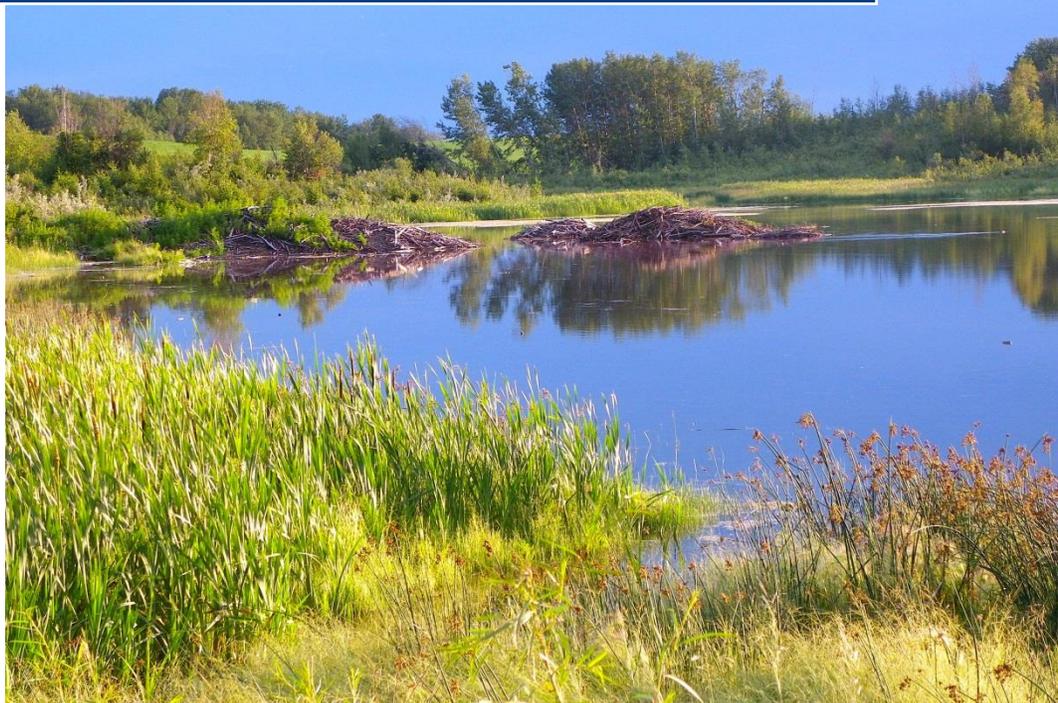




*Watershed Management Plan:
Water Quality Component*

Non-point Source Pollution Management: Implementation Guidelines

Nutrient Management Focus



December 2013

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About This Document

Water quality in the Battle River watershed is a major issue of concern. In particular, high nutrient levels pose a threat to water quality and the overall health of aquatic ecosystems in this watershed. In turn, poor water quality has implications for the quality of life in our communities and the stability of our economy. About half of the nutrient loading to the Battle River comes from non-point sources of pollution. Relatively little is known about water quality in the Sounding Creek watershed. It is important to build a greater understanding of water quality and non-point source pollution in this watershed in order to manage it effectively.

The following document outlines the BRWA's implementation guidelines for non-point source pollution management in the Battle River and Sounding Creek watersheds in Alberta. Non-point source pollution management is one component of the BRWA's watershed management planning (WMP) process. For more information about this process, see page 28.

This advice was developed with broad input from watershed residents, stakeholders and decision-makers¹, and is supported by information compiled in the BRWA's *Policies and Practices for Managing Non-point Source Pollution (Nutrient Management Focus)* report². Reference information from this report is provided for select guidelines on page 26.

Accompanying Policy Advice

This implementation guidelines document is accompanied by a corresponding policy advice document³. Whereas the policy advice document puts forward an overarching policy direction for non-point source pollution management, this implementation guidelines document describes options for management strategies aimed at supporting the implementation of that policy direction.

Guideline Purpose

The purpose of this implementation guidelines document is to provide recommendations for beneficial management practices and strategies that may be implemented to support the improvement of water quality in the Battle River and Sounding Creek watersheds in Alberta through reducing and minimizing non-point source pollution. Nutrient management is the focus of these implementation guidelines.

Guideline Objectives

Overall objectives of this document:

- Promote the implementation of actions and strategies that help to:
 - Limit nutrient loading to the Battle River and its tributaries from urban and rural non-point sources
 - Address the root causes and sources of non-point source pollution
 - Meet the Government of Alberta site-specific water quality objectives for the Battle River
- Provide information to watershed residents, stakeholders, and decision-makers on recommended management actions for non-point source pollution reduction
- Support regulatory discretion and adaptation to local and regional circumstances in the implementation of these actions

Guideline Application

These implementation guidelines apply to the Battle River and Sounding Creek watersheds within Alberta, and are intended for all residents, stakeholders and decision-makers within these watersheds. This includes all four orders of government (municipal, provincial, federal and First Nations), urban and rural residents, agricultural producers, business and industry, environmental and community organizations, academia and watershed stewardship groups. See page 29 for a map of these watersheds.

The BRWA's WMP process is non-regulatory. Implementation of the policy advice and implementation guidelines developed for each of the BRWA's 12 watershed management priority areas is dependent on the voluntary actions of watershed residents, stakeholders and decision-makers. In addition, implementation of these recommendations is based on an adaptive management approach. The BRWA recognizes that we do not have a complete understanding of the natural and social systems functioning within the Battle River and Sounding Creek watersheds. Implementation actions are viewed as experiments that may or may not result in the desired outcomes; lessons learned through these experiments allow us to collectively improve watershed management approaches over time.

The BRWA will work to support the implementation of policies and management practices that align with the goals and objectives outlined in this document.

Implementation Guidelines

1 Water Quality Management Framework

Additional water quality monitoring is required to build a greater understanding of water quality conditions and trends and identify sources and loadings of non-point source pollution in the Battle River and Sounding Creek watersheds. Site-specific water quality objectives would establish targets for water quality. Management strategies could then be developed to help achieve these targets.

Policy Objective:

A framework should be developed to guide the improvement of water quality in the Battle River and Sounding Creek watersheds. Enhanced water quality monitoring, site-specific water quality objectives, and non-point source pollution management strategies are essential components of this framework.

Implementation Guidelines:

Guideline	Responsibility
<p>1.1: A process should be undertaken to finalize the draft Water Quality Objectives developed by Alberta Environment and Sustainable Resource Development and develop management strategies to achieve the targets outlined in these objectives.</p> <p><i>Rationale: The development of site-specific Water Quality Objectives will set targets for water quality in the Battle River watershed. Management actions may then be directed towards the achievement of these targets.</i></p>	<ul style="list-style-type: none"> • Alberta Environment and Sustainable Resource Development • Battle River Watershed Alliance • Watershed stakeholders
<p>1.2: Consideration should be given to establishing additional long-term river network (LTRN) stations along the Battle River. In particular, it would be beneficial to have one station near the Forestburg reservoir and another in the Hardisty-Wainwright area.</p> <p><i>Rationale: Additional LTRN stations would allow stakeholders and decision-makers to have a more comprehensive understanding of water quality conditions and trends along the entire Alberta length of the Battle River.</i></p>	<ul style="list-style-type: none"> • Alberta Environment and Sustainable Resource Development

Guideline	Responsibility
<p>1.3: Detailed water quality monitoring (similar to that done by Alberta Environment in 1989-1990 and 2004-2005 for 11 stations along the Alberta portion of the Battle River) should continue to be undertaken on a regular basis (ideally, every 5 years) in order to evaluate river conditions that may not be represented in data collected at the LTRN stations.</p> <p><i>Rationale: Detailed monitoring would support improved knowledge of water quality along the various reaches of the Battle River and help to identify non-point sources of pollution in the watershed.</i></p>	<ul style="list-style-type: none"> • Alberta Environment and Sustainable Resource Development
<p>1.4: Water quality monitoring should be undertaken for lakes and tributary streams in the Battle River watershed in order to quantify non-point source pollution loads in these systems.</p> <p>Based on monitoring results, discussions should take place to determine where the development of site-specific water quality objectives for tributaries and lakes may be appropriate.</p> <p><i>Rationale: Water quality monitoring of lakes and tributary streams would support the identification of non-point sources of pollution in the Battle River watershed. Management actions may then be targeted accordingly.</i></p>	<ul style="list-style-type: none"> • Alberta Environment and Sustainable Resource Development • Watershed Stakeholders
<p>1.5: The feasibility of establishing long-term water quality monitoring in the Sounding Creek watershed should be explored.</p> <p><i>Rationale: Long-term water quality monitoring would support greater understanding of water quality conditions in the Sounding Creek watershed.</i></p>	<ul style="list-style-type: none"> • Alberta Environment and Sustainable Resource Development
<p>1.6: Monitoring should be undertaken to determine the degree to which atmospheric deposition is contributing to non-point source pollution (and especially nutrient loading) in the Battle River and Sounding Creek watersheds.</p> <p><i>Rationale: Additional management measures may be required if atmospheric deposition is found to contribute significantly to non-point source pollution in the watershed.</i></p>	<ul style="list-style-type: none"> • Alberta Environment and Sustainable Resource Development

Guideline	Responsibility
<p>1.7: Efforts should be undertaken to enhance the sharing of water quality monitoring results and research completed in the Battle River and Sounding Creek watersheds by various agencies (including municipal, provincial and federal governments and private organizations).</p> <p><i>Rationale: The sharing of up-to-date water quality information will ensure that this information is more readily available to watershed residents, stakeholders and decision-makers.</i></p>	<ul style="list-style-type: none"> • All agencies who undertake water quality monitoring in the Battle River and Sounding Creek watersheds

2 Agricultural Management

Nutrient losses from agricultural lands are recognized as a significant contributor to surface water quality degradation in Alberta. Beneficial agricultural management practices may have significant economic, social and ecological benefits.

Policy Objective:

Agricultural management practices which limit non-point source pollution and other adverse ecological impacts should be promoted, while ensuring that the economic viability of agricultural operations is not impeded by these practices.

In particular, improvements should be made to livestock, crop and manure management practices.

Agricultural regulations should be reviewed to ensure that they adequately address water quality concerns in agricultural regions of Alberta.

Implementation Guidelines:

2.1 Agricultural Management

Guideline	Responsibility
<p>2.1.1: Agricultural organizations, governments, and the Battle River Watershed Alliance should expand educational programs around agricultural beneficial management practices and provide technical assistance for the implementation of these practices.</p> <p><i>Rationale: Lack of awareness and knowledge of agricultural beneficial management practices may be a barrier to action. Technical assistance and support would further strengthen implementation of beneficial management practices.</i></p>	<ul style="list-style-type: none"> • Agricultural organizations • Municipal governments • Government of Alberta • Battle River Watershed Alliance
<p>2.1.2: The Environmental Farm Plan process should be utilized as the foundation for encouraging agricultural producers in the Battle River and Sounding Creek watersheds to examine practices on their land and undertake management practices that promote environmental stewardship and watershed sustainability. Programs to support agricultural producers in completing and implementing Environmental Farm Plans should be a central component of this work.</p> <p><i>Rationale: The Environmental Farm Plan looks at a suite of beneficial management practices that are central to the implementation of the recommendations in this Policy Advice document.</i></p>	<ul style="list-style-type: none"> • Agricultural Research and Extension Council of Alberta • Regional Environmental Farm Plan technicians • Battle River Watershed Alliance

Guideline	Responsibility
<p>2.1.3: As recommended through Alberta Agriculture and Rural Development’s 2006 <i>Soil Phosphorus Limits Project</i>, the potential for regulation of soil-test phosphorus limits for agricultural land in Alberta should be reviewed. In addition, the progress of the agricultural industry in developing and implementing a more sustainable phosphorus management strategy should be assessed.</p> <p><i>Rationale: Legislated soil-test phosphorus limits would help to ensure that soil phosphorus levels do not exceed crop uptake rates, reducing the likelihood that excess phosphorus will accumulate in the soil and/or be transported through surface water runoff to surrounding water bodies and waterways.</i></p>	<ul style="list-style-type: none"> • Alberta Agriculture and Rural Development • Battle River Watershed Alliance
<p>2.1.4: Consideration should be given to modifying manure application limits (as outlined in Alberta’s Agricultural Operation Practices Act) to resolve the issue of phosphorus accumulation in agricultural soils.</p> <p><i>Rationale: As described further in recommendation 2.4.5, manure application limits in Alberta are currently based on nitrogen considerations. Phosphorus may be more adequately managed through applying manure application limits based on phosphorus considerations. In addition, crop nutrient uptake rates are significantly lower than manure application rates currently allowed under AOPA. Soil nutrient levels may be reduced further by reducing manure application limits.</i></p>	<ul style="list-style-type: none"> • Alberta Agriculture and Rural Development

2.2 Grazing Management

Guideline	Responsibility
<p>2.2.1: Steps should be taken to encourage livestock producers to implement beneficial grazing management practices in order to improve water quality in the watershed. A suite of beneficial management practices may be pursued, including:</p> <ul style="list-style-type: none"> ▪ Excluding livestock from (or limiting livestock access to) surface water bodies and water ways and utilizing off-site/off-stream watering systems. This serves to protect sensitive riparian areas, thus supporting water quality improvements. ▪ Ensuring that seasonal feeding and bedding sites (livestock wintering sites) and livestock corrals are located a minimum of 30 m away from any water bodies (as outlined in Alberta’s Agricultural Operation Practices Act) ▪ Implementing alternative grazing techniques, such as rotational grazing, in order to prevent overgrazing. Reducing cattle stocking density may also limit overgrazing of pasture land. Limiting overgrazing may significantly improve the quality of runoff water by limiting soil erosion. <p><i>Rationale: Nutrient transport may be reduced through beneficial grazing management practices such as those listed above.</i></p>	<ul style="list-style-type: none"> • Agricultural producers • Agricultural organizations • Municipal governments • Government of Alberta • Battle River Watershed Alliance

2.3 Crop Management

Guideline	Responsibility
<p>2.3.1: Steps should be taken to encourage agricultural producers to implement beneficial crop management practices in order to improve water quality in the watershed. A suite of beneficial management practices may be pursued, including:</p> <ul style="list-style-type: none"> ▪ Utilizing conservation/minimum tillage; ▪ Converting marginal crop land, flood-prone areas, and ephemeral and permanent waterways to permanent cover; ▪ Reducing the number of acres in summer fallow (bare, uncultivated land) by planting cover crops or retaining crop residues or stubble on the land; ▪ Planting crops along the contour of the land (across the slope of the land rather than up and down the slope). <p><i>Rationale: Soil erosion and nutrient transport from cropped lands may be reduced through beneficial crop management practices such as those listed above.</i></p>	<ul style="list-style-type: none"> • Agricultural producers • Agricultural organizations • Municipal governments • Government of Alberta • Battle River Watershed Alliance

2.4 Manure Management

Guideline	Responsibility
<p>2.4.1: Under the Agricultural Operation Practices Act, manure spreading on frozen and/or snow-covered ground is permitted under certain circumstances. This practice should be discouraged in the Battle River and Sounding Creek watersheds (especially within the effective drainage area of these watersheds) and producers should be encouraged to wait until after spring runoff to spread manure.</p> <p><i>Rationale: A large portion of annual surface water runoff in the Battle River watershed occurs during spring snowmelt. As such, the land is most vulnerable to the loss of nutrients in runoff during this time period.</i></p>	<ul style="list-style-type: none"> • Agricultural producers • Agricultural organizations • Municipal governments • Government of Alberta • Natural Resources Conservation Board • Battle River Watershed Alliance
<p>2.4.2: Efforts should be undertaken to encourage producers to increase their manure storage capacity to eliminate the need to spread manure during winter months. Producers should follow manure storage requirements outlined in the Agricultural Operation Practices Act.</p> <p><i>Rationale: The potential for surface water contamination is greatly increased when manure is spread during winter months. Proper manure storage limits the potential for surface and groundwater contamination.</i></p>	<ul style="list-style-type: none"> • Agricultural producers • Agricultural organizations • Municipal governments • Government of Alberta • Battle River Watershed Alliance
<p>2.4.3: Efforts should be undertaken to encourage producers to test the nutrient content of manure and soil in order to ensure manure application rates do not exceed crop requirements.</p> <p><i>Rationale: Many Albertan farmers do not test manure for nutrient content. In addition, soil testing to determine soil nutrient requirements may not be completed. Testing manure for nutrient content and soil for nutrient requirements allows producers to more accurately determine how much manure/fertilizer should be applied to a given piece of land in order to meet crop nutrient requirements.</i></p>	<ul style="list-style-type: none"> • Agricultural producers • Agricultural organizations • Municipal governments • Government of Alberta • Battle River Watershed Alliance

Guideline	Responsibility
<p>2.4.4: The development of manure management plans should be encouraged. These plans may be developed by individual landowners, municipalities, or at the regional scale.</p> <p><i>Rationale: Manure management plans would help to ensure that manure is adequately managed in order to limit non-point source pollution from this source.</i></p>	<ul style="list-style-type: none"> • Agricultural producers • Agricultural organizations • Municipal governments • Government of Alberta • Battle River Watershed Alliance
<p>2.4.5: Agricultural producers should be encouraged to apply manure based on phosphorus (rather than nitrogen) requirements (with additional nitrogen applications as required).</p> <p><i>Rationale: In Alberta, manure application limits under the Agricultural Operation Practices Act are based on nitrogen considerations. However, research shows that manure applied on the basis of nitrogen requirements results in an accumulation of phosphorus in the soil. Research has also shown that manure application rates based on phosphorus requirements (with additional nitrogen fertilizer applications, if required) may be just as effective at producing optimum crop yields while producing less environmental concerns. See related recommendations 2.1.4 and 5.3.</i></p>	<ul style="list-style-type: none"> • Agricultural producers • Agricultural organizations • Municipal governments • Government of Alberta • Battle River Watershed Alliance
<p>2.4.6: Agricultural producers should be encouraged to compost manure that is produced through their operations.</p> <p><i>Rationale: The amount of manure being applied to land may be reduced through the composting of manure (which reduces the total volume of manure).</i></p>	<ul style="list-style-type: none"> • Agricultural producers • Agricultural organizations • Municipal governments • Government of Alberta • Battle River Watershed Alliance
<p>2.4.7: Efforts should be taken to work with Confined Feeding Operations to implement the manure management strategies outlined in this document. Where applicable, linkages should be made with the Intensive Livestock Working Group Phosphorus Strategy.</p> <p><i>Rationale: As a major source of manure in Alberta, management and spreading of manure generated by confined feeding operations is a key component of non-point source pollution management.</i></p>	<ul style="list-style-type: none"> • Confined Feeding Operations • Municipal governments • Government of Alberta • Natural Resources Conservation Board • Battle River Watershed Alliance

Guideline	Responsibility
<p>2.4.8: Efforts should be taken to limit the development of new Confined Feeding Operations within the effective drainage area of the Battle River and Sounding Creek watersheds.</p> <p><i>Rationale: The effective drainage area is that portion of the watershed that might be expected to contribute runoff to the main stem during a flood with a return period of two years. As these areas regularly contribute water to the main stem, the potential for nutrient transport from these areas is greater than in non-contributing areas.</i></p>	<ul style="list-style-type: none"> • Natural Resources Conservation Board • Municipal governments • Government of Alberta • Battle River Watershed Alliance
<p>2.4.9: No manure application should be allowed in riparian areas and flood plain zones. In addition, manure application setbacks (for lands sloping towards surface water bodies) outlined in the Agricultural Operation Practices Act should be adhered to.</p> <p><i>Rationale: Riparian and flood plain zones are recognized as sensitive ecosystems and critical phosphorus source areas that require special consideration among other landscape types.</i></p>	<ul style="list-style-type: none"> • Agricultural producers • Municipal governments • Government of Alberta

Guideline	Responsibility
<p>2.4.10: Several beneficial manure and fertilizer application practices should be encouraged within the Battle River and Sounding Creek watershed:</p> <ul style="list-style-type: none"> ▪ Where manure and/or inorganic fertilizer are applied to fields, they should be applied only to meet the annual crop nutrient uptake rates ▪ Where possible, manure and/or fertilizer should be applied through direct injection techniques, such as banding (placing fertilizer in bands to one or both sides of planted rows) or application with the seed, as opposed to being broadcast or sprayed over the entire field. ▪ Where manure is surface-applied, vertical beaters are the preferred application method, and manure should be incorporated into the soil immediately after application. ▪ Finally, manure, fertilizers and other chemicals should not be applied along ephemeral waterways running through cropland. <p><i>Rationale: Applying fertilizer and manure at crop nutrient uptake rates ensures that crop production is maximized without releasing excess nutrients into the environment. More effective application methods also ensure that nutrient transport is kept to a minimum.</i></p>	<ul style="list-style-type: none"> • Agricultural producers • Agricultural organizations • Municipal governments • Government of Alberta • Battle River Watershed Alliance

3 Natural Areas

Wetlands and riparian areas act as natural buffer zones, capturing runoff and sediment and filtering out nutrients and other pollutants. As such, they play a significant role in protecting water quality and reducing adverse water quality impacts associated with non-point source pollution.

Policy Objective:

Wetlands and riparian areas should be maintained and restored within the Battle River and Sounding Creek watersheds, with a focus on restoration efforts that support water quality enhancement.

Monitoring and restoration strategies should be developed to support this work.

Implementation Guidelines:

3.1 Riparian Areas

Guideline	Responsibility
<p>3.1.1: Riparian health assessments should be completed on a regular basis for the main stem of the Battle River, as well as for tributary streams, lakes, and wetlands within the watershed. Various methods may be utilized to complete these assessments, such as aerial videography and on-the-ground riparian health assessments.</p> <p><i>Rationale: Determining the health of a riparian area is an essential first step in determining what management actions may be required in that area.</i></p>	<ul style="list-style-type: none"> • Landowners • Cows and Fish • Alberta Conservation Association • Battle River Watershed Alliance • Government of Alberta

Guideline	Responsibility
<p>3.1.2: Based on riparian health assessments completed, riparian restoration projects should be established in key areas in the watershed. A riparian restoration strategy should be developed to guide this work. Landowners should be encouraged to maintain or restore riparian buffer strips on their property.</p> <p>Collaboration with local landowners will be an essential component of these projects. Riparian restoration efforts may be undertaken along any water body or waterway within the watershed, including the main stem of the Battle River, tributary streams, other ephemeral and permanent waterways, drainage ditches, wetlands, and lakes.</p> <p><i>Rationale: Riparian areas play a significant role in capturing runoff and sediment and filtering out nutrients and other pollutants before they enter adjacent water systems.</i></p>	<ul style="list-style-type: none"> • Landowners • Cows and Fish • Alberta Drainage Council • Municipal governments • Battle River Watershed Alliance
<p>3.1.3: In addition to riparian restoration efforts, emphasis should be placed on protecting riparian areas that are currently in good health.</p> <p><i>Rationale: The combined efforts of riparian restoration and protection will lead to an overall improvement in the health of riparian areas in the Battle River and Sounding Creek watersheds.</i></p>	<ul style="list-style-type: none"> • Landowners • Cows and Fish • Municipal governments • Battle River Watershed Alliance

3.2 Wetlands

Guideline	Responsibility
<p>3.2.1: Detailed wetland inventories should be completed for the Sounding Creek watershed and each subwatershed of the Battle River watershed. Currently, detailed wetland inventories have been completed for the Iron Creek subwatershed and portions of the Bigstone subwatershed.</p> <p><i>Rationale: Wetland inventories are able to identify drained or altered wetlands, thereby accurately measuring wetland loss. Wetland restoration efforts may be supported through identification of areas where wetlands have been lost or altered.</i></p>	<ul style="list-style-type: none"> • Ducks Unlimited Canada and other Wetland Restoration Agencies • Government of Alberta

Guideline	Responsibility
<p>3.2.2: Wetland restoration projects should be established in key areas in the watershed, with a focus on restoration efforts that support water quality enhancement. A wetland restoration strategy should be developed to guide this work. Landowners should be encouraged to maintain or restore wetlands on their property.</p> <p>Different restoration techniques may be piloted at each site in order to determine the most effective techniques for use in this region of the province. Collaboration with local landowners will be an essential component of these projects.</p> <p><i>Rationale: Wetlands serve as important nutrient sinks on the landscape due to their ability to trap and store nutrients in sediments, convert inorganic nutrients to organic biomass, and otherwise process nutrients through microbial activity.</i></p>	<ul style="list-style-type: none"> • Landowners • Ducks Unlimited Canada and other Wetland Restoration Agencies • Battle River Watershed Alliance • Municipal governments • Government of Alberta
<p>3.2.3: In addition to wetland restoration efforts, emphasis should be placed on protecting existing wetlands, thereby preventing further wetland loss.</p> <p><i>Rationale: The combined efforts of wetland restoration and protection will lead to an overall improvement in the health of wetlands in the Battle River and Sounding Creek watersheds.</i></p>	<ul style="list-style-type: none"> • Landowners • Ducks Unlimited Canada and other Wetland Restoration Agencies • Battle River Watershed Alliance • Municipal governments • Government of Alberta
<p>3.2.4: Research should be undertaken to determine if the development of water attenuation areas at key locations along road and drainage ditches would help to attenuate surface water runoff from these ditches and decrease the transport of nutrients and other non-point source pollutants.</p> <p><i>Rationale: Road and drainage ditches have the capacity to transport substantial amounts of surface water runoff. The flow rate of this runoff may be fairly high, as there are few barriers to its movement. As such, a significant amount of non-point source pollution may be carried through these systems.</i></p>	<ul style="list-style-type: none"> • Government of Alberta • Alberta Drainage Council

4 Storm and Waste Water Management

Stormwater runoff is the principal means through which non-point source pollution enters surface water systems from communities. Alternative stormwater management techniques may reduce non-point source pollution from this source.

Private sewage disposal systems that are failing, inadequate, approaching end-of-life, or not meeting current standards may contribute to non-point source pollution in our watersheds and pose a risk to human and animal health when effluent is not treated to an adequate level. Adequate effluent treatment and disposal would alleviate these concerns.

Policy Objective:

Enhancements should be made to stormwater management and private sewage effluent disposal to limit impacts to water quality.

Efforts should be undertaken to bring attention to these issues and ensure that management improvements are not cost-prohibitive.

Implementation Guidelines:

4.1 Municipal Stormwater Management

Guideline	Responsibility
<p>4.1.1: Municipalities should integrate “Low Impact Development” techniques for stormwater management into their planning documents. Techniques may include: permeable pavement, bioswales, rain gardens, natural drainage ways, stormwater retention ponds, rainwater harvesting, and conservation designs for new developments.</p> <p><i>Rationale: Low Impact Development techniques are designed to treat stormwater close to its source, removing pollutants and reducing the amount and rate of stormwater runoff. In doing so, the amount of pollutants entering waterbodies and waterways from stormwater runoff may be reduced.</i></p>	<ul style="list-style-type: none"> • Municipal governments • Alberta Low Impact Development Partnership • Battle River Watershed Alliance
<p>4.1.2: Municipalities, landowners and residents throughout the watershed should be encouraged to limit the use of cosmetic fertilizers, pesticides and other chemicals.</p> <p><i>Rationale: Cosmetic fertilizers, pesticides and other chemicals may enter surface water systems through stormwater runoff, contributing to water quality issues in these systems.</i></p>	<ul style="list-style-type: none"> • Watershed residents • Municipal governments • Battle River Watershed Alliance

Guideline	Responsibility
<p>4.1.3: Educational efforts should be undertaken to build understanding among residents about local stormwater management systems and the potential water quality impacts of lawn products and other substances that may enter stormwater systems.</p> <p><i>Rationale: Lack of awareness and knowledge of beneficial stormwater management practices may be a barrier to action.</i></p>	<ul style="list-style-type: none"> • Municipal governments • Battle River Watershed Alliance • Community organizations

4.2 Waste Water Management

Guideline	Responsibility
<p>4.2.1: Educational efforts should be undertaken to build understanding among residents about the installation, maintenance, use and life-expectancy of private sewage disposal systems.</p> <p><i>Rationale: Private sewage disposal systems that are failing, inadequate, approaching end-of-life, or not meeting current standards may result in the leaching of sewage waste into groundwater and surface water systems.</i></p>	<ul style="list-style-type: none"> • Municipal governments • Battle River Watershed Alliance
<p>4.2.2: The feasibility of alternative sewage system management strategies and treatment options (such as the development or expansion of regional sewage disposal systems) should be explored.</p> <p><i>Rationale: Alternative methods for sewage disposal, such as regional sewage disposal systems, may more adequately address regional sewage disposal needs and reduce non-point source pollution from this source.</i></p>	<ul style="list-style-type: none"> • Municipal governments • Government of Alberta • Battle River Watershed Alliance

5 Encouraging Beneficial Management Practices

Research has shown that providing support and incentives for the implementation of beneficial management practices may be a more effective and positive approach than requiring compliance through regulations.

Policy Objective:

Implementation of beneficial non-point source pollution management practices should be supported through incentive programs and other support mechanisms.

Implementation Guidelines:

Guideline	Responsibility
<p>5.1: Municipal, provincial and federal governments and agricultural organizations should develop and/or continue to support programs that compensate agricultural producers for costs associated with implementing beneficial non-point source pollution management practices (including the crop, manure, grazing and other beneficial management practices outlined in this document).</p> <p>The large amount of paperwork required to apply for current incentive programs is considered by many to be a barrier to participation. As such, paperwork associated with funding applications should be kept to a minimum (and/or additional support provided during the application process) in order to encourage participation from landowners.</p> <p><i>Rationale: Financial and technical support for beneficial management practices provides an incentive for agricultural producers to undertake these actions.</i></p>	<ul style="list-style-type: none"> • Municipal, provincial and federal governments • Agricultural organizations • Battle River Watershed Alliance
<p>5.2: Agricultural organizations, governments and the Battle River Watershed Alliance should develop or expand educational programs to bring attention to incentive programs that support beneficial non-point source pollution management practices.</p> <p><i>Rationale: One barrier associated with participation in incentive programs is a lack of knowledge about programs already in existence.</i></p>	<ul style="list-style-type: none"> • Municipal governments • Government of Alberta • Agricultural organizations • Battle River Watershed Alliance

Guideline	Responsibility
<p>5.3: Consideration should be given to developing a manure transportation incentive program for Alberta livestock producers. This program would be aimed at reducing manure applications on lands that are already nutrient-rich by promoting the transportation of excess manure greater distances, to lands that could benefit from additional nutrient inputs.</p> <p><i>Rationale: Manure applied on the basis of phosphorus has to be applied over a substantial land base (perhaps double the land base required for nitrogen-based application rates), and producers do not always have access to adequate areas of land at reasonable transportation costs. Thus, manure is often applied in excess in some areas, while other areas that could benefit from manure application receive none.</i></p>	<ul style="list-style-type: none"> • Alberta Agriculture and Rural Development
<p>5.4: Watershed residents should be encouraged to undertake beneficial stormwater management practices. These practices may include rainwater storage (through the use of rain barrels, for example), the installation of rain gardens and/or bioswales, and the use of permeable pavement. Financial incentives (subsidies, rebate programs, etc.) may be used to further encourage these practices.</p> <p><i>Rationale: As stated above, beneficial stormwater management practices help to reduce the amount of pollutants entering waterbodies and waterways from stormwater runoff.</i></p>	<ul style="list-style-type: none"> • Watershed residents • Municipal governments • Government of Alberta • Community organizations • Battle River Watershed Alliance

Guideline	Responsibility
<p>5.5: Landowners should be encouraged to replace and upgrade private sewage disposal systems that are failing, inadequate, approaching end-of-life, or not meeting current standards. Financial incentives should be utilized to support landowners in upgrading their systems, and a program should be developed to assist with alternative sewage treatment options. A request should be made to review the Private Sewage Disposal Systems Regulation to allow alternative, cost-effective sewage disposal options.</p> <p><i>Rationale: Recent changes to the Private Sewage Disposal Systems Regulation have made upgrading systems cost prohibitive to many landowners. Financial incentives for system upgrades, a program to assist with alternative treatment options, and a review of the Regulation to reduce the financial burden to landowners would make it easier for people to comply with the regulations and enhance the environment by encouraging compliance.</i></p>	<ul style="list-style-type: none"> • Landowners • Municipal governments • Government of Alberta

6 Additional Research

The benefits of beneficial management practices may be maximized by: 1) focusing efforts in those areas where risk of non-point source pollution is greatest (also referred to as critical source areas), and 2) implementing those practices that have the greatest potential for non-point source pollution reduction in those areas.

Policy Objective:

Research should be undertaken to identify critical source areas in the Battle River and Sounding Creek watersheds, understand the degree to which different land covers and land uses contribute to non-point source pollution, and evaluate the relative effectiveness of various beneficial management practices in reducing non-point source pollution in different regions of the watershed.

Implementation Guidelines:

Guideline	Responsibility
<p>6.1: Critical source areas should be identified in the Battle River and Sounding Creek watersheds. Beneficial management practices should then be targeted to these areas.</p> <p><i>Rationale: Research in Alberta suggests that that the most effective means of reducing the amount of non-point source pollution (and especially nutrients) entering surface water systems may be to identify critical source areas (areas with high nutrient concentrations and runoff potential) and focus non-point source pollution management efforts in these areas.</i></p>	<ul style="list-style-type: none"> • Alberta Agriculture and Rural Development • Alberta Environment and Sustainable Resource Development • Battle River Watershed Alliance
<p>6.2: Research should be undertaken to calculate export coefficients for the various types of land cover and land use found within the Battle River and Sounding Creek watersheds, taking into account the unique combination of landscapes and processes present in these watersheds.</p> <p><i>Rationale: An important step in identifying critical source areas is having accurate numbers for export coefficients – that is, understanding the degree to which various pollutants are exported from a given landscape. The export of pollutants may vary depending on various factors, including land cover, land use, management practices, weather and climate variations, natural hydrology, soil type, and catchment slope.</i></p>	<ul style="list-style-type: none"> • Alberta Agriculture and Rural Development • Alberta Environment and Sustainable Resource Development

Guideline	Responsibility
<p>6.3: Much work has already been undertaken in Alberta to understand the impacts of various land uses on water quality and evaluate the effectiveness of beneficial management practices aimed at non-point source pollution reduction.</p> <p>Governments, industry, universities, and other organizations should be encouraged to continue this research in order to support a greater understanding of the relative effectiveness of various beneficial management practices in reducing non-point source pollution in different regions of the watershed. This could include a research program that evaluates the effectiveness of subwatershed-wide implementation of beneficial management practices across all sectors and land users.</p>	<ul style="list-style-type: none"> • Governments • Industry • Universities • Other Organizations

Reference Information for Select Guidelines

The following table outlines reference information for select guidelines. All reference information is found in the BRWA report: *Policies and Practices for Managing Non-point Source Pollution (Nutrient Management Focus)*².

Guideline	Reference Information
1.2: Additional long-term monitoring stations 1.3: Additional in-depth water quality monitoring	Section 2 (page 9)
2.1.3: Soil-test phosphorus limits 2.4.8: Confined Feeding Operations within Effective Drainage Area of Watershed 6.1: Critical source areas 6.2: Export coefficients	Section 6.1.1 (page 16-19)
2.3.1: Beneficial crop management practices 2.4.10: Beneficial manure and fertilizer application practices	Section 6.1.2 (page 20, 22)
2.1.4: Manure application limits 2.4.5: Manure application based on phosphorus requirements	Section 6.1.2.1 (page 21)
2.2.1: Beneficial grazing management practices 2.4.1: Manure spreading on frozen and/or snow-covered ground 2.4.2: Increase manure storage capacity 2.4.7: Manure management strategies for Confined Feeding Operations 2.4.9: No manure application in riparian areas and flood plain zones	Section 6.1.2.2 (page 22-23)
3.1.1: Riparian Health Assessments 3.2.1: Wetland Inventories	Section 6.1.2.3 (page 23-25)
5.1: Support and incentives for implementation of beneficial non-point source pollution management practices 5.2: Educational programs to raise awareness of incentive programs 5.3: Manure transportation incentive program	Section 6.1.4 (page 26)
1.1: Finalize water quality objectives	Section 6.2.2 (page 29)
4.2.1: Private sewage disposal systems 5.5: Education on alternative sewage treatment options	Section 7.1.1 (page 32)
4.1.1: Low Impact Development 5.4: Beneficial stormwater management practices	Section 7.1.2 (page 32)

About the Battle River Watershed Alliance

The Battle River Watershed Alliance (BRWA) was created in 2006 as a non-profit society. Shortly after its formation, the BRWA was selected by Alberta Environment, under *Water for Life: Alberta's Strategy for Sustainability*⁴, as the designated Watershed Planning and Advisory Council (WPAC) for the Battle River and Sounding Creek watersheds within Alberta. See page 29 for a map of the Alberta portions of these watersheds.

Under Alberta's *Water for Life* strategy, WPACs have a role to report on the state of the watershed, lead in watershed planning, develop best management practices, educate users of the water resource and foster stewardship activities within the watershed.

The BRWA works in partnership with communities, individual watershed residents, watershed stewardship groups, all four orders of government (municipal, provincial, federal and First Nations), industry, academia, and environmental organizations to promote the health and sustainable management of the land and water resources of the Battle River and Sounding Creek watersheds using the best science and social science available.

We exist to have a watershed that sustains all life by using sound knowledge, wisdom, and wise actions to preserve our watershed for future generations.

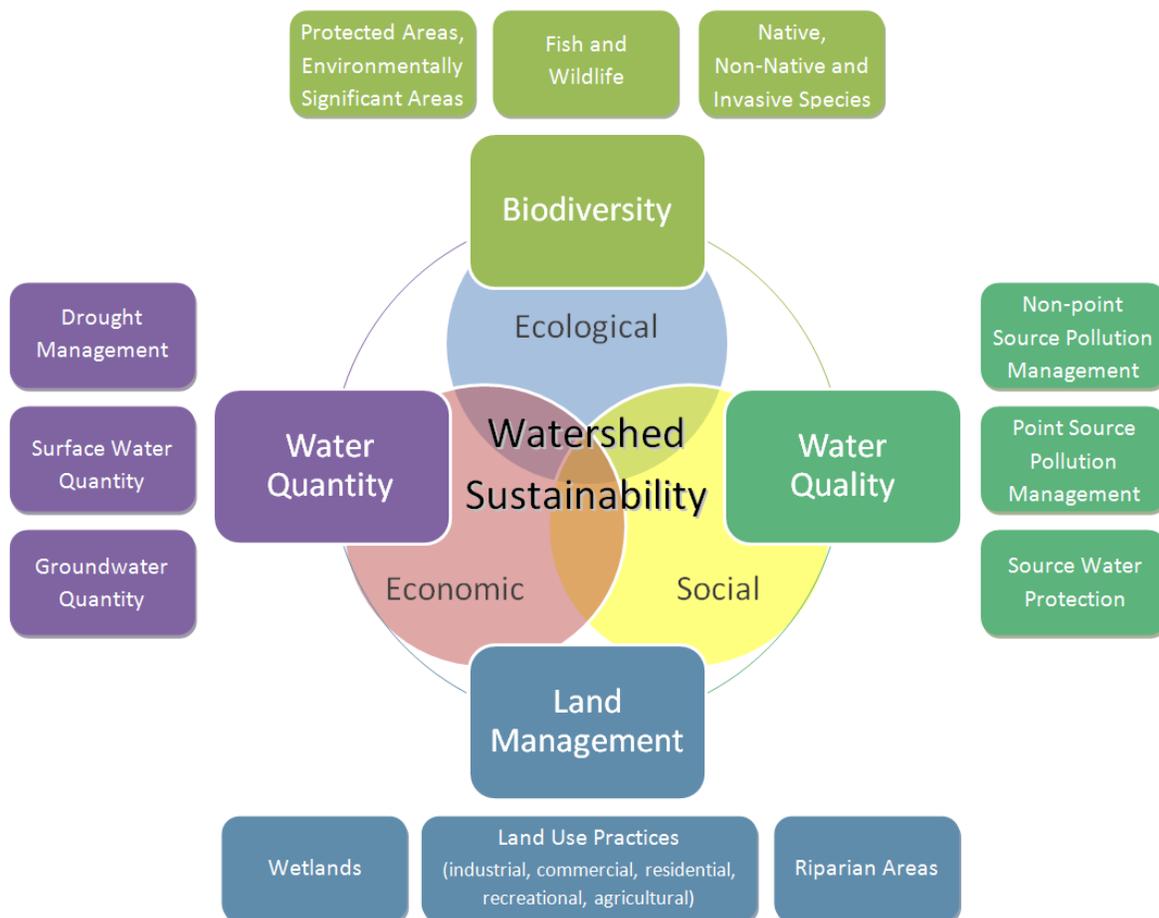
About BRWA's Watershed Management Planning Process

As the provincially designated Watershed Planning and Advisory Council (WPAC) for the Battle River and Sounding Creek watersheds within Alberta, the BRWA has a role to lead in watershed planning.

The BRWA's Watershed Management Planning Process was initiated in 2011. This planning process will ultimately result in a comprehensive Watershed Management Plan for the Battle River and Sounding Creek watersheds in Alberta, and is guided by the *Battle River Watershed Management Planning Process Phase Two Terms of Reference*⁵.

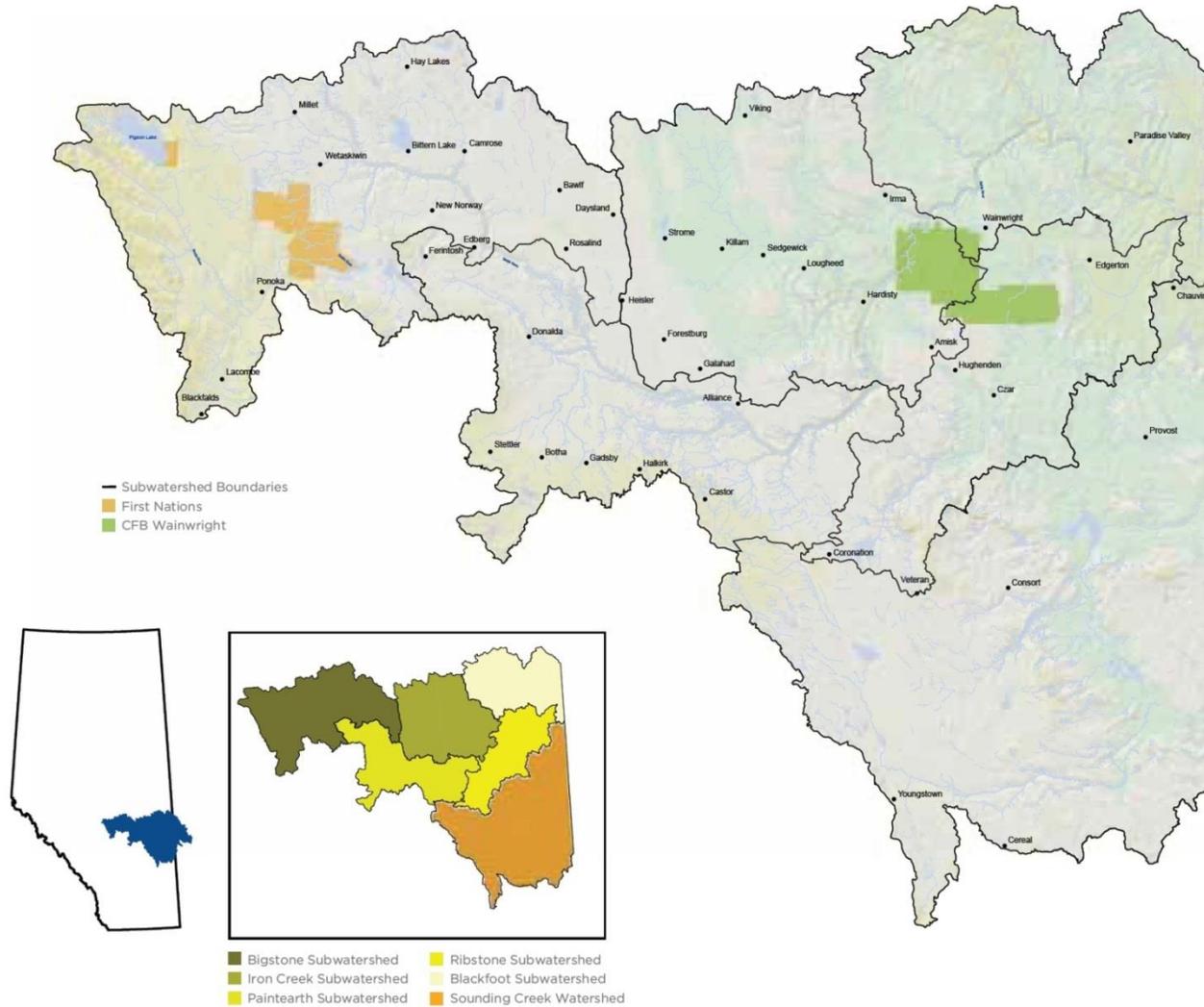
The Watershed Management Planning Process will address a number of watershed management priorities that have been identified through the BRWA's 2011 State of the Watershed Report⁶ and extensive public engagement. These priorities are outlined in the figure below.

Policy advice and implementation guidelines will be developed for each of these priority areas. These documents will comprise the Watershed Management Plan for the Battle River and Sounding Creek watersheds in Alberta.



Key components of the BRWA's Watershed Management Planning Process

Battle River and Sounding Creek Watersheds within Alberta



Endnotes

- ¹ Battle River Watershed Alliance (BRWA). 2013a. *What We Heard: Non-point Source Pollution Management*. BRWA Public Engagement Report, 30 pages.
- ² Battle River Watershed Alliance (BRWA). 2013b. *Policies and Practices for Managing Non-point Source Pollution (Nutrient Management Focus)*. BRWA Watershed Planning Document, 46 pages.
- ³ Battle River Watershed Alliance (BRWA). 2013c. *Non-point Source Pollution Management: Policy Advice (Nutrient Management Focus)*. BRWA Watershed Planning Document, 11 pages.
- ⁴ Government of Alberta. 2003. *Water for Life: Alberta's Strategy for Sustainability*. 31 pages.
- ⁵ Battle River Watershed Alliance (BRWA). 2012. *Battle River Watershed Management Planning Process Phase Two Terms of Reference*. Battle River Watershed Alliance Watershed Planning Report, 36 pages.
- ⁶ Battle River Watershed Alliance (BRWA). 2011. *State of the Battle River and Sounding Creek Watersheds Report 2011*. Battle River Watershed Alliance, 64 pages.

This is our battle: the watershed we all share, and the fight to maintain a healthy environment, vibrant communities and a stable economy.

Battle River Watershed Alliance

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Connecting People to Place for Action

