

Watershed Land Use Planning Toolbox

For Watershed Management Planning



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Parkland County

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NOTE: The Toolbox should be used as a reference document and does not commit the County to fund or resource any programs, projects or steps reflected in the Wabamun Lake Sub-Watershed Land Use Plan Toolbox –it is solely for information and reference for future sub-watershed planning.

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Watershed Land Use Planning Primer

Phase 1

Programs

Know your local programs

- Alberta Lake Management Society- Lake Watch
- Alberta Riparian Habitat Management Society - Cows & Fish
- Alberta Environment and Parks
- Living by Water
- Alberta Stewardship Network
- North Saskatchewan Riverkeeper
- Watershed Resiliency and Restoration Program

Grants \$

Where can you find grants?

- Alberta Community Resilience Program
- Alberta Conservation Association
- Alberta Ecotrust Grants
- Alberta Land Stewardship Centre
- Creative Sentencing Funds
- Green Municipal Fund
- Growing Forward 2
- RBC Blue Water Project
- Watershed Resilience and Restoration Program

Initial Steps

Initial Steps

- Create a Watershed Group
- Prepare a State of the Watershed Report
- Create a Land-Use Plan
- Identify outcomes, objective and indicators
- Confirm local support for your plan
- Review available reference material for Watershed Management Planning

Phase 2

Watershed Management Planning

Implementation Checklist



Establish an Implementation Committee

- Establish municipal partnerships
- Technical Task Groups
- Scientific community- technical members
- Address Gaps
- Area Residents



Monitor indicators

- Create Scorecards and report on performance



Desktop Mapping

- Identify priority areas (VECs, ESAs), establish habitat corridors, determine indicator sites



Use Existing Directives and Tools to Establish Guidelines and Restrictions for Land Use Practices



Amend bylaws and policies to further achieve outcomes (Land Use Bylaws)



Engage the Public and Stakeholders

Phase 1

1 Local Watershed Programs

Before initiating the Watershed Management Planning Process, it is important to identify existing local and provincial watershed management initiatives. In many cases, these organizations will provide direction, data, educational materials, planning support, project implementation support, or financial support. The following organizations are beneficial in Watershed Management Planning:

Alberta Lake Management Society - LakeWatch

LakeWatch is a water quality monitoring program established through the Alberta Lake Management Society (ALMS). Water quality data is collected from lakes through the summer months and summarized. Over the past 20 years, LakeWatch has collected data at over 200 Alberta Lakes.

How can they help: ALMS can provide technicians to sample your lake and provide a water quality report for free. They also provide educational and outreach material on lake management strategies.

<http://alms.ca/about-lakewatch/>

Alberta Riparian Habitat Management Society - Cows & Fish

Established in 1992, Cows & Fish is a not-for-profit habitat management society. This society assesses riparian health and develops and delivers awareness and education programs to the public, producers, and land managers about managing, maintaining, and protecting riparian areas. The programs highlight methods to increase productivity and retain value of property. Cows & Fish are also actively involved in riparian management and have developed many tools for assessing riparian health.

How can they help: Cows & Fish can assess riparian health within a watershed for a fee and provide outreach material on riparian management programs and land use practices.

<http://cowsandfish.org/>

Alberta Environment and Parks

Alberta Environment and Parks (AEP) is the main regulator regarding shoreline activities. They provide high-level information regarding water management activities, and policies and laws regarding water management.

How can they help: AEP can provide information and direction on watershed management activities.

http://healthyshorelines.com/media/The_Law_and_the_Lake.pdf

<http://aep.alberta.ca/lands-forests/shorelands/lakeshores/default.aspx>

<http://aep.alberta.ca/water/programs-and-services/respect-our-lakes/lake-information.aspx>

<http://aep.alberta.ca/water/programs-and-services/respect-our-lakes/lake-stewardship.aspx>

<http://aep.alberta.ca/water/water-conversation/documents/WaterFuture-ConversationAlbertans-Feb2013.pdf>

Nature Alberta - Living by Water

The Living by Water program provides information to Albertans about healthy shoreline living. This initiative provides education to lake shore property owners on the importance of maintaining natural lake ecosystems. The program strives to provide a balance between preservation and supporting recreational use.

How can they help: They provide outreach material on maintaining healthy shorelines. Lake management groups can also opt into the Love Your Lake program, which provides free shoreline assessments.

<http://naturealberta.ca/programs/living-by-water/>

<http://www.loveyourlake.ca/>

Alberta Stewardship Network

The Alberta Stewardship Network assists stewardship groups by providing sources of stewardship tools and access to stewardship resources. They also assist with volunteer recruitment and funding opportunities for stewardship activities. Every active stewardship group in Alberta can be found there.

How can they help: Provide financial support, resources for stewards, guidance on stewardship programs, and assists in providing volunteers for stewardship activities.

<http://www.landstewardship.org/ASN/>

North Saskatchewan Riverkeeper

North Saskatchewan Riverkeeper is a group dedicated to managing and preserving the North Saskatchewan River watershed. They provide educational material and awareness, and actively engage in pollution and water quality monitoring projects within the watershed. Additionally, Riverkeeper provides ongoing support and implementation for water quality research and remediation projects that occur within the North Saskatchewan River watershed.

How can they help: Assist in water quality monitoring, and provide outreach material on watershed health and water quality.

<http://saskriverkeeper.ca/>

Watershed Resiliency and Restoration Program

The Watershed Resiliency and Restoration Program is an Alberta Environment and Parks' initiative that aims to reduce the effects of flooding by implementing watershed mitigation measures. The program also aims to enhance and restore priority areas that have been degraded within watersheds, as well as provide education and conservation initiatives for citizens living within the watershed.

How can they help: Provide funding opportunities for stewardship activities, and provide outreach materials on flood mitigation and watershed health.

<http://aep.alberta.ca/water/programs-and-services/watershed-resiliency-and-restoration-program/default.aspx>

2 Where can you find grants?

Prior to Watershed Management Planning, outside funding sources should be identified to determine whether potential watershed management projects could receive grant funding. The following organizations typically provide funding to municipalities or non-profit organizations to support environmental education, stewardship, or remediation projects:

Alberta Community Resilience Program

The Alberta Community Resilience Program provides funding for initiatives that work to improve long-term resilience to flood and drought events by improving watershed health. Funding is available for projects in the areas of:

- Enhance or enable protection of critical infrastructure, and/or
- Mitigate public safety hazards

<http://aep.alberta.ca/water/programs-and-services/alberta-community-resilience-program/default.aspx>

Alberta Conservation Association

The Alberta Conservation Association (ACA) provides funding for projects that work to promote ACA's initiatives in the areas of:

- Fish and wildlife management programs
- Habitat restoration for fish and wildlife populations
- Education and outreach programs promoting conservation

<http://www.ab-conservation.com/grants/aca-grant-programs/>

Alberta Land Stewardship Centre

The Land Stewardship Centre provides funding opportunities for projects in the areas of:

- Maintaining healthy aquatic ecosystems
- Securing safe drinking water
- Establishing a sustainable economy around water quality

<http://www.landstewardship.org/news/2016/dec/21/great-news-community-stewardship-groups/>

Alberta Ecotrust Grants

Alberta Ecotrust is a partnership between the corporate sector and the environmental community. They invest in the people and projects that protect natural systems through three programs: environmental grant making, capacity building, and community collaboration. Most notably, Alberta Ecotrust provides funding for projects that promote:

- Sustainable land use
- Protecting or restoring natural areas
- Maintaining health and integrity of waterbodies

<http://albertaecotrust.com/>

Creative Sentencing Funds

Creative Sentencing Funds refer to funds that are paid as a penalty after prosecution of an environmental offense. Creative sentencing funds are typically applied in the geographic area that the offense occurred in, and tend to reflect the nature of the offense. These funds are available irregularly, and there is no formal grant application process. To be eligible to receive funding, organizations must share information on ongoing and proposed projects with the Creative Sentencing Program Liaison.

<http://aep.alberta.ca/about-us/compliance-assurance-program/creative-sentencing/default.aspx>

Green Municipal Fund

The Federation of Canadian Municipalities provides funding for municipal development projects that support:

- Sustainable land use
- Sustainable neighbourhood plans
- Capital projects in water use

<http://www.fcm.ca/home/programs/green-municipal-fund/what-we-fund/eligibility.htm>

Growing Forward 2

The Growing Forward 2 program provides funding for innovative initiatives in the areas of:

- Research and Innovation
- Environmental Stewardship
- Water Management

http://www.growingforward.alberta.ca/AboutGrowingForward/index.htm?contentId=CDF_AB_T_GF2&useSecondary=true

RBC Blue Water Project

RBC provides funding for projects that support:

- Sustainable water use within municipalities
- Watershed protection
- Education programs surrounding sustainable water use

<http://www.rbc.com/community-sustainability/environment/rbc-blue-water/about/index.html>

Watershed Resiliency and Restoration Program

Provides funding for projects that improve natural watershed functions through:

- Conservation projects
- Education and stewardship initiatives
- Watershed restoration and enhancement projects

They currently have regional priority areas listed and Parkland County is a priority area.

<http://aep.alberta.ca/water/programs-and-services/watershed-resiliency-and-restoration-program/default.aspx>

3 Initial Steps

Once local watershed management programs and potential funding sources have been researched, the initial steps of Watershed Management Planning can be completed. The preliminary steps are as follows:

Create a Watershed Group

Watershed Management Planning should be a collaborative effort, with input and participation from various stakeholder groups. Establishing a watershed working group will ensure that the shared outcomes of multi-stakeholders are attained and implementation goals are met. The watershed working group should consist of representatives from:

- Provincial Government
- Municipal Government
- Federal Government
- First Nations and Metis
- Industry Stakeholders
- Municipality residents and members of the public
- Local environmental organizations
- Local special interest groups
- Academic organizations

Prepare a State of the Watershed Report

A State of the Watershed Report is necessary to understand the overall health of the specific watershed. The report will summarize all available data on health, condition, and physical properties of the watershed. The report will also identify any threats facing the watershed, including inappropriate land use practices.

A State of the Watershed Report should include:

- An Introduction
 - Purpose and Scope of Report
- Public Input and Concerns
- Existing Plans and Programs
- Watershed Characteristics
 - Description of Watershed
 - Climate
 - Land Cover types within the Watershed
 - Fish and Wildlife
 - Soils and Topography
 - Hydrology and Drainage
 - Air Quality

- Land Use and Social Resources
 - History of development
 - Agricultural Resources
 - Forestry Resources
 - Oil and Gas/Mining Resources
 - Recreational Resources
 - Water Supply and Wastewater
 - Riparian Health
 - Wetland Inventory
- Surface Water Quality
 - Water Quality Parameters
 - Pollutant Point Sources
 - Aquatic Ecosystem Health
 - Public Health
- Surface Water Quantity
 - Lake Water Levels
 - Water Allocations
 - Water Conservation Objectives
- Challenges Facing Watershed Planning
- Stewardship Opportunities

The Government of Alberta has published a handbook to guide Watershed Groups through the State of the Watershed Report process. This guide, the Handbook for State of the Watershed Reporting, provides tips and recommendations for State of the Watershed Reporting, including a recommended Table of Contents. The document can be accessed at:

http://www.landstewardship.org/media/uploads/Handbook_for_State_of_the_Watershed_Reporting_Nov2008.pdf.

Create a Land-Use Plan

After completion of the State of the Watershed Report, a Land-Use Plan may be developed. A Land-Use plan identifies desired objectives for balancing development and watershed health. The Land-Use Plan is a collaborative effort between all stakeholders to identify current and future pressures on the watershed, and predominantly outlines actions that can be taken by Municipalities, planners, and developers to ensure that these pressures are minimized within the watershed. Stakeholders and the public should be consulted, and can contribute ideas through Open House meetings and planning meetings.

A Land-Use Plan should include:

- Identification of Current Land Uses within the Watershed
- Contributing Jurisdictions in the Watershed
- Desired Outcomes on Watershed Health
 - Objectives to Achieve Desired Outcomes
 - Tasks to Achieve Desired Objectives

- Desired Outcomes and Objectives for Development within the Watershed
 - Objectives to Achieve Desired Outcomes
 - Tasks to Achieve Desired Objectives
- An Implementation Plan

A clear, well-defined Land-Use Plan is needed to direct the Watershed Management Plan. Outcomes and Objectives outlined in the Land-Use Plan will help identify regulatory and non-regulatory actions that can be developed within the Watershed Management Plan.

Identify Outcomes, Objectives, and Indicators

After identifying desired outcomes and objectives in the Watershed Land-Use Plan, the Watershed Group will need to develop means to achieve these goals. Based on watershed health issues or potential threats identified in the State of the Watershed Report, the group should determine priority goals for restoration and management. Specific targets should be identified, as well as means to attain those targets, and how those targets can be measured. For example, past lake watershed plans have focused on the protection of the source water as a drinking water source.

Environmental indicators should be identified to measure success, as well as a means to monitor these indicators. Indicators should be specific measurable attributes of the watershed that be monitored to reflect the condition of the ecosystem over time.

Indicators should be:

- Specific (definable and clear)
- Measurable
- Achievable
- Relevant
- Time specific

Indicators fit into three categories: Condition Indicators, Pressure Indicators, and Response Indicators.

Condition Indicators refer to measurable aspects of the physical, biological, or chemical properties of the watershed that reflect the health of the environment.

Pressure Indicators are natural or anthropogenic processes that impact the health of the watershed, such as water allocation or soil erosion.

Response Indicators refer to action items that are implemented to address watershed health issues. These include municipal bylaw amendments or stewardship programs. The Watershed Group should identify which Indicators are important for the development of the Watershed Management Plan, and then setup parameters surround those Indicators.

For example, water quality is typically used as an indicator of environmental health and the progress of remediation and land use plans. To effectively monitor water quality, sample sites must be established in several areas within the watershed, and water samples should be taken periodically to monitor changes in water quality. Professional help should be sought when establishing a sampling plan to ensure results can be statistically evaluated. Certified labs and proper due diligence when collecting

samples by qualified personnel, including collecting replicate samples, will ensure the integrity of your results. The Watershed Group will need to outline how many sample sites should occur in the watershed, where those sample sites are, and what the timeline for water sampling will be. Additional indicators could include water quantity, fish community structure, or riparian health.

Confirm Support for Plan

The Watershed Group should confirm funding support, academic support, and landowner support before continuing with the Watershed Management Plan. Multi-stakeholder support will be necessary for the success of all desired outcomes, and all stakeholders should receive continued communication throughout all stages of the Watershed Management Plan.

Useful Reference Material for Watershed Management Planning

- [Framework for Water Management Planning¹ – undated – \(Government of Alberta\)](#)
- Guidebook to Water Management – 2002 – (Bow River Basin Council)
- [Handbook for State of the Watershed Reporting: A Guide for Developing State of the Watershed Reports in Alberta – 2008 \(Government of Alberta\)](#)
- [Stepping Back from the Water – 2012 – \(Government of Alberta\)](#)
- [Model Land Use Bylaw – 2013 – \(Judy Stewart, for the Pigeon Lake Watershed Management Plan Steering Committee\)](#)
- [Guide to Watershed Management Planning in Alberta - 2015 \(Government of Alberta\)](#)
- [Workbook for Developing Lake Management Plans in Alberta – 2015 \(ALMS\)](#)
- [A Quick Guide to Watershed Management Planning \(ALMS\)](#)

Phase 2

4 Establish an Implementation Committee

An Implementation Committee will ensure that all desired outcomes and objectives are completed on time. Currently Action Plan partners exist to help a municipality achieve objectives put forth in the Watershed Implementation Plan. These partners consist of municipalities and watershed councils including:

- adjacent municipalities such as, counties, towns or cities, summer villages and villages

¹ The Framework contains a central chapter entitled the *Strategy for the Protection of the Aquatic Environment*. The Strategy affirms the Government of Alberta’s commitment to not only maintaining and restoring the aquatic ecosystem **but also enhancing it**. The Government of Alberta is committed to making resource decisions within the context of this strategy.

- the Government of Alberta (GOA)
- industry professionals, power generation, mining, oil and gas, agriculture and others
- A Watershed Management Council
- First Nations
- the North Saskatchewan Watershed Alliance (NSWA)

Identified partners should form a committee to ensure continued communication and success of desired outcomes. However, an Implementation Committee should also include members from the scientific and academic communities to ensure scientific integrity and sound decision making. Examples of organizations from the scientific community consist of:

- University of Alberta and other academic institutes
- Alberta Lake Management Society
- Environmental consultants and advisors

The Implementation Committee should also involve and engage the public and residents of the watershed to consider various perspectives and ensure continued support for activities outlined in the Watershed Management Plan. Members of the Implementation Committee should have a variety of assets and skills, including project management, communication skills, scientific knowledge, and public engagement experience. In addition to ensuring that implementation actions are completed, the Implementation Committee should also actively engage in monitoring activities and progress reporting, as well as continually identify funding opportunities for implementation activities.

In addition to an Implementation Committee, Working Groups should be utilized to achieve the desired outcomes of the management plans. Working Groups can consist of members of the Implementation Committee, but may also consist of a more technical group made up of scientific experts or consultants. Working Groups can provide more information to direct management plans, and can produce progress reports to guide decision making. For example, a Working Group could be created that is responsible for monitoring water quality and generating ongoing reports on the state of water quality within the watershed.

5 Monitoring Indicators

The goal of monitoring indicators is to gather information on possible indicators of watershed health. Typically, indicators have associated thresholds or limits associated with them. Thresholds can be associated with acceptable limits or health.

An example of monitoring indicators for determining watershed health is water quality monitoring. Water quality monitoring programs work towards fulfilling goals set by the Watershed Management Plan. Water quality monitoring programs aim at improving source water quality in the watershed for the regional drinking water supply as well as improving the health of riparian areas and the overall watershed. Monitoring programs also ensure the health of the aquatic ecosystems and identification of any issues that surrounding land use practices may have on water quality.

A water quality indicator would meet **Outcome 1 – Objective 1: Our Land Use Practices Improve Surface Water Quality**, however, additional objectives may require identification of other indicators. Working groups and the Implementation Committee are responsible for determining specific indicators for specific outcomes.

Water Quality Monitoring Plan how to:

1. Select specific sites that are of interest or suspected to need improvement. Select sites that can be sampled consistently on an annual basis.
2. Select parameters for sampling (e.g. water chemistry, pesticides, coliforms and total nutrients)
3. Set thresholds for parameters. Thresholds determine acceptable limits within a healthy system (Canadian Environmental Quality Guidelines, Alberta Surface Water Quality Guidelines)
4. Develop a scoring system for ranking health/quality of each site
5. Continue to monitor and compare results overtime
6. Develop strategies and plans for improving sites that are ranked poorly
7. Create scorecards to assess and rank sites

Score card example

A score index considers the number of times a parameter exceeds guidelines and the magnitude of these exceedances. An index percentage score is given for each site, with 100 being the best water quality and 0 being the poorest. From these percentages, a water quality rating can be obtained for each site.

Percent Score	Rating
96-100	Excellent – Guidelines are always met, best water quality
81-95	Good – Guidelines are occasionally exceeded, but usually by small amounts
66-80	Fair – Guidelines are sometimes exceeded by moderate amounts; occasionally water quality is undesirable
46-65	Marginal – Guidelines are often exceeded, sometimes by large amounts
0-45	Poor – Guidelines are always exceeded by large amounts, water quality is below desirable levels, poorest quality

6 Desktop Mapping

A critical step in the Watershed Management Planning phase is to complete desktop mapping exercises. Spatial processing and analysis of available data in a watershed can direct the management planning process in that priority areas for remediation, conservation, and sampling can be identified. Desktop mapping can help achieve desired outcomes and objectives in several ways:

Outcome 1: Our Land Use Practices Protect the Environment

Objective 1: Our Land Use Practices Improve Surface Water Quality

A desktop mapping exercise is needed to determine areas where surface runoff of contaminants may potentially be high. These include feedlot operations, agricultural areas, and industrial areas. Identification of exact source areas of pollutants will help identify which bylaws will need to be reviewed and amended in the future, and will help establish priority areas for future remediation and water quality monitoring work.

Objective 2: Our Land Use Practices Improve Groundwater Quality and Quantity

A desktop mapping exercise is needed to determine areas of groundwater recharge and potential point-source for groundwater contamination. Identification of these areas will help establish areas for future groundwater protection, including bylaw review and amendment, establishment of environmental reserves in groundwater recharge areas, and priority areas for future remediation.

Objective 3: Our Land Use Practices Improve Upland/Riparian Health

To reduce fragmentation and create connectivity corridors in upland areas, spatial analysis of the sub-watershed area is needed. A desktop mapping exercise could easily identify suitable areas of upland connectivity that could be set aside as municipal reserves, as well as identify areas that should be priority for future remediation work. Desktop mapping could also identify areas that would be suitable for the development of off-road trails and recreational areas.

Outcome 2: Our Land Use Practices Provide Economic Opportunities That Support the People and Health of our Watershed

Objective 1: Our Land Use Practices Attract Economic Opportunities that Support the People and Health of our Watershed

A desktop analysis would identify target areas for agricultural development, as well as areas that should be set aside for non-agricultural use. Environmentally sensitive areas would be identified as areas that should not be developed, and that may be used to create a conservation network that can be linked by multi-use trails and recreation areas. Additionally, a desktop analysis could show areas that may be suitable for renewable energy development.

Outcome 3: Reduce the Environmental Impacts of Development

Objective 1: Our Land Use Practices Reduce the Environmental Impacts from Development

A desktop analysis would identify environmentally sensitive areas, location of wetlands, natural banks, and other natural features, allowing municipal planners to avoid these areas when planning roads, subdivisions, or industrial areas.

Checklist of suggested Desktop Assessments (including but not limited to)

- Biophysical Inventory and Assessment
- Wetland Inventory and Historical Inventory
- Identification of Environmentally Significant Areas (ESAs)
- Identification of Valued Ecosystem Components (VECs)
- Identification of high-risk pollutant areas
- Identification of groundwater recharge areas
- Riparian Health mapping
- Mapping of areas suitable for habitat connectivity
- Mapping of areas providing habitat for Species at Risk

7 Use existing directives and tools to establish guidelines and restrictions for land use practices

There are several directives and tools that currently exist to aid in the development of a Watershed Management Plan. These tools can be utilized to set specific guidelines for land use practices, such as determining development setbacks from waterbodies or establishing appropriate erosion and sediment controls. Establishing specific guidelines using these tools can help drive bylaw amendments and policy development. When implementing any of these tools, professional consultation may be used. Three tools to consider are:

- Stepping Back from the Water
- Riparian Setback Matrix Model
- Erosion and Sediment Control

Stepping Back from the Water

The Government of Alberta is working to operationalize Stepping Back from the Water in a Municipal Toolkit. The following sections have been substantively reproduced from the most recent draft of *The Municipal Toolkit to Implement Stepping Back from the Water* and reproduced with permission of the authors and the Province. *The Municipal Toolkit to Implement Stepping Back from the Water* is currently in draft, and may change from what is presented below.

Stepping Back From the Water: A Beneficial Management Practices Guide for New Development Near Water Bodies in Alberta's Settled Region (Stepping Back) (GOA, 2012) was adopted as a policy document by the GOA in 2012. In Stepping Back, the GOA recognized that healthy riparian lands perform watershed resiliency functions, including water quality improvement, flood attenuation, bank stabilization, and water storage and discharge, while providing habitat for biodiversity and social-ecological services for human benefit. The purpose of Stepping Back was to help municipalities establish appropriate setbacks from water bodies during 'new development' on privately-owned lands.

*Stepping Back is designed to be operationalized in the White Area of Alberta by municipal development authorities **at the water body scale** when private landowners or developers apply for subdivision approvals or development permits that may impact the water body or the adjacent riparian lands.*

Stepping Back helps municipalities determine appropriate development setbacks for riparian areas within their management area by considering site conditions including bank slope, presence of fish, and presence of vegetation, to calculate an appropriate buffer zone for individual waterbodies.

In 2014, in the South Saskatchewan Regional Plan, 2014-2024 (SSRP), the Government of Alberta (GOA) identified "enhanced integrated watershed management" as a plan outcome. Section 4.5 of SSRP stated that the GOA would "continue to increase knowledge and improve management of riparian lands within the region." One of the strategies to increase knowledge and improve riparian land management was to "encourage municipalities to use Stepping Back From the Water when establishing appropriate setbacks from water bodies to maintain water quality, flood water conveyance and storage, bank stability and habitat" (GOA, 2014:83-84).

Since the 2013 flood in the South Saskatchewan River Basin, the GOA has recognized that operationalizing Stepping Back should occur in municipalities across the Province and not just in the South Saskatchewan land-use planning region.

Process tools and tool-sets

*The Toolkit combines four interconnected and equally important 'tool-sets' or **processes** to delineate and manage riparian setbacks on private lands that can be characterized as:*

- a) scientific and technological processes;***
- b) legal and institutional processes;***
- c) private landowner's processes; and***
- c) collaborative partnership processes.***

The tool-sets are presented to address municipally identified implementation barriers. They reflect the roles and shared responsibilities of parties involved in riparian setback delineation and management, but at the municipal and water body scales.

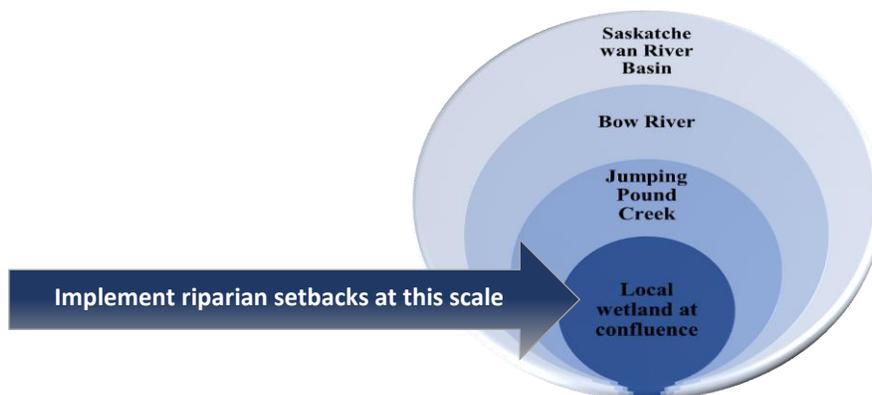
As proclaimed by the GOA in Water For Life: Alberta's Strategy for Sustainability (W4L) (GOA, 2003), conservation and management of water resources is the cornerstone to the province's social, economic and environmental sustainability. Conserving and managing riparian lands and wetlands has been identified as the cornerstone to increasing watershed resilience and mitigating water pollution, drought and floods, and increasing watershed resilience.

The GOA has directed that regional land use plans, such as LARP and the SSRP are to be developed at the ‘watershed-scale.’ However, a watershed, like the South Saskatchewan River Basin is a vast territory that includes many natural regions and nested social-ecological systems. Within each nested system, locally recognized social, cultural, economic, and ecological conditions exist that must be acknowledged and addressed through local policies and use of science and technology appropriate at that scale.

Within each of these nested scales, local water bodies function as the smallest ‘watershed- scale’, reflecting dynamic interactions between human land use patterns on riparian lands adjacent to water. However, it must always be recognized that ecosystems are interconnected and interrelated, meaning that negative impacts to even a small local waterbody can have negative impacts beyond private or municipal boundaries.

The figure below illustrates the nested scale of a local wetland. In this scenario, Stepping Back would be implemented at the wetland scale – a riparian setback would be delineated from the legal bank of the wetland (as determined by a surveyor) by a qualified expert using Stepping Back and this Toolkit.

Nested scale of a local water body (a wetland) in a river basin



Overview of Stepping Back’s 5 steps to riparian setback delineation

A five-step (linear) process for delineating riparian setbacks adjacent to water bodies on private lands during applications for new development is presented in Stepping Back (2012:17), as follows:

- Step 1: Define scenario**
- Step 2: Summarize key information**
- Step 3: Determine width of vegetated filter strip**
- Step 4: Determine setback relative to site constraints**
- Step 5: Additional considerations**

Each of these steps is to be conducted on **a case-by-case basis by a person or persons qualified to make these assessments.**

Qualified professionals ensure that the operationalizing of Stepping Back from the Water is conducted in a scientifically robust manner, and will address concerns brought forth by municipalities looking for better watershed planning tools. Implementation checklists, decision support tools, and access to resources such as wetland inventories and flood hazard areas will aid in the appropriate mapping and delineating of riparian boundaries. Stepping Back from the Water provides these technical tools and resources to help municipal planners get started with implementation and watershed management planning.

Implementing Stepping Back

To assist local lake land use planners and user groups in developing and implementing their plan, Stepping Back from the Water can be utilized by incorporating biophysical findings into a tangible action plan.

Step 1: Define the scenario

To define the physical scenario, both desktop applications and site investigations and assessments are required. These will help planners, engineers and consultants to understand the geopolitical and geophysical aspects of the parcel of land that is the subject of an application for a development permit or subdivision approval. For example, when defining the scenario during preparation for delineating riparian setbacks from water bodies in large greenfield areas, experts may be required to perform the following studies and assessments:

- Classification of water body (body of water, watercourse, wetland or ephemeral water body)*
- Assessment of permanence of water body*
- Determination of legal bank*
- General health of aquatic environment*
- General health of riparian landscape/amount of shear*
- General geography, geology*
- Local climatic conditions/precipitation*
- Proposed and adjacent land uses*
- Possibility of contamination from industry*
- Human access to water body*

Sample Step 1 checklist items:

- ✓ *Locate the parcel of land using satellite images or aerial photos such as Google Earth or similar products. Examine topographical and other features.*
- ✓ *Does the parcel contain one or more visible water bodies? **If yes – Stepping Back applies. If yes, classification of the water body is the first step.***

Aquifers are permanent and naturally occurring active water channels and are public water resources. Aquifers, floodplains and some wetlands will not be adequately visible with aerial imagery. If presence of such water bodies is known or suspected, further investigation by study of wetland mapping (for example mapping done by Ducks Unlimited Canada), wet areas mapping, flood hazard mapping and/or drilling logs will be required to ensure proper delineation of all water bodies present.

- ✓ *If the water body is identified as a 'wetland' as defined under Alberta's legal system, and the proposed new development will disturb the wetland, **then the Alberta Wetland Policy (GOA:2014) and implementation plan for the White Area will apply. See Wetland Impact Assessment Reporting in Appendix B.** In that case, follow the phased approach outlined in that policy and implementation plan.*
- ✓ ***Check to see if there is an existing flood hazard map for the water body.** Flood hazard maps delineate both the floodway and the flood fringe.*
- ✓ *If a water body is permanent and naturally occurring, then the bed and shore of the water body is owned by the Province by operation of law and is claimable as provincial public lands under section 3 of the Public Lands Act. This is the same for a river or stream or a pond or lake. **Check to determine if there are there any approved land-uses for the bed and shore of the water body.** These might include water wells in an aquifer, temporary or seasonal uses like docks, beach development or erosion controls. The GOA is currently drafting a new mooring policy.*
- ✓ ***Establish the legal bank of the water body on the subject parcel of land.** A surveyor is required to establish the legal bank of a water body. A surveyor marks the legal bank with survey pins.*
- ✓ *Sometimes the landowner's land title indicates that he or she owns the land to the "high water mark" of the water body. It is the responsibility of the landowner to know the extent of his or her title, because the shoreline of water bodies can migrate during the natural processes of accretion, erosion and avulsion.*
 - ✓ *During extended drought, the shoreline can migrate outward, exposing bed and shore which the private landowner can claim as accreted lands through a simple application to Alberta Environment and Parks, Public Lands Division. During extended wet periods, the shoreline can flood and migrate into a landowner's property and the Province can claim additional bed and shore covered by water for extended periods as public lands. At all times, a landowner is responsible for hiring the surveyor and getting survey pins put in to establish the legal bank and clarify land ownership.*
 - ✓ *Wet area mapping should also be consulted.*

Step 2: Summarize the key information collected in Step 1

Information collected in Step 1 is not much use as raw data – Step 2 requires an exploration of the current and projected functions of the riparian lands and the possibility of restoring critical riparian functions on degraded lands. These data sets of key information must be accumulated and analyzed:

- ✓ *Substrate*
- ✓ *Slope profile*
- ✓ *Condition of bank, toe and backshore*
- ✓ *Vegetation*
- ✓ *Instability of banks and surface materials*
- ✓ *Identification of 1:100 year floodplain (flood fringe area)*
- ✓ *Identification of the 1:20 year floodplain (flood way area)*
- ✓ *Identification of shallow groundwater*
- ✓ *Water quality – pH, temperature, etc.,*
- ✓ *Hydrogeology of the local watershed where the water body is located*
- ✓ *Identification of riparian land functions to be conserved, restored and managed including habitat and biodiversity and social-economic functions.*

Tools used to perform these investigations and identifications include GIS, LiDAR, aerial photography, Google Earth and historical photographs, online data banks and tools, professional checklists and investigative strategies, technologies and software applications.

Step 3: Determining the width of the vegetated filter strip

Based on the combined and analyzed data from Step 1 and Step 2, and using Table 3 of Stepping Back, plus effective protection of floodplains, alluvial aquifers and shallow groundwater, experts should be able to determine the width of the vegetated filter strip required to achieve the riparian setback functions that have been established as desired outcomes by the local municipal council following advice of appropriately qualified professionals. Step 3 is a complex design problem that can only be solved by working with citizens, landowners, planners and other staff. There are numerous criteria that should be used during these vegetated filter strip design processes, including but not limited to knowledge of the substrate and the pollutants that the riparian setback is expected to mitigate.

Table 3: Effective Widths for Vegetated Filter Strips

Type of Water Body	Substrate	Width	Modifiers	Notes
Permanent Water Bodies (Lakes, Rivers, Streams, Seeps, Springs) Class III – VII Wetlands	Glacial Till	20 m	If the average slope of the strip is more than 5%, increase the width of the strip by 1.5 m for every 1% of slope over 5%	Slopes > 25% are not credited toward the filter strip
	Coarse Textured sands and gravels, alluvial sediments	50 m	None	Conserve native riparian vegetation and natural flood regimes
Ephemeral and Intermittent Streams, Gullies	Not specified	6 m strip	If the average slope of the strip is more than 5%, increase the width of the strip by 1.5 m for every 1% of slope over 5%	Maintain continuous native vegetation cover along channels and slopes
Class I and II Wetlands	Not specified	10 m strip of willow and perennial grasses adjacent to water body	None	Maintain and conserve native wetland or marshland plants on legal bed and shore

Step 4: Determining riparian setbacks (buffers) relative to site constraints

In addition to the information provided in Steps 1-3, experts will need to perform studies to determine whether the vegetated filter strips designed in Step 3 need to have increased setbacks to achieve their desired functions. Some further considerations that may add additional setback width from the legal bank of a water body are as follows:

- *Unstable ground*
- *Slopes*
- *Shallow groundwater*
- *Floodplain*
- *Meanderbelts*

Step 5: Additional considerations

Sometimes, depending on the local social-economic conditions, or the existence of habitat for migratory birds, fish or species at risk, other social or ecological studies will need to be performed before riparian setback widths can be delineated and mapped. In some cases, legal and institutional reasons will dictate where the setback is located (e.g. municipal statutory planning documents and the local land use bylaw, or Alberta Energy Regulator land use decisions for oil and gas developments. The riparian setback (buffer) from the legal bank will contain the vegetated filter strip, and additional widths to address Steps 4 and 5 considerations.

Municipal policy for implementing Stepping Back

Municipal governments have jurisdiction and responsibility to develop a riparian setback delineation and management policy and create municipal bylaws to prohibit, or regulate and control development and buildings and human activities in riparian setbacks adjacent to water bodies located within municipal boundaries.

Riparian Setback Matrix Model

The following section is reproduced from *the Developer's Guide to the Riparian Setback Matrix Model for Use by Parkland County* (Aquality, 2015, pages 3-5), and is reproduced with permission by the author.

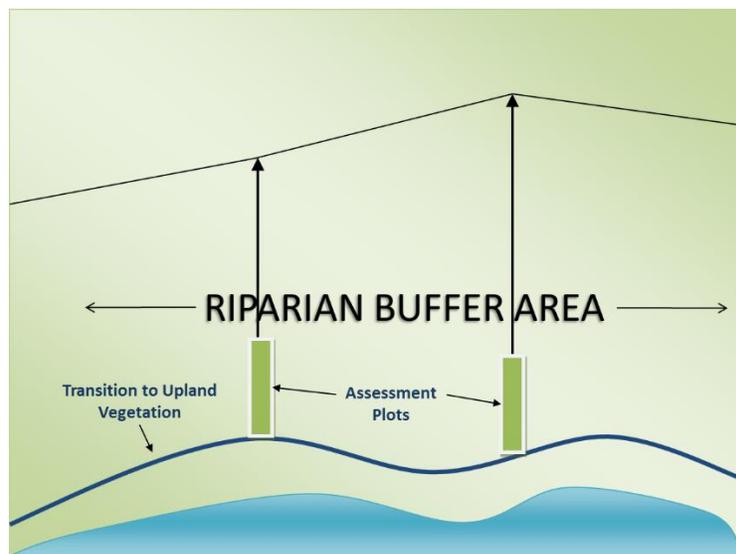
Under the *Municipal Government Act (MGA)*, setbacks around waterbodies (in the form of development setbacks or environmental reserves) can protect waterbodies from pollution and to allow for public access. Under the MGA, a minimum 6 meter setback is specified for areas where they are to be implemented. Also, the MGA does not specify a maximum setback. However, independent research has shown that this minimum 6 meter buffer is often woefully inadequate for protecting waterbodies from pollution (in particular, sediment and nutrients). Some municipalities have enacted larger buffers around all waterbodies to increase protection, but have generally used uniform, fixed-width buffers (e.g. 30 meters) that do not account for variations in site conditions that might require larger setbacks (or allow smaller setbacks) to provide an adequate level of protection. The arbitrary nature of these fixed-width buffers led to them frequently being overturned on appeal to the Alberta Subdivision and Development Appeal Board.

The Riparian Setback Matrix Model (RSMM) incorporates such features as vegetation type and abundance, bank slope and height, groundwater influence, and various soil characteristics to determine the most appropriate setback distance. It can also be adapted to the intended role of the setback; setback distances can be increased to improve removal of nutrient pollutants or maintenance of wildlife corridors are key, or reduced if the intended function is to increase bank or shoreline stability and integrity.

The Riparian Setback Matrix Model is a scientifically-established, peer-reviewed tool that has been developed for creating setbacks around waterbodies that provides a similar degree of protection between parcels by adjusting setback distances to account for site-specific conditions. It was created to address the extensive research demonstrating that the *minimum* six meter buffer specified under the

MGA was inadequate for protecting the aquatic environment, and that fixed-width buffers used in some jurisdictions were arbitrary and had no scientific justification. Versions of the model have been developed for municipalities across the province, including Lac La Biche County, Sturgeon County, the City of Grande Prairie, Leduc County, Parkland County, and the Municipal District of Foothills.

Each municipality develops its own criteria for the model, based on which aspects of the environment are the most sensitive to disturbance and based on development priorities. However, despite these differences, the ranges of expected setbacks have proven to be largely similar between jurisdictions. This is because all the versions of the model, despite small differences in how they are parameterized, largely account for a similar suite of environmental factors in a similar fashion: sites with steep slopes, shallow groundwater, poor or low vegetation cover, or adjacent to especially sensitive water bodies require larger setbacks, while sites with shallow slopes, deep groundwater, dense vegetation cover, or adjacent to less sensitive water bodies require smaller setbacks.



Schematic of application of Riparian Setback Matrix Model to a property bordering a body of water. Figure courtesy of Aquality Environmental Consulting Ltd. (2015).

While similar to *Stepping Back from the Water*, the RSMM offers a more specific guideline for setbacks within a watershed. Using desktop mapping and spatial analysis, specific setbacks can be calculated for individual waterbodies based on selected parameters. For Parkland County, a map of potential setbacks has been created around all waterbodies within the County. This map was created to allow a quick and easy visualization of setbacks that were determined in a rigorous and consistent fashion across the County. Because it was created using existing data, the map allows setbacks to be established without a site visit, allowing greater transparency in development rules and requirements, as they can be determined in advance for any parcel early in the application process. It also expedites permitting for developments and reduces costs to developers because additional field studies are not required.

Erosion and Sediment Control Measures

Accelerated erosion and sedimentation of soils around construction sites can greatly reduce water quality, particularly in fish-bearing waterbodies. Fine particulate matter from sedimentation is a primary cause of fish mortality. To ensure that construction, agricultural, and industrial activities have a minimal impact on water quality in the watershed, a well-developed Erosion and Sedimentation Control Plan is needed. Environmental Construction Operations (ECO) Plans can also provide guidelines for sediment control, however, an Erosion and Sediment Control Plan provides a more robust, comprehensive guide for water quality and fish habitat protection in construction areas. An Erosion and Sedimentation Control (ESC) Plan can be used by contractors, developers, and consultants doing work within the watershed that results in ground disturbance. ESC Plans are required for all projects within the watershed, and will need to be completed by an individual with experience in the design and installation of Best Management Practices and Erosion and Sediment Control measures. Experienced individuals such as biologists, engineers, or planners can provide input on the ESC plan, but the final plan must be stamped by a qualified Professional Engineer, a Landscape Architect, or a Certified Professional in Erosion and Sediment Control (CPESC). Suggested parameters that should be considered in an ESC Plan are:

- Phased construction that will limit soil exposure
- Practices that minimize needless soil stripping or grading
- Immediate stabilization of exposed soils
- Prioritized protection of waterways and steep slopes
- Understanding of when ESC measures are required
- Properly installed perimeter controls
- Implementation, inspections, and maintenance of ESC measures

Using current Best Management Practices, items needed to develop an Erosion and Sediment Control Framework may include compile sewage system information, drainage system information, Best Management Practices, and Municipal bylaws to provide guidance for all ESC plans developed within the management area. Additionally, the Framework may include watershed data, including:

- The watershed boundaries and mapped developments in relation to it
- Detailed mapping of all waterbodies within the development area
- Description of natural storage and drainage
- Identification of pre-development flows
- Topography
- Identification and proposed use of natural features
- Identification of areas on or adjacent to the site that are or may be susceptible to erosion
- Identification of permanent ESC measures/BMP

A well-developed ESC Framework and subsequent ESC plans for all developments within the watershed will ensure that the Watershed Management Plan objectives to improve water quality and reduce impact on the environment are met.

Using these toolboxes will primarily establish buffers around waterbodies. By utilizing these tools, the following outcomes and objectives can be addressed:

Outcome 1: Our Land Use Practices Protect the Environment

Objective 1: Our Land Use Practices Improve Surface Water Quality

Creating buffers around waterbodies within the watershed and reducing sedimentation and erosion into waterbodies will improve water quality and fish habitat.

Objective 3: Our Land Use Practices Improve Upland/Riparian Health

Creating appropriate setbacks in riparian areas will ensure that they remain undisturbed and can continue to function as healthy ecosystems.

Outcome 3: Reduce the Environmental Impacts of Development

Objective 1: Our Land Use Practices Reduce the Environmental Impacts from Development

Developing appropriate setback distances and developing a strong erosion and sediment control plan will ensure that future developments within the watershed will have a minimal impact on watershed health.

8 Amend Bylaws and Policies to Reflect Objectives

In order to achieve the outcomes and objectives outlined in a lake use plan, watershed planning groups may need to propose changes to existing municipal bylaws, including the Municipal Development Plan (MDP), the Land Use Bylaw (LUB), Area Structure Plans (ASP), and other municipal documents. LUBs are influenced by various sources of law, including federal and provincial laws for environmental protection and water management. For this reason, a lawyer who is familiar with land use and water law and the special considerations of lakeshore development and water quality protection should be consulted.

To complete a municipal bylaw review, the Implementation Committee will first need to come up with generalized, themed policy statements that reflect the desired objectives. The following policy statements from the Pigeon Lake Model Land Use Bylaw may be used to guide bylaw provisions for a Watershed Management Plan.

The following sections are reproduced substantively from the *Pigeon Lake Model Land Use Bylaw* (Stewart, J., 2013, pages 6, 21-26) and are reproduced here with permission from the author.

Note: the following are for example purposes only.

The following Model Land Use Bylaw Lakeshore Environmental Development Provisions are provided to municipalities that contain lands adjacent to Pigeon Lake within their boundaries as suggestions only, and users are cautioned to seek professional planning and legal advice before incorporating policies and planning regulations into their Municipal Development Plans, Area Structure Plans, and Land Use Bylaws. Every municipal bylaw should reflect the shared community values of the citizens who reside within the municipality, and the discretion of local councils to exercise decision making with respect to planning and development cannot be fettered.

Theme 1: Restricted Land Uses within the Lakeshore Environmental Development Area

Theme 1 Policy Statements

The municipality will:

1.1. identify and map all significant natural environment features, water resources, and reserve lands located within the watershed through a Biophysical Inventory and Assessment conducted by a qualified expert. An inventory and assessment of such natural environment features, water resources, and reserve lands will be kept current.

1.2 in consultation with local stakeholders and provincial authorities, initiate the development and implementation of a watershed management plan for the natural environment features, water resources and reserve lands identified and mapped in accordance with Policy 1.1.

1.3 without restricting the generality of Policy 1.1, identify and map all lands in the municipality located within 800 metres of the legal bank of Pigeon Lake.

1.4 discourage or restrict land uses within the lands identified and mapped in Policy 1.1 and lands identified and mapped in Policy 1.3. that are the source of phosphorus and other nutrients, chemicals, or nutrient-rich sediment that may pollute the watershed.

1.5 in consultation with provincial authorities, request that in exercising its discretion where provincial approvals or permits are required, the Province does not approve land uses, development, redevelopment, or buildings that may counteract the land use bylaw provisions of the Lakeshore Environmental Development Area: for example, private access, private beaches, private piers, docks and boat lifts, dredging, and shoreline erosion control.

1.6 in consultation with provincial authorities, establish appropriate environmental reserve locations where the municipality may develop community access points, community beaches, and community docks and boat lifts that will enable the phasing out of private access, beaches, docks and boat lifts over time.

1.7 in consultation with provincial authorities, ensure that the municipality is the only authorized entity that may apply for approvals or permits to allow dredging or shoreline erosion control on the bed and shore adjacent to private or municipal lands within the municipality.

1.8 require special studies to be performed prior as part of the application process for development and redevelopment of any parcel of land within 800

metres of the legal bank of Pigeon Lake, or within 100 metres of the natural environment features, water resources, or reserves mapped and inventoried according to Policy 1.1.

Theme 5: Riparian Lands and Wetlands

Theme 5 Policy Statements

The municipality will:

5.1 ensure that all wetlands in the watershed are identified and mapped in accordance with Policy 1.1 are classified in accordance with the “Alberta Wetland Classification System.”

5.2 work with the Province to ensure that all wetlands of Class III or greater within the watershed are preserved in their natural state. Avoidance of all classifications of wetlands during the process of subdivision and development shall be encouraged as the primary objective of local wetland conservation.

5.3 ensure that all wetlands of all classifications are preserved in their natural state within 800 metres of the legal bank of Pigeon Lake.

5.4 except where authorized by the federal or provincial government, prohibit the excavation or filling in of all natural environment features, water resources and reserve lands in the watershed.

5.5 without restricting the generality of Policy 5.4, prohibit the excavations or filling in of all wetlands of all classifications and their associated riparian lands within 800 metres of the legal bank of Pigeon Lake.

5.6 ensure that naturally occurring wetlands of all classifications in the watershed are not used as untreated storm drainage catchment basins.

The identified indicators that have been monitored and reported on should be used to prioritize and guide the bylaw amendment process. For example, if water quality is selected as an indicator, areas that consistently show poor water quality or may be sources of pollutants should receive priority for bylaw amendments.

After creating policy statements, a municipality, with the guidance of appropriate legal representation and a Land-use Bylaw subcommittee, may write a series of LUB provisions and amendments tailored towards each statement. This will ultimately guide the bylaw amendments to achieve the desired outcomes and objectives. There are other bylaws in addition to the land use bylaw that can be enacted under the authority of the MGA that will assist a municipality to manage human activities and land uses within riparian setback areas, such as pesticide application, nutrient and fertilizer application and

unauthorized use of environmental reserve lands. These bylaws, enacted under the authority of section 7 of the Municipal Government Act.

9 Engage Public and Stakeholders

For the Watershed Management Plan to be successful, continued support must come from landowners, stakeholders, and members of the public that live or operate within the watershed. The municipality cannot achieve the objectives of the plan without a well informed and motivated community. Inclusion in planning meetings, working groups, and decision making will help ensure that the Watershed Management Plan objectives are achieved through the actions of all land users. Suggested methods for public engagement include:

- Encouraging of the public and stakeholders to join working groups
- Holding forums and discussion groups regarding decisions being made within the watershed
- Updating the public on changes and progress on the Watershed Management Plan via a webpage and various social media platforms
- Designating a Working Group to build educational materials for land users regarding land use practices that promote healthy aquatic ecosystems and healthy, functioning riparian areas
- Holding bioblitzes and volunteer events that encourage landowners and members of the public to take an active role in remediation and stewardship activities throughout the watershed

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