GUIDE TO WATERSHED MANAGEMENT IN LAND USE PLANNING FOR LOCAL GOVERNMENTS

In the Battle River and Sounding Creek Watersheds

Prepared By: Municipal Planning Services
Prepared For: Battle River Watershed Alliance

Date: March 2025

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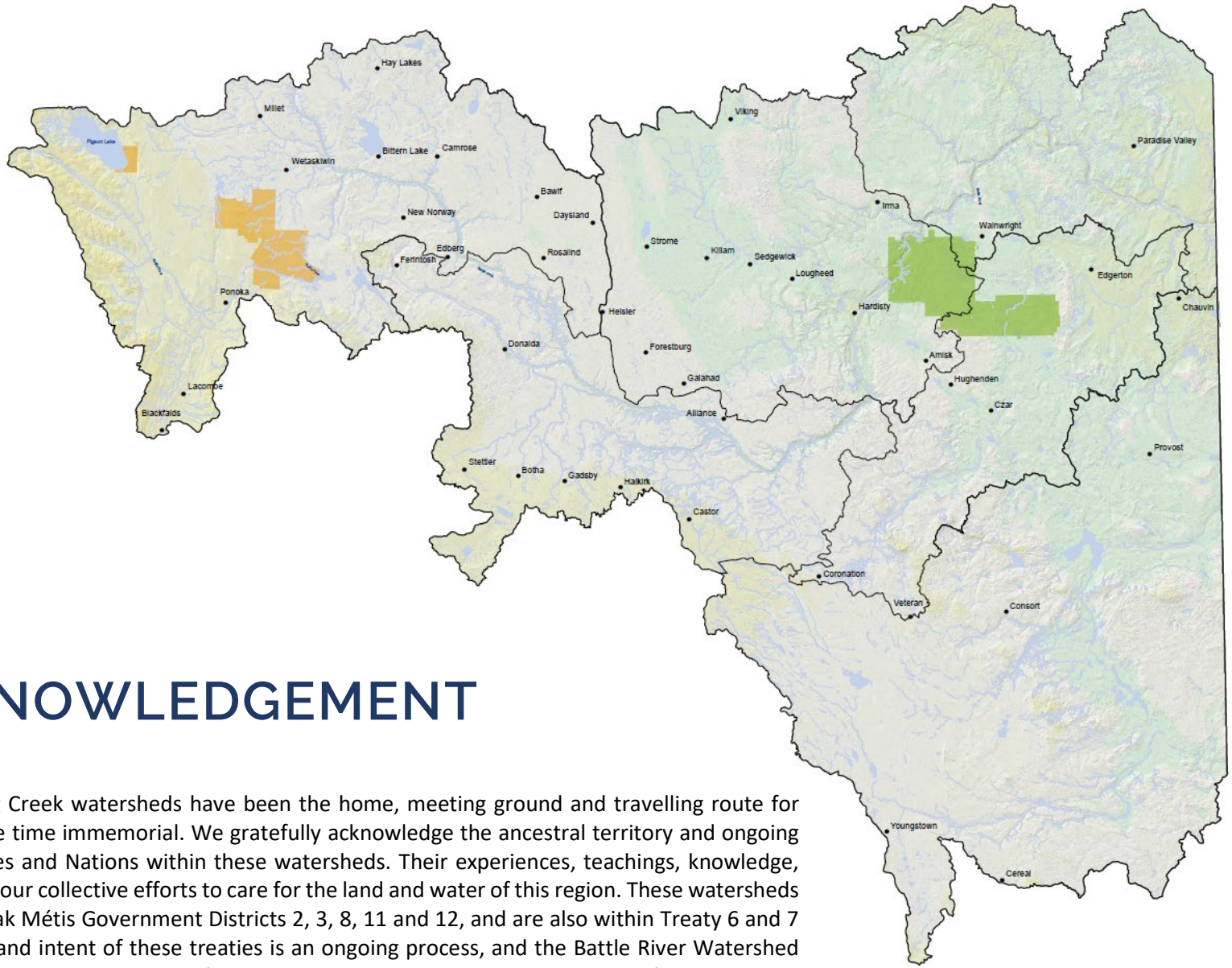

LAND ACKNOWLEDGEMENT

The Battle River and Sounding Creek watersheds have been the home, meeting ground and travelling route for many Indigenous Peoples since time immemorial. We gratefully acknowledge the ancestral territory and ongoing presence of Indigenous Peoples and Nations within these watersheds. Their experiences, teachings, knowledge, and wisdom inform and enrich our collective efforts to care for the land and water of this region. These watersheds are located within Otipemisiwak Métis Government Districts 2, 3, 8, 11 and 12, and are also within Treaty 6 and 7 territories. Fulfilling the spirit and intent of these treaties is an ongoing process, and the Battle River Watershed Alliance is committed to building strong and respectful relationships with the Indigenous Peoples of this land, with all living beings, and with the land and water on which we all depend.

ACKNOWLEDGMENTS

Land & Water Committee

The following members of the Battle River Watershed Alliance Land & Water Committee graciously provided their time and insight to the project team in the preparation of the *Guide to Watershed Management in Land Use Planning for Local Governments*:

NAME	ORGANIZATION
DALE PEDERSON	Beaver County
ANJAH HOWARD	Camrose County
DOUG LYSENG	Camrose County
TERRY VOCKEROTH	County of Paintearth / BRWA Board
CATHIE ERICHSEN ARYCHUK	County of Vermilion River
ALAN CORBETT	Drainage Council / BRWA Board
BART MUUSSE	Ducks Unlimited Canada
HOWARD SHIELD	Flagstaff County
MELVIN THOMPSON	Flagstaff County
JAMIE BRUHA	Alberta Environment and Protected Areas
ARIN MACFARLANE-DYER	Alberta Environment and Protected Areas
MELISSA ORR-LANGNER	Alberta Agriculture and Irrigation
DWAYNE WEST	Lacombe County
AMANDA KOOT	Pigeon Lake Watershed Association
DIANE HANSON	Resident (Beaver County) / BRWA Board
GLINIS BUFFALO	Samson Cree Nation
WILL CHALLENGER	Town of Wainwright
SCOTT FLETT	Town of Wainwright
ADRIAN LAM	University of Alberta, Augustana Campus
AARON LECKIE	City of Camrose
RICK MELIA	Pigeon Lake Watershed Association
GREG SMITH	BRWA Board

Municipal and Indigenous Engagement

This project would not be possible without the participation and support of the diverse communities within the Battle River and Sounding Creek watersheds. The project team extends their sincere appreciation to the Councils and Administrations of municipal governments, First Nations and the Otipemisiwak Métis Government for their time and contributions to the project.

Communities have been engaged throughout the project and ongoing consultation will continue through the next phases to best serve the needs of municipalities, First Nations, and the Otipemisiwak Métis Government.

Municipalities

Battle River Watershed Alliance (BRWA) staff have met with municipal councils across the watersheds to communicate the intent of the project and encourage participation in engagement activities.

A representative sample of municipal policy documents were selected for focused review to inform the preparation of this Guide. Municipal Development Plans, publicly available through the municipalities, were reviewed independently by the project team. Municipal decision-makers have been invited to participate in engagement activities to better inform the outcomes of this project.

First Nations

The BRWA is working to build meaningful relationships with the Ermineskin Cree Nation, Louis Bull Tribe, Montana First Nation, and Samson Cree Nation.

BRWA staff have met with the First Nations to establish trust and coordinate future consultation and partnership on matters related to land use planning.

Otipemisiwak Métis Government

The BRWA is also working to build a meaningful relationship with the Otipemisiwak Métis Government. BRWA staff have met with the Otipemisiwak Métis Government to establish trust and will continue to prioritize opportunities to collaborate for the protection of the land and water through land use policies and programs.

Project Funding

This project is funded through an Alberta Community Partnerships Grant, partnering with Camrose County (managing partner), Flagstaff County, and Lacombe County.

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EXECUTIVE SUMMARY

The *Guide to Watershed Management in Land Use Planning for Local Governments* provides guidelines to support local government initiatives to implement watershed management recommendations and environmental land management practices into land use planning documents and to identify opportunities for enhancing measures to achieve watershed resilience and sustainability in a local context.

The guide refines recommendations from existing BRWA plans to enable the local governments to better support the incorporation of BRWA watershed management recommendations into the nuanced planning documents of local governments. The inclusion of BRWA recommendations in the planning documents of local governments enables local governments to:

1. More effectively consider ecological assets, including natural areas, water quality and quantity, drought resiliency, wetlands and riparian areas, and biodiversity during the planning and approval processes relating to local land management decisions within the Battle River and Sounding Creek watersheds.
2. Demonstrate municipal compliance with the following requirements in the *Municipal Government Act (MGA)*. Specifically, to:
    a. foster the well-being of the environment (Part.1 s.3 *MGA*); and
    b. determine if the land subject to a proposal is suitable for the purpose for which the subdivision is intended (654(1)(a) *MGA*).

    Making a determination regarding the suitability of a site for a proposed use includes undertaking an assessment of the impacts to natural assets within the subject site and minimizing the degradation of these natural assets.
3. Reduce risk(s) associated with development on lands generally characterized by hazard features and provide local governments with tools to better monitor impacts and undertake enforcement action when non-compliant land use or development activities occur.

    Taking an active and coordinated approach to the management of natural assets enables local governments to manage risks and legal liability associated with land management decisions and enables local governments to demonstrate greater alignment with the requirements established in provincial and federal laws and regulations.

The guidelines are structured to be incorporated into the land management plans of local government. The guidelines include:

- definitions for specific technical and environmental terminology utilized in municipal development plans and other high-level planning documents adopted by local governments;
- specific actions and strategies required to enable the identification, monitoring and consideration of natural assets in the decision-making process; and
- goals, objectives and polices that support the consideration and prioritization of natural assets as part of local government decision-making processes.

INTRODUCTION

Background

The Battle River Watershed Alliance (BRWA) is a non-profit organization and one of 11 Watershed Planning and Advisory Councils under Water for Life: Alberta's Strategy for Sustainability.

BRWA Watershed Management Plans emphasize that ecosystem health and land use in the Battle River and Sounding Creek watersheds plays a large role in watershed sustainability, drought resiliency and managing risks associated with land development throughout the watersheds.

The BRWA recommendations in the plans were written broadly to provide direction for planning programs at provincial, regional, and local levels. Through the BRWA's work with communities across the watersheds, local jurisdictions identified the need for "tools" to assist in:

1. Refining the recommendations in the BRWA plans to enable them to be translated more specifically into planning documents for local governments; and
2. To undertake more direct engagement with local government to identify how the implementation of the recommendations may improve the long-term health, conservation, and ecological restoration of the Battle River and Sounding Creek watersheds.

To address this need, BRWA engaged Municipal Planning Services (MPS) to prepare two deliverables: A Discussion Guide and this Guide to Watershed Management in Land Use Planning for Local Governments within the Battle River and Sounding Creek Watersheds (the Battle River and Sounding Creek jurisdictions).

A sample of municipal development plans were assessed in 2024 to identify how watershed management recommendations are currently integrated into local land management plans. The Discussion Guide was developed in 2024 to summarize the assessment. The purpose of the Discussion Guide was to highlight how communities currently implement watershed management recommendations and environmental land management practices into land use planning documents and to identify opportunities to achieve watershed resilience and sustainability in a local context.

Feedback generated from the Discussion Guide included input from the BRWA Land and Water Committee, municipalities engaged at two workshops in April 2024, and written comments from municipalities within the watersheds. The input provided a local planning context including areas for enhancement and potential constraints to integration. A What We Heard Report was developed, and the aggregate inputs informed the development of this Guide to Watershed Management in Land Use Planning for Local Governments.

This Guide to Watershed Management in Land Use Planning for Local Governments was developed to identify high-level goals, objectives, actions, and policies to support local government initiatives to implement watershed management recommendations and environmental land management practices into the land use planning documents and to identify opportunities for enhancing measures to achieve watershed resilience and sustainability in a local context.

Purpose

The purpose of the Guide is to:

- More effectively incorporate the BRWA's watershed management planning recommendations during the planning and approval processes relating to local land management decisions within the Battle River and Sounding Creek watersheds as they relate to the following BRWA planning priorities:
    - Water Quantity and Drought Resiliency
    - Water Quality
    - Biodiversity, and
    - Land Management and Protected Areas.
- Demonstrate municipal compliance with requirements in the *Municipal Government Act (MGA)*. Specifically, to:
    - foster the well-being of the environment (Part.1 s.3 *MGA*); and
    - determine if the land subject to a subdivision proposal is suitable for the purpose for which the subdivision is intended (654(1)(a) *MGA*);
- Reduce risk(s) associated with development on lands generally characterized by hazard features and provide local governments with tools to better monitor impacts and undertake enforcement action when non-compliant land use or development activities occur.

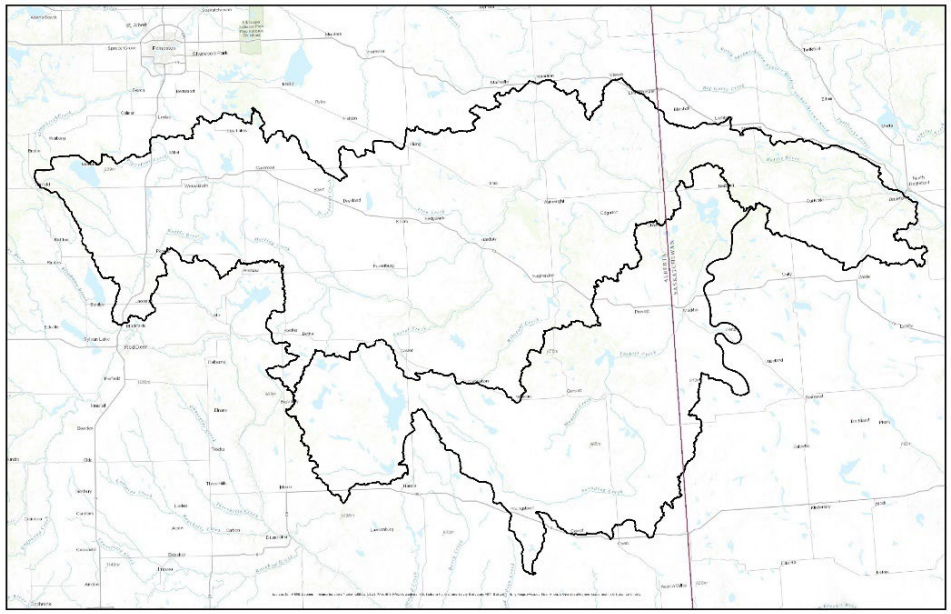

Figure 1: Map of the Battle River and Sounding Creek Watersheds

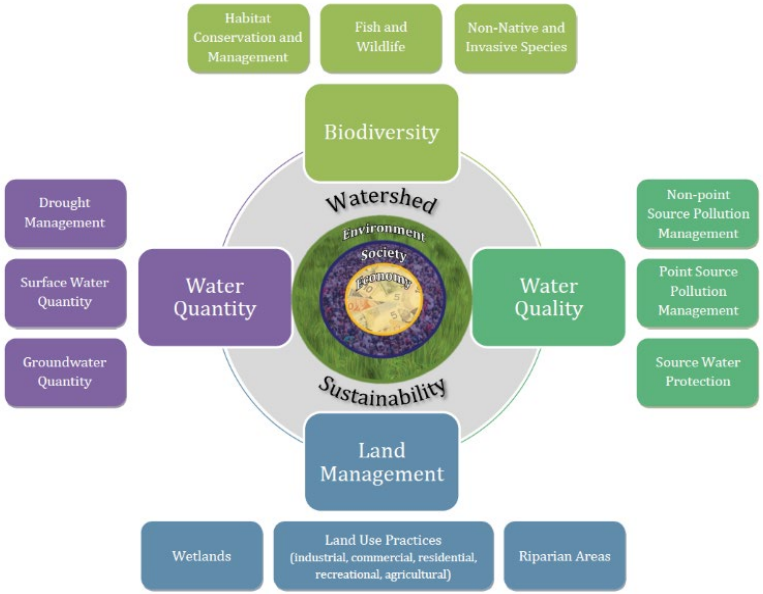

Figure 2: BRWA Watershed Management Planning Framework, including Priorities and Components

Project Methodology & Process

An overview of the methodology and process undertaken and the project deliverables for each phase of the project are included below:

Methodology & Process

The project resulted in two deliverables: a Discussion Guide and a *Guide to Watershed Management in Land Use Planning for Local Governments.* The first deliverable, the Discussion Guide, included a survey of municipal land management documents, specifically Municipal Development Plans (MDP). The purpose of this deliverable was to gather data to better understand how watershed management recommendations identified by the BRWA to support the four (4) watershed management planning priorities have been incorporated into land management plans within the watersheds. Survey questions were based on a review of both published and draft recommendations as well as regional and related management plans.

The findings from the Discussion Guide indicated that:

1. The BRWA's four watershed management planning priorities (land management, water quality, water quantity, and biodiversity) have been incorporated to varying degrees into MDPs throughout the watersheds. Where Objectives and Policies are included in an MDP that support these components, there is often little correlation between the policy and an overarching goal or priority statement that is directly related to existing BRWA recommendations.
2. Some BRWA watershed management recommendations have been incorporated into MDPs; however, the manner in which they have been incorporated (or not incorporated) varies across the municipalities.

The Discussion Guide was prepared in 2023/24 and was presented to leaders and administrators within the watersheds for feedback in Spring 2024. Feedback from leaders and administrators was carefully considered in the preparation of the second deliverable, this *Guide to Watershed Management in Land Use Planning for Local Governments*. This guide was presented to local government administrators at a workshop in 2025, where support for further implementation was discussed.

Project Timeline

The following graphic identifies the timeline to undertake this project

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ROLE OF LOCAL GOVERNMENT

Local Governments Within the Watersheds

Within the Battle River and Sounding Creek Watersheds, land use and development decisions and plans are managed by municipal governments, First Nations, Otipemisiwak Métis Government, the Government of Alberta, and the Government of Canada. Jurisdictionally, the land management process is complex. The plans that guide the decision-making processes for each local government and other jurisdictions are nuanced and developed to reflect the values and planning priorities identified within each community and jurisdiction. However, the decisions issued have lasting impacts that resonate throughout the watersheds. The focus of this guide is to support the incorporation of watershed planning into the land use plans and documents of local governments within the watersheds to maintain and enhance the health of the natural environment.

Legislated Responsibility to Foster Well-Being of the Environment

Municipalities have a significant role in stewarding land within the watersheds through their authority to regulate land use on private land. Among their obligations under the *MGA* and the *Provincial Land Use Policies*, municipalities must contribute to "the maintenance and enhancement of a healthy natural environment."[1]

Municipalities are responsible for minimizing incompatible land uses through the local planning process. The purpose of land use planning is, in large part, an attempt to avoid instances where incompatible land uses negatively affect one another and create unforeseen risks or result in infrastructure costs that are unsustainable. This principle extends to impacts from land use and development on significant natural features, including those features which impact: Water Quantity, Water Quality, and Biodiversity.

Through municipal policy documents and Land Use Bylaws, municipalities can implement watershed management recommendations and environmental land management practices to:

- maintain and enhance a healthy natural environment;
- support the local agricultural community through the implementation of land and water management practices that conserve and restore ground and surface water quality and quantity; and
- reduce risks and costs associated with increased occurrences of extreme climate events, including flooding, drought, and wildfires.

In Alberta, all municipalities must adopt two documents to guide and regulate land use decisions: a Municipal Development Plan (MDP) and a Land Use Bylaw (LUB). Municipal decision-makers utilize these planning documents to inform decisions about land management and development and to plan for infrastructure improvements and investments. Additionally, provincial regulations have regard for the policy direction in Municipal Development Plans when assessing applications for some types of development within their jurisdiction.

[1] Municipal Government Act, RSA 2000, c M-26., Part 1 s. 3(a.1)

Some land management approvals and decisions are subject to an inter-jurisdictional regulatory space, which makes the management of these lands more complex, increases "red tape," and can result in delays in moving through required approval processes. In some instances, these complexities have resulted in land management decisions shifting from the focus of municipalities under the assumption that other levels of government are entirely responsible for decisions and enforcement actions affecting these areas.

This approach to environmental management may subject municipalities to increased levels of risk and may even result in inadvertent administrative errors.

When assuming the authority to manage land within a municipality, decision-makers have an obligation to:

- foster the well-being of the environment; and
- manage environmental risks.

Management of environmental risks includes the protection of natural assets within municipal boundaries from degradation. Taking an active and coordinated approach to the management of natural assets enables municipalities to manage legal risks and legal liability as they consider and administer land use and development decisions. This in turn contributes to greater municipal alignment with the requirements established in provincial and federal laws and regulations.

There are several provincial and federal laws and regulations relevant to municipal management of environmental features, including (but not limited to):

Jurisdiction	Legislative Context
Municipal Government Act (the MGA) (Provincial)	• Establishes as one of the purposes of municipalities the requirement to "to foster the well-being of the environment" (*Part. 1 s.3*) • Establishes the following purpose for municipal planning: "to maintain and improve the quality of the physical environment within which patterns of human settlement are situated in Alberta" (*s. 617(b)*). • These provisions imply that municipalities have a responsibility, through the development and administration of their planning documents, and land management decisions to maintain and improve the physical environment within their jurisdiction. • Incorporating Watershed Management Planning into the land management plans of local governments aligns with this purpose. • Enables municipalities to make decisions about subdivision and development. • The MGA also provides municipalities with tools such as municipal reserves, environmental reserves, environmental reserve eases, and conservation reserves, which enable the identification, conservation, and enhancement of environmental features subject to the limitations within s.664 of the *MGA*.
Land Stewardship Act (Provincial)	• Enables the use of conservation easements, which are a valuable tool for protecting, conserving and enhancing the environment. • This tool may be utilized by municipalities and private landowners to protect, conserve and enhance natural features.

Environmental Protection and Enhancement Act (EPEA) (Provincial)	• *EPEA* regulates pollution, waste, wastewater, stormwater, pesticides, and potable water (as well as other matters).[2] • Management of natural assets, including riparian areas and wetlands, can mitigate stormwater management impacts and have positive impacts on water quality and quantity in receiving areas. • Conserving and enhancing natural assets supports alignment with *EPEA* and the well-being of the environment.
Water Act (Provincial)	• Activities that have a significant impact on natural assets such as riparian areas and wetlands may require an approval, registration or a licence under the *Water Act.*[3] • Where a non-exempt land use or development activity would also require municipal approvals, coordination between the municipal and provincial approvals will enable the municipality to determine if the site has a sufficient developable area and whether access to the development area can be provided. • Where coordination does not occur, the administrative risk associated with approvals is increased. Landowners and local governments could be subject to an enforcement order issued under the *Water Act*.

Alberta Wetland Policy (Provincial)	• The Goal of the Alberta Wetland Policy[4] is to conserve, restore, protect and manage Alberta's Wetlands to sustain the benefits they provide to the environment, society and the economy. The Policy is focused on four outcomes:
	  ○ Wetlands of the highest value are protected for the long-term benefit of Albertans
	  ○ Wetlands and their benefits are conserved and restored in areas where losses have been high;
	  ○ Wetlands are managed by avoiding, minimizing and if necessary, replacing lost wetland value; and
	  ○ Wetland management will consider the regional context.
	• The Wetland Policy promotes avoidance and minimization of impacts from development on wetlands as the preferred course of action.
	• Wetland loss and degradation have historically been the result of human development activities on the landscape.
	• Through the wetland policy, the Government of Alberta acknowledges the roles of municipal, regional, and provincial planning in the decision-making process.
	• Including policy direction in local land management plans that is consistent with the outcomes in the wetland policy aligns with the provincial wetland management framework, provides benefits to the environment, society and economy, and reduces risks associated with development for landowners.

Public Lands Act (Provincial)	• Management of natural assets including riparian areas and wetlands, can mitigate stormwater management impacts, erosion or the degradation of adjacent Public Lands. • The *Public Lands Act* restricts activities on public lands that may injure or destroy the surface of the public land, without authorization (s. 53).[5] • Preventing the disturbance of natural assets adjacent to public lands aligns with this requirement.
Provincial Land Use Policies (Provincial)	• Municipal Approving Authorities are guided by the provincial land use policies when considering and issuing subdivision and development decisions.

[2] Environmental Protection and Enhancement Act. R.S.A. 2000, c. E-12.
[3] See Environmental Law Centre. "Legal Foundations for Municipal Riparian Management". March 2023.
[4] Alberta Wetland Policy. 2013.
[5] Public Lands Act. R.S.A 2000 C P-40.

	• The *MGA* requires municipalities to be in alignment with the Land Use Policies in s. 6.18.4(1), "Every statutory plan, Land Use Bylaw, and action undertaken pursuant to this Part by a municipality, municipal planning commission, subdivision authority, development authority or subdivision and development appeal board or the Land and Property Rights Tribunal must be consistent with the land use policies established under subsection (2)."[6][7] • The Land Use Policies include a goal requiring planning decisions to "contribute to the maintenance and enhancement of a healthy natural environment". The policies under this goal align with preserving and enhancing natural assets and biodiversity through the municipal decision-making process.

Matters Related to Subdivision and Development Regulation (the Regulation) (Provincial)	• The regulation stipulates that a relevant consideration of the Subdivision Authority is to consider the following in relation to the land subject to an application:
	  ○ Topography,
	  ○ Potential for flooding, subsidence or erosion,
	  ○ Soil characteristics, and
	  ○ Stormwater collection and disposal.
	• The Regulation also stipulates that an application for subdivision must include, as required by the subdivision authority:
	  ○ an assessment of subsurface characteristics of the land that is to be subdivided, including but not limited to susceptibility to slumping or subsidence, depth to the water table, and suitability for any proposed on-site sewage disposal system, and
	  ○ if the land that is the subject of an application is located in a potential flood plain and flood plain mapping is available, a map showing the 1:100 flood.
	• These regulations enable the subdivision authority to request additional information at the time of application for applications on sites that exhibit the features identified above to determine if the site is suitable for the intended use.
	• Restricting development on sites that are characterized by hazard features aligns with restricting development in areas characterized by features that are environmentally sensitive.

Agricultural Operations and Practices Act (AOPA) (Provincial)	• *AOPA* Part 2 20(1)(a)) stipulates that if an application for a Confined Feeding Operation is inconsistent with MDP land use provisions, then the application must be denied. This indicates that although municipalities are not responsible for issuing approvals for Confined Feeding Operations, a municipality can directly influence the outcome of an approval issued under *AOPA* for a CFO by including goals, objectives, or policies in their MDP. • When a proposal is consistent with MDP land use provisions, the approval officer will then further investigate to consider the merits of the application as well as effects on the environment, the economy, the community, and the appropriate use of land (*AOPA* 20(1)(b)(ix)). • These provisions support the inclusion of goals, objectives, and policies in MDPs that identify the preferred location for new CFO developments. Additionally, MDPs may identify environmental features that should be considered when determining the appropriateness of a proposed CFO site within a municipality to protect ground and surface water

[6] Municipal Government Act, R.S.A 200, c M-26. Online https://www.canlii.org/en/ab/laws/stat/rsa-2000-c-m-26/latest/rsa-2000-c-m-26.html.

[7] Alberta Municipal Affairs, Land Use Policies, Established by the Lieutenant Governor in Council Pursuant to Section 622 of the Municipal Government Act, Order in Council 522/96), online: https://open.alberta.ca/dataset/7a02d9d4-be82-4019-b05e-4205df30cefe/resource/b2993476-6864-4903-8a77-917300f760fa/download/1996-landusepoliciesmga.pdf.

quality, biodiversity, and preserve the recreation value and property values of existing developments identified within municipal growth nodes.

- This indicates that although municipalities are not responsible for issuing approvals for Confined Feeding Operations, a municipality can directly influence the outcome of an approval issued under *AOPA* for a CFO by including goals, objectives, or policies in their MDP.

The scope of municipal jurisdiction to control, monitor, and enforce land management decisions varies based on the proposal, the site, and the applicable legislation. As such, it is essential for municipalities to effectively interpret and implement their responsibilities under the legislation.

Limitations & Applicability

The project team recognizes that the applicability of the Guide may be limited in other jurisdictions, such as First Nations and Métis Settlements. The project team recognizes that the guidelines have been structured for incorporation into statutory plans and other plans and procedures that are enabled under the *MGA*. As a result, additional refinement may be required to enable the incorporation of the guidelines into Indigenous land management plans and processes.

However, the BRWA and the project team invite and encourage Indigenous governments and land managers to participate in the collaboration and co-creation process to further adapt the guidelines presented herein to best address their specific needs and requirements.

The project team acknowledges that for watershed management planning to be successfully integrated into the decision-making processes of local governments, additional steps will be required to update baseline municipal GIS data, engineering design standards, Land Use Bylaw provisions, and even municipal applications affecting Area Structure Plans, Land Use Bylaw amendments, subdivision applications, and development permit applications. It is acknowledged that incorporating the guidelines into land management plans will be the first step required to facilitate a system-wide change to support watershed management planning at the local government level.

IMPLEMENTATION GUIDELINES OVERVIEW

Organization of the Guidelines

The guidelines have been structured around the four (4) BRWA Watershed Management Planning Priorities. Unique Plan Components were developed for each Planning Priority. Corresponding recommendations to support each plan component were developed by the BRWA. The Guidelines in the following sections are organized under the BRWA recommendations related to each plan component.

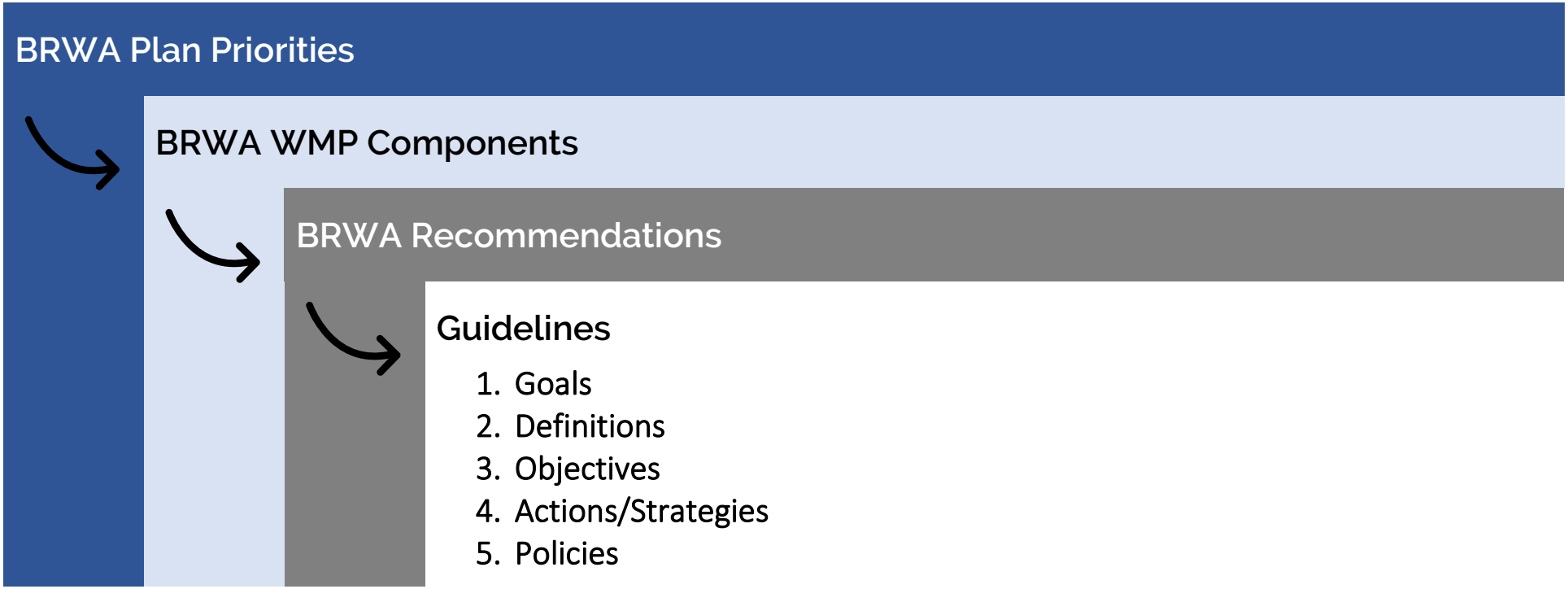
WATERSHED MANAGEMENT PLANNING PRIORITIES	PLAN COMPONENTS	BRWA RECOMMENDATION AREAS
Water Quantity	• Drought Management • Surface Water Quantity • Ground Water Quantity	3
Water Quality	• Non-point Source Pollution Management • Point Source Pollution Management • Source Water Protection	8
Biodiversity	• Habitat Conservation and Management • Non-Native/Invasive Species Management	4
Land Management	• Wetland Management • Riparian Areas Management	11

The guidelines identify recommended terms, actions and strategies, goals, objectives, and policies intended to be individualized and incorporated into land management plans developed and adopted by local governments to support the inclusion of watershed management recommendations.

The guidelines are intended to achieve the following outcomes:

- Effectively incorporate the BRWA's watershed management planning recommendations into the planning and approval processes relating to local land management decisions within the Battle River and Sounding Creek watersheds as they relate to the following BRWA planning priorities:
    - Water Quantity and Drought Resiliency
    - Water Quality
    - Biodiversity, and

    - Land Management and Protected Areas.
- Demonstrate municipal compliance with requirements in the *Municipal Government Act (MGA)*. Specifically, to:
    - foster the well-being of the environment (Part 1 s.3 *MGA*); and
    - determine if the land subject to a subdivision proposal is suitable for the purpose for which the subdivision is intended (654(1)(a) *MGA*).
- Reduce risk(s) associated with development on lands generally characterized by hazard features and provide local governments with tools to better monitor impacts and undertake enforcement action when non-compliant land use or development activities occur. The figure below illustrates how the guidelines have been structured:



LAND MANAGEMENT GUIDELINES

Land Management is a vital component to supporting watershed health and sustainability. Land use practices within the watersheds have greatly modified the natural landscape. Population growth and increased development result in increased pressures on land and water resources. It is anticipated that development pressures will continue and/or increase within the watersheds. In response to these pressures, it is important to implement land management strategies that support growth within the watershed while also identifying design mitigations and conservation priority areas that are responsive to more frequent climate events, support ecosystem services and protect natural assets that sustain families and businesses within our communities. Additional benefits to implementing a land management strategy that prioritizes ecosystem services such as wetlands and riparian areas include: reduce risks associated with new development, improved drought, flood and wildfire resiliency, and reductions to municipal infrastructure costs.

The BRWA Watershed Management Planning Framework identifies three planning components related to Land Management: Wetland Management, Riparian Area Management and Land Use Practices. Recommendations relating to land use practices are interwoven throughout all the plan priorities and BRWA management recommendations identified in this Guide. This section of the guide is focused on **Watershed Management Planning**, **Wetland Management** and **Riparian Areas Management** to avoid duplication.

In addition to the main focus, which is the importance of incorporating watershed management planning into the land management plans of local government, the BRWA identified two planning components and associated watershed management planning recommendations relating to **Land Management.**

Planning Component	BRWA Watershed Management Plan Recommendations
Wetland Management	• Protect existing wetlands to prevent further wetland loss.
	• Include wetland setback provisions to preserve ecological and hydrological function.
	• Incorporate wetland and riparian management for new developments.
	• Integrate existing tools (e.g. Stepping Back from the Water, Field Manual on Buffer Design for the Canadian Prairies, and the Riparian Setback Matrix Model) to determine optimal buffer for development near wetlands.
	• Identify ecologically, hydrologically, economically, and culturally significant wetlands within municipal boundaries.
Riparian areas management	• Restrict development in riparian areas.
	• Include provisions for setbacks and buffer zones for riparian areas.
	• Establish protection and conservation areas around riparian ESAs.
	• Establish minimum 30-metre-wide naturally vegetated areas adjacent to each side of watercourses to protect riparian areas.
	• Require increased riparian protection areas where habitat functionality requires greater setbacks.
	• Ensure a minimum of 75% of riparian areas are naturally vegetated.
	• Manage riparian impacts related to aggregate extraction development.

Watershed Management Planning

Incorporating watershed management planning into the land management plans of local governments is vital to preserving the integrity and function of water sources and biodiversity within the watersheds and demonstrating municipal compliance with legislated requirements to foster the well-being of the environment. Identifying watershed features within local land management plans enables local governments to establish baseline data to monitor the cumulative impacts from land development decisions on valuable natural assets within the watershed that support continued economic development, human health, biodiversity and the availability and quality of water sources.

Implementing watershed management planning and environmental land management practices enables local government to:

- maintain and enhance a healthy natural environment;
- support the local agricultural community through the implementation of land and water management practices that conserve and restore ground and surface water quality and quantity;
- reduce risks and costs associated with increased occurrences of extreme climate events, including flooding, drought, and wildfires;
- reduce risk(s) to local government and landowners associated with development on lands generally characterized by landscape features that are hazardous to some types of development;
- cost-effectively and efficiently plan for infrastructure investments and improvements;
- monitor impacts to natural assets resulting from development decisions; and
- where necessary, undertake enforcement action when non-compliant land use or development activities occur to support local conservation and restoration priorities.

Goal Statement: Implement watershed management planning through local land management plans.

Definitions:
Biodiversity, Ecological Services, Natural Assets, Watershed (See **Appendix A** for a full list of definitions)

Objective 1: Local land management plans identify watershed features and support watershed management planning

Actions/Strategies:

1. Identify regional and sub-watershed basins on MDP maps.
2. Identify local ecoregions in land management plans.
3. Identify water features on maps included in statutory plans and other land management plans.
4. Collaborate with local Watershed Planning and Advisory Councils to access resources and identify important ecological services and natural assets within the community.
5. Recognizing the unique interjurisdictional nature of water and other natural assets, collaborate with regional and provincial partners to maintain and enhance natural assets throughout the watersheds.

Polices:

1. Restrict development that would harm water quality or detrimentally impact water quantity or biodiversity.
2. Consider impacts to ecological services when evaluating the appropriateness of development proposals.
3. Statutory plans, plan amendments and bylaw amendments should include a description of and delineation of natural features including: wetlands, riparian areas, important hydrological features, environmentally sensitive areas, source water protection areas, and ecological corridors.
4. When applicable, require proposed development to comply with approved watershed management plans.

Wetland Management

Wetlands are among the most productive ecosystems in our communities. They play an integral role in the ecology of the watershed by supporting water quality and quantity. They provide natural protection from flooding and reduce erosion in riparian areas. Wetlands also support ecosystem diversity by providing habitat for fish, wildlife, and waterfowl. Stewardship of wetlands on public and private land is an important component of effective watershed management.

MDP goals, objectives and policies for the conservation and restoration of wetlands support ecosystem health, minimize private and public costs associated with stormwater management infrastructure, reduce flood risk, and improve drought resiliency within the watersheds.

Guidelines in the following section include: definitions, goal statements, objectives, actions, and policies intended to assist local governments in implementing BRWA watershed management planning recommendations that support Wetland Management.

Goal Statement: Maintain and restore wetlands.

Definitions:
Development, geotechnical report, high water table, environmental impact assessment, wetland, wetland boundary, wetland assessment, watercourse, water body, wetland, wetland restoration, passive wetland restoration, native species, ephemeral water body, Environmental Reserve (ER), Environmental Reserve Easement (ERE), Conservation Reserve (CR), Conservation Reserve Easement (CRE) (See Appendix A for a full list of definitions)

Objective 1: Prevent further wetland loss

Actions/Strategies:

1. Inventory wetlands and hydrology features.
2. Incorporate wetland data into MDP information maps.
3. Identify ecologically, hydrologically, economically, and culturally significant wetlands within municipal boundaries.
4. Identify clear triggers for when wetland assessments will be required.
5. Identify requirements for design mitigations at the time of subdivision or development to protect wetlands.
6. Establish clear and achievable restoration and conservation goals.
7. Identify ongoing causes of wetland degradation and loss.

Polices:

1. Require new development proposals to align with the following Alberta Wetland Policy outcomes:
    a. Protect wetlands of the highest value for the long-term benefit of Albertans;
    b. Conserve and restore wetlands in areas where losses have been high;
    c. Avoid, minimize, and, where necessary, replace lost wetland value; and
    d. Consider the regional context of wetland management when evaluating new development proposals.
2. Require new or proposed amendments to municipal development plans (MDPs), area structure plans (ASPs), outline plans and Land Use Bylaws to include wetland mapping.
3. Require subdivision and development permit applications, in areas characterized by wetlands, to include wetland mapping and/or a wetland assessment prepared by a qualified professional.
4. Restrict development within wetlands.
5. Require development buffers adjacent to wetlands as a condition of subdivision or development permit approval.
6. When wetlands are identified within a site, require new subdivision and development to be designed to avoid or replace wetlands within the contributing area.
7. Prioritize passive restoration methods for the restoration of wetlands to minimize costs associated with restoration projects.
8. Incorporate native vegetation into restoration projects.
9. Utilize natural fixes and bioengineering techniques to restore wetlands, wherever possible.

Objective 2: Preserve the ecological and hydrological function of wetlands

Actions/Strategies:

1. Incorporate wetland data into MDP information maps.
2. Identify clear triggers for when wetland assessments will be required.
3. Identify requirements for design mitigations at the time of subdivision or development to protect wetlands.
4. Identify setback or Environmental Reserve requirements to be applied at the time of subdivision or development to protect wetlands.

Policies:

1. Incorporate wetland and riparian management into the design of new developments.
2. Require wetland assessments to include the following information:
    a. delineate the area of the wetlands;
    b. delineate watercourse and the area of influence; and
    c. provide a recommended development setback and/or development buffer area.
3. Utilize environmental reserves and environmental reserve easements at the time of subdivision to establish development buffers adjacent to wetlands subject to the limitations within s.664 of the *MGA*.
4. Incorporate mitigation actions to conserve or restore wetlands and riparian areas at time of subdivision or development.

5. Integrate existing tools (e.g. Stepping Back from the Water, Field Manual on Buffer Design for the Canadian Prairies, and the Riparian Setback Matrix Model) to determine optimal buffer areas for development near wetlands.

Riparian Area Management

Riparian lands are the transitional areas between upland and aquatic ecosystems. These areas can have variable width and extend both above and below ground. These lands are influenced by and/or exert an influence on associated water bodies, which include alluvial aquifers and floodplains, when present. Riparian lands usually have soil, biological, and other physical characteristics that reflect the influence of water and/or hydrological processes[8]. Riparian areas provide valuable ecosystem services that can reduce municipal costs, support water quality, and maintain biodiversity. The loss of intact riparian areas significantly impacts water quality, harms fish and wildlife populations and negatively impacts water quantity within a watershed. When a riparian area exhibits high disturbance levels, its ecosystem functions decline, and it can become highly vulnerable to the impacts of local land management decisions[9]. Adopting municipal land management policies and practices that support riparian area management are key components of protecting ecosystem services within the watershed, and striking a balance between a healthy aquatic ecosystem, a vibrant economy, and sustainable communities.

Goal Statement: Improve the function and intactness of riparian areas.

Definitions:
Bioengineering techniques, development, ephemeral water body, environmental impact assessment, erosion and sediment control plan, geotechnical report, hazard lands, high water table, legal bank, littoral, lot grading and drainage plan, native species, natural assets, natural state, passive wetland restoration, riparian area, riparian intactness runoff, upland area, wetland, wetland assessment, watercourse, water body, wetland, wetland boundary, wetland restoration, Environmental Reserve (ER), Environmental Reserve Easement (ERE), Conservation Reserve (CR), Conservation Reserve Easement (CRE) (See **Appendix A** for a full list of definitions)

Objective 1: Preserve the ecological and hydrological function of riparian areas

Actions/Strategies:

1. Identify and incorporate existing riparian area intactness survey information into MDP mapping.
2. Establish and monitor riparian area intactness targets.
3. Explore partnerships with organizations such as *Cows and Fish* to share information about Beneficial Management Practices for grazing near riparian areas.
4. Identify clear triggers for when the identification and delineation of water bodies, watercourses, and riparian areas will be required as part of the Land Use Bylaw amendment, statutory plan development or amendment process, and the development or subdivision process.
5. Collaborate with AB Environment and Parks to access data and setback recommendations as part of the subdivision and development referral process.
6. Collaborate with the BRWA and AB Environment and Parks to access data and monitor riparian intactness.

[8] Alberta Water Council, 2013.
[9] "Approved Water Management Plan for the Battle River". July 2014. Alberta Environment and Sustainable Resource Development

7. Develop a reserves or public lands bylaw which includes minimum targets for the retention of natural vegetation in riparian areas or riparian intactness on public land.

Policies:

1. Establish a minimum riparian intactness target of 75%.
2. New development within riparian areas is discouraged.
3. Where development is allowed within riparian areas, require the development to comply with the established minimum intactness target.
4. Require landscaping plans to include design features that support riparian intactness.
5. Discourage shoreline armoring within riparian areas.
6. Where shoreline armoring is required, discourage the use of hard landscaping elements and encourage the use of native vegetation to prevent erosion.
7. Require applications for subdivision or development on sites which include water bodies, watercourse or riparian features to include a biophysical assessment when the proposed application would result in a multi-lot subdivision or result in an increase in the intensity or density of development on the site.
8. Require biophysical or wetlands assessments to include the following information:
    a. delineate riparian areas within the project or plan area; and
    b. provide a recommended development setback and/or development buffer area.
9. Utilize environmental reserves and environmental reserve easements at the time of subdivision, subject to the limitations within s.664 of the *MGA*.
10. Incorporate mitigation actions to conserve or restore riparian areas at the time of subdivision or development permit application.
11. Require new subdivision and development applications to demonstrate compliance with established riparian intactness targets.
12. Integrate existing tools (e.g. Stepping Back from the Water, Field Manual on Buffer Design for the Canadian Prairies, and the Riparian Setback Matrix Model) to determine optimal buffer areas for development near riparian areas.
13. Require, as a condition of subdivision or development approval, the establishment of a minimum 30-metre-wide naturally vegetated development buffer adjacent to the boundaries of permanent watercourses to protect riparian features.
14. Where identified in a wetland assessment, biophysical assessment or other report prepared by a qualified professional require buffer areas to be increased to protect or enhance riparian function.

Objective 2: Minimize damage to riparian areas from aggregate extraction development

Actions/Strategies:

1. Identify preferred and non-preferred locations for aggregate extraction in statutory plans.
2. Identify the location of existing aggregate extraction development and known aggregate deposits in the MDP.

Policies:

3. Discourage aggregate extraction development within riparian areas.
4. Require site remediation to include revegetation of the site with native vegetation, where avoidance cannot be achieved.

5. Require new development proposals to provide and comply with erosion and sediment control plans.
6. Restrict staging and storage areas from locating in riparian areas.
7. Minimize onsite dewatering associated with aggregate extraction developments.
8. Require the installation of silt fences and incorporation of Low Impact Development (LID) practices to limit sediment and pollutants from entering watercourses and water bodies.

WATER QUANTITY & QUALITY GUIDELINES

Water Quantity and **Quality** are key components of maintaining watershed health and sustainability. Activities on the land can impact water quantity and quality of both surface and groundwater sources. Management of land, particularly in riparian areas, which is largely the responsibility of local governments, has direct effects on our water sources.

Local governments are responsible for ensuring the effective and efficient delivery of services. Developments that directly or indirectly cause harm to water quality or water quantity can negatively impact the function of ecological services that provide tangible benefits within the municipality by enhancing water quality and reducing flood risk[10].

Water, in a sufficient supply and of sufficient quality, is critical to food production and is also used for cleaning, sanitation, and manufacturing activities in the food system (Kirby et al., 2003). While the demand for water in many of our communities is increasing due to growing populations, industry, and agricultural needs, climate change has reduced the natural availability of water in some areas. It is anticipated that climate events will continue to cause fluctuations in water quantity throughout the watersheds[11]. When water quantity decreases, it can result in greater erosion and compaction of soil so that rainfall events lead to increased runoff and associated point and/or non-point sources of pollution, which impact water quality. Decreases in water quantity can also result in reduced agricultural output and/or negative impacts on producers and consumers through lower yields and higher costs. To prepare for the anticipated variation in annual precipitation rates and changes to when precipitation events occur, local governments can prioritize the conservation of important water recharge areas and protect riparian areas to reduce erosion, runoff, and associated point and/or non-point sources of pollution through land management goals, objectives, and policies.

Water Quantity Guidelines

The BRWA has identified three planning components and associated watershed management planning recommendations relating to **Water Quantity.** These components are closely related and are jointly addressed in the "Water Quantity" guidelines to reduce repetition.

Planning Component	BRWA Watershed Management Plan Recommendations
Drought Management	• Identify environmental considerations or ecosystem needs (e.g. natural assets, riparian areas, green spaces, other ecosystem elements) as a priority value, goal, or objective.
Surface Water Management	• Limit the removal of tree areas/shelterbelts.
Groundwater Management	• Collaborate with regional and provincial partners to improve the health of natural areas, including riparian areas, wetlands, shelterbelts, and other treed areas.

[10] *Legal Foundations for Municipal Riparian Management*. Prepared for the North Saskatchewan Watershed Alliance. (March 2023) Environmental Law Centre., pp.3-4.
[11] Takaro, T., Enright, P., Waters, S., Galway, L., Brubacher, J., Galanis, E., McIntyre, L., Cook, C., Dunn, G., Fleury, M. D., Smith, B., & Kosatsky, T. (2022). Water Quality, Quantity, and Security. In P. Berry & R. Schnitter (Eds.), Health of Canadians in a Changing Climate: Advancing our Knowledge for Action. Ottawa, ON: Government of Canada. *Chapter7 - Water Quality, Quantity, and Security* (Pg. 493-503).

The following guidelines include: definitions, goal statements, objectives, actions/strategies, and policies intended to assist local governments in implementing BRWA watershed management planning recommendations that support water quantity.

Goal Statement: Ecosystem services that support water quantity and drought resiliency are prioritized in planning decisions.

Definitions

Biodiversity, bioengineering techniques, biophysical assessment, ecosystem services, wetlands, riparian areas, important habitat areas, important peat lands, high groundwater table areas, tree cover, natural assets, drought adaptation and management, drought resilience, shelterbelt, Environmental Reserve (ER), Environmental Reserve Easement (ERE), Conservation Reserve (CR), Conservation Reserve Easement (CRE), and protected area (See **Appendix A** for a full list of definitions)

Objective 1: Maintain the integrity and efficiency of ecosystem services that support water quantity and drought resilience

Actions/Strategies

1. Conduct a natural asset inventory to identify the location of natural assets that benefit surface water quantity, groundwater quantity, and drought management.
2. Monitor land use and development patterns within natural asset areas to measure the efficacy of conservation and restoration strategies.
3. Identify conservation and restoration priorities to support water quantity.
4. Include Watershed Protection or Conservation district(s) in the Land Use Bylaw to encourage the retention of large intact tree stands.
5. Collaborate with regional, provincial and federal partners to identify and designate wetlands, riparian areas and intact tree stands as protected areas or conservation areas within the municipality to improve drought resiliency and biodiversity and support the long-term viability of agriculture.

Policies

1. Require new area structure plans (ASPs), local area plans and/or conceptual schemes to include stormwater management plans and an inventory of natural assets, including riparian areas within the plan area.
2. Require the delineation of features and areas that align with the water quantity and drought management priorities of local government in new ASPs, local area plans and/or conceptual schemes.
3. Require the assessment and delineation of riparian intactness areas within riparian features.
4. Require statutory plans and developments to incorporate site design measures to minimize impacts to ecosystem services that support water quantity and drought management.
5. Discourage wetland disturbance in new development areas and brownfield development areas.
6. Encourage the reclamation of wetlands and other ecosystem services on brownfield sites.
7. Support practices that optimize the efficient use of water.

Objective 2: Strive to achieve a riparian intactness target of 75%

Actions/Strategies

1. Establish a municipal riparian intactness target that is consistent with the BRWA recommendation of 75% intactness.
2. Include the riparian intactness target as an objective within local government land management plans.

Policies

1. Encourage landowners to take voluntary action to improve riparian intactness on private land.
2. Require the identification of riparian intactness targets for sites that include or are adjacent to riparian features at time of:
    a. new area structure plans, local area plans and/or conceptual scheme development; and
    b. subdivision and development permit applications on sites where riparian features are present (water bodies and watercourse).
3. Require new development to be designed to conform to municipal riparian intactness targets.

Objective 3: Conserve important water recharge areas

Actions

1. Identify important water recharge areas within the municipality.
2. Collaborate with provincial agencies and not-for-profit organizations to access funding for livestock fencing and watering equipment.

Policies

1. Enable development within important water recharge areas only where water quantity and water quality can be maintained or enhanced to the satisfaction of the municipality.
2. Require new area structure plans, local area plans and/or conceptual schemes to identify the location of important water recharge areas.
3. Require site design to minimize impacts to ecosystem services that support water quantity including wetlands and water recharge areas.
4. Prohibit the disturbance of important water recharge areas, including important peat areas and wetlands.

Objective 4: Conserve and restore large tree stands and shelterbelts to minimize soil erosion and surface water runoff and support biodiversity

Actions

1. Encourage the planting and retention of tree stands and shelterbelts along property lines, adjacent to roadways, and adjacent to riparian features.

Policies

1. Prohibit the removal of native, non-invasive vegetation within riparian areas and/or adjacent to areas exhibiting steep slopes (>15%). Site-specific setbacks may be determined using one of the following methods:
    a. Recommended setback from Stepping back from the Water; or
    b. Riparian Setback Matrix Model; or

c. AEPA Setback Recommendations; or
d. Recommendations from a report prepared by a qualified professional.

2. Enable large, intact tree stands or old-growth tree stands to be provided as Conservation Reserves in accordance with Section 664.2 of the *MGA*.

Water Quality Guidelines

Access to a safe water supply in quantities sufficient to sustain industry, agricultural producers, and communities within the watersheds is dependent on effective strategies for managing source water. Implementing source water protection strategies supports continued access to safe drinking water and the availability of sufficient volumes of water to support agriculture and industry.

The BRWA has identified two planning components and associated watershed management planning recommendations relating to **Water Quality.** Guidelines have been developed to address each planning component.

Planning Component	BRWA Watershed Management Recommendation
Source Water Management	• Maintain and restore riparian vegetation within the 1:100 flood zone around all watercourses, water bodies and wetlands. • Manage development within floodplains to maintain floodplain structure and function. • Maintain and restore riparian and wetland areas on private and municipal property. • Incorporate surface source water protection planning principles in development policies. • Incorporate groundwater protection planning principles in development policies.
Point & Non-point Pollution Management	• Limit the development of new Confined Feeding Operations (CFOs) within the effective drainage area of Battle River and Sounding Creek watersheds. • Prohibit manure application in riparian areas and floodplains. • Adhere to manure application setbacks for lands sloping toward surface water bodies as outlined in the *AOPA*. • Integrate Low Impact Development (LID) techniques for stormwater management in new development, including permeable pavement, bioswales, rain gardens, natural drainage ways, stormwater retention ponds, and rainwater harvesting.

Source Water Management Guidelines

The following definitions, goal statements, objectives, and policies are intended to assist local governments in implementing new guidelines in land management documents that support BRWA Watershed Management Recommendations for Source Water Protection.

Goal Statement: Support clean, high-quality water through proactive stewardship and management of our water sources.

Definitions

Development, source water, source water protection, Environmental Reserve (ER), Environmental Reserve Easement (ERE), Conservation Reserve (CR), Conservation Reserve Easement (CRE), Flood way, Flood Fringe, Flood Construction Level, low risk development, moderate risk development, high human activity centre, high risk development (See **Appendix A** for a full list of definitions)

Objective 1: Protect source water intake areas to minimize risks to drinking water

Actions/Strategies:

1. Collaborate with watershed associations to establish and implement riparian intactness targets.
2. Develop drinking water protection zone overlays and integrate with statutory and regulatory instruments.
3. Encourage the reclamation of abandoned water wells.

Policies:

1. Require information about source water and proposed design mitigations as part of the ASP development, outline plan development and/or Land Use Bylaw amendment applications.
2. Prohibit or restrict high-risk development or land uses, such as industrial land uses, storage facilities for hazardous materials, gas stations, car repair garages, and dry-cleaning facilities, confined feeding operations, manure storage facilities or resource extraction developments within identified drinking water protection overlay areas.
3. Where drinking water protection zone overlays have not been established, require development that could negatively impact surface source water, such as industrial land uses, storage facilities for hazardous materials, gas stations, car repair garages, and dry-cleaning facilities, confined feeding operations, manure storage facilities or resource extraction developments to provide information with the application to demonstrate how negative impacts will be mitigated and/or prevented.
4. Require new Area Structure Plans, local area plans and/or conceptual schemes and Land Use Bylaw amendment applications to include the identification of drinking water protection zone overlays, and, where applicable, riparian areas and development buffers.
5. Prioritize erosion and sediment control in development permit applications and approvals.
6. Require development proponents to demonstrate that a proposed development can be serviced by a sustainable water supply over the lifespan of the project.

Objective 2: Promote innovation in stormwater management to support source water quality

Actions/Strategies:

1. Evaluate and implement stormwater management requirements to meet source water quality objectives.

Policies:

1. Require development to comply with stormwater management requirements and source water quality objectives.
2. Prioritize riparian, wetlands, and green infrastructure projects.

Objective 3: Discourage development within flood hazard areas to reduce risks to property and human safety.

Policies:

1. Require subdivision and/or new development applications in flood hazard areas to be accompanied by flood elevation mapping that demonstrates the site includes a building pocket outside of the floodway and flood fringe areas. Where Flood Construction Levels (FCL) have been identified, new building construction should be located at or above the FCL.
2. Support moderate risk development, such as limited recreational uses within flood hazard lands that do not include permanent buildings or overnight accommodations.
3. Discourage the establishment of wastewater management infrastructure or private sewage disposal systems within the identified floodway or flood fringe areas.

Objective 4: Prioritize wetland avoidance and restoration

Actions/Strategies:

1. Inventory wetlands within the municipality.
2. Identify priority wetlands, or priority wetland conservation or restoration areas within the municipality where wetlands must be avoided and/or restored at the time of development.
3. Share information and reference materials with community members to explain the benefits of wetland conservation.

Policies:

1. Where avoidance is reasonably achievable, new development shall be designed to avoid wetlands and wetland disturbance.
2. Wetlands that provide stormwater management functions should be avoided, restored or enhanced to improve their function and minimize future municipal infrastructure costs.

Objective 5: Protect local and regional groundwater sources

Actions/Strategies:

1. Identify local watersheds in local land management plans, including MDPs.
2. Identify local hydrology features on environmental mapping in local land management plans, including MDP.
3. Identify local and regionally significant groundwater sources in local land management plan mapping and statutory plans.

Policies:

1. Consider requiring applications for Land Use Bylaw amendments to include information about groundwater where the proposed amendment would increase the intensity or density of development within the subject site.
2. Require development that could negatively impact groundwater, such as CFOs, industrial or resource extraction developments, to provide information with the application to demonstrate how negative impacts will be mitigated and/or prevented.
3. Restrict new multi-lot development to areas with sufficient groundwater quantity or access to a municipal or regional water service to support the density of development.
4. Restrict the development of new septic fields, mounds, and surface discharge systems within ½ mile of a lake, Battle River or Sounding Creek.
5. Protect groundwater and ensure use does not exceed the carrying capacity of the land by:
    a. Supporting long-term groundwater research and monitoring programs;
    b. Mitigating the potential adverse impacts of development on groundwater recharge areas;
    c. Adhering to provincial groundwater testing requirements, as part of the development approval process; and
    d. Encouraging and facilitating the capping of abandoned water wells to protect against groundwater leakage and cross-contamination.

Point and Non-Point Source Pollution Management Guidelines

There is a pressing need to identify adaptive actions to reduce or eliminate negative impacts from point and non-point source pollution on water quality within the watershed. Point source pollution refers to pollution that comes from a single source. Non-point source pollution refers to pollution that comes from many places all at once. Non-point source pollution can be harder to identify and harder to address. To manage non-point source pollution, it is necessary to implement management strategies that apply to a large area (such as a municipality or watershed). Implementing strategies to reduce the opportunity for pollutants and sediment to be introduced into surface and groundwater supplies throughout a large area increases the chance of successfully protecting ground and surface water within the watersheds.

Goal Statement: Primary drinking water sources and recreational assets are protected from point and non-point source pollution.

Definitions

Effective Drainage Area, Environmentally Sensitive Areas, Gross Drainage Area, Hydrogeological Impact Assessment, Hydrogeologically sensitive, Point source pollution, Non-point source pollution (See **Appendix A** for a full list of definitions).

Objective 1: Reduce the opportunity for pollutants and sediment to be introduced into surface and groundwater supplies

Actions/Strategies:

1. Undertake an Environmentally Sensitive Areas Inventory and Mapping.
2. Identify environmentally sensitive areas mapping in statutory plans, regulatory frameworks or corresponding land management plans or policies.
3. Identify the ecoregion(s) within the municipality to establish precipitation rates that may impact the transfer of pollutants to surface water.
4. Identify the hydrological features of the major watershed and sub watershed basins.
5. Identify watershed boundaries within land use plans.
6. Identify basins and seasonal tributaries utilizing enhanced lidar or other available data.
7. Identify CFO and/or Industrial Development exclusion zones near high-value recreation lakes, rivers and tributaries.
8. Consult with neighbouring jurisdictions to define statements of limitation for CFOs to protect shared ecological features.
9. Where shared objectives and/or policies related to CFO developments are identified in an adopted Intermunicipal Development Plan or Watershed Management Plan, include the shared objectives and policies in new local-level statutory plans, regulatory frameworks or corresponding land management plans or policies.
10. Integrate Low Impact Development (LID) design guidelines for stormwater management into municipal design standards for new development, including permeable pavement, bioswales, rain gardens, natural drainage ways, stormwater retention ponds, and rainwater harvesting.
11. Encourage the Government of Alberta to update the provincial flood hazard mapping to identify the flood way, flood fringe and flood construction levels adjacent to major waterways throughout the watersheds.

Policies:

1. Limit the development of new Confined Feeding Operations (CFOs) within the Effective Drainage Areas[12] of the Battle River and Sounding Creek watersheds[13].
2. Restrict manure application within riparian areas and flood hazard areas.
3. Restrict manure application within the watershed of highly developed lakes and within 1 mile of less developed lakes.
4. Restrict manure application within a prescribed distance of urban areas serviced by GUDI municipal water treatment systems.
5. Adhere to manure application setbacks for lands that slope toward surface water bodies as outlined in the *AOPA*.
6. Integrate Low Impact Development (LID) techniques for stormwater management in new development areas, including permeable pavement, bioswales, rain gardens, natural drainage ways, stormwater retention ponds, and rainwater harvesting.
7. Restrict development in riparian areas to reduce erosion, runoff, and associated point and/or non-point sources of pollution.

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[12] For data source see: *Gross and effective drainage area boundaries of the AAFC Watersheds project – 2013 https://open.canada.ca/data/en/dataset/063ee9b6-b3f2-45ab-9bed-d330880064d5*

[13] Under the *Agricultural Operation Practices Act* Part 2 Matters Regulations and Standardized Regulatory Framework for permitting and compliance of CFOS & Manure Management, the Natural Resource Conservation Board has jurisdiction to approve confined feeding operations. The role of the Municipal Development Plan is a key aspect of the NRCB approval process. If a CFO is not consistent with the MDP the NRCB must deny the application. If the application is consistent with the MDP the approval officer will than consider the effects on the environment, the economy and the community and the appropriate use of land, AOPA 20(1)(b)(ix)

8. Require stormwater management plans to consider the ecoregion and provide recommendations to minimize the transfer of pollutants to surface water.
9. Prohibit manure management practices that may result in harmful levels of pollutants entering watercourses and water bodies.
10. Restrict new CFO and/or Industrial Developments in exclusion zones near high-value recreation lakes, rivers and their tributaries.
11. Consider requiring Land Use Bylaw amendment applications, development permit applications or subdivision applications to include a hydrogeological impact assessment when the site exhibits any of the following features:
    a. High groundwater table,
    b. Project is located within the effective drainage area of a river, tributary or named lake,
    c. Thin soil cover, and/or
    d. Highly permeable soils.

Objective 2 Integrate Low Impact Development (LID) techniques for stormwater management in new development, including permeable pavement, bioswales, rain gardens, natural drainage ways, stormwater retention ponds, and rainwater harvesting

Actions/Strategies:

1. Develop municipal LID standards or design requirements to ensure proposed techniques are compatible with municipal stormwater management infrastructure.
2. Clarify through the Land Use Bylaw and Municipal Servicing Standards when LID techniques must be incorporated into the site development and municipal stormwater infrastructure.

Policies:

1. Require new infrastructure to incorporate LID standards.
2. Require LID techniques to be incorporated into new stormwater management plans.
3. Encourage the development of bioswales and rain gardens on public and private lots designed to meet or exceed approved municipal stormwater management design guidelines.

BIODIVERSITY GUIDELINES

Habitat Conservation & Management and **Non-Native & Invasive Species Management** are key components to supporting biodiversity within the watersheds.

The BRWA Watershed Management Planning Framework identifies three planning components to support Biodiversity: Habitat Conservation & Management, Non-Native & Invasive Species Management, and Fish & Wildlife. The Habitat Conservation & Management and Fish & Wildlife components are closely related and have been grouped under the "Habitat Conservation and Management" subsection to reduce repetition.

The BRWA has identified two planning components and associated watershed management planning recommendations relating to **Biodiversity.**

Planning Component	BRWA Watershed Management Plan Recommendations
Habitat Conservation and Management	• Maintain natural habitat corridors. • Incorporate ESAs in municipal policies related to environmental protection. • Integrate local ESAs into development project criteria. • Introduce policies to create, protect, and restore natural assets (identified as natural resources and ecosystems that yield a flow of benefits to people, including forests and healthy tree stands, watercourses, water bodies, wetlands, fields, and soil).
Non-Native and Invasive Species Management	• Work with agricultural producers and other landowners to implement beneficial management practices that support non-native and invasive species management.

Habitat Conservation & Management Recommendations

Intact habitat is crucial to maintaining biodiversity within the watersheds. Habitat management is the management of human activity, including land development, infrastructure development, resource development, and transportation corridors, to ensure that habitat remains or is restored to allow animals to survive and thrive on the landscape. Successful habitat management strategies further conservation and habitat management goals while supporting the local economy and economic development initiatives.

Guidelines in the following section include: definitions, goal statements, objectives, actions, and policies intended to assist local governments in implementing BRWA watershed management planning recommendations that support Habitat Conservation & Management.

Goal Statement: Ecological corridors within the municipality are protected.

Definitions:
Ecological corridor, environmental impact assessment, corridor flatness, significant wildlife area, protected area, biophysical assessment, high-human activity centre (See **Appendix A** for a full list of definitions)

Objective 1: Maintain the integrity of ecological corridors

Actions/Strategies:

1. Identify and map ecological corridors for ungulates and carnivore habitat.
2. Identify and incorporate ecological corridor mapping into MDP information maps (where available).
3. Identify clear triggers in ASP policies and/or the Land Use Bylaw to identify when a biophysical study, including ecological corridor identification, will be required.
4. Identify requirements for design mitigations at the time of subdivision or development application to protect ecological corridors.
5. Implement seasonal and temporary trail closures as necessary for public safety or when wildlife are most sensitive to human disturbance (e.g., early spring when bears are emerging from their dens and/or fall rut for ungulates, no night use on trails).
6. Implement beneficial management practices in relation to unsecured human features (secure all garbage, composting, and recycling, discourage planting fruit trees, discourage use of bird-feeders, and wildlife-proof fence gardens).
7. Adopt a 50% intactness target for ungulate habitat and carnivore habitat[14].

Policies:

1. Discourage new development within ecological corridors.
2. Require new development within ecological corridors to be situated near the edges of the corridor to minimize intrusion.
3. Relocate high-human activity centres outside or close to the corridor edge.
4. Require new development within corridors to meet the following design requirements:
    a. Maintain an unobstructed corridor width of >350 m and less than 30 degrees (average) slope.
    b. Install a berm to block the corridor from the development. The berm should be planted with natural vegetation.
    c. Use wildlife-friendly fencing to create a barrier between wildlife movement and human activity.
5. Offset loss of ecological corridor function through conservation opportunities, including securement/protection in other ecological corridors.
6. Minimize road infrastructure associated with urban development within or adjacent to the ecological corridor.
7. For developments which cause linear disturbances (trails, roads, service corridors, pipelines, roads, rail):
    a. Group linear disturbances together where possible to reduce the number of crossings.
    b. Align the linear infrastructure so it runs perpendicular to the direction of the ecological corridor (avoid infrastructure that bisects the corridor).
    c. Install a berm to block the corridor from the development. The berm should be landscaped with native vegetation.

[14] The Miistakis Institute recommends an intactness target of 50% to abate human influence and enable movement of ungulates and large terrestrial mammals through ecological corridors.

8. Encourage the use of conservation easements or other conservation tools on lands within or adjacent to ecological corridors where corridors are identified on privately owned land.
9. Collaborate with appropriate government agencies to place a protective notation on public lands within or adjacent to ecological corridors to discourage the disposal of or conversion of these areas to higher-density or intensity land uses in the future.
10. Minimize the disturbance of native vegetation within ecological corridors to maintain hiding cover and forage.
11. Limit recreational access in highly productive grizzly bear habitat.
12. Restrict road density below 0.6km/km² in grizzly bear habitat.

Objective 2: Consider Environmentally Significant Areas when evaluating the merits of new development projects

Actions/Strategies:

1. Identify and incorporate Environmentally Significant Areas (ESA) mapping into MDP information maps.
2. Where GIS is not available, utilize publicly available ESA data[15] through provincial web mapping portals such as GeoDiscover.
3. In the Land Use Bylaw, identify specific site triggers for new subdivision applications that require additional application requirements, in alignment with applicable municipal conservation priorities related to ESAs. Triggers and resulting application requirements may include:
    a. Waterbody, watercourse, or wetland within or adjacent to the subject site – require assessment report by a professional engineer or other qualified professional as necessary;
    b. Identify flood hazards affecting the subject site – require assessment report by a professional engineer;
    c. Identify slope stability hazards – require geotechnical study;
    d. Identify Environmentally Significant Areas (ESAs) within or adjacent to the subject site – require environmental assessment by a qualified professional.
4. Identify requirements for design mitigations at the time of subdivision or development application to protect sensitive features within an ESA.
5. Prepare a Municipal Land Suitability Tool Report (MLUST)[16], as a decision support tool, to identify where industrial-scale renewable energy projects would be suitable or unsuitable and identify "No-Go Areas". The MLUST should identify and assess potential land use conflicts from renewable energy projects on agricultural, ecological, and cultural/scenic features to inform siting guidelines for proposed renewable energy developments.

Policies:

1. Identify Environmentally Significant Areas (ESAs) within or adjacent to a subject site at the time of ASP development, Outline Plan development, Land Use Bylaw amendment, subdivision or development application.
2. Require an environmental impact assessment or biophysical assessment, prepared by a qualified professional, to determine any site design mitigation requirements where:
    a. The site is affected by an identified ESA, and
    b. The proposal would increase the intensity or density of development on the site.

[15] For data source see: AB Parks Environmentally Significant Areas Report https://www.albertaparks.ca/albertaparksca/library/environmentally-significant-areas-report/

[16] An excellent example of an MLUST is the report prepared for the MD Of Pincher Creek by the Miistakis Institute and the Oldman River Regional Services Commission. See: Municipal Land Use Suitability Tool (MLUST) for Municipal District of Pincher Creek, 2020.

2. Require new industrial-scale renewable energy projects to provide mapping that identifies the location of the proposed project in relation to the MLUST conflict and No-Go areas.
3. Discourage new industrial-scale renewable energy projects in No-Go and high-conflict areas.

Goal Statement: Natural assets within the municipality are protected.

Objective 3: Prioritize the conservation and restoration of natural assets

Actions/Strategies:

1. Conduct a natural asset inventory to identify the location of natural assets that benefit surface water quantity, groundwater quantity, biodiversity and flood and drought management.
2. Protect natural assets that provide valuable stormwater management services as components of the municipality's stormwater management system to minimize municipal infrastructure costs and help manage ground and surface water.
3. Monitor land use and development patterns within natural asset areas to measure the efficacy of conservation and restoration strategies.
4. Incorporate natural asset mapping into MDP information maps (where available).
5. Identify conservation and restoration priorities to support natural assets.
6. Identify clear triggers for when biophysical studies will be required to delineate and conserve natural assets.
7. Identify requirements for design mitigations at the time of subdivision or development to protect natural assets.
8. Include regulations to minimize impacts from development on natural assets in the Land Use Bylaw.

Policies

1. Delineate features and areas that align with the natural asset conservation goals of local government in new ASPs, local area plans and/or conceptual schemes.
2. Discourage development within delineated natural asset areas.
3. Require areas characterized by natural assets to be delineated and dedicated as environmental reserves (ER) or environmental reserve easements (ERE).
4. Encourage the voluntary use of conservation easements or other conservation tools on lands within or adjacent to natural assets on privately owned land.
5. Collaborate with appropriate government agencies to place a protective notation on public lands within or adjacent to natural assets to discourage the disposal of or conversion of these areas to higher-density or intensity land uses in the future.

Non-Native & Invasive Species Management Recommendations

There are significant risks and economic impacts to local governments resulting from non-native and invasive species. They include increased management costs to control non-native and invasive species as well as the subsequent loss of resource productivity, including grazing lands and fish habitat. Recreational value, whether on land or water, is also affected by invasive plants and animals that reduce or ruin recreational quality. Additionally, health hazards posed by particular non-native and invasive species, such as skin burns from Giant Hogweed, can be reduced if non-native and invasive populations are managed.

Establishing a framework for the management of non-native and invasive species enables local governments to minimize negative economic impacts caused by the degradation and loss of productive land, damage to infrastructure and property, loss of biodiversity and negative impacts on wildlife habitat, water quality, soils and human health.

Guidelines in the following section include: definitions, goal statements, objectives, actions, and policies intended to assist local governments in implementing BRWA watershed management planning recommendations that support Non-native & Invasive Species Management.

Goal Statement: Non-native and invasive species are well-managed

Definitions:
Environmentally Sensitive Area, landscaping plan, native species, native vegetation, non-native species, invasive species, non-native and invasive species (See **Appendix A** for a full list of definitions)

Objective 1: Manage non-native and invasive species

Actions/Strategies:

1. Set priorities for the prevention, eradication, containment and control of non-native and invasive species.
2. Utilize Environmentally Sensitive Areas Mapping to set priorities for non-native and invasive species management.
3. Collaborate with agricultural producers and other landowners to implement beneficial management practices that support non-native and invasive species management.
4. Develop a non-native and invasive species management plan to optimize municipal resources and minimize the impacts of non-native and invasive species.
5. Undertake or continue to undertake inventory & monitoring programs to document non-native and invasive species.
6. Restore sites cleared of invasive species by reestablishing vegetation with native species.
7. Develop or expand on Best Management Practices to control known non-native and invasive species within the community.
8. Incorporate Best Management Practices to reduce the introduction and spread of invasive species through capital improvement projects, purchasing protocols and development approvals.
9. Develop protocols to monitor, track and record priority invasive species at the local level that is informed by regional and provincial initiatives.
10. Identify clear triggers in the Land Use Bylaw for when landscaping plans will be required.
11. Include in the Land Use Bylaw specific landscaping design mitigations, to be implemented through the subdivision or development process to conserve or restore existing vegetation on residential, commercial, and industrial lots or within areas designated for watershed protection.
12. Explore landowner incentives to control and properly dispose of invasive species.

Policies:

1. Landscaping practices on private and public land support the management of non-native and invasive species.
2. Require landscaping plans to incorporate tree cover and native species.

SUMMARY

The **Guide to Watershed Management in Land Use Planning for Local Governments** provides comprehensive guidelines for consideration by local governments. Adoption of the guidelines will enable coordinated action and collaboration across local government jurisdictions for the protection and improvement of water quantity, water quality, biodiversity, and land management practices affecting wetlands and riparian areas.

APPENDIX A: LIST OF TERMINOLOGY

The following definitions represent terms used or referenced in this report.

Alluvial Aquifer	means a non-confined aquifer comprised of groundwater that is under the influence of surface water. (Government of Alberta, *Stepping Back from the Water).*
Aquifer	means a sub-surface layer or layers of porous rock that holds water within the spaces between the rocks (interstitial spaces).
Arborist Report	means a report prepared by a certified arborist includes an inventory of the trees on the site and identifies a plan to manage the trees on the site to best preserve their health and function.
Bed and Shore	means the land covered so long by water as to wrest it from vegetation or as to mark a distinct character on the vegetation where it extends into the water or on the soil itself.
Biodiversity	means the variability among living organisms – within species, between species, and in ecosystems. (City of Edmonton, *Biodiversity Report).*
Bioengineering Techniques	means a method of construction combining live plants with dead plants or inorganic materials, to produce living, functioning systems to prevent erosion, control sediment and other pollutants and provide habitat. (Adapted from: United States Environmental Protection Agency, *Principles of Wetland Restoration.)*
Biophysical Assessment	means an assessment that outlines the existing conditions, potential impacts and appropriate mitigating measures of the affected and surrounding lands. The purpose of the assessment is to examine the potential impacts and mitigation of development on biophysical elements (ecosystems, landforms and habitats). (City of Calgary, *Stormwater Management & Design Manual).*
Buffers	means a strip of land placed in the landscape and managed in such a way so as to maintain desired ecological processes and provide economic and societal benefits.
Conservation Easement	means a legal tool that allows landowners to conserve natural attributes of their land.
Conservation Easement Agreement	means a voluntary legal agreement between landowners and a conservation agency or government that limits development activities in order to protect the features of the land.
Conservation Reserve	means land designated Conservation Reserve (CR) pursuant to the Act.
Conservation Values	means the existing and future ecological, natural and aesthetic characteristics and values of the Habitat Area, including but not limited to the ecosystem of the Wetlands and Uplands, and the contribution of the Habitat Area to the protection, conservation and enhancement of the Biological Diversity of the environment.
Corridor Flatness	means an area flat enough for wildlife to move through unimpeded. The slope of the corridor must be < 25° to allow wildlife to move through unimpeded.

Development	means development as defined in the Municipal Government Act: a. An excavation or stockpile and the creation of either of them, b. A building or an addition to or replacement or repair of a building and the construction or placing of any of them on, in, over or under land, c. A change of use of land or a building or an act done in relation to land or a building that results in or is likely to result in a change in the use of the land or building, or A change in the intensity of use of land or a building or an act done in relation to land or a building that results in or is likely to result in a change in the intensity of use of the land or building.
Drought Adaptation and Management	means the actions, policies, programs, tools, and strategies intended to reduce the negative impacts of drought on infrastructure and natural assets. (Adapted from the City of Calgary, *Drought Resilience Plan*).
Drought Resilience	means the ability of the environment and ecosystem to recover from the impacts of prolonged periods of dry conditions and water shortages. (Adapted from the City of Calgary, *Drought Resilience Plan*).
Ecological Corridor	means a geographical space that is governed and managed over a long term to maintain or restore ecological connectivity, or the unimpeded movement of animals. These spaces are commonly referred to as wildlife corridors.
Ecological Features	means biotic and abiotic factors that interact directly or indirectly within the natural environment.
Ecological Services	means the direct and indirect benefits humans receive from nature.
Ecosystem Elements	means biotic and abiotic factors that interact directly or indirectly within the natural environment.
Effective Drainage Area	means areas that are expected to contribute to an average runoff within a catchment area.
Endangered Animal or Plant Species	means a species whose present existence in Alberta is in danger of extinction within the next decade. (Government of Alberta, *Wildlife Act).*
Environmental Impact Assessment	means a comprehensive report prepared by a certified professional that predicts and measures the environmental effects of development and identifies mitigation strategies to reduce or eliminate those effects. (Lamont County, *Land Use Bylaw 848.22).*
Environmental Reserve	means Lands designated as "Environmental Reserve" are lands designated at time of subdivision that are left in a natural state or may be used as a public park. Lands may be designated as "Environmental Reserve" if they consist of the following: a. a swamp, gully, ravine, coulee, or natural drainage course, b. land that is subject to flooding or is, in the opinion of the subdivision authority, unstable, or c. a strip of land, not less than 6 metres in width, adjacent to the bed and shore of any body of water. Environmental Reserves are primarily used to establish development setbacks from water bodies and watercourses to prevent development from occurring too close to the shoreline.
Environmental Reserve Easement	means lands that would normally be taken as Environmental Reserve (ER) at the time of subdivision may instead be the subject of an Environmental Reserve Easement pursuant to the Act.

Environmentally Sensitive Areas	Means lands that exhibit one or more of the following: a. hazardous lands and areas that are unsuitable for development in their natural state (i.e. floodplains, steep slopes (greater than 15%), unstable slopes), b. areas that perform a vital environmental, ecological or hydrological function (i.e., aquifer, groundwater recharge areas, or peatlands), c. areas that contain unique geological or physiological features, d. ecological features or habitat areas that contain significant rare or endangered animal or plant species and/or provide an important link for the natural migration of wildlife, or e. Protective notations.
Environmentally Significant Area	means areas that are important to the long-term maintenance of biological diversity, physical landscape features and/or other natural processes, both locally and within a larger spatial context. ESAs are determined by the Government of Alberta as per the criteria and evaluation matrix outlined in *Environmentally Significant Areas in Alberta: 2014 Update*.
Environmentally Significant Features	means natural attributes that function as a part of the system or landscape.
Ephemeral Water Body	means is an area that can be saturated or hold water for less than two weeks, but not long enough to promote the formation of water-altered soils within 12 inches (30 cm) of the ground surface. Ephemeral water bodies may have some water-tolerant vegetation; however, upland vegetation dominates.
Erosion and Sediment Control Plan	means a plan that satisfies the requirements of the Development Authority which is to be provided to the contractor for implementation to address erosion and sedimentation issues both through temporary measures during construction and permanent measures to address post-construction conditions. It provides details about how the site will be managed during construction for the preservation of vegetation, topsoil, and municipal infrastructure and must detail how noise, erosion, mud, and sediment transport will be controlled and minimized, how the disturbance of vegetation and topography will be minimized. (Sometimes referred to as a Construction Management Plan).
Floodplains	means the area of low-lying land next to a watercourse that is subject to periodic inundation. A 1:100-year floodplain, which is the result of a flood having a 1 per cent chance of being equaled or exceeded in any given year, is used for purposes of development. In the absence of information that identifies the 1:100-year floodplain elevation, the best available information must be used to establish the historic high-water level for a water body. The floodplain can be divided into two zones once a flood hazard mapping study has been completed.
Floodway	means the area within which the entire design flood can be conveyed while meeting certain water elevation rise, water velocity and water depth criteria. Typically, the floodway includes the river channel and some adjacent overbank areas.
Flood Construction Level	means an elevation represented via isolines at 0.5 metre intervals along the length of a watercourse. Flood construction levels are based on the predicted water surface elevation for a 100-year flood event plus a minimum freeboard allowance, as established by the municipality's engineering services provider.

Flood Fringe	means the land along the edges of the flood risk area that has relatively shallow water (less than 1 metre deep) with lower velocities (less than 1 metre/s).
Flood Mitigation Measure	means a measure taken to reduce the risk of flood damage to existing or new development or lands including but not limited to elevated pads, fill, back sloping, dykes, development at or above flood construction levels, and other construction methods intended to reduce the risk of flood damage during a design flood.
Freeboard Allowance	means a factor of safety that accounts for various uncertainties. In the context of design floods within a flood hazard area, uncertainties may include potential wave action, uncertainty in hydrologic estimates, uncertainty with hydraulic modeling, and errors and uncertainty in the underlying data used to predict the flood extents.
Geotechnical Report	means a report prepared by a qualified professional that may include the following: a. Slope stability, including slope setback distances, cross-sections of the slope area both before and after development and final grading (The height and existing angle of the slope verified by accurate historical survey data or site specific information completed by a qualified surveyor); b. Seasonally adjusted and recommended water tables; c. Location of on-site storage of sewage; d. Recommended building foundations and basement construction; and e. Soil bearing capabilities.
Grading	means the recontouring or sloping of the land in such a way that surface drainage from rainstorms, snowmelt or groundwater is directed away from the buildings and is controlled in a manner that eliminates or minimizes the impact on adjacent properties.
Gross Drainage Area	Means the total watershed drainage catchment area.
Ground Water Recharge Areas	means areas where precipitation or runoff infiltrate the soil to the saturation zone or aquifer. (Alberta Environment, *Focus on Groundwater).*
Habitat Area	means areas that provide environmental conditions that support entire populations of animals and plants and associated ecological functions. (City of Edmonton, *Biodiversity Report).*
Hazard Lands	means lands having inherent environmental hazards such as susceptibility to flooding and/or erosion, unstable soils, slopes susceptible to subsidence or mass movement. These lands are not suitable for some kinds of development because the hazards are severe enough to pose a potential risk of property damage and/or loss of life. (adapted from Lamont County, *Land Use Bylaw 848.22).*
High Human Activity Centre	means an area with greater than 20 human activity events per day. High human activity centres impede wildlife movement.
High Risk Development	means development that will have a substantial impact on source water and will make the source water unsuitable for treatment as drinking water.
High Water Table	means when the ground water level is close to the surface. Normally, ground water within 1.8m during the frost season and 2.4 m during the rest of the year is considered a high-water table.

Hydrogeologically Sensitive	means a development area which exhibits one or more of the following features: karstic areas, areas of fractured bedrock exposed at surface, areas of thin soil cover, or areas of highly permeable soils.
Invasive Species	means non-native species that causes harm to the environment, economy, or human, animal, or plant health
Landscaping	means the incorporation, preservation, or enhancement of vegetation and other materials on a site which are intended to improve the aesthetic appeal of the site, contribute to the character of a neighbourhood, and/or harmonize the site with its surrounding natural environment and may include the placement or addition of any or a combination of soft landscaping elements and/or hard landscaping elements. Landscaping does not include stripping, grading, shoreline modification, and architectural elements (i.e., decorative fencing, sculpture).
Landscaping Elements, Hard	means a non-permeable surface or landscaping element such as, but not limited to, ceramic, brick, wood, concrete, or marble. Retaining walls are also considered as hard landscaping elements.
Landscaping Elements, Soft	means vegetation such as, but not limited to, grass, hedges, ground cover, flowering plants, shrubs, and trees and may also include non-grass alternatives such as rock gardens that incorporate vegetation and xeriscaping.
Landscaping Plan	means a scaled drawing illustrating a design for a landscaped area which specifies the number, species, height, and caliper of trees and shrubs, the size, colour, and texture of hard landscaping, areas of grass, edging details, cross sections and details of any construction and details of any other features, or horticultural elements. (Lamont County, *Land Use Bylaw 848.22).*
Legal Bank	means the line where the bed and shore of the body of water cease and the line is to be referred to as the bank of the body of water. The legal bank in Alberta is the line separating the Crown-owned bed and shore from the adjoining upland.
Littoral	means pertaining to or along the shore, particularly to describe currents, deposits, and drift.
Lot Grading and Drainage Plan	means a plan that specifies design elevations, surface gradients, swale locations, and other drainage information required for lot grading.
Low Impact Development (LID)	means land planning and engineering design approach for managing stormwater runoff. LID emphasizes conservation, the minimization of hard surfaces, and use of natural features and processes to replicate predevelopment hydrology in terms of rate, volume, and quality. Both natural and engineered solutions are employed to prevent and manage runoff as close to its source as possible with a treatment-train approach using the processes of evaporation, transpiration, storage, infiltration, and treatment. The term “green infrastructure” or “green stormwater infrastructure” or “natural/ engineered natural infrastructure” are sometimes used to refer to the constructed components of an LID approach.
Low Risk Development	means development that will have little impact on source water.
Moderate Risk Development	means development that will have an impact on source water but will not make the source water unsuitable for treatment as drinking water.
Native Species	means plants and animals living in areas where they naturally exist.

Natural Assets	means natural resources and ecosystems that yield a flow of benefits to people, including forests and healthy tree stands, watercourses, water bodies, wetlands, fields, soil
Natural State	means a condition where the natural environment is left undisturbed, and where the only allowed development shall be limited to a walking trail with associated amenities such as benches, trash cans and fences to delineate the natural state area. Clearing of existing tree cover shall be limited to the development of a walking trail and associated amenities.
Non-Native Species	means plants and animals living in areas where they don't naturally exist.
Non-Point Source Pollution	means pollution that comes from many places all at once.
Passive wetland restoration	Means reducing or eliminating the sources of degradation and allowing recovery time to restore the original hydrogeologic regime and reestablish native plant communities. (Adapted from: United States Environmental Protection Agency, Principles of Wetland Restoration.)
Peatlands	means vegetated wetlands with a minimum organic soil depth of 40cm resulting from the accumulation of peat (decomposing plant material). (City of Edmonton, *City-Wide Natural Area Management Plan).*
Phase 1 Environment Assessment	means a study that presents an evaluation of historical and current land use. Site reconnaissance and other information gathering techniques assess whether a site is or may be subject to potential or actual contaminants of potential concern. Areas of potential environmental concern and associated contaminants of potential concern may be identified. (Government of Alberta, *Alberta Environmental Site Assessment Standard).*
Protected Area	means a clearly defined geographical space that is recognized, dedicated, and managed through legal or other effective means to achieve long term conservation of nature and associated ecosystem services.
Protective Notation	means areas usually called reservations, that are placed by public agencies in consultation with the public land manager. They identify land and resources that are managed to achieve particular land use or conservation objectives. Protective notations identify the agency that has placed the reservation, show allowable land uses and may give management guidelines for integrating different uses on the land. Restrictions on land use are based on the characteristics of the land itself. These include soil, vegetation and surface materials and drainage. Local and regional factors such as fish and wildlife requirements or timber regeneration and access, also receive consideration. (Government of Alberta, *About Public Lands).*
Pruning	means the removal of branches in a way that does not jeopardize the vitality of the tree, shrub, or vegetation being altered.
Point Source Pollution	means pollution that comes from a single source.
Qualified Wetland Professional	means a registered member of an Alberta Professional Regulatory Organization who is also an approved Wetland Practitioner under the Alberta Wetland Policy.
Rain Garden	means a garden area planted in a hole or depression that receives and absorbs rainwater runoff from impervious areas, such as driveways, walkways, parking areas, and roofs.

Ravines/Escarpment	means an extended linear topographical feature of relatively steep slope and significant change in elevation. Where an escarpment line has been previously altered, the top of escarpment shall be considered from the original escarpment line as determined by an Alberta Land Surveyor.
Recontouring	means the addition or removal of soil (or other material) on a parcel of land that alters its natural topography to promote a building site and/or to create an aesthetically appealing area.
Retaining Wall	means a structure designed and constructed to resist the lateral pressure of soil, loose rock, or similar material, which creates a change to site grades.
Riparian Area	means transitional areas between upland and aquatic ecosystems. They have variable width and extent above and below ground and perform various functions. These lands are influenced by and exert an influence on associated water bodies, including alluvial aquifers and floodplains. Riparian lands usually have soil, biological, and other physical characteristics that reflect the influence of water and hydrological processes.
Riparian Intactness	means the extent to which natural riparian habitat or shorelines have been altered by human activity. Highly intact shorelines are dominated by natural vegetation, while shorelines classified as very-low intactness are dominated by human-built structures or disturbed vegetation.
Runoff	means water that moves over the surface of the ground. Runoff collects sediments and contaminants as it moves from higher elevations to lower elevations.
Setback	means an established minimum distance that must be maintained between a land use or development from a property boundary, including boundaries with water bodies defined features.
Shelterbelt	means a barrier of trees or shrubs that provides protection from wind and storm and lessens erosion.
Shoreline	means the intersection of water and land surfaces.
Shrub	means plant species with woody stems that are distinguished from trees by their lower stature and multiple stems and may be native or horticultural.
Significant Wildlife Area	means regions recognized for their importance in supporting diverse wildlife populations and habitats.
Silt Fence	means permeable fabric barriers installed vertically on support posts along contours to collect sediment laden sheet flow runoff. (Government of Alberta, *Field Guide to Erosion and Sediment Control).*
Slope Stability Study	means a static or dynamic, analytical or empirical study, undertaken by a professional engineer or geotechnical scientist to evaluate the stability of slopes of soil- and rock-fill dams, embankments, excavated slopes, and natural slopes in soil and rock. It is performed to assess the safe design of a human-made or natural slopes (e.g. embankments, road cuts, open-pit mining, excavations, landfills etc.) and the equilibrium conditions. A slope stability study shall identify a factor of safety for the safe construction of a building on a site and the recommended setback area for development from the slope.
Steep Slopes	means a slope with inclination greater than 15 degrees and height greater than 10 metres. For non-uniform slope geometries, a Major Slope shall also be indicated by the presence of any intermediate portion of the slope, with inclination greater than 15

	degrees and height greater than 10 metres, between two areas of different slope angle. (City of Edmonton, *Development Setbacks from River Valley/Ravine Crests).*
Stripping	means the removal of some or all vegetation and topsoil on a lot in preparation for construction activities.
Storm Water Management Plan (SWMP)	means a plan prepared by a qualified professional that outlines the design and implementation of systems that mitigate and control the impacts of man-made changes to the runoff and other components of the hydrologic cycle. Stormwater management plans should include design considerations to minimize flooding, erosion, and impacts on groundwater, water bodies, and watercourses. SMWPs must include: a. Contour information, b. Proposed plan to control surface water runoff, c. Proposed minor drainage system (ditches/pipes/catch basin locations/flow rate), d. Proposed major drainage systems (direction of surface drainage/flow rate), e. Proposed on-site detention/retention facility (location/size/capacity), f. Location of outflow/outfall structures, g. Any related modeling and calculation information, and h. must conform to an approved master drainage plan (if applicable).
Storm Water Management Plan, Site Specific	means a plan prepared by a qualified professional to address on-site and off-site stormwater for a specific site. It will demonstrate proposed post-development and pre-development storm water flows, include the use of Best Management Practices, address water quality and the method of on-site containment during a 1:100 year storm event.
Subdivision	means the division of a parcel of land approved by a municipal subdivision authority pursuant to the *Municipal Government Act.*
Subsidence	means a lowering of the soil surface due to a reduction in volume through settling or other means. (Alberta Environment, *Glossary of Reclamation and Remediation Terms Used in Alberta).*
Surface, Non-Permeable	means solid surfaces, including hard landscaping elements that do not allow water to penetrate, forcing it to run off. (e.g., asphalt, concrete, decks, patios, paving stones, etc.).
Surface, Permeable	means surfaces (also known as porous or pervious surfaces) allow water to percolate into the vegetation and/or soil to filter out pollutants and recharge the water table. Permeable surfaces allow for the absorption of water into the ground and minimize runoff (e.g., vegetated areas, flower beds, grass, gravel, etc.).
Source Water	means water in its natural state prior to being withdrawn for treatment or distribution as drinking or irrigation water.
Source Water Protection Plan	means a coordinated risk management plan that identifies a multi-barrier approach to provide safe, clean drinking water.
Tree	means a woody perennial plant, either deciduous or coniferous, that typically has a single self-supporting trunk and in most species, the trunk produces secondary limbs, called branches.
Tree Cover	means the estimated area comprised of woody vegetation.

Tree Removal	means the cutting down and/or removal of trees or shrubs other than for commercial logging. This does not include the removal of dead trees or shrubs, or selective management by a qualified arborist to maintain tree stand health and remove hazards.
Upland Area	means an area of land, usually terrestrial land (not aquatic) either upstream or surrounding a water body. It is not part of the water body but may contribute to the integrity of the water body.
Vegetation	means non-invasive plant species that are native and/or appropriate for the relevant plant hardiness zone and are: a. Structurally sound, well-balanced, healthy, and vigorous, b. Of normal growth habits, and/or c. Densely foliated when in leaf, with a healthy, well-developed root system.
Vegetation, Native	means those plant species that are indigenous to a particular region. They have adapted over time in association with the landscape and climate.
Water Body	means any location where water flows or is present, whether or not the flow or the presence of water is continuous, intermittent, or occurs only during a flood. This includes, but is not limited to, wetlands and aquifers.
Watercourse	means the bed and shore of a river, stream, lake, creek, lagoon, swamp, marsh or other natural body of water, or a canal, ditch, reservoir, or other artificial surface feature made by humans, whether it contains or conveys water continuously or intermittently.
Watershed	means a drainage basin where all flowing water converges to a single point, such as a lake, river, or ocean.
Wetland	Means land that has the water table at, near, or above the land surface, or which is saturated for a long enough period to promote wetland or aquatic processes as indicated by hydric soils, hydrophytic vegetation, and various kinds of biological activity that are adapted to the wet environment.
Wetland Assessment	means an assessment prepared by a qualified wetland professional that delineates and classifies wetland(s) within the site and is consistent with the requirements of Alberta Environment and Parks, the *Alberta Wetland Policy*, and the *Alberta Wetland Identification and Delineation Directive*.
Wetland Boundary	means the furthest ecological extent of a wetland bordering upland or other non-wetland habitat, as indicated by a shift in soils and vegetation. Indicators of a wetland boundary are delineated by a Qualified Wetland Professional.

APPENDIX B: BRWA WATERSHED MANAGEMENT RECOMMENDATIONS[17]

Plan Priority	Management Recommendations
Defined language	• Use language that clearly identifies terms of significance to watershed management goals
Habitat conservation and management	• Maintain natural habitat corridors • Incorporate ESAs in municipal policies related to environmental protection • Integrate local ESAs into development project criteria • Introduce policy to create, protect, restore natural assets (identified as natural resources and ecosystems that yield a flow of benefits to people, including forests and healthy tree stands, watercourses, water bodies, wetlands, fields, soil)
Non-point source pollution management	• Limit the development of new Confined Feeding Operations (CFOs) within the effective drainage area of Battle River and Sounding Creek watersheds • Prohibit manure application in riparian areas and floodplains • Adhere to manure application setbacks for lands sloping towards surface water bodies as outlined in the AOPA • Integrate Low Impact Development (LID) techniques for stormwater management in new development, including permeable pavement, bioswales, rain gardens, natural drainage ways, stormwater retention ponds, rainwater harvesting
Non-native invasive species management	• Work with agricultural producers and other landowners to implement beneficial management practices that support non-native and invasive species management
Riparian Areas Management	• Restrict development in riparian areas • Include provisions for setbacks and buffer zones for riparian areas • Establish protection and conservation areas around riparian ESAs • Establish minimum 30-metre-wide naturally vegetated areas adjacent to each side of watercourses to protect riparian areas. • Ensure a minimum of 75% of riparian areas are naturally vegetated • Manage riparian impacts related to aggregate extraction development
Source water protection	• Maintain and restore riparian vegetation within the 1:100 flood zone around all watercourses, water bodies and wetlands • Manage development within floodplains to maintain floodplain structure and function • Maintain and restore riparian and wetland areas on private and municipal property

[17] BRWA Watershed Recommendations include recommendations developed by the BRWA, where gaps were identified, other regional planning documents were considered in the recommendations.

	• Incorporate surface source water protection planning principles in development policies • Incorporate groundwater protection planning principles in development policies
Water quantity	• Identify ecosystem needs as a priority in planning decisions • Limit removal of treed areas / shelterbelts • Ensure 10% of municipal lands are designated as protected areas
Wetlands management	• Protect existing wetlands to prevent further wetland loss • Include wetland setback provisions to preserve ecological and hydrological function • Incorporate wetland and riparian management for new developments • Integrate existing tools (e.g. Stepping Back from the Water, Field Manual on Buffer Design for the Canadian Prairies, and riparian setback models) to determine optimal buffer for development near wetlands • Identify ecologically, hydrologically, economically, and culturally significant wetlands within municipal boundaries

APPENDIX C: ADDITIONAL RESOURCES:

- *Alberta Biodiversity Monitoring Institute Mapping Portal*
  - https://maps.abmi.ca/#/
- *Alberta Parks - Environmentally Significant Areas Report and Mapping Data*
  - https://www.albertaparks.ca/albertaparksca/library/environmentally-significant-areas-report/
- *Health of Canadians in a Changing Climate: Advancing our Knowledge for Action.*
  - https://changingclimate.ca/health-in-a-changing-climate
- *Legal Foundations for Municipal Riparian Management.*
  - https://www.nswa.ab.ca/resource/legal-foundations-for-municipal-riparian-management
- *Making Wetlands Work in Your Municipality*
  - https://adoa.net/wp-content/uploads/2017/03/NAWMP_MunicipalWetlandGuide_Final.pdf
- *Municipal Development Plan Review: Wetlands & Grasslands Act Sheet*
  - https://www.yoursayleduccounty.com/40227/widgets/172709/documents/122558
- *Municipal Government Act, RSA 2000, c M-26., Part 1 s. 3(a.1)*
  - https://www.canlii.org/en/ab/laws/stat/rsa-2000-c-m-26/latest/rsa-2000-c-m-26.html
- *North Saskatchewan Region: Surface Water Quality Management Framework for the North Saskatchewan and Battle Rivers*
  - https://open.alberta.ca/dataset/a5049f19-d46c-4b43-8782-c10c076afe29/resource/382503d1-7c73-475c-856f-438e62571ab1/download/epa-north-saskatchewan-region-surface-water-quality-management-framework-2022.pdf
- *Recommendations Document from the North Saskatchewan Regional Advisory Council*
  - https://landuse.alberta.ca/LandUse%20Documents/NS%20RAC%20Recommendations%20Report_Final.pdf
- *Relative Landslide Susceptibility Model of the Alberta Plains and Shield Regions*
  - https://ags.aer.ca/publications/all-publications/map-605
- *Riparian Web Portal (RWP)*
  - https://riparian.info/#/nav
- *Subsidiarity in Action: Effective Biodiversity Conservation and Municipal Innovation*
  - https://www.albertalandinstitute.ca/public/download/files/103303
- *Gross and effective drainage area boundaries of the AAFC Watersheds project – 2013*
  - https://open.canada.ca/data/en/dataset/063ee9b6-b3f2-45ab-9bed-d330880064d5

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