through the use of development credits. Municipalities identify two areas: 1) the area they are

Chapter 4 - Municipal Planning and Development

trying to protect from development and 2) the area in which they are encouraging high density development. Once these areas have been defined a developer can purchase development credits from a landowner in the protected area (which involves a similar process as that of a PDR as discussed in the previous section) which permits the developer to build a higher density development in the area slated for development.

TDRs can be used to shift development pressures from important natural areas and valuable agricultural lands to areas that have been identified for high density urban growth, and to channel development into areas with existing resources. While the authority of a municipality to set up a TDR scheme is not set out in legislation it is argued that specific legislation is not needed (Kwasniak 2005).

There are some challenges to TDR programs. Setting up a TDR scheme is complex and requires a significant amount of resources. TDR programs are complicated and for them to work they require community understanding, which in turn requires education and public outreach. Furthermore, there must be sufficient development pressure in the area to create an incentive for a developer to pay the extra cost for development credits (Ryan and Wilkie 2005).



"A successful example (of TDRs) in the United States is Montgomery County, Maryland, which has preserved over 43,000 acres of farmland through TDRs."

- Ryan and Wilkie
2005

4-8

Environmental Assessments for
Municipal Projects

Legislation

Legislation: Under the Environmental Protection and Enhancement Act (EPEA) and its Environmental Assessment Regulation and Environmental Assessment (Mandatory and Exempted Activities) Regulation many activities require that an environmental assessment and/or an environmental impact assessment (EIA) is conducted prior to these activities taking place.

In addition to scrutinizing proposed developments by residents and developers, municipalities have a responsibility to ensure that municipal development projects will not be detrimental to the natural environment. Just as with any individual or company, under EPEA, municipalities proposing a development may be required to conduct an environmental assessment or an EIA. A list of mandatory activities that require an EIA are listed in the Environmental Assessment (Mandatory and Exempted Activities) Regulation. In addition to the activities listed in this regulation, if the province believes that any proposed activity has the potential for environmental impacts and warrants further consideration under the environmental assessment process, an environmental assessment may be required.

Chapter 4 - Municipal Planning and Development

For municipal development projects or other activities for which the province does not require an environmental assessment or an EIA, municipalities may still wish to conduct an environmental assessment. These studies can be conducted prior to initiating proposed development to ensure that it and any associated activities will not adversely affect the environment and that it is in line with municipal policies regarding the environment. While the cost of these studies may be considerable, the cost of the damage caused to the quality of the water, land and air may be significantly more if precautionary assessments are not carried out.

More Information

More Information: Municipal Environmental Assessments

Environmental Assessment (National Guide to Sustainable Municipal Infrastructure 2004) - outlines a systematic process that can be used to identify, analyze, and evaluate the potential effects of proposed activities and projects on the environment. Available online: http://www.sustainablecommunities.fcm.ca/files/Infraguide/Environmental_Protocols/Accounting_Environm_Soc_Outc_Dec_Mak.pdf

The quality and quantity of water in a watershed is intricately linked to the practices used in the treatment and distribution of potable water, the collection and treatment of wastewater and the management and treatment of stormwater. Municipal governments have considerable responsibility when it comes to many of these operations and they have many opportunities to protect the health of their watershed by adopting best management practices (BMPs) relating to these operations. Even in municipalities that have contracted out many water-related operations, municipal governments have the power to influence how these services are carried out.



5-1

Water Quality Guidelines

Treated wastewater and stormwater eventually end up in the natural environment and most often in local water bodies or rivers where they can impact water quality. By incorporating watershed stewardship in water, wastewater and stormwater management, municipalities can help ensure that local water bodies meet the following guidelines set by the provincial and federal governments:

Canadian Water Quality Guidelines:

1. *Canadian Water Quality Guidelines for the Protection of Aquatic Life* - serve to help protect aquatic life by establishing acceptable levels for substances or conditions that affect water quality such as toxic chemicals, temperature and acidity (responsibility of Environment Canada).
2. *Guidelines for Canadian Drinking Water Quality* - serve to help protect human health by establishing maximum acceptable concentrations for substances found in water used for drinking. Parameters are set for microbial, chemical, physical and radiological parameters (responsibility of Health Canada).
3. *Guidelines for Canadian Recreational Water* - serve to help protect the health of Canadians using water for recreational activities like swimming and diving, white water sports, sailing, canoeing and fishing. Deal mainly with potential health hazards such as infections transmitted by disease-causing micro-organisms, and aesthetics and nuisance conditions (responsibility of Health Canada).
4. *Canadian Water Quality Guidelines for the Protection of Agricultural Water Uses* - serve to help protect sensitive crop species that may be exposed to toxic substances such as pesticides in irrigation water (responsibility of Environment Canada).

For more information on these guidelines see Environment Canada's website:
<http://www.ec.gc.ca/ceqg-rcqe/English/Ceqg/Water/default.cfm>.

Chapter 5 - Water, Wastewater and Stormwater Operations

Surface Water Quality Guidelines for Use in Alberta

- numerical concentrations of substances or conditions recommended by the Province of Alberta to support and maintain a designated water use (responsibility of Alberta Environment). For a copy of these guidelines visit Alberta Environment's website: <http://environment.gov.ab.ca/info/library/5713.pdf>.

5-2

Stormwater Management

LegislationLegislation:

- Under the Environmental Protection and Enhancement Act (EPEA) and its Wastewater and Storm Drainage Regulation and Wastewater and Storm Drainage (Ministerial) Regulation, most municipal stormwater systems must be approved by Alberta Environment. In accordance with these regulations, a stormwater system shall be designed to meet, as a minimum, the performance standards and design requirements set out in the Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems (AENV 2006) (available online: <http://environment.gov.ab.ca/info/library/6979.pdf>). Generally speaking, approvals under EPEA relate to water quality.
- Under the Water Act, approvals are also required for storm water ponds and outfalls. Generally speaking approvals under the Water Act relate to water quantity.

Rainfall travels in four directions:

- interflow - soaking into shallow ground and moving slowly through soils to streams
- percolating vertically into deep groundwater
- evapotranspiration - evaporation from surfaces and transpiration from leaves moves water back up into the air
- surface runoff - water flows over the ground

- Stephens et al.

Why is Stormwater Management Important?

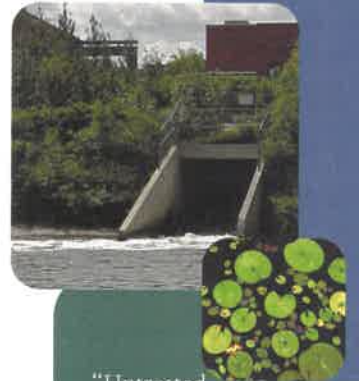
If not managed with watershed health in mind, stormwater can be detrimental to the environment. Urban environments tend to generate large quantities of stormwater that can create many problems relating to stormwater collection and treatment. In rural and urban areas stormwater can wash contaminants from all areas of the watershed into water bodies or groundwater recharge areas where these pollutants accumulate. If not managed properly, stormwater can cause water quality and water quantity problems that are detrimental to property values, human health and watershed health.

In natural conditions (e.g. forests, prairies) precipitation travels in four directions (see box on left), but in many built environments humans have changed how rainfall travels in a site. Natural areas (that supported interflow, percolation and evapotranspiration) have been covered with pavement, buildings and other impermeable surfaces. As a result the quantity of urban stormwater runoff has increased thus increasing the quantity of stormwater municipalities have to manage.

Chapter 5 - Water, Wastewater and Stormwater Operations

During heavy rains in an area characterized by a large area of impermeable surfaces, the increased quantity of stormwater runoff can be too much for built stormwater infrastructure. When infrastructure does not have the capacity to store or redirect these large stormwater flows, flooding results. Flooding is associated with property damage and human and environmental health concerns related to untreated stormwater. Furthermore, a large stormwater flow in an area not designed to store stormwater can also result in flooding in downstream areas, which can harm stream habitat and alter hydrological features.

Stormwater also carries with it a number of contaminants which can include nutrients, pathogens, sediments, pesticides, toxic substances and organic debris. Human activities have increased the quantity of these contaminants on the land while at the same time decreasing the area of natural areas that can help to filter these contaminants out of stormwater. If not managed properly stormwater can be heavily contaminated, which is costly to treat or detrimental to the natural environment if discharged without treatment.



"Untreated urban stormwater discharges may be one of the largest sources of uncontrolled pollution impacting the quality of receiving waters."

- McFarlane & Nilsen
2003

More information

More Information: the Impact of Impervious Surfaces

Paving Our Way to Water Shortages: How Sprawl Aggravates Drought

(Otto *et al.*) - provides an overview of the impact that impervious surfaces are having in urban centres in the U.S. Available online:
www.epa.gov/region8/water/pavingourway1.pdf.

"Historically, the impact of infrastructure was not considered in the design of roads or water systems. It was assumed the environment could support and absorb the changes made to it...This historic narrow focus for infrastructure decision making...had a series of unintended outcomes of an environmental, social, and economic nature."

-National Guide
to Municipal
Infrastructure 2003c
(p7)

Chapter 5 - Water, Wastewater and Stormwater Operations

Municipal Success Story**Intermunicipal Cooperation for Stormwater Management:
The Big Lake Basin Task Force**

In the spring of 2002 municipalities formed the Big Lake Basin Task Force to develop a stormwater management plan for the Big Lake Drainage Basin, located north west of Edmonton. The task force was made up of one representative from each of the participating municipalities that had land in the basin which included: the City of Edmonton, Parkland County, the Town of Stony Plain, the City of Spruce Grove, Sturgeon County, the City of St. Albert and Lac Ste. Anne County. Representatives from Alberta Environment and Alberta Transportation were also on the task force. The project was completed in the spring of 2005.



Photo credit:
City of
Edmonton

Project Details:

The goal of the Big Lake Basin Task Force was to develop a Stormwater Management Plan for the Big Lake Drainage Basin Area that addressed existing and future drainage patterns and flooding concerns arising from increasing development within the Basin. The project had two important components:

1. **Hydrological Study.** The hydrological study emphasized the importance of the basin's floodplains (Atim Creek floodplain and the Big Lake floodplain) for their environmental/ecological benefits and practical stormwater implications. It was concluded that a small increase in water levels would have an extensive impact on land in the area which was important information because of the implication this would have on private land development.
2. **Big Lake Basin Study Report.** The key recommendations of the Big Lake Basin study report included aggressive protection of the floodplain for flood protection and environmental protection and a stormwater release requirement for all forms of development in the watershed. The report provided a recognized and accepted drainage release rate for all development activities in the basin including agriculture.

Consultants were hired to complete a number of tasks, which included: background research, a literature review, community consultation, analyses, Task Force coordination and preparation of the final report. The cost for the work done by consultants was shared between Alberta Environment and the participating municipalities.

Successes

Prior to the initiation of this project, there was little stormwater management taking place in the Big Lake Drainage Basin Area. This partnership has improved relations between participating municipalities and has resulted in a collaborative stormwater management. All participating municipalities have accepted the recommendations of the

Chapter 5 - Water, Wastewater and Stormwater Operations

Big Lake Basin study report and have adopted the use of the controlled release rate as part of their regular operations. A maximum water level has been agreed upon for Big Lake (and thus for its low lying tributary, Atim Creek). Controlling release rates into the basin will ultimately protect the area from flooding and from related property and environmental damage.

Challenges

Different levels of tolerance or acceptance for environmentally driven issues was an obstacle for determining a stormwater release rate. The conservation of a floodplain for environmental purposes can be seen to be in conflict with utilization of a floodplain for land development purposes, just as a predevelopment release rate can be seen to be in conflict with land development (developers are required to build larger stormwater management facilities at a greater cost). Balancing environmental and development concerns was an obstacle to determining a stormwater release rate.

What's Next?

Municipalities participating in the Big Lake Basin Task Force continue to follow the established controlled release rate agreed upon by the group. Furthermore, the Task Force has met several times to initiate the next phase of the project, which is the preparation of a floodplain map.

Contact:

Senior Engineer
Drainage Services
City of Edmonton



Chapter 5 - Water, Wastewater and Stormwater Operations

Integrated Stormwater Management

Stormwater management is a mechanism for controlling stormwater runoff to protect against flooding, erosion and water quality degradation. It can include decisions related to: the protection, restoration or rehabilitation of green infrastructure on public and private lands, the construction of built infrastructure, pollution prevention and property drainage. Integrated stormwater management is an approach to stormwater management that involves the consideration of all factors that affect stormwater (e.g., water quality and quantity, flow rate), from precipitation through to the release of stormwater into receiving waters. Table 5.1 contrasts some of the main attributes of integrated stormwater management with those of traditional stormwater management.

Successful integrated stormwater management requires good planning. In order to make sound decisions extensive knowledge about the characteristics and needs of the local watershed is required. For example, when making stormwater management decisions, municipalities may want to consider already existing natural stormwater management areas (e.g. floodplains, wetlands), natural waterways, local hydrology, stormwater problem areas and existing stormwater management infrastructure (Association of New Jersey Environmental Commission 2002).

Table 5.1 Attributes of Traditional and Integrated Stormwater Management

Source: Stephens, K., P. Graham and D. Reid. *Stormwater Planning: A Guidebook for British Columbia*. British Columbia Ministry of Environment.

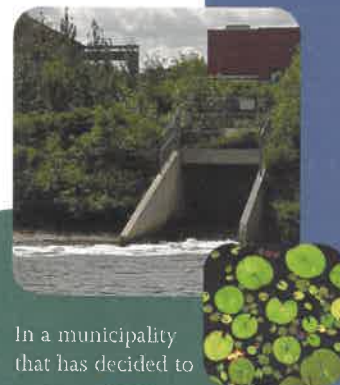
Traditional	Integrated
Drainage Systems	Ecosystems
Reactive (solve problems)	Proactive
Engineer-Driven	Interdisciplinary Team-Driven
Protect Property	Protect Property and Habitat
Pipe and Convey	Mimic Natural Processes
Unilateral Decisions	Consensus-Based Decisions
Local Government Ownership	Partnerships with Others
Extreme Storm Focus	Rainwater Integrated with Land Use
Peak Flow Thinking	Volume-Based Thinking

Chapter 5 - Water, Wastewater and Stormwater Operations

Integrated stormwater management requires active involvement of many municipal departments in stormwater management. The following are examples of roles that municipal departments (or their equivalent) can play in stormwater management (adapted from City of Edmonton 2006):

- Drainage Services - primarily responsible for stormwater management
- Office of Conservation - involved in the preservation of naturalized wetlands and their incorporation into the drainage system
- Office of the Environment - works on contaminated sites (which influence the quality of stormwater runoff)
- Transportation and Streets - responsible for the construction of streets through new industrial areas and new/reconstructed dangerous goods routes
- Planning and Development - the type, magnitude and design of new developments impacts stormwater quality and quantity (see box on right)
- Community Services - may be involved in watercourse stabilization projects, wetland projects and pesticide monitoring

Recognizing the connections between stormwater management and other land-use planning and activities being carried out throughout a municipality is integral to effective stormwater management.



In a municipality that has decided to promote **green cluster development**, this responsibility would normally fall in the hands of the Department of Planning and Development. This initiative, however, would likely have a number of direct stormwater management benefits and thus its incorporation into stormwater management planning would also be beneficial.

Benefits of cluster development to a stormwater system include (adapted from New Jersey Department of Environmental Protection 1999):

- Reducing site and watershed imperviousness
- Providing partial or total compensation for lots that would be lost for resource protection areas and streams
- Reducing stormwater runoff and pollutant loads
- Reducing pressure to encroach on resource and buffer areas
- Reducing the size of stormwater quantity and quality controls
- Reducing potential for soil erosion (since some green space is not cleared)
- Concentrating runoff where it can be most effectively treated
- Providing a wider range of possible sites to locate stormwater BMPs

Municipal Example

Municipal Example: Stormwater Management

City of Edmonton: ISO Certification - in 2005 the City's Drainage Services received ISO 14001:1996 Certification for its environmental management system. The system covers all activities in the Planning, Design/Construction, Operations and Wastewater Treatment sections. Regular review by both internal and external parties helps ensure the system remains viable and current. The Drainage Services Environmental Management System reduces the environmental risk associated with the following aspects:

- | | |
|--|-------------------------------|
| • Untreated Wastewater Discharge | • Solid Waste |
| • Partially Treated Wastewater Discharge | • Habitat Disruption and Loss |
| • Treated Wastewater Discharge | • Odour |
| • Stormwater Discharge | • Energy Use |
| • Contaminated Site and Land Use | • Air Emissions |
| • Erosion and Sedimentation | |

For more information on ISO Certification visit www.iso.org or call their Ottawa office at (613)238-3222.

Chapter 5 - Water, Wastewater and Stormwater Operations

More
InformationMore Information: Integrating Water Services**An Integrated Approach to Assessment and Evaluation of Municipal Road, Sewer and Water Networks** (National Guide to Sustainable Municipal

Infrastructure 2003) - available online at

http://www.sustainablecommunities.fcm.ca/files/Infraguide/Integrated_Infrastructure/Integr_Approach_Ass_Eval_Mun_Rd_.pdf.**5-2.1. Stormwater Pollution Prevention**

Stormwater quality is an important aspect of stormwater management. Perhaps the most effective means of improving stormwater quality is through pollution prevention on both private and municipal lands in both rural and urban areas. There are many ways municipalities can protect stormwater from **non-point source pollution** and **point source pollution**:

1. **Point source pollution** - pollutants discharged from discrete, identifiable point of source (e.g., pipes, ditches, sewers, wells, animal feeding operations)
2. **Non-point source pollution** - pollution caused by diffuse sources with no discernible distinct point of source (e.g., runoff from agriculture, urban areas, mining sites and construction sites)

- Managing the use of fertilizers and pesticides (see section 6-1.3)
- Promoting stewardship on agricultural lands, in woodlots and by industry (see section 6-4)
- Designating safe routes for dangerous goods (see section 6-2.2)
- Controlling the disposal of toxic substances in stormwater drains (see section 6-3.1)
- Encouraging industry to minimize stormwater contamination (e.g., require that stormwater from parking lots is treated prior to disposal into stormwater sewers)
- Utilizing good road salt and snow disposal practices (see section 6-2.3)
- Encouraging the use of industrial car washes (which collect and reuse water rather than having it run into stormwater sewers)
- Controlling disposal of animal wastes
- Addressing private sewage system issues relating to siting, construction and management (see section 5-4.5)
- Minimizing erosion on construction sites (see below)

Construction sites, especially those on previously green sites can be a significant source of stormwater contamination if soil erosion is not controlled and if measures are not taken to keep soil and other debris out of stormwater. Some of the BMPs for erosion and sediment control that can be used during construction include (Bow River Project 2002):

- Locate stockpiles away from watercourses and environmentally sensitive areas
- Stabilize stockpiles
- Designate access points for construction vehicles to leave construction sites and construct access roads with non-erodible material (gravel or asphalt)
- Protect existing catch basins and sewer inlets



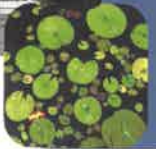
Photo credit:
City of Edmonton

Chapter 5 - Water, Wastewater and Stormwater Operations

- Control on-site drainage through temporary storage facilities (large jobs)
- Use dust control measures such as water trucks, mulching and temporary vegetation
- Establish wind erosion control using options such as barriers, vegetative controls, soil retention blankets and soil sealants
- Establish rainfall and water erosion controls using structural options (e.g., sediment traps and basins, inlet filters, straw barriers, sand bags, terracing, paving, blankets) and non-structural options (e.g., temporary and permanent seed planting, mulching, sod installation, netting, erosion control blankets, weed control)
- Use dry or wet ponds for ponding and filtering water
- Remove accumulated sediment and debris
- Regularly inspect and maintain erosion and sediment control system



Photo credit:
City of Edmonton



Municipal Example

Municipal Examples: Stormwater Quality

City of Edmonton: Erosion and Sediment Control Guidelines - created for the construction of green sites. Available online:
http://www.edmonton.ca/city_government/planning_development/erosion-and-sedimentation-cont.aspx.

City of Edmonton: Stormwater Quality Strategy (2006) - in order to improve stormwater quality and decrease impacts on the NSR, this strategy outlines three improvement concepts to focus on which include: 1) optimization of municipal operations; 2) land development servicing requirements; and 3) street and lot-level initiatives. Available online:
<http://www.edmonton.ca/CityGov/ampw/StormwaterQuality06.pdf>.
Phone: (780) 496-5660 (Lyndon Gyurek).

More Information

More Information: Stormwater Management

Best Management Practices: Stormwater Runoff from Petroleum Facilities (Canadian Institute of Petroleum Producers 2004) - BMPs for minimizing the effect of fuel facilities (e.g., service stations, card locks) on the quality of stormwater runoff. Available online:
<http://www.cppei.ca/pdf/BMPstormwater.pdf>.

5-2.2. Structural Best Management Practices (BMPs)

Stormwater is being managed by municipalities through a combination of structural best management practices made up of pre-existing green infrastructure and built infrastructure. Structural BMPs are used to treat stormwater at either the point of generation or the point of discharge to either a storm sewer system or receiving waters. They include engineered and constructed systems that are designed to provide for water

Chapter 5 - Water, Wastewater and Stormwater Operations

quantity and/or water quality control of stormwater runoff (United States Environmental Protection Agency 1999).

Many municipalities are recognizing the value of green infrastructure for their uses in stormwater detention, erosion control, nutrient and pollutant removal capabilities and groundwater recharge capacity. These municipalities are incorporating the protection, restoration/rehabilitation and even construction of green infrastructure into their stormwater management plans. By retaining already existing natural drainage areas (or restoring or creating them where preexisting natural areas have been destroyed), municipalities can save money and protect against flooding, water pollution and other stormwater problems. Table 5.2 presents some of the advantages and disadvantages of a number of stormwater BMPs being used today.

Table 5.2 Stormwater Structural BMPs: Advantages and Disadvantages

Source of some information in the following table: Alberta Environment. 1999. *Stormwater Management Guidelines for the Province of Alberta*. <Available online at <http://environment.gov.ab.ca/info/library/6786.pdf>

BMP	Advantages	Disadvantages
Wet pond	• Capable of removing soluble as well as solid pollutants • Provides habitat, aesthetic and recreation opportunities • Requires more maintenance than wetlands (due to having less natural vegetation)	• More costly than dry ponds • Permanent pool storage requires larger land area • Could be constrained by topography or land designations • Sediment removal relatively costly when required
Dry pond	• Not constrained by land area required by wet ponds • Can provide recreational benefits (but limited because surface is littered with stormwater grit)	• Potential re-suspension of contaminants (which are often washed out following large rain events) • More expensive O&M costs than wet ponds • Known to be effective breeding grounds for mosquitoes • Do not provide significant water treatment (only attenuate peak flows)



Photo credit: City of Edmonton

In order to ensure its effectiveness, green infrastructure must be properly maintained. This may include, for example, dredging wet ponds and controlling algae in stormwater wetlands.

Chapter 5 - Water, Wastewater and Stormwater Operations

BMP	Advantages	Disadvantages
Wetlands	• Pollutant-removal efficiencies are generally higher than typical wet ponds • Offers enhanced nutrient-removal capability • Provides habitat, aesthetic and recreation opportunities • Mosquito populations are usually controlled by dragon flies and other mosquito predators	• Generally requires more land area than wet ponds • Could be constrained by topography or land designations • Potential for some nuisance problems (but less likely to have algae build up than wet ponds)
Infiltration trenches	• Potentially effective in promoting recharge and maintaining low flows in small areas (where soil permeabilities permit) • May be appropriate as secondary facility where maintenance of groundwater recharge is a concern	• No public safety concerns • Appropriate only to small drainage areas (<2 ha) and residential land uses • Constrained by native soil permeabilities (e.g. Edmonton's water table lies under 60m of clay) • When being used for groundwater recharge, usually requires pretreatment device (potential contamination of groundwater must be investigated) • Can be used for water quantity control if many properties employ these BMPs (to deal with small quantities of stormwater) but generally ineffective for dealing with large quantities of stormwater at a single site • Common problems: improper siting and design, pollutant loading and lack of maintenance
Infiltration basins	• Potentially effective in promoting recharge and maintaining low flows in small areas (where soils permeabilities permit) • May be appropriate as secondary facility where maintenance of groundwater recharge is a concern • No public safety concern	• Appropriate only to relatively small drainage areas (<5 ha) and residential land uses • Constrained by native soil permeabilities • When being used for groundwater recharge, pretreatment is recommended (potential contamination of groundwater must be investigated) • Generally ineffective for water quantity control in neighbourhoods where the area of impermeable surfaces is high • Common problems: improper siting and design, pollutant loading and lack of maintenance



Photo credit:
City of Edmonton

Chapter 5 - Water, Wastewater and Stormwater Operations

BMP	Advantages	Disadvantages
Filter strips	• Water quality benefits may be realized if part of overall SUM plan (e.g., as secondary facility) • Effective in filtering out suspended solids and intercepting precipitation • May reduce runoff by reducing overland flow velocities, increasing time of concentration and increasing infiltration • Can create wildlife habitat	• Limited to small drainage areas (<2 ha) with little topographic relief • Uniform sheet flow through vegetation difficult to maintain • Effectiveness in freeze/thaw conditions questionable
Sand filters	• Generally effective in removing pollutants, resistant to clogging and easier/less expensive to retrofit compared to infiltration trenches	• Not suitable for water quantity control • Generally applicable to only small drainage areas (<5 ha) • Do not generally recharge groundwater system • May cause aesthetic/odour problems • O&M costs generally higher than other end-of-pipe facilities
Offline Oil/grit separators	• May be appropriate for commercial, industrial, large parking or transportation-related areas • Bypass prevents the scouring and resuspension of trapped pollutants in heavy rainfall events • Effective in removing sediment load when properly applied as a source control for small areas • Effective in trapping oil/grease from run off	• Difficult to maintain (requires sediment removal when filled with crud) • Relatively high O&M costs • Applicable for drainage areas less than 5 ha

Wetlands are an important part of natural drainage systems in Alberta and many rural and urban municipalities are taking measures to protect the remaining wetlands in their jurisdiction by incorporating them into stormwater management planning. For example, municipalities are justifying the purchase of wetlands as public utility lots and they are constructing their own wetlands (see box below). For more information on wetland conservation see Section 6-1.4.

The preservation of naturally existing healthy wetlands, whose ecological processes are well-established, provide the largest watershed benefits. However in areas where wetlands no longer exist, the construction of wetlands is an option for mimicking some of these complex ecological processes.

Municipal Success Story

The City of Edmonton Capitalizing on Constructed Wetlands

The City of Edmonton has undertaken a number of successful and award winning constructed wetland projects that use ecological restoration principles to develop a naturalized wetland facility and enhance the natural treatment of stormwater prior to discharge into creeks and into the North Saskatchewan River. To date, the City has constructed three wetlands and continues to plan for more in the future. The three constructed wetlands projects are: Fulton Marshland, Mill Creek Roper Pond and Elmjay Wetland. Under the City's guidance, private developers have built an additional eight constructed wetlands to provide for stormwater management in new residential areas.

Fulton Marshland

Fulton Marshland, built in 1998, was the first wetland constructed by the City of Edmonton. The project was an innovative collaboration between two of the City's departments. The Department of Transportation and Streets wanted fill for an interchange they were making and Drainage Services would have soil left over from the construction of a wetland that was needed for stormwater management in the area. The two departments got their wish and the location of Fulton Marshland was chosen for its proximity to this interchange. The project was financed primarily by the City's tax base and cost shared by the Departments of Transportation and Streets and Asset Management and Public Works.

The wetland is seventeen hectares in size and is primarily surrounded by agriculture but also by residential development. Under the City's Partners in Parks program, the Edmonton Naturalization Group is responsible for stewardship in a portion of the marsh.

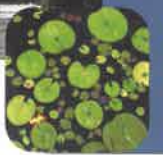
Mill Creek Roper Pond

The Mill Creek Roper Pond wetland is ten hectares in size and was completed in 2004 after two years of construction. Prior to its construction, the area was farmland that was continually subject to flooding and the land owner was asking for compensation. The wetland has met stormwater management needs in the area.

A major component of the project was the restoration of the habitats of small mammals and birds and the protection of native species. The wetland is also enjoyed by employees in surrounding businesses for passive recreation.



Photo credit: Lyndon Gyurek
Fulton Creek Marshland



Chapter 5 - Water, Wastewater and Stormwater Operations



Photo credit:
Lyndon Gyurek
Elmjay Wetland

Elmjay Wetland

Elmjay Wetland is the most recent of the City's constructed wetland projects and was completed in 2005 after two years of construction. Elmjay is located in an industrial area that previously had no stormwater management and is about three hectares in size.

Project Need

The construction of these and other wetlands has demonstrated environmental innovation by the City of Edmonton. These wetlands have helped to address both stormwater quality and quantity issues in the city, which were a concern of both the City and Alberta Environment. In the past the City has built dry ponds (and now discourages their construction) and more recently wet ponds as the solution to stormwater management. Today the City acknowledges the superiority of wetlands for their ability to clean stormwater.

Resources

Constructed wetlands are cost effective stormwater management facilities and have the added benefit of improving storm water quality. A number of the City's engineers have been involved in the project along with a variety of consultants specializing in landscape architecture and biology. Stormwater management facilities constructed by the City are funded primarily through the City's own Land Drainage Utility. On average, their construction costs roughly \$75 per square metre. Additional funding for the Mill Creek Roper Pond project came from the Infrastructure Canada-Alberta Program (ICAP).

In the years to come, the City expects that constructed wetlands may require some level of maintenance in the form of sediment removal. Excessive sedimentation could also lead to the development of algae blooms and associated odour problems. Constructed wetlands are a new initiative and the cost of maintenance will be discovered with time.

Policy

The City does not currently have an overarching policy that prioritizes the construction of wetlands and stormwater management plans are made on a per basin level. However, the City has developed a new Stormwater Quality Strategy, which identifies a number of constructed BMPs to be used on public lands. Constructed wetlands are identified in the strategy as neighbourhood-level and basin-level BMPs.

Chapter 5 - Water, Wastewater and Stormwater Operations

What's Next?

The City of Edmonton is continuing to construct wetlands and is currently looking at sites that may be appropriate for new projects. One future possibility is the conversion of already existing dry ponds into wetlands.

Contact Information

General Supervisor - Strategic Planning
Drainage Services
City of Edmonton



BMPs on privately owned lands also have an important role to play in managing both the quantity and quality of stormwater. As a means of decreasing stresses on municipal stormwater infrastructure, municipalities can encourage landowners to adopt practices that promote stormwater storage and infiltration on their lands. These include activities such as decreasing the size of impermeable surfaces (e.g., driveways, rooftops and sidewalks), increasing vegetation (e.g., native vegetation and gardens) and collecting and storing rainwater (e.g., rain barrels for watering and rock gardens for storing water). Municipalities can also promote pollution prevention (see section 5-2.1). For information on community outreach see section 8-3.

More Information

More Information: Constructed Wetlands

Guidelines for the Approval and Design of Natural and Constructed Treatment Wetlands for Water Quality Improvements (Alberta Environment 2000) - available online at <http://environment.gov.ab.ca/info/library/5711.pdf>.
Phone: (780)427-2700 (toll free by first dialing 310-0000).

Municipal Example

Municipal Examples: Stormwater BMPs

City of St. Albert: Stormwater Outfall - in 2001 the City installed an oil-grit separator at a major stormwater sewer outfall along the Sturgeon River. The device has improved the quality of stormwater being deposited in the river and in 2004 it removed over 82% of the targeted sediment load and captured significant oil and grease. The City plans to continue its efforts to improve stormwater quality through a ten year program that will allocate \$1 million per year to stormwater outfall projects. This program will include both the use of oil and grit separators and wetland treatment. Phone: 459-1746 (Leah Jackson).

City of Calgary: Wetlands Conservation Plan - outlines a number of goals relating to: conservation and sustainability, "No Net Loss," regional planning, management of wetland habitats, wetland monitoring, research and development and public education.

Chapter 5 - Water, Wastewater and Stormwater Operations

Municipal Example

Website: <http://content.calgary.ca/CCA/City+Hall/Business+Units/Parks/Parks+Management/Natural+Areas+and+Wetlands/Wetland+Conservation.htm>.
Phone: (403) 268-5212.

City of Seattle - the City's Public Utilities has developed an approach to stormwater management called "natural drainage systems," where natural features are used to manage and treat stormwater. They have embarked on a number of neighbourhood projects to promote stormwater drainage through, for example, vegetated swales and small wetland ponds. Website: http://www.seattle.gov/util/About_SPU/Drainage_&_Sewer_System/Natural_Drainage_Systems/index.asp.

5-2.3. More Resources: Stormwater Management

Stormwater Management Guidelines for the Province of Alberta (Alberta Environment 1999) - available online: <http://environment.gov.ab.ca/info/library/6786.pdf>.
Phone: (780) 427-2700 (toll free by first dialing 310-0000).

The National Guide to Sustainable Municipal Infrastructure - best practices relating to stormwater management. Available online: http://www.sustainablecommunities.fcm.ca/Infraguide/Storm_and_Water.asp.

- Source and On-Site Controls for Municipal Drainage Systems (2003) - provides an overview of stormwater run-off controls, source control and on-site control for stormwater pollution prevention
- Stormwater Management Planning (2005) - based on a survey of relevant practices across Canada
- Conveyance and End-of-Pipe Measures for Stormwater Control (2005) - examines methodologies for conveyance and end-of-pipe controls and their effectiveness and costs and lists a number of guides for implementing stormwater management systems
- Road Drainage, Design Alternatives, and Maintenance (2003) - includes a section on stormwater runoff management and controls

Urban Stormwater-Bow Basin website - provides information on best practices, standards, guidelines, funding and research that apply throughout Alberta and beyond. This site was developed by the Bow River Basin Council. Website: www.urbanswm.ab.ca.

Stormwater Planning: A Guidebook for British Columbia - provides a detailed overview of integrated stormwater management. Available online (from British Columbia's Ministry of Environment): <http://www.env.gov.bc.ca/epd/epdpa/mpp/stormwater/stormwater.html>.

Municipal Options for Stormwater Management (Association of New Jersey Environmental Commission 2002) - examines the following stormwater management components: planning, zoning, ordinances, BMPs and retrofitting/redevelopment. Available online: <http://www.anjec.org/pdfs/Stormwtr.pdf>.

Chapter 5 - Water, Wastewater and Stormwater Operations

City of Calgary: Stormwater Management & Design Manual (2000) - available online:
http://calgaryonlinestore.com/detail.asp?prod_id=23

Also see list of references at the end of this Chapter.

5-3

Potable Water

Legislation

Legislation: Under the *Environmental Protection and Enhancement Act* (EPEA) and its *Potable Water Regulation*, municipal waterworks systems require an approval or a registration:

- Approval - in order to receive an approval, a waterworks system shall be designed to meet, as a minimum, the performance standards and design requirements set out in the *Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems* (AENV 2006) (see references below).
- Registration - applies to systems that have a high quality groundwater supply and systems consisting only of a distribution system (e.g. a municipality that gets its water from regional water supply lines). Registration requires that systems follow a code of practice (see references below).

Most municipal governments have taken on the responsibility of supplying their rate payers with potable water and are accountable (to varying degrees) for the collection, treatment and distribution of potable water. Some municipalities supply these services directly while others contract the work to specialized companies or collaborate with other municipalities in their region. This section is a summary of the following stewardship activities for municipalities to consider regarding potable water: water conservation, source protection, water treatment, water distribution and groundwater protection.

More Information: Approvals and Registration

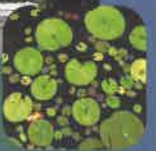
The following Alberta Environment publications are available online or phone (780)427-2700 (toll free by first dialing 310-0000).

- *Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems* (2006) - <http://environment.gov.ab.ca/info/library/6979.pdf>.
- *Code of Practice for Waterworks Systems Using High Quality Groundwater* (2003) - <http://www.qp.gov.ab.ca/documents/codes/GROUNDWATER.CFM>.
- *Code of Practice for Waterworks System Consisting Solely of a Water Distribution System* (2003) - <http://www.qp.gov.ab.ca/documents/codes/DISTRIBUTION.CFM>.



Statistics
on Water
Use:

- In Canada, the municipal residential sector (domestic and household water uses) accounts for 50% of all municipal uses (McFarlane & Nilsen 2003)
- In both Calgary and Edmonton, commercial, industrial and institutional water use account for approximately one-third of overall water use (Wilkie 2005)



Chapter 5 - Water, Wastewater and Stormwater Operations

5-3.1. Water Conservation

Population increases and economic growth are increasing the demand for a limited supply of water. There is growing concern about the capacity of the environment to sustain current water uses and to meet these growing demands. In the past, increased demand for water was addressed by building dams, pipelines and increased storage facilities. In many instances these solutions have altered water regimes (creating water shortages downstream), impaired ecological processes and diminished overall watershed health.

More recently governments have explored water conservation as an alternative to manipulating water supply so as to ensure water availability in the long term. Water conservation is also associated with decreased operating costs relating to water collection, treatment, storage and distribution and can serve to delay water treatment capacity expansion which also saves money.

Demand Management

A number of governments and organizations are exploring demand management as a strategy for decreasing the supply of water demanded by water users. Demand management involves encouraging water conservation by residents, businesses and industry. Table 5.3 presents a number of demand management policy instruments that can be used and promoted by municipal governments.

There are a number of ways municipalities can use demand management. For example, measuring water use with water meters and charging users by the volume of water used is a proven method for decreasing water use. Both the City of Calgary and Environment Canada have found that non-metered residential customers use on average 50% to 60% more water than metered users (Wilkie 2005). Municipalities must decide which policy instruments are best for them.

Public Awareness and Education

As part of their demand management initiatives, many municipalities encourage water conservation through a variety of outreach programs to residents and businesses ([for information on public outreach see section 8-3](#)). One important consideration for water conservation outreach initiatives is eliminating false perceptions relating to water supply and the value of water. In consultations held by Canada West the following barriers to demand management in Alberta were identified by water experts, stakeholders and policy makers (Wilkie 2005):

- Myth of abundance - the notion that there will always be more and that supply and infrastructure solutions are the answers to water shortages
- Myth of entitlement - for many, access to clean, free water is seen as a right
- Societal values - Canadians tend to prefer lifestyle options that are harmful to water supplies (e.g., lawns, golf courses, urban sprawl)
- Perceived fear - water recycling and water reuse is viewed by many as harmful to human health

"Some municipalities have initiated programs encouraging water efficient practices, including promoting, or requiring, water efficient fixtures, such as shower heads and low volume toilets. They have demonstrated that significant savings can be achieved at little additional cost."

- Environment
Canada

In Environment Canada's Municipal Water Use and Pricing survey (2001) it was found that demand-control strategies employed by municipalities vary. Of the 967 municipalities that responded to a question on demand-control strategies, 12% advised their industrial, commercial and institutional clients about ways to reduce water use, 11% used public advertising to promote water conservation, 6% installed efficiency-enhancing equipment, 35% offered home audits, 8% offered water efficiency kits for sale and 33% had instituted municipal bylaws to restrict lawn watering.

- Environment Canada
(2005)

Chapter 5 - Water, Wastewater and Stormwater Operations

Table 5.3 Demand Management Policy Instruments

Source: Wilkie, Karen. 2005. *Balancing Act: Water Conservation and Economic Growth – Water and Economic Growth Initiative Consultations Summary*. Canada West Foundation.

Category	Instrument	Definition
Economic	Pricing	A dollar value is placed on volumetric use of water
	Incentives	Positive measures designed to encourage certain actions of behavior (e.g., tax breaks, credits, grants or low interest loans for new technology and upgrades)
Technological	Water Efficiency	Technology or infrastructure upgrades and new facilities (designed to use less water)
	Water Recycling	Reuse of treated wastewater for non-potable uses (non-human consumption) or indirect potable uses (mixed with raw potable supplies such as groundwater)
	Alternate Sources	Use of other resources (other than freshwater) to perform the same function (e.g., use of water with low salt content by the oil and gas industry)
Educational	Public Awareness	Programs to engage citizens and provide information on the importance and value of water (economic, social, and environmental) and the consequences of unsustainable water use
Trading	Water Trading (has been used by the Province of Alberta)	A system where a portion of annual water allocations can be traded (e.g., if a water user does not use 100% of the annual water allocation, they could sell/transfer the remaining water to another user)



Chapter 5 - Water, Wastewater and Stormwater Operations

- Afraid of change - many Canadians “are set in their ways and dislike change” which is a barrier to developing public support for changing how water is viewed, valued and used
- More government control - industry sees water pricing as just another government tax and more red tape that will harm the economy (e.g. “government benefits at the cost of industry,” “pricing will impede market competitiveness,” “costs of demand management will outweigh the benefits”)
- Lack of technological confidence - industry does not want to invest in technology that has not proven to be effective

More Information

More Information: Water Conservation

Western Canada Water & Wastewater Association website - a resource for information on water conservation opportunities for governments, businesses and individuals. Website: <http://www.wcwwa.ca/>.

Balancing Act: Water Conservation and Economic Growth - Water and Economic Growth Initiative Consultations Summary (Wilkie 2005) - provides an overview of the demand management policy instruments presented in Table 5.3. Available online: www.cwf.ca. Phone: 1-888-825-5293.

The National Guide to Sustainable Municipal Infrastructure - best practices relating to potable water. Available online: http://www.sustainablecommunities.fcm.ca/Infraguide/Potable_Water.asp.

- Establishing a Metering Plan to Account for Water Use and Loss (2003) - a primer on water metering, current equipment and options for pricing water
- Demand Management (2004) - outlines a number of guidelines for developing a Demand Management strategy such as information needs and tools for initiation and implementation

Municipal Example

Municipal Example: Water Conservation

Town of Beaumont: Toilet Rebates - the Town offers toilet replacement rebates in order to reduce water consumption. A rebate of \$50 is given to a homeowner who replaces a 13+ litre toilet with a 6 litre one.

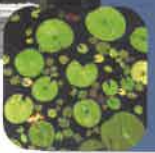
5-3.2. Source Protection

An important component of providing clean potable water to municipal rate payers is protecting water sources. Threats to water sources include land uses and activities throughout the watershed that result in the deposit of sediments, nutrients, pathogens, toxic contaminants and debris into water bodies. Source protection is particularly important for contaminants that are potentially harmful to human health and difficult to remove from water, such as pesticides, herbicides, pharmaceuticals, nitrates, nitrites, phosphorus and heavy metals.

Chapter 5 - Water, Wastewater and Stormwater Operations

Municipalities can protect water sources by identifying areas where threats to the quality and quantity of source water exist, developing strategies to reduce these threats and monitoring water sources. Source protection involves the management of many land uses and activities occurring throughout the watershed. Some important components of source water protection are:

- Managing stormwater runoff through pollution prevention (see section 5-2.1)
- Maintaining green spaces - healthy shorelines, riparian areas and other natural areas that serve as buffers between water sources (both water bodies and groundwater recharge areas) and potentially detrimental land uses (see section 6-1)
- Controlling point-source pollution



Municipal Examples: Source Protection

Town of Okotoks (Alberta) - has set a limit for its maximum population size based on the capacity of the Sheep River on which the town relies for water.
Website: <http://www.okotoks.ca/>.

Association of Pigeon Lake Municipalities - a number of the summer villages at Pigeon Lake (members of the Association of Pigeon Lake Municipalities) have adopted resolutions promoting themselves as "phosphate free." Phosphates, present in detergents and fertilizers are a major source of nutrients that contaminate water and promote undesirable plant growth in lakes. Using low-phosphate detergents is particularly important in rural areas, where grey water with high phosphate content in septic fields may result in phosphates entering the groundwater.

5-3.3. Potable Water Treatment

As new wastewater treatment technologies are developed, as Alberta adopts more stringent water quality standards and as awareness about water quality problems grow, municipalities are under increasing pressure to upgrade or replace wastewater treatment equipment. For small communities these pressures can be expensive. However there are some affordable options for providing safe drinking water at reasonable costs.

Some small municipalities have responded by seeking private sector delivery of water services (e.g., the towns of Tofield and Viking, and the villages of Ryley and Holden) and others have undergone regionalization where municipalities have partnered with neighbouring municipalities to share water treatment infrastructure and staff. There are also a number of affordable technologies available for improving water quality such as retrofitting current surface water treatment systems to include oxidation and biological filtration. Furthermore, there are many new technologies available to provide safer water, which include membrane filtration and UV disinfection.

Chapter 5 - Water, Wastewater and Stormwater Operations

Water and Wastewater Operators

Operators for most municipal waterworks and wastewater systems require a Certificate of Qualification based on the Alberta Water and Wastewater Operators' Certification Guidelines as per the Environmental Protection and Enhancement Act (EPEA). Operators obtain this certificate by completing the Alberta Environment Operator Certification Program which is intended to provide the following benefits:

- Assurance of a safe and adequate water supply
- Protection of the aquatic environment
- Optimum use of public funds and resources dedicated to water and wastewater facilities
- Best use of existing technology
- Recognition of water and wastewater facility operators and the important role they play in their communities

A copy of Water and Wastewater Operators' Certification Guidelines can be obtained from Alberta Environment's Edmonton office by calling (780)427-7713.

5-3.4. Distribution of Potable Water

Leaks in water distribution systems can lead to the loss of water from municipal systems. This is of particular interest in potable water systems that use surface water because water from these leaks often flows to groundwater sources where it may be impossible to recover. For this reason it is important that water distribution infrastructure follow Alberta Environment's Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage System and that they are properly maintained.

More Information

More Information: Water Distribution Systems

National Guide to Municipal Infrastructure - best practices on water distribution systems. Available online:
http://www.sustainablecommunities.fcm.ca/Infraguide/Potable_Water.asp.

- Deterioration and Inspection of Water Distribution Systems (2003) - a primer on inspecting distribution and transmission mains
- Water Use and Loss in the Water Distribution System (2003) - a summary of the basics of water auditing and a tool for reducing costs and improving accountability
- Selection of Technologies for the Rehabilitation or Replacement of a Water Distribution System (2003) - an overview of current options for pipe repair or replacement and how to make the best choice for local conditions

Chapter 5 - Water, Wastewater and Stormwater Operations

More Information

- **Water Quality in Distribution Systems (2003)** - a summary of common water quality problems in distribution systems and how to address them
- **Developing a Water Distribution System Renewal Plan (2003)** - an overview of Basic approaches to planning renewal of water distribution systems

See list of references at the end of this chapter.

5-3.5. Ground Water Protection and Use

About 90 percent of rural Albertans rely on groundwater for their household water supply (AAFRD, PFRA & Alberta Environment 2000) and protecting this water source is important in many rural communities. Groundwater sources are maintained by groundwater recharge, which comes from precipitation and surface water that is drawn by gravity through soil and rock layers.

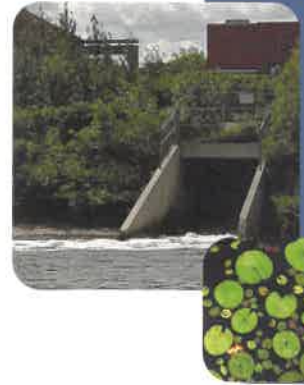
It is important that municipalities know where groundwater recharge areas exist so that they can manage human activities and land uses in these areas to minimize impacts on groundwater quality and quantity. For example, the drainage of wetlands (which requires an Alberta Environment approval under the *Water Act*) and activities associated with potentially harmful contaminants can be discouraged on our near groundwater recharge areas. [For more information on incorporating watershed needs into land use plans see Chapter 4.](#)

Another topic that deserves attention from rural municipalities is water wells. As the density of wells increases their collective demand on local groundwater resources increases as well, which can increase the threat of groundwater shortages and contamination. Municipalities can assess the quantity of groundwater available in their communities and if there is a threat of groundwater overuse they may want to seek other sources of potable water. Furthermore, wells can be a source of groundwater contamination if they are not designed, maintained and plugged properly (see publication below for more information).

More Information

More Information: Ground Water

Water Wells...that last for generations (AAFRD, PFRA & Alberta Environment 2000) - a resource for well owners with information on groundwater and water wells. It includes information on the planning, design, construction monitoring and maintenance of water wells and the steps to plugging abandoned wells to protect groundwater. Phone: (780)427-2181 (Alberta Agriculture, Food and Rural Development's Agricultural Engineering Branch), (780)495-3307 (Prairie Farm Rehabilitation Administration), or (780)449-3463 (Alberta Environment's Licensing and Permitting Standards Branch).



Chapter 5 – Water, Wastewater and Stormwater Operations

More Information

Regional Groundwater Assessments - the Prairie Farms Rehabilitation Administration (of Agriculture and Agri-Foods Canada) and many municipalities have jointly funded regional groundwater assessment studies. Website: <http://www.hcl.ca/items/rgwa.asp>.

More Information: Potable Water

See list of references at the end of this chapter.

5-4

Wastewater

Legislation

Legislation: Under the *Environmental Protection and Enhancement Act* (EPEA) and its *Wastewater and Storm Drainage Regulation* and *Wastewater and Storm Drainage (Ministerial) Regulation* municipal wastewater systems require an approval or a registration from Alberta Environment:

- Approval - in order to obtain an approval a wastewater system shall be designed to meet, as a minimum the performance standards and design requirements set out in the *Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems* (AENV 2006) (see references below)
- Registration - applies to systems consisting of a lagoon or a collection system and must follow a code of practice (see references below)
- Smaller wastewater systems are regulated through Municipal Affairs under the *Safety Codes Act* (see section 5-4.5)

More Information

More Information: Wastewater Approvals and Registration

The following Alberta Environment publications are available online or phone (780)427-2700 (toll free by first dialing 310-0000).

- **Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems** (2006) - <http://environment.gov.ab.ca/info/library/6979.pdf>.
- **Code of Practice for Wastewater Systems Consisting Solely of a Wastewater Collection System** (2003) - <http://www.qp.gov.ab.ca/documents/codes/COLLECTION.CFM>.
- **Code of Practice for Wastewater Systems Using a Wastewater Lagoon** (2003) - <http://www.qp.gov.ab.ca/documents/codes/LAGOON.CFM>.

Chapter 5 - Water, Wastewater and Stormwater Operations

5-4.1. Municipal Wastewater and the Environment

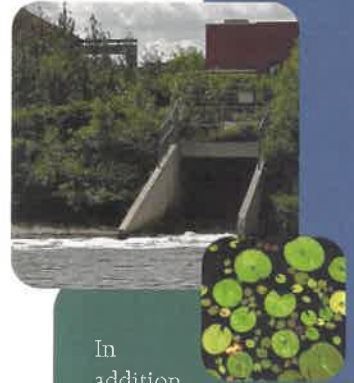
Municipal effluent is a major source of water contamination in Canada. Untreated human sewage released into the environment can result in high levels of pathogens and other contaminants. These contaminants are harmful to human health and can upset natural nutrient balances in water bodies, which can lead to **eutrophication** and other negative environmental impacts.

Technologies for treating wastewater have come a long way but treated wastewater still creates environmental and human health risks. For example, high quantities of ammonia and chloramines are often found in treated wastewater, both of which are listed as toxic under the *Canadian Environmental Protection Act* (CEPA) Environmental Registry. At levels found in the natural environment these substances degrade and are part of natural processes. However, the quantity of these substances produced in large urban areas is significantly above natural levels and can pose a serious threat to downstream environments and water users. The presence of pharmaceuticals in wastewater is also a growing concern among Canadians.

Ammonia - Ammonia is a human waste product and, while required by most organisms for protein synthesis, it can become highly toxic to fish and other animals living in the water (depending on water pH and temperature). Municipal wastewater treatment plants are a major source of ammonia released in the aquatic environment. The CEPA assessment that concluded ammonia to be toxic indicated that based on its effects on more sensitive environmental organisms, action taken to reduce ammonia release would be protective for human health as well (Environment Canada webpage (b)).

Chloramines - Chloramines are a group of chemical substances formed when chlorine and ammonia combine in water. While Health Canada has determined that chloramines used as a disinfectant in drinking water do not pose a health threat to humans, they have been found to be highly toxic to fish and other aquatic organisms. Chloramines are used as a disinfectant for drinking water and wastewater and are found in effluents from sewage treatment plants. An assessment of drinking water releases found that even very small direct discharges of chloramine-treated potable water could result in impacts on aquatic species. The CEPA assessment on chloramines indicated that based on its effects on more sensitive environmental organisms, action taken to reduce chloramines release would be protective for human health as well (Environment Canada webpage (c)).

Pharmaceuticals - Concern regarding the existence of pharmaceuticals in treated wastewater is increasing in Alberta and around the world. In 2002 and 2003 Alberta Environment tested waters in the North Saskatchewan, South Saskatchewan, Bow, Oldman and Red Deer rivers and confirmed the presence of a fairly broad range of pharmaceuticals, endocrine disruptors and other organic wastewater contaminants in wastewater treatment plant effluents and receiving waters (Alberta Environment 2005). These substances enter wastewater through both urine and unused drugs that are flushed down the toilet. The affects of these substances in our water on humans and aquatic life is not well-known.



In addition to being present in municipal wastewater, ammonia is released in large quantities into the environment by many industries such as pulp and paper mills, mines, food processing and fertilizer production. The majority of these releases go into the atmosphere.

-Environment Canada
webpage (b)

Chloramines are also found in discharges from industrial cooling water processes that are treated with chlorine or chloramines, in fire fighting runoff and in storm-water runoff from domestic water supplies treated with these substances.

- Environment Canada
webpage (c)

Chapter 5 - Water, Wastewater and Stormwater Operations

In the past, the practice of flushing old medication down the toilet was considered acceptable. Now, re-education is needed to ensure that old drugs are kept out of wastewater streams. Municipalities can support and promote EnviRx, a program run by Alberta Pharmacists' Association which works to promote safe and effective drug use while giving Albertans an opportunity to return unused and expired medications to their community pharmacies. These medications are collected by pharmacies and incinerated in an environmentally friendly manner. For more information call 1-800-563-9566 or visit their website at www.albertapharmacy.ca/funding/envirx.aspx.

Ammonia, chloramines and pharmaceuticals are just a few of the contaminants that enter municipal sewer systems and can be harmful to watershed health. Most municipalities provide wastewater services in their communities and as such have many opportunities to protect watershed health. These include opportunities related to: 1) wastewater collection, source control, 2) wastewater treatment, 3) the use/disposal of biosolids and 4) the management of private sewage systems.

More Information

More information: Sources of Sewer Contaminants

Directory of Sources of Contaminants Entering Municipal Sewer Systems (Canadian Water and Wastewater Association 2001) - tool for identifying the potential industrial, commercial and institutional sources of contaminants entering municipal sewage treatment plants. Available online: www.cwwa.ca/publicationorder_e.asp. Phone: (613)747-0524.

CEPA website - contains information on ammonia and chloramines and their designation as toxic. Website: http://www.ec.gc.ca/CEPARegistry/subs_list/Ammonia_BG.cfm. Phone: Danie Dubé (Environment Canada) at (819)953-0356.

A Preliminary Survey on Pharmaceuticals and Endocrine Disrupting Compounds in Treated Municipal Wastewaters and Receiving Rivers in Alberta (Alberta Environment 2005) - available online at <http://environment.gov.ab.ca/info/library/7604.pdf>. Phone: (780) 427-2700 (toll free by first dialing 310-0000).

5-4.2. Wastewater Collection Systems and Source Control

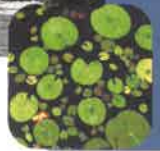
As with potable water distribution systems, poorly constructed or maintained wastewater infrastructure such as pipes, joints, connections and septic tanks can cause environmental problems. Typically poor construction and maintenance problems lead to the infiltration of stormwater into the system (which can hydraulically overload the system and cause overflows and backups) but can also be a source of wastewater loss into the surrounding environment. The leaching of untreated wastewater into the ground can be a source of groundwater and surface water contamination during heavy rains (when this water is washed into nearby water bodies). Ensuring that wastewater collection systems are properly constructed and maintained is an important component of protecting ground and surface water.

Chapter 5 - Water, Wastewater and Stormwater Operations

Municipalities also have a responsibility to ensure that their wastewater collection systems have the capacity to handle their maximum quantity of wastewater flow. There are two general methods of addressing increased wastewater flow into a system. First, they can increase the holding capacity of the system through expansions in inline and offline storage (which is costly). Second, they can decrease the quantity of wastewater into the system by encouraging individuals and industry to use less water (see section 5-3.1 for information on water conservation). For municipalities that have systems where wastewater and stormwater sewers are combined, heavy rains create additional problems related to water holding capacity of the system and can lead to the discharge of untreated wastewater into the environment through stormwater outlets.

Wastewater source control is also worth considering as a means of controlling the contaminants that enter wastewater sewers in the first place. By controlling what goes into sewers, municipalities can minimize wastewater treatment needs. Wastewater source control is particularly valuable for substances that are difficult to remove from wastewater (e.g. pharmaceuticals, phosphorus and heavy metals). Some examples of municipal wastewater source control include:

- Creation of sewer bylaws that control the substances that go into wastewater sewers (see section 7-2.3)
- Public education and outreach aimed to keep pharmaceuticals, household hazardous wastes (e.g., paints and solvents), industrial pollutants and other contaminants out of wastewater sewers (see Chapters 6 and 8)



Municipal Example

Municipal Example: Wastewater Source Control

Greater Vancouver Regional District (GVRD), BC - enacted a code of practice for wastewater management at food sector establishments to reduce grease buildups in the sewer system. This code complements the district's sewer-use by-law by specifying the size, operation and maintenance of grease interceptors to ensure compliance with oil and grease discharge limits. In co-operation with representatives from municipalities and restaurant associations, the GVRD published a booklet describing the code's requirements and a best management practice to improve the quality of wastewater discharge as well as the efficiency of the grease interceptor installation (National Guide to Sustainable Municipal Infrastructure 2003d).

Chapter 5 - Water, Wastewater and Stormwater Operations

More Information

More Information: Wastewater Collection and Source Control

Guide to Requirements for Wastewater Systems Consisting Solely of a Wastewater Collection System (Alberta Environment 2004) - available online at <http://environment.gov.ab.ca/info/library/7138.pdf>. Phone: (780) 427-2700 (toll free by first dialing 310-0000).

The National Guide to Sustainable Municipal Infrastructure - best practices relating to wastewater collection. Available online: http://www.sustainablecommunities.fcm.ca/Infraguide/Storm_and_Water.asp.

- **Selection of Technologies for Sewer Rehabilitation and Replacement (2003)** - a resource to help municipalities select the appropriate sewer rehabilitation or replacement technology based on social, economic and environmental factors
- **Infiltration/Inflow Control/Reduction for Wastewater Collection Systems (2003)** - provides an overview of a program for controlling the quantity of water entering a sewer system from water discharged to a sanitary sewer system and from the ground through defective pipes, pipe joints, connections or manhole walls
- **Wastewater Source Control (2003)** - provides information on bylaws, monitoring and enforcement programs, educational and awareness programs, codes of practice, wastewater rates and pollution prevention plans.

Best Management Practices - the Canadian Petroleum Products Institute has produced two publications that outline BMPs that minimize the effects of vehicle wash facilities and automotive repair operations (that discharge to a sanitary sewer system) on the quality of wastewater sent to sewers. Available online: <http://www.cppei.ca/pdf/BMPwash.pdf> (vehicle wash facilities), <http://www.cppei.ca/pdf/BMPrepair.pdf> (automotive repair operations).

See list of references at the end of this Chapter.

5-4.3. Treating Wastewater

Most municipalities are responsible for wastewater treatment in their communities. As the understanding of the relationship between wastewater and environmental health grows and as new wastewater treatment practices and technologies are developed, standards set under EPEA may change. Furthermore, the increasing quantities of wastewater that result from population growth have increased the need for improved practices to protect environmental and human health.

There are a number of wastewater treatment technologies being used throughout Alberta. These include: biological nutrient removal, activated sludge, digestors, dewatering techniques, rotating biological contactors, membrane filtration and UV filtration.

Chapter 5 - Water, Wastewater and Stormwater Operations

Wastewater treatment technology is always developing and as the quality of treated wastewater improves, so do the potential uses of wastewater which currently include irrigating golf courses and crops (for other than human consumption) and making hydrogen for processes used by the oil and gas sector (see box below).

Municipal Success Story**The City of Edmonton Leads the Way in Wastewater Treatment**

The City of Edmonton is the largest municipality in the North Saskatchewan Watershed, and as such has the potential to have a considerable impact on the quality of water in the North Saskatchewan River into which treated wastewater and stormwater is discharged. The City is taking their responsibility to protect the North Saskatchewan River seriously and is demonstrating global leadership in wastewater treatment at their Gold Bar Wastewater Treatment Plant (WWTP). They have been busy making a number of upgrades at this plant that will help protect the health of the river.

The Gold Bar WWTP is a tertiary treatment facility and treats wastewater from 95% of Edmontonians and all of Leduc, Nisku, Beaumont and the Edmonton International Airport. Of the water extracted from the North Saskatchewan River for use by the City of Edmonton and surrounding areas, 90% of this is put back into the river after treatment at the Gold Bar WWTP. The City has made three major developments that have greatly improved the quality of plant effluent discharged into the North Saskatchewan River: Biological Nutrient Removal (BNR), Membrane Filtration and Enhanced Primary Treatment (EPT).

Biological Nutrient Removal (BNR)

In 2002 the City incorporated BNR as part of the tertiary treatment process at Gold Bar WWT Plant. In this process microorganisms are used to remove phosphorus from wastewater and to break down ammonia-nitrogen into harmless elements.

The driving forces behind the incorporation of BNR into the City's wastewater treatment process were both a concern for environmental health and changing regulations for wastewater treatment set out by the province. The City's license for operation of the Gold Bar WWTP required that BNR become part of the treatment process by 2005. The City has shown environmental excellence by initiating and completing this project three years prior to the date set by the province. A variety of City of Edmonton drainage staff and consultants were involved in the \$80 million project (which also included upgrades for using high intensity UV to disinfect final effluent). The project received a \$37.5 million grant from Canada/Alberta Infrastructure Works (which no longer exists).

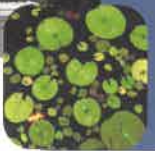


Photo credit:
City of Edmonton

Chapter 5 - Water, Wastewater and Stormwater Operations

Membrane Filtration and Water Reuse Initiative

The City is currently constructing a membrane treatment facility to further improve the quality of treated wastewater at Gold Bar WWTP. Membrane filters are made up of a series of membranes which resemble drinking straws and are so minute that nothing but water can pass through them.

The City is undergoing an initiative for the reuse of membrane filtered wastewater which will be piped to industry groups for their reuse in a variety of processes and for irrigation. Petro-Canada is one of the participating industry groups and will be using hydrogen produced from the recycled water for a process that involves the de-sulfurization of diesel fuel. This process decreases the quantity of sulfur emitted into the air during the process of making diesel which decreases greenhouse gases. In this regard the membrane filtration facility will improve both air quality and water quality.

The membrane treatment facility was an initiative of the City of Edmonton and will be the largest of its kind in Canada. Drainage staff, consultants and industry have been involved in the project from the beginning and the \$13 million project is fully financed by industry, with no cost to the City. The project will be up and running in 2006.

Enhanced Primary Treatment (EPT)

EPT is a mechanical and chemical process that aids in the settling process as a means of removing solids from water. Suspended solids can be detrimental to water quality and overall aquatic health. The City's EPT process strives to remove 80% or more of the solids from stormwater prior to its discharge into the river. ETP is used during heavy flows (during and after heavy rains), when the volume of water flowing into the Gold Bar WWTP exceeds the water capacity of its secondary and tertiary treatment facilities (which are slow processes). During heavy flows, excess water is bypassed directly to the river but first undergoes EPT which decreases the volume of suspended solids.

The EPT upgrades are an innovative solution to stormwater quality problems associated with Combined Sewer Overflow (CSO) control, which is required by the provincial government. A variety of City staff in the drainage department and contractors have been involved in the EPT project. The \$80 million EPT development is being financed in part by the Infrastructure Canada-Alberta Program (ICAP) (20%) and by municipal utility rates.

Chapter 5 - Water, Wastewater and Stormwater Operations

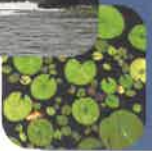
More Information

The City of Edmonton has produced two informative booklets on Gold Bar WWTP. For a copy of either of the following publication phone: (780)496-4322.

- A River Runs Through It: Gold Bar Wastewater Treatment Plant
- On Line with Nature: Gold Bar Wastewater Treatment Plant

Contact

General Supervisor - Strategic Planning
Drainage Services
City of Edmonton



In smaller Albertan communities, where adopting expensive wastewater treatment technologies is not feasible many municipalities rely on lagoon systems for wastewater treatment. A properly constructed and maintained lagoon will provide good wastewater treatment and there are many opportunities for municipalities to improve these systems as new practices and technologies become available. The following are some examples of how a municipality can improve the functioning of a lagoon system (National Guide to Sustainable Municipal Infrastructure 2004a):

- Making operational and minor design changes
- Modifying flow schemes
- Adding aeration or chemicals
- Pre-treating wastewater (to reduce lagoon loadings)
- Post-treating wastewater (e.g. adding polishing ponds such as wet ponds, dry ponds or wetlands to lagoons for polishing and aeration)

Not only will making improvements such as these to lagoon systems increase the quality of water being put back into the environment, but they may help increase water capacity, meet more stringent discharge requirements, reduce energy use and costs, reduce chemical use and costs and reduce odour emissions (National Guide to Sustainable Municipal Infrastructure 2004a).

Some municipalities are decreasing wastewater treatment costs through regionalization of wastewater systems and resources. By sharing facilities, resources and certified operators, municipalities can address new infrastructure demands resulting from increasing populations and improvements in available technology, while keeping their costs low. [For information on intermunicipal cooperation see section 8-1.](#)

Wastewater operators have an important role to play in ensuring that wastewater treatment facilities are up-to-date and identifying opportunities for improvement. [For information on Alberta Water and Wastewater Operators' Certification Guidelines see section 5-3.3.](#)

Chapter 5 - Water, Wastewater and Stormwater Operations

Municipal Success Story**Brazeau County Demonstrates Municipal Innovation in Wastewater Treatment**

Brazeau County is in the process of getting approval for an ecological wastewater treatment (WWT) system called a Solar Aquatics System™ (SAS). An ecological WWT system is designed to mimic the natural wastewater treatment processes that occur in systems such as wetlands. Ecological WWT relies largely on organisms (microbiological plants and animals) to treat wastewater. The SAS is proposed to be installed in 2007 in the Hamlet of Cynthia, which consists of about 20 households and six commercial operations. Cynthia's wastewater is currently treated in a single cell lagoon and is due for replacement.



Photo credit:
SASTM Eco-Industrial
Solutions Ltd.
“Design of the proposed
SAS for the Town of
Cynthia”

Solar aquatics are mostly used in warmer climates and temperatures of -40 Celsius could make these systems non-functional. To determine whether an SAS would be possible in Cynthia and the design factors that would make this possible, Brazeau County hired a firm to conduct a feasibility study for the project. The study evaluated 13 ecological WWT systems in other cold climates communities in North America and found that a SAS designed for efficiency could function in a northern Alberta climate.

Expected Benefits of an SAS

In addition to meeting wastewater treatment needs, expected benefits of an SAS in Cynthia include:

- Cleaner effluent (will exceed effluent requirements set by Alberta Environment)
- Aesthetically more appealing than conventional lagoon systems
- No strong odours
- Decreased energy consumption and costs - energy modeling has projected that the proposed SAS system will reduce energy costs by 70% and greenhouse gases by 10% (in comparison to a conventional SAS); heating and cooling will be largely passive, with a small geexchange with a boiler back-up system; possibilities for solar water heating and photovoltaic electrical generation are being explored
- Less space required - an SAS system would occupy one acre of land to treat the same quantity of water treated in a conventional lagoon system
- Flexibility and expandability of the system
- Underground storage capacity for treated wastewater - will increase fire protection capacity in the hamlet

Chapter 5 - Water, Wastewater and Stormwater Operations

- Eco-industrial partnership opportunities - plant species can be chosen based on known local market value and demand; the County has had positive discussions with the local oil and gas service sector and Alberta Environment regarding a pilot project to sell treated wastewater to the oil and gas service sector to displace bulk-hauled potable water

Municipal Innovation and Leadership

An objective of the SAS project in Cynthia is to demonstrate municipal leadership by piloting an innovative, green technology that could be adapted to other areas in Brazeau County and throughout Canada. The Cynthia SAS will be the coldest climate SAS in North America. It is being designed to facilitate research projects and will help ensure that subsequent designs become even more energy and space-efficient and cost-effective. Municipal staff involved in the project have already received many calls from other municipalities and developers interested in the application of an SAS in their communities.

Municipal Costs

A grant from the Federation of Canadian Municipalities' (FCM) Green Municipal Enabling Fund (GMEF) has covered 50% of the costs for the project's feasibility study and the County covered the other 50%. Municipal staff has been utilized where possible for researching materials and contacting many of the users and interest groups that could capitalize on products produced by this facility. The feasibility study and the creation of a design for the SAS was contracted out to a number of private companies specializing in ecological WWT. For the construction of the SAS, the County will be seeking funds from Alberta Transportation, under their Alberta Municipal Water/Wastewater Partnership grant.

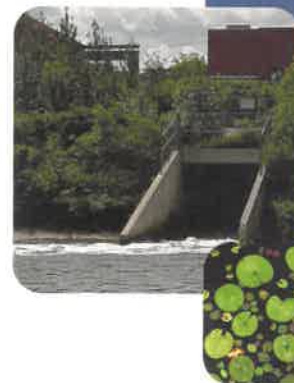
What's Next?

The response from the industrial community as well as the residents of the Hamlet of Cynthia regarding the proposed SAS has been positive and the project has full support of council. The County has applied for a permit from Alberta Environment (AENV) for the SAS system and is awaiting their decision. AENV has completed the public advertisement component of the permit approval process and is now examining the technical components of the proposed system. As soon as a permit is received from Alberta Environment, the County will begin construction of the system, which is proposed to begin in 2007.

Contact Information:

Brazeau County
Public Works
Phone: (780)542-7711

Eco-Industrial Solutions
Vancouver, BC
Phone: (604) 737.8506
E-Mail: info@ecoindustrial.ca
Website: www.ecoindustrial.ca



Chapter 5 - Water, Wastewater and Stormwater Operations

Municipal Examples

Municipal Examples: Wastewater Treatment

Town of Drayton Valley: Solar Bee Program - as a means of increasing wastewater treatment capacity at reduced operating costs, the Town of Drayton Valley has developed an Alternative Wastewater Treatment facility that uses solar power. For more information visit the Municipal Excellence Network website at http://www.menet.ab.ca/bins/view_practice.asp?pid=743. Phone: (780)514-2202 (town manager).

Alberta Capital Region Wastewater Commission (ACRWC) - is a model of regional cooperation providing wastewater services to 13 municipalities in the Alberta Capital Region. ACRWC's mission is to provide safe, reliable, cost-efficient and environmentally responsible wastewater transmission and treatment service. Website: <http://www.acrwc.ab.ca/>. Phone: (780)467-8655.

More Information

More Information: Wastewater Treatment

Guidelines for the Approval and Design of Natural and Constructed Treatment Wetlands for Water Quality Improvements (Alberta Environment 2000) - available online at <http://environment.gov.ab.ca/info/library/5711.pdf>. Phone: (780)427-2700 (toll free by first dialing 310-0000).

Guide to Requirements for Wastewater Systems Using a Wastewater Lagoon (Alberta Environment 2004) - available online: <http://environment.gov.ab.ca/info/library/7136.pdf>. Phone: (780)427-2700 (toll free by first dialing 310-0000).

The National Guide to Sustainable Municipal Infrastructure - best practices relating to wastewater. Available online: http://www.sustainablecommunities.fcm.ca/Infraguide/Storm_and_Water.asp.

- **Wastewater Treatment Plant Optimization** (2003) - describes a set of tools for maximizing the capacity of existing infrastructure, enhancing performance of the works and reducing operating and maintenance costs
- **Solids Inventory Control for Wastewater Treatment Plant Optimization** (2003) - describes procedures for completing solids mass balances around processes such as primary clarifiers and biological treatment systems and approaches for controlling the solids inventory effectively (including primary clarifiers, biological treatment processes, secondary clarifiers, sludge digesters and thickeners)
- **Optimization of Lagoon Operation** (2004)

Guidelines for Municipal Wastewater Irrigation (Alberta Environment 2000) - available online at <http://environment.gov.ab.ca/info/library/7268.pdf>. Phone: (780)427-2700 (toll free by first dialing 310-0000).

5-4.4. Use of Biosolids (Wastewater Sludge)

Legislation

Legislation: Under the Wastewater and Storm Drainage Regulation of the *Environmental Protection and Enhancement Act* (EPEA), a sludge application project must be developed in accordance with two guideline documents: 1) the *Guidelines for the Application of Municipal Wastewater Sludges to Agricultural Lands* and 2) the *Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems* (see references listed below).

While biosolids have been applied to agriculture fields for decades, public concern about human and environmental health regarding biosolids is growing. In terms of watershed health, improperly treated biosolids and poor application practices can contaminate agricultural fields and nearby water bodies (through agricultural runoff). In addition to land application, current biosolids management options include: landfill, incineration, composting and soil injection. By adopting best practices for the management of biosolids from wastewater treatment plants (e.g. sludge digestion and sludge dewatering), municipalities can benefit from: improved biosolids quality, improved odour management, improvements in safety, wider public acceptance, improved cost effectiveness and sustainability (National Guide to Sustainable Municipal Infrastructure 2003b).



More Information

More Information: Biosolids

The following Alberta Environment publications are available online or phone (780)427-2700 (toll free by first dialing 310-0000).

- **Guidelines for the Application of Municipal Wastewater Sludges to Agricultural Lands** - <http://environment.gov.ab.ca/info/library/6378.pdf>
- **Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems** - <http://environment.gov.ab.ca/info/library/6979.pdf>

The National Guide to Sustainable Municipal Infrastructure - best practices relating to biosolids. Available online:

http://www.infraguide.ca/bestPractices/PublishedBP_e.asp#sw.

- **Biosolids Management Programs** (2003)
- **Quality Management for Biosolids Programs** (2005) - presents methods for developing, implementing and integrating quality management principles into municipal biosolids programs
- **Communication and Public Consultation for Biosolids Management** (2005)
 - practical guidelines for establishing an effective relationship with the public around biosolids

Chapter 5 - Water, Wastewater and Stormwater Operations

5-4.5. Private Sewage Systems and Sewer Service Connection - the Safety Codes Act

Legislation

Legislation: Under the *Safety Codes Act*, Municipal Affairs has responsibility for regulating private sewage systems. In many areas, municipalities have been given the responsibility of granting permits for activities under this Act and its associated Plumbing Code Regulation.

The *Safety Codes Act* requires that all contractors and homeowners in Alberta obtain permits prior to commencing work covered by the Alberta Plumbing Code. Under the Alberta Plumbing Code individuals need permits for activities related to plumbing, sewer service connection and private sewage. If the standards required by these permits are not met, leaks may permit the percolation of sewage and other hazardous materials from residences and industry into the soil and into surface and ground water sources. The Plumbing Code Regulation of the *Safety Codes Act* requires, for example, that private sewage disposal tanks that do not use holding tanks “shall not be installed on lots within, a multi lot development unless each lot contains a minimum of 1800m².” This is one example of a standard that if not strictly adhered to can negatively impact watershed health.

Many municipalities throughout Alberta have been given the responsibility of granting permits for activities under the *Safety Codes Act*. Through this responsibility municipalities have the authority to ensure that the standards set in this code are adhered to, thus helping to protect the environment from potential contamination with untreated sewage. By establishing thorough processes that ensure permits granted under the Alberta Plumbing Code meet all requirements, municipalities can help protect watershed health.

Furthermore, all municipalities (even those that do not grant permits under the *Safety Codes Act*) have the opportunity to encourage individuals to exceed provincial standards for private sewage systems and sewer service connections. For example, municipalities can encourage owners of private sewage systems to practice regular maintenance by: checking that their septic systems are large enough to meet changing needs, inspecting the system every two years, cleaning it when required and regularly ensuring that the operations meet or exceed legislation (Alberta Environmental Farm Plan 2003).

More Information

More Information: Private Sewage Systems

Alberta Private Sewage Systems Standard of Practice (Alberta Environment 1999) - available for purchase online at Available online at: http://www.municipalaffairs.gov.ab.ca/Handbook_index.cfm. Phone: (780)427-2700 (toll free by first dialing 310-0000).

Private Sewage Treatment System Model Process - study undertaken by AAMD&C and Municipal Affairs. It outlines how to evaluate private sewage treatment sites for availability. Phone: (780)955-4075 (Keith Gylander, AAMD&C). Email: keith@aamdc.com.

5-5

Additional References for Water, Wastewater and Stormwater

National Guide to Sustainable Municipal Infrastructure - published best practices. Available online: http://www.sustainablecommunities.fcm.ca/Infraguide/Storm_and_Water.asp.

- **Speed and Quality of Linear System Repairs** (2004) - this document is a road map for water utilities planning and improvements
- **Methodologies for Setting up a Cross-Connection Program** (2005)
- **Best Practices for Utility-Based Data (water, stormwater and wastewater)** (2003) - provides framework for acquiring the utility data needed for sound decisions
- **Assessment and Evaluation of Storm and Wastewater Collection Systems** (2004) - topics addressed include inventory, investigation, condition assessment, performance evaluation and a rehabilitation/replacement plan stormwater and wastewater collection systems

Regulating Municipal Waterworks, Wastewater and Storm Drainage Systems: A

Discussion Paper (Alberta Environment 1997) - available online:

<http://environment.gov.ab.ca/info/library/7277.pdf>. Phone: (780)427-2700 (toll free by first dialing 310-0000).

Municipal Policies and Procedures Manual (Alberta Environment 2001) - outlines policies and procedures followed by Alberta Environment in dealing with situations not covered by EPEA. Available online: <http://environment.gov.ab.ca/info/library/7278.pdf>. Phone: (780)427-2700 (toll free by first dialing 310-0000).

Alberta Water and Wastewater Operators Association (AWWOA) - offer resources for municipal personnel in the water and wastewater field, including seminars, courses and technical papers. Website: www.awwoa.ab.ca.

Western Canada Water & Wastewater Association (WCWWA) - offer resources relating to BMPs and watershed health and run seminars throughout the year. Website: <http://www.wcwwa.ca/>.



Chapter 5 - Water, Wastewater and Stormwater Operations

There are many links between watershed health and the manner in which municipal infrastructure is designed, municipal property is managed and municipal operations are carried out. This section is an overview of these links and provides information and resources to help local governments identify opportunities for voluntary watershed stewardship.

6-1

Green Spaces

6-1.1. Components of a Green Space Network

Green spaces are a vital part of a healthy watershed as they provide many ecological goods and services that clean and store water. Just as important as the existence of protected natural areas, is the green space corridors that connect them. The connection of land, water and air in green spaces is vital to a number of ecosystem processes (e.g., pollination, maintaining genetic diversity by allowing for the travel of plant seeds and animals) and to overall **ecological integrity**. Many municipalities are actively planning a green space network by identifying and protecting important natural areas in their communities. See section 4-5.2 for municipal examples of natural area planning.

Green Spaces on Public Lands

Green spaces on public lands include municipal, provincial and federal parks and protected areas with a combination of environmental/natural resource conservation and recreation in mind. These areas serve as important green spaces whose contribution to maintaining watershed health and various ecological processes varies greatly. The following are examples of types of parks and protected areas and how they contribute to watershed health:

- Large tracts of green space kept as close to its natural state as possible (or reconstructed to mimic a natural state) - these areas are the most effective means for protecting ecosystem functions important to watershed health. From a watershed perspective natural areas are especially important as buffers around water bodies and over groundwater recharge areas. Natural areas can provide water storage, water filtration, nutrient removal, groundwater recharge, erosion control, soil formation, wildlife habitat and much more (see Chapter 2).
- Walking trails in urban parks that are surrounded by small pockets of native vegetation and natural drainage areas - although on a smaller scale, these types of areas can provide many of the benefits of the previously discussed green space.



Photo credit:
City of Edmonton
Patches of green space and the corridors connecting them are all part of a green space network



Photo credit:
City of Edmonton

Chapter 6 - Municipal Infrastructure, Property and Operations



Photo credit:
City of Edmonton

- Manicured lawns for sporting events and picnicking - these areas do not provide places for water storage or habitat for a great diversity of plant and animal species, but they do provide permeable surfaces that allow for the infiltration of stormwater.

Green Spaces on Private Lands

Creating a network of green spaces also requires environmental stewardship on private lands. Private lands may contribute to the green infrastructure network either as large green spaces or smaller green corridors that connect them. They include yards in residential, commercial and industrial areas, agriculture fields and privately owned natural areas. As part of creating and maintaining green infrastructure municipalities can work with residents and business owners to promote the conservation of natural areas and the development and maintenance of

lands that provides for natural areas and other green spaces. [For more information on community outreach see section 8-3.](#)

6-1.2. Tools for Conserving Natural Areas

There are a number of tools municipalities can use to conserve environmentally sensitive areas on private and public lands (see Table 6.1).

Table 6.1 Municipal Tools for the Conservation of Environmentally Sensitive Areas

Source: Kwasniak, Arlene. 2001. *Alberta's Wetlands: A Law and Policy Guide*. Environmental Law Centre and Ducks Unlimited Canada for the North American Waterfowl Management Plan. Edmonton, Alberta.

Type of Tool	Description
Designation Tools	• Sale or gift to the federal government (for establishment as a national park, park reserve, national historic site, migratory bird sanctuary or national wildlife area) • Sale or gift to the provincial government (for designation as a provincial park, wildlands park, recreation area, ecological reserve, natural area, wilderness area or wildlife sanctuary)
Sales and Purchase Transactions	• Sale of land or conservation easement to a municipality or to an Environmental Non-Government Organizations (ENGO)
Gifts	• Gift of land or conservation easement to a municipality or an ENGO



Photo credit:
Ducks Unlimited Canada
Farmers own large tracts of land and can contribute significantly to a green space network.

Chapter 6 - Municipal Infrastructure, Property and Operations

Type of Tool	Description
Personal, Term and Common Law Partial Interests	• Voluntary action by owner to refrain from or limit development • Lease of land to a municipality or to an ENGO • License to a municipality or ENGO (to enter onto land to carry out a conservation program) • Profit a prendre (right to enter into land and take some “profit” of the soil) to a municipality or an ENGO • Common law easement from owner regarding neighbouring land • Restrictive covenant regarding neighbouring land
Traditional Administrative and Planning Tools (see Chapter 4)	• Municipal reserve, environmental reserve or environmental reserve easement required by a municipality • Natural Area Land Use Designation under Land Use Bylaw of a municipality (involves downzoning)
Novel Administrative and Planning Tools (see Chapter 4)	• Conservation easement instead of environmental or municipal reserve • Formal transfer of development potential by a municipality to developer from one parcel to another • Informal transfer of development potential by a municipality to developer from one parcel to another • Bare land condominium (unit owners manage natural area for mutual benefit) • Bonusing (municipality approving authority provides added subdivision or development potential; e.g., density in return for protecting an area) • Building scheme restrictive covenants
Economic Incentives ¹	• Municipal tax assessments - wetlands and natural/naturalized areas are not taxed or owners are given tax rebates



¹ not referred to in Kwasniak (2001)

Chapter 6 - Municipal Infrastructure, Property and Operations

Municipal Success Story**Lois Hole Provincial Park: An Intermunicipal Effort**

The cities of Edmonton and St. Albert and the counties of Parkland and Sturgeon have joined efforts for the protection of a shared natural resource. As part of the provincial Special Places program these four municipalities worked together to create Big Lake Natural Area (see section 5-2). Following the creation of a Natural Area Management Plan for the Big Lake Natural Area, there was strong interest in entrenching the protection of a portion of the Big Lake area by having it designated as a provincial park. This designation would give the area more prominence and ensure stricter management.

All four municipalities agreed that they wanted a Provincial Park created in the Big Lake area. A number of consultants were hired (specializing in engineering and natural areas), consultations were held (i.e. “kitchen table” meetings) and engineering/conservation committees were created to guide the project. In the spring of 2005 Lois Hole Provincial Park was established under the *Provincial Parks Act* which includes the bed and shore of the lake as well as an additional 302 hectares of Crown land to the immediate west of the lake. In addition, large areas within and just outside the 1:100 year flood boundary have been taken by the respective municipalities and counties (cities of St. Albert and Edmonton and Sturgeon and Parkland Counties) as Environmental and Municipal Reserve.

Participating municipalities have much to gain from the regional effort to create this Provincial Park. All will benefit from the long term preservation of a unique natural area and the protection of the lake and wetlands in this area. Benefits include improved water quality, better drainage/flood protection, significant wildlife area (birds, etc.), enhanced recreational opportunities and aesthetics.



Photo credit:
City of Edmonton

Chapter 6 - Municipal Infrastructure, Property and Operations

In addition to the tools presented in Table 6.1, a conservation land trust can also be used for conserving green spaces at a regional level. A conservation land trust is a private, charitable organization whose primary role is to protect land under its stewardship from undesirable change (Arendt 1999 as referenced by Salomons 2004). Over time, it acquires legal interests in land in a designated region. As a non-government organization, a land trust is free of political influences and priorities which change over time and is not limited by municipal boundaries. While land trusts function at an arms length from municipal governments, municipal support is important to the success of a land trust, especially in urban areas where the cost of the acquisition is high. Municipalities have much to gain from land trusts as they are not only a tool for conserving natural areas, but can strengthen community participation and pride and be a means of setting community priorities.



More Information

More Information: Land Trusts

Discussion Paper: Establishing an Edmonton Regional Land Trust (Salomons 2004) - provides a description of and an evaluation of models and experiences of successful urban land trusts throughout Canada and the U.S. Available online: www.landstewardship.org/EdmontonLandTrustReport_000.pdf.pdf. Phone: (780) 483-1885 (the Land Stewardship Centre of Canada).

Legacy Lands Conservation Society - a group working towards the establishment of a Capital Region Land Trust in and around Edmonton. Website: www.legacylands.ca. Email: jvisser@oanet.com (Jim Visser) or maguy@telusplanet.com (Michael Salomons).

More Information: Green Spaces in Urban Municipalities

Green Space Acquisition and Stewardship in Canada's Urban Municipalities: Results of a Nation-Wide Survey (Evergreen 2004) - summarizes the results of a survey of land-use planners and park managers in urban municipalities across Canada and presents information on the status of urban green spaces and the challenges faced by urban municipalities. Available online: www.evergreen.ca. Phone: 1-888-426-3138.

Municipal Examples

Municipal Example: Green Space

County of Barrhead - offers a voluntary program that provides municipal property tax rebate to landowners who conserve target lands (e.g. large areas of good habitat) under ten to 20 year agreements. Phone: (780)674-3331 (Marilyn Flock).

City of Edmonton - has created 460 parks and designated almost 14,000 hectares of open spaces. The City has more green space than any city in Canada, and its river valley, at 87, 210 hectares, is the largest urban park in North America (Worbets & Berdahl 2003). For more information about the City's green space plans see section 4-5.2.



Photo credit:
City of Edmonton

Chapter 6 - Municipal Infrastructure, Property and Operations

6-1.3. Green Space Management

Proper green space management is vital to maintaining the ecological processes that help sustain watershed health. The following are components of successful naturalization initiatives (Evergreen 2001) that can be applied to general green space management:

- Managing sites as a system rather than individually (helps restore **ecological integrity**)
- Conducting green space inventories
- Visibly managing the site (when a project reflects “perceived care” it is likely to be more accepted by the public)
- Monitoring and evaluating sites and applying lessons learned
- Buffering and enhancing remnant natural areas (e.g., ravines, escarpments, wetlands and forests)
- Integrating projects into existing urban trail systems
- Managing wildlife (address wildlife habitat requirements in the design and maintenance of an area)
- Carrying out multi-year pilot or demonstration projects
- Maintaining a balance among all users

Pesticide Management

Legislation

Legislation:

- The *Environmental Protection and Enhancement Act (EPEA)* deals with various aspects of pesticide use within Alberta, including handling, sales and application. There are three important pesticide-related regulations under EPEA: the Pesticide (Ministerial) Regulation, the Pesticide Sales, Handling, Use and Application Regulation and the Environmental Code of Practice for Pesticides.
- The *Pest Control Products Act* and regulations require that all products used in Canada be registered.
- The *Canadian Environmental Protection Act*, the *Fisheries Act* and the *Migratory Birds Convention Act* provide for the protection of the environment from toxic chemicals, which include pesticides.
- Pesticide application around water bodies is regulated by Alberta Environment.

There is currently much debate concerning the effects of pesticides on environmental and human health. Pesticides include insecticides, herbicides and fungicides. If BMPs are not practiced in the selection, handling and application of pesticides they can be a significant source of land and water contamination. Pesticides can travel through surface runoff and subsurface flow and can eventually end up in drinking water sources. Exposure to high concentrations of these chemicals can harm the health of humans, plants and animals.

Under the *Weed Control Act* municipalities are held responsible for keeping noxious weeds off of their property so as to stop their spread throughout the province. Most



Photo credit: Rick Taillieu
Many pesticides are applied by plane

Chapter 6 - Municipal Infrastructure, Property and Operations

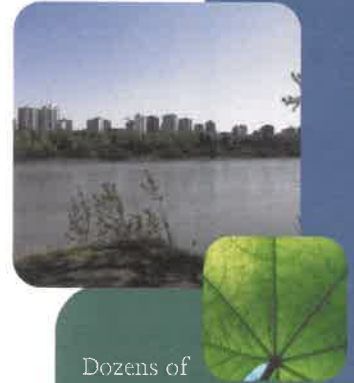
municipalities use some level of pesticide control against weeds and pests in municipal green spaces and/or along roadsides. There are however many options for municipalities for decreasing their reliance on pesticides through Integrated Pest Management (IPM). IPM refers to a system of managing pests through a wide variety of management practices and control measures that are environmentally sound and economically feasible. Control measures include a combination of the following (as listed in the City of Calgary's IPM Plan):

- **Preventative Measures** - landscape facilities that prevent or minimize pest problems
- **Physical and Mechanical Controls** - require operational equipment and staff (e.g., manual weeding, string trimming and mowing around fence-lines and site perimeters, chainsaws or heavy-duty mowers to control woody perennials, repetitive mowing or cutting off top-growth of bushy weed species)
- **Chemical Controls** - selected according to specific criteria (preference is given to low toxicity and highly selective products and chemicals are applied with target-specific techniques whenever practical)

The principles of an IPM plan can include (as listed in the City of Calgary's IPM Plan):

- Use an ecological approach to vegetation and pest management that strives to reduce reliance on pesticides as well as to integrate preventative measures and alternative control technology
- Minimize the risk to human health and the environment
- Consider cost-effectiveness and operational feasibility
- Consider community values
- Take a leadership role by educating citizens and private landowners about, and promoting an environmentally-sound, integrated approach to pest management
- Apply IPM principles when planning, designing, constructing and renovating projects
- Ensure accountability in pesticide use through a regular reporting system

In addition to municipal operations, a significant amount of pesticides are used by residents on private lands. In Alberta, the home and garden sector uses the highest intensity of pesticides and the agriculture/commercial sector uses the largest quantity of pesticides (Alberta Environment 1998). A municipality can work with residents to raise awareness about the effects of improper pesticides use on the environment as a means of promoting better pesticide application practices. This includes educating residents about issues relating to the overuse of pesticides, the differences between various types of pesticides, alternatives to pesticides and the importance of avoiding the application of pesticides near water bodies or before rain events. [For more information on community outreach see section 8-3.](#) Some municipalities have even created bylaws that control the use of pesticides on residential properties ([see section 7-2.3](#)).



Dozens of Canadian municipalities instruct their parks departments to reduce the cosmetic use of pesticides on municipal property (CBC News Online 2003).



Photo credit: Doug Macaulay
Canada thistle can be controlled using the stem weevil.

Chapter 6 - Municipal Infrastructure, Property and Operations

More Information

Municipal Examples: Integrated Pest Management and Pesticide Use

The City of Calgary - has an excellent Integrated Pest Management Plan. Available online: http://www.calgary.ca/DocGallery/BU/parks_operations/ipm.pdf

Lac Ste. Anne County - offers residents an opportunity to opt out of roadside spraying on roadsides adjacent to their property. Interested residents sign a no spray agreement with the county and in return they take responsibility for the destruction of noxious weeds (to prevent the spread, growth, ripening or scattering of the weeds), which is usually done by mowing or hand pulling. For a copy of Lac Ste. Anne County's No Spray Agreement see Appendix B.

The City of Windsor (Ontario) - the City's parks department kills unwanted weeds along fences with a focused stream of hot steam. With this method and others, they have cut their pesticide use by half (CBC News Online 2003).

More Information

More Information: Pesticide Use

Industry Standards and Good Practices for Vegetation Management (4th Edition) (2001) - resource for municipal parks departments by the Industrial Vegetation Management Association of Alberta. Website: http://www.ivmaa.com/index.php?option=com_content&task=blogcategory&id=18&Itemid=29. Phone: (780)433-0838.

Pest Management Regulatory Agency (PMRA) - a division of Health Canada. PMRA is responsible for the regulation of pest control products in Canada and is a good source of information on federal pesticide regulations, initiatives and information. Website: www.pmra-arla.gc.ca. Phone: 1-800-267-6315.

Pesticide Application Courses

- **Lakeland College** - Phone: (780)416-8844 (Strathcona County campus). Website: http://www.lakelandcollege.ca/programs/agricultural_sciences/crop_technology/courses.aspx.
- **Olds College** - Phone: (403)556-8281. Website: www.oldscollege.ca/programs/ContinuingEducation/index.htm (click on the course calendars).

Alberta Environment publications relating to pesticides:

- **Overview of Pesticide Data in Alberta Surface Waters Since 1995** (2005) - <http://environment.gov.ab.ca/info/library/7614.pdf>

Chapter 6 – Municipal Infrastructure, Property and Operations

More Information

- Pesticide Regulation Fact Sheets (fact sheet) - <http://www3.gov.ab.ca/env/protenf/legislation/factsheets/pesticid.html>
- Fact Sheet: Pesticide Use In Or Near Water (2001) - <http://environment.gov.ab.ca/info/library/7459.pdf>

Crop Life Canada - an industry association offering information on pesticide use, stewardship and management. Website: www.croplife.ca.

Fertilizer Use

Fertilizers present in stormwater runoff flowing into surface waters can disturb natural nutrient balances. Of particular concern with fertilizers is the presence of phosphates which are one of the chief sources of nutrients that promote undesirable plant growth in lakes and can lead to **algal blooms** which negatively effect ecosystem health. Fertilizers can also percolate through the ground and contaminate groundwater.

To minimize fertilizer runoff from lands municipalities can adopt the following practices on municipal lands and promote the following practices on private lands:

- Follow instructions on fertilizer containers and avoid over application
- Avoid applying fertilizers before a rain storm
- Use alternatives to synthetic fertilizers on lawns, flower beds, tree belts and gardens (e.g. organic compost and compost tea)
- Use BMPs on agricultural lands to decrease loss of fertilizer in runoff
(see section 6-4.3)

More Information

More Information: Lawn Care

12 Easy Steps to Get Your Lawn Off Drugs - publication by Environment Canada. Available online: <http://www.organiclawncare101.com/lawn-off-drugs.html>.

Vegetation

Just as important as the designation of green spaces is the vegetation that keeps them green and provides many of the ecological goods and services discussed in Chapter 2. Protecting green spaces in their natural state is usually the easiest and most effective means of protecting vegetation. However, where natural areas have been altered or destroyed, municipalities may wish to consider re-vegetation projects.

Naturalization is a process of ecological restoration that involves returning an altered or degraded site to a more natural condition. It usually involves the use of trees, shrubs and/or flowers that are native to an area. However, to meet watershed health objectives, creating vegetative cover that is suitable for an area is usually the main objective. Natural landscapes with plants that are best suited to local climates and resistant to drought and local pests require less watering, maintenance and pesticides than do green spaces that contain exotic species.



Photo credit: City of Edmonton
Restoring vegetation along stream banks is aesthetically pleasing, controls erosion, filters substances out of surface water runoff and creates shade for aquatic life.

Chapter 6 - Municipal Infrastructure, Property and Operations



Photo credit:
City of Edmonton

Municipalities can begin naturalization projects by first identifying priority sites and appropriate plant species for use in the areas. Some municipalities have created specific policy documents such as a Naturalization Master Plan. These documents can address topics such as: appropriate plant species, criteria for selection of sites, roles and responsibilities of individuals involved, community outreach strategies and methods for implementation (Evergreen 2001).

In terms of vegetation on private lands, municipalities can encourage landowners to consider watershed needs when planning their landscaping and to consider carrying out naturalization projects on their lands (for more information on community outreach see section 8-3).

Municipalities can also create landscaping requirements for private lands in their landuse bylaws (see section 4-4).

“the cost of maintaining a conventional horticulture landscape is estimated to be up to \$4/m² per year, compared with 20 cents/m² for natural landscapes.”

- City of Surrey 2003
as referenced by
Evergreen b

Municipal Example

Municipal Example: Naturalization

The City of Guelph (Ontario) - created a plan for Naturalization in the City of Guelph Parks. The plan recommends that naturalized areas be included in all future parks and identifies methods for implementation (Evergreen 2001). Phone: (519)837-5626 (City office).

More Information

More Information: Vegetation

Urban Naturalization in Canada: A Policy and Program Guidebook (Evergreen 2001) - overviews policy and program development for urban naturalization and provides case studies from throughout Canada. Part of the guide focuses on issues related directly to municipal governments. Available online: <http://www.evergreen.ca/en/cg/cg-policy1.pdf>. Phone: (604)689-0766.

A Guide to Using Native Plants on Disturbed Lands - lists the native plants suited to various natural regions and site types across Alberta. Information is targeted at municipalities, the reclamation industry, seed producers and nurseries, land management agencies, landscapers and gardeners. Published by AAFRD. Phone: 1-800-292-5697 (AAFRD's Publication Office).

A Field Guide to Common Riparian Plants of Alberta (Hale et al. 2005) - includes information on identifying common riparian plants, how they link to riparian health and how management choices change riparian plant communities. Available from Cows and Fish. Website: www.cowsandfish.org. Phone: (780)427-7940 (Edmonton office).

6-1.4. Water Body and Riparian Area Stewardship

While the information in all of section 6-1 applies to the protection of water bodies, there are some important municipal considerations specific to water bodies. While the provincial and federal government have the ultimate authority over water bodies, municipalities can also play an important role in their protection.

Chapter 6 - Municipal Infrastructure, Property and Operations

Riparian Areas

In terms of riparian areas, municipalities can promote the use of BMPs in their operations and in activities on private lands. BMPs for riparian areas include (Bow River Project 2002):

- Prevent/minimize soil erosion associated with land use activities
- Retain native vegetation in riparian areas, buffer strip retention and protection
- Prevent disturbances within riparian areas (e.g., construction, cultivation, deepening, additional ponding)
- Retain slopes in their natural state - construction and earth moving on slopes can result in landslides, mudflows and property damage, and riparian areas in the proximity of collapsed slopes can be adversely affected
- Avoid landscaping, building structures or constructing in the floodplain, including the watercourse, shorelines and river banks
- Adhere to development setbacks and other regulations in riparian areas
- Minimize the use of drainage channels or culverts, because these destroy riparian habitat and streams
- Provide awareness information to users/land owners on why land use in riparian areas and activities are controlled (e.g. they may cause harm or degradation)
- Plan for recreational use - use well defined trails and paths; designate sensitive areas for low impact activities; restrict access where vegetation is not fully established; encourage pet owners to walk their dogs away from streams and to pick up after their pets

Photo credit:
Billie Milholland



**Wetland
Loss in
Alberta**

From the
time
Alberta

was settled by non-natives in the late 1800s to today, between 40-60% of all original wetlands have been drained in the prairie and parkland natural areas in order to support agricultural, transportation and urban development. In some areas (especially in suburban housing or industrial developments) drainage is as high as 80-90%.

- Land Stewardship
Centre of Canada
(adapted from federal
government and non-
government sources)

More Information: Riparian Habitat Restoration

Healthy Shorelines website - www.healthyshorelines.com

Cows and Fish - www.cowsandfish.org

Agriculture and Agri-Food Canada - <http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1187368724250&lang=e>

Wetlands**Legislation**

Legislation - The Water Act requires an approval from Alberta Environment prior to undertaking a construction activity in a wetland. A construction activity includes but is not limited to disturbing, altering, infilling or draining a wetland.

The draining of wetlands has the potential to significantly impact water tables, water quality and quantity, and to reduce the resilience of the landscape during drought and flooding. While the draining and filling of any wetland requires an approval by Alberta Environment, many wetlands on agriculture land have been filled illegally over the last few years. To deter illegal activities in wetlands, municipalities can work to create

Chapter 6 - Municipal Infrastructure, Property and Operations

awareness among landowners and developers regarding the need for approvals. The penalty of filling a wetland without approval is to restore the wetland to its original state or pay the cost of doing so. In some cases, the province will approve an application to fill a wetland if compensation is provided through the restoration of another drained wetland (ideally in the same watershed).

In addition to deterring illegal wetland drainage, municipalities can discourage authorized wetland drainage. They can educate land owners, developers, potential buyers and industry of the economic, social and environmental benefits of wetlands and they can address concerns relating to mosquito populations and odours (see section 8-3 for more information on community outreach). Municipalities can also provide economic incentives for wetland conservation through municipal tax assessments where wetlands and other natural/naturalized areas are not taxed.



Photo credit:
Agriculture
and
Agri-Food
Canada

Mosquito populations, which are often a concern in urban areas, are kept in check by dragon flies and other mosquito predators present in healthy wetland ecosystems.

Even though municipal jurisdiction to implement wetland policies beyond municipal powers for land-use planning and development are unclear (Mallet 2005), some municipalities are considering and beginning to develop wetland policies. While the Province is developing more clear directives, municipalities can be proactive and adopt some of the wetland management strategies outlined in the Province's interim policy for Wetland Management in the Settled Area of Alberta (see Appendix A).

Municipal example

Municipal Example: Wetland Policy

City of Calgary: Wetland Conservation Plan - the City has created this policy to set priorities and alternatives for protecting wetland habitats in a growing city. Calgary is the first major municipality in Canada to develop a formal wetland protection policy. Available online: <http://content.calgary.ca/CCA/City+Living/The+Environment/Initiatives+and+Events/Parks/Calgarys+Wetland+Conservation+Plan.htm>. Phone: (403) 268-5212 (Chris Manderson, City Planner).

More information

More Information: Wetlands

Alberta's Wetlands: A Law and Policy Guide (Kwasniak 2001) - contains information on laws, policies and regulatory processes that can affect Alberta's wetlands. Published by the Environmental Law Centre (ELC). Available online: <http://www.nawmp.ab.ca/AlbertaWetlandsGuide.pdf>. Phone: 1-800-661-4238 (ELC Office).

Provincial Wetland Restoration/Compensation Fact Sheet (Alberta Environment 2005) - available online: http://www3.gov.ab.ca/env/water/reports/Prov_Wetland_Rest_Comp_Guide.pdf

Chapter 6 - Municipal Infrastructure, Property and Operations

Off-Road Vehicles in Riparian Areas

Each year the use of all-terrain vehicles (ATVs) and off-highway vehicles (OHVs) in Alberta increases, and with this increase in use has come an associated increase in the impact that these activities are having on natural areas, and in particular on riparian areas. To minimize the environmental impact caused by the recreational use of these vehicles, municipal governments can initiate a public outreach process to encourage good stewardship among users. Good stewardship by ATV and OHV riders includes (Fisheries and Oceans Canada 2004):

- Avoiding streams, rivers, lakes, marshes, beaches and wetlands (e.g., maintain a distance of 30m from water bodies and construct bridges where needed).
- Keeping to hard roads and trails
- Avoiding wet weather conditions
- Avoiding crossing water bodies where the approaches are very steep (vulnerable to soil erosion)
- Eliminating fuel or oil leaks
- Never washing an ATV or OHV in a water body
- Constructing cross ditches along the trail that direct water to vegetation (which will filter out soil and sediments)

Municipalities can encourage good stewardship by working with local groups to designate areas and design trails for ATV and OHV use that minimize environmental impacts (for information on community outreach see section 8-3). Municipalities can also address OHV use in municipal bylaws (see section 7-2.1).

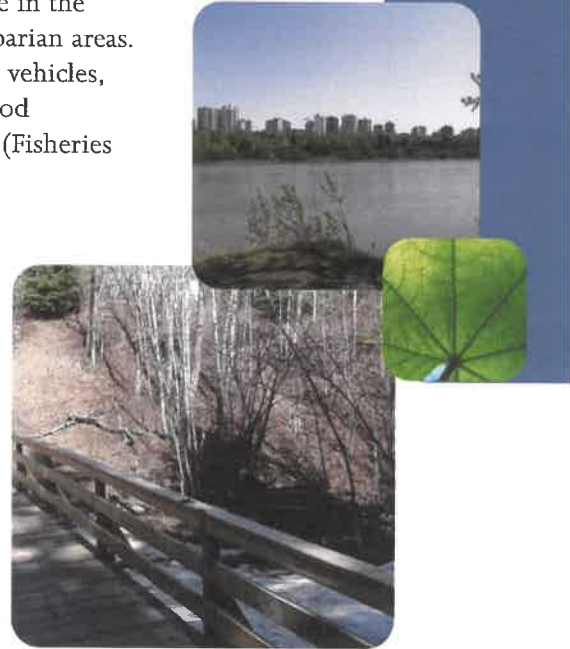


Photo credit: City of Edmonton

When ATVs and OHVs are driven through shallow streams riparian vegetation is destroyed and sediments are stirred up, which impact water quality. Building bridges protects streams and riparian areas from these disruptions.



Photo credit: City of Edmonton

Chapter 6 - Municipal Infrastructure, Property and Operations

6-2 Transportation and Road Maintenance

Most transportation systems in Canada are centered on the automobile, which requires an extensive system of roads and parking spaces, both of which can negatively impact watershed health. Paved roads and parking lots are impervious surfaces which impede the filtration of water through vegetation and into the soil to surface or groundwater recharge areas. Furthermore, vehicles can be a significant source of pollutants, leaking petroleum products and other contaminants onto the road, which are swept away by stormwater and can eventually find their way into water bodies. By integrating watershed needs into transportation infrastructure and transportation activities, municipalities can help maintain watershed health.



Photo credit:
John Zylstra

6-2.1. Transportation Infrastructure

To decrease the impact of transportation infrastructure on the watershed, municipalities can consider two alternatives. First they can consider environmental impacts when making decisions about the location and design of transportation infrastructure such as:

- Diverting transportation routes around environmentally sensitive lands
- Minimizing road width in urban areas by providing for parking in back alleys and creating one way streets
- Controlling surface water runoff along rural roads (which runs into trenches and can create flows alongside the road carrying sediments and other contaminants to nearby water bodies) by: slowing down surface water flows with vegetation or other materials that offer erosion protection, by directing runoff into nearby vegetated areas and by encouraging natural soil infiltration with infiltration trenches

Second, municipalities can decrease the impact of their transportation system on the watershed by providing alternatives to automobile transportation, which do not require large tracts of land for road infrastructure. For example, municipalities can reduce the number of cars on the road by creating or improving public transportation and encouraging the creation or redevelopment of communities that are walkable (e.g. amenities are within walking distance from homes and connected with a system of walking paths).

There are a number of economic spin-offs to reducing the demand for road infrastructure. Decreasing the size of road infrastructure decreases the quantity of stormwater a municipality has to manage (when permeable surfaces exist in place of impermeable road surfaces) thereby decreasing the municipal costs associated with stormwater sewers and treatment. Furthermore, a smaller road network is associated with decreased costs for road construction and maintenance.



Photo credit: City of Edmonton
Vegetation along roads can serve to store and treat surface water runoff from roads.

Chapter 6 - Municipal Infrastructure, Property and Operations

More Information

More Information: Public Transportation

The National Guide to Sustainable Municipal Infrastructure - published best practices relating to transit. Available online: <http://www.sustainablecommunities.fcm.ca/Infraguide/>.

- Transit Primer (2003)
- Strategies for Implementing Transit Priority (2005)

Transportation Cost and Benefit Analysis: Techniques, Estimates and Implications - an online guidebook for quantifying the full costs and benefits of different transportation modes. It examines eleven travel modes and their associated costs, which include land use impacts, water and air pollution, operating subsidies, vehicle ownership and operation and waste disposal. The guide is available from the Victoria Transport Policy Institute. Website: www.vtpi.org/tca/. Phone: (250)360-1560.



Municipal Example

Municipal Example: Transportation Plan

City of Calgary: Transportation Plan 2005 - issues included in the vision of this plan include: living closer to work, relying less on cars, more transit, walking and cycling, rate of outward growth slowing, intensifying existing neighbourhoods, moved towards a user pay system, more commuters per vehicle, river valley and environmentally sensitive areas protected. Available online: <http://content.calgary.ca/CCA/City+Hall/Business+Units/Transportation+Planning/Calgary+Transportation+Plan+2005/Calgary+Transportation+Plan+2005.htm>.

6-2.2. Dangerous Goods Routes and Designated Truck Routes

Legislation

Legislation: the *Dangerous Goods Transportation and Handling Act* empowers municipalities to pass bylaws designating dangerous goods routes and restricting the transportation of such goods within the municipality.

Cargo traveling on dangerous goods routes (DGR) and designated truck routes (DTR) can be a dangerous source of contamination if toxic substances are accidentally released into the environment. Proactive municipalities can protect the watershed from these releases through effective planning that ensures that spills have minimal impacts on the environment. This can mean designating routes for dangerous goods and trucks that are safe distances from water bodies, groundwater recharge areas or other environmentally sensitive areas. Municipalities can also plan ahead so that spills are contained and treated as effectively as possible. Stormwater runoff from dangerous goods and truck routes can be directed to a treatment facility such as an oil/grit separator or a wet pond, which protects water bodies which receive contaminated stormwater runoff from both spills and small leaks from transport vehicles.



Photo credit: City of Edmonton

Wetlands can help treat surface water runoff from dangerous goods and truck routes. However, because these wetlands are exposed to toxic chemicals, it is important that they are isolated from subsurface and groundwater flows.

Chapter 6 - Municipal Infrastructure, Property and Operations

Most municipalities are responsible for weed control alongside rural roads and depend on pesticides for controlling their growth. [See Section 6-1.3 for information on pesticides.](#)

Municipal Example

Municipal Example: Dangerous Goode Routes

City of Edmonton: Stormwater Quality Strategy (2006) - includes guidelines for the construction and redevelopment of DGRs and the construction of DTRs. These guidelines set out that stormwater runoff from DGRs and DTRs in environmentally sensitive zones (wetlands, creeks, rivers, etc.) will be conveyed through a constructed BMP (oil/grit separator, wet pond, etc.) prior to being released into a receiving watercourse. Website: <http://www.edmonton.ca/CityGov/ampw/StormwaterQuality06.pdf>. Phone: (780) 496-5660 (Lyndon Gyurek, Drainage Services).

6-2.3. Snow Disposal and Road Salts

Legislation

Legislation: Under the Wastewater and Storm Drainage Regulation (s 6.2) of the *Environmental Protection and Enhancement Act* (EPEA) municipalities are required to notify Alberta Environment of the intention to dump snow in an area for more than one year. The notice must at least describe the location and provide a comparison with the Snow Disposal Guidelines for the Province of Alberta.

Road salts enter the environment through losses at salt storage and snow disposal sites and through runoff and splash from roadways. In 1996 a five-year scientific assessment was conducted under the *Canadian Environmental Protection Act* for chloride salts (and brines used in road de-icing/anti-icing and dust suppression, the salt portion of abrasives mixtures and ferrocyanide additives). The study was completed in 2001 and concluded that high releases of road salts were having an adverse effect on freshwater ecosystems, soil, vegetation and wildlife (Environment Canada 2004).

Road salts are used by many municipalities and contractors as de-icing and anti-icing chemicals for winter road maintenance and are important for winter safety. There are two ways municipalities can ensure environmental protection while maintaining roadway safety using road salts (Environment Canada 2004):

1. Develop salt management plans, based on a review of existing road maintenance operations, identification of means and goal-setting to achieve reductions of the negative impacts of salt releases
2. Implement BMPs in the areas of salt application, salt storage and snow disposal

In addition to contamination from road salts, snow from municipal roads and highways may contain a mixture of suspended solids, organic chemicals, phosphates, heavy metals, trash and oil, all of which are detrimental to stormwater quality. Municipalities are responsible for clearing and disposing of snow from roads (although many have contracted out this responsibility) and have a role in keeping contaminants out of water systems. By removing snow before it melts municipalities keep these substances from contaminating the environment.

Chapter 6 - Municipal Infrastructure, Property and Operations

Depending on the level of contamination of the snow, municipalities may need to treat melted snow prior to discharging it into stormwater drainage systems and receiving watercourses. Caution must be taken in determining the location of snow disposal and environmentally sensitive places such as near water bodies or groundwater recharge areas should be avoided.

More Information

More Information: Snow Disposal and Salt Contamination**Code of Practice for the Environmental Management of Road Salts**

(Environment Canada 2004) - available online at

http://www.ec.gc.ca/nopp/roadsalt/cop/en/rs_main.htm. Phone: (819) 997-1640 (Controls Development Section, Chemicals Control Branch, Environment Canada - Quebec office).

Snow Disposal Guidelines for the Province of Alberta (Alberta Environment 1994) - a resource to help municipalities develop methods for snow disposal that minimize the potential for negative environmental impacts. Available online: <http://environment.gov.ab.ca/info/library/5871.pdf>. Phone: (780)427-2700 (toll free by first dialing 310-0000).

Salt Contamination Assessment & Remediation Guidelines (Alberta

Environment 2001) - available online at

<http://environment.gov.ab.ca/info/library/6144.pdf>. Phone: (780)427-2700 (toll free by first dialing 310-0000).

Environment Canada's website - provides a breakdown of a number of controls and regulations put in place and regulated by Alberta Infrastructure and Transport and Alberta Environment regarding the application, cleanup, storage and disposal of salt and/or snow. Website: www.ec.gc.ca/nopp/roadsalt/reports/en/list.cfm.

Municipal Example

Municipal Example: Snow Disposal

City of Edmonton: Stormwater Quality Strategy - requires that all City operated snow storage sites have permanent facilities for on-site treatment to control settleable and floatable materials prior to discharging stormwater into the drainage system or receiving watercourses. Phone: (780) 496-5660 (Lyndon Gyurek, Drainage Services).



"Despite the lack of specific legislation, it is evident that considerable effort is being made by road authorities at all levels to improve the management of road salts. Some jurisdictions are well advanced in introducing technologies such as electronic spreader controllers, anti-icing, pre-wetting and Advanced Road Weather Information Systems (ARWIS) whereas others are just beginning to investigate these practices in a serious way."

- Environment Canada d

Chapter 6 - Municipal Infrastructure, Property and Operations

6-3

Solid Waste Disposal

6-3.1. Hazardous Waste

The dangers associated with the disposal of hazardous wastes are obvious: putting them in the ground (i.e. landfills) risks contaminating land and groundwater and dumping them in our sewers pollutes water sources. There are a number of measures municipalities can take to protect communities and the environment from exposure to hazardous wastes.

Household Hazardous Waste

One of the most effective means of keeping household hazardous wastes out of municipal sewers is to provide an easy way for residents to dispose of these wastes safely. A number of large urban municipalities have created waste management facilities (e.g. eco stations) that accept household hazardous wastes year round.

In rural and small urban municipalities, where the resources to run year round eco stations may not be available, many municipalities hold annual or biannual household hazardous waste roundup events. At these events residents are invited to bring their household hazardous wastes (see list in Box 6.1) to a designated location. Many of these roundups include a paint exchange where participants are invited to take home paint that others have brought in. Generally these events are put on by municipal governments, run by volunteers and supported by Alberta Environment. Alberta Environment is responsible for the transportation of hazardous wastes in Alberta and pays for the transport of many of the collected wastes (that cannot be recycled) to Swan Hills Treatment Centre.

Municipalities can also take advantage of and promote voluntary stewardship programs for hazardous wastes. The following are some organizations working in Alberta that offer programs for recycling hazardous wastes:

- **The Alberta Recycling Management Authority (ARMA)** - oversees provincially mandated electronics recycling programs in Alberta. Website: www.albertarecycling.ca/. Phone: 1-888-999-8762.
- **The Alberta Used Oil Management Association (AUOMA)** - establishes and administers used oil material waste minimization and recycling programs directed at the private sector. Website: <http://www.usedoilrecycling.com/en>. Phone: 1-888-922-2298.
- **The Rechargeable Battery Recycling Corporation** - coordinates the collection of portable rechargeable batteries for recycling. Website: www.rbrc.org/index.html.

By volume post-consumer paint is the largest household hazardous waste.

Box 6.1 Materials Commonly Brought to Household Hazardous Waste Round-Ups

Abrasive cleaners	Disinfectants	Paints (oil and water based)
Acetone	Drain cleaners	Photographic chemicals
Aerosol paints and sprays	Fabric Softeners	Propane gas cylinder (recyclable)
Air fresheners (aerosol)	Floor wax strippers	Rubbing alcohol
All-purpose cleaners (solvent based)	Hair sprays (aerosol)	Septic tank degreaser
AmmoniaAnt/wasp spray	Insecticides	Shoe polish
Antifreeze	Kerosene	Silver and brass polish
Auto body filler	Laundry starch	Solvents, turpentine, varnish, lacquers
Barbecue starters	Laundry stain removers	Spot removers
BleachBrake and transmission fluid	Lighter fluid	Spa and pool chemicals
Butane refills	Liquid cleaners	Toilet cleaners
Carbon tetrachloride	Lye	Tub and tile cleaners
Car (lead-acid) batteries	Mildew removers	Used oil (where recycling not available)
Car waxes and polishes (solvent and waster based)	Muriatic acid	Weed killers
Contract cement	Nail polish and remover	Windshield washer solution containing methyl alcohol
Degreasers (petroleum based)	Oven cleaners	Wood preservatives
	Paint thinners and strippers	

Source: Alberta Environment. 2001. *Household Hazardous Waste Roundups: A Guide for Municipalities Participating in the Household Hazardous Waste Program*.

Chapter 6 - Municipal Infrastructure, Property and Operations

Industrial Hazardous Waste**Legislation**

Legislation: Under the *Environmental Protection and Enhancement Act (EPEA)*, an approval is required for businesses/facilities that store or process hazardous wastes/recyclables that meet conditions relating to the quantity of these substances being stored or processed and the period of time they are stored for. Alberta Environment is responsible for administering these approvals as well as controlling the transportation of hazardous wastes.

There are many businesses in Alberta that generate or manage hazardous waste and hazardous recyclables. In small and medium sized businesses these hazardous materials include: oil, undrained used oil filters, spent antifreeze, used car batteries, paint leftovers, spent solvents, corrosives and cleaning products (Alberta Environment 2004). Municipalities can familiarize themselves with regulations, requirements and BMPs for the management of various industrial hazardous wastes and promote the safe use and disposal of these substances as a means of minimizing risks to human health and the environment. Municipalities can also work to attract businesses to their communities that generate or use minimal quantities of hazardous materials.

More Information**More Information: Hazardous Waste**

Alberta Environment - has a number of resources relating to hazardous waste. These are available online or phone: (780)427-2700 (toll free by first dialing 310-0000).

- Alberta Environment's website - <http://www3.gov.ab.ca/env/waste/aow/hhw/index.html>
- Household Hazardous Waste Round-Ups: A Guide for Municipalities Participating in the Household Hazardous Waste Program (2001) - <http://environment.gov.ab.ca/info/library/7810.pdf>
- Background Document on Recycling Waste from Computers (2000) - <http://environment.gov.ab.ca/info/library/6205.pdf>
- Fluorescent Lamp Stewardship Initiative (2000) - <http://environment.gov.ab.ca/info/library/6344.pdf>
- Hazardous Waste Storage Guidelines (1988) - <http://environment.gov.ab.ca/info/library/7238.pdf>
- Policy on Management of Hazardous Wastes and Recyclable Materials (1990) <http://environment.gov.ab.ca/info/library/7244.pdf>
- Waste Management Information for Businesses that Store Hazardous Wastes and Hazardous Recyclables (2004) - <http://environment.gov.ab.ca/info/library/5733.pdf>

6-3.2. Household and Industrial Waste

Legislation

Legislation: Under the *Environmental Protection Act* (EPEA) most landfill sites require approval or registration from Alberta Environment and are subject to the Code of Practice for Landfills (see below) which is incorporated under the Waste Control Regulation.

Albertans produce an enormous amount of garbage, the disposal of which can contaminate land and water resources if EPEA standards are not met. The breakdown and decomposition of many materials put into landfills creates a toxic **leachate** that can percolate through the ground and be carried to nearby ground and surface water. Keeping hazardous wastes out of landfills is vital to minimizing the toxicity of leachate. The development of landfill sites with barriers that stop this leachate from seeping into the ground and groundwater is expensive but necessary for the protection of groundwater. Alternatively, incinerating garbage releases greenhouse gases and other substances into the air that can harm human health and contribute to climate change.

Landfills require large areas, adding to already mounting pressures for land (e.g., for residential and industrial growth). Decreasing the quantity of garbage produced is one way to reduce the land needed for landfill space, thus decreasing the municipal dollars spent on garbage disposal and protecting the long-term health of the environment. Decreasing municipal waste streams can be done through the four R's: reduce, reuse, recycle and reclaim and through composting. Municipalities can create public outreach programs to encourage the four R's and composting (see section 7-3 for public outreach ideas). Furthermore, municipalities can consider constructing their own large scale recyclables collection and composting facilities or partnering with other municipalities or organizations to offer these services.

More Information

More Information: Waste Disposal and Reduction

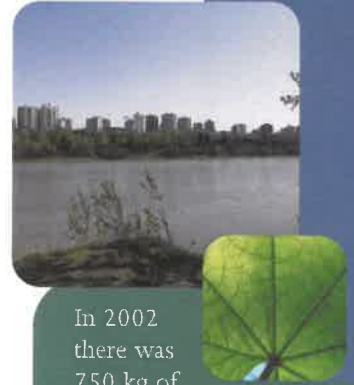
Alberta Environment has created the following resources relating to municipal waste disposal. Most of these are available online or phone (780)427-2700 (toll free by first dialing 310-0000).

Landfills

- Code of Practice for Landfills - <http://www.qp.gov.ab.ca/documents/codes/LANDFILL.cfm>
- Standards For Landfills in Alberta (2004) - <http://environment.gov.ab.ca/info/library/7316.pdf>

Municipal Waste Programs:

- Alberta's Municipal Waste Action Plan (2004-2006) - <http://environment.gov.ab.ca/info/library/6360.pdf>
- Full Cost Analysis Guide for Municipal Waste Managers (1995) - <http://environment.gov.ab.ca/info/library/7257.pdf>



In 2002 there was 750 kg of waste per capita in Alberta disposed of in landfills.

- Alberta Environment
2004b

On average, 77% of Edmonton's residential waste is compostable, which consists of the following:

- yard waste 28%
- food waste 23%
- paper 17%
- other organics 9%

The remainder of wastes is made up of plastics (7%), metals (3%), glass (2%), textiles (3%), and others (7%).

- City of Edmonton
2005

Chapter 6 - Municipal Infrastructure, Property and Operations

More Information

- Resource Recovery Grant Program Guidelines (2001) - <http://environment.gov.ab.ca/info/library/5709.pdf>
- Waste Management Assistance Program Guidelines (2001) - <http://environment.gov.ab.ca/info/library/5708.pdf>
- Municipal Planning Guide: For a Successful Waste Reduction and Recycling Program (2000) - <http://environment.gov.ab.ca/info/library/6304.pdf>

Recycling

- Alberta Recycling Market Profiles (1997) for high grades/office papers, mixed paper waste, MSW metals, old corrugated containers, old newspaper waste and glass - <http://www.environment.gov.ab.ca/info/listing.asp?txtsearch=recycling+market+profile&searchtype=asset&audience>

Composting

- Leaf and Yard Waste Composting Manual (2004) - <http://environment.gov.ab.ca/info/library/6299.pdf>
- Midscale Composting Manual (2004) - <http://www.environment.gov.ab.ca/info/library/6318.pdf>
- Taking Action through Vermicomposting and Taking Action through Backyard Composting - these two pamphlets can encourage homeowners to reduce waste through home composting and can be customized and printed for use by municipalities.
<http://environment.gov.ab.ca/info/library/6188.pdf>;
<http://environment.gov.ab.ca/info/library/6189.pdf>

Non-government organizations that offer recycling programs:

- **The Recycling Council of Alberta (RCA)** - promotes and facilitates waste reduction, recycling, and resource conservation. They have an Enviro Business Guide that lists enviro business in Alberta and is available online at www.recycle.ab.ca/directory.htm. Website: www.recycle.ab.ca/. Phone: (403)843-6563.
- **The Alberta Recycling Management Authority (ARMA)** - oversees provincially mandated tire recycling programs and funds major municipal projects that incorporate recycled tire products. Website: www.trma.com/. Phone: 1-888-999-8762.
- **The Beverage Container Management Board (BCMB)** - website: www.bcmb.ab.ca/. Phone: 1-888-424-7671.
- **The Alberta Dairy Council** - recycles milk containers. Website: www.milkcontainerrecycling.com/AB/. Phone: 1-877-414-5847.

6-4

Agriculture Services



Photo credit:
Kelly Montgomery

Healthy agricultural lands can be an important component of a healthy watershed. Well managed agricultural lands serve as green infrastructure and provide a number of ecosystem goods and services which include flood control, water filtration, erosion control and groundwater recharge (see Chapter 2). Not only does good environmental stewardship on agricultural lands serve to protect and improve soil and water quality but it can also increase crop yield and improve livestock health, thereby increasing agriculture profits.

In addition to being an important watershed

component, agricultural lands have a number of economic, social and cultural values. As a primary source of income for many Albertans, agriculture constitutes a considerable portion of the Canadian economy and is the backbone of many rural economies and even some near-urban economies (Curran 2003b). Agricultural lands are also essential to retaining the identity, character and culture of many rural communities. These lands are a reminder of the important role agriculture has played in Alberta's history.



Photo credit:
Shayne Steffen

There are two manners in which municipalities can ensure that the watershed values associated with agricultural lands are protected. The first is to protect agricultural lands and the second is to promote watershed stewardship on these lands.

6-4.1. Protecting Agricultural Lands

Increasing population and development pressures have resulted in the loss of agricultural lands throughout Alberta. There are, however, a number of strategies municipalities can use to protect and support these green open spaces. Chapter 4 discussed opportunities for protecting green spaces and agricultural lands through municipal land-use planning (e.g., MDPs, ASPs and LUBs) and tools designed to decrease development pressures (e.g., purchase of development rights, density bonusing and buffering). Municipalities can also create



Photo credit:
Trevor Wallace



"...managers of agricultural landscapes should be recognized and valued not only for producing food and/or fibre, but for the accompanying environmental goods and services that good stewardship provides to society."

- The Ag Summit
Collection of Action
Team Reports
2002a(p1)

"Western Canadian urban centres are under unprecedented pressure to consume agricultural land to meet new housing and employment needs..."
"Our communities are being challenged to find innovative ways to manage urbanization while still protecting the integrity of our agricultural land base and economy and the very real benefits they offer to all Canadians."

- McNaney 2004

Chapter 6 - Municipal Infrastructure, Property and Operations

municipal tax regimes that keep farmland taxes at agriculture value rather than market price, which can be particularly useful in protecting agricultural lands near the urban fringe.

Municipalities can also help protect agricultural lands by supporting the agriculture industry. They can do so by: contributing to local farmers markets, creating strategies for value-added industries, organizing promotional farm tours and hosting agriculture awareness events (The Ag Summit Collection of Action Team Reports 2002a).



Photo credit: City of Edmonton

Agriculture lands at the urban fringe are under increasing pressure to subdivide. As the price of these lands go up, so do taxes, in some cases making it difficult for farmers to make ends meet.

Municipal Example

Municipal Example: Supporting Agriculture

Strathcona County: Future of Agriculture Study - conducted in 2003, the overall goal of this study was to develop a realistic and implement-able strategy to ensure the sustainability of Strathcona's agricultural sector, based on thorough research and expressed community support. It came up with a number of policy recommendations. Available online: <http://www.strathcona.ab.ca/Strathcona/Rural+Life/Future+of+Agriculture+report/Future+of+Agriculture+Report.htm>. For more information about the development of the study visit the Municipal Excellence Network: http://www.menet.ab.ca/bins/view_practice.asp?pid=349. Phone: (780)464-8248 (David Turner, Manager of Corporate Planning Secretariat).

6-4.2. Confined Feeding Operations

Legislation

Legislation: Pursuant to the *Agricultural Operation Practices Act (AOPA)*, the Natural Resources Conservation Board regulates and approves confined feeding operations and manure storage facilities. Developers of these facilities are not required to obtain subdivision approvals or development permits.

CFOs produce large quantities of manure and contain substances that if managed improperly, can be a major source of water contamination. Municipalities can offer some degree of protection to environmentally sensitive areas through their authority to designate CFO exclusion areas in their MDPs. While confined feeding operations are approved by the Natural Resources Conservation Board (NRCB), an NRCB approvals officer must refuse an approval for a CFO if the facility is inconsistent with the land use provisions of the MDP (Mallet 2005). In their MDP, municipalities may for instance identify areas that are unsuitable for CFOs. These may include, for example, areas with a high groundwater table, areas near groundwater discharge and recharge areas or areas that may be unable to meet the watering demands of CFOs. It is however important to note that in an appeal to the NRCB, the Board is required to give consideration to, but is not bound by the MDP [AOPA s.25(4)(g)].

6-4.3. Watershed Stewardship on Agricultural Lands

While agricultural lands have the potential to contribute to watershed health, if not managed properly they pose a danger to its health. For example, fertilizers, pesticides, manure and other substances found in agriculture runoff can be a source of **non-point source pollution**, which contaminates soil and water. At the watershed level, the cumulative impacts of these pollutants can be a significant threat to water quality and the health of the environment.

Municipalities can work with farmers and ranchers with lands in their jurisdiction to promote good stewardship practices. They can do this through their agriculture fieldman and other agriculture staff and through conservation technologists provided by Alberta Agriculture Food and Rural Development's Environmentally Sustainable Agriculture (AESAs) program (known as Rural Extension Staff). These individuals can provide farmers and ranchers with information, advice, resources and opportunities for watershed stewardship. At a minimum, farmers and ranchers should be aware of the legislation that applies to their activities on their lands. Furthermore, farm extension staff can provide farmers and ranchers with the knowledge and tools to exceed the standards set through legislation and to become active stewards of their land. Table 6.2 is a summary of watershed stewardship activities that municipalities can promote to farmers and ranchers.



Chapter 6 - Municipal Infrastructure, Property and Operations

Table 6.2 Watershed Stewardship on Agricultural Lands

Adapted from: Alberta Environmental Farm Plan. 2003. *Environmental Farm Plan* (First Edition).

Topic	Watershed Stewardship Activity
Riparian Areas	• Avoid cultivating through riparian areas • Keep livestock areas away from the banks of streams and lakes • Keep pesticides and fertilizers and other chemicals out of riparian zones
Livestock Watering	• Set up livestock watering sites away from water bodies • Utilize remote watering systems (e.g., solar powered water pumps that allow for livestock watering away from riparian areas) • Municipalities can promote the use of remote watering systems by making demonstration equipment available to producers to test
Livestock Yards and Wintering Sites	• Consider environmental factors when determining the location of livestock yards and livestock wintering sites (e.g., they should not be located downhill of waterways or other environmentally sensitive areas) • Protect groundwater by avoiding putting livestock yards on or near: coarse-textured permeable soils, a water table that is near to the surface or a spring or water well • Disperse animals on livestock wintering sites to minimize manure build-up
Grazing Management	• Promote the growth of healthy forage plants (which protect against soil erosion from surface water runoff and have deep root systems that are efficient at harvesting moisture) • Avoid over grazing (e.g., manage herds so that grazing activity is distributed) and early spring grazing

Chapter 6 - Municipal Infrastructure, Property and Operations

Topic	Watershed Stewardship Activity
Silage Storage	• Store silage safely to avoid seepage (which can contaminate ground and surface water with ammonia, nitrate and iron) • Collect seepage
Pesticides (insecticides, rodenticides, fungicides and herbicides)	• Apply pesticides only in quantities needed and at times that decrease the risk of contaminating water bodies • Consider integrated pest management as an alternative (in some cases pesticides may not be needed) (see section 6-1.3) • Store pesticides safely
Fertilizers	• Apply only the quantity of fertilizers that are needed (based on soil tests, crop type and expected yield) • Apply fertilizers at appropriate rates and times to increase productivity and decrease the risk of contaminating water bodies • Store fertilizers safely • Explore alternatives to fertilizers with high phosphate content (phosphates are one of the chief sources of nutrients that promote undesirable plant growth in lakes)
Manure Use	• Manage manure with the same care as commercial fertilizers by calculating nutrient needs to avoid applying excess manure and compost (improper management can lead to nutrient runoff and problems associated with nutrient loading in water bodies)
Soil Erosion Control	• Inspect lands and identify the places soil is most likely to erode • Explore options for preventing erosion and consider re-vegetating areas with trees and grass • Reduce or eliminate tillage and summer fallow and return stubble and roots to the soil • Maintain ground cover (live plants and dead or decaying plant material) to reduce runoff and associated soil erosion and to increase water infiltration into the soil



There are three common reasons why farm nutrients (from chemical and organic fertilizers) reach water bodies:

1. the rate of application is higher than the plant use rate
2. inappropriate time of application
3. inappropriate method of application

In addition to reducing runoff, ground cover increases soil moisture, reduces evaporation, shades the soil surface in the summer, traps snow in the winter, provides wildlife habitat, returns nutrients to the soil, and increases soil organic matter (which also increases the soil's water holding capacity).

- Alberta Agriculture
Food and Rural
Development et al.
2004



Photo credit
Ducks Unlimited Canada

Chapter 6 - Municipal Infrastructure, Property and Operations

Topic	Watershed Stewardship Activity
Petroleum Products	• Store liquid petroleum products (e.g., gasoline, diesel fuel and kerosene) safely by ensuring storage tanks are installed properly, inspected and monitored to prevent leaks
Disposal of Farm Wastes	• Dispose of toxic and other wastes (e.g., animal health care products, containers for fertilizer, oil and paint, preservatives) safely by bringing them to hazardous waste collection centres and landfill sites that are controlled to prevent soil and water contamination

A slow leak of a petroleum product can move quickly through the soil into groundwater.

Chapter 6 - Municipal Infrastructure, Property and Operations

Municipal Success Story**County of Minburn Partnership to Promote Offsite Watering**

The County of Minburn has demonstrated municipal watershed stewardship by working to promote offsite watering in and around their county. The County recognizes the value of keeping livestock away from rivers and other water bodies as a means of protecting water quality. The County of Minburn has partnered with the provincial government and with a local producer to build an offsite watering system for cattle.

The project was initiated by Minburn County in 2000 when funding for an offsite watering project became available through AAFRD's Alberta Environmentally Sustainable Agriculture (AESA) program. The County put an advertisement in the local paper looking for producers interested in building an offsite watering system on their lands. A local producer responded to the advertisement and was a perfect candidate: he had just begun rotational grazing on his quarter section and watered from the creek which flowed through his land and into the Vermillion River.

The County of Minburn's Agriculture Fieldman managed the project and was responsible for researching and deciding on the type of system that was going to be used and the set up of the system. The system was purchased with funds from AESA and the producer was responsible for fencing and for the maintenance of the site.

Benefits of the Project

The offsite watering project has provided huge benefits to a number of user groups. The producer has found that his lands are in better shape. By keeping his cattle out of the creek the County, and all downstream counties on the Vermillion River have an increased level of water quality protection. The offsite watering site also serves as a demonstration site for other producers in the county and is the destination for a number of tours made up of interested producers, college students and the Provincial Agriculture Council. This site has promoted and created awareness of the value of offsite watering to individuals throughout western Canada.

Contacts:

Mona Lee Kirkland
Municipal Conservation Specialist
Vermillion River and Minburn Counties
Phone: (780) 853-8104
Email: monalee.kirkland@gov.ab.ca

Darwin Ullery
Agricultural Fieldman
County of Minburn
Phone: (780) 632-4033
Email: dullery@minburncounty.ab.ca



Photo credit:
Bob Buchanan

Solar off-site
watering system.

Chapter 6 - Municipal Infrastructure, Property and Operations

Municipal Example

Municipal Example: Agricultural Stewardship

New York City - in 1989 the US Environmental Protection Agency required improved filtration system for pathogens in the New York City Water Supply. The filtration system would have cost \$6 - \$8 billion with an annual upkeep of \$300 million. The City committed itself to working with farmers in the watershed, where much of the sedimentation originated, to secure a clean water supply. Farmers have benefited from the process by receiving technical and financial assistance to develop whole-farm plans. Plans address soil erosion, livestock waste, use of chemicals, pesticide, fertilizers and best management practices to improve operations. The program allows farmers and New York City to share responsibility for protecting the watershed and water resources. The program costs the City about \$7 million per year and helps the private sector support watershed protection in the long run by using the marketplace to reward behavioral changes made by farmers (American Farmland (Fall 1998) as referenced by The Ag Summit Collection of Action Team Reports 2002a).

More Information

More Information: Watershed Stewardship in Agricultural Lands

Alberta Environmental Farm Plan Company - runs workshops with ranchers and farmers to create awareness among individuals about environmental health and endorsing environmental stewardship through the creation of individual farm plans. They have developed a workbook that outlines environmental issues related to agriculture and stewardship opportunities (which is the main source of information for Table 6.2). Website: www.albertaefp.com. Phone: 1-866-844-2337.

Caring for the Green Zone: Riparian Areas and Grazing Management (2003) - a resource for ranchers created by Cows and Fish. Website: www.cowsandfish.org. Phone: (780)679-1289 (Camrose office).

Information on the economic benefits of clean water for cattle:

- Agriculture and Agri-Food Canada - www.agr.gc.ca/pfra/water/directac_e.htm

Organizations with Agriculture Resources and Programs (for more information on the following organizations see Watershed Stewardship in Alberta in Appendix B)

- Alberta Conservation Association
- Alberta Fish and Game Association (Parkland Stewardship Program and Operation Grassland Community)
- Cows and Fish
- Ducks Unlimited Canada
- Agriculture and Agri-Food Canada - Prairie Farms Rehabilitation Administration
- Alberta Agriculture Food and Rural Development - Alberta Environmentally Sustainable Agriculture (AESAs)



Photo credit: Alberta Milk

6-5

Woodlots and Agro-Forestry*

*This section was written by the Woodlot Association of Alberta

The term woodlot and agro-forestry are often used interchangeably in Alberta. A woodlot may vary in size and diversity but generally describes a tract of forested or tree covered land. Agro-forestry refers to the act of managing a woodlot in a “farming” manner (e.g. cultivation or plantation), or when a woodlot is integrated with farming operations (e.g. grazing or rangeland). For the purpose of this guide we will use the term woodlot.

Whether left alone unmanaged or intensively managed, woodlots play an integral role within a watershed. Aside from providing aesthetic and intrinsic values for a landowner, a woodlot can provide supplemental income through the sale of products such as logs, lumber, posts, poles, rails and firewood. In addition, revenue may be generated from non-timber woodlot sources such as mushrooms, berries, florals, oils and eco-tourism. Often times the mere existence of forest vegetation (woodlot) provides important pasture and cover for a livestock operation.

Woodlots also help conserve water resources in the watershed. Forested lands effectively trap precipitation (e.g. snow) and retain moisture through shading which reduces evaporation. On steep slopes and along tributaries woodlots help slow surface water flow and prevent soil erosion, which in turn reduces silt and other debris deposits within watercourses. A sustainably managed woodlot within a riparian zone will contribute to improved water quality.



Photo credit: City of Edmonton

6-5.1. Protecting Woodlots and Best Management Practices

Forest vegetation is being increasingly removed to create access to, and for exploration and development activities in remote areas. The **cumulative impact** of the loss of forest vegetation throughout the NSW has the potential to significantly impact water quality and overall watershed health. Municipalities can use many of the same tools for protecting woodlots as they can use for protecting agricultural lands (as discussed in the previous section).

Furthermore, just as they do with agricultural lands, municipalities have many opportunities to promote good stewardship of privately owned woodlots. Agriculture staff and rural extension staff can work with landowners to promote the use of a number of BMPs for woodlots. The sale and harvest of standing timber continues to be the most common form of woodlot management throughout the North Saskatchewan River Watershed. If adequate, preventative measures are not taken during the timber harvest and removal process, significant damage can occur to habitat, soil and water resources. To mitigate environmental damage during timber harvest and removal activities the following BMPs can be applied:



Photo credit: Delaney Anderson

When managed sustainably, woodlots can provide important long-term habitat for a number of local and migratory wildlife species.

Chapter 6 - Municipal Infrastructure, Property and Operations

Before any tree is harvested it is very important that landowners understand their responsibilities and legal liabilities when harvesting and moving their forest resource. Regardless of if a landowner hires or signs a contract for a third party to harvest and remove their timber resources, it is ultimately the landowner that is responsible and legally liable for any environmental damages and on the ground mistakes that may occur. See section 3-2 for a list of statutes that apply to woodlot and agro-forestry activities.

- Minimize the area developed for access and movement of the harvested timber (e.g., roads, skidding trails, landings and log decking areas)
- Where possible avoid removal of surface vegetation and topsoil and where necessary ensure the material is rolled back
- Prevent the deposit of soil and forest material in water bodies and water courses
- Limit timber harvest activities to frozen ground conditions especially on steep slopes (>20%), near riparian areas and on wet soils
- Maintain a buffer area (with zero removal) or only perform very light timber removal along watercourses - generally, the larger the watercourse and/or the steeper the bank, the larger the buffer (distance from the edge of the bank)
- Avoid timber harvest operations on slopes steeper than 45%
- Avoid damage to younger growing stock and other vegetation
- Avoid timber harvest operations during nesting and breeding seasons



Photo credit:
Delaney Anderson

More Information

More Information: Timber Management Guidelines

Alberta Timber Harvest Planning and Operating Ground Rules Framework for Renewal (Alberta Sustainable Resource Development 2006) - available online at <http://www.srd.gov.ab.ca/forests/managing/manuals.aspx>.
Phone: (780)944-0313 (SRD Information Centre, Edmonton)

More Information: Woodlot and Agro-Forestry Resources

Woodlot Association of Alberta - represents and supports Alberta landowners on woodlot and agro-forestry matters. Website: www.woodlot.org

Agriculture Canada: Prairie Farm and Rehabilitation Administration - provides information on shelterbelts and land conservation practices and programs. Website: http://www4.agr.gc.ca/AAFC-AAC/display_afficher.do?id=1187362338955&lang=e. For more information see *Watershed Stewardship in Alberta* in Appendix B.

Alberta Agriculture: Woodlot Extension Program - source of general woodlot management information and educational events. Website: [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/apa3312](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/apa3312). For more information see *Watershed Stewardship in Alberta* in Appendix B.

Woodlots Canada - website aims to connect provincial woodlot organizations, woodlot owners and woodlot support agencies. Website: www.woodlotscanada.ca.

Woodlot Extension Library - located at the Canadian Forest Service Northern Alberta Forestry Research Centre (5320 - 122 Street, Edmonton).
Phone: (780)435-7282.

6-6

The Oil and Gas Industry

6-6.1. Overview

The oil and gas industry has been heavily criticized for the impacts that their activities have on the environment. While these impacts have been considerable, it is important to recognize the improvements this sector has made to decrease their environmental impacts and the role this sector has in the Albertan economy. This section provides an overview of some pertinent watershed health issues relating to oil and gas activities. Much of the information in this section is from Rutherford 2004 (available online <http://www.wcel.org/wcelpub/2004/14184.pdf>). See document for sources of information.

More
InformationMore Information: Industry Stewardship

Canadian Association of Petroleum Producers (CAPP) - for more information on the oil and gas industry and CAPP stewardship initiatives visit CAPP's website (http://www.capp.ca/default.asp?V_DOC_ID=5) or call their Calgary office at (403) 267-1100.

Oilfield Injection - In Alberta, groundwater is used in oilfield injection activities for enhanced oil recovery. In 2001 the Alberta oil and gas industry diverted 10.2 million m³ of fresh groundwater for enhanced oil recovery, which made up 26.4% of Alberta's licensed groundwater supply (Alberta Environment as referenced by Rutherford 2004). While this is a large portion of licensed groundwater, it is worth noting that the groundwater used by the oil industry represents less only 1.3% of total licensed water use in Alberta and that the overall supply of groundwater is far larger than that of surface water. However, a unique concern regarding oilfield injection is that water used is consumed - it will not be returned to the natural environment from which it came (this is not the case for many other licensed water uses in the province).

The Government of Alberta has been working to encourage industry to explore alternatives to using fresh or potable water for oilfield injection. In 1990, the province instituted the Groundwater Allocation Policy for Oilfield Injection Purposes and in 2003 they instituted the Groundwater Evaluation Guideline. These policies have encouraged decreased reliance on fresh groundwater. However, the shift to "alternative sources" has largely meant a shift to the use of saline groundwater (Alberta Environment as referenced by Rutherford 2004). These policies have also sparked exploration of water recycling by the oil and gas sector.

Chapter 6 - Municipal Infrastructure, Property and Operations

More Information

More Information: Alberta's Groundwater Policies and Guidelines

Alberta Environment's Water for Life website - provides background information on current policies and guidelines related to water use for enhanced oil recovery in Alberta. Website: www.waterforlife.gov.ab.ca/html/technical_reports.html. Phone: 310-4455 (Alberta Connects - toll-free).

Coalbed Methane - In recent years there has been much public debate on the impact that the practice of coalbed methane extraction using dewatering is having on groundwater supplies. This practice is relatively new in Alberta. In "wet" coal reserves in Alberta, in order to lower underground pressure and allow coalbed methane to be extracted, groundwater is removed with pumps or drainage systems (a process called dewatering). This activity has led to concerns about the ability of freshwater aquifers to meet human needs and recharge surface water bodies (Griffiths & Severson-Baker 2003 as referenced by Rutherford 2004). Alberta's regulations do not allow for the dewatering of aquifers.

More Information

More Information: Coalbed Methane

Unconventional Gas: the environmental challenges of coalbed methane development in Alberta (Pembina Institute for Appropriate Development 2003) - provides an overview of environmental issues relating to coalbed methane. Website: <http://energy.pembina.org/pub/157>. Phone: (780) 542-6272.

Other Water Uses - In addition to dewatering and oilfield injection, the oil and gas industry uses water for a number of activities. These include: flood injection, steam assisted gravity drainage, oil sands mining, drilling fluids, pipelines, vessels, tank testing, process, firefighting and associated domestic uses (as referenced by Rutherford 2004).

Water Contamination - There is currently concern regarding the contamination of groundwater as a result of oil and gas extraction and oil sands production activities. The current regulatory focus is on ensuring proper treatment for any water that comes in contact with oil to prevent it from becoming a source of contamination of groundwater (Alberta Environment as referenced by Rutherford 2004).

Seismic Lines and Pipelines - Seismic lines and pipelines have an impact on the health of our natural ecosystems because they fragment the landscape. As exploration for oil and gas expands into new areas and as the number of pipelines increases, the network of disturbances grows and has a larger impact on the natural environment. These impacts include the disruption of wildlife corridors, ecological processes and natural watercourses.

6-6.2. The Role of Municipal Governments

A commonly expressed municipal frustration is the inability of municipalities to control land use by the oil and gas industry. Municipal involvement in decisions regarding whether an oil and gas operation will be permitted in an area is minimal; it is the responsibility of the Energy Resources Conservation Board (ERCB). Municipalities do, however, have opportunities to impact oil and gas decisions: 1) they have a responsibility to participate in the decision-making process of the EUB; 2) they have opportunities to work with landowners whose lands may be subject to oil and gas activities; and 3) they can develop relations with the oil and gas industry to promote good stewardship.

Working with the EUB

Legislation

Legislation: Oil and gas companies are required to have licenses from the EUB prior to drilling to extract or before constructing a pipeline.

Municipalities have the authority to make requests and recommendations on individual applications by the oil and gas sector to the EUB. Through this process municipalities can bring up issues relating to the potential effects of proposed development on watershed health (in addition to other concerns relating to the health of their communities). However, Section 60(2) of the MGA makes it clear that decisions on these proposals are beyond the jurisdiction of municipalities. Any issues raised by municipalities may be discarded by the EUB, often to the frustration of municipalities, environmental lobbyists or other stakeholder groups.

More Information

[More Information: ERCB](#)

EUB website - <http://www.ercb.ca/portal/server.pt?>

Working with Landowners

Municipalities can work with landowners to control oil and gas activities on private lands. They can provide information to landowners about the potential environmental impacts of oil and gas activities on their lands and they can help landowners understand their rights regarding oil and gas exploration and development. Landowner rights include (adapted from Alberta Fish and Game):

- Oil and gas exploration on private lands requires the landowner's permission
- While a landowner cannot refuse access for drilling activities, they have significant input on how and when these activities will occur
- Companies are required to obtain written consent from landowners before drilling to extract oil or gas
- Companies are required to return land to equivalent land capability once all projects are completed
- Landowners can request that:



Chapter 6 - Municipal Infrastructure, Property and Operations

- companies follow Environment Canada Guidelines for Petroleum Industry Activities to protect wildlife resources (e.g., setback distances, timing and mitigation)
- any damages caused on private lands are repaired (e.g., crop or pasture loss, destruction of trees)
- well water is tested before activities and compensation is given if the quantity or quality of well water is affected
- soil is tested if there is concern regarding contamination

Prior to and during drilling, landowners can have water level and water quality tests done from their wells and records of these can be kept. They can also identify and pay attention to environmentally sensitive sites on or near their property (e.g., wells, rivers and wetlands) and make companies aware of these and their priority for protection. While at minimum, oil and gas companies are required to follow regulations, they may be willing to do more if requested. Landowners are advised to get agreements in writing with company representatives.

More Information

More Information: Landowner Rights

The Landowners Toolkit Series - Oil & Gas Development: Opportunities to Minimize Environmental Impacts on Your Land (Alberta Fish and Game) - an overview of landowner rights and issues to consider. Phone: (780)437-2342.

When the Oilpatch Comes to Your Backyard: A Citizens Guide to Protecting Your Rights (Pembina Institute 2001) - information about each stage in oil and gas development, how potential impacts can be minimized, issues concerning surface rights and questions to ask before signing a lease or right-of-entry agreement. Phone: (780)542-6272. Email: riaf@pembina.org. Chapter 1 can be previewed online: <http://www.pembina.org/pub/175>.

More Information: Agencies and Organizations Involved in Oil and Gas

The following is a list of groups that offer resources regarding oil and gas activities. Municipalities and landowner may wish to consult them.

- Alberta Energy and Utilities Board*
- Surface Rights Board - website: <http://www.surfacerights.gov.ab.ca/home/default.aspx>. Phone: (780)427-2444.
- Environmental Appeal Board*
- Alberta Sustainable Resource Development*
- Environment Canada*
- The Farmer's Advocate - the Farmers' Advocate is an individual, with an agricultural background and farming experience, appointed by the Provincial Government to deal with problems and concerns of farmers. Website: [www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/ofa2621](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/ofa2621). Phone: (780)427-2433.

Chapter 6 - Municipal Infrastructure, Property and Operations

More Information

- Environmental Law Centre - Phone: (780) 424-5099 (toll free: 1-800-661-4238). Email: elc@elc.ab.ca.
- Pembina Institute for Appropriate Development*

*see Watershed Stewardship in Alberta in Appendix B for more information and for contacts.

Working with the Oil and Gas Industry

Municipalities can be proactive and seek to develop relationships with oil and gas industries active in their municipalities. By keeping the lines of communication open, there may be opportunities for cooperation and/or modifying activities to meet local needs and desires. One example of how the oil and gas industry can adapt to watershed needs is directional drilling, which can be used to protect natural areas. See Chapter 8 for more information on cooperation and collaboration.



Chapter 6 - Municipal Infrastructure, Property and Operations

A major source of municipal power is the municipal authority to pass and enforce bylaws. In addition to a land use bylaw (as discussed in Chapter 4), municipalities have the power to pass bylaws that address a number of issues relating to watershed protection.

For years, municipalities throughout Canada have been using bylaws to address water quality issues in their sewers. There are also many opportunities for municipalities to explore bylaw powers that have not traditionally been used for watershed protection. For example, in 2001 the Supreme Court of Canada affirmed the right of the Municipality of Hudson, Quebec to regulate the cosmetic use of pesticides. This case was a milestone in municipal law and while its implication for environmental and health bylaws are not entirely clear, it has demonstrated the ability of municipalities to pass bylaws to address local environmental and health concerns (Mallet 2005). The question that remains to be answered is just how far municipalities can go to regulate environmental issues through bylaws.

This chapter provides an overview of opportunities for municipal governments to create bylaws that protect watershed health. Discussed are municipal bylaw powers that are widely accepted as well as those that have not traditionally been used to protect watershed health. As for the later, there is considerable room for the expansion of municipal bylaws into the environmental health realm, although as of yet the range of these powers remains unclear.



More Information

[More Information: the Hudson, Quebec Pesticide Bylaw](#)

Canadian Environmental Law Association website - contains a collection of materials related to the Supreme Court of Canada's decisions on the Hudson Case and general municipal powers to set bylaws. Website: www.cela.ca/celacourts/detail.shtml?x=1615.

7-1

Municipal Jurisdiction to Pass Bylaws

Legislation

In the MGA (s.9), municipal bylaw power is stated in general terms for two reasons:

- 1) to "give broad authority to councils and to respect their right to govern municipalities in whatever way the councils consider appropriate, within the jurisdiction given to them under this or any other enactment" and
- 2) to "enhance the ability of councils to respond to present and future issues in their municipalities".

Chapter 7 - Municipal Bylaws

Municipalities have the authority to pass bylaws respecting a variety of municipal purposes, many of which may be used to protect watershed health. The general nature of the municipal bylaw power provides municipalities with flexibility in terms of creating bylaws that address watershed protection and are tailored to their specific needs, resources and desires. Table 7.1 outlines a number of bylaw powers identified in the MGA that municipalities can use to address watershed issues.

Despite the range and flexibility of municipal bylaw powers, municipalities interested in developing innovative bylaws for watershed protection must be cautious of overstepping their power. Bylaws must conform to one or more of the purposes outlined in the MGA, must address local issues and must not conflict with provincial and federal powers. Municipalities have much to gain from creating new and innovative bylaws but should be aware of expensive litigation that may result if these are challenged in court.

In terms of the court's decision regarding a municipality's authority to legally pass a bylaw, James Mallet (2005) writes:

The legality of a bylaw or resolution will normally depend on "a reasonable connection to the municipality's permissible objectives" (Canada Ltee v. Hudson). These include the promotion of its residents' health, the use and protection of the natural environment within the community, the use of land and property within the municipality and neighborhood concerns (Canada Ltee v. Hudson; Entreprises Sibeca Inc. v. Frelighsburg). (p10)

In addition to being connected to permissible objectives, municipal bylaws must not conflict with already existing federal and provincial law. If there is an inconsistency between a bylaw and another enactment, the bylaw is of no effect to the extent of the inconsistency (MGA 13). For example, many public health issues fall under the Public Health Act, which is enforced by Regional Health Authorities. Municipalities must be careful that their bylaws do not infringe on federal and provincial responsibilities (as outlined in Chapter 3). This being said, the courts have indicated that unless there is an "express contradiction," or it is impossible to comply with both the bylaw and the federal or provincial law, there will normally be no conflict.

"Where several municipalities are interested in adopting a bylaw to address an emerging environmental concern, potential liability could be managed through agreement among the municipalities to share legal costs in the event of a challenge."

- Mallet 2005 (p10)

The Supreme Court's recent articulation of (a liberal approach in determining whether a bylaw conflicts with a statute) will reduce the range of potential conflicts and support greater municipal action, even in areas already heavily regulated by the provincial or federal governments (Valiente 2002).

- Mallet 2005 (p 10)

More Information

More Information: Legal Advice

For municipalities wanting legal advice about bylaws relating to watershed stewardship there are a number of organizations that specialize in environmental law. These include:

- **Environmental Law Centre** - Website: www.elc.ab.ca/home/index.cfm.
Phone: (780) 424-5099 (Edmonton office)
- **Alberta Law Foundation** - website provides links to a list of organizations that provide legal information and advice. Website: www.albertalawfoundation.org/Links/index.html.

Table 7.1 Bylaw Powers and their Use in the Protection of Watershed Health

Bylaw Power*	Watershed Considerations
The safety, health and welfare of people and the protection of people or property	• There is potential for the use of this municipal power to protect wetlands and other natural areas responsible for water source protection (but this area remains relatively unexplored) • The general welfare power has been used by municipalities to pass bylaws to control smog, greenhouse gas emissions, the cosmetic use of pesticides, smoking and other health and environmental concerns (Valiente 2002 as referenced by Mallet 2005) • Controlling pesticide use (see section 7-2.3)
People, activities and things in, on or near a public place or place that is open to the public	• Protecting parks from human activities that would be detrimental to important ecological functions (see section 7-2.1) • Prohibiting off highway vehicles on municipal public lands in environmentally sensitive areas or around important green infrastructure (see section 7-2.1)
Nuisances, including unsightly property	• “Nuisance” is not defined in the MGA and municipalities have the flexibility to determine what behaviors will constitute a nuisance (Reynolds 1993 as referenced by Mallet 2005) • Restricting the alteration of landscape or wetlands in any way that affects water levels on neighboring property in a way which is considered unsightly or a nuisance (Kwasniak 1997 as referenced by Mallet 2005)
Businesses, business activities and persons engaged in business	• Bylaws may: regulate or prohibit, deal with industry or businesses in different ways and provide for a system of licenses, permits or approvals (MGA s.8) • Restricting or prohibiting businesses that are unsuitable or undesirable due to local health effects or environmental impacts
Public utilities and services provided by or on behalf of the municipality	• Protecting public utility infrastructure and the services they supply (e.g., green infrastructure used for wastewater treatment) • Prohibiting the dumping of substances into stormwater and wastewater drains that will be deleterious to water quality (see section 7-2.3) • Water conservation (see section 7-2.4)

* as listed in the MGA (s. 7)



Chapter 7 - Municipal Bylaws

7-2 Bylaws as a Tool for Promoting Watershed Health

This section provides an overview of some watershed issues that can be addressed in municipal bylaws as well as specific examples from within the North Saskatchewan River Watershed and throughout Canada. *For information on incorporating any of these bylaws into an intermunicipal bylaws see section 8-1.3.*

7-2.1. Protecting Natural Areas

Parks and Protected Areas Bylaw

Municipalities can use bylaws to protect public parks and natural areas from development and human activities that are detrimental to their conservation purposes and to overall watershed health. These include activities such as land alterations, the destruction of vegetation and the construction of structures.



Photo credit:
City of Edmonton

Municipal Examples

Municipal Examples: Natural Area Bylaws

City of Edmonton - has created two bylaws to protect natural areas:

1. Parkland Bylaw (Bylaw 2202)
 - Purpose: to regulate the conduct and activities of people in parkland in order to promote the safe, enjoyable and reasonable use of such property and to protect and preserve natural ecosystems for the benefit of all citizens of the City
 - Available online: www.edmonton.ca/attractions_recreation/documents/C2202.doc. Phone: (780)496-8178 (Office of the City Clerk).
2. Unauthorized Use of Parkland Bylaw (Bylaw 12308)
 - Purpose: to regulate the unauthorized use of Parkland and to provide the City with a mechanism for removing unauthorized uses
 - Serves as a tool for Administration to assist in the control and elimination of encroachments without having to resort to litigation
 - Available online: http://www.edmonton.ca/attractions_recreation/documents/C12308.doc. Phone: (780)496-8178 (Office of the City Clerk).

Environmental Reserves Bylaw

In addition to protecting public parks municipalities can use bylaws to protect environmental reserves from activities that may be detrimental to their health. This can be done in one of two ways. First municipalities can incorporate the protection of

Chapter 7 - Municipal Bylaws

environmental reserves into natural areas bylaws. Second, municipalities can develop bylaws specific to environmental reserves. Environmental reserve bylaws can address, for example, vegetation management, grazing, off-road vehicles use, construction and enforcement.

Municipal Examples

Municipal Example: Environment Reserve Bylaw

Building an Environmental Reserve By-Law Fact Sheet (Vincent Lake Working Model 2001) - provides a sample of an environmental reserve bylaw (based on those of the Counties of Barrhead and Parkland) and information on potential components of an environmental reserve bylaw. *See Appendix B for a copy.*

M.D. of Rocky View: Municipal Lands and Reserves Bylaw - this bylaw lists a number of activities that are prohibited on land owned by the city (unless individuals have written consent), which includes destruction of vegetation, digging of soil, littering, motorized vehicles and livestock grazing. Available online: <http://www.gov.mdrockyview.ab.ca/Uploaded/C-5756-2003.pdf>.

Off Highway Vehicles Bylaw

If good stewardship is not practiced by users, off highway vehicles (OHVs) and all terrain vehicles (ATVs) can have considerable impacts on natural areas and in particular on riparian areas and water bodies. In addition to promoting good stewardship practices and creating designated OHV areas (see section 6-1.4) municipalities can create OHV bylaws to protect sensitive natural areas from OHV use.



Photo credit:
City of Edmonton

Municipal Examples

Municipal Example: OHV Bylaw

Leduc County has created two bylaws that address OHV use:

- 1) Off-Highway Vehicle Bylaw (no. 7-96) - created in 1996 to regulate the operation and use of off-highway vehicles on highways and lands under their control. Section 13 of the bylaw states that the operation of an OHV is prohibited at all time on any posted public park, recreation grounds, exhibition grounds, environmental reserve, municipal reserve and school reserve. Available online: www.leduc-county.com/council/ByLaws/ByLawsArchive/1996-99/7-96.pdf. Phone: (780)955-3555 or 1-800-379-9052.
- 2) Parks Bylaw - provides for the control and operation of natural areas under the County's jurisdiction (municipal reserves, parks and campgrounds). Section 66 of the bylaw prohibits the operation of OHVs in municipal reserves where signs have been erected. Individuals not obeying this section of the bylaw are subject to a \$100 fine. To create awareness of this bylaw Leduc County has put up a number of signs and barricades on municipal reserves around water bodies. Phone: (780)955-3555 or 1-800-379-9052.

Chapter 7 - Municipal Bylaws



Photo credit
Delaney Anderson

"Buffalo, NY's twelve percent tree canopy reduces runoff by 30 percent, providing stormwater services that save the City about US\$34.3 million."

- American Forests
2002 as referenced by
Evergreen b

7-2.2. Protecting Trees on Public Lands

Trees are an important green infrastructure that offer a number of services which include the absorption of stormwater, production of oxygen, removal of greenhouse gases and temperature control (to name a few). Trees on public lands are the property of municipalities and as such municipal bylaws can be created to protect them. The protection of trees and other vegetation is often addressed in bylaws to protect natural areas on municipal lands. Municipalities can also protect trees along streets in street bylaws.

Municipal Examples

Municipal Example: Tree Bylaw

City of Calgary - trees growing in parks, natural areas and road right-of-ways are the City's property and their protection is mandated through two municipal bylaws:

- 1) **Tree Protection Bylaw** (no. 23M2002) - prohibits the removal (of a tree, its bark or a tree protection barrier), cutting, or transplanting of a public tree and other potentially damaging activities without written consent. Available online: <http://www.calgary.ca/docgallery/bu/cityclerks/23m2002.pdf>. Phone: (78)268-2677 (Urban Forestry).
- 2) **Street Bylaw** (no. 20M88) - under this bylaw individuals applying for permits for a variety of activities may be required to create a Tree Protection Plan. Available online: <http://www.calgary.ca/DocGallery/BU/cityclerks/20m88.pdf>. Phone: (780)268-2677 (Urban Forestry).

7-2.3. Wastewater and Stormwater Pollution Prevention

Wastewater bylaws can be an important part of a wastewater source control program and can serve to increase the quality of wastewater discharged into the natural environment. Municipal sewage treatment plants are designed to function within specific parameters and loadings, and may not be capable of removing some toxic chemicals, heavy metals and other harmful substances prior to discharging wastewater into the natural environment. The presence of these substances may also impact the biological processes used in many wastewater treatment systems and add to treatment costs.

Wastewater bylaws vary from one municipality to the next depending on a number of factors including the size of a municipality, the types of wastewater systems used, the types of industry present and the needs and priorities of a municipality. There are two types of bylaws used for controlling sewers: 1) sewer use bylaws and 2) sewer bylaws.

Sewer Use Bylaw

Many municipalities have passed sewer use bylaws to regulate what is discharged into their sewers. While sewer use bylaws often focus on sanitary sewers, they can also apply to stormwater sewers. A sewer use bylaw defines regulations regarding the discharge of

Chapter 7 - Municipal Bylaws

pollutants in a wastewater or stormwater system, which are usually divided into two types:

- **Prohibited substances** - cannot be released into sewers
- **Restricted substances** - disposal into sewers is permitted up to a determined concentration or overstrength charges are required for discharges above a determined concentration

For a list of substances municipalities may wish to consider prohibiting or restricting see Appendix B.

Ideally municipalities want to keep detrimental substances out of their sewers completely, but when this is not feasible they can also apply overstrength charges in order to recover municipal costs for the treatment of identified pollutants. Overstrength charges assign treatment costs to the dischargers themselves and therefore, also serve as an incentive for industrial and commercial entities to decrease their discharges of these substances. For a list of examples of overstrength charges applied by municipalities throughout Canada see Appendix B.

In addition to listing prohibited and restricted substances a sewer use bylaw may contain the following:

- **Wastewater rates** (see section 7-2.4)
- **Fines and other penalties** - for bylaw violations
- **Discharge permit requirements** - a bylaw may require discharge permits from industrial and commercial entities with the potential to release restricted wastes in a volume or concentration over those permitted. Permits specify the terms and conditions for a discharge (e.g., sampling, monitoring and reporting) to ensure compliance with a bylaw (National Guide to Sustainable Municipal Infrastructure 2003d). Discharge permits are an excellent tool for increasing compliance with sewer use bylaws.
- **Pollution prevention plan requirements** - a bylaw may require pollution prevention plans from industry and commercial entities. Pollution prevention is the “use of processes, practices, materials, products or energy that avoid or minimize the creation of pollutants and waste, at the source” (CCME 1996). See City of Toronto example below.
- **Codes of practice** - a bylaw may include codes of practice to be followed by industry and commercial entities to reduce the quantity and/or concentration of harmful substances deposited (intentionally or unintentionally) into a municipal sewer
- **Forms** - e.g. for discharge permits or pollution prevention plans



Every type of business has unique wastes, some of which may be harmful in wastewater. For example, dental offices produce waste from spent X-ray fixer that is acidic and contains silver (a heavy metal that can be hazardous in wastewater). Municipal bylaws can protect wastewater by prohibiting these substances from being deposited in sewers and setting limits on the pH of substances deposited in sewers. The dental community can meet these standards by taking advantage of take-back and recycling programs offered by the suppliers of these substances.

Chapter 7 - Municipal Bylaws

While monitoring wastewater discharges can be costly, it is an important part of enforcing a sewer use bylaw. The Canadian Water and Wastewater Association (CWWA) has a directory of source contaminants (see resources at the end of this section) that is a good resource for helping municipalities focus their monitoring programs and narrow the range of laboratory analysis that may be needed for a given effluent, thereby decreasing the cost of monitoring.

Sewer Bylaw

A sewer bylaw regulates a number of infrastructure issues relating to building sewer connections. As a tool for source water protection some sewer bylaws require the pre-treatment of discharges from businesses and industry. These include, for example, the requirement of oil and grease interceptors in establishments that produce high quantities of these contaminants.

Pre-treatment Devices

Canadian standards writing organizations such as CSA International and Underwriters' Laboratories of Canada are developing performance-based standards for wastewater pre-treatment devices (point-of-discharge pollution control devices). CWWA supports this initiative and encourages all municipalities to provide reference in their Sewer Use Bylaws to such devices and to require certified devices to be installed and maintained where possible. CWWA recognizes the need to phase in such requirements, given existing investment in non-certified devices.

- Canadian Water and Wastewater Association, website

More InformationMore Information: Source Contaminants

Directory of Sources of Contaminants Entering Municipal Systems (Canadian Water and Wastewater Association 2001) - for more information visit http://www.cwwa.ca/publicationorder_e.asp. Phone: (613)747-0524 (Ottawa office).

More Information: Sewer Bylaws

Wastewater Source Control (National Guide to Sustainable Municipal Infrastructure 2003) - provides information on bylaws, monitoring and enforcement programs, educational and awareness programs, codes of practice, wastewater rates and pollution prevention plans. Available online: <http://www.sustainablecommunities.fcm.ca/infraguide/>.

Municipal ExamplesMunicipal Examples: Sewer Use Bylaws

City of Edmonton: Sewers Use Bylaw (no. C9675) - available online at <http://www.edmonton.ca/bylaws/C9675.doc>. Phone: (780)496-8178 (Office of the City Clerk).

City of Toronto: Sewer Use Bylaw (incorporated into Municipal Code Chapter 681) - s681-5 requires pollution prevention planning from companies in the following business sectors: metal finishing, industrial laundry, gas stations/auto repair, photofinishing/printing, dental/medical labs, soap and detergents and rubber and plastic. Companies must complete a Pollution Prevention Plan and submit a Plan Summary to the City that identifies ways to avoid, reduce or eliminate the creation of certain pollutants at source. Website: http://www.toronto.ca/water/protecting_quality/sewer_bylaw/index.htm. Phone: (416)394-8455 or (416)791-3588.

Chapter 7 - Municipal Bylaws

Municipal Examples

Municipal Example: Sewer Bylaw

City of Edmonton: Sewers Bylaw (bylaw C9425) - requires oil and grease interceptors in, for example, commercial food preparation establishments and industrial and commercial establishments that may release grease, oil or sand into the sewer system. See Appendix B for an insert of this bylaw. Also available online: <http://webdocs.edmonton.ca/bylaws/C9425.doc>. Phone: (780)496-8178 (Office of the City Clerk).

Considerations for Creating or Upgrading Sewer Bylaws

Bylaws should be reviewed regularly to accommodate for new regulations for effluents and biosolids, changes in technical and scientific information and changes in the types of industry and businesses in a community. When creating or upgrading a sewer use bylaw or a sewer bylaw municipalities can phase in changes over time. This will allow affected businesses the time to find the best available treatment technology and/or make the necessary changes in their practices to meet new sewer bylaw regulations. Some municipalities have phased in compliance programs that allow businesses time to make needed equipment modifications over time (Environmental Law Centre 1999).

Pesticide Bylaw

Pesticides found in the environment can be harmful to both human and environmental health. They can be transported in stormwater runoff and subsurface water flows to surface and groundwater. A pesticide bylaw that regulates pesticide use is one method of decreasing the risk of the contamination of water sources with pesticides. Since the Supreme Court of Canada affirmed the right of the Municipality of Hudson, Quebec to regulate the cosmetic use of pesticides in 2001, a number of municipalities throughout Canada have explored the use of pesticide bylaws. While banning the use of all pesticides in a municipality may not be a realistic goal for many municipalities in the NSRW, a pesticide bylaw can be a tool for regulating the appropriate use of pesticides on municipal and private lands. For more information on pesticides see section 6-1.3.

More Information

More Information: Pesticide Bylaws

Sample pesticide bylaw - a sample Alberta pesticide bylaw is available on the Sierra Club of Canada's website. Website: www.sierraclub.ca/national/programs/health-environment/pesticides/pesticide-bylaws/page8.html. Phone: 1-800-810-4204.

Model pesticide use bylaw - available from Vancouver Island's Capital Regional District Roundtable on the Environment. Available online: www.crd.bc.ca/rte/pest/.



Chapter 7 - Municipal Bylaws

Municipal Examples

Municipal Example: Pesticide Bylaw

Halifax Regional Municipality: Bylaw Respecting the Regulation of Pesticides, Herbicides and Insecticides (bylaw P-800) - this bylaw states that “no person shall carry out or permit or suffer to be carried out a pesticide application within the Halifax Regional Municipality” [(section 5(1)]. Pesticide use has been phased out on municipal property, around public property and throughout the entire HRM over a four year period. Available online: <http://www.halifax.ca/pesticides/index.html>.

7-2.4. Water Conservation

There are a number of municipal bylaws that are currently being used to promote water conservation. These include bylaws addressing water rates, lawn watering and low flow fixtures.

Sewer and Water Rates Established in a Bylaw

As part of water metering, municipalities can create a bylaw to establish water rates that capture the true costs of pre-treatment, distribution and post-treatment of water. Many municipalities that use water meters charge residents and industry an initial flat rate and have a fee structure that sets out how much they are charged per volume of water that is consumed over and above a specified volume. By minimizing or eliminating this initial fee and putting more weight on charges that are based on the volume of water consumed, the reward to residents and industry that are conserving water will be greatest, thus promoting water conservation. Every municipality has different needs relating to the size of their population and the type of water systems they use for treating, distributing and collecting water and therefore, municipal approaches to water metering and rate establishment will vary.

More Information

More Information: Water Metering

Canadian Water and Wastewater Association (CWWA) - publications for municipalities interested in starting a metering program or improving their existing one. Phone: (613) 747-0524 (Ottawa office).

- Municipal Water and Wastewater Rate Manual: 2nd Edition (1994) - http://www.cwwa.ca/publicationorder_e.asp#ratemanual
- Municipal Water and Wastewater Rates Primer (1997) - http://www.cwwa.ca/publicationorder_e.asp#ratesprimer
- Meters Made Easy: A Guide to the Economic Appraisal of Alternative Metering Investment Strategies - http://www.cwwa.ca/publicationorder_e.asp#meters

Chapter 7 - Municipal Bylaws

Municipal Example

Municipal Example: Water Metering

City of St. Albert: Water Bylaw - requires that individuals applying for connection to the City's water also apply to the City to have a water meter and remote reading device installed (at the City's cost). Available online: http://www.stalbert.ca/uploads/files/our_government/bylaws/Water_Bylaw_52001.pdf. Phone: (780)459-1500.

Lawn Watering Bylaw

Municipalities can conserve municipal water supplies through a lawn watering bylaw. By prohibiting residents and businesses from watering their lawn midday (when it is hottest) municipalities can save water that would otherwise be lost to evaporation. Furthermore, by permitting residents to water their lawns only at specified times and on specified dates (e.g., every second day) a municipal bylaw discourages individuals from over-water. Over-watering can cause the loss of a significant amount of municipal water to groundwater, where it is unrecoverable.

Municipal Example

Municipal Examples: Lawn Watering Bylaw

Town of Espanola (Ontario): Lawn Watering Bylaw (Bylaw 1336/98) - bylaw states that no person shall use water from the municipal water works for lawn and garden care except as follows (Town of Espanola website):

- Even street numbers may use municipal water for lawn and garden care only on even numbered days of the month.
- Odd street numbers may use municipal water for lawn and garden care only on odd numbered days of the month.
- The consumption of water shall be between 7:00 am and 10:00 am in the morning AND 7:00 pm and 10:00 pm in the evening.
- The consumption of water by the owners or occupants who use electronic sprinkler systems for lawn and garden care shall be between the hours of 3:00 am and 6:00 am daily.
- The consumption of water by the owners or occupants of the following properties for lawn and garden care shall be between the hours of 8:00 am and 5:00 pm: Schools, Cemeteries, Municipal Property and Institutions.
- Owners or occupants of a property having established a new lawn, either sodded or seeded shall be permitted to water the lawn on the alternate days to what is allowed between the hours of 7:00 pm and 9:00 pm only. This permission shall be for a time limit of three (3) weeks from the establishment of the new lawn.
- Persons using water on a private water system shall obtain a notice from the Manager of Public Works stating that a private water system is in use. This notice must be prominently displayed at all times during hours other than as stated above.



In Environment Canada's Municipal Water Use and Pricing survey (2001) they found that of the 967 municipalities that responded to a question on demand management, 33 percent had instituted municipal bylaws to restrict lawn watering. The survey also indicated that this was the most widely practiced demand-management measure in smaller municipalities.

- Environment Canada
2005

Chapter 7 - Municipal Bylaws

Ultra low-flush toilets use only about six litres of water per flush, compared to conventional toilets, which can use as much as 22 L per flush. Low-flow showerheads can cut the amount of water released per minute in half.

Low Flow Fixtures Required in a Bylaw

As a water conservation initiative, municipalities can create bylaws that require low flow faucets in new building developments. A bylaw of this kind can require water efficient technologies such as low-flow toilets, low-flow shower heads and **faucet aerators**.

Municipal Examples

Municipal Example: Low Flow Fixture Bylaw

Town of Cochrane - in 1992, the Town of Cochrane became one of the first communities in Alberta to implement a low-flow plumbing fixture bylaw. The bylaw requires that all new homes have water efficient plumbing and low flush (6 litre) toilets. Phone: (403) 932-2075. Email: cochrane@town.cochrane.ab.ca.

7-3

Bylaw Enforcement

Legislation

Legislation: Under the MGA (s.7(i)) municipalities have the authority to conduct inspections to determine compliance with bylaws and to assign penalties associated with offences outlined in bylaws (e.g. fines and imprisonment).

The power of a municipality to enforce a bylaw is an essential component of its effectiveness. Ideally, bylaws are enforced by local bylaw enforcement officers and local police who are well informed on bylaws. Where neither of these exists, bylaws can be enforced by the RCMP.

A common frustration among municipalities is the costs of enforcing bylaws. While enforcement costs are significant, they are often negated with the long term savings or revenues associated with a healthier watershed (e.g., lower treatment costs for cleaner and lower volumes of water, revenues associated with residents and tourists attracted to a healthy environment).

There are also a number of options for municipalities to lessen the cost of bylaw enforcement:

1. Education and Outreach

The most apparent means of decreasing the cost of enforcement is decreasing the need for enforcement through education and outreach, which is important for two reasons. First, community members need information about new or modified bylaws and resources available to them to help them meet new requirements. Second, creating awareness among individuals about the economic, human health and ecological benefits associated with a bylaw that protects watershed health can contribute to increased compliance in a community. Furthermore, when individuals

Chapter 7 - Municipal Bylaws

understand that their neighbour's noncompliance impacts their ability to benefit from a healthy watershed they are more likely to pressure those around them to obey bylaws as well. [For more information on community outreach see section 8-3.](#)

2. Monitoring Partnerships

Another means of decreasing the cost of bylaw enforcement is through monitoring partnerships, which decrease the resources needed to monitor compliance with bylaws. Monitoring partnerships can take many forms, depending on the type of bylaw. For example, as part of a sewer bylaw municipalities can require industries to monitor their discharges at a given frequency (e.g., daily, monthly, quarterly, annually). This monitoring is conducted in addition to audit sampling and site inspections carried out by municipalities or third parties.

Another example of a monitoring partnership is asking community members to report instances of non-compliance within their community. This can apply to a number of bylaws such as: ATV bylaws that prohibit entry in designated natural areas; park bylaws that prohibit activities that are destructive to ecological health within protected areas; and lawn watering bylaws that restrict watering between specified hours or on specific days. Signs put in protected areas and notices put in newspapers to educate people about bylaws, can also include a line encouraging individuals that witness non-compliant behaviors to call a local authority.

3. Intermunicipal Cooperation

As a means of decreasing the cost of the enforcement of municipal bylaws municipalities can share bylaw officers. [For more information on intermunicipal cooperation see section 8-1.](#)

4. Assistance from Other Agencies

Many smaller municipalities do not have local bylaw officers or local police or the opportunity to share bylaw officers with neighbouring municipalities and therefore rely on the RCMP to enforce bylaws. While the RCMP's ability to enforce bylaws varies depending on the type of municipal bylaw and local circumstances, developing a good relationship with RCMP officers may create opportunities for them to promote compliance with municipal bylaws.

Another option that can be used as a last resort for enforcing watershed-related bylaws in some instances is to alert provincial and federal departments of other offences that may also be committed. Where a municipal bylaw is being broken and notification and education regarding the offence has not been effective in changing the behavior and where provincial and federal offences are also being committed, a municipality can bring in help from other government agencies. For example, in a situation where a deleterious substance is being disposed of into the environment or actions are contributing to the destruction of fish habitat or wetlands, activities may be punishable under the Environmental Protection and Enhancement Act or the Fisheries Act. Having provincial and federal departments dealing with these offenses may also remedy non-compliance issues with municipal bylaws. [For more information on federal and provincial legislation see Chapter 3.](#)



Should it be determined that a discharge is persistently non-compliant, a discharger may make application for a permit to discharge subject to entering into a compliance program. The applicant provides information (concentrations, volumes, etc.) about the non-compliant matter and outlines a program of investigation, reporting and remediation to bring the discharge back into compliance. Programs vary depending on the nature of non-compliance (threat to the wastewater system and treatment process) and the magnitude of the remediation (e.g., process changes, construction of new pre-treatment processes). Compliance programs can have remediation plans (schedules) that last for several years.

- National Guide to Sustainable Municipal Infrastructure 2003d (p7)

Chapter 7 - Municipal Bylaws

The North Saskatchewan River Watershed is a valuable resource shared between the individuals working and living in the 152 rural and urban municipalities that have lands in the watershed. The watershed does not coincide with municipal boundaries and the impacts of the activities of individuals and groups accumulate at the watershed level. For watershed stewardship to be truly successful, municipalities must have support from a diversity of stakeholders throughout their municipality and the greater watershed. Developing this support is a dynamic process that is not always easy.

There are however many opportunities for municipal cooperation and collaboration with groups and individuals residing and/or working within the watershed. These groups and individuals include other municipalities, municipal staff, residents, community groups, local businesses and industry. By working with these stakeholders municipalities can increase the effectiveness of their efforts to protect the health of their watershed.



Photo credit:
Ducks Unlimited Canada

8-1

Intermunicipal Cooperation

Intermunicipal cooperation has become increasingly important to the economic viability of many municipalities, both urban and rural. Municipalities can also use intermunicipal cooperation to stretch their stewardship efforts beyond municipal boundaries and into the greater watershed. Intermunicipal cooperation provides municipalities with many opportunities to promote both economic and watershed health.

Intermunicipal cooperation requires leadership and commitment from participating municipalities. Alberta currently has no coordinated regional planning process through which to organize regional watershed stewardship and consequently intermunicipal cooperation depends greatly on municipal initiative. Overcoming past conflicts, creating a sense of intermunicipal cooperation (rather than competition) and developing a shared vision are central to the success of intermunicipal efforts. Municipalities must also be willing to allocate resources to intermunicipal efforts in the form of time, funding and staff. This section discusses three opportunities for municipalities to jointly promote watershed health: 1) intermunicipal planning, 2) resource sharing and 3) intermunicipal bylaws.

8-1.1. Intermunicipal Planning

Many municipalities have recognized the economic, social and environmental importance of coordinating local planning initiatives with those of neighbouring municipalities and are engaging in a number of intermunicipal and regional planning initiatives. From a watershed perspective, a municipality that is incorporating watershed considerations into

Chapter 8 - Cooperation and Collaboration in the Watershed

planning decisions will have limited success if an upstream municipality is not making similar efforts or if the land use of neighbouring municipalities conflicts.

An important component of intermunicipal planning is identifying and agreeing on shared foundational issues on which to build intermunicipal efforts. These may include defining regional watershed needs and regional growth issues. Once these issues are defined municipalities may wish to then examine broad issues such as:

- Regional compatibility of statutory plans, land use bylaws and subdivision and development decisions in terms of how they address watershed health issues
- Opportunities for intermunicipal cooperation
- Coordination of regional growth management (e.g. protecting natural lands and/or agricultural lands at the urban fringe; coordinating public transportation systems to decrease the need for additional road infrastructure)

The Intermunicipal Development Plan

The creation and adoption of an Intermunicipal Development Plan (IDP) by two or more councils can be a powerful tool for stretching watershed stewardship across municipal boundaries. IDPs provide a needed opportunity for municipalities to formally develop joint visions and implementation strategies for future development that addresses watershed health. Because they are voluntary, IDPs depend on municipal initiative and available resources. While they typically address fringe areas between municipalities such as important natural areas, IDPs can also address larger areas such as a subwatershed shared between municipalities. Table 8.1 provides some examples of watershed issues that can be addressed in an IDP.

Municipal Examples

Municipal Examples: IDPs

County of Lacombe - an Intermunicipal Management Plan (IMP) was created for lakeshore development around three lakes in the County of Lacombe. It addressed multiple issues and concerns of the municipalities involved. For more information visit the Municipal Excellence Network website:

http://www.menet.ab.ca/bins/view_practice.asp?pid=7. Phone: (403) 782-6601 (County of Lacombe's Commissioner).

M.D. of Rocky View and the City of Calgary - this 1998 IDP addresses the following issues: protection of all sources of drinking water, especially the Bow River and Elbow River; protection and rehabilitation of key natural features and habitat areas; and land use compatibility across jurisdictional boundaries. Available online: http://www.calgary.ca/DocGallery/BU/planning/pdf/rockyview_intermunicipal_dev_plan/rockyview_intermunicipal_dev_plan_one.pdf. Phone: (311- 403) 268-2489 (City of Calgary).

Chapter 8 - Cooperation and Collaboration in the Watershed

Table 8.1 An IDP as a Tool for Watershed Stewardship

Issues that May be Addressed in an IDP*	Watershed Considerations for Inclusion in an IDP
Future land use within the area	• Identifying shared natural areas to protect • Defining shared watershed management priorities in natural areas and implementing them together • Limiting development on lands on the outskirts of neighbouring municipalities (e.g. to protect agriculture lands at the edge of one municipality from incompatible land uses in a neighbouring municipality; to maintain urban growth boundaries) • Addressing broad regional planning issues such as source water protection, protection of green infrastructure and growth strategies • Establishing common language and common items of concern (this may seem minor but can be important in the long-term)
The manner of and the proposals for future development in the area	• Requiring that prior to approving future development, watershed impacts are considered and avoided, minimized or mitigated • Requiring that environmental assessments are conducted prior to the approval of proposed developments
Any other matter relating to the physical, social or economic development of the area	• Protection of water sources (e.g. control point and non-point source pollution) • Municipalities are free to explore opportunities for cooperation relating to watershed stewardship beyond matters relating directly to land use • Municipalities can explore opportunities for adopting parts of or adapted versions of one another's policies, regulations, strategies, etc. which serve to protect watershed health

*as listed in the MGA section 631(2)(a)



Chapter 8 - Cooperation and Collaboration in the Watershed

Municipal Examples

Town of Blackfalds and Lacombe County - section 6 of this 2003 IDP addresses environmental policies and states that “for any type of development (including recreation) near a wetland or water body (in the plan boundary), the municipalities will require an environmental assessment by a qualified professional, to determine the need for, and recommend means of, the preservation of the feature and/or mitigation of development impacts.” The plan also restricts development on unstable slopes in areas prone to flooding and requires that setback distances are determined with the appropriate provincial and/or federal authorities. Available online:

<http://www.blackfalds.com/municipal/planning/idp.php>.

Phone: (403)885-4677 (Blackfalds town office).

County and Town of Lacombe - section 4.1 (3) of this IDP states that “land uses, walkways and municipal road and utility systems will be developed and managed to minimize impact on the ecological, aesthetic and recreational qualities of the area’s lakes and wetlands, as well as steeply sloping lands.” Available online:

http://www.lacombecounty.com/dept_planning/lacombe_idp.php.

Phone: (403)782-6666 (Town of Lacombe’s main office).

City and County of Lethbridge - section 5.4.6 to 5.4.9 of this IDP limits land uses in the river valley of the plan area to those that compliment the recreational corridor, protect future opportunities to expand the corridor, protect water quality and prevent soil erosion. Available online:

<http://www.lethbridge.ca/NR/rdonlyres/14B6DC79-C738-45A5-9EF7-FBA035DDCDA4/1973/CountyCityIMDP.pdf>.

Phone: (403)320-3920 (City of Lethbridge Planning and Development office).

Statutory Plans

Under the MGA [s.632(3)], if there is no intermunicipal development plan that addresses intermunicipal matters, municipalities are required to coordinate land use, future growth patterns and other infrastructure with adjacent municipalities in their MDP. This is an opportunity for municipalities to jointly address watershed issues relating to land use, growth and infrastructure.

The MGA also requires that municipalities notify adjacent municipalities and provide them with an opportunity to comment on proposed MDPs and ASPs. If this is done early in the planning process it can be an opportunity for a municipality to encourage watershed stewardship in the MDPs and ASPs of neighbouring municipalities.

Intermunicipal Planning Bodies

Municipalities are authorized to form a number of intermunicipal bodies and through these they can address planning issues related to watershed health. These bodies include intermunicipal planning commissions (MGA 626), intermunicipal service agencies (MGA 625), intermunicipal subdivision and development authorities and intermunicipal subdivision and development appeal boards (MGA 627). These intermunicipal planning bodies can be responsible for a number of activities that may incorporate watershed

Chapter 8 - Cooperation and Collaboration in the Watershed

stewardship which include: creating intermunicipal plans and bylaws, advising councils, generating partnerships and collaborative projects between municipalities and making subdivision and development decisions.

Municipal Examples

Municipal Examples: Intermunicipal Planning Bodies

City of Edmonton's Intermunicipal Planning Group - liaises with neighbouring municipalities on planning matters of mutual concern and promotes co-operation, collaboration and effective communication on intermunicipal and regional issues. Website: http://www.edmonton.ca/city_government/planning_development/planning/intermunicipal-planning.aspx. Phone: (780)496-6233 (City of Edmonton Planning and Development Department).

Subdivision & Development Appeal Board: Town of Legal, Town of Bon Accord, Town of Gibbons and the Town of Redwater - the board is comprised of one elected official from each council and each municipality has adopted its own bylaw establishing this board. For more information visit the Municipal Excellence Network website: http://www.menet.ab.ca/bins/view_practice.asp?pid=122. Phone: (780)961-3773 (Town of Legal's CAO).



Regional Forums

Regional forums can be an important tool for bringing together elected officials and municipal staff from throughout the watershed to discuss issues related to the health of this shared resource. They are a venue for a number of important municipal interactions which include:

- Sharing information among municipalities
- Informing municipalities about the latest developments in watershed stewardship practices
- Addressing regional growth issues relating to watershed health
- Defining regional needs
- Developing regional visions for watershed health (e.g., through visioning exercises)
- Identifying natural areas of regional significance
- Fostering intermunicipal partnerships (e.g., joint policies and strategies, intermunicipal development plans, intermunicipal bylaws, joint public education campaigns)
- Assessing the regional compatibility of statutory plans, land use bylaws and subdivision and development decisions



Photo credit:
Billie Milholland

Chapter 8 - Cooperation and Collaboration in the Watershed

Other Planning Strategies

In addition to the more well-known forms of intermunicipal planning discussed above, municipalities are working together to define and develop unique plans and strategies that are suited to local conditions and needs. The motivations behind these partnerships are diverse and include creating more effective initiatives while saving money and resources and alleviating current or potential conflicts between municipalities. Following the Municipal Success Story, below is a list of examples of intermunicipal planning initiatives. While these examples are not initiatives developed to address watershed health issues specifically, they are examples of intermunicipal efforts that have created intermunicipal relationships, venues and processes. Efforts such as can be important in fostering intermunicipal watershed stewardship initiatives.

Municipal Success Story**Partnership for Protection: the Beaver Hills Initiative**

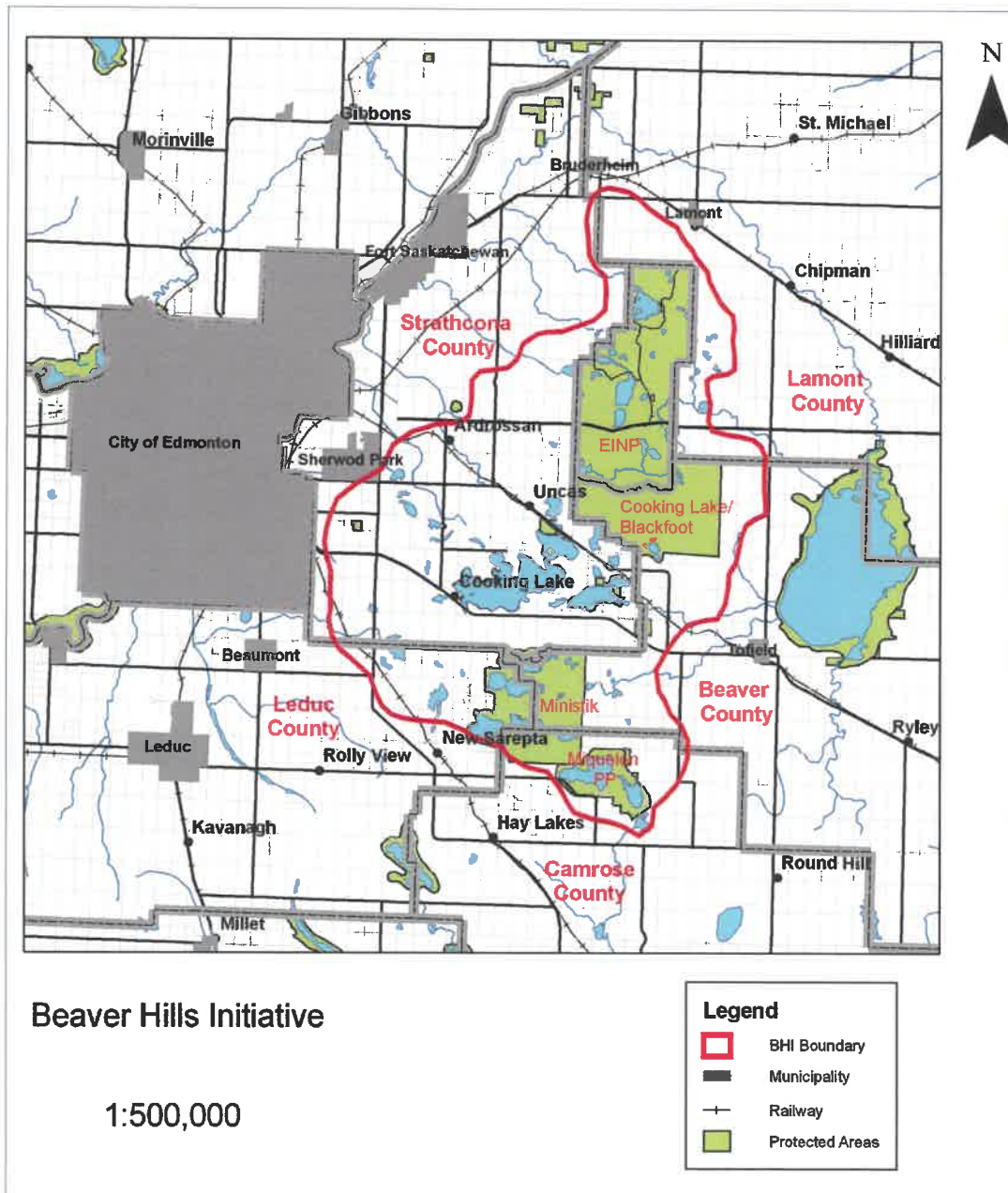
The Beaver Hills Initiative (BHI) is a partnership created between four municipalities, the provincial and federal government, industry, environmental non-government organizations and academia. It was formed in 2000 when its partners came together with a common concern over the conservation of the ecologically significant Beaver Hills area (also known as the Cooking Lake Moraine) located just east of Edmonton. Together these partners are working for a sustainable region, through shared initiatives and coordinated action. The BHI provides land use management policy recommendations to decision makers that recognize the unique qualities of the area.

Why the Beaver Hills Initiative?

The Beaver Hills is an ecologically significant area and crosses the boundaries of five rural municipalities, Elk Island National Park and several provincial parks and protected areas. It consists of healthy forests, grasslands and wetlands that filter rainfall, trap sediment and pollutants and recycle nutrients, thus cleansing water that enters underground aquifers and surface water. It is an upland area unique for its rolling to hummocky terrain shaped by glacial retreat. This ecologically-significant area encompasses 1,572 km² (607 square-miles) and supports a high diversity of vegetation, waterfowl, mammals and birds.

The Beaver Hills is experiencing increased land use demand for recreation, urban and country residential development and from industry and agriculture, which is creating increasing pressures on the area. The BHI believes that in order for the ecosystem to remain sustainable, when reviewing growth and development, decision makers must consider the natural resources and their sensitivity to development.

Chapter 8 - Cooperation and Collaboration in the Watershed



Chapter 8 - Cooperation and Collaboration in the Watershed

Municipal Involvement in the BHI

The four partner municipalities in the BHI are Beaver County, Lamont County, Leduc County and Strathcona County. Each of these has jurisdiction over a part of Beaver Hills and together they have recognized the value of working together to protect this shared resource, while recognizing the demands for various land uses. These municipalities are working together to developing new land management practices and policies that will create balance between recreation, agriculture, industry and residential subdivision.

How does the Initiative work?

Regular meetings are held with all of the partners in this cooperative effort to address land use and management issues. Data from a diversity of sources is being compiled and evaluated to help create policy recommendations based on social, economic and environmental balance. The approach is based on sustainability, recognizing that protecting biodiversity can contribute to protecting quality of life through distinctive means of land management.

The BHI has created partnership/received support from four municipalities and fifteen agencies to date. It is guided by its mission, vision, guiding principles and landscape management area principles and statements. The group has accomplished a number of achievements, including mapping the area using a variety of ecological data, completing a business plan and developing a communications plan.

The BHI offers a model for other municipalities and organization seeking to achieve similar sustainability goals on a regional scale. To date the BHI has been recognized with a Minister's Award for Municipal Excellence (Municipal Excellence Network) and has been nominated for an Emerald Award.

Municipal Resources Used

Administration costs for the initiative have been covered by participating municipalities and have been fundamental to the success to the BHI. Costs for implementing the Business Plan and research and monitoring projects have been covered in part by Alberta Municipal Affairs and Elk Island National Park.

Contact Information:

Brenda Wispinski
Executive Director
Beaver Hills Initiative 464-8280
Email: wispinsk@strathcona.ab.ca
Website: www.beaverhills.ab.ca



Chapter 8 - Cooperation and Collaboration in the Watershed

Municipal Examples

Municipal Examples: Intermunicipal Planning

Thinking regionally, acting locally: Calgary Regional Partnership (CRP) - the CRP is a voluntary association of municipalities and jurisdictions in the greater Calgary area. Members have come together in recognition that many of today's issues - including transportation, water resources, waste management, and economic development - go beyond municipal borders and must be addressed on a regional basis. The CRP promotes and fosters creative approaches to thinking and solving issues by bringing together the resources of its members in addressing specific and significant intermunicipal concerns. For more information visit the Municipal Excellence Network website:

http://www.menet.ab.ca/bins/view_practice.asp?pid=471.

Phone: (403)863-7425 (Calgary Regional Partnership Administrator).

Inter-Municipal Planning & Cooperation: Town of Drayton Valley and M.D. of Brazeau - in addition to an IDP, joint planning between the Town & M.D. has included: standardized agreements for development, infrastructure, storm drainage, roadways, water and sewer, area structure plans, efficient services, seamless development and the formation of an intermunicipal planning commission for fringe development. For more information visit the Municipal Excellence Network website:

http://www.menet.ab.ca/bins/view_practice.asp?pid=61.

Phone: (780)514-2200 (Town of Drayton Valley's manager).

Joint Council Meetings: Town & County of Barrhead - councils meet quarterly to discuss common issues, services and initiatives between the municipalities. A majority from both councils is required to pass a resolution or action. For more information visit the Municipal Excellence Network website:

http://www.menet.ab.ca/bins/view_practice.asp?pid=82.

Phone: (780)674-3301 (Town of Barrhead Municipal Manager).



More Information

More Information: Sample Intermunicipal Policy

Intermunicipal cooperation policy - AAMD&C has a sample policy to advance cooperation between municipalities to improve levels of service, reduce duplication, reduce costs and increase efficiency.

8-1.2. Sharing Resources

In many cases, by sharing resources municipalities can create watershed stewardship initiatives that cover larger areas, reach more people and save money. For example, it is more economical for a number of municipalities to jointly conduct a regional land survey (which can be used to help incorporate watershed needs into land use decisions) than it is for each municipality to conduct its own. As another example, a small municipality may not have the resources to hire its own agriculture fieldman (to help promote sustainable farm practices) or bylaw officer (to monitor and enforce bylaws to protect watershed

Chapter 8 - Cooperation and Collaboration in the Watershed

health), but it may have the resources to pay half of the salary of an agriculture fieldman and share him/her with a neighbouring municipality.

In terms of water services, there are many opportunities for intermunicipal cooperation that promote watershed health. By pooling funds and resources, municipalities can afford technology that provides higher water and wastewater quality than would otherwise be affordable if municipalities worked alone. These opportunities include: centralized potable water treatment with regional distribution, centralized wastewater treatment with regional collection systems and shared water treatment plant operators.

Municipal Examples

Municipal Examples: Sharing Resources

Some of these examples do not focus directly on watershed health but provide a template for similar initiatives that could be developed to protect watershed health.

City of Camrose and Camrose County - the City and County of Camrose have built a partnership where financial, educational and technical support is shared for various watershed programs. With its drinking water supply situated in the County of Camrose, the City has provided the County with financial support to conduct riparian health inventories as a tool for source water protection. There is also a joint initiative between the two municipalities for the collection of water quality samples from throughout both municipalities. Furthermore, they work together to run tours and field days that occur in the County of Camrose and to develop and implement solutions when various issues arise.

Oldman River Region Urban GIS Project - this is a project between 18 small and medium sized urban municipalities in southwestern Alberta to develop a centralized regional Geographic Information System. The project capitalizes on the efficiencies gained by sharing resources and expertise and will help municipalities improve infrastructure effectiveness, land use management and coordination when planning for growth and environmental issues. For more information visit the Municipal Excellence Network website:

http://www.menet.ab.ca/bins/view_practice.asp?pid=227.

Phone: (403)381-3033 (Town of Coalhurst's Chief Administrative Officer).

Alberta Capital Region Wastewater Commission (ACRWC) - this is a model of regional cooperation providing service to 13 municipalities in the Alberta Capital Region. Their mission is to provide safe, reliable, cost-efficient and environmentally responsible wastewater transmission and treatment service. ACRWC is governed by the MGA. Website: www.acrwc.ab.ca. Phone: (780)467-8655 (Fort Saskatchewan Office).

Sharing Staff:

- The County of St. Paul and Smoky Lake County share a Conservation Specialist (also known as Rural Extension Staff - RES) that delivers agricultural extension

Chapter 8 - Cooperation and Collaboration in the Watershed

Municipal Examples

programs throughout the two counties. Many other municipalities and organizations throughout Alberta also share RES's, which are funded by AAFRD's Alberta Environmentally Sustainable Agriculture (AESA) program. For more information about the AESA program see *Watershed Stewardship in Alberta* in Appendix B.

- **The Municipal Districts of Peace and Fairview** have a cost-share arrangement to share an agricultural fieldman. For more information visit the Municipal Excellence Network website:
http://www.menet.ab.ca/bins/view_practice.asp?pid=14.
 Phone: (780)338-3845 (M.D. of Peace's Municipal Administrator).

Municipal Government Day Program - the City of Grande Prairie has developed an annual Municipal Government Day Program. It serves to highlight the role of municipal government and to encourage a sense of pride in City staff. There are a number of events throughout the day including a friendly games competition with neighboring municipal elected officials and administration. For more information visit the Municipal Excellence Network website:
http://www.menet.ab.ca/bins/view_practice.asp?pid=561.
 Phone: (780)538-0314 (City of Grande Prairie's clerk).



More Information

More Information: Intermunicipal Agreements

Rural/Urban Cost-Sharing Tool Kit - online toolkit developed by AAMD&C and AUMA to assist municipalities with the development of cost-sharing agreements. Available online: <http://www.auma.ca/live/AUMA/Toolkits>.
 Phone: (780)955-3639 (AAMD&C) or (780)433-4431 (AUMA).

Sample Agreement - AAMD&C has available a sample agreement between two municipalities for access to liquid waste treatment facilities, owned by one municipality. The agreement provides for sharing of tax revenues to compensate for access and use.

8-1.3. Intermunicipal Bylaws

Legislation

Legislation: Under the MGA [(s.12(a))], a municipality can agree to have another municipality's bylaw apply within its boundaries.

Once a municipality has created a sound bylaw that successfully protects some aspect of watershed health (such as those discussed in Chapter 7), it can further protect the health of this shared resource by encouraging neighbouring municipalities to adopt the same bylaw. Intermunicipal bylaws can also be used to carry out policy direction from Intermunicipal Development Plans or other intermunicipal plans. Intermunicipal bylaws usually apply to shared resources such as natural areas but can impact even greater portions of the watershed by being applicable to larger areas of land in participating municipalities.

Chapter 8 - Cooperation and Collaboration in the Watershed

There are a couple restrictions of intermunicipal bylaws worth noting. The first is that all bylaws are legally required to address concerns of a local nature. Therefore municipalities must exercise caution that, while bylaws may apply across municipal borders, they must be clearly directed at local issues relevant to both municipalities. The second restriction of intermunicipal bylaws is that the MGA only addresses an agreement between two municipalities, which is not conducive to a regional approach to watershed management involving many municipalities. While a number of separate agreements can be negotiated between municipalities, ideally, all municipalities in a region would create and adopt bylaws together.

8-2 Intra-Municipal Capacity Building

Most successful municipal watershed stewardship initiatives have strong support from municipal council and from municipal administrators and staff across a number of departments. Generating this support requires building awareness and staff capacity in all departments and at all levels, from administrators to laborers to planners to councillors. It also requires creating cohesion across departments. Efforts to build support, awareness, capacity and cohesion among municipal staff and council can take a number of forms. These include:

- Creating clear policies to guide staff and ensuring that staff are aware of these policies (in some cases municipal administrators and other staff have the knowledge and/or desire to pursue watershed stewardship initiatives but lack direction or support).
- Sharing information within and across departments - keep senior staff from various departments informed about watershed initiatives occurring in other departments (e.g., hold interdepartmental meetings).
- Staff training - keep staff up to date with new information and technologies and provide them with opportunities to develop their skills and knowledge relating to watershed health (e.g., seminars run by external groups, municipal training programs and mentoring).
- Gathering input from staff - municipal employees who work closely on municipal stewardship initiatives are a valuable source of information regarding their success and challenges. Feedback from staff can be gathered through surveys, workshops or focused meetings. Involving staff in watershed decisions is also an effective means of gathering their support for watershed initiatives (e.g. teams of knowledgeable staff can be created to address watershed issues).

8-3

Community Outreach

Successful municipal watershed stewardship efforts depend on support from the community and beyond. However, attaining public acceptance for new and innovative policies, programs and initiatives is not always easy. Public education about the value of watershed health and opportunities for public involvement in stewardship efforts can be important components for gathering community support.

This section is an overview of considerations for municipalities interested in developing their own community outreach strategies, whether independently or in cooperation with another municipality or group. Before a municipality begins planning its own outreach efforts they may want to examine the many environmental education/extension programs already available throughout the NSRW (see [Watershed Stewardship in Alberta in Appendix B for a list of groups offering programs and resources](#)). Municipal outreach efforts can take many forms and include: 1) education and awareness building, 2) community programs and 3) community consultation.

Community-Based Social Marketing (CBSM)

Before discussing the opportunities for municipal outreach, there is value in first discussing the concept of community-based social marketing (CBSM). CBSM is a planned process for influencing change and can be used to inform, persuade, influence, motivate and gain acceptance. The adoption of watershed stewardship initiatives in a municipality may require changes in the attitudes and behaviors of individuals living and working in a municipality. Changing old viewpoints and habits is not always easy and municipalities may want to consider using CBSM in their outreach efforts.

There are five steps to CBSM (McKenzie-Mohr 2005):

1. Select specific behaviours that focus on change (can be repetitive or one-time behaviours).
2. Identify barriers and benefits that underlie individual behaviour choices (using literature search, observations, focus groups and surveys).
3. Develop program strategies that use “tools” for behaviour change (e.g. commitment, social diffusion, prompts, norms, communication, incentives and convenience).
4. Conduct a pilot program to test effectiveness of delivery by measuring behaviour change and/or resource use. This is critical for gathering feedback and retooling of strategies.
5. Implement a broad based program. This should only be done after a comprehensive evaluation of the pilot project has been completed.



“Municipalities must be leaders in environmental protection so individuals and businesses in the community can learn and contribute through their own actions in meaningful, coordinated ways.”

- National Guide to Sustainable Municipal Infrastructure 2003 (p10)

CBSM can be used to alleviate two types of barriers to social change:

1. **internal individual barriers** - require personal changes (e.g., lack of knowledge and understanding regarding which wastes are hazardous and why they should not be dumped down the drain)
2. **external barriers** - require structural changes that make a behavior more convenient (e.g., absence of an easily accessible facility that collects and safely disposes of household hazardous wastes)

Chapter 8 - Cooperation and Collaboration in the Watershed

More Information

More Information: Community-Based Social Marketing

Fostering Sustainable Behavior website - offers an online guide to uncovering barriers that inhibit the adoption of sustainable behaviors and provides tools for fostering and maintaining behavioral change. It also presents a number of articles, reports and cases. Website: www.cbsm.com.

Tools of Change website - offers tools, case studies and a planning guide for helping individuals take actions and adopt habits that promote health and/or are more environmentally-friendly. Website: www.toolsofchange.com

8-3.1. Education and Awareness

Education and awareness building is a fundamental component of municipal watershed stewardship initiatives and serves two important purposes. The first is to gather community and stakeholder support for municipal initiatives. A community informed about the values of a healthy watershed and about how municipal stewardship efforts will benefit their community will generally provide stronger support for municipal policies and programs.

The second purpose of education and awareness building is to change the behaviors of residents and businesses that are negatively impacting a watershed. Municipal watershed stewardship initiatives need the active support of residents and business owners and many require behavior changes in order to alleviate stresses on the watershed (e.g. water conservation, hazardous waste disposal, non-point source pollution). Effective programs for changing behaviors through education and awareness tap into self interest, provide hands-on learning tools and techniques and encourage people to share information with their neighbours.

Education Mediums

There are a number of mediums that can be used by municipalities to educate individuals about the value of watershed health and municipal stewardship initiatives and to inform individuals about how they can contribute. These are summarized in Table 8.2.

“Governments, industries and citizens must recognize the value of land and water to their province, and find ways to celebrate the importance of that natural capital.”

- Worbets & Berdahl
2003 (p15)

“Education is most effective when it is relevant to people's needs and life experience, and immediately applicable to their situation.”

- The Ag Summit
Collection of Action
Team Reports
2002b (p 30)



Photo credit:
Delaney Anderson

Chapter 8 - Cooperation and Collaboration in the Watershed

Table 8.2 Mediums for Watershed Stewardship Education

Medium for Promoting Watershed Stewardship	Examples
Printed material	• Newsletters, brochures and fact sheets (made by a municipality or another group) • Articles and advertisements in local newspapers • Information sheets mailed with municipal bills (e.g., utility bills, property taxes) • Information packages for new residents • Posters in shopping malls, libraries and other public spaces • "How to" manuals • Reports (e.g. annual municipal reports, case studies) • "Living next to nature" publications targeted at neighbourhoods that are adjacent to natural areas
Public events and programs	• Community watershed day • Stewardship awards/recognition programs • Workshops for residents, schools and businesses • Neighbourhood meetings • Tours (e.g., of natural areas, of green municipal buildings, of demonstration sites) • Involve individuals in municipal planning activities • "Living next to nature" seminars targeted at neighbourhoods that are adjacent to natural areas
Demonstration sites and information centres	• Municipal buildings that demonstrate watershed stewardship (e.g., water efficiency, landscaping that absorbs rainwater, rainwater collection for landscape irrigation, minimal impermeable surfaces) • Pilot project demonstration sites • Interpretive signs in natural areas and at demonstration sites
Use of natural areas	• Creating access and encouraging use of natural areas can help develop an appreciation for these areas
Municipal website	• Create a section about watershed stewardship • Add links to additional watershed information and resources
Radio and television ads	• Public broadcasting announcements
One on one interactions	• Take advantage of one-on-one opportunities with individuals - when individuals contact municipal staff for information, for advice or with a complaint related to watershed health, staff can provide up-to-date information on municipal watershed initiatives



Photo credit:
City of Edmonton

Chapter 8 - Cooperation and Collaboration in the Watershed

Community Education Topics

There are a variety of watershed stewardship topics that municipalities can encourage in their communities. Table 8.3 provides some examples of stewardship activities that municipalities can promote to home owners, developers, business owners and other individuals living and working within their watershed.

Table 8.3 Watershed Stewardship Topics for Community Education

Stewardship Topic	Examples of Activities
Potable water conservation	• Using water efficient appliances (e.g., dish washers, washing machines) • Using low flow fixtures (e.g. low flow toilets and showerheads, faucet aerators) • Lawn watering practices (e.g., avoid watering lawn at hottest parts of the day, avoid over watering, use drought tolerant vegetation to minimize water needs, irrigate with stored rain water) • Minimize water use in daily activities (e.g. showering, brushing teeth, washing dishes) • Encourage existing industry to adopt practices and technologies that conserve water • For information on demand management see section 5-3.1
Wastewater source protection	• Use the three Rs of pollution reduction: 1) replace the use of hazardous products with more environmentally friendly substances; 2) reduce the quantity of hazardous products bought and used; and 3) recycle hazardous wastes by returning them to the proper depots and locations, or by sharing leftovers with neighbours (National Guide to Sustainable Municipal Infrastructure 2003d) • See Section 6-3.1 for information on household hazardous waste • Change household habits (e.g., decrease the use of food waste grinders or the disposal of large quantities of cooking oil to the sewer) • Promote better practices by commercial, institutional and industrial employees working with potential wastewater contaminants



Photo credit:
David Fairless

Chapter 8 - Cooperation and Collaboration in the Watershed

Stewardship Topic	Examples of Activities
Stormwater drainage on private property	- Minimize impermeable surfaces (e.g., minimize the size of driveways and paved paths, build structures up rather than out) - Keep pollutants out of stormwater (e.g., promote BMPs for fertilizer and pesticide use, regularly check vehicles for oil leaks, use commercial car washes rather than washing cars on driveways) - Collect rainwater in rain barrels for landscape irrigation - Proper lot drainage, connection of downspouts, foundation drains and sump pumps - For information on stormwater drainage see Section 5-2
Green space stewardship	- Promote stewardship of green spaces on private and public lands - see section 6-1 - Promote stewardship of agricultural lands - see section 6-4 - Responsible pesticide use - see section 6-1.3
Municipal stewardship	- Inform individuals about municipal initiatives, plans and strategies to protect watershed health - Inform individuals about the need for changes to traditional forms of land-use planning and development and for growth management in order to protect watershed health



Chapter 8 - Cooperation and Collaboration in the Watershed

Municipal Examples

Municipal Examples: Community Education and Awareness

Brochures: Wastewater Education - The City of Edmonton has created two brochures for wastewater education entitled *Can I Send it Down the Drain?* and *Liquid Waste Disposal Sites: Where to Go and What to do with Holding Tank Wastewater*. These brochures are distributed at various open houses and events attended by the City. Available online: http://www.edmonton.ca/Environment/Wastewater_and_sewers/can%20i%20dump%20it%20down2_021.pdf and http://webdocs.edmonton.ca/Environment/Wastewater_and_sewers/liquid%20waste_03.pdf.

Website: Wastewater Source Protection - The City of Edmonton has a section on their website dedicated to waste management, which includes information about household hazardous wastes and their Eco Station. Website: http://www.edmonton.ca/for_residents/garbage_recycling/garbage1103.aspx.

Municipal Awards: Environmental Stewardship - Leduc County has created the Environmental Stewardship Awards to honour county residents, businesses and community groups that have demonstrated outstanding stewardship in the County. These awards serve not only to acknowledge the efforts of individuals but also to educate others on successful stewardship initiatives occurring in their community, initiatives that they may wish to get involved in.

Provincial and International Awards - The Town of Okotoks has received and/or been nominated for a number of environmental awards. This recognition has not only attracted national and international attention but has instilled pride among its residents. Website: <http://www.okotoks.ca/sustainable/awards.asp>.

Demonstration Site: Leadership in Energy and Environmental Design (LEED) - LEED is a program that municipalities can use to guide the development of green municipal buildings which can serve as demonstration sites for residents, businesses and industry. LEED is a voluntary standards and certification program that defines high-performance green buildings which are environmentally responsible, healthy and profitable. The certification process examines a number of sustainability measures which include site location and design, energy and water efficiency, the source and content of materials and innovation in the design process. LEED has been licensed for use in Canada by the Canada Green Building Council. Website: www.cagbc.org. Phone: (613)241-1184 (Canada Green Building Council's Ottawa office).

Municipal Success Story**The City of Camrose Teams up with Kids to
Protect their Environment**

Kids Camrose is an on-going environmental education initiative that began in 2001. It was initiated by the City of Camrose Engineering Department in response to a growing concern for the environment. The intention was to create a population of citizens aware of, concerned about and involved in the protection and preservation of their natural environment through conservation education programs. The City has targeted children in this program because they have found that when the importance of the environment is instilled in children at an early age, those children pass messages on to parents and other adults.

Background

In September of 2001, the City approached the Battle River School Division to discuss a partnership. The School Board agreed to support an environmental education program and to encourage its integration into the school environment. They hired a qualified teacher to conduct the programs who would be responsible for developing the majority of the programs with assistance from other City staff, Battle River School Division Staff and other pertinent resources.

Currently the main focuses of the programs being presented are water and waste. Water includes programs about: water treatment, water conservation, wastewater treatment, watershed protection and riparian health. Waste topics include: how waste is collected, landfill operations, recycling, reuse and reduction. The program currently targets all school grades from kindergarten to grade six with programs for grades seven to twelve in development stages.

City Contributions

Initially, the largest barrier for schools to participating in the program was the cost associated with busing students to various locations for Kids Camrose programs. In addition to covering the costs of the teacher hired to develop and conduct the programs, the City also covers busing costs. The annual cost for this bus service is equivalent to the cost of a one half page ad in the City's local paper. The City also supplies office space and all the materials necessary for the program. The budget for the Kids Camrose Program is approved each year by the City of Camrose Council.

Key to Success

In order for the Kids Camrose Program to be successful and pertinent to the students and teachers, the material presented has to be integrated directly into the school curriculum. Buy-in by the schools and local teachers has been high because the programs fit course outlines and can actually reduce the workload of teachers. Learning



Chapter 8 - Cooperation and Collaboration in the Watershed

objectives of the Kids Camrose Program are directly linked into the school learning objectives.

The program has been considered a huge success by both the City and the School Board. With the number of requests for the program increasing each year, the ability of the program to meet this demand has become a challenge. There are many possibilities for expanding this program in the future.

Contact:

Vicki Cole
Kids Camrose - Educational Promotions Coordinator
City of Camrose
Phone: (780) 672-4428



8-3.2. Community Programs

A community that is well educated about watershed issues (whether this be a result of municipal education efforts, efforts of independent groups or individual initiative) is in the perfect position to benefit from municipal programs that ensure individuals have the resources they need to adopt good stewardship practices. These programs can take many forms and are generally focused on making the adoption of stewardship activities easier for one of the following reasons:

1. **affordability** (e.g., creating opportunities for residents to purchase rain barrels at reduced costs, offering rebates for water efficient appliances)
2. **accessibility** (e.g., constructing municipal infrastructure such as eco centres that collect hazardous waste and running community activities such as toxic roundups)
3. **appeal** (e.g., community groups make watershed stewardship a social activity)



Photo credit:
Heather Landiak

Participation in these watershed programs creates a sense of community between involved individuals and can create a culture of acceptance of new stewardship behaviors. While municipal programs require funds, the money spent on these programs is often negated by savings related to watershed health.

The following are some important characteristics of successful community programs (modified from Ewaschuk 2005):

- Involve local people from the very beginning
 - individuals have to believe: that there is a problem, that their practices contribute to the problem and that they can do something to address the problem
 - develop a sense of ownership and commitment

Chapter 8 - Cooperation and Collaboration in the Watershed

- allow locals to identify problems, to develop strategies for action, and to implement plans
- Exchange information between all affected individuals and groups
- Develop mutual trust and respect between groups
 - put past disagreements and disputes aside
 - all stakeholders must be treated respectfully
 - do not single out any one group - all groups must take responsibility
- Involve all groups in decision making
- Develop new tools
- Provide economic incentives
- Address social and psychological needs
- Use a variety of educational methods (see table 8.2)
- Monitor progress - identify areas for improvement; local people and funders want to see changes and celebrate successes

**Municipal Success Story****Strathcona County Works to Promote Water Conservation**

Strathcona County has and continues to work on a number of water conservation initiatives. These initiatives are fairly low-cost and are aimed at helping residents learn the importance of water conservation and providing them with tools to reduce their current water consumption.

The County posts a bi-weekly “Water-Spot” advertisement in Strathcona County this Week (SCTW), an informative paper delivered for free to all Strathcona County residents. The water spot gives readers quick water conservation tips which they can practice at home, work and play. The advertisement also references the County’s free pamphlets: 25 things you can do to save water indoors and 25 things you can do to save water outdoors. The cost of each advertisement is approximately \$140.

From May to October the County works with local hardware stores to promote the use of sprinkler timers by placing coupons in SCTW and at participating stores. Hardware stores provide the discount and Strathcona County Utilities provide the coupons and advertising.

In 2004, along with Strathcona County’s Utility department, the Planning and Development Services department implemented a low flush toilet rebate program. Brochures, applications, web pages and newspaper ads helped to raise awareness and encourage residents to participate in the program. Successful applicants received a \$50

Chapter 8 - Cooperation and Collaboration in the Watershed

rebate from Strathcona County. The money for this program was used primarily on rebate checks. Man power and advertising costs were not significant. The Utilities department is now taking over this project.

Since 2004 the County has run an ecoscape contest to encourage low-water landscaping. Public awareness of ecoscaping practices is created through brochures, web pages, newspaper ads and articles. Entries are collected from June to September with one winner chosen monthly. Winners receive a water conservation prize pack, a gift basket from a local greenhouse, a custom-made stepping stone and an announcement in the local paper.

The County recently wrapped up a water conservation slogan campaign. Residents sent in slogan ideas to encourage water conservation in their community. The winning slogan was posted in SCTW and on the web. The winner received a water conservation package.

Contact:

Strathcona County Utilities

Phone: (780)467-7785

Email: watersaver@strathcona.ab.ca



Municipal Example

Municipal Examples: Community Programs

City of Edmonton: Partners in Parks Program - encourages community involvement in the beautification of City parks. Partners maintain flower beds, cul-de-sac islands, parkland areas and land along roadways. Activities include: planting annuals, maintaining shrub beds, eliminating weeds and removing litter from public green areas.

City of Burnaby (B.C.): Stewardship Coordinator - as part of its State of the Environment Report, the City created a stewardship coordinator position to ensure active and sustained community participation in environmental decision-making and City-sponsored environmental events (Evergreen 2001).

8-3.3. Community Consultation

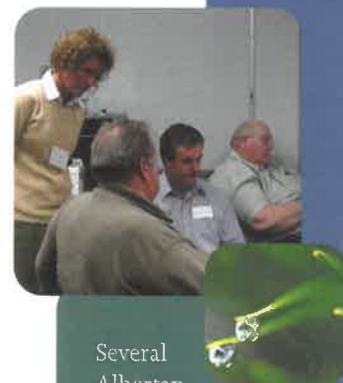
Legislation

Legislation: Under the MGA [s.636(1)], municipalities are required to provide a means for individuals who may be affected by a statutory plan (including neighbouring municipalities) to make suggestions and representations.

Community consultation is not only important for decisions about statutory plans but is also valuable for a variety of municipal decisions. In terms of watershed health, there are three major benefits of conducting comprehensive and inclusive community consultations:

Chapter 8 - Cooperation and Collaboration in the Watershed

1. **Directing municipal decisions** - Inclusive, timely and thorough community consultation is one method of ensuring that the values and wishes of individuals living and working in a municipality are well understood. Values and desires expressed during community consultations can provide municipalities with important direction for determining watershed priorities. For example they can guide decisions about land uses in areas where the land base is limited and both development and natural area protection are in demand. Municipal initiatives without clear public support are risky and can lead to significant losses in municipal dollars if lack of community support leads to their failure. Incorporating the needs, values and desires expressed during community consultations into municipal decisions is a means for developing watershed stewardship programs that will be supported by the communities they affect.
2. **Avoiding potential conflicts** - Thorough community consultation provides municipalities with the information they need to make decisions that best accommodate the values, needs and desires of all affected parties. In doing so they decrease the likelihood of conflicts arising between groups. Community consultation usually creates public dialogue which can also be a form of education for those involved and can foster understanding and even collaboration between groups that may otherwise be opposed to one another.
3. **Generating community support and building capacity** - Citizens that have played an active role in decision-making relating to watershed health have a better understanding of what is involved in decisions and may be more likely to support municipal initiatives and actively promote them.



Several Albertan municipalities have undertaken exercises to articulate a vision for future growth outside the statutory planning process.

- Mallet 2005 (p61)

There are many opportunities for municipalities to consult with individuals living and working in a municipality. The MGA requires that municipalities provide individuals that may be affected by changes to IDPs, ASPs, ARPs and land use bylaws with an opportunity to comment on them. It also stipulates that individuals living near a proposed rezoning, subdivision or development have rights of notice, hearing and appeal. In addition to consultation required under the MGA, municipalities may wish to conduct community consultations prior to making other municipal decisions impacting watershed health. Some municipalities have developed public policies that address procedures relating to community consultation. Within these policies municipalities can stipulate community consultation procedures to be followed when making decisions that may impact watershed health.

Components of Effective Community Consultation

Community consultation can take many forms and is broken down into a number of components in Table 8.4. Any combination of these components may make up a municipality's community consultation process.

Chapter 8 - Cooperation and Collaboration in the Watershed

Table 8.4 Components of Effective Community Consultation

Component	Examples
Gathering public input	• Public meetings • Open houses • Public hearings • Surveys (e.g., mail, phone)
Providing watershed related information as a primer for discussion	• Begin public meeting or open houses with presentations • Displays and handouts at public events (see Table 8.2) • Potential topics: benefits of a healthy watershed; impacts of growth and development and other activities on the watershed; current and emergent practices for minimizing negative watershed impacts (e.g., land use)
Asking the right questions	• Ask participants questions that relate to environmental health to insure that information about environmental values and desires is gathered • Hold focused discussions on: watershed health, water supply, land use, etc.
Visioning	• Focus on long-term (individuals often come to community consultations with short term issues on their minds and consequently long-term issues do not get fully addressed) • Ask participants to imagine what they want their municipality to look like in 20-40 years • Ask specific questions to ensure information about environmental values and desires are gathered (e.g., identify important natural areas and community values)

Municipal Example

Municipal Examples: Community Consultation

Town of Okotoks: “Sustainable Okotoks” Planning and Visioning Process - this comprehensive visioning process incorporates community survey feedback into the Council’s priority-setting activities. For more information visit the Municipal Excellence Network website:

http://www.menet.ab.ca/bins/view_practice.asp?pid=40.

Phone: (403)938-8900 (Town of Okotoks Municipal Manager).

Chapter 8 - Cooperation and Collaboration in the Watershed

Municipal Example

Village of Vilna: Community Visioning and Resource Team Sessions - in 2000, the Village of Vilna participated in a Community Visioning Session as a tool for developing community engagement and consensus for downtown development and reviving public spaces. For more information visit the Municipal Excellence Network website: http://www.menet.ab.ca/bins/view_practice.asp?pid=607. Phone: (780)636-3620 (Village of Vilna's CAO).

City of Edmonton: Park Plans Consultations - the City has completed the first phase of public consultation for Terwillegar Park (a large City park). Through public focus group meetings, direct email, telephone contact, open houses, questionnaires and telephone surveys, close to 1,200 citizens were engaged in a process to develop a vision for the park. Future concept and management planning will take place in consultation with public stakeholders, users and citizens. Website: www.edmonton.ca/ParksRiver/TerwillegarVisioningExecutiveSummary.pdf.

Phone: (780)496-4781 (City of Edmonton Parks Planner).

City of Calgary: imagine CALGARY - the City is leading this community owned initiative to create a long range vision for a sustainable Calgary as well as 30 year targets and strategies that support this vision. It involves: advertising, face to face visioning sessions, a Round Table comprised of nearly 40 citizen volunteers, working groups comprised of 15 - 20 experts and representatives of key organizations and institutions, advisors that will be called upon throughout the process and a mayor's panel. Website: www.imaginecalgary.ca. Phone: (403)268-4461 (Project Team).



More Information

More Information: Community Consultation

Community Consultation in the Planning and Development Process: A Guide for Edmonton (Edmonton Federation of Community Leagues 2003) - this guide speaks to everyone in the planning and development process. It provides a basic outline of Edmonton's planning process, discusses roles and expectations for all stakeholders and includes information, tools, resources and encouragement to enhance the consultation process. Website: <http://www.efcl.org/Portals/0/Resources/EFCL/Planning%20Matters/Community%20Consultation%20Guide/contents.html>. Phone: (780) 437-2913.

Environmental Advisory Committees

Municipalities may wish to create environmental advisory committees that act as a permanent vehicle for the flow of information between and among the public, municipal councils and municipal administration. These advisory committees are generally made up of a combination of citizens-at-large, municipal representatives and government and educational institution representatives. Their roles and responsibilities vary depending on municipal needs but generally include providing input on environmental policies, strategies and initiatives. Table 8.5 provides examples of the roles and responsibilities of environmental advisory committees in the City of Edmonton, Leduc County and the City of St. Albert.

Chapter 8 - Cooperation and Collaboration in the Watershed

Table 8.5 Roles and Responsibilities of Environmental Advisory Committees

Municipality	Roles and Responsibilities
City of Edmonton ¹	• Review, comment and provide input during the preparation of environmental plans • Provide a public perspective on implementation of the Environmental Strategic Plan strategies and initiatives and other emergent issues • Identify additional issues and prioritize short-term, intermediate and long-term environmental strategic initiatives • Advise on appropriate consultation between the City, the identified stakeholder groups and the community-at-large concerning environmental matters • In carrying out its responsibilities, the Committee will give due consideration to the balance between environmental, economic and social aspects
Leduc County ²	• Support, facilitate and advise Council on the achievement of the County's Environmental vision and goals • Annually review environmental issues and establish priorities • Encourage community groups and organizations working on environmental issues and objectives to be consistent with the County's • Report regularly to Council on ongoing environmental issues • Liaise with and seek the support of the other governments, agencies or the public on environmental issues as directed by Council
City of St. Albert ³	• Provide a vehicle for the flow of strategic advice and expert information between and among the public, City administration and Council, with an ongoing focus upon best practices and the development and implementation of the City's environmental policies, strategies and initiatives • Facilitate the public perspective on how particular environmental issues impact the community and other City plans, recognizing that many of the issues are of regional, national and global concern • With or without a Committee recommendation, submit semi-annual and as requested reports directly to Council further to the Committee's deliberations • Encourage a variety of views and respect the opinions and views of all Members, Interested Parties, stakeholders and the public

Chapter 8 - Cooperation and Collaboration in the Watershed

Municipality**Roles and Responsibilities**

- Make recommendations to Council on: (a) methods to be used for public consultation with identified stakeholders and the community at large with respect to environmental goals, initiatives and policies; (b) sources of funding to be pursued to support environmental initiatives; (c) partnerships with environmental interest groups, community groups, or other levels of government and (d) tools for facilitating public awareness of how particular environmental issues impact the City and the decisions made by Council
- Comment and provide input on the City's environmental policies, strategies and initiatives and on other emergent environmental issues, as requested by City administration or Council
- Identify additional issues and provide input on the priorities of the City's short-term, intermediate and long-term environmental strategic initiatives
- Advise on appropriate consultation between the City, the identified stakeholder groups and the community-at-large concerning environmental matters



- 1 For more information about the City of Edmonton's EAC visit www.edmonton.ca (click on "Environment," then "Environment" and then "Environmental Advisory Committee").
- 2 For more information about Leduc County's EAC visit <http://www.leduc-county.com/council/Committees/Environment%20Committee.html>.
- 3 For a copy of the City of St. Albert's EAC Bylaw (29/2005 sections 20-24) visit http://www.stalbert.ca/uploads/files/our_government/bylaws/Environmental_Advisory_Committee_Bylaw_292005.pdf.

More Information: Environmental Advisory Committees**Protecting Nature Close to Home: A Guide to Municipal Environmental Advisory Committees in Ontario**

- created by the Federation of Ontario Naturalists this booklet provides information on what an EAC is, what an EAC can do and the advantages of an EAC to municipal councils. Website: <http://www.ontarionature.org/>. Phone: 1-800-4402366.

Chapter 8 - Cooperation and Collaboration in the Watershed

8-4 Partnerships with Other Groups

Developing partnerships with groups already active in or around a municipality or with groups already working on watershed-related issues is often one of the most effective means for municipalities to protect watershed health. While the initial resources needed to develop and maintain these partnerships may seem onerous, the benefits often outweigh these. Benefits associated with long-term partnership approaches include (Evergreen 2004):

- Leveraging funds that are available to non-profit organizations, but would not otherwise be accessible to public agencies (e.g., from charitable foundations and corporations)
- Tapping into specialized expertise and passionate commitment via community groups and volunteers
- Preventing conflict by involving organizations and communities in the land use and development process at an early stage
- Garnering community support for green space and generating goodwill by involving the community, rather than simply responding to concerns
- Catalyzing innovation, introducing diverse perspectives and flagging new opportunities for green space acquisition and enhancement

This section provides an overview of some of the types of partnerships that can be developed to address watershed health and some strategies for success.

8-4.1. Partnership Opportunities

There are many opportunities for municipalities to join forces with other groups who are also working to protect watershed health or who stand to gain from helping a municipality achieve its watershed goals. Municipal commitment in these partnerships can range from simply promoting another group's initiative, to working directly with a group to develop and implement an initiative, to heading an independent initiative with minor support from another group. There are a number of groups municipalities can work with which are presented in Table 8.6 along with some examples of partnerships with these groups. There are many partnership possibilities in addition to those listed in Table 8.6 and municipalities must explore opportunities for creative partnerships that fit their unique needs.



Photo credit:
City of Edmonton

Municipalities can benefit from partnerships with companies that own undeveloped lands. For example, a company may be willing to conserve natural areas for their watershed values in return for recognition for their contributions to the environmental health of a community.

“...when managed well, partnerships have the potential to yield a significant return - in the form of efficiency, community empowerment and green space protection - on the municipality's initial investment of time, energy and funds.”
- Evergreen 2004 (p26)

Chapter 8 - Cooperation and Collaboration in the Watershed

Table 8.6 Partnership Opportunities by Sector

Sector	Partnership Examples
Community Groups	• Potential partners: watershed stewardship groups, schoolyard naturalization groups, residents associations, community associations, environmental advocacy groups and local planning organizations • Roles of municipality: project funding, technical assistance, labour and supplies • Roles of community groups (Mallet 2005): investigating neighbourhood planning issues and concerns; gathering information; monitoring development initiatives; setting up meetings, public forums and consultations; surveying the membership to develop a group position on a development proposal; and representing the group in discussions with developers and the municipality • Municipalities may hire a municipal stewardship groups coordinator that knows who and where stewardship groups are (could be shared with neighbouring municipalities) • See Watershed Stewardship in Alberta in Appendix B for information about community groups active in the NSRW
Industry, Commerce and Agriculture	• Potential partners: individual businesses, developers, Economic Development Board, Chamber of Commerce, agriculture organizations, industry groups and individuals • Municipalities may offer grants to industry, businesses, developers or farmers demonstrating watershed stewardship (e.g., wise water use) • Municipalities may work with these partners to develop a long term sustainable land use policy and regulation framework • Municipalities may create partnerships to share environmental monitoring responsibilities with those whom are being monitored (e.g., wastewater monitoring) • Landowners of industrial lands may agree to conserve lands that are in a natural state and to permit public access (can be in exchange for municipality being liable for accidents occurring on the land) • See Watershed Stewardship in Alberta in Appendix B for information about agriculture and industry groups active in the NSRW



Chapter 8 - Cooperation and Collaboration in the Watershed

Sector	Partnership Examples
Non Government Organizations (NGOs)	• Potential partners: watershed planning and advisory councils (WPACs) and regional, provincial, national and international groups • Municipalities can promote stewardship programs run by NGOs and provide them with project funding, technical assistance, labour and supplies • Municipalities can participate in the creation of an Integrated Watershed Management Plan for the NSRW (see Chapter 2) • See Watershed Stewardship in Alberta in Appendix B for information about NGOs active in the NSRW
Government Bodies	• Potential partners: federal and provincial government departments • See Watershed Stewardship in Alberta in Appendix B for information about government departments involved in watershed stewardship and the resources and programs offered by them

Municipal Success Story**Municipalities Support the Creation of a Centennial Atlas**

A number of municipalities in Alberta's capital region are involved in a project to create a Centennial Atlas for the Alberta Capital Region. Information is being gathered from residents throughout the region to create greenmaps that identify environmentally and culturally significant features of the area. The project's goal is to produce an interactive website, a printed atlas and an educational CD by mid 2006.

The Centennial Atlas Project is the result of a unique partnership between the Province of Alberta, the City of Edmonton, Area Councils Edmonton Society, the Federation of Alberta Naturalists and the Green Map System. The project is guided by a management committee made up of representatives from these groups.

Municipal Involvement

The City of Edmonton has taken an active role in this project since its beginning. In 2003 the City's approval and support for Phase I of the project was an important factor leading to the creation of a green map for a portion of South East Edmonton (<http://www.ecrcm.fanweb.ca/>).

Chapter 8 - Cooperation and Collaboration in the Watershed

Since the completion of Phase I, the project has evolved to the larger capital region and has the support of the 23 municipalities that make up the Alberta Capital Region Alliance. These include the Counties of Sturgeon, Leduc, Parkland and Strathcona and all the towns and villages encompassed in this area.

Public Outreach

Not only will the Centennial Atlas be a valuable resource for municipal planning, but it is a means of creating awareness and appreciation for natural areas. The process of gathering data for the atlas is a creative way of engaging citizens in identifying important ecological areas. With support from schools, community groups and special interest groups, the project is a means of getting people together to discuss environmental issues.

Resources Required

The design and implementation of the project has been lead by a team consisting of a project coordinator, GIS specialist, Web coordinator, educational consultant, Atlas Committee, historical coordinator and management committee. Project staff includes one project coordinator, one part-time GIS coordinator and one part-time website coordinator. The project also receives thousands of dollars of service-in-kind from supporters and volunteers. The budget for the project is: Phase 1 - \$22,000; Phase 2 - \$71,000.00; and Phase 3 - \$130,000.00.

Contact Information

Bob Gerlock, Project Coordinator
Email: rgerlock@interbaun.com
Website: www.capmap.fanweb.ca



Chapter 8 - Cooperation and Collaboration in the Watershed

Municipal Success Story

The Strawberry Plains Water Management Project: MD of Wainwright Works with Local Grazing Association

In 2002 the Strawberry Plains Grazing Association was alerted by the results of a riparian health assessment conducted along the Battle River in their area. They decided that a plan was needed to lessen the impact grazing was having on riparian areas by creating permanent watering sources off of the river. The Association organized a meeting with the Western Area Training Centre (WATC), Public Lands, PFRA and the MD of Wainwright to propose a partnership and from this meeting the Strawberry Plains Water Management Project was born.

The project began in the spring of 2003 with the completion of four spring and well developments, with an additional five completed in the fall of 2005. These were constructed for the Strawberry Plains Grazing Association and South Park Grazing Association.

Who is Involved?

There are a number of groups involved in the Strawberry Plains Water Management Project, all of which have provided important inputs for the project. Public Lands, PFRA and WATC all provided environmental approvals that were required for the project. Other inputs included:

- Strawberry Plains Grazing Association - completed the research required for the projects and spoke with the local alternative watering systems dealer (Kelln Solar) about their requirements. Members of the association completed each site based on their past experiences and knowledge.
- PFRA (Vegreville) - provided information on watering site development to help ensure the proper construction of the sites
- Kelln Solar - provided information and helped construct the watering sites
- Western Area Training Centre - completed the Environmental Assessment for the proposed sites
- MD of Wainwright - Public Lands department was consulted on the placement of the water sites

Resources

The total cost of the projects was \$83,400. Labor costs were saved by having the projects constructed by the members of the associations. It took four days with twelve people to develop the first four sites and roughly thirteen people to complete the second five project sites. Financial assistance for the project was accessed through the MD of Wainwright from an application to the Rural Water Development Program under the Sustainable Land Initiative.



Photo credit:
Delaney Anderson

Chapter 8 - Cooperation and Collaboration in the Watershed

Contact:

Judy Fenton,
Strawberry Plains Grazing Association Member
Phone: (780) 754-2257

Somerlee Bennett
MD of Wainwright
Phone: (780) 842-4454.

**Municipal Success Story**

Water's Edge Resource Group: Working Together to Create a Resource for Rural Landowners

Water's Edge Resource Group (WERG) is a local group working cooperatively with the people of Barrhead, Lac Ste. Anne and Westlock. The group was formed in 1997 to address problems relating to the overwhelming number of agencies that individuals in the area had to deal with to get answers to questions relating to riparian issues. The group's mission statement is: linking knowledge with practical application to create awareness of healthy riparian areas-the transition zone between land and water.

Groups Involved

WERG is made up of the County of Barrhead, Lac Ste. Anne County, PFRA, Agriculture Food and Rural Development, Public Lands, Alberta Sustainable Resource Development, Fish and Wildlife, Barrhead Fish and Game, Alberta Conservation Association and the Gateway Research Organization. Since their creation, the group has been joined by Cows and Fish, Alberta Environment and the Department of Fisheries and Oceans.

Partnership Need

Prior to WERG's formation, members of the group were fielding many questions from landowners in the area that related to riparian health. In many cases groups were contacted with questions that were outside of their area of expertise and their reaction was to refer individuals to another group. In many cases, finding an answer to an individual's question required the amalgamation of knowledge, resources, ideas and funding from a number of groups. Individuals were finding that getting answers to their questions or solutions to their problems was difficult because there were too many agencies to deal with.

Each of the groups participating in WERG understood that they each had knowledge and/or resources to contribute to riparian-related questions. Some were knowledgeable about local conditions, others knew about legislation while others knew of possible funding sources. WERG was developed to make finding answers a one stop shop. When

Chapter 8 - Cooperation and Collaboration in the Watershed



Thunder Lake was the site of WERG's first project

a client calls, the group now serves to offer him/her help without just passing him/her along to another person. The group makes suggestions only and the landowner must decide which suggestions will work for them.

Successes

All of the groups involved have gained from their participating in WERG. By organizing themselves as a group they now have a better understanding as to what each group does and are in constant contact with one another. WERG has successfully hosted many seminars and Lake Day Tours and has provided class room instruction on a number of occasions. At the moment they are working on a Lake Specific Brochure.

Contact:

Marilyn Flock
Agricultural Fieldman
County of Barrhead
Phone: 780-674-3331
Email: marilyn@phrd.ab.ca

Municipal Success Story

Flagstaff County Helps Local Stewardship Efforts Thrive

The Iron Creek Watershed Improvement Society (ICWIS) is a local group working to promote watershed health in the Iron Creek Subwatershed, which covers 72% of Flagstaff County. The success of the ICWIS has been the result of the determination of the group and the support of many groups and organizations, including that of Flagstaff County.

In 2001, with help from an Alberta Beef representative, a group of producers concerned about the health of their local watershed got together with Flagstaff County's agriculture fieldman and the ICWIS was formed. Shortly after this meeting Flagstaff County agreed to provide ICWIS with \$2,000 in seed money and the assistance of their agriculture fieldman. This relatively small contribution was the catalyst for many successes to come.



The initial \$2,000 seed money from the county was a source of empowerment for the group. It was enough to cover their initial administrative costs and get them on their way to securing additional funding and creating partnerships with a number of other groups, which include: Alberta Beef Producers, Cows and Fish, PFRA, Ducks Unlimited, AESA, Alberta Conservation, DFO and the Battle River Community Foundation.

Chapter 8 - Cooperation and Collaboration in the Watershed

Flagstaff County has continued to provide the group with \$2,000 annually and with the help of their AESA technician. This dependable source of funding and support has been essential to the success of the ICWIS as other sources of funding are often unreliable.

Benefits of the Partnership

The benefits to Flagstaff County for supporting ICWIS have been immense. With relatively little cost to the county, ICWIS has promoted watershed health and has created awareness among those who live and work in the watershed of the effects local actions have on the health of the environment, the community and livestock. With the help of many partners, the ICWIS has organized suppers to raise awareness of watershed issues, conducted riparian health assessments, held workshops for producers, planted trees in riparian areas and promoted the use of solar powered water pumping systems (by loaning one to individuals). Because their message comes from local residents and producers its impact may be more effective than had it been part of a county-run outreach program.

Contact:

Don Ruzicka
ICWIS President
Phone: (780)385-3525
Email: ruzickadon@hotmail.com



More Information

More Information: Community Stewardship Groups

Community Watershed Toolkit For the North Saskatchewan Watershed (North Saskatchewan Watershed Alliance 2005) - summarizes everything needed for community stewardship from forming a watershed stewardship group through to organizing local stewardship activities. Website: www.nswa.ab.ca.
Phone: (780)496-5577.

Keeping it Green: A Citizen's Guide to Urban Land Protection (Evergreen 2005) - guide for citizens and community groups looking for consensus-based approaches to protecting threatened landscapes in urban and urbanizing areas. Available online: <http://www.evergreen.ca/en/cg/keepingitgreen.pdf>.
Phone: (604)689-0766.

No Plot Is Too Small: A Community's Guide to Restoring Public Landscapes (Evergreen 2000) - available online at <http://www.evergreen.ca/en/cg/resources/noplot/index.html>.
Phone: 1-888-426-3138.

Voluntary Sector Initiative (VSI) - an undertaking between the Government of Canada and the voluntary sector to enhance their relationship and strengthen the voluntary sector's capacity. Over the five year initiative issues being addressed include: funding practices, policy dialogue, technology, volunteerism and research about the sector. Website: <http://www.vsi-isbc.org/eng/index.cfm>.
Phone: 1-800 821-8814.

Chapter 8 - Cooperation and Collaboration in the Watershed

Municipal Example

Municipal Examples: Partnerships

City of Vancouver - provides funding for community-based greening initiatives through a neighbourhood matching funds program. Website: <http://vancouver.ca/parks/arts/nmf/index.htm>. Phone: (604) 257-8495.

Alberta Water Quality Awareness (AWQA) Day - held for the first time in the summer of 2005. AWQA day offers Albertans the opportunity to learn about their watersheds by actively testing the quality of the rivers and stream in their communities. The initiative was a joint effort between the federal and provincial governments, NGOs and industry. By promoting participation in the program municipalities can help to educate their communities about watershed health. Staff from Brazeau County was very involved in the AWQA Day program in 2005 and collected water quality samples from 50 sites along the major and minor tributaries in their county. They used the program to create a snapshot of water quality in their sub-watershed and their innovation and enthusiasm helped build awareness about water in the County. Website: www.awqa.ca.

8-4.2. Tips for Creating Effective Partnerships

Creating and maintaining successful partnerships requires the active participation of all partners involved. In a nation-wide survey of large urban municipalities conducted by Evergreen in 2001 (Evergreen 2004)² they found that effective partnerships require:

1. Support at Every Level:

- Municipal staff in every department who are aware of the benefits of partnerships, and well informed about the process of partnership-making
- A supportive and informed council that appreciates the benefits of partnerships
- A formalized set of guidelines for partnerships, articulating the benefits, challenges and means of forging partnerships for green space
- A well-established proactive framework for working with partners, such that each new partnership requires less in terms of research and the development of memoranda of understanding than when undertaken on an ad hoc basis
- A willingness to dedicate staff time to working with partners throughout the life of a partnership
- Inclusion of elements in official municipal policies and documents such as an official plan, zoning and green space strategies that identify partnerships as a key means by which to achieve greater success

2. Communication

- Open and regular communication among partners regarding expectations, developments and changing commitments or capacities
- Communication about partnerships with stakeholder communities and the public

² Evergreen's research was specifically focused on green space preservation and stewardship but their findings are relevant to many aspects of watershed stewardship.

Chapter 8 - Cooperation and Collaboration in the Watershed

3. Clear Roles and Expectations

- Defined through, for example, a formal memorandum or letter of understanding that specify agreed-upon rights, responsibilities, assumption of risk and general contributions of each party



8-5

Dispute Resolution

Legislation

Legislation: The MGA (s.690) stipulates that when a municipality believes that a statutory plan or a land use bylaw (or amendments to these) adopted by an adjacent municipality may be detrimental to it, the municipalities involved must attempt mediation before the Municipal Government Board can hear the matter. Furthermore, an IDP must include a procedure to resolve or attempt to resolve any conflict between municipalities that have adopted the plan [MGA 692(2)(b)].

Protecting watershed health requires the support and active participation of a very large and very diverse group of stakeholders. Consequently, it is almost inevitable that there will be diverse and often conflicting opinions in regards to the most effective way to protect watershed health and even regarding the level of effort that should be made in this regard. In some cases one group may be outright opposed to another group's ideas or efforts. Table 8.7 lists some common causes of municipal disputes, all of which may interrupt municipal watershed stewardship efforts.

The best way to address disputes is to avoid them. Many of the methods for preventing disputes are discussed throughout this guide and include: maintaining open lines of communication, developing positive relationships and involving various stakeholders in decisions.

However, while municipalities can do a lot to avoid disputes many are inevitable. For those that are unavoidable, there are a number of resources available to municipalities, which include:

Let's Resolve: the Municipal Dispute Resolution Initiative - program offered by the Municipal Dispute Resolution Services of Alberta Municipal Affairs. This program provides mediation and dispute resolution support to municipalities who want to improve how they deal with conflict. There are a number of courses offered, which include: Resolving Difficult Issues, Negotiating Effectively, Manager as Mediator, Public Involvement and Facilitation. Alberta Municipal Affairs also offers financial assistance to municipalities who use the Municipal Dispute Resolution Initiative to assist them in dealing with disputes. Website:

<http://municipalaffairs.gov.ab.ca/ms/mediation/index.html>. Phone: (780)422-8848 (Edmonton office).

Chapter 8 - Cooperation and Collaboration in the Watershed

Table 8.7 Common Causes of Municipal Disputes

Type of Dispute	Common Causes
Intermunicipal (taken from Municipal Dispute Resolution Services website)	• Annexation • Land use planning • Cost sharing • Service provisions (e.g. water and wastewater services)
Intra-Council (taken from AAMD&C 2000)	• Lack of a common vision for the municipality • Poor or nonexistent land use planning • Unclear policy or inconsistent application of policy • Poor or unclear decision making process • Poor inter personal relationships
Local Disputes (taken from Municipal Dispute Resolution Services website)	• New policy or new or revised bylaws that upset ratepayers • Uncertainty about how and when to conduct public participation activities • Land use planning - changes to zoning bylaws and development plans • Opposing views between individual council members or administration regarding policy implementation or the delivery of municipal services • Disagreements between the municipality and the service provider over the quality or timing of the services or goods provided

For an overview of the program see The Municipal Dispute Resolution Initiative: Five years of resolving disputes together (Alberta Municipal Affairs 2005). This document also identifies current trends in municipal dispute resolution. Available online: <http://municipalaffairs.gov.ab.ca/ms/mediation/who/pdfs/Muni5yrReport.pdf>.

Municipal Affairs website - contains materials on dispute resolution. Assistance is available from Municipal Affairs where parties are considering hiring a mediator. Website: <http://www.municipalaffairs.gov.ab.ca/ms/mediation/index.html>.

AAMD&C Advisory Committee on Council Conflict Resolution Final Report (AAMD&C 2000) - identifies the most common sources of intra-council conflict and summarizes best practices for minimizing these. Available online: <http://www.aamdc.com/>.

Alberta Court of Queen's Bench - Civil Mediation Program Roster. Available online: <http://www.albertacourts.ab.ca/CourtOfQueensBench/CivilMediationProgram/tabid/74/Default.aspx>

Chapter 8 - Cooperation and Collaboration in the Watershed

Municipal Example

Municipal Example: Alternative Dispute Resolution (ADR)

A Process for Resolving Intermunicipal Planning Issues - together the City of Edmonton, Sturgeon County, Town of Morinville, City of St. Albert and Municipal Affairs developed an ADR system for identifying and resolving intermunicipal disputes. The primary focus of the system is intermunicipal land use planning related disputes, but it is anticipated to be applicable or adaptable to other types of disputes. Available online: http://www.edmonton.ca/city_government/documents/InfraPlan/Intermunicipal_Plan.pdf.



Chapter 8 - Cooperation and Collaboration in the Watershed

While municipal budgets may be a limiting factor in what municipalities can and cannot do, there are many affordable opportunities for municipal watershed stewardship. First off, it is important to note that in many cases municipalities do not need extra funding for these initiatives. The long-term savings and/or profits of watershed initiatives often pay for themselves. For example:

- Programs to decrease non-point source pollution in water sources saves money that would need to be spent on water treatment
- Existing functioning wetlands that are incorporated into stormwater systems can provide many of the same water filtering processes provided by expensive stormwater treatment infrastructure
- Water conservation saves costs associated with the treatment, distribution and storage of potable water and wastewater
- Natural area conservation saves money that may otherwise be needed for drainage infrastructure and/or flood mitigation
- **Green cluster development** is characterized by high density developments, which are generally less costly to service than low density developments
- Infill development (which can be used to preserve natural areas at the urban fringe) can minimize development costs when already existing infrastructure is used
- Attractive green spaces and overall environmental health can draw potential residents and businesses to a community
- The costs of development and ongoing services are often less for municipal buildings and property that incorporate green technologies
- See Chapter 2 for more examples of the economic benefits associated with watershed health

While net economic gains associated with municipal watershed initiatives are often significant, most successful watershed stewardship initiatives require an initial investment and many require ongoing financial support. There are two main sources of funding for municipal stewardship initiatives: 1) allocating municipal funds and 2) attaining external funds.



Evergreen conducted a nation-wide survey of large urban municipalities in 2001. The most frequently mentioned areas of need related to the challenge of doing more with less was providing sufficient high quality green space using limited financial resources.

- Evergreen 2004

Chapter 9 - Funding Watershed Stewardship

9-1 Allocating Municipal Funds

Municipal funds are an important source of funding for watershed stewardship initiatives. Not only is allocating funds to these initiatives important for municipalities to demonstrate their commitment but it is often a requirement of funders that offer matching grants. Property taxes are the most obvious source of municipal funding but they are not the only mechanism that can be used to generate municipal funds for watershed stewardship initiatives. The following are some alternative mechanisms that can be used to fund municipal infrastructure and services (adapted from National Guide to Sustainable Municipal Infrastructure 2002a). Many of these can be used to protect green infrastructure, to build infrastructure and to develop services to help protect watershed health.

- **Special levies** - can be used to generate municipal funding to cover a new service not traditionally covered by the general tax base or a specific service offered to only a portion of the community.
- **Development fees** (lot levies) - can be used by municipalities as a tool for the delivery of infrastructure that suits the community's vision (which may include environmental health) and to influence development in accordance with the community's strategic planning and economic goals. Development fees may apply to sewage treatment, water services, drainage and parkland acquisition and improvement.
- **Utility models** - user fees can be charged for municipal services such as water and wastewater services, stormwater management and solid waste management. These fees can serve both to create municipal revenue that can be used to improve municipal services and to promote activities that support environmental health (e.g. water fees based on the quantity of water used can be a source of funding for new wastewater treatment technologies and can promote water conservation among users).
- **Strategic budget allocations** - moneys collected from a portion of the tax bill or a portion of a rate bill are set aside into a special fund, which is invested and the interest earned is reinvested. The goal is to have a special fund for future needs (e.g., watershed stewardship initiatives). In some cases the fund will generate net revenues and in other cases net savings.

Chapter 9 - Funding Watershed Stewardship

More Information

More Information: Municipal Funding

National Guide to Sustainable Municipal Infrastructure - best practices relating to funding for municipal infrastructure. Available online:
http://www.sustainablecommunities.fcm.ca/Infraguide/Decision_Making_and_Investment_Planning.asp.

- Alternative Funding Mechanisms (2003) - presents eight approaches to funding infrastructure beyond property taxes
- Dedicated Funding (2004) - an overview for developing methodologies and applications of dedicated funding mechanisms for potable water, wastewater, storm water and road infrastructure



9-2

Seeking External Funds

Funding opportunities for municipal watershed stewardship initiatives are available from a variety of external sources. These include funds specifically available to municipalities as well as more general funds available to a variety of groups working on stewardship-related initiatives.

NOTE: This section provides a snapshot of some of the funding opportunities available to municipalities and community groups at the time in which this guide was written. Funding opportunities are always changing as new opportunities emerge and old opportunities terminate.

Grants Available for Municipal Initiatives

There are a number of formal funding opportunities specifically available to municipalities which can be used to fund initiatives with watershed components (Table 9.1).

Chapter 9 – Funding Watershed Stewardship

Table 9.1 Sources of Funding for Municipal Watershed Initiatives

Issue	Fund	Description
Air, Water and Soil Quality	Green Municipal Fund (GMF) - provided by the Government of Canada - administered by the Federation of Canadian Municipalities' Centre for Sustainable Community Development	- GMF is a \$550 million endowment to stimulate environmental projects by municipal governments and their partners that generate measurable environmental, economic and social benefits - Supports partnerships, leveraging both public and private sector funding to encourage municipal actions to improve air, water and soil quality and to reduce greenhouse gas emissions - Grants are available for feasibility studies, field tests or planning initiatives and range to up to 50% of a study to a maximum of \$350,000 - For capital implementation projects Request for Proposals (RFPs) are conducted once a year - Website: http://www.sustainablecommunities.fcm.ca/GMF/ Phone: (613)241-5221 ext. 357 (Application Coordinator)
Water/Wastewater Systems	Alberta Municipal Water/Wastewater Partnership provided by and administered by Alberta Infrastructure and Transportation	- Provides financial assistance for municipal water supply/treatment and wastewater treatment/disposal projects - Available to: cities (under 45,000 population), towns, villages, summer villages, regional commissions and eligible hamlets within rural municipalities - Website: http://www.transportation.alberta.ca/2719.htm. Phone: Alberta Infrastructure and Transportation at (780)674-8221 (Barrhead) or (403)340-5166 (Red Deer)

Chapter 9 - Funding Watershed Stewardship

Issue	Fund	Description
Core Municipal Infrastructure	Alberta Municipal Infrastructure Program provided by and administered by Alberta Infrastructure and Transportation	- Provides financial assistance for Capital Infrastructure projects, such as: municipal roads, bridges, public transit vehicles and facilities, water and wastewater systems and facilities, storm drainage systems and facilities, infrastructure management system software, cultural and recreational facilities, community environmental and energy systems and facilities, solid waste management systems and facilities, municipal buildings and other municipal physical infrastructure - Available to: cities, towns, villages, summer villages, municipal districts, specialized municipalities, improvement districts and special areas - Website: http://www.transportation.alberta.ca/2719.htm. Phone: Alberta Infrastructure and Transportation at (780)674-8221 (Barrhead) or (403)340-5166 (Red Deer)
Sustainable Core Municipal Infrastructure	New Deal for Cities and Communities provided by and administered by Alberta Infrastructure and Transportation	- Provides financial assistance for Sustainable Capital Municipal Infrastructure in support of the desired outcomes of cleaner air and water and the reduction of greenhouse gases - Eligible projects include: public transit, water and wastewater, solid waste, community energy systems and rehabilitation of roads and bridges - Available to: cities, towns, villages, summer villages, municipal districts, specialized municipalities, improvement districts and special areas - Website: http://www.transportation.alberta.ca/536.htm. Phone: Alberta Infrastructure and Transportation at (780)674-8221 (Barrhead) or (403)340-5166 (Red Deer)

Chapter 9 - Funding Watershed Stewardship

Issue	Fund	Description
Transportation Infrastructure	Various grants available provided by and administered by Alberta Infrastructure and Transportation	- Many grants are available to all types of municipalities for transportation capital projects and maintenance - Website: http://www.transportation.alberta.ca/527.htm. Phone: Alberta Infrastructure and Transportation at (780)674-8221 (Barrhead) or (403)340-5166 (Red Deer)
Municipal governance, administration, and services Intermunicipal cooperation	Municipal Sponsorship Program provided by and administered by Alberta Municipal Affairs	- Promotes innovation, cooperation and excellence in municipal practices by funding projects that improve municipal governance or administration, enhance municipal services or service delivery and/or increase intermunicipal cooperation - Phone: (780)427-2225 (Alberta Municipal Affairs' Grants and Administration Unit)
Open	Unconditional Municipal Grant Program provided by and administered by Alberta Municipal Affairs	- Provides unconditional grants to municipalities, improvement districts and Special Areas - Recipients may spend funds in any manner they wish - No municipal applications are required - the formulas used to distribute the grants are based on allocations made according to the 1994 business plan - Phone: (780)427-2225 (Alberta Municipal Affairs' Grants and Administration Unit)
Regional Partnerships	Regional Partnerships Initiative provided and administered by Alberta Municipal Affairs	- Encourages three or more municipalities to jointly explore and implement regional identities and arrangements that work for them - Municipalities are encouraged to explore and develop partnerships that benefit their operations and residents as well as business and industry - Phone: (780)427-2225 (Alberta Municipal Affairs' Grants and Administration Unit)

Chapter 9 - Funding Watershed Stewardship

Issue	Fund	Description
Surface Water Problems and Erosion Control	Alberta Water Management and Erosion Control Program (AWMEC) administered by: the Natural Resources Service of Alberta Environment	- Intended to assist Local Authorities to resolve surface water management and erosion control problems - Municipalities can receive advice and financial assistance for the design and construction of projects that correct problems caused by surface water - Website: http://www3.gov.ab.ca/env/water/Reports/AWMEC.pdf. Phone: an Alberta Environment Regional Manager at 780-963-6131 ext.258 (Northern East Slopes), 780-427-7033 (Northeast) or 403-340-7660 (Parkland)

Funding Available for Stewardship Initiatives

There is a diversity of funding available for watershed stewardship initiatives. Some of these are available directly to municipalities and others are only available to non-government groups or individuals. In cases where funds are not directly available to municipalities, community groups may be able to attain these funds to help them carry out watershed initiatives that contribute to a municipality's watershed health. By partnering with non-government groups a municipality can gain indirect access to funds that are not directly available to them.

The following is a list of website resources for finding funding opportunities that are compatible with municipal and community desires and initiatives (as adapted from Alberta Environment 2005d and Primeau 2005).

- **Fundraising Opportunities for Watershed Stewardship Groups in Alberta** - this list was created by Alberta Environment for organizations involved in environmental and watershed protection and some of these funding opportunities are available directly to municipalities. Also available online: <http://www.landstewardship.org/documents/ABFundsforWatershedGroups.pdf> (Land Stewardship Centre of Canada).
- **BIG Database Canada** - this is an on-line resource that allows fundraisers to search through lists of private funders and foundations. There is a fee to join and search. <http://www.bigdatabase.ca>
- **Canadian Community Monitoring Network** - contains many tools and resources, including a document on fundraising, with links to funders. http://www.ccmn.ca/english/library/bridge_funding/bridge_funding_summ.html

Chapter 9 - Funding Watershed Stewardship

- **Canadian Environmental Grants Network** - offers many resources and a searchable on-line database. <http://www.cegn.org/grantmaking/dbintro.html>
- **Environmental Assistance Directory, Alberta Agriculture** - a list of funders compiled in 2002. [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/aesa6464?opendocument](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/aesa6464?opendocument)
- **Green Source, EcoAction 2000** - Environment Canada's Green Source Resource Guide. http://www.ec.gc.ca/ecoaction/grnsrc/index_e.cfm
- **Stewardship Canada** - Searchable grant/funder database found under the Stewardship Directories Tab.
<http://www.stewardshipcanada.ca/stewardshipcanada/home/scnIndex.asp>
- **A Guide to Alberta Programs, Grants and Organizations Relevant to Natural Diversity, Wetlands, Watershed, Wildlife and Habitat** (2002) - prepared for the North American Waterfowl Management Plan, by the Land Stewardship Centre of Canada. Available on-line:
<http://www.landstewardship.org/aguidetoalbertaprogramsgrantsandorg.doc>.
Phone: (780) 483-1885 (Land Stewardship Centre of Canada).
- **The Canadian Directory to Foundations and Corporations** - produced by Imagine Canada (formerly the Canadian Centre for Philanthropy), a registered charity that supports Canada's charities, nonprofit organizations, and socially conscious businesses. For a fee, you can access their on-line directory and search for thousands of foundations and corporations that offer support to organizations. To order visit www.imaginecanada.ca or call 1-800-263-1178 or 416-597-2293 x. 221

Developing Partnerships

In addition to the formal funding opportunities referred to in this chapter, municipalities can seek opportunities for partnering with neighbouring municipalities, industry and community groups to decrease the cost of watershed initiatives. These partnerships can take many forms and include sharing resources with other municipalities, cost sharing with industry, receiving volunteer labour and local knowledge from community groups and accepting sponsorship from businesses. *See Chapter 8 for more information on opportunities to collaborate with these groups.*

Disclaimer:

This Appendix summarizes federal and provincial legislation and policies pertaining to watershed health. The information in this document is subject to change as laws and government policies are amended and changed. This appendix is not intended to provide legal advice but it is to serve as an introduction to law and policies that municipalities may want to familiarize themselves with. It is the responsibility of readers to consult the appropriate documents (e.g. acts, regulations, policies) and seek legal advice where needed. In the event of conflict between this guide and any legislation, it is the user's responsibility to interpret and act in compliance with legislation.



A-1

Federal Legislation

A-1.1. Canada National Parks Act

Responsible Minister: Environment

Administered by: Parks Canada Agency

Description:

Under the *Canada National Parks Act*, a national park can be established for the following purpose: to be dedicated to the people of Canada for their benefit, education and enjoyment and shall be maintained and made use of so as to leave them unimpaired for the enjoyment of future generations (s.4(1)).

Under this Act the minister is responsible for the administration, management and control of parks [s.8(1)]. In terms of their management, the Act states that the Minister's first priority shall be the maintenance or restoration of ecological integrity, through the protection of natural resources and natural processes [s.8(2)]. The minister is also required to prepare a management plan for the park containing a long-term ecological vision for the park, a set of ecological integrity objectives and indicators and provisions for resource protection and restoration [s.11(1)].

Under this Act the Governor in Council may make regulations for parks on a number of issues relating to watershed health, which include [s.16(1)]:

- The preservation, control and management of parks
- The protection of soil, water and natural features
- The management and regulation of fishing
- The prevention and remedying of any obstruction or pollution of waterways

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

- The restriction or prohibition of activities
- The control of the use of park resources and facilities and the operations of water and sewage works

National Parks in the North Saskatchewan Watershed include: Elk Island National Park, Jasper National Park and Banff National Park (only a small portion of Jasper and Banff National Parks are within NSRW).

More
Information

More Information:

For a copy of this Act visit the Department of Justice Canada's website at <http://laws.justice.gc.ca/>.

A-1.2. Canada Water Act

Responsible Minister: Environment

Administered by: Environment Canada

Description:

The *Canada Water Act*, first passed in 1970, is aimed at ensuring that water issues of national significance are conserved, developed and managed. The *Canada Water Act* is divided into four parts (as outlined by Environment Canada 2002a):

- **Part I: Comprehensive Water Resource Management** - enables the Minister of the Environment, with Governor in Council approval, to establish consultative arrangements with provinces on water resource matters, and to conclude federal-provincial water resource agreements for planning and implementation programs in any waters where there is a significant national interest in water resource management. It also permits the Minister, directly or in co-operation with any provincial government, institution, or person, to establish an inventory of those waters, collect data and conduct research associated with water resources.
- **Part II: Water Quality Management** - enables the Minister, with Governor in Council approval, to conclude agreements with provinces for the joint designation of water quality management areas for federal waters or for any other waters where water quality management has become a matter of urgent national concern.
- **Part III: Nutrients** - repealed.
- **Part IV: General** - contains provisions on general administration and enforcement, and allows the Minister to establish advisory committees and undertake public information programs. An annual report to Parliament on activities under the Act is also required.

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

More
InformationMore Information:

For a copy of this Act visit the Department of Justice Canada's website at <http://laws.justice.gc.ca/>.

A-1.3. Canada Wildlife Act

Responsible Minister: Environment

Administered by: Canadian Wildlife Service (under the authority of Environment Canada)

Description:

Under the *Canada Wildlife Act* the minister is authorized to (s.3):

- a) Undertake, promote and recommend measures for the encouragement of public cooperation in wildlife conservation and interpretation
- b) Initiate conferences and meetings respecting wildlife research, conservation and interpretation
- c) Undertake programs for wildlife research and investigation, and establish and maintain laboratories and other necessary facilities for that purpose
- d) Establish such advisory committees as the Minister deems necessary and appoint the members of those committees
- e) Coordinate and implement wildlife policies and programs in cooperation with the government of any province having an interest therein

Under this Act, the Minister may enter into an agreement with any province, municipal authority, organization or person for wildlife research, conservation, and interpretation. The Act sets out general provisions for how the federal government can work with these groups and individuals. Agreements involving parties other than a provincial government will require the approval of the provincial government.

This Act also gives Environment Canada separate powers to create and manage areas for the protection of wildlife. Lands can be acquired or leased by the Minister of the Environment for the purposes of wildlife research, conservation, and interpretation and administrative powers for public lands can be assigned to the ministry for wildlife research, conservation or interpretation.

The Wildlife Area Regulations of the *Canada Wildlife Act* prohibits all activities that could be harmful to species and to their habitat, unless a permit is issued indicating the permitted activity.

Related Legislation: *Species At Risk Act*



Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

More
InformationMore Information:

For a copy of this Act visit the Department of Justice Canada's website at <http://laws.justice.gc.ca/>.

A-1.4. Canadian Environmental Assessment Act

Responsible Minister: Environment

Administered by: Canadian Environmental Assessment Agency (CEAA)

Description:

The *Canadian Environmental Assessment Act* is administered by the Canadian Environmental Assessment Agency (CEAA), which is an independent agency that reports directly to the Minister of Environment. The Act requires federal departments, agencies and crown corporations to conduct environmental assessments for proposed projects where the federal government is the proponent. It also requires environmental assessments when the project involves federal funding, permit or licence. There are a number of regulations that put the procedures of the Act into effect and clarify its requirements and scope in certain circumstances.

- adapted from Environment Canada 2002b

The purposes of this Act are [s.4(1)]:

- To ensure that projects are considered in a careful and precautionary manner before federal authorities take action in connection with them, in order to ensure that such projects do not cause significant adverse environmental effects
- To encourage responsible authorities to take actions that promote sustainable development and thereby achieve or maintain a healthy environment and a healthy economy
- To ensure that responsible authorities carry out their responsibilities in a coordinated manner with a view to eliminating unnecessary duplication in the environmental assessment process
- To promote cooperation and coordinated action between federal and provincial governments with respect to environmental assessment processes for projects;
- To promote communication and cooperation between responsible authorities and Aboriginal peoples with respect to environmental assessment
- To ensure that projects that are to be carried out in Canada or on federal lands do not cause significant adverse environmental effects outside the jurisdictions in which the projects are carried out
- To ensure that there be opportunities for timely and meaningful public participation throughout the environmental assessment process

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

Related Legislation:

The *Canadian Environmental Assessment Act* will often arise when Fisheries and Oceans Canada is called on to give approvals under the *Fisheries Act* or the *Navigable Waters Protection Act*.

Also see the *Canada-Alberta Agreement for Environmental Assessment Cooperation* in section A-5.

More Information

More Information:

CEAA website - contains information on environmental assessments, public participation and much more. It also hosts the Canadian Environmental Assessment Registry, which contains information about projects undergoing environmental assessment under the *Canadian Environmental Assessment Act*. (www.ceaa-acee.gc.ca)

For a copy of this Act visit the Department of Justice Canada's website at <http://laws.justice.gc.ca/>.

**A-1.5. Canadian Environmental Protection Act**

Responsible Minister: Environment

Administered by: Environment Canada
Minister of Health - toxic substances regulation

Description:

"The goal of the renewed *Canadian Environmental Protection Act* (CEPA) is to contribute to sustainable development through pollution prevention and to protect the environment, human life and health from the risks associated with toxic substances. CEPA also recognizes the contribution of pollution prevention and the management and control of toxic substances and hazardous waste to reducing threats to Canada's ecosystems and biological diversity...Health Canada works in partnership with Environment Canada to assess potentially toxic substances and to develop regulations to control toxic substances."

- Environment Canada 2004

West Coast Environmental Law has summarized the *Canadian Environmental Protection Act* (CEPA) in the *British Columbia Guide to Watershed Law and Planning* (2003) as follows:

1. Establishes public rights to information, notification and involvement. In particular it:
 - Establishes a National Pollutant Release inventory where the public can find site specific information on the pollutants created by industrial facilities across Canada
 - Creates an internet accessible registry that provides public notification for decisions under CEPA

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

- Gives Canadian residents the right to demand investigations into offences under CEPA and to take CEPA offenders to court and it requires independent panels to review environmental decisions

It also gives the federal government the powers to require environment related information from industry.

2. Creates a process for assessing and potentially regulating substances and biotechnology products that could harm the environment. One of the most important aspects of CEPA is the process for regulating “toxic” substances. Under this part of CEPA, the federal government can regulate in order to avoid harm to the environment or human health by substances deemed toxic. Toxic in the context of CEPA has a different meaning from toxic as it is usually used (i.e. poisonous). Generally, Environment Canada only considers a substance “CEPA toxic” if it is entering the environment in amounts that have or may have an immediate or long-term harmful effect on the environment or human health. Thus, poisonous or inherently toxic substances may not be “CEPA toxic” if they are not entering the environment in sufficient quantities to pose a threat, and non-poisonous substances may be CEPA toxic if they are causing environmental harm.
3. Prohibits waste disposal at sea without a permit...
4. Gives the federal government a wide variety of regulation making powers. These include the power to regulate water-pollution-causing nutrients in cleaning products, vehicle emissions and international air or water pollution. The Act also gives the federal government the power to pass environmental protection regulations applicable to the federal government, federal land, aboriginal land (including reserves or treaty settlement areas), and federally regulated industries such as airlines, communications companies, railways and banks.
5. Establishes a system of non-legally binding tools, intended to guide environmental regulation in Canada. These include guidelines, codes of practice and standards.

More Information:

CEPA website - provides additional information about CEPA
(www.ec.gc.ca/CEPARRegistry/gene_info/)

Environment Canada website - provides a summary of highlights from CEPA
(www.ec.gc.ca/EnviroRegs/eng/ceparegs.cfm)

For a copy of this Act visit the Department of Justice Canada’s website at
<http://laws.justice.gc.ca/>.

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

A-1.6. Fisheries Act

Responsible Minister: Fisheries and Oceans

Administered by: Department of Fisheries and Oceans

Environment Canada – administration and enforcement of pollution prevention provisions

Description:

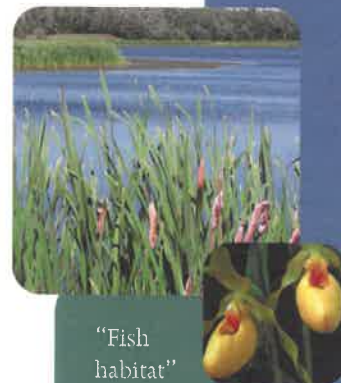
The *Fisheries Act*, provides the legislative authority for the management and regulation of salt and fresh waters fisheries. A significant portion of the *Fisheries Act* focuses on fish habitat protection and pollution prevention and applies on both private and public lands.

Under the *Fisheries Act* no one may carry out any work that harmfully alters, disrupts or destroys fish habitat unless authorized by Fisheries and Oceans Canada (s.35). While activities that threaten fish habitat are not defined in the Act, the following are some common threats (as listed by Fisheries and Oceans Canada):

- Removing streamside vegetation
- Removing sand or gravel from beaches, riverbanks or streambeds
- Diverting, dyking and channelizing streams
- Dredging tidal flats and marshland
- Filling foreshore, marshes and flood plains
- Clearing land for agriculture or urban development
- Building causeways, wharves, marinas and reservoirs
- Polluting with sediment, pesticides, oil and other contaminants
- Discharging industrial and municipal waste
- Logging and log storage
- Constructing buildings, pipelines, transmission lines, roads and railways
- Constructing and operating hydroelectric power facilities
- Mining and discharging mine effluent
- Mining the seabed and accidents at offshore oil and gas extraction facilities

Individuals must obtain approval from Fisheries and Oceans Canada prior to taking any action that alters or destroys fish habitat.

In terms of pollution prevention, the *Fisheries Act* prohibits depositing or permitting the deposit of deleterious substances into Canadian fisheries waters [s.36(3)]. Deleterious substances include oils, sediment, paint and other substances or materials that will degrade or alter water quality so that the water is rendered or is likely to be rendered deleterious to fish. In the Act there is a duty to report spills and a duty of persons responsible for the spill to prevent or minimize damage or danger to fish habitat or fish. There are also effluent regulations set in the Act for a number of substances.



“Fish habitat” is defined in the *Fisheries Act* as spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes.

“Canadian fisheries waters” are defined in the *Fisheries Act* as all waters in the fishing zones of Canada, all waters in the territorial sea of Canada and all internal waters of Canada.

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

The Fisheries Act has a number of additional powers that can be useful for protecting fish habitat. These include (as outlined by West Coast Environmental Law 2003):

- **Fishways** - The Minister can require fishways (artificial paths to permit fish to pass an obstacle) to be constructed and maintained by the owner or operator of an obstruction (s.20-21).
- **Water for Fish** - The Minister can require that a minimum flow of water over a dam be maintained to ensure that fish have enough water passing through a dam spillway for downstream migration and/or enough water below a dam for spawning (s. 22).
- **Obstructions in a River** - The Act requires that at least 1/3 of the flow of a river or stream should be kept free of obstructions so that fish can pass (s. 26), as well as providing other prohibitions against obstructing the passage of fish (ss. 27, 29).
- **Destruction of Fish** - The Act prohibits the use of explosives to hunt or fish for fish (s. 28) and the destruction of fish by any means other than fishing (s. 32).
- **Fish Guards** - The Act gives the Minister the power to require placement of fish guards over the mouths of canals, ditches, water intakes and other places that fish should not go (ss. 30).

More
Information

More Information:

For a copy of this Act visit the Department of Justice Canada's website at <http://laws.justice.gc.ca/>.

A-1.7. Navigable Waters Protection Act

Responsible Minister: Transportation

Administered by: Transport Canada

Description:

The primary purpose of the *Navigable Waters Protection Act* (NWPA) is the protection of the public right of navigation and the regulation of structures that interfere with navigation. Under this Act all work that is to be built or placed in, on, over, under, through or across any navigable water must be approved by the minister of transport.

The Act also includes provisions that address activities relating to the dumping of stone, gravel, earth, cinders, ashes or other materials or the excavation of materials from the bed of a navigable water. However, these provisions are less relevant because of the existence of provincial and federal environmental protection legislation.

Related Legislation: Approvals under the NWPA often trigger the need for a federal environmental assessment under the *Canadian Environmental Assessment Act*.

Under NWPA a "navigable water" includes a canal and any other body of water created or altered as a result of the construction of any work.

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

More
InformationMore Information:

For a copy of this Act visit the Department of Justice Canada's website at <http://laws.justice.gc.ca/>.

A-1.8. Migratory Bird Convention Act

Responsible Minister: Environment

Administered by: Canadian Wildlife Service (under the authority of Environment Canada)

Description:

The purpose of the *Migratory Birds Convention Act* is to implement a treaty between Canada and the United States by protecting migratory birds and nests. Under this Act, the *Migratory Birds Regulations* prohibits anyone from doing anything that could harm migratory birds or their nests without statutory authorization (s.5 and s.6). The Act also prohibits the deposit of oil, oil wastes or any other substances harmful to migratory birds in any waters frequented by them without a statutory authorization (s.35).

The *Migratory Bird Sanctuary Regulations* grant sanctuary status to areas that represent habitat that is important to migratory birds. These sanctuaries help protect the birds from hunting and all other disturbances while they are in breeding and other staging areas.

More
InformationMore Information:

Canadian Wildlife Service's Enforcement Branch website - contains information about the *Migratory Birds Convention Act* (<http://www.cws-scf.ec.gc.ca/enforce/>)

Environment Canada website - provides a list of questions and answers about the *Migratory Birds Convention Act* and regulation (www.mb.ec.gc.ca/nature/migratorybirds/dc00s06.en.html)

Canadian Wildlife Services website - contains information about migratory birds (www.cws-scf.ec.gc.ca)

For a copy of this Act visit the Department of Justice Canada's website at <http://laws.justice.gc.ca/>.

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

A-1.9. Pest Control Products Act

Responsible Minister: Health

Administered by: Pest Management Regulatory Agency (an agency under the Minister of Health)

Description:

The current *Pest Control Products Act* (1985) regulates products used for the control of pests and the organic functions of plants and animals. Under the Act, the Pest Management Regulatory Agency (PMRA) maintains a system for the registration of pesticide products. In the Act there is a general prohibition against the manufacture, storage, display, distribution or use of pest control products under unsafe conditions.

- adapted from Environment Canada 2002c

Under the Act's *Pest Control Products Regulations*, an applicant attempting to register a pest control product must satisfy the Minister of Health that the product will not lead to an unacceptable risk of harm to public health, plants, animals and the environment.

-adapted from Environment Canada 2002d

In the Act's *Pest Control Products Regulations* there are a number of requirements in terms of what is to be included on the product's label. These include: directions for the use of the product (e.g., dosage rates, timing of application, use limitations); information identifying any significant hazard respecting the handling, storage, display, distribution and disposal of the product; and information identifying any significant hazard to public health, plants, animals or the environment (the information shall include instructions respecting the procedures to alleviate any such hazard).

A new *Pest Control Products Act* (2002) received Royal Assent in 2002 and will come into force on a date yet to be determined. As outlined by Health Canada (2005), the new Act will:

1. Strengthen health and environmental protection by:
 - Requiring special protection for infants and children
 - Taking into account pesticide exposure from all sources, including food and water, and considering cumulative effects of pesticides that act in the same way
 - Supporting pesticide risk reduction, for example, by ensuring that only pesticides that make a useful contribution to pest management are registered and expediting the registration of lower-risk products
2. Make the registration system more transparent by:
 - Establishing a public registry to allow access to detailed evaluation reports on registered pesticides

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

- Allowing the public to view the test data on which these pesticide evaluations are based
 - Allowing the PMRA to share scientific studies with provincial/territorial and international regulators, which will enhance the process for international joint reviews of pesticides, giving Canadian growers equal access to newer, safer pesticides so they can be competitive in the marketplace
3. Strengthen post-registration control of pesticides by:
- Requiring pesticide companies to report adverse effects
 - Requiring re-evaluations of older pesticides 15 years after they are registered
 - Providing the Minister with the authority to remove pesticides from the market if required data are not supplied
 - Providing increased powers of inspection and higher maximum penalties, up to \$1million for the most serious offences

More Information

More Information:

Health Canada webpage - contains information about the new Pest Control Products Act (www.pmra-arla.gc.ca/english/legis/pcpa-e.html)

For a copy of this Act visit the Department of Justice Canada's website at <http://laws.justice.gc.ca/>.

A-1.10. Species at Risk Act

Responsible Minister: Environment

Administered by: Canadian Wildlife Service (under the authority of the Minister of the Environment)

Parks Canada - administer parts of the Act relating to species in national parks, national historic sites or other protected heritage areas

Fisheries and Oceans Canada - administer parts of the Act relating to aquatic species

Description

*Information in this section has been taken from an Environment Canada publication entitled Canada's Species at Risk Program: Questions and Answers on the federal Species at Risk Act (2005a) and from Environment Canada's webpage (2005b).

The purpose of the Species At Risk Act (SARA) is to:

- Prevent wildlife species from becoming extinct or lost from the wild (extirpated)
- Help in the recovery of extirpated, endangered or threatened species
- Ensure that species of special concern do not become endangered or threatened



There are over 300 species on the legal list of the Species at Risk Act, 20 percent of which are found in the prairie provinces. Species on the Schedule 1 list are classified into one of the following categories:

- **Extinct** - a species no longer occurring anywhere
- **Extirpated** - a species no longer existing in the wild in Canada, but existing elsewhere in the world.
- **Endangered** - a species facing imminent extirpation or extinction
- **Threatened** - a species likely to become endangered if nothing is done to reverse the factors leading to extirpation or extinction
- **Special Concern** - species that are particularly sensitive to human activities or natural events but are not endangered or threatened species.

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

Schedule 1 of SARA contains a list of plant and animal species to which the Act applies. Species are put on this list after the federal government considers assessments conducted by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), a group of government and non-government experts. COSEWIC's role is to assess and classify wildlife species using the best available scientific, community and aboriginal traditional knowledge. Any person may apply to COSEWIC for an assessment of the status of a wildlife species, and the committee must make a determination within one year.

SARA has prohibitions against the killing, harming, harassing or taking of endangered, threatened and extirpated species and against the damage or destruction of their residences (e.g., nest, den). These prohibitions apply to all species on federal lands and to aquatic species and migratory birds listed in the *Migratory Birds Convention Act* (1994) anywhere that they occur. As for species on provincial or private land (other than aquatic species) these prohibitions may apply if provincial legislation does not effectively protect the species and cooperative stewardship does not succeed. If this is the case, consultation with the provincial government is required.

SARA is intended to protect the critical habitat (the habitat necessary for the survival or recovery of a species) for species listed in Schedule 1. Within a few years of listing a species, critical habitat is described and recovery strategies or action plans are developed in cooperation with various agencies and in consultation with people who are directly affected. For species on private or provincial land (excluding aquatic species), critical habitat will be protected through voluntary actions, stewardship measures or provincial law. If these measures do not succeed, a prohibition on the destruction of critical habitat may be applied.

For landowners interested in getting involved in habitat stewardship projects, there are a number of projects run by nongovernmental organizations (e.g., Alberta Conservation Association, Nature Conservancy of Canada). Many of these initiatives are supported by the Environment Canada's Habitat Stewardship Program. The Government of Canada may provide compensation for landowners if they have a loss as a result of an extraordinary impact resulting from prohibitions on the destruction of critical habitat.

Related Initiatives:

SARA is one of three parts of the federal government's National Strategy for the Protection of Species at Risk. The two other components of this strategy precede this Act and are: the Accord for the Protection of Species at Risk signed in 1996 and the Habitat Stewardship Program established in 2000. Through these initiatives, Canada is making its commitment under the United Nations Convention on Biological Diversity a reality.

Also see the Canadian Biodiversity Strategy in section A-2.1.

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

More Information:

Species at Risk Act Public Registry (www.sararegistry.gc.ca) - includes the legal list of species, COSEWIC assessments, recovery strategies, action plans, regulations and orders

National Species at Risk website (www.speciesatrisk.gc.ca) - includes information on species at risk and on general stewardship programs and the Habitat Stewardship Program (http://www.sararegistry.gc.ca/default_e.cfm)

Department of Fisheries and Oceans webpage - contains information about SARA (www.dfo-mpo.gc.ca/species-especes/home_e.asp)

Parks Canada webpage - contains information about SARA (www.pc.gc.ca/nature/eep-sar/itm1-/index_e.asp)

Environment Canada's Green Lane website - includes information on species at risk in the prairies and on conservation efforts being undertaken (www.pnr-rpn.ec.gc.ca/nature/endspecies/index.en.html)

For a copy of this Act visit the Department of Justice Canada's website at <http://laws.justice.gc.ca/>.



A-2

Federal Policies and Strategies

A-2.1. Canadian Biodiversity Strategy

Description:

In 1992 Canada signed and ratified the United Nations Convention on Biological Diversity and soon after began work on the Canadian Biodiversity Strategy. The objectives of the Strategy are:

1. The conservation of biodiversity
2. The sustainable use of biological resources
3. The fair and equitable sharing of the benefits that result from the use of genetic resources

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

These strategies are to be achieved through the following five goals:

1. To conserve biodiversity and sustainably use biological resources
2. To enhance both our understanding of ecosystems and our resource management capability
3. To promote an understanding of the need to conserve biodiversity and sustainably use biological resources
4. To provide incentives and legislation that support the conservation of biodiversity and the sustainable use of biological resources
5. To work with other countries to conserve biodiversity, use biological resources sustainably and share equitably the benefits that arise from the utilization of genetic resources

There are a series of mechanisms identified in the strategy for implementing it which include reporting on policies, priorities, plans and actions undertaken to implement the Strategy, national and international coordination, encouraging non-government participation and reporting on the status of biodiversity.

More Information

More Information:

For a copy of the Canadian Biodiversity Strategy visit Environment Canada website at http://www.eman-rese.ca/eman/reports/publications/rt_biostrat/intro.html.

Sustaining Alberta's Biodiversity: An Overview of Government of Alberta Initiatives Supporting the Canadian Biodiversity Strategy - this report is available online at <http://www3.gov.ab.ca/env/resedu/biodiversity/biodiversityreport.pdf>.

A-2.2. Federal Policy on Wetland Conservation

Description:

The Federal Policy on Wetland Conservation was created in 1991. Its objective is to “promote the conservation of Canada’s wetlands to sustain their ecological and socio-economic function, now and in the future.” The goals of the Policy are as follows:

- **Maintenance** of the function and values derived from wetlands throughout Canada
- **No net loss of wetland functions** on all federal lands and waters
- **Enhancement and rehabilitation** of wetlands in areas where the continuing loss or degradation of wetland function have reached critical levels
- **Recognition** of wetland functions in resource planning, management and economic decision-making with regard to all federal programs, policies and activities
- **Securement** of wetlands of significance to Canadians

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

- **Recognition of sound, sustainable management practices** in sectors such as forestry and agriculture that make a positive contribution to wetland conservation while also achieving wise use of wetland resources
- **Utilization** of wetlands in a manner that enhances prospects for their sustained and productive use by future generations

The Policy outlines seven strategies to be used to achieve these goals:

1. Developing Public Awareness
2. Managing Wetlands on Federal Lands and Waters and in Other Federal Programs
3. Promoting Wetland Conservation in Federal Protected Areas
4. Enhancing Cooperation
5. Conserving Wetlands of Significance to Canadians
6. Ensuring a Sound Scientific Basis for Policy
7. Promoting International Actions



More Information

More Information:

For copy of the Federal Policy on Wetland Conservation visit the Government of Canada's Depository Services Program website (<http://dsp-psd.communication.gc.ca/Collection/CW66-116-1991E.pdf>) or call their office (613-990-5221).

A-2.3. Federal Water Policy

Description:

In 1987 the government released its Federal Water Policy, which has since given focus to the water-related activities of all federal departments and continues to provide a framework for action as it evolves in the light of new issues and concerns (Environment Canada 2002e).

The Federal Water Policy addresses the management of water resources, balancing water uses with the requirements of the many interrelationships within the ecosystem. The overall objective of the policy is to encourage the use of freshwater in an efficient and equitable manner consistent with the social, economic and environmental needs of present and future generations. The policy stresses that government action is not enough and that Canadians at large must become aware of the true value of water in their daily lives and use it wisely.

Main goals:

1. To protect and enhance the quality of the water resource
2. To promote the wise and efficient management and use of water

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

In the Policy there are five strategies laid out for meeting these goals. For each strategy there are a number of broad courses of action outlined which define a supportive, yet flexible, role for the federal government. These strategies include:

1. **Water pricing** - implement the concept of “a fair value for water” in federal policies, programs and initiatives
2. **Science leadership** - recognizing the national leadership role the federal government must play in science leadership
3. **Integrated planning** - taking into account all water uses and water-related activities, within whatever political, administrative, economic or functional boundaries they are defined; increasingly, watersheds are becoming the preferred spatial unit for water resource planning
4. **Legislation** - renew, consolidate or otherwise strengthen the application of existing federal legislation
5. **Public awareness** - promote public awareness and participation in programs and initiatives to improve and protect Canada’s water resources

The policy also contains specific statements relating to a number of issues, which include: management of toxic chemicals, water quality management, groundwater contamination, fish habitat management, provision of municipal water and sewer infrastructure, safe drinking water, water use conflicts, interbasin transfers, wetlands preservation, hydroelectric energy development, navigation, heritage river preservation, transboundary water management, potential inter-jurisdictional water conflicts within Canada, international water relations, drought, flooding, shoreline erosion, climate change, water data and information needs, research leadership and technological needs.

More Information

More Information:

For a copy of the 1987 Federal Water Policy visit Environment Canada’s website at http://www.ec.gc.ca/water/en/policy/pol/e_pol.htm.

A-2.4. Department of Fisheries and Oceans Policy for the Management of Fish Habitat

Description:

The Department of Fisheries and Oceans Policy for the Management of Fish Habitat was created by the Department of Fisheries and Oceans (DFO) and presented to Parliament in 1986. This policy’s objective is the net gain of habitat for Canada’s fisheries resources. The policy has three goals:

1. **Fish Habitat Conservation** - Maintain the current productive capacity of fish habitats supporting Canada’s fisheries resources, such that fish suitable for human consumption may be produced. This goal is guided by the principle of no net loss of the productive capacity of habitats.

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

2. **Fish Habitat Restoration** - Rehabilitate the productive capacity of fish habitats in selected areas where economic or social benefits can be achieved through the fisheries resource.
3. **Fish Habitat Development** - Improve and create fish habitats in selected areas where the production of fisheries resources can be increased for the social or economic benefit of Canadians.

More
InformationMore Information:

For a copy of Department of Fisheries and Oceans Policy for the Management of Fish Habitat visit DFO's website at http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/legislation-lois/policies/fhm-policy/index_e.asp.



A-2.5. Wildlife Policy for Canada

Description:

A Wildlife Policy for Canada is a national policy, providing a framework for federal, provincial, territorial and nongovernmental policies and programs that affect wildlife. The policy was developed in 1990 and builds on the Guidelines for Wildlife Policy in Canada, which were formally approved at the Wildlife Ministers' Conference of September 1982.

The goal of this policy is to maintain and enhance the health and diversity of Canada's wildlife, for its own sake and for the benefit of present and future generations of Canadians. Achieving this goal requires the following (as outlined in the policy):

1. **Maintaining and restoring ecological processes** - includes: the maintenance of the chemical balance of the planet, stabilizing climate, recycling of nutrients, breakdown of pollutants and cleansing of air and waters, watershed protection, soil formation and the supply of food and habitat for all species
2. **Maintaining and restoring biodiversity** - maintenance of all levels of diversity which include ecosystem diversity, species diversity and genetic diversity
3. **Ensuring that all uses of wildlife are sustainable** - the uses of wildlife should maintain the health and capacity for renewal of the populations and ecosystems concerned

More
InformationMore Information:

For a copy of the Wildlife Policy for Canada visit the Canadian Wildlife Service's website at http://www.cws-scf.ec.gc.ca/publications/pol/index_e.cfm.

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

A-3 Provincial Legislation

A-3.1. Agricultural Operation Practices Act

Responsible Ministry: Alberta Agriculture, Food and Rural Development (AAFRD)

Administered by: Alberta Agriculture, Food and Rural Development (AAFRD) - responsible for the legislation and associated regulations and for updating the legislation (to meet the needs of the livestock industry and the public); takes the lead role in providing extension services, information materials and technology transfer of applied research related to AOPA

Natural Resources Conservation Board (NRCB) - responsible for administering the regulations under AOPA (including regulating confined feeding operations); reports to Alberta Sustainable Resource Development

Description:

The *Agricultural Operation Practices Act* (AOPA) lays out clear manure management standards for all farming and ranching operations in Alberta. It also provides producers and other stakeholders with a one-window process for siting new and expanding confined feeding operations (CFOs). Amendments to AOPA were proclaimed on January 1, 2002, launching a new standard for environmental management in Alberta's livestock industry. Further amendments based on a targeted review of the legislation were made in 2004. The amendments clarify and enhance the province's ability to deal with nuisance, such as odour, noise, dust, smoke or other disturbances resulting from an agricultural operation.

- adapted from AAFRD 2004a

Under AOPA, municipal governments are invited to provide input on all applications within their municipal boundaries and to develop land-use plans that identify where new and expanding CFOs would not be compatible with current or future land uses. Municipal governments are considered directly affected parties for all CFO applications and their views are an important part of decisions for siting new and expanding CFOs.

- adapted from AAFRD 2004a

Under AOPA there are a number of standards that protect ground water and surface water from contamination from feeding and bedding sites, livestock corrals, manure storage facilities and manure collection facilities. These standards address a number of issues which include:

- Minimum distances from water bodies, water tables, springs and water wells
- Construction of surface water run-off control systems (and requirement that they do not significantly alter regular water flow or a non-flowing water body)
- Erosion control measures

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

- Liners that separate facilities and aquifers
- Manure storage (relating to volumes, containment and leak detection)

In terms of manure application and nutrient management, AOPA sets standards for the application of livestock manure, composting materials and compost relating to:

- Application limits (also apply to liquid manure and catch basin contents)
- Minimum setback distances from water bodies
- Maximum salinity or nitrate-nitrogen levels
- Soil testing and analysis
- Record keeping

In addition to manure storage and application and nutrient management, AOPA also addresses the following (AAFRD 2004):

- There are provisions for Approval Officers to obtain public input
- Existing CFOs do not have to change, modify or construct a building or structure to meet the standards unless there is a risk to the environment or an inappropriate disturbance as determined by the NRCB
- AOPA allows an inspector to enter and inspect any building or land, other than a private dwelling-place, believed to be used in connection with an agricultural operation
- The NRCB may issue an enforcement order to compel producers to rectify a situation



More Information:

AAFRD website - for more information about this Act visit www.agric.gov.ab.ca (click "Search" and type in "AOPA"). The following documents provide valuable information about AOPA and are available online:

- 2004 Reference Guide Agricultural Operation Practices Act (2nd Edition) - [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/epw8746](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/epw8746)
- Beneficial Management Practices: Environmental Manual for Crop Producers in Alberta - 9.1 Alberta Legislation - [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex9450](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex9450)

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

A-3.2. Agricultural Pests Act

Responsible Ministry: Alberta Agriculture Food and Rural Development (AAFRD)

Description

This Act is enabling legislation which provides the legal authority to deal with native and introduced pests which affect agricultural production. The Act does not specify how pests populations should be controlled, but because they are often controlled with pesticides this Act has implications for watershed health.

The Act is written in such a manner that the municipal local authority has the option to enforce, provide a warning or do nothing about pest concerns (AAFRD 2003). Section 6 states the duty of local authority as follows: “A local authority of a municipality shall take active measures (a) to prevent the establishment of, or (b) to control or destroy, pests in the municipality.”

More InformationMore Information:

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

A-3.3. Dangerous Goods Transportation and Handling Act

Responsible Ministry: Alberta Infrastructure and Transportation

Description

The *Dangerous Goods Transportation and Handling Act* lays out a number of restrictions, prohibitions, powers and liabilities relating to the transportation and handling of dangerous goods. Of particular interest to municipalities is section 17, which permits a local authority to make bylaws with respect to highways under its direction, control and management for the purpose of:

- a) designating the route and time of travel of vehicles transporting dangerous goods,
- b) prohibiting the carriage of dangerous goods on those highways specified in the bylaw, and
- c) specifying restrictions or conditions to ensure the safe transportation in or by a means of transport, safe storage and controls necessary for public safety [s.17(1)].

Bylaws of this nature must be approved by the minister and renewed every 5 years.

The Act's Dangerous Goods Transportation and Handling Regulation “sets safety standards and shipping requirements for thousands of different dangerous goods. The regulations also provide a means of communicating the nature and level of danger associated with various chemicals and other products” (Alberta Infrastructure and Transportation).

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

More
InformationMore Information:

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

A-3.4. Energy Resources Conservation Act

Responsible Ministry: Alberta Energy

Administered by: Alberta Energy
Alberta Energy and Utilities Board (AEUB)

Description:

The purposes of the *Energy Resources Conservation Act* are as follows (s.2):

- To provide for the appraisal of the reserves and productive capacity of energy resources and energy in Alberta
- To provide for the appraisal of the requirements for energy resources and energy in Alberta and of markets outside Alberta for Alberta energy resources or energy
- To effect the conservation of, and to prevent the waste of, the energy resources of Alberta
- **To control pollution and ensure environment conservation in the exploration for, processing, development and transportation of energy resources and energy**
- **To secure the observance of safe and efficient practices in the exploration for, processing, development and transportation of the energy resources of Alberta**
- To provide for the recording and timely and useful dissemination of information regarding the energy resources of Alberta
- To provide agencies from which the Lieutenant Governor in Council may receive information, advice and recommendations regarding energy resources and energy

The Act assigns a number of powers and roles to the AEUB to help it achieve these purposes.

More
InformationMore Information:

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).



Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

A-3.5. Environmental Protection and Enhancement ActResponsible Ministries and Administered by:

Alberta Environment
Alberta Sustainable Resource Development
Alberta Community Development

Description:

The *Environmental Protection and Enhancement Act* (EPEA) came into effect in 1993 and outlines an integrated approach to the protection of air, land, and water.

Proposed Development. Under EPEA legislation, those who operate or propose developments must accept certain environmental responsibilities. EPEA establishes a legislated process for environmental assessments which ensures potential environmental impacts are identified early in the planning stages.

- adapted from Alberta Environment 2005a

Approvals. “The approval process acts as an early warning system by identifying and preventing potential problems before a project proceeds. As a further safeguard, approval conditions detail specific operating requirements all projects must meet. Regular inspections and monitoring ensure projects comply with stringent environmental standards during and after their operation. Projects that do not comply are subject to enforcement action, which may include penalties of up to \$1 million in fines and two years in jail.”

- Alberta Environment 2005a

Public Participation. “One of EPEA’s cornerstones is the guarantee of public participation in decisions affecting the environment. This public involvement includes increased access to information, participation in the Environmental Assessment and Approval Processes and the right to appeal certain decisions, as appropriate.”

- Alberta Environment 2005b

Pollution. EPEA prohibits individuals from knowingly releasing or permitting the release of a substance into the environment in an amount, concentration or level or at a rate of release that causes or may cause a significant adverse effect on the environment. While “significant” is not defined in EPEA, “adverse effect” is broadly defined to mean the “impairment of, or damage to, the environment, human health or safety or property.”

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

Conservation Easements. Under EPEA, a conservation easement may be granted to a qualified organization for one of more of the following purposes (s.22):

1. The protection, conservation and enhancement of the environment
2. The protection, conservation and enhancement of natural scenic or aesthetic values
3. Providing for any or all of the following uses of the land that are consistent with the purposes set out in 1 and 2: recreational use, open space use, environmental education or research and scientific studies of natural ecosystems

A conservation easement under this Act must be registered under the *Land Titles Act* with the Registrar of Land Titles (unless the *Métis Settlements Act* applies).

Under EPEA there are a number of regulations, bylaws and codes of practice which include:

Regulations:

- Activities Designation Regulation
- Administrative Penalty Regulation
- Approvals and Registrations Procedure Regulation
- Beverage Container Recycling Regulation
- Conservation and Reclamation Regulation
- Conservation Easement Registration Regulation
- Designated Material Recycling and Management Regulation
- Disclosure of Information Regulation
- Electronics Designation Regulation
- Environmental Appeal Board Regulation
- Environmental Assessment (Mandatory and Exempted Activities) Regulation
- Environmental Assessment Regulation
- Environmental Protection and Enhancement (Miscellaneous) Regulation
- Forest Resources Improvement Regulation
- Lubricating Oil Material Recycling and Management Regulation
- Ozone-Depleting Substances
- Pesticides Regulation
- Pesticide Sales, Handling, Use and Application
- Potable Water
- Release Reporting
- Substance Release Regulation
- Tire Designation Regulation



Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

- Waste Control Regulation
- Wastewater and Storm Drainage Regulation

Bylaws:

- Lubricating Oil Material Environmental Handling Charge Bylaw
- Lubricating Oil Material Recycling and Management Bylaw

Codes of Practices:

- Asphalt Paving Plants
- Compost Facilities
- Compressor and Pumping Stations and Sweet Gas Processing Plants
- Concrete Producing Plants
- Energy Recovery
- Exploration Operations
- Hydrologic Tracing Analysis Studies
- Land Treatment of Soil Containing Hydrocarbons
- Landfills
- Pesticides
- Pits
- Practice for Foundries
- Small Incinerators
- Tanker Truck Washing Facilities
- The Release of Hydrostatic Test Water From Hydrostatic Testing of Petroleum Liquid and Gas Pipelines
- Wastewater Systems Consisting Solely of a Wastewater Collection System
- Wastewater Systems Using a Wastewater Lagoon
- Waterworks System Consisting Solely of a Water Distribution System
- Waterworks Systems Using High Quality Groundwater

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

More Information

More Information:

Alberta's Environmental Assessment Process (Alberta Environment 2004) - document available online at www3.gov.ab.ca/env/info/infocentre/index.cfm. Phone: (780) 427-2700 (toll free by first dialing 310-0000) (Alberta Environment's Information Centre).

AAFRD website - for information on how EPEA applies to crop producers see Beneficial Management Practices: Environmental Manual for Crop Producers in Alberta ([http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex9450](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex9450))

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (toll free by first dialing 310-0000).

**A-3.6. Fisheries (Alberta) Act**

Responsible Ministry and Administered by: Alberta Sustainable Resource Development

Description:

The Fisheries Act restricts the marketing of fish and licensing of Albertans regarding fish. It provides a mechanism to enter into agreements with the federal government regarding the licensing of the use of fish for different purposes, and the culture, use and marketing of fish for commercial purposes within the province. While this act does not apply to the management of water directly, the management of fisheries can impact in-stream flows and other ecological needs relating to water bodies.

More Information

More Information:

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

A-3.7. Forest and Prairie Protection Act

Responsible Ministry and Administered by: Alberta Sustainable Resource Development

Description:

The Forest and Prairie Protection Act establishes regulations in regard to fire control, prevention and education in the forested and prairie land in Alberta (Alberta Sustainable Resource Development 2003).

Under the Forest and Prairie Protection Act the province may make regulations designating any part of Alberta as a forest protection area. Regulations can be made by the province

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

respecting control measures applicable to these areas and precautions to be taken to prevent and suppress fires in a forest protection area [s.41(c)].

More
Information

More Information:

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

A-3.8. Forests Act

Responsible Ministry and Administered by: Alberta Sustainable Resource Development

Description:

The Forests Act “establishes an annual allowable cut in coniferous and deciduous forests. It prohibits persons from damaging the forest in any way and allows the Minister to construct and maintain forest recreation areas” (Alberta Sustainable Resource Development 2003).

Under this Act the province may enter into a Forest Management Agreement (FMA) with any person to enable that person to enter on forest land for the purpose of establishing, growing and harvesting timber in a manner designed to provide a perpetual sustained yield. Under the Act's Timber Management Regulation a person clearing land for industrial use is required to take all necessary precautions to minimize soil erosion and to avoid pollution of waters and waterways (s.146).

More
Information

More Information:

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

A-3.9. Forest Reserves Act

Responsible Ministry and Administered by: Alberta Sustainable Resource Development

Description:

The Forest Reserves Act provides a process for the acquisition of land in order to sustain a forest reserve (Alberta Sustainable Resource Development 2003). The purpose of a forest reserve under this Act is the conservation of the forests and other vegetation in the forests and the maintenance of conditions favourable to an optimum water supply in a reserve (s.4).

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

More
InformationMore Information:

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

**A-3.10. Government Organization Act**

Responsible Ministries: Alberta Advanced Education, Alberta Environment, Alberta Agriculture, Food and Rural Development, Alberta Economic Development, Alberta Education, Alberta Government Services, Alberta Health and Wellness, Alberta Human Resources and Employment, Alberta International and Intergovernmental Relations, Alberta Infrastructure and Transportation, Alberta Justice and Attorney General, Alberta Municipal Affairs, Alberta Restructuring and Government Efficiency, Alberta Seniors and Community Supports, Alberta Solicitor General and Public Security and Alberta Sustainable Resource Development

Description:

The *Government Organization Act* is broad and outlines process for organizing and establishing departments and ministerial powers. In terms of environmental matters, the Act addresses the following issues:

- The Minister of Environment may purchase or expropriate land for the purpose of any program or development project relating to the protection, enhancement and wise use of the environment
- The Lieutenant Governor in Council may declare a state of emergency for the purpose of preventing, alleviating, controlling or stopping the destruction or damage of the environment or pollution
- The Lieutenant Governor in Council may by regulation establish any part or parts of Alberta as a "Restricted Development Area" or a "Water Conservation Area" in the public interest for a variety of purposes, which include: protecting a watershed in or adjacent to the Area, retaining the environment of the Area in a natural state and preventing the deterioration of the quality of the environment of the Area

More
InformationMore Information:

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

A-3.11. Hydro and Electric Energy ActResponsible Ministry: Alberta EnergyAdministered by: Alberta Energy and Utilities Board (AEUB) (under Alberta Energy)**Description:**

The *Hydro and Electric Energy Act* “establishes a scheme of approvals administered by the AEUB for the construction and operation of electric generation projects, electric transmission facilities and electric distribution systems in Alberta” (Alberta Energy 2004).

More
InformationMore Information:

For a copy of this statute and any regulation(s) it may have visit the Queen’s Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

A-3.12. Mines and Minerals ActResponsible Ministry and Administered by: Alberta Energy

Alberta Sustainable Resource Development (responsible for only part of the Act)

Description:

The *Mines and Minerals Act* “governs the management and disposition of rights in Crown owned mines and minerals, including the levying and collecting of bonuses, rental and royalties” (Alberta Energy 2004). “This Act specifies the general powers of the Minister and the process which one must take in order to obtain a mine or minerals. It gives procedures to obtain the rights for minerals and the repercussions of disobeying regulations” (Alberta Sustainable Resource Development 2003).

More
InformationMore Information:

For a copy of this statute and any regulation(s) it may have visit the Queen’s Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

A-3.13. Municipal Government ActResponsible Ministry and Administered by: Municipal Affairs**Description:**

The *Municipal Government Act* outlines the powers and roles of municipalities in Alberta. Below is a list of verbatim environmental references in the Act, as outlined in Appendix A of the Draft Environmental Guidelines for the Review of Subdivisions in Alberta (Alberta

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

Environment 1998). Where applicable, references have been updated to the 2000 version of the Act.

Municipal Responsibility for Water Bodies

60(1) Subject to any other enactment, a municipality has the direction, control and management of the rivers, streams, watercourses, lakes and other natural bodies of water within the municipality, including the air space above and the ground below.

Transfer of a Parcel to a Municipality

424(1) The municipality at whose request a tax recovery notification was endorsed on the certificate of title for a parcel of land may become the owner of a parcel after the public auction, if the parcel is not sold at the public auction.

Purpose of Part 17 - Planning and Development

617 The purpose of this Part and the regulations and bylaws under this Part is to provide means whereby plans and related matters may be prepared and adopted

- (a) to achieve the orderly, economical and beneficial development, use of land and patterns of human settlement, and
- (b) to maintain and improve the quality of the physical environment within which patterns of human settlement are situated in Alberta, without infringing on the rights of individuals for any public interest except to the extent that is necessary for the overall greater public interest.

Non-application of Part 17 - Planning and Development

618(1) This Part and the regulations and bylaws under this Part do not apply when a development or a subdivision is effected only for the purpose of

- (a) a highway or road,
- (b) a well or battery within the meaning of the *Oil and Gas Conservation Act*, or
- (c) a pipeline or an installation or structure incidental to the operation of a pipeline.

Land Use Policies

622(1) The Lieutenant Governor in Council may by order, on the recommendation of the Minister, establish land use policies.

- (2) The *Regulations Act* does not apply to an order under subsection (1).
- (3) Every statutory plan, land use bylaw and action undertaken pursuant to this Part by a municipality, municipal planning commission, subdivision authority, development authority or subdivision and development appeal board or the Municipal Government Board must be consistent with the land use policies.



Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

Environmental Components of Intermunicipal Development Plans

631(2)(a)(iii) An intermunicipal development plan may provide for any other matter relating to the physical, social or economic development of the area that the councils consider necessary,

Environmental Component of Municipal Development Plans

632(3) A municipal development plan

- (b) may address
 - (iii) environmental matters within the municipality,
- (c) may contain statements regarding the municipality's development constraints, including the results of any development studies and impact analysis, and goals, objectives, targets, planning policies and corporate strategies,
- (d) must contain policies compatible with the subdivision and development regulations to provide guidance on the type and location of land uses adjacent to sour gas facilities

Environmental Components of Land Use Bylaws

640(1) A land use bylaw may prohibit or regulate and control the use and development of land and buildings in a municipality.

(2) A land use bylaw

- (a) must divide the municipality into districts of the number and area the council considers appropriate;
- (e) must establish the number of dwelling units permitted on a parcel of land.
- (4)** Without restricting the generality of subsection (1), a land use bylaw may provide for one or more of the following matters, either generally or with respect to any district or part of a district established pursuant to subsection (2)(a):
 - (a) subdivision design standards;
 - (b) the ground area, floor area, height, size and location of buildings;
 - (c) the amount of land to be provided around or between buildings;
 - (d) the landscaping of land or buildings;
 - (h) the location and amount of access to lots from roads and ensuring that there is at least one means of access from each lot to a road;
 - (j) the enlargement, alteration, repair, removal or relocation of buildings;
 - (k) the excavation or filling in of land;
 - (l) the development of buildings
 - (i) on land subject to flooding or subsidence or that is low lying, marshy or unstable,

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

- (ii) on land adjacent to or within a specified distance of the bed and shore of any lake, river, stream or other body of water, or
- (iii) subject to regulations made under section 693 or 694, within a specified area around an airport;
- (o) the density of population in any district or part of it;

Approval of a Subdivision Application - Suitability of Land for the Purpose for which the Subdivision is Intended

654(1) (a) A subdivision authority must not approve an application for subdivision approval unless the land that is proposed to be subdivided is, in the opinion of the subdivision authority, suitable for the purpose for which the subdivision is intended,

Conditions of subdivision approval

655(1) A subdivision authority may impose the following conditions or any other conditions permitted to be imposed by the subdivision and development regulations on a subdivision approval issued by it:

- (a) any conditions to ensure that this Part and the statutory plans and land use bylaws and the regulations under this Part affecting the land proposed to be subdivided are complied with;
- (b) a condition that the applicant enter into an agreement with the municipality to do any or all of the following:
 - (i) to construct or pay for the construction of a road required to give access to the subdivision;
 - (ii) to construct or pay for the construction of
 - (A) a pedestrian walkway system to serve the subdivision, or
 - (B) pedestrian walkways to connect the pedestrian walkway system serving the subdivision with a pedestrian walkway system that serves or is proposed to serve an adjacent subdivision, or both;
 - (iii) to install or pay for the installation of public utilities, other than telecommunications systems or works, that are necessary to serve the subdivision;
- (2) A municipality may register a caveat under the Land Titles Act in respect of an agreement under subsection (1)(b) against the certificate of title for the parcel of land that is the subject of the subdivision.
- (3) If a municipality registers a caveat under subsection (2), the municipality must discharge the caveat when the agreement has been complied with.



Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

Environmental Reserve

663 A subdivision authority may not require the owner of a parcel of land that is the subject of a proposed subdivision to provide reserve land or money in place of reserve land if

- (a) one lot is to be created from a quarter section of land,
- (b) land is to be subdivided into lots of 16.0 hectares or more and is to be used for only agricultural purposes,
- (c) the land to be subdivided is 0.8 hectares or less, or
- (d) reserve land, environmental reserve easement or money in place of it was provided in respect of the land that is the subject of the proposed subdivision under this Part or the former Act.

664(1) Subject to section 663, a subdivision authority may require the owner of a parcel of land that is the subject of a proposed subdivision to provide part of that parcel of land as environmental reserve if it consists of

- (a) a swamp, gully, ravine, coulee or natural drainage course,
- (b) land that is subject to flooding or is, in the opinion of the subdivision authority, unstable, or
- (c) a strip of land, not less than 6 metres in width, abutting the bed and shore of any lake, river, stream or other body of water for the purpose of
 - (i) preventing pollution, or
 - (ii) providing public access to and beside the bed and shore.

(2) If the owner of a parcel of land that is the subject of a proposed subdivision and the municipality agree that any or all of the land that is to be taken as environmental reserve is instead to be the subject of an environmental reserve easement for the protection and enhancement of the environment, an easement may be registered against the land in favour of the municipality at a land titles office.

(3) The environmental reserve easement

- (a) must identify which part of the parcel of land the easement applies to, and
- (b) must require that land that is subject to the easement remain in a natural state as if it were owned by the municipality, whether or not the municipality has an interest in land that would be benefited by the easement,

(4) An environmental reserve easement does not lapse by reason only of *

- (a) non enforcement of it,
- (b) the use of the land that is the subject of the easement for a purpose that is inconsistent with the purposes of the easement, or

* This section of the MGA was not referenced in the Draft Environmental Guidelines for the Review of Subdivisions in Alberta (Alberta Environment 1998) from which this section was taken)

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

- (c) a change in the use of land that surrounds or is adjacent to the land that is the subject of the easement.

Designation of Municipal Land

665(1) A council may, by bylaw, require that a parcel of land or a part of a parcel of land that it owns or that it is in the process of acquiring be designated as municipal reserve, school reserve, municipal and school reserve, environmental reserve or public utility lot.

(2) Subject to subsection (3), on receipt of a copy of a bylaw under this section and the applicable fees, the Registrar must do all things necessary to give effect to the order, including canceling the existing certificate of title and issuing a new certificate of title for each newly created parcel of land with the designation of

- (a) municipal reserve, which must be identified by a number suffixed by the letters "MR"*,
- (c) environmental reserve, which must be identified by a number suffixed by the letters "ER"

(3) The certificate of title for a municipal reserve, school reserve, municipal and school reserve, environmental reserve or public utility lot under this section must be free of all encumbrances, as defined in the *Land Titles Act*.

Use of Reserve Land, Money

671(1) Subject to section 676(1), environmental reserve must be left in its natural state or be used as a public park.

(2) Municipal reserve, school reserve or municipal and school reserve may be used by a municipality or school authority or by them jointly only for any or all of the following purposes*:

- (a) a public park;
- (b) a public recreation area;
- (d) to separate areas of land that are used for different purposes.

Changes to Environmental Reserves' Use or Boundaries

676(1) A council may by bylaw, after giving notice in accordance with section 606 and holding a public hearing in accordance with section 230,

- (a) use an environmental reserve for a purpose not specified in section 671(1),
- (b) transfer an environmental reserve to the Crown or an agent of the Crown for consideration, as agreed,
- (c) lease or dispose of an environmental reserve other than by a sale for a term of not more than 3 years, and



* This section of the MGA was not referenced in the Draft Environmental Guidelines for the Review of Subdivisions in Alberta (Alberta Environment 1998) from which this section was taken)

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

(d) change the boundaries of an environmental reserve or environmental reserve easement in order to correct an omission, error or other defect in the certificate of title, or to rectify an encroachment problem or other concern.

(2) A council may include terms and conditions in a bylaw under subsection (1).

(3) Any proceeds from a lease or other disposition under subsection (1) may be used only to provide land for any or all of the purposes referred to in section 671(2).

(4) On receipt of a bylaw under subsection (1)(b) or (d), the Registrar must cancel the existing certificates of title or amend an environmental reserve easement affected by the bylaw and issue any new certificates of title required by the bylaw.

Road, etc. over Reserve Land

677 Notwithstanding section 671, a municipality or a municipality and a school authority may authorize

- (a) the construction, installation and maintenance or any of them of a road, public utility, pipeline as defined in the *Oil and Gas Conservation Act* or transmission line as defined in the *Hydro and Electric Energy Act* on, in, over or under reserve land, or
- (b) the maintenance and protection of reserve land if the interests of the public will not be adversely affected.

Subdivision and Development Regulation

The Subdivision and Development Regulation under the *Municipal Government Act* also has a number of implications for environmental health. These include:

- Requirement that an assessment of subsurface characteristics of the land is submitted by an applicant [s.4(4)]
- A subdivision authority may require an applicant to submit additional environmental reports and maps [s.4(5)]
- A subdivision authority may be required to send a copy of the subdivision application to Alberta Environment or the Alberta Sustainable Resource Development if specific environmental conditions exist [s.5(5)]
- A subdivision authority must consider a number of environmental factors when making a decision on a subdivision application (s.7)
- Specifications regarding the distances of subdivisions from: wastewater treatment plants (s.11), landfills and waste sites (s.13), sour gas facilities (s.10) and gas or oil wells (s.11)

More Information:

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

A-3.14. North Red Deer Water Authorization Act

Responsible Ministry and Administered by: Alberta Environment

Description:

The North Red Deer Water Authorization Act was passed in 2002. It authorizes a diversion of treated water from the South Saskatchewan River Basin (Red Deer River), to the towns of Blackfalds, Ponoka and Lacombe. The piping and discharge of treated water into the Battle River results in a transfer of water to the North Saskatchewan River Basin.

More
Information

More Information:

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

**A-3.15. Oil & Gas Conservation Act**

Responsible Ministry: Alberta Energy

Administered by: Alberta Energy

Alberta Energy and Utilities Board (AEUB)

Description:

The Oil & Gas Conservation Act establishes a regulatory regime and scheme of approvals administered by the AEUB for the development of oil and gas resources and related facilities in Alberta (Alberta Energy 2004). One of the purposes of this Act is to control pollution above, at or below the surface in the drilling of wells and in operations for the production of oil and gas and in other operations over which the AEUB has jurisdiction (s.4).

Under the Act's Oil & Gas Conservation Regulations water bodies are identified and incorporated into licence applications (s.2.02) and setback from water bodies are required (s.2.12). This regulation also contains water requirements for spill reporting and remediation (s.8.050).

More
Information

More Information:

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

A-3.16. Oil Sands Conservation ActResponsible Ministry: Alberta EnergyAdministered by: Alberta Energy and the Alberta Energy and Utilities Board (AEUB)**Description:**

The Oil Sands Conservation Act “establishes a regulatory regime and scheme of approvals administered by the AEUB for the development of oil sands resources and related facilities in Alberta” (Alberta Energy 2004).

Among the seven purposes of the Act are the following two purposes that relate to the environment: 1) to assist the Government in controlling pollution in the development and production of the oil sands resources of Alberta; and 2) to ensure the observance, in the public interest, of safe and efficient practices in the exploration for and the recovery, storing, processing and transporting of oil sands, discard, crude bitumen, derivatives of crude bitumen and oil sands products (s.3).

More
InformationMore Information:

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

A-3.17. Pipeline ActResponsible Ministry: Alberta EnergyAdministered by: Alberta Energy and Alberta Energy and Utilities Board (AEUB)**Description:**

The Pipeline Act “establishes a scheme of approvals administered by the AEUB for the construction and operation of pipelines in Alberta” (Alberta Energy 2004). Outlined in part of this Act are steps to be taken in the case of leaks, breaks and spills.

More
InformationMore Information:

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

A-3.18. Provincial Parks Act

Responsible Ministry and Administered by: Alberta Community Development

Description:

Under the *Provincial Parks Act*, parks can be established and maintained for the following purposes: 1) the conservation and management of flora and fauna; 2) the preservation of specified areas and objects in them that are of geological, cultural, ecological or other scientific interest, and 3) to facilitate their use and enjoyment for outdoor recreation. Recreation areas can also be established and maintained for the purpose of facilitating their use and the enjoyment for outdoor recreation. Under this Act land or buildings can be purchased, expropriated or acquired by other means by the Minister for the purpose of a park or recreation area.

A number of regulations may be made in respect of parks and recreation areas. These can address issues, which include: the establishment of reservoirs and the use of water stored in them; uses of land and activities on that land; the use of motor vehicles and off highway vehicles and standards respecting buildings and other structures.

Provincial Parks found in the North Saskatchewan Watershed include: Big Knife, Brazeau Canyon Wildland, Crimson Lake, Dillberry Lake, Gooseberry Lake, Lois Hole Centennial, Long Lake, Ma-Me-O, Miquelon Lake, Pigeon Lake, Strathcona Science, Vermillion, Wabamun Lake and Whitney Lakes.

**More Information:**

Alberta Tourism, Parks and Recreation website - provides a map showing the location of Provincial Parks in Alberta
(http://www.cd.gov.ab.ca/enjoying_alberta/parks/planning/gateway/geosearch.aspx)

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

A-3.19. Public Health Act

Responsible Ministry: Alberta Health and Wellness

Administered by: Regional Health Authorities

Description:

"The *Public Health Act* gives regional health authorities significant powers to protect the public health. This Act has priority over all provincial statutes, except the Alberta Bill of Rights."

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

This Act has a Nuisance and General Sanitation Regulation. Under this Regulation no person shall create, commit or maintain a nuisance which is defined as “a condition that is or might become injurious or dangerous to the public health, or that might hinder in any manner the prevention or suppression of disease.” Watershed-related nuisances addressed in this Regulation relate to toilet facilities, waste storage and removal, water supplies, wells and water quality standards at beaches.

More
Information

More Information:

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

A-3.20. Public Lands Act

Responsible Ministry and Administered by: Alberta Sustainable Resource Development

Description:

The *Public Lands Act* “deals with the selling and transferring of public land, as well as the management of rangeland and activities permitted on designated land” (Alberta Sustainable Resource Development 2003).

In terms of watershed-related activities, the *Public Lands Act* states that the Province holds the title to the beds and shores of all permanent and naturally occurring bodies of water and all naturally occurring rivers, streams, watercourses and lakes in Alberta (s.3). The Act prohibits activities that cause a disturbance in any manner that result or are likely to result in injury to the bed or shore of any river, stream, watercourse, lake or other body of water or land in the vicinity of that public land (unless authorized) (s.54). In addition to the protection of water bodies and their beds and shores, the Act prohibits activities on public lands that may injuriously affect watershed capacity or that are likely to result in soil erosion (unless authorized) (s.54).

The *Public Lands Act* also entitles the Minister to establish and support programs and initiatives for the purpose of conservation and resource management. These include programs and initiatives that: assist in resource protection and enhancement, are for the purposes of education and research and assist in the resolution of multiple use concerns (s.11.1).

More
Information

More Information:

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

A-3.21. Safety Codes Act

Responsible Ministry: Alberta Municipal Affairs

Administered by: Alberta Municipal Affairs
Safety Codes Council (oversees the Act)

Description:

The *Safety Codes Act* sets out codes and standards in the following areas: building, fire, electrical, gas (natural and propane), plumbing, private sewage treatment systems, boilers and pressure vessels, elevators, amusement rides and ski lifts. Safety codes officers are certified under the Act to issue certificates of competency and to enforce codes and standards. Qualified municipalities, corporations and agencies may carry out some responsibilities under the Act (Alberta Municipal Affairs website).

In terms of watershed health, the *Safety Codes Act* has two important regulations: the Plumbing Code Regulation and the Private Sewage Disposal Systems Regulation. These Regulations set standards that offer protection from the release of untreated sewage or other wastes into the natural environment. The Plumbing Code Regulation is based on the National Plumbing Code of Canada 1995 which specifies minimum requirements for draining systems, venting systems, water service pipes and water distribution systems.

Under the Private Sewage Disposal Systems Regulation, the manufacturing, installation or sale of equipment related to private sewage disposal systems (to which the Regulation applies) must be accepted by a certification organization accredited by the Standards Council of Canada, or have evidence of being accepted by a testing organization acceptable to the Administrator.

More
Information

More Information:

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

A-3.22. Soil Conservation Act

Responsible Ministry: Alberta Agriculture Food and Rural Development (AAFRD)

Administered by: Alberta Agriculture Food and Rural Development (AAFRD)
Municipal Governments collaborate with AAFRD (usually through agricultural fieldmen acting on behalf of Agriculture Service Boards)

Description:

"The *Soil Conservation Act* is enabling legislation which allows for the sustainment of the agricultural land resource by discouraging practices which cause soil degradation" (AAFRD 2003a). This Act is important from a watershed perspective because soil erosion



Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

and many practices that cause soil degradation are directly linked to water quality in water bodies that receive agricultural runoff.

“The Act gives municipal councils the authority to protect land from soil loss or deterioration. Under the Act, each landholder has the responsibility to actively prevent soil loss or deterioration from taking place or, if soil loss or deterioration is already taking place, to stop it from continuing. Each municipal council has the duty to ensure that each landholder in its jurisdiction fulfils this responsibility.

“When agricultural practices cause or are likely to cause soil degradation, a soil conservation officer, usually an agricultural fieldman acting on behalf of the municipality’s agricultural services board, may serve notice on the landholder advising him or her to take remedial action within a specified time. The landholder may appeal this notice. If the appeal fails, then the landholder must comply with the notice.”

- AAFRD 2004b

More
Information

More Information:

For a copy of this statute and any regulation(s) it may have visit the Queen’s Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

A-3.23. *Special Areas Act*

Responsible Ministry: Alberta Municipal Affairs

Administered by: Alberta Municipal Affairs
Special Areas Board

Description:

In 1938 the *Special Areas Act* was created which established three Special Areas, as well as a Special Areas Board to administer this area. The Act was needed because many municipal services could not be provided due to financial hardship resulting from the Depression and drought of the 1930’s (Special Areas Board website). Together these three Special Areas cover about 2.1 million hectares of southeastern Alberta and include more than 30 hamlets (Special Areas Board website).

The *Special Areas Act* enables the provincial government to manage this area of land and outlines the powers of the Minister of Municipal Affairs in terms of these Special Areas. The structure, powers and duties of the Special Areas Board and provisions for an advisory committee are also outlined in the Act.

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

More
InformationMore Information:

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

A-3.24. Water Act

Responsible Ministries: Alberta Environment
Alberta Infrastructure and Transportation

Administered by: Alberta Environment

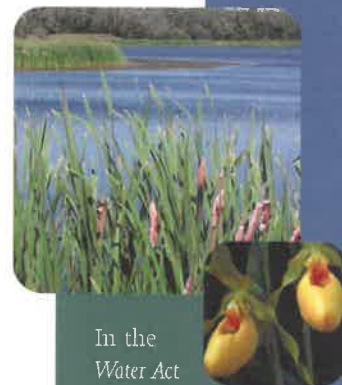
Description:

The *Water Act* came into force on January 1, 1999. Its purpose is to support and promote the conservation and management of water, including the wise allocation and use of water, while recognizing the following (s.2):

- The need to manage and conserve water resources to sustain our environment and to ensure a healthy environment and high quality of life in the present and the future
- The need for Alberta's economic growth and prosperity
- The need for an integrated approach and comprehensive, flexible administration and management systems based on sound planning, regulatory actions and market forces
- The shared responsibility of all residents of Alberta for the conservation and wise use of water and their role in providing advice with respect to water management planning and decision making
- The importance of working co operatively with the governments of other jurisdictions with respect to trans boundary water management
- The important role of comprehensive and responsive action in administering this Act

Highlights of the Act include (as outlined by Alberta Environment 2005b):

- Protects existing licences that are in good standing, by bringing them forward into and making them subject to the new Act
- Protects existing traditional agricultural uses of water through a streamlined, voluntary registration process that "grandfathers" the relative priority of the right according to the date when the water was first used
- Recognizes the importance of household uses of water by providing these uses with a statutory right that has priority over all other uses
- Ensures the sustainability of Alberta's water by requiring a provincial water management planning framework to be completed within a three-year period; allows for water management plans to be developed to address local and regional issues



In the
Water Act
"water" is defined as all
water on or under the
surface of the ground,
whether in liquid or
solid state.

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

"Alberta Environment evaluates a water license application based on the potential impact of a new license on the needs of the environment (the amount of water that need to remain in the watershed), on the amount of water required to meet apportionment agreements, and on the amount of water being used by existing water users. There are already areas in the province where maximum allowable allocations have been reached. As Alberta grows and water demand rises...this evaluation process will become increasingly important."

- Wilkie 2005 (p,8)

- Recognizes the importance of protecting Alberta's rivers, streams, lakes and wetlands, by requiring that a strategy for protecting the aquatic environment be developed as part of the provincial water management planning framework
- Provides a streamlined, one-window licensing and approval process for water-related activities and diversions
- Allows for flexible water management in areas where the available water is already allocated, by providing the ability to transfer water licences
- Prohibits the export of Alberta's water to the United States
- Prohibits any inter-basin transfers of water between Alberta's major river basins
- Encourages cooperation and proactive measures to resolve water management problems and provides a wide range of enforcement measures where necessary
- Gives Albertans the opportunity to provide advice on and understand water management

The *Water Act* requires that an approval and/or licence be obtained before undertaking a construction activity in a water body or before diverting and using water (Alberta Environment) except in the following cases: licence holders, exempt agricultural uses and households and riparian owners or occupants. Both approvals and licences need to be renewed.

Codes of Practice exist under the Act for the following activities: outfall structures on water bodies, watercourse crossings, pipelines and telecommunications lines crossing a water body and the temporary diversion of water for hydrostatic testing of pipelines.

More Information

More Information:

Alberta Environment webpage - provides *Water Act* Legislation (<http://www3.gov.ab.ca/env/water/legislation/index.cfm>)

Draft Environmental Guidelines for the Review of Subdivisions in Alberta - Appendix D of this publication presents verbatim major environmental references in the *Water Act*. Available online: <http://www3.gov.ab.ca/env/info/infocentre/index.cfm>. Phone: (780)427-2700 (dial 310-0000 first for a toll free connection) (Alberta Environment's Information Centre).

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

A-3.25. Weed Control Act

Responsible Ministry and Administered by: Alberta Agriculture Food and Rural Development

Description:

The *Weed Control Act* is “enabling legislation which provides the legal authority to deal with native and introduced weed species which affect agricultural production” (AAFRD 2003c). If left unchecked, weeds can cause significant economic and invasive losses. The Act's purpose is to “eliminate existing invasive plant infestations and limit the introduction and spread of invasive plants throughout the province” (Alberta Sustainable Resource Development 2005). This Act has implications for watershed health because pesticides can harm watershed health if not used properly.

Under this Act, invasive plants designated as weeds are listed in the Weed Regulation and categorized as: (S.31)

- **Restricted** - owners or occupants of land shall as often as necessary destroy all restricted weeds located on the land to prevent the spread, growth, ripening or scattering of the restricted weeds
- **Noxious** - owners or occupants of land shall as often as necessary control all noxious weeds located on the land to prevent the spread, growth, ripening or scattering of the noxious weeds (in accordance with this Act and the regulations)
- **Nuisance** - owners or occupants of land shall as often as necessary prevent the spread or scattering of nuisance weeds

While this Act is administered by AAFRD, it is enforced by local municipalities. The Act defines the actions municipal inspectors are to take in respect to weed control, and issuing notices and “stop orders” and it defines the conditions necessary for appeal.

More
Information

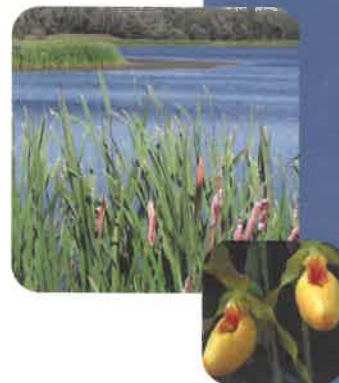
More Information:

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

A-3.26. Wilderness Areas, Ecological Reserves, Natural Areas and Heritage Rangeland Act

Responsible Ministry: Alberta Community Development

Administered by: Alberta Community Development
Alberta Sustainable Resource Development



Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

Description:

Under the *Wilderness Areas, Ecological Reserves, Natural Areas and Heritage Rangeland Act* the province can designate public lands as the following:

1. Wilderness Areas

Wilderness Areas in the North Saskatchewan Watershed include: Siffleur Wilderness Areas and White Goat Wilderness Area

2. Ecological Reserves

Ecological reserves are meant to preserve public lands for ecological purposes, which include: scientific research associated with the studies of natural ecosystems, representative example of a natural ecosystem or containing rare or endangered native plants or animals or rare examples of natural biological or physical features. Ecological Reserves in the North Saskatchewan Watershed include: Marshybank, the Kootenay Plains and the Wainwright Dunes.

3. Natural Areas

Natural Areas are public lands that are designated in order to protect sensitive or scenic public land from disturbance and to ensure the availability of public land in a natural state for use by the public for recreation, education or any other purpose. There are over 50 Natural Areas in the North Saskatchewan Watershed (see reference to website below).

4. Heritage Rangelands

Heritage Rangelands are public lands or lands in respect of which the Minister has entered into an agreement that gives the Crown the right to designate land as a heritage rangeland. They are meant to ensure the preservation and protection of the land using grazing to maintain the grassland ecology. There are no Heritage Rangelands in the North Saskatchewan Watershed.

The *Wilderness Areas, Ecological Reserves, Natural Areas and Heritage Rangeland Act* lists activities that are prohibited in these areas which relate to the following: hunting, trapping, fishing, depositing litter or potentially harmful substances, removing plant life, the use of motor vehicles and surface disturbances.

More Information:**More Information:**

Alberta Community Development website - provides a map showing the location of all wilderness areas, ecological reserves and natural areas in Alberta (http://www.cd.gov.ab.ca/enjoying_alberta/parks/planning/gateway/geosearch.aspx)

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

Appendix A – Legislation, Policies and Agreements Relating to Watershed Health

A-3.27. Wildlife Act

Responsible Ministry and Administered by: Alberta Sustainable Resource Development

Description:

The Wildlife Act “governs the management of wildlife as a Crown resource and enables the hunting and trapping of wildlife, stating that the remains of dead animals are the property of the Crown unless otherwise specified. It also addresses the conservation of species at risk (endangered, threatened)” (Alberta Sustainable Resource Development 2003).

This Act requires that the Minister establish and maintain an Endangered Species Conservation Committee. The functions of this committee are to advise and to make recommendations to the Minister about endangered species in respect to: species that should be established as endangered, recovery plans for endangered species, biodiversity conservation and other matters. Endangered species recovery plans may identify critical habitats and strategies to enable populations to recover.

Related Legislation: Federal *Species at Risk Act*

More
Information

More Information:

For a copy of this statute and any regulation(s) it may have visit the Queen's Printer Bookstore at www.gov.ab.ca/qp or call (780)427-4952 (dial 310-0000 first to connect toll free).

**A-4****Provincial Policies and Frameworks****A-4.1. Alberta's Commitment to Sustainable Resource and Environmental Management****Description:**

Alberta's Commitment to Sustainable Resource and Environmental Management was released in 1999 and outlines a shared vision for a sustainable future and messages about provincial direction regarding the management of Alberta's resources. It is the cornerstone of the Alberta government's management approach to the environment (Alberta Environment 2005c). It also highlights the importance of effective, fair and informed decision making processes and an up-to date legislative/regulatory regime.

In the Implementation Plan for Alberta's Commitment to Sustainable Resource and Environmental Management it is outlined that the commitment's directions will be achieved through Integrated Resource Management (IRM). The Implementation Plan

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

document defines IRM as “an interdisciplinary and comprehensive approach to decision making for the management of natural resources. IRM integrates decisions, legislation, policies, programs and activities across sectors to gain the best overall long-term benefits for society and to minimize conflicts” (p.1). The Implementation Plan outlines the underlying values, guiding principles, roles and responsibilities of various individuals and groups in IRM and in an IRM implementation plan.

More Information

More Information:

For a copy of the following publications visit Alberta Environment’s webpage at http://www3.gov.ab.ca/env/irm/irm_commitment.html.

- Alberta’s Commitment to Sustainable Resource and Environmental Management
- Annual Report on the Implementation of Alberta’s Commitment to Sustainable Resource and Environmental Management - 2000
- Alberta’s Commitment to Sustainable Resource and Environmental Management - Implementation Plan

A-4.2. Framework for Water Management Planning

Description:

The Framework for Water Management Planning outlines the process for water management planning and the components required for water management plans in the province. It applies to all types of water bodies, including streams, rivers, lakes, aquifers and wetlands and takes a holistic approach. The Framework recognizes that no two situations are exactly alike and is meant to provide general guidance for the planning process.

Any person developing a water management plan, whether for a single issue such as a lake cleanup or multiple issues in a large river basin, must follow the Framework for Water Management Planning.

More Information

More Information:

For a copy of the Framework for Water Management Planning visit Alberta Environment’s webpage at <http://www3.gov.ab.ca/env/water/management/index.cfm>.

A-4.3. Land Use Policies

Description:

The creation of Land Use Policies is the responsibility of the Provincial Cabinet and the current Land Use Policies were developed in 1996 after regional planning commissions were abolished in 1995. Under the *Municipal Government Act* (MGA), municipalities are

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

expected to implement these policies by incorporating them into their planning processes [s.622(3)]. This involves their inclusion in every statutory plan, land use bylaw and municipal action taken under the planning provisions of the MGA.

The following is a summary of Provincial Land Use Policies taken from The Ag Summit Collection of Action Team Reports (2002 b):

1. Implementation & Interpretation Policy:

(1.1) Implementation: “the MGA (Part 17) establishes a relationship between the Land Use Policies & planning decisions by municipalities”

(1.2) Interpretation: “The Province is entrusting to each municipality, the responsibility to interpret and apply the Land Use Policies and to further elaborate on the policy initiatives in its statutory plans and land use bylaws”

2. Planning Process Policy:

Planning activities are to be carried out in a fair, open, considerate, & equitable manner

3. Planning Cooperation Policy:

To foster cooperation & coordination between neighbouring municipalities & provincial departments & other jurisdictions in addressing planning issues & in implementing plans & strategies

4. Land Use Patterns Policy:

To foster the establishment of land use patterns which make efficient use of land, infrastructure, public services, and public facilities; which promote resource conservation; which enhance economic development activities; which minimize environmental impact; which protect significant natural environments; and which contribute to the development of healthy, safe, and viable communities

5. Natural Environment Policy:

To contribute to the maintenance & enhancement of a healthy natural environment

6. Resource Conservation Policy:

(6.1) Agriculture: “To contribute to the maintenance & diversification of Alberta’s agricultural industry”

(6.2) Non-renewable Resources: “To contribute to the efficient use of Alberta’s non-renewable resources”

(6.3) Water Resources: “To contribute to the protection & sustainable utilization of Alberta’s water resources, including lakes, rivers, and streams, their beds and shores, wetlands, groundwater, reservoirs and canals”

(6.4) Historical Resources: “To contribute to the preservation, rehabilitation & reuse of historical resources...”

7. Transportation Goal:

“To contribute to a safe, efficient, & cost effective provincial transportation network”



Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

8. Residential Development Goal:

“To contribute to the development of well planned residential communities, a high quality residential environment...& affordable housing for all Albertans.”

In the Land Use Policies municipalities are encouraged to engage in a number of activities related to environmental conservation and watershed health which include (as outlined by Mallet 2005):

- Creating inventories of environmentally sensitive areas, water resources and watersheds, and significant fish, wildlife and plant habitat
- Creating plans to mitigate impacts on such areas resulting from subdivision and development
- Identifying prime agricultural lands and limiting fragmentation of such lands
- Direct development in areas
- Minimizing potential conflicts between intensive agricultural operations and other land uses

Alberta Sustainable Resource Development is currently leading an initiative to develop a provincial land use policy framework. This framework is not specifically tied to the Land Use Policies under the MGA but will have a number of implications for them. This initiative will include a public consultation process which is to be held in 2006-2007.

More Information

More Information:**Draft Environmental Guidelines for the Review of Subdivisions in Alberta -**

Appendix C of this publication presents verbatim selected references from the Land Use Policies. These references give a general understanding of the policies and highlight components that relate to the environment. Available online: <http://www3.gov.ab.ca/env/info/infocentre/index.cfm>. Phone: (780)427-2700 (dial 310-0000 first for a toll free connection) (Alberta Environment's Information Centre).

For a copy of the provincial Land Use Policies visit Alberta Municipal Affairs' website at www.municipalaffairs.gov.ab.ca/ms/pdf/LandUsePoliciesMGA.pdf.

For more information about the Land Use Policies contact Municipal Services, Alberta Municipal Affairs at (780)427-2225.

A-4.4. Water for Life: Alberta's Strategy for Sustainability

Responsible Ministry: Alberta Environment

Key Ministries Involved: Alberta Environment; Alberta Health and Wellness; Alberta Community Development; Alberta Transportation; Alberta Innovation and Science; Alberta Sustainable Resource Development; Alberta Agriculture, Food and Rural Development; and Alberta Economic Development

Appendix A – Legislation, Policies and Agreements Relating to Watershed Health

Description:

Following a provincial consultation process with Albertans, key stakeholders and experts, Water for Life: Alberta's Strategy for Sustainability was formed in 2003. The Water for Life strategy is based on three key goals or outcomes:

1. Safe, drinking water supply
2. Healthy aquatic ecosystems
3. Reliable, quality water supplies for a sustainable economy

In order to meet these goals, a number of actions are outlined in the Water for Life strategy which revolve around the following three core areas of focus:

1. **Knowledge and Research**

Albertans will have the knowledge needed to achieve safe drinking water, efficient water use and healthy watersheds. This direction has three main elements: 1) scientific knowledge of Alberta's water resources; 2) an understanding of emerging water issues and opportunities; and 3) ensuring all Albertans are aware of water uses and have the knowledge and tools necessary to make effective management decisions.

2. **Partnerships**

Citizens and stakeholders will have opportunities to actively participate in watershed management on a provincial, regional and community basis. Three partnerships are identified as being integral to achieving success in water stewardship:

- Provincial Water Advisory Council - multi-stakeholder group established to oversee the overall implementation of Water for Life and provide policy advice to government.
- Watershed Planning and Advisory Councils (WPACs) - multi-stakeholder groups established to involve communities and stakeholders in watershed management. WPACs will lead in watershed planning, develop best management practices, foster stewardship activities within the watershed, report on the state of the watershed and educate users of the water resource. WPACs will not have a direct reporting relationship to the Provincial Water Advisory Council. The NSWA is the designated WPAC for the North Saskatchewan River Watershed. (note: this designation does not include the Battle River Watershed.)
- Watershed Stewardship Groups - community groups made up of volunteer citizens will be encouraged to participate at the WPAC level, for guidance, technical advice and mentoring.

3. **Water Conservation**

Albertans will be leaders in conservation by using water efficiently and effectively. Water conservation actions of the strategy include: establish a system to monitor actual water use by all sectors, determine the true value of water, evaluate the merit of economic instruments to meet water conservation and productivity objectives, implement economic instruments and create public education and awareness.



Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

More
InformationMore Information:

Water for Life website - provides information about actions outlined in the *Water for Life* strategy and information about where the Province is to date in terms of its implementation (<http://www.waterforlife.gov.ab.ca/>)

A-4.5. Wetland Management in the Settled Area of Alberta - An Interim Policy

Description:

In response to the growing loss of wetlands in the settled areas of Alberta and the need for consistent direction to guide provincial government departments, Cabinet approved Wetland Management in the Settled Area of Alberta: An Interim Policy in 1993.

In the policy it is stated that the goal of the Government of Alberta is to sustain the social, economic and environmental benefits that functioning wetlands provide, now and in the future. The policy intent with respect to slough/marsh wetlands in settled areas is:

1. To conserve slough/marsh wetlands in a natural state
2. To mitigate degradation of loss of slough/marsh wetland benefits as near to the site of disturbance as possible
3. To enhance, restore or create slough/marsh wetlands in areas where wetlands have been depleted or degraded

The following is a list of wetland management strategies topics addressed in the interim policy:

- | | |
|--|---|
| • Administration | • Water Management |
| • Education | • Wildlife Damage |
| • Wetland Ownership | • Pollution and Degradation of Wetlands |
| • Planning | • Legislation |
| • Drainage | • Inventory |
| • Incentives for Wetland Retention | • Research |
| • Surrounding Land and Wetland Margins | • Public Consultation |
| • Urban Wetlands | • Municipal Governments |
| • Transportation, Utility and Energy Development | • Coordination and Cooperation |

More
InformationMore Information:

For a copy of Wetland Management in the Settled Area of Alberta: An Interim Policy visit www3.gov.ab.ca/env/info/infocentre/index.cfm or order a copy by phone at (780)427-2700 (dial 310-0000 first for a toll free connection) from Alberta Environment's Information Centre.

A-5

Federal-Provincial Agreements

A-5.1. Canada-Alberta Agreement for Environmental Assessment Cooperation

Administered by: Environment Canada
Alberta Environment

Description:

The Canada-Alberta Agreement for Environmental Assessment Cooperation outlines how the governments of Canada and Alberta cooperate on environmental assessments. The Agreement applies when an environmental assessment of a proposed project is required under the *Canadian Environmental Assessment Act* and *Alberta's Environmental Protection and Enhancement Act*. The agreement establishes a process for a single, cooperative environmental assessment to avoid duplication and ensure the environmental assessment is conducted as efficiently and effectively as possible. The agreement was renewed in 2005.

- adapted from Alberta the Environment website

Some key features of this agreement are (as outlined by the Canadian Environmental Assessment Agency 2005b):

- Preserves each government's authority and legislative requirements
- Provides for effective consultation between parties to determine their environmental assessment responsibilities
- Provides guidelines to determine a "lead party" responsible for administration of each cooperative environmental assessment
- Provides for the development of work plans to make the assessment process more timely and efficient
- Describes procedures for the establishment of joint review panels in the context of a cooperative environmental assessment
- Establishes a single contact in each jurisdiction to coordinate consultation, to resolve process and content issues and to ensure parties meet established timelines
- Allows each party to use information generated by a joint assessment to make their own decisions about the process and to coordinate the timing of their announcements related to the proposed project



Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

More Information

More Information:

Canada Environmental Assessment Agency webpage - available on this websites are a copy of the Canada-Alberta Agreement for Environmental Assessment Cooperation, a backgrounder, a summary of the results of public consultation and questions and answers about the agreement (www.ceaaacee.gc.ca/010/0001/0003/0001/0001/index_e.htm)

Alberta Environment website - provides information about the Canada-Alberta Agreement for Environmental Assessment Cooperation (www3.gov.ab.ca/env/protenf/ccme/body.html)

A-5.2. Master Agreement of Apportionment

Administered by: Prairie Provinces Water Board (PPWB)

Environment Canada (fulfills the majority of monitoring requirements of the agreement)

Description:

In 1969, Saskatchewan, Alberta, Manitoba and Canada signed the Master Agreement on Apportionment. “This agreement outlines a simple formula based on the principle of equal sharing of available water in the prairies. The formula states that Alberta and Saskatchewan may each take up to one half of the natural flow of water originating within its boundaries and one half of the flow entering the province. The remainder is left to flow into Manitoba” (Environment Canada 2003). There are a number of water quantity and water quality monitoring sites along the Alberta-Saskatchewan and Saskatchewan-Manitoba borders that are used to determine if requirements of the Agreement are being met.

“Natural flow is an important part of the Master Agreement’s formula. Broadly defined, natural flow is the volume of flow that would occur in a particular river if that river had never been affected by human activity. While calculating this amount can be difficult, the result is straightforward - all three provinces, even in drought periods, end up with approximately equal shares of the total water flow. It is then solely up to the provinces to decide how they will use their share of water.”

-Environment Canada 2003

The Master Agreement on Apportionment guides the activities of the PPWB. The PPWB is made up of one representative each from Alberta, Saskatchewan and Manitoba, and two from the federal government. “Apart from preparing reports and recommendations on water sharing, the Board is also responsible for promoting continued cooperation and consultation among the three provinces and Canada on water matters” (Environment Canada 2003).

Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

More
InformationMore Information:

Environment Canada webpage - contains information on the PPWB
(<http://www.pnr-rpn.ec.gc.ca/water/fa01/index.en.html>)

A-6

International Agreements

Canada is a signatory in a number of international agreements that relate to the environment and watershed health. These include:

- **Convention on Biological Diversity** - aims are the conservation of biological diversity, the sustainable use of its components, the fair and equitable sharing of the benefits arising out of the utilization of genetic resources and to provide for appropriate funding (description taken from Environment Canada's website - see reference below).
- **Ramsar Convention: Convention on Wetlands of International Importance** - seeks to ensure the sustainable, wise use of wetland resources including designation of wetland sites of international importance and to ensure that all wetland resources are conserved, now and in the future. Since accession in 1981, Canada has nominated and received designation of 36 sites as Wetlands of International Importance under the Convention (description taken from Environment Canada's website - see reference below).
- **Stockholm Convention on Persistent Organic Pollutants (POPs)** - objectives are to control, reduce, or eliminate discharges, emissions and losses of POPs to the environment (description taken from Environment Canada's website - see reference below).
- **Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention)** - seeks to: minimize significant adverse transboundary environmental impacts of certain projects that are likely to cause adverse transboundary impacts; ensure that an environmental assessment is undertaken for those projects; provide to the government and public of an affected country an opportunity to participate in the environmental assessment; and ensure that the results of the environmental assessment are taken into account in the final decision about the project (description taken from Environment Canada's website - see reference below).
- **North American Agreement on Environmental Cooperation (NAAEC)** - creates a framework to better conserve, protect and enhance the North American environment through cooperation and effective enforcement of environmental laws. NAAEC is the environmental side agreement to NAFTA (description taken from NAAEC Canadian Office website - see reference below)



Appendix A - Legislation, Policies and Agreements Relating to Watershed Health

- **Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal** - seeks to control the transboundary movement of hazardous wastes and hazardous recyclable materials and to promote their environmentally-sound management (description taken from Environment Canada's website - see reference below).
- **Canada U.S.A. Agreement on the Transboundary Movement of Hazardous Waste** - intended to ensure that hazardous wastes, hazardous recyclable materials, and municipal solid waste destined for final disposal crossing the Canada-United States boundary comply with each country's regulations (description taken from Environment Canada's website - see reference below).
- **The World Heritage Convention** - in 1972 the World Heritage Convention established a system of collective protection for cultural and natural heritage of outstanding universal value. "Natural heritage" includes natural features, geological formations and areas that constitute the habitat of threatened species and natural sites, of universal, aesthetic, scientific or conservation value. Under this treaty, Parties designate cultural and natural heritage sites within their territories and agree to take measures for their protection, preservation and presentation. The treaty establishes a World Heritage Committee as a decision-making body; a World Heritage List of Sites designated under the Convention and a World Heritage Fund financed by the Parties, which grants financial assistance for heritage protection (description taken from the West Coast Environmental Law 2003).
- **North American Waterfowl Management Plan** - an international action plan to conserve migratory birds throughout the continent. Wetland conservation is an integral part of this plan.
- **United Nations Conference on Environment and Development Agenda 21** - identifies wetland conservation as a priority.

More Information

More Information:

Environment Canada's website - provides an overview of most of the international agreements mentioned above (www.ec.gc.ca/international/multilat/mea_e.htm)

United Nations Education Scientific and Cultural Organization (UNESCO) World Heritage's website - contains information about the Convention concerning the Protection of the World Cultural and Natural Heritage and UNESCO's work (<http://whc.unesco.org/en/about/>)

North America Waterfowl Management Plan website - provides an overview of the North American Agreement on Environmental Cooperation (www.nawmp.ca)

B-1 Lac Ste. Anne County's "No-Spray Agreement" for Pesticides

Available online: <http://www.gov.lacsteanne.ab.ca/html/no%20spray.html>

LAC STE. ANNE COUNTY
AGRICULTURAL SERVICE BOARD
Box 219, Sangudo, AB T0E 2A0
Phone: (780) 785-3411 or (780) 459-1900 FAX: (780) 785-2359

NO SPRAY AGREEMENT

Re: County Road Allowances

Location:

You have requested the portion of the County road allowance as described above, not to be sprayed under our regular Roadside Spraying Program.

By doing so, you are required to assume responsibility for vegetation control in this area. The vegetation you are required to control includes noxious weeds (as listed in the *Alberta Weed Control Act*) and brush. Mowing or hand-pulling will be considered as acceptable method of control.

PLEASE NOTE:

If upon inspection by County Agricultural Services staff, the vegetation is found to be improperly managed by non-chemical means, we reserve the right to spray the affected area, and the area requested not to be sprayed will be returned to the regular Roadside Spraying Program. For organic purposes, any required buffers will NOT include County owned property.

I

(NAME-PLEASE PRINT)

of

(MAILING ADDRESS)

have read and understand the conditions set out above and agree to these conditions.

SIGNS MUST BE EASILY VISIBLE FROM THE ROADSIDE!

Signs are to be purchased from the County Office at a cost of \$6.00 per pair and are to be mounted on stakes which are a minimum of three feet tall and placed in a highly visible area as close as possible to the property line. (See Attachment)

This is a long term agreement, however the landowner is responsible to register and designate the NO SPRAY area ANNUALLY (phone, fax, mail, or in person) PRIOR to MAY 20 of each year.

Sign Numbers _____ to _____

Signature _____

County Representative _____

Phone Number: _____ Date: _____



B-1

Appendix B - Additional Information

ATTACHMENT TO NO SPRAY AGREEMENT

As a reminder to landowners who have requested NO SPRAY areas within Lac Ste. Anne County, you must remember the following:

1. Landowners must pick up the signs and complete the agreement at the county office.
2. Although this agreement is designed to be long-term it is the landowner's responsibility to register their participation and designated NO SPRAY area ANNUALLY (by phone, mail or in person) prior to May 20th of each year.
3. The landowner is responsible for proper placement of signs and maintaining visibility of the signs. Signs must be placed facing oncoming traffic- one at the beginning of a NO SPRAY area and one at the end. For durability it is recommended that signs be installed no later than May 20 and removed as soon as possible after September 1 of each year. They may be left up year round but this will shorten the life span of the signs.
4. Lac Ste. Anne County's spray program is intended to reduce the spread of weeds and brush, reduce snow trap problems, aid visibility and reduce the spread of diseases (i.e.: via volunteer canola) along County roads.
5. The NO SPRAY agreement offers landowners the opportunity to opt out of herbicide application adjacent to their property.
6. The County is still concerned with vegetation management in road right-of-way, specifically with weed and brush control and urges the landowner/participant to place high emphasis on maintaining their area free of weeds and brush.
7. The County is required to enforce the *Provincial Weed Control Act*, which states that all landowners or occupants are responsible for maintenance of their properties including areas identified in the NO SPRAY agreement.
8. For mowing or hand pulling to be a viable weed control option, it shall be done as often as is necessary to destroy restricted weeds and control noxious weeds located on the land to prevent the spread, growth, ripening or scattering of the weeds.

B-2 Building an Environmental Reserve Bylaw

Source: Vincent Lake Working Model. 2001. *Building an Environmental Reserve Bylaw Fact Sheet (draft)*. <available online at <http://www.healthyshorelines.com/pdf/Building%20an%20Environmental%20Reserve%20By-Law%20Fact%20Sheet,%20%2021-Mar-2001.pdf>>

Environmental Reserves are very important components of the riparian (i.e. shoreline) habitat that provides many recreational and water quality benefits to our lakes. When subdividing land adjacent to a lake or stream a developer is required by the *Municipal Government Act (MGA)* to provide buffer zones called Environmental Reserves (ERs) between the private lots and the stream or lake and donate these strips of land to the local municipal government. In recent decades each subdivided lot is therefore separated from the Crown owned bed and shore of the lake by an ER which must be at least six metres wide and sometimes is much wider. The MGA states that the purpose of the ER is to (a) prevent pollution of the water body, and to (b) provide public access to and beside the bed and shore of the water body.

A number of municipalities have not yet passed a by-law that would protect their ERs on streams and lakes. Citizens can help their municipal governments develop and pass such by-laws. For a by-law to be effective in protecting the health of the ER, the riparian area, and the adjacent water body, the following points should be considered.

Definitions should include at least: development officer (i.e. the municipal government contact/approval person), environmental reserve, vehicle, off-highway vehicle, and service vehicle.

Protect the ER from damage by at least the following:

- damage to trees and other plants on the ER; but allow hand-pulling of designated noxious weeds; consider allowing a two metre wide, meandering trail from the lot, across the ER, to the beachtop.
- grazing of livestock on the ER.
- placing of signs on the ER, except with authorization from the municipal government.
- molesting of amphibians, reptiles, birds, and mammals on the ER.
- transporting and leaving goods or property upon the ER, and leaving property within the ER overnight except for camping in designated campsites.
- fires in the ER except in approved areas or with specific authorization of the municipal government.
- advertising, commercial or rental sales, and similar activities on the ER.
- use by amusement or entertainment activities, parades, spectator events, unless specifically authorized.
- use of motorized vehicles on the ER; consider exceptions for emergency vehicles, for deliver vehicles to lots where appropriate access cannot be achieved except through



B-2

Appendix B - Additional Information

the ER, for direct crossing by motorized vehicles from the lot to the beachtop, and requiring that such crossing be done in the most direct and least damaging manner.

- digging, excavating, or building with the ER except with specific approval of the municipal government.

Activities done by, or upon the instructions of, the municipality on the ER should not be prohibited.

Signs marking the ER, installed by or for the municipality, should be protected from removal or defacing.

Enforcement of the by-law protecting environmental reserves should involve a three stage process in which (i) a development office may order in writing that harmful activities must stop, harmful developments must be removed, and restoration of the natural ER setting must be undertaken, (ii) if that order is unheeded, the municipality may, in accordance with the MGA, enter upon private land if required and take such action as necessary to carry out the order to repair and restore the ER, (iii) Council shall apply those costs to the property owner's land taxes, and (iv) a person in contravention of the by-laws is guilty of an offense and is liable on summary conviction to a substantial fine, court ordered restoration, or, in default, imprisonment.

With a by-law containing such provisions, and with effective monitoring and enforcement, environmental reserves will be more likely to survive intact and continue to provide the very important functions that they were designed to.

The sample ER by-law on the following page is built upon by-laws from the County of Barrhead and the County of Parkland. Copies of those counties ER by-laws can be obtained by phoning: County of Barrhead (780)674-3331 and County of Parkland (780)963-2231.

Sample ER Bylaw:

COUNTY/MUNICIPALITY OF _____

BY-LAW ____-01

A BY-LAW TO AUTHORIZE THE COUNCIL OF THE COUNTY/MUNICIPALITY OF _____ TO REGULATE AND CONTROL THE USE AND OPERATION OF ENVIRONMENTAL RESERVE LANDS WITHIN THE COUNTY/MUNICIPALITY OF _____.

WHEREAS the Council of the County/Municipality of _____ has passed By-law No. ____-01 being a by-law to regulate and control the use and operation of Environmental Reserve Lands within the County/Municipality of _____ in order to insure public safety and natural preservation of these lands, to prevent pollution of adjacent water bodies, and to provide public access to and beside the bed and shore of adjacent water bodies,

[Prevention of pollution and allowing public access are requirements of the Municipal Government Act.]

NOW THEREFORE the Council of the County/Municipality of _____, in the Province of Alberta, duly assembled, enacts:

1) In this By-law:

- a) "County," means the County/Municipality of _____;
- b) "Development Authority", means:

[In some jurisdictions this is the "Development Officer" or "By-law Enforcement Officer".]

- i) a person appointed as a development authority pursuant to a resolution of Council, or;
- ii) where a municipal planning commission is authorized to act as a development authority, the municipal planning commission, or;
- iii) where a municipal planning commission is authorized to act as a development authority, in addition to a person appointed as a development authority, either or both of them;
- c) "Environmental Reserve" means an environmental reserve, as defined under the Municipal Government Act, Statutes of Alberta, 1994, and, amendments thereto;
- d) "Off-highway Vehicle" means an off-highway vehicle as defined in the Off-highway Vehicle Act, 1980, Revised Statutes of Alberta, Chapter 0-4, and amendments thereto;

[Includes four wheel drives, motorized quads and trikes, snowmobiles, etc.]



Appendix B - Additional Information

- e) "Service Vehicle" means a vehicle, as defined in this by-law, used for the purpose of servicing lots within the various subdivisions, with such commodities as fuel, boat gas, propane, fire wood, etc. Service Vehicle also means a fire truck, ambulance, water truck, delivery vehicle, etc., and a vehicle used to pump out sewage holding tanks and septic tanks.
 - f) "Vehicle" means a device in, on or by which a person or thing may be transported or drawn on a highway. [Includes cars, trucks, trailers, motorcycles, etc.]
- 2) No person shall deface or in any way disrupt the natural growth of any tree or plant life within an environmental reserve, except by (i) hand-pulling weeds (as identified in the *Weed Control Act*, Revised Statutes of Alberta, 1980, Chapter W-6, and amendments thereto), or by (ii) mowing a single meandering trail, a maximum of two metres wide, from a landowner's private lot directly across the environmental reserve to the lakeward side of the environmental reserve.
[Native vegetation must be left intact; hand-pulling of formal weeds & mowing of narrow trail is allowed.]
 - 3) No person shall allow livestock in their possession to graze vegetation in any environmental reserve.
 - 4) No signage shall be placed on, altered, or removed from environmental reserves, except as authorized by the development authority.
 - 5) No person in an environmental reserve shall tease, molest or injure any amphibian, reptile, bird, or mammal or throw any substance at or near such animals in such a way as causes, or is likely to cause, injury to any such animal.
 - 6) No person shall transport any goods or property (chattels) over, or place and leave property upon, any environmental reserve without authorization from the development authority; and further, any goods and property used for personal recreational purposes shall be removed from an environmental reserve prior to 11:00 p.m. and shall not be left within an environmental reserve overnight except for camping in designated campsites.
[Camping on ERs is allowed only in specified sites; belongings cannot be stored on ERs without approval.]
 - 7) Fires shall be permitted in an environmental reserve only in approved areas; otherwise, no fires are permitted unless approved by the development authority.
 - 8) No person, firm, agency or corporation shall advertise, promote or carry on commercial or rental sales within any environmental reserve.
[ERs are for protection of water bodies and public access and enjoyment, not commercial purposes.]
 - 9) The holding of any and all commercial amusements, entertainments, parades and spectator events is prohibited within an environmental reserve without first obtaining authorization from the development authority.
[Certain activities might be approved if non-damaging and appropriate to the ER.]
 - 10) No person shall operate, drive or abandon a vehicle, an off-highway vehicle, or a service vehicle within or upon any environmental reserve unless it is (i) a service vehicle responding to an emergency, (ii) a service vehicle for which there is no other

Appendix B - Additional Information

reasonable access to the subdivision lot that requires the respective service and that necessary access is conducted in the most direct and least damaging manner, or (iii) any type of vehicle that is crossing directly across the environmental reserve from a private lot to the lakeward side of the environmental reserve and its crossing is conducted in the most direct and least damaging manner.

[Emergency vehicles, service vehicles with no other options, and direct crossing by a vehicle is allowed.]

- 11) No person shall conduct any digging, excavation, or building operations within or upon any environmental reserve unless authorized by the development authority.

[ER restoration or other construction work requires approval.]

- 12) The provisions of this By-law do not apply to actions and operations of the County or persons acting upon the instructions of the County in respect to any activities within environmental reserves.

- 13) Enforcement:

[The following is wording similar to Land Use Bylaw enforcement provisions.]

- a) Where the development authority finds that a development or use of an environmental reserve is not in accordance with this Bylaw, the development authority may, by notice in writing, order the person in possession of the adjacent land or the person responsible for the contravention or all or any of them to:
 - i) stop the development or use of the land in whole or in part as directed by the notice; and
 - ii) demolish, remove, or replace the development and restore the natural features of the environmental reserve; and
 - iii) take such other measures as are specified in the notice so that the development or use of the environmental reserve is in accordance with the Act, the regulations, a development permit, a subdivision approval, or this Bylaw, as the case may be.

[The municipality's agent can stop, remove, etc. unauthorized works or intrusions.]

- b) Where a person fails or refuses to comply with an order directed to him under subsection (a) or an order of the Subdivision and Development Appeal Board within the time specified, the development authority may, in accordance with Section 542 of the Act, enter upon the private land and take such action there and on the environmental reserve as is necessary to carry out the order.

[When necessary, the municipality's agent can enter upon lands to repair and protect the ER.]

- c) Where the development authority carries out an order, the Council shall cause the costs and expenses incurred in carrying out the order to be placed on the tax roll as an additional tax against the property concerned and that amount shall be collected in the same manner as taxes on the land.

[Following (b), the person's taxes will be adjusted to include the municipality's repair/restoration costs.]



Appendix B - Additional Information

- d) A person who contravenes any provision of this By-law either by doing something which he is prohibited from doing or failing to do something which he is required to do is guilty of an offence and is liable on summary conviction to a fine not exceeding \$10,000.00, exclusive of costs; and/or to environmental reserve restoration works or other habitat protection activities as determined by a Court by way of creative sentencing; or, in default of payment of the fine and costs of the committal, or in default of such site restoration works or other activities as determined by a Court, to imprisonment for a period not exceeding six months or until such fine and costs are sooner paid or such restoration works or other ordered activities are sooner completed.

[In extreme circumstances the municipality may have to take a person to court.]

READ A FIRST TIME, this day of , A.D., 2001.

READ A SECOND TIME this day of , A.D., 2001.

READ A THIRD TIME, by unanimous consent of the Councillors present and finally passed this day of , A.D., 2001.

B-3

B-3 Example: Prohibited Discharges into Sanitary Sewers

Source: National Guide to Sustainable Municipal Infrastructure. 2003. *Wastewater Source Control* (Appendix A). A Best Practice by the National Guide to Sustainable Municipal Infrastructure.

No person shall discharge, into wastewater facilities, sewage, or wastewater, which causes or may cause, or results or may result in:

- a) a health or safety hazard;
- b) obstructions or restrictions to the flow in the wastewater facilities;
- c) an offensive odour to emanate from wastewater facilities, and without limiting the generality of the foregoing, sewage containing hydrogen sulphide, mercaptans, carbon disulphide, other reduced sulphur compounds, amines, or ammonia in such quantity that may cause an offensive odour;
- d) damage to wastewater facilities;
- e) interference with the operation and maintenance of wastewater facilities;
- f) a restriction of the beneficial use of sludge from the municipality's wastewater facilities; or
- g) effluent from municipal wastewater facilities to be in violation of any provincial or federal acts or regulations.

Appendix B - Additional Information

No person shall discharge, into wastewater facilities, sewage, or wastewater with any one or more of the following characteristics:

- a) a pH less than 5.5 or greater than 9.5;
- b) two or more separate liquid layers; or
- c) a temperature greater than 65°C.

No person shall discharge, into wastewater facilities, sewage, or wastewater containing one or more of the following:

- a) combustible liquid;
- b) fuel;
- c) hauled sewage, hauled wastewater or leachate, except where written permission from the municipality has been obtained;
- d) ignitable waste including but not limited to, flammable liquids, solids, and/or gases, capable of causing or contributing to explosion or supporting combustion in wastewater facilities;
- e) detergents, surface-active agents or other substances that may cause excessive foaming in the wastewater facilities;
- f) sewage containing dyes or colouring materials which pass through wastewater facilities and discolour the wastewater facility or effluent;
- g) pathological waste in any quantity;
- h) material containing polychlorinated biphenyls (PCBs);
- i) pesticides;
- j) reactive materials;
- k) radioactive substances; or
- l) leachate, except where the discharger has written permission from the municipality.



Appendix B - Additional Information

B-4 Example: Restricted Discharges into Sanitary Sewers

Source: National Guide to Sustainable Municipal Infrastructure. 2003. Wastewater Source Control (Appendix B). A Best Practice by the National Guide to Sustainable Municipal Infrastructure.

Substance	Milligrams Per Litre	Substance	Milligrams Per Litre
Aluminium, total	50	Mercury, total	0.01
Antimony, total	5	Methylene chloride	0.2
Arsenic, total	1	Molybdenum, total	5
Barium, total	5	Nickel, total	2
Benzene	0.01	Oil and grease - mineral or synthetic in origin	15
Beryllium, total	5	Oil and grease - animal or vegetable in origin	150
Biochemical oxygen demand	300	o-Xylene	0.5
Bismuth, total	5	Phenolic compounds (4AAP)	1
Cadmium, total	1	Phosphorus, total	10
Chemical oxygen demand	1000	Selenium, total	1
Chlorides	1500	Silver, total	2
Chloroform	0.05	Sulphates expressed as SO ₄	1500
Chromium, total	2	Suspended solids, total	300
Cobalt, total	5	1,1,2,2-Tetrachloroethane	1.0
Copper, total	1	Tetrachloroethane	1.0
Cyanide, total	2	Tin, total	5
1,2 - Dichlorobenzene	0.1	Titanium, total	5
1,4 - Dichlorobenzene	0.1	Toluene	0.01
cis - 1,2	4.0	Total Kjeldahl nitrogen	100
Dichloroethylene		Trichloroethylene	1.0
Trans- 1,3	0.15	Vanadium, total	5
Dichloropropylene		Xylenes, total	1.5
Ethylbenzene	0.15	Zinc, total	2
Fluoride	10		
Iron total	50		
Lead, total	1		
Manganese, total	5		

Note: A reference to "total" in this table denotes total concentrations of all forms of the metal and ion including both particulate and dissolved species.

B-5 Example: Overstrength Charges of Canadian Municipalities

Source: National Guide to Sustainable Municipal Infrastructure. 2003. *Wastewater Source Control* (Appendix C). A Best Practice by the National Guide to Sustainable Municipal Infrastructure.

B-5

Municipality	Biochemical Oxygen Demand (COD)	Chemical Oxygen Demand (COD)	Suspended Solids	Phosphorus	Oil and Grease	Total Kjeldahl	Remarks
Quebec (1)	None	\$22/1000 kg over 204 mg/l	\$170/100 kg over 123 mg/l	\$4,051/100 kg over 2,0 mg/l			
Ontario (1)	\$1.07/kg over 300 mg/l	\$0.57/kg over 350 mg/l	\$1.72/kg over 10 mg/l	\$0.67/kg over 150 mg/l	\$4.26/kg over 100 mg/l	Phenolic compounds \$1.07/kg over 1.0 mg/l	
Prairies (1) (1st Level)	\$0.1727/kg over 300 mg/l	\$0.1727/kg over 600 mg/l*	\$0.1776/kg over 300 mg/l	\$0.7939/kg over 10 mg/l	\$0.1829/kg over 100 mg/l	\$0.1777/kg over 50 mg/l	*or twice the BOD whichever is greater
Prairies (1) (2nd Level)	\$0.1727/kg over 3000 mg/l	\$0.1727/kg over 6000 mg/l*	\$0.1776/kg over 3000 mg/l	\$0.7939/kg over 75 mg/l	\$0.1829/kg over 400 mg/l	\$0.1777/kg over 200 mg/l	Rates apply in addition to first level
Prairies (2)	\$0.526/kg over 300 mg/l	\$0.499/kg over 300 mg/l	\$0.747/kg over 100 mg/l				

Note: * In the case of Prairies (1), surcharge applies after the first level is reached and an additional surcharge applies if the second level is exceeded.

Appendix B - Additional Information

B-6 Insert from the City of Edmonton's Sewers Bylaw**City of Edmonton Sewers Bylaw** (bylaw no. 9425)

Consolidated December 14, 2004

Section 19 - Oil and Grease Interceptor

- (1) The owner of any premises in which there is commercial or institutional food preparation shall provide a grease and oil interceptor on all fixtures which may release oil and grease, or a common interceptor, located downstream of all fixtures that may release oil and grease.
- (2) The owner of any industrial, commercial or institutional premises in which vehicles or equipment are serviced, repaired or washed, shall provide grease, oil or sand interceptors on all fixtures which may release grease, oil or sand, or a common interceptor, located downstream of all fixtures which may release grease, oil or sand.
- (3) The owner of any premises other than a building from which only domestic wastewater is released shall install an interceptor in the drainage system upon receiving notification from the City Manager that an interceptor is required.
- (4) All interceptors shall be:
 - (a) of sufficient capacity and appropriate design to perform the service for which the interceptors are used;
 - (b) located to be readily and easily accessible for cleaning and inspection; and
 - (c) maintained by the owner.

B-6

A-8 Bed & Shore Activities Requiring Approvals / Permits From Various Government Agencies

Source: Haekel, G. 2002. *The Law and the Lake: Navigating Alberta's Regulatory Framework* (what everyone should know before working around water). Public Lands Division of Alberta Sustainable Resource Development.

B-7

Activities (Partial list)	Approval Requirement (Government Agency)	Legislation
Aquatic Plant Control	• Temporary Field Authority (Public Lands Division) • Approval (Water Management) • Special Permit-Chemical Control (Pollution Control Division)	• Public Lands Act • Water Act • Environmental Protection & Enhancement Act • Fisheries Act (Canada)
Boat Launch/Pad	• Licence of Occupation (Public Lands Division) • Development Permit (Local / Municipal Planning or Development Department)	• Public Lands Act • Bylaws (as per Area Structure Plan / Municipal Government Act)
Beaver Control/Dam Removal	• Permit (Wildlife Management)	• Wildlife Act
Commercial Developments (permanent & temporary)	• License of Occupation (Public Lands Division) • Approval (Water Management)	• Public Lands Act • Water Act • Navigable Waters Protection Act
Drainage Works	• Approval (Water Management)	• Water Act
Erosion Protection, Retaining Walls, Groynes, Breakwaters or Causeways	• Temporary Field Authority - minor erosion protection, Licence of Occupation - permanent encroachments (Public Lands Division) • Approval (Water Management)	• Public Lands Act • Water Act • Navigable Waters Protection Act
Gravel Extraction	• Surface Materials Lease/Licence (Public Lands Division) • Approval (Water Management)	• Public Lands Act • Water Act
Municipal & Environmental Reserves (all Reserve developments)	• Development Permit (Local / Municipal Planning or Development Department)	• Bylaws (as per Area Structure Plan / Municipal Government Act)

Appendix B - Additional Information

Activities (Partial list)	Approval Requirement (Government Agency)	Legislation
Permanent Structures	• Licence of Occupation (Public Lands Division) • Approval (Water Management)	• Public Lands Act • Water Act
Piers & Boat Lifts (permanent)	• Marinas • Licence of Occupation (Public Lands Division) • Approval (Water Management)	• Public Lands Act • Water Act • Navigable Waters Protection Act
Piers, Boat Lifts (temporary/seasonal)	• NO APPROVALS ISSUED (Public Lands Division) • Exempt (Water Management)	• Public Lands Act • Water Act
Re-aligning Watercourses	• Licence of Occupation, Formal Land Exchange (Public Lands Division) • Approval (Water Management)	• Public Lands Act • Water Act • Fisheries Act (Canada) • Navigable Waters Protection Act
Rip-Rap	• Temporary Field Authority - minor erosion protection. • Licence of Occupation - permanent encroachments (Public Lands Division) • Approval (Water Management)	• Public Lands Act • Water Act • Navigable Waters Protection Act
Sand/Earth (fill, removal or dredging)	• Letter of Authority (Public Land Services) • Approval (Water Management)	• Public Lands Act • Water Act • Fisheries Act (Canada)
Water Supply Lines (permanent lines)	• Licence of Occupation (Public Lands Division) • Exempt if directionally drilled/bored (Water Management)	• Public Lands Act • Water Act

NOTE: Only one application needs to be submitted for an activity requiring both a Public Lands Act and a Water Act approval.

Glossary

- Adaptive management** evaluating the performance of new management approaches and changing practices over time as experience is gained (Curran 2003b).
- Agro-forestry** refers to the act of managing a woodlot in a “farming” manner (e.g. cultivation or plantation) or when a woodlot is integrated with farming operations (e.g. grazing or rangeland).
- Algal bloom** a heavy growth of algae in and on a body of water; triggered by environmental conditions such as high nitrate and phosphate concentrations; the decay of algal bloom may reduce dissolved oxygen levels.
- Aquifers** underground layers of porous rock, sand or gravel containing large amounts of water (Alberta Environment 2002).
- Biosolids** primarily an organic product produced by wastewater treatment processes that can be beneficially used; treated solid or semi-solid residues generated during the treatment of domestic sewage in a wastewater treatment facility.
- Brownfield** unused industrial lands that may or may not be contaminated, or that have been remediated (Curran 2003b).
- Climate change** long-term change in atmospheric and/or ocean conditions due to natural or human activity. Climate change is sometimes used synonymously with the term global warming, but climate change is a broader term because it includes natural changes in climate (Wilkie 2005).
- Conservation Subdivision Design (CSD)** a form of subdivision design based on rearranging development as it is being planned so that half (or more) of the buildable land is set aside as open space; cluster development is an important tool for CSD.
- Cluster development** see “green cluster development”.
- Cumulative impacts** the environmental impacts of an action in combination with the impacts of other past, existing and proposed actions. Each increment from each action may not be noticeable but cumulative impacts may be noticeable when all increments are considered together (Nevada Division of Water Planning).



Glossary

- Demand management**an approach that aims to conserve water by using a variety of policy instruments to reduce demand and increase efficient use. This approach recognizes that water is a finite resource (Wilkie 2005).
- Dissolved Oxygen (DO)**a measurement of the amount of oxygen available to aquatic organisms. Temperature, salinity, organic matter present, biochemical oxygen demand and chemical oxygen demand affect dissolved oxygen solubility in water (NSWA 2005).
- Drought**periods of less than average precipitation over a certain period of time. Drought is naturally occurring and can cause imbalances in the hydrologic system.
- Ecological Integrity**the degree to which all environmental (ecological) components and their interactions are represented and functioning (NSWA 2005).
- Ecosystem**an ecological system of an assemblage of plants, animals, bacteria and fungi that, in their natural environment are treated together as a functional unit (NSWA 2005).
- Eutrophication**the process by which lakes and ponds become enriched with dissolved nutrients (either from natural sources of human activities), resulting in a number of changes to the ecosystem, which includes increased growth of algae and other microscopic plants. The decay of algae may cause decreased oxygen levels (which may kill fish and other aquatic life).
- Faucet aerator**a device that is attached to a faucet that serves to mix air with water in order to reduce water flow, thus conserving water and reducing splash.
- Green cluster development**concentrating development on smaller lots on a portion of a larger site to protect the integrity of the green infrastructure (Curran 2003b).
- Green infrastructure**the ecological processes, both natural and engineered, that act as the natural infrastructure. It includes ditches, creeks, wetlands, parks, open space, trees, green roofs, gardens, working lands, aquifers and watersheds (Curran 2003b).
- Greyfield**aging strip malls and shopping centres.

Glossary

- Impervious surfaces** surfaces of land where water cannot infiltrate back into the ground such as roofs, driveways, streets and parking lots. Total imperviousness means the actual amount of surface taken up with impervious surfaces. A site with total impervious of 60% can act like a site with only 10% imperviousness if strategies such as channeling roof runoff into the garden and using swales to capture rainwater from the driveway and sidewalk are used (Curran 2003b).
- Instream flow need** the quantities of water and water quality conditions needed to sustain riverine processes and associated ecosystems over the long term (Alberta Environment a).
- Instream users (of water)** water users that do not take water out of the environment but instead use it in the environment in which it is found (e.g., hydropower production, recreation).
- Integrated watershed management planning** a comprehensive multi-resource management planning process involving all stakeholders within the watershed, who, together as a group, cooperatively work toward identifying the watershed's resource issues and concerns as well as develop and implement a watershed plan with solutions that are environmentally, socially and economically sustainable (Gabor et al. 2004).
- Leachate** a liquid that has been in contact with waste in the landfill cell and has undergone chemical or physical changes (Alberta Environment 2004c).
- Natural capital** the stock of natural and environmental resources that yields many goods and services that are essential to the sustained health of our environment, communities and the economy (Olewiler 2004).
- Nitrogen** a nutrient necessary for the growth and development of animals and plants. Typically nitrogen is the limiting nutrient in terrestrial systems (NSWA 2005).
- Non-point source pollution** pollution caused by diffuse sources with no discernible distinct point of source (e.g., runoff from agriculture, urban areas, mining sites, construction sites).
- Pathogen** an agent that causes disease, especially a living microorganism (e.g., viruses, bacteria, or fungi that cause disease).



Glossary

Phosphorus	.....	a nutrient necessary for the growth and development of animals and plants, which is typically the limiting nutrient of aquatic systems (NSWA 2005).
Point source pollution	.....	pollutants discharged from a discrete, identifiable point of source (e.g., pipes, ditches, sewers, wells, animal feeding operations).
Riparian area	.....	the transitional zone between upland and aquatic habitat. Riparian areas perform important ecological functions, contain a diverse assemblage of plant and animal species, provide essential habitat for wildlife and are influenced by seasonal water levels (NSWA 2005).
Rural sprawl	.....	the uncontrolled or unplanned extension of rural development into the countryside (e.g. country residential development).
Seismic	.....	an exploration technique to identify oil and gas deposits by producing sound waves at the surface, recording how the waves are reflected from underlying features and interpreting these reflections to produce a computer model of subsurface geological structures (NSWA 2005).
Smart growth	.....	a collection of urban development strategies to reduce sprawl that are fiscally, environmentally and socially responsible. Smart growth is development that enhances quality of life, protects the environment and uses tax revenues wisely (Smart Growth BC).
Sub-watershed	.....	a smaller watershed that is a piece of a much larger watershed.
Total Suspended Solids (TSS)	..	a measurement of the amount of solids suspended in water including a wide variety of material such as silt, decaying plant matter, industrial wastes and sewage.
Urban Growth Boundaries	.....	a regional boundary that is set in an attempt to control urbanization. Urban growth and development is directed to the area inside this boundary and limited in the area outside of it.
Urban sprawl	.....	the uncontrolled or unplanned extension of urban areas into the countryside.
Water turbidity	.....	the cloudy or muddy appearance of water caused by the suspension of particulate matter.

- Watershed** an area of land, bounded by topographic features, that drains into a shared destination such as a river, stream, lake, pond or ocean. The size of a watershed can be tiny or immense and its boundaries and speed of flow are determined by land forms such as hills, slopes and mountain ranges that direct water. Within each large watershed, there are many smaller watersheds. For example, a small creek that flows into the Vermillion River has its own watershed, but is also part of the larger Vermillion River watershed, which is part of the much larger North Saskatchewan Watershed.
- Watershed management** the analysis, protection, development, operation or maintenance of the land, vegetation and water resources of a drainage basin for the conservation of all its resources for the benefit of its residents (Nevada Division of Water Planning).
- Watershed stewardship** the act of taking good care of the watershed through sound management, recognizing that watersheds are not owned, but passed on to future generations.
- Wetland** land that is saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, hydrophilic vegetation (i.e. plants that grow in water), and various kind of biological activity that are adapted to a wet environment (Government of Canada 1991).
- Withdrawal users (of water)** water users that remove water from the watercourse and then return all or part of it to the watershed.
- Woodlot** may vary in size and diversity but generally describes a tract of forested or tree covered land. See also “agroforestry.”



Glossary

List of Acronyms

AAFRD - Alberta Agriculture, Food, and Rural Development

AESA - Alberta Environmentally Sustainable Agriculture

ASP - Area Structure Plan

ACD - Alberta Community Development

AE - Alberta Energy

AENV - Alberta Environment

AEUB - Alberta Energy and Utilities Board

ASRD - Alberta Sustainable Resource Development

BMP - Best Management Practice

DFO - Department of Fisheries and Oceans (Fisheries and Oceans Canada)

EC - Environment Canada

ENGO - Environmental Non-Government Organization

EPEA - *Environmental Protection and Enhancement Act*

IDP - Intermunicipal Development Plan

IPM - Integrated Pest Management

LUB - Land Use Bylaw

MDP - Municipal Development Plan

MGA - *Municipal Government Act*

NSRW - North Saskatchewan River Watershed

NRCB - Natural Resources Conservation Board

PFRA - Prairie Farm Rehabilitation Administration - Agriculture and Agri-food Canada

RCMP - Royal Canadian Mounted Police

WWTP - Waste Water Treatment Plant

Bibliography

114957 *Canada Ltee (Spraytech, Societe d'arrosage) v. Hudson (town)*. 2001. 2 S.C.R. 241 at para. 19.

AAFRD, PFRA & Alberta Environment. 2000. *Water Wells...that last for generations*.

AAFRD. 2003. Alberta Agriculture, Food and Rural Development website: *Agriculture Pests Act and Regulation*. Accessed Jan 13, 2006.

<[http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/acts6008](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/acts6008)>

AAFRD. 2003a. Alberta Agriculture, Food and Rural Development website: *Soil Conservation Act and Regulations*. Accessed Jan 13, 2006.

<[http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/acts6138](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/acts6138)>

AAFRD. 2003c. Alberta Agriculture, Food and Rural Development website: *Weed Control Act and Regulations*. Accessed Jan 16, 2006. <[http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/acts6156?opendocument](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/acts6156?opendocument)>

AAFRD. 2004. *Beneficial Management Practices: Environmental Manual for Crop Producers in Alberta (9.2 Federal Legislation)*. Alberta Agriculture, Food and Rural Development. <available online at [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex9451](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex9451)>

AAFRD. 2004a. *2004 Reference Guide Agricultural Operation Practices Act (2nd Edition)*. Alberta Agriculture, Food and Rural Development. <available online at [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/epw8746](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/epw8746)>

AAFRD. 2004b. *Beneficial Management Practices: Environmental Manual for Crop Producers in Alberta (9.1 Alberta Legislation)*. Alberta Agriculture, Food and Rural Development. <available online at <[http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex9450](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex9450)>

AAMD&C. 2000. *AAMD&C Advisory Committee on Council Conflict Resolution Final Report*. Alberta Association of Municipal Districts and Counties, Nisku, AB. <available online at <http://www.aamdc.com/Policy/Publications/Reports/report%20conflictcommittee%20nov00%20gis.pdf>>

AESA. 2005. Alberta Environmentally Sustainable Agriculture website: *Conservation*. Accessed November 10, 2005. <www.aesa.ca/new/conservation.cfm>

Alberta Agriculture Food and Rural Development and Alberta Environmentally Sustainable Agriculture Program. 2004. *Improving Pasture Productivity: Working with the Weather*. AAFRD and AESA.

Alberta Economic Development. 2005. Alberta Economic Development website: *Tourism Statistics in Alberta*. Accessed April 22, 2006. < <http://www.alberta-canada.com/statpub/tourismStatistics/index.cfm>>



Bibliography

- Alberta Energy. 2004. Alberta Energy Website: Acts and Regulations. Accessed July 13, 2006.
<<http://www.energy.gov.ab.ca/1348.asp>>
- Alberta Environment. Water Act Fact Sheet: Approvals and Licences. <available online at
<http://www3.gov.ab.ca/env/water/Legislation/FactSheets/GeneralInfo.pdf>>
- Alberta Environment a. South Saskatchewan River Basin Water Management Plan: Water Conservation Objectives Fact Sheet. <available online at
http://www3.gov.ab.ca/env/water/regions/ssrb/pdf_phase2/WCO%20fact%20sheet%20revised%2018%20March%202004.pdf>
- Alberta Environment website. Canada-Alberta Agreement for Environmental Assessment Cooperation. Accessed January 13, 2006.
<<http://www3.gov.ab.ca/env/protenf/ccme/body.html>>
- Alberta Environment. 1998. Draft Environmental Guidelines for the Review of Subdivisions in Alberta.
- Alberta Environment. 1998. Fact Sheet: Pesticide Use in Alberta. <available online at
www3.gov.ab.ca/env/info/infocentre/PubDtl.cfm?ID=1621>
- Alberta Environment. 2002. Water for Life: Facts and Information on Water in Alberta 2002.
- Alberta Environment. 2004. Waste Management Information for Businesses that Store Hazardous Wastes and Hazardous Recyclables. <available online at
<http://environment.gov.ab.ca/info/library/5733.pdf>>
- Alberta Environment. 2004b. Waste Not: Alberta's Approach to Waste Management - Facts About Waste in Alberta. <available online at
<http://www3.gov.ab.ca/env/waste/wastenot/pubs/WasteNotBooklet.pdf>>
- Alberta Environment. 2004c. Standards for Landfills in Alberta. <available online at
<http://www3.gov.ab.ca/env/waste/rr/pubs/StandardsForLandfills.pdf>>
- Alberta Environment. 2005. A Preliminary Survey on Pharmaceuticals and Endocrine Disrupting Compounds in Treated Municipal Wastewaters and Receiving Rivers in Alberta. <available online at
http://www3.gov.ab.ca/env/water/SWQ/assets/Pharmaceutical_Report_Final.pdf>
- Alberta Environment. 2005a. Alberta Environment website: Environmental Protection and Enhancement Act. Accessed January 13, 2006.
<<http://www3.gov.ab.ca/env/protenf/approvals/factsheets/enhanact.html>>
- Alberta Environment. 2005b. Alberta Environment website: Water Act Fact Sheets. Accessed January 16, 2006.
<<http://www3.gov.ab.ca/env/water/Legislation/FactSheets/Background.html>>
- Alberta Environment. 2005c. Alberta Environment website: Integrated Resource Management: Alberta's Commitment. Accessed January 16, 2006.
<<http://www3.gov.ab.ca/env/irm/index.html>>

Bibliography

- Alberta Environment. 2005d. *Places to look for funding in Alberta (January 2005)*. <available online at <http://landstewardship.org/documents/PlacestolookforfundinginAlberta.pdf>>
- Alberta Environmental Farm Plan. 2003. *Environmental Farm Plan: First Edition (workshop binder)*. Alberta Environmental Farm Plan.
- Alberta Fish and Game Association. *The Landowners Toolkit Series - Oil & Gas Development: Opportunities to Minimize Environmental Impacts on Your Land*.
- Alberta Infrastructure and Transportation. Alberta Infrastructure and Transportation website. Accessed March 2, 2006. <http://www.infratrans.gov.ab.ca/Commercial_Transportation/Dangerous_Goods_Handling/index.htm>
- Alberta Institute of Agrologists. 2005. *Environment for Growth: People to Water, Water to People - An Alberta Institute of Agrologists Discussion Paper*. Presented at the 2005 Banff Conference on Agriculture, Food and the Environment.
- Alberta Municipal Affairs website. *Safety Services*. Accessed January 15, 2006. <http://www.municipalaffairs.gov.ab.ca/ss_index.htm>
- Alberta Sustainable Resource Development. 2003. Alberta Sustainable Resource Development website: *Law*. Accessed January 13, 2006. <<http://www3.gov.ab.ca/srd/law.html>>
- Alberta Sustainable Resource Development. 2005. Alberta Sustainable Resource Development website: *Legislation and Info Sheets: 1. The Weed Control Act*. Accessed January 16, 2006. <http://www3.gov.ab.ca/srd/forests/health/w_legislation.html>
- American Forests. 2002. *Urban Ecosystem Analysis for the Washington DC Metropolitan Area: An Assessment of Current Conditions and a Resource for Local Action*. American Forests, Washington D.C.
- Arendt, R. 1999. *Growing Greener: Putting Conservation into Local Plans and Ordinances*. Island Press, Washington, D.C.
- Association of New Jersey Environmental Commission. 2002. *Municipal Options for Stormwater Management*. Association of New Jersey Environmental Commission, New Jersey.
- Benedict, Mark A. and Edward T. McMahon. 2001. *Green Infrastructure: Smart Conservation for the 21st Century*. Sprawl Watch Clearing House Monograph Series. The Conservation Fund, Washington, D.C.
- Berdahl, L. 2003. *Looking West: A Survey of Western Canadians*. Canada West Foundation, Calgary, Alberta.



Bibliography

- Bow River Project. 2002. *Protection Riparian Areas: Creative Approaches to Subdivision Development in the Bow River Basin - A Guide for Municipalities, Developers and Landowners*. <available online at http://www.brbc.ab.ca/pdfs/brp_w.pdf>
- Briody, Fiona and Karen Yakimishyn. 2002. *Getting to Know Your Local Watershed*. Alberta Environmentally Sustainable Agriculture and Alberta Agriculture, Food and Rural Development.
- CAESA - Canada-Alberta Environmentally Sustainable Agriculture. 1998. *Agricultural Impacts on Water Quality in Alberta*. Canada-Alberta Environmentally Sustainable Agriculture Agreement. Lethbridge, Alberta.
- Canadian Environmental Assessment Agency. 2005b. Canadian Environmental Assessment Agency website: *Backgrounder: Canada-Alberta Agreement on Environmental Assessment Cooperation*. Accessed January 13, 2006. <http://www.ceaa-acee.gc.ca/010/0001/0003/0001/0001/bg050722_e.htm>
- Canadian Mortgage and Housing Corporation. 1996. *Infrastructure Costs Associated with Conventional and Alternative Development Patterns*. Ottawa: CMHC Socio-Economic Series, Issue 26.
- Canadian Mortgage and Housing Cooperation. 2002. *Sustainable Community Design Demonstrations in Okotoks, Alberta: Testing Consumer Receptivity*. Ottawa: CMHC Socio-Economic Series, Issue 111.
- Canadian Water and Wastewater Association. Website: *Sewer Use By-laws - Pre-treatment Devices*. Accessed December 1, 2005. <www.cwwa.ca/policy_e.asp#221>
- Canadian Wildlife Service. 1996. *Federal Policy on Wetland Conservation - Implementation Guide for Federal Land Managers*. Wildlife Conservation Branch, Canadian Wildlife Service, Environment Canada. <available online: <http://dsp-psd.pwgsc.gc.ca/Collection/CW66-145-1996E.pdf>>
- CBC News Online. *Pesticide alternatives*. May 23, 2003. <available online at <http://www.cbc.ca/news/background/pesticides/alternatives.html#top>>
- City of Calgary. *Integrated Pest Management Plan*. City of Calgary, AB. <available online at http://www.calgary.ca/DocGallery/BU/parks_operations/ipm.pdf>
- City of Edmonton. 2005. *The Master Composter/Recycler Resource Manual - 2005*. City of Edmonton, AB.
- City of Edmonton. 2006. *Drainage Services - Stormwater Quality Strategy*. City of Edmonton, AB. <available online <http://www.edmonton.ca/CityGov/ampw/StormwaterQuality06.pdf>>

Bibliography

- Condon, Patrick. 2005. *Building Better Compact Cities While Protecting and Restoring Green Infrastructure* (Presentation). <available online at www.sustainable-communities.agsci.ubc.ca/newsroom/portland.html (accessed November 7, 2005)>
- Cows and Fish. 2005. *Riparian Health Inventory Report*. City of Camrose, AB.
- Curran, Deborah. 2001. *Economic Benefits of Natural Greenspace Protection*. The POLIS Project on Ecological Governance and Smart Growth B.C. <available online at www.smartgrowth.bc.ca/downloads/Economic%20Benefits%20of%20Natural%20Green%20Space%20Protection.pdf>
- Curran, Deborah. 2003a. *A Case for Smart Growth*. West Coast Environmental Law, Vancouver, BC.
- Curran, Deborah. 2003b. *Smart Bylaws - Summary and Smart Bylaws Guide*. West Coast Environmental Law, Vancouver, BC.
- Don Watershed Regeneration Council. 2000. *A Time for Bold Steps: the Don Watershed Report Card 2000*. <available online at http://www.trca.on.ca/water_protection/strategies/don/>
- Entreprises Sibeca Inc. v. Frelighsburg (Municipality). 2004. 3 S.C.R. 304 at para. 38.
- Environment Canada d. Environment Canada website: *List of Canadian Programs, Initiatives and Guidelines Related to Road Salts*. Accessed November 14, 2005. <www.ec.gc.ca/nopp/roadsalt/reports/en/list.cfm>
- Environment Canada e. Environment Canada website: *National Action Plan to Encourage Municipal Water Use Efficiency*. Accessed October 31, 2005. <www.ec.gc.ca/water/en/info/pubs/action/e_action.htm>
- Environment Canada webpage (b). *Backgrounder: Ammonia in the aquatic environment*. Accessed October 31, 2005. <www.ec.gc.ca/CEPARRegistry/subs_list/Ammonia_BG.cfm>
- Environment Canada webpage (c). *Backgrounder: Chloramines*. Accessed October 31, 2005. <www.ec.gc.ca/CEPARRegistry/subs_list/Chloramines_BG.cfm>
- Environment Canada. 2002a. Environment Canada website: *Acts Administered by the Minister of the Environment: Canada Water Act*. Accessed January 11, 2006. <<http://www.ec.gc.ca/EnviroRegs/Eng/SearchDetail.cfm?intAct=1003>>
- Environment Canada. 2002b. Environment Canada website: *Acts Administered by the Minister of the Environment: Canadian Environmental Assessment Act*. Accessed January 11, 2006. <<http://www.ec.gc.ca/EnviroRegs/Eng/SearchDetail.cfm?intAct=1000>>
- Environment Canada. 2002c. Environment Canada website: *Acts Administered By Others With Environment Canada Assistance: Pest Control Products Act*. Accessed January 11, 2006. <<http://www.ec.gc.ca/EnviroRegs/Eng/SearchDetail.cfm?intAct=1032>>



Bibliography

- Environment Canada. 2002d. Environment Canada website: *Acts Administered By Others With Environment Canada Assistance: Pest Control Products Act-Pest Control Products Regulations*. Accessed January 11, 2006. <<http://www.ec.gc.ca/EnviroRegs/Eng/SearchDetail.cfm?intReg=116>>
- Environment Canada. 2002e. Environment Canada website: *Background: Canada's Water*. Accessed January 13, 2006. <http://www.ec.gc.ca/water/en/policy/pol/e_backg.htm>
- Environment Canada. 2003. Environment Canada website: *Prairie Provinces Water Board: Overview*. Accessed January 13, 2006. <<http://www.pnr-rpn.ec.gc.ca/water/fa01/fa01s01.en.html>>
- Environment Canada. 2004. *Code of Practice for the Environmental Management of Road Salts*. <available online at http://www.ec.gc.ca/nopp/roadsalt/cop/pdf/1774_EngBook_00.pdf>
- Environment Canada. 2004. Environment Canada website: *Environmental Acts and Regulations*. Accessed January 11, 2006. <<http://www.ec.gc.ca/EnviroRegs/eng/ceparegs.cfm>>
- Environment Canada. 2005. *2004 Municipal Water Use Report*. <available online at www.ec.gc.ca/water/en/info/pubs/sss/e_mun2001.htm>
- Environment Canada. 2005a. *Canada's Species at Risk Program: Questions and Answers on the federal Species at Risk Act*. Her Majesty the Queen in Right of Canada.
- Environment Canada. 2005b. Environment Canada website: *Law Enforcement: Species at Risk Act*. Accessed January 13, 2006. <http://www.cws-scf.ec.gc.ca/enforce/law_5_e.cfm>
- Environmental Law Centre. 1999. *Don't Ignore those Municipal Bylaws*. *Environmental Law Centre News Brief*: vol.14 no.3, 1999. <available online at www.elc.ab.ca/publications/NewsBriefDetails.cfm?id=651>
- Environmental Law Centre. 2003. *The ABC's of Environmental Jurisdiction: An Alberta guide to federal, provincial and municipal responsibility*. Environmental Law Centre, Edmonton, AB.
- Evergreen b. *Urban Green Space Makes Economic Sense*. Fact Sheet received at Evergreen workshop October 6, 2005.
- Evergreen. 2001. *Urban Naturalization in Canada: A Policy and Program Guidebook*. Evergreen, Toronto, ON.
- Evergreen. 2004. *Green Space Acquisition and Stewardship in Canada's Urban Municipalities: Results of a Nation-Wide Survey*. Evergreen, Toronto, ON. <available online at www.evergreen.ca - click on "Resources" and then "Common Grounds (communities)">
- Ewaschuk, Ernie. 2005. *Watersheds 101* (presentation). Land Stewardship Centre of Canada, Edmonton, AB.

Bibliography

- Falabi, J. A., C. P. Gerba, and M. M. Karpiscak. 2002. Giardia and Cryptosporidium removal from wastewater by a duckweed (*Lemna gibba* L.) covered pond. *Letters in Applied Microbiology* 34:384-387.
- Federation of Canadian Municipalities. 2002. *Bridging the Innovation Gap: Count Cities In*. Federation of Canadian Municipalities, Ottawa, Ontario.
- Fisheries and Oceans Canada. *Canada's Fishery Act: the Habitat Protection and Pollution Prevention Provisions of the Fisheries Act*. Communications Directorate, Fisheries and Oceans Canada, Ottawa, Ontario.
- Fisheries and Oceans Canada. 2004. *All-Terrain Vehicles, Fish Habitat, and You*. Central Arctic Region, Fisheries and Oceans Canada, Sarnia, Ontario.
- Fitch, L. and N. Ambrose. 2003. *Riparian Areas: A User's Guide to Health*. Lethbridge, Alberta: Cows and Fish Program.
- Gabor, T. Shane, April Kiers North, Lisette C. M. Ross, Henry R. Murkin, James S. Anderson and Mary Raven. 2004. *Natural Values - The importance of Wetlands and Upland Conservation Practices in Watershed Management: Functions and Values for Water Quality and Quantity*. Ducks Unlimited Canada.
- Government of Canada. 1991. *Canada's Federal Policy on Wetland Conservation*.
- Griffiths, M. and C. Severson-Baker. 2003. *Unconventional Gas: the environmental challenges of coalbed methane development in Alberta*. Pembina Institute for Appropriate Development. <available online at www.pembina.org/pdf/publications/CBM_Summary.pdf>
- Health Canada. 2005. Health Canada website: *Legislation: New Pests Control Products Act*. Accessed January 13, 2006. <<http://www.pmr-arla.gc.ca/english/legis/pcpa-e.html>>
- Heathcote, Isobel W. 1998. *Integrated Watershed Management: Principles and Practice*. John Wiley & Sons, Inc.
- Humber Watershed Alliance. 2003. 2003 Humber Watershed Progress Report. *Humber River Advocate: Fall 2003*. Ontario <available online at http://www.trca.on.ca/water_protection/strategies/humber/HumberAdvocate-fall2003.pdf>
- Keewatin Publications. 2003. *Supply, Quality and Use of Water in the Prairie Provinces: Alberta Edition*. Keewatin Publications.
- Kwasniak, Arlene J. 1997. *Reconciling Ecosystem and Political Borders: A Legal Map*. Environmental Law Centre, Edmonton, Alberta.
- Kwasniak, Arlene. 2001. *Alberta's Wetlands: A Law and Policy Guide*. Appendix. Environmental Law Centre and Ducks Unlimited Canada for the North American Waterfowl Management Plan. Edmonton, Alberta.



Bibliography

- Kwasniak, Arlene. 2005. The Potential for Municipal Transfer of Development Credits Programs in Canada. *Journal of Environmental Law and Practice*, vol. 15.
- Land Stewardship Centre of Canada. Website. Accessed March 23, 2006.
<<http://www.landstewardship.org/tpview.asp?id=37>>
- Mallet, James S. 2005. *Municipal Powers, Land Use Planning, and the Environment: Understanding the Public's Role*. Environmental Law Centre, Edmonton, Alberta.
- McFarlane, S. and E. Nilsen. 2003. *On Tap: Urban Water Issues in Canada*. Canada West Foundation, Calgary, Alberta.
- McKenzie-Mohr, Doug. 2005. Workshop. *Fostering Sustainable Behaviour - An Advanced Workshop on Community-Based Social Marketing*. February 11, 2005.
- McNaney, K. 2004. *Municipal Services: Part of the Western Cities Project (B.C.'s Agricultural Land Reserve touted as model for all of Canada)*. Canada West Foundation, Calgary, Alberta.
- Municipal Dispute Resolution Services website.
<<http://municipalaffairs.gov.ab.ca/ms/mediation/index.html>>
- National Guide to Sustainable Municipal Infrastructure. 2003. *Strategic Commitment to the Environment by Municipal Corporations*. A Best Practice by the National Guide to Municipal Infrastructure, Ottawa, ON.
- National Guide to Sustainable Municipal Infrastructure. 2003b. *Biosolids Management Programs*. A Best Practice by the National Guide to Municipal Infrastructure, Ottawa, ON.
- National Guide to Sustainable Municipal Infrastructure. 2003c. *Strategic Commitment to the Environment by Municipal Corporations*. A Best Practice by the National Guide to Municipal Infrastructure, Ottawa, ON.
- National Guide to Sustainable Municipal Infrastructure. 2003d. *Wastewater Source Control*. A Best Practice by the National Guide to Municipal Infrastructure, Ottawa, ON.
- National Guide to Sustainable Municipal Infrastructure. 2004a. *Optimization of Lagoon Operation*. A Best Practice by the National Guide to Municipal Infrastructure, Ottawa, ON.
- National Guide to Sustainable Municipal Infrastructure. 2003a. *Alternative Funding Mechanisms*. A Best Practice by the National Guide to Municipal Infrastructure, Ottawa, ON.
- National Wetlands Working Group. 1997. *The Canadian Wetland Classification System* (Second Edition).
- Nevada Division of Water Planning. *Dictionary: Technical Water, Water Quality, Environmental, and Water-Related Terms*.

Bibliography

- New Jersey Department of Environmental Protection. 1999. *Planning for Clean Water: the Municipal Guide*. NJDEP: Trenton, N.J. Division of Watershed Management.
- North Saskatchewan Watershed Alliance. 2005. *State of the North Saskatchewan Watershed Report 2005: A Foundation for Collaborative Watershed Management*. North Saskatchewan Watershed Alliance, Edmonton, AB.
- Olewiler, N. 2004. *The Value of Natural Capital in Settled Areas of Canada*. Published by Ducks Unlimited Canada and the Nature Conservancy of Canada. 36 pp.
- Primeau, S.N. (Editor). 2005. *Watershed Stewardship in Alberta: A Directory of Stewardship Groups, Support Agencies, and Resources*. Alberta Environment, Alberta Stewardship Network and Land Stewardship Centre of Canada. 103 pp.
- Quayle, Moura and S. Hamilton. 1999. *Corridors of Green and Gold: impact of Riparian Suburban Greenways on Property Values*. Fraser River Action Plan, Department of Fisheries and Oceans, Vancouver.
- Reynolds, Larry. 1993. "Environmental Regulation and Management by Local Public Authorities in Canada." 3 J.E.L.P. 41 p 76-77.
- Rutherford, Susan. 2004. *Ground Water Use in Canada*. West Coast Environmental Law, Vancouver, BC. <available online
<http://www.wcel.org/wcelpub/2004/14184.pdf>>
- Ryan, Laura and Karen Wilkie. 2005. *Finding Win-Win Situations: The Purchase and Transfer of Development Rights*. Canada West Foundation, Calgary, Alberta.
- Salomons, M.J. 2004 *Discussion Paper: Establishing an Edmonton Regional Land Trust*. Land Stewardship Centre of Canada, the Legacy Lands Conservation Society and the Natural Areas Advisory Committee. Edmonton, Alberta.
- Saure, Amanda. 2002. *The Values of Conservation Easement* discussion paper, World Resources Institute, presented by West Hill Foundation for Nature, December 1, 2002.
- Smart Growth BC. Website. Accessed April 22, 2006. <<http://www.smartgrowth.bc.ca>>
- Special Areas Board website. *History*. Accessed January 15, 2006.
<<http://www.specialareas.ab.ca/prod02.htm>>
- Stephens, K., P. Graham and D. Reid. *Stormwater Planning: A Guidebook for British Columbia*. British Columbia Ministry of Environment. <available online:
<http://www.env.gov.bc.ca/epd/epdpa/mpp/stormwater/stormwater.html>>
- The Ag Summit Collection of Action Team Reports. 2002a. *Environmental Stewardship Action Team Strategic Action Plan*. Prepared by Eg Environmental Inc. March 2002. Agrivantage. Canada.



Bibliography

The Ag Summit Collection of Action Team Reports. 2002b. *Towards the Development of a Provincial Land Use Strategy for Alberta. An Agricultural Perspective*. Prepared by Land Use Core Action Team (LUCAT). April 2002. Agrivantage. Canada.

Town of Espanola. Website. Accessed February 5, 2006.
<<http://www.town.espanola.on.ca/Municipal/mbylaws.htm>>

United States Environmental Protection Agency. 1999. *Preliminary Data Summary of Urban Stormwater Best Management Practices*.

Valiente, Marcia. 2002. "Turf War: Municipal Powers, the Regulation of Pesticides and the Hudson Decision." 11 J.E.L.P. 325 [Turf War].

West Coast Environmental Law. 2003. *The B.C. Guide to Watershed Law and Planning*. West Coast Environmental Law, Vancouver, BC. <available online at <http://www.bcwatersheds.org/issues/water/bcgwlp/n1.shtml>>

Wilkie, Karen. 2005. *Balancing Act: Water Conservation and Economic Growth - Water and Economic Growth Initiative Consultations Summary*. Canada West Foundation, Calgary, Alberta.

Worbets, B. and L. Berdahl. 2003. *Western Canada's Natural Capital: Towards a New Public Policy Framework*. Canada West Foundation, Calgary, Alberta.



