NORTH SASKATCHEWAN WATERSHED

MUNICIPAL RIPARIAN REGULATIONS BEST MANAGEMENT PRACTICES GUIDE

AUGUST 2025

ACKNOWLEDGMENTS

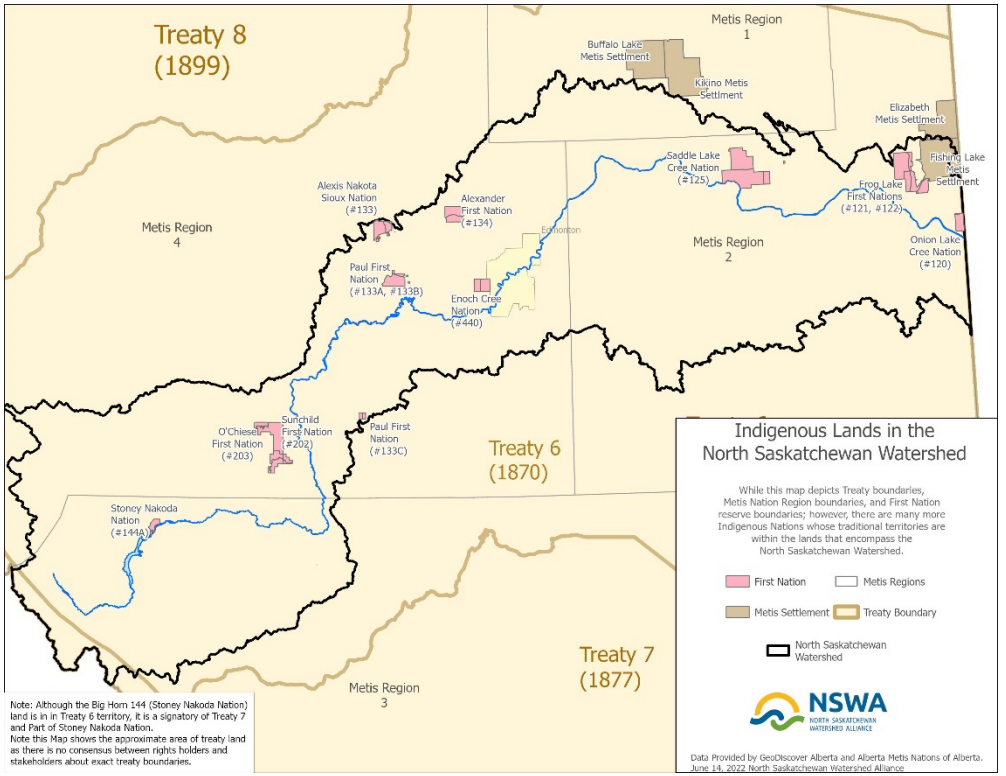
Land Acknowledgement

In the spirit of respect and reciprocity, we acknowledge that the lands within the watershed of the North Saskatchewan River are in Treaty 6, Treaty 8, and the Métis Homeland. These lands are the traditional territories, traveling routes, and gathering places of the Cree, Saulteaux, Blackfoot, Métis, Dene, Stoney, Nakoda Sioux, and Inuit people.

We recognize the contributions of Indigenous peoples who have cared for this land since time immemorial and whose rich histories, cultures, languages, and presence continue to enrich these sacred lands that we all steward as Treaty People.

We recognize the role of watershed management and its practitioners in perpetuating a colonial system by excluding and ignoring the perspectives offered by Indigenous culture and science. We make this statement as an affirmation of our commitment to improving the practice of watershed stewardship by strengthening our relationships with our indigenous neighbors.

Riparian areas are shared spaces: an intersection of land and water, of people and nature, settlers and indigenous people.



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EXECUTIVE SUMMARY

The *NSWA Municipal Riparian Regulations Best Management Practices (BMP) Guide* is intended primarily for use by municipalities governed under the Municipal Government Act (MGA). The overall project was instigated at the request of municipalities to better align their regulatory documents with the goals of riparian intactness. The NSWA received direction from its municipal partners that a review of the current state of existing municipal bylaws would be of value. The project is focused on municipal bylaws and the powers established through the MGA.

Municipalities manage local land use and development approvals through local Land Use Bylaws and statutory plans. The authority to manage land use and development, and the responsibilities associated with this authority, are established and described in the *Municipal Government Act*. As the decision-making body for local land use and development applications, municipalities are uniquely positioned to undertake an important role in the management of riparian areas.

Land Use Bylaws are specific to each municipality and are not shared between municipalities. Two adjacent municipalities may develop different regulatory approaches to the same land use issue (e.g. setback distances, the types of uses permitted in an area, etc.). This has historically been the approach within the watershed. As a result, the development footprint within each of the municipalities within the watershed is unique and reflects the historic regulatory approaches to land development within that community.

However, to improve consistency in the approaches taken to managing riparian lands, municipalities may choose to incorporate regulations into their Land Use Bylaws that are similar to the regulations adopted by a neighbouring municipality.

Riparian areas are vital natural spaces within our watersheds, performing many significant ecosystem services. These areas are particularly sensitive to human impacts associated with land use and development activities and should be considered by municipal approving authorities when evaluating the suitability of proposed land use or development.

The recommendations in the *NSWA Municipal Riparian Regulations BMP Guide* are intended to:

- maintain and improve riparian intactness throughout the watershed;
- mitigate environmental and legal risks associated with developments located on hazard lands;
- support local conservation objectives and targets; and
- assist NSWA partner municipalities in achieving riparian intactness goals and targets approved by municipal representatives on the sub-watershed alliances.

The *NSWA Riparian Regulations Best Management Practices Guide* is **Stage 3** of a three-stage project to provide local governments within the North Saskatchewan River Watershed (the Watershed) with recommendations and tools to improve the regulatory protection of lands nearest to watercourses and waterbodies.

During **Stages 1 and 2** of this project, three **ACTIONS** were identified to align the regulatory documents of local governments with the riparian intactness goals in the North Saskatchewan River Watershed Riparian Conservation and Restoration Strategy (2021):

Action 1: Incorporate definitions of key terms into the **common language** of regulatory documents within the North Saskatchewan Watershed.

Action 2: Incorporate **subdivision regulations** that enable the delineation and protection of riparian areas.

Action 3: Incorporate **development regulations** to mitigate the impact of development on riparian areas.

Overview of BMP Guide Recommendations

The targeted recommendations identified within the BMP Guide for inclusion in regulatory documents of local governments, including municipal Land Use Bylaws (LUBs) support the identification, regulation, and monitoring of human impacts associated with development on riparian areas through the subdivision and development process.

Recommendations in the BMP Guide include:

1. Identification of LUB terms and features that characterize riparian areas, including water features, hazard lands, and environmentally significant areas.
2. Application requirements to support the identification of riparian features at the time of application for new subdivision/development.
3. Identification of trigger features to identify when additional application requirements should be provided to assess alignment with applicable municipal riparian conservation priorities.
4. Identification of conditions of approval to support monitoring and enforcement of development activities to minimize impacts on riparian intactness.
5. Identification of setback requirements (buffers) for new subdivision or development where riparian features are present.
6. Municipal permitting requirements for shoreline modifications on lands above and abutting the riparian areas of water bodies (including wetlands) and watercourses.
7. Development regulations to minimize vegetation clearing and other development activities that may destabilize areas subject to slope instability or high landslide susceptibility.
8. Landscaping regulations to minimize negative impacts on riparian intactness from human use and development, to control surface water run off, and maintain or enhance water quality within the watershed.
9. Regulations to identify and restrict human use and development on lands characterized by environmentally significant features.

Local governments are encouraged to review and adapt these recommendations for inclusion in municipal Land Use Bylaws and other statutory, non-statutory, and other guidance documents utilized by local decision makers when assessing and evaluating the suitability of subdivision and development proposals and applications within their jurisdictions.

The project team recognizes that the applicability of this Guide may be limited in other jurisdictions, such as First Nations and Métis Settlements. The project team recognizes that the comparison of municipal bylaws and processes under the MGA to the Indigenous land management process is not directly analogous or appropriate. Indigenous land management regimes are subject to colonial history and ongoing colonial systems that operate in unique political contexts.

INTRODUCTION

1.1 Purpose

Riparian lands provide essential ecosystem services that are "critical for protecting source waters and maintaining the water quality, quantity and aquatic health of the North Saskatchewan River and its tributaries, as well as other water bodies (e.g., lakes, wetlands) in the Watershed [1]"

The *NSWA Riparian Regulations Best Management Practices Guide* is intended to provide local governments within the North Saskatchewan River Watershed (the Watershed) with straightforward recommendations and tools to improve the regulatory protection of lands nearest to watercourses and waterbodies.

The intended outcome of the project is to assist NSWA partner municipalities in achieving the riparian intactness goals of:

- a minimum of **65%** highly intact riparian areas across the watershed and within each of its sub-basins; and
- a maximum of **25%** very low and low intact riparian areas.

These goals were approved by municipal representatives on the sub-watershed alliances to help reduce the risk associated with development adjacent to or within riparian areas. This project is one element of the North Saskatchewan Watershed Alliance (NSWA) *North Saskatchewan River Watershed Riparian Conservation and Restoration Strategy* (2021) and supports the action items in the Integrated Watershed Management Plan (IWMP, 2012).

Municipalities hold a range of legislated powers to manage land use, as established in the *Municipal Government Act*. Riparian areas – those lands immediately adjacent to waterbodies and watercourses – are vital natural spaces within our watershed, performing many significant ecosystem services. These lands are also particularly sensitive to land use and development impacts.

This project was organized into three stages:

STAGE 1: NSWA RIPARIAN REGULATIONS DISCUSSION GUIDE

- A discussion guide was developed to assess the current municipal regulatory environment related to municipal land management decisions affecting lands near or within riparian areas. A survey of 30 Land Use Bylaws from different municipalities (Counties, Towns, Villages, and Summer Villages) within the watershed was undertaken to identify current regulatory successes and target opportunities to revise and/or update LUB regulations to maintain and improve riparian intactness within the watershed.

[1] North Saskatchewan Watershed Alliance (September 2021) at 3, online: http://www.nswa.ab.ca/wp-content/uploads/2022/05/Riparian-Health-Strategy-May-4-2022.pdf.

STAGE 2: MUNICIPAL WORKSHOPS

- The purpose of the workshops with members of the North Saskatchewan Watershed Alliance was to:
    - Review the findings of the Riparian Regulations Discussion Guide;
    - Gather stories from local governments on successes and challenges related to land use policy and regulations for riparian intactness; and
    - Seek input to focus on the recommendations to be included in the next stage.

STAGE 3: NSWA MUNICIPAL RIPARIAN REGULATIONS BEST MANAGEMENT PRACTICES GUIDE

- The purpose of this deliverable is to identify a set of LUB terms, application requirements, regulations, and approval conditions based on best practices that may be adopted or adapted by municipalities and incorporated into Land Use Bylaws to:
    - support the NSWA riparian intactness goal;
    - improve municipal riparian management systems;
    - mitigate environmental and legal risks associated with developments located on hazard lands; and
    - support local conservation objectives and targets.

1.2 Current Regulatory Environment

Land use and development in the North Saskatchewan Watershed is regulated through the approved statutory plans and Land Use Bylaws of the 71 respective municipalities. Land use and development within the Watershed is also managed by the Government of Alberta, the Government of Canada, First Nations, and Métis Settlements.

The 71 municipalities in the North Saskatchewan Watershed each have unique Land Use Bylaws and statutory plan policies, master plans, and other guiding documents that direct how to assess and regulate human activities and proposed developments within areas characterized by riparian features. These documents reflect the unique circumstances and contexts of each municipality. Increasingly, however, there is broad recognition of the need to align policy and regulatory documents as they relate to shared water resources (surface and ground water), and environmentally significant features, including important habitat areas.

The watershed also includes Metis and Indigenous lands, crown lands which have separate land management requirements, processes and procedures.

It is noted, however, that even though specific processes and requirements may differ between jurisdictions, there remains a consistent and collaborative understanding of the value and importance of pursuing an approach to land management that enables the conservation and enhancement of riparian assets within the watershed.

1.3 Legal Responsibilities of Municipalities

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."[2]

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

Riparian areas occupy an interjurisdictional 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 the management of riparian areas being excluded as a relevant consideration of municipal approving authorities because they have incorrectly been interpreted as "outside of municipal jurisdiction".

This approach to riparian management may subject municipalities to increased levels of litigation risk, increased municipal infrastructure costs and may result in municipalities being subject to enforcement orders or penalties issued under federal or provincial legislation.

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 protecting riparian areas within municipal boundaries from degradation. Taking an active and coordinated approach to the management of riparian lands 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 riparian lands including (but not limited to):

Jurisdiction	Legal Context
Municipal Government Act (the MGA) (Provincial)	• A purpose of municipalities, as established in the *MGA,* is "to foster the well-being of the environment" (*Part 1 s. 3*). • The purpose of planning as expressed in s.617 of the *MGA* is "to maintain and improve the quality of the physical environment within which patterns of human settlement are situated in Alberta" (*s. 617(b)*). • These requirements suggest that municipalities have a responsibility, through the development and administration of their planning documents, to maintain and improve the physical environment within their jurisdiction. • Improving riparian intactness aligns with these purposes. • The *MGA* also provides municipalities with tools such as Municipal Reserves, Environmental Reserves, Environmental Reserve Easements, and Conservation Reserves, which enable the identification, conservation, and enhancement of riparian areas.
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 riparian areas.

Environmental Protection and Enhancement Act (EPEA) (Provincial)	• *EPEA* regulates pollution, waste, wastewater, storm water, pesticides, and potable water (as well as other matters). [3] • Management of riparian areas and wetlands can mitigate stormwater management impacts and have positive impacts on water quality and quantity in receiving areas. • Conserving and enhancing riparian intactness supports alignment with *EPEA* and the well-being of the environment.
Water Act (Provincial)	• Activities that have a significant impact on riparian areas may trigger the application for an approval, registration, or licence under the *Water Act.*[4] • 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, a municipality may increase the administrative risk.
Public Lands Act (Provincial)	• Management of riparian areas and wetlands can mitigate stormwater management impacts, erosion, or the degradation of adjacent public land/crown land. • The *Public Lands Act* restricts activities on public lands that may injure or destroy the surface of the public land/crown land, without authorization (s. 53). [5] • Preventing the disturbance of riparian areas adjacent to public land/crown land aligns with this requirement.
Provincial Land Use Polices (Provincial)	• Municipal Approving Authorities are guided by the provincial land use policies when considering and issuing subdivision and development decisions. • The *MGA* requires municipalities to be in alignment with the Land Use Polices 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 goals statement that requires planning decisions to contribute to the maintenance and enhancement of a healthy natural environment. The policies under this goal statement align with preserving and enhancing riparian intactness through the municipal decision-making process.

Matters Related to Subdivision and Development Regulation (the Regulation)	• 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

[3] Environmental Protection and Enhancement Act. R.S.A. 2000, c. E-12.

[4] See Environmental Law Centre. "Legal Foundations for Municipal Riparian Management. March 2023.

[5] Public Lands Act. R.S.A 2000 C P-40.

[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.

(Provincial)	○ 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 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 within riparian areas that demonstrate or may demonstrate the characteristics noted above to restrict development on unsuitable lands.
Fisheries Act (Federal)	• Risks associated with erosion and sedimentation arising from activities in the riparian area can impact fish habitat. • Managing erosion and sedimentation of watercourses and water bodies by preventing the degradation or disturbance of riparian areas aligns with the Fisheries Act by assisting in the prevention of "harmful alteration, disruption or destruction of fish habitat."[8]

Intact riparian areas can mitigate legal risks to municipalities by discouraging or preventing human uses and development activities that may impact water quality and aquatic habitat.

Establishing regulations in municipal Land Use Bylaws to support riparian intactness can also reduce risk associated with development on lands generally characterized by hazard features and provide municipalities with tools to successfully undertake enforcement action in situations where land use or development activities undertaken by a private party violate a municipal regulation.

1.4 Significance of Municipal Regulations and Bylaws

One of the primary planning and development tools utilized by municipalities to regulate human use and development within their jurisdiction is the Land Use Bylaw. A Land Use Bylaw is a regulatory document that implements the policy direction outlined in approved statutory plans, including Intermunicipal Development Plans (IDP), Municipal Development Plans (MDP), and Area Structure Plans (ASP). The LUB regulates and controls the use and development of lands and buildings in a municipality. It identifies where specific land uses are allowed to be developed, and establishes specific building height, setback distance, area, and density requirements.

Land Use Bylaws are specific to each municipality and are not shared between municipalities. Two adjacent municipalities may develop different regulatory approaches to the same land use issue (e.g. setback distances, the types of uses that may be permitted in an area, etc.). This has historically been the approach within the watershed. As a result, the development footprint within each of the municipalities within the watershed is unique and reflects the historic regulatory approaches to land development within that community. However, individual municipalities may choose to incorporate regulations into

[8] Fisheries Act, R.S.C ., 1985 c.F-14 s. 35(1)

their Land Use Bylaws that are similar to the regulations adopted by a neighbouring municipality in order to develop a regionally consistent approach to land development.

Additionally, municipalities may choose to adopt supplementary reports, plans, and bylaws to further address, regulate, and provide processes for specific land use issues. Examples of this include flood hazard mapping, fertilizer bylaws, wastewater bylaws, and bylaws regulating the use of reserve lands.

1.5 Limitations

This guide is intended primarily for use by municipalities governed under the Municipal Government Act (MGA). The overall project was instigated at the request of municipalities to better align their regulatory documents with the goals of riparian intactness. The NSWA received direction from its municipal partners that a review of the current state of existing municipal bylaws would be of value. The project is focused on municipal bylaws and the powers established through the MGA.

The project team recognizes that the applicability of this Guide may be limited in other jurisdictions, such as First Nations and Métis Settlements. The project team recognizes that the comparison of municipal bylaws and processes under the MGA to the Indigenous land management process is not directly analogous or appropriate. Indigenous land management regimes are subject to colonial history and ongoing colonial systems that operate in unique political contexts.

The focus of the NSWA Riparian Regulations Best Management Practices Guide is on Land Use Bylaws. The project team recognizes that the recommendations in this Guide may require further refinement to support implementation into the documents that support Indigenous land management process and to reflect and enable Indigenous land use activities within the watershed.

Additionally, the project team recognizes that local governments utilize a range of planning tools, including statutory and non-statutory plans, policy documents, and design standards in addition to Land Use Bylaws to guide and manage development in riparian areas. Recommendations in this guide are intended to support these tools to assist local governments in implementing best management practices that support riparian intactness within their communities.

The assessment of municipal planning documents was undertaken in the absence of consultation with municipal administration. A process of data validation was included in the project to ensure the project team's assessment of current land use regulations is as accurate as the available data.

SUMMARY OF FINDINGS FROM DISCUSSION GUIDE & MUNICIPAL WORKSHOPS

During Stage 1 and 2 of the Project, data was gathered to assess the current regulatory framework implemented by local governments throughout the watershed to identify successes and opportunities for greater alignment to support improvements to riparian intactness. A survey of 30 Land Use Bylaws from different municipalities (Counties, Towns, Villages, and Summer Villages) within the watershed was undertaken to identify current regulatory successes and target opportunities to revise and/or update LUB regulations to maintain and improve riparian intactness within the watershed. The following section provides a summary of the findings and recommendations from Stages 1 and 2 of the project as they relate to the three identified project actions.

1.6 ACTION 1 – ADOPT COMMON LANGUAGE

Definitions in LUBs impact functionality, interpretation, and a municipality's ability to consistently interpret and defend the bylaw. The focus of this part of the project is to identify omissions, opportunities for improvement in transparency, and establish greater consistency throughout the watershed.

FINDINGS

- Limited defined language around riparian areas and riparian features.
- Focus on flood hazard terminology.
- No significant differences between definitions included or excluded in urban and rural municipalities.
- Tendency for municipalities to defer to other mechanisms – policy documents, Acts, and Regulations, rather than specifically regulating the management of riparian lands and features through the LUB directly.
- Language incorporated in LUBs is very context-specific to particular municipalities, which can result in inconsistencies between how terms are utilized or understood between municipalities and/or between municipalities and different levels of government.
- Administrative complexity and access to (or lack of access to) resources limit the types of information and understanding of information required to support the implementation initiatives that support riparian intactness.

OPPORTUNITIES

The following opportunities have been identified for amendments to LUBS to improve consistency in language related to riparian areas:

1. Provide definitions for terms associated with development and human use of riparian areas to:
    a. Provide greater clarity and consistency between terminology;
    b. Help define and establish triggers for application requirements;
    c. Identify which features should be shown on site plans and tentative plans of subdivision; and
    d. Support regulations to minimize impacts from development on these natural assets.
2. Defined terms should include:
    a. **Water features** such as watercourses, waterbodies, and wetlands.
    b. **Riparian areas** adjacent to water features to aid in delineating sensitive riparian lands.
    c. **Hazard lands,** ex. steep slopes, ravines, etc.
    d. **Development terms** used in land use bylaws, design guidelines, and best management practices
    e. Terms associated with **Environmentally Significant Areas** to support biodiversity, maintain habitat areas, and corridors.

1.7 ACTION 2 – IMPLEMENT SUBDIVISION APPLICATION REQUIREMENTS AND CONDITIONS TO SUPPORT RIPARIAN INTACTNESS

Municipalities are required to undertake an assessment of the suitability of a proposed lot when considering a subdivision application. Factors that impact suitability include assessing slope stability, flood hazard, and groundwater table.

Municipalities have the authority to restrict development in these areas using tools that are only implementable at the time of subdivision.

Many of the features that are considered "hazards" to future development are also features that characterize riparian areas. Requiring these features to be identified at the time of subdivision and including regulations to minimize impacts on these features from future development can reduce municipal risk, financial costs to the landowners, and help to achieve riparian intactness targets.

FINDINGS

- Very little direction within LUBs related to the subdivision process and requirements.
- No significant differences in the approaches taken by urban and rural municipalities relating to the management of hazard lands with riparian features.
- Tendency for municipalities to defer to other mechanisms – policy documents, Acts, and Regulations, rather than specifically regulating the management of riparian lands and features through the LUB directly.
- Few LUBs provide regulations related to the taking of Environmental Reserves or Reserve Easements.
- Only two LUBs reviewed identified conditions related to subdivision near water features.

OPPORTUNITIES

The following opportunities have been identified for amendments to LUBs to improve consistency in controlling subdivision impacts on riparian areas.

1. For new subdivision applications, provide explicit requirements for information required to accurately delineate waterbodies, watercourses, wetlands and any associated riparian lands within or adjacent to the subject parcel. Such information may include the location of water features on or adjacent to the subject site, flood hazard delineation, etc.
2. Identify specific site triggers for new subdivision applications that require additional application requirements, in alignment with applicable municipal conservation priorities. Triggers and resulting application requirements may include:
    a. Waterbody, watercourse or wetland within or adjacent to 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.

3. For new subdivisions, require the provision of environmental and/or municipal reserves between the lots and the legal bank [9] of water bodies, watercourses, and wetlands. The width and size of the reserve should take into consideration the type of land use proposed and the guidelines and/or recommendations of:
    a. Qualified professionals; and/or
    b. Riparian Setback Matrix Model (RSMM); and/or
    c. The Government of Alberta's *Stepping Back from the Water: A Beneficial Management Practices Guide for New Development Near Water Bodies in Alberta's Settled Region*; and/or
    d. ESRD Recommended Setbacks Chart (see Appendix D).
4. Identify general or specific conditions of approval that may be applied for subdivisions impacting water bodies, watercourses, wetlands, and any associated riparian lands. Conditions may include:
    a. The provision of Environmental Reserve or Environmental Reserve Easements where appropriate;
    b. Compliance with Erosion and Sediment Control Plan;
    c. Compliance with Lot Grading and Drainage Plan;
    d. Compliance with Stormwater Management Plan; and/or
    e. Any other conditions requested by the Subdivision Authority to address matters affecting the protection of riparian areas.

1.8 ACTION 3 – IMPLEMENT DEVELOPMENT PERMIT APPLICATION REQUIREMENTS AND CONDITIONS TO SUPPORT RIPARIAN INTACTNESS

The LUB is one of the most powerful tools available to a municipality to effect change to the development footprint. It impacts riparian intactness and minimizes municipal risks and costs associated with development.

Identifying application and design requirements for new developments in the LUB enables municipalities to identify and mitigate risks associated with development, reduce municipal and regional infrastructure costs, and help achieve municipal conservation and restoration objectives.

FINDINGS

- Most LUBs reviewed included requirements for identifying water features at the development permit stage.
- Reliance on development officer discretion to assess on a site-by-site basis when additional information will be required in support of an application without a clear list of triggering site characteristics. This can result in challenges with consistency in the interpretation of triggers and the application of development permit conditions.
- Deferral to other mechanisms – policy documents, Acts, and Regulations to provide guidance and direction.
- Variety of approaches to determining setbacks from water features, controlling development in proximity to riparian areas, and for applying conditions.

[9] As defined in Section 17 of the *Surveys Act*, the bed and shore of a body of water ends at the legal bank, also known as the ordinary high-water mark. The legal bank is a natural boundary formed by the presence of water that typically results in vegetation distinct from the upland vegetation. The legal bank may fluctuate over time.

OPPORTUNITIES

The following opportunities have been identified for amendments to LUBs to improve consistency in controlling development impacts on riparian areas.

1. For new development applications, provide explicit requirements for information required to accurately delineate waterbodies, watercourses, wetlands and any associated riparian lands within or adjacent to the subject parcel. Such information may include the location of water features on or adjacent to the subject site, flood hazard delineation, etc.
2. Identify specific site triggers for development applications that require additional application requirements, in alignment with applicable municipal conservation priorities. 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 to determine appropriate setbacks;
    b. Identify flood hazards affecting the subject site – require assessment report by a professional engineer to determine site suitability, setbacks and/or flood mitigation conditions;
    c. Identify slope stability hazards – require geotechnical study to determine site suitability and setback requirements;
    d. Identify Environmentally Significant Areas (ESAs) within or adjacent to subject site – require environmental assessment by a qualified professional to determine any mitigation requirements.
3. Identify general or specific conditions of approval that may be applied where a proposed development may impact waterbodies, watercourses, wetlands, and any associated riparian lands. Conditions may include:
    e. Requirements to prevent soil or debris from entering waterbodies during or after construction, such as silt fences or traps;
    f. The responsibility of the applicant to ensure surface runoff water does not discharge from the site through grading;
    g. Compliance with Erosion and Sediment Control Plan;
    h. Compliance with Lot Grading and Drainage Plan; and/or
    i. Any other conditions requested by the Development Authority to address matters affecting the protection of riparian areas.
4. Include a minimum setback distance regulation for new developments and redevelopment on existing lots that meets or exceeds the minimum development setback regulations from waterbodies, watercourses or wetlands for buildings on a site.
5. Require development permits for shoreline modifications on lands above and abutting the riparian areas of waterbodies, watercourses, wetlands, and other water bodies
6. Require development permits where a development is proposed on lots that include or abut riparian areas for:
    j. Modifications to lot grading or drainage which could alter the quantity or quality of surface water runoff into a watercourse or water body;
    k. Clearing of vegetation;
    l. Landscaping which could alter the quantity or quality of surface water runoff into a watercourse or water body. **This should not apply to agricultural parcels in most cases**.

NORTH SASKATCHEWAN WATERSHED ALLIANCE

BMP RECOMMENDATIONS
MUNICIPAL REGULATIONS FOR RIPARIAN INTACTNESS

BMP RECOMMENDATIONS: ACTIONS TO IMPROVE RIPARIAN INTACTNESS

The purpose of the recommendations in the BMP Guide is to provide municipalities with tools to:

- Maintain and improve riparian intactness throughout the watershed;
- Mitigate environmental and legal risks associated with developments located on hazard lands;
- Support local conservation objectives and targets; and
- Assist NSWA partner municipalities in achieving riparian intactness goals adopted by the partner municipalities.

The tools provided in the BMP guide will enable decision-makers to identify, consider, support, and improve riparian intactness within the watershed. Recommendations are organized under the Three Actions identified as opportunity areas during the previous stages of the project. A summary of the findings and recommendations is included in the previous section of this report.

Specific BMP recommendations are provided to support the implementation of each action. The recommendations are structured to comply with the legislative requirements and authorities delegated to municipalities through provincial and federal acts and regulations.

Recommendations are informed by:

- The authority to manage land use and development is delegated to municipalities in the MGA and supporting Regulation.
- Best management practices to support riparian intactness when considering development in and near riparian areas;
- Where applicable, regulatory requirements already implemented within the watershed, identified during the previous phase of the project and complied with in the discussion guide.

Figure 1: Riparian Intactness Examples From: Riparian Web Portal. www.riparianresourcesab.info/satellite-data-method-examples

1.9 Benefits of Riparian Intactness

Managing human uses and development of land within riparian areas reduces negative development impacts and provides a broad range of ecological and financial benefits within the watershed. Benefits include:

- Increased functionality and value of ecosystem services that support economic development and minimize costs associated with the provision of municipal services;
- Improved water quality;
- Increased water quantity levels;
- Reduced development risk for landowners, developers, and local governments relating to flood hazard, drought management, slope instability; and erosion; and
- Improvements to habitat management.

The benefits of riparian intactness have been classified into 4 benefit areas: **Water Quality, Water Quantity, Hazard Management, and Habitat and Ecosystem Management**. Recommendations in this guide include information about the benefits they provide to assist users in identifying recommendations that best support local community conservation goals and objectives in these areas. Benefits associated with each area are summarized on the following page.

ICON	BENEFIT AREA
	WATER QUALITY • Traps and stores sediment • Minimizes algae blooms • Benefits fish and other biota habitat • Reduces drinking water treatment costs • Increased recreation value of recreation lakes • Decreased health risks associated with poor water quality • Positive impacts on recreation property values
	WATER QUANTITY • Dissipation of flood energy and reduced downstream flood intensity and frequency • Higher, longer lasting, and less variable baseflow between storm events • Decreased irrigation costs in areas where runoff is managed and controlled • Recharges aquifers • Stores water and energy

HAZARD MANAGEMENT

- Improved bank stabilization
- Reduced erosion by building and maintaining banks and shorelines
- Minimization of contaminants entering water bodies and water courses
- Protect ownership boundaries and property values
- Increased resiliency to flood, drought, ice damage, and landslides
- Reduced insurance risk associated with slope instability, flood, drought, and fire
- Reduced costs associated with constructing and maintaining infrastructure
- Reduced costs for emergency response

HABITAT AND ECOSYSTEM MANAGEMENT

- Provides habitat for aquatic and terrestrial species.
- Riparian vegetation canopies shade streams and reduce water temperatures, supporting fish habitat.
- Preserve food sources for both aquatic and terrestrial fauna.
- Reduced risk from invasive species
- Promotes plant growth
- Maintains biodiversity

Figure 2: Examples of Riparian Areas. Retrieved from: Riparian Web Portal. (www.riparianresourcesab.info/riparian-101) Photos are courtesy of Cows and Fish (www.cowsandfish.org).

1.10 Action 1 - Adopt Common Language

Through Part 17 of the MGA, the Province of Alberta has delegated the authority to regulate the use of land to municipalities based on the regulatory frameworks adopted through municipal Land Use Bylaws (LUBs). A LUB must prescribe the "uses of land or buildings that are permitted… with or without conditions." A LUB may also provide for subdivision design standards, the amount of land to be provided around or between buildings, landscaping, the excavation or filling in of land, the development of buildings (including appearance, height, and size), population density, development on lands subject to flooding or subsidence, and development on lands adjacent to waterbodies (emphasis added).

Within LUBs, key terms are defined. The defined terminology in LUBs enables a clearer and more consistent interpretation of the bylaw. Most terms defined in an LUB are related to use types, which can be either permitted, discretionary, or not permitted by their omission from listed uses within Land Use Districts. However, other terms unrelated to use types can be defined to provide transparency and aid in interpreting other aspects of the bylaw.

Definitions in LUBs impact functionality, interpretation, and a municipality's ability to consistently interpret, implement, and defend the bylaw.

OPPORTUNITIES

The following opportunities were identified to improve consistency in language related to riparian areas:

1. Provide definitions for specific **water features** to improve consistency in interpretation.
2. Provide definitions for **riparian areas** adjacent to water features to aid in delineating sensitive riparian lands.
3. Provide definitions related to other **hazard lands** (e.g. steep slopes, ravines, etc.).
4. Provide definitions for **development terms** used in land use bylaws, design guidelines, and best management practices.
5. Provide definitions related to **environmentally significant areas & biodiversity** to support biodiversity and maintain habitat areas and corridors.

RECOMMENDED BMPS: DEFINITIONS

The following list of recommended definitions was adapted, where possible, from existing provincial and municipal sources and are intended to serve as a resource for municipalities to further adapt and incorporate into municipal Land Use Bylaws and other planning documents to support improvements to riparian intactness within the watershed. Inclusion of the recommended definitions will support:

- improve awareness about features associated with riparian areas;
- increase consistency in the use of terminology associated with riparian areas throughout the watershed;
- improve transparency for developers and landowners regarding application processes and application considerations relating to subdivisions and development in riparian areas to reduce confusion and enable early project planning and budgeting;
- improve the defensibility of the LUB when addressing enforcement matters; and
- decrease municipal risk associated with subdivision and development approvals on sites characterized by riparian features.

Recommendation: Incorporate the following definitions into municipal Land Use Bylaws.

Water Features

DEFINITIONS RELATED TO WATER FEATURES WITHIN MUNICIPALITIES, INCLUDING WATERCOURSES, WATERBODIES, AND WETLANDS.

BMP RECOMMENDATION:
Define Water Features and Assets in Municipal Land Use Bylaws

Aquifer
Means a sub-surface layer or layers of porous rock that hold water within the spaces between the rocks (interstitial spaces).

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.

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.

Groundwater
Means subsurface water moving in soil and underlying strata. (Government of Alberta, *Alberta Wetland Classification System)*

Groundwater Discharge
Means wetlands that receive water from groundwater flow.(Government of Alberta, *Alberta Wetland Classification System)*

Groundwater Recharge Areas
Means areas where precipitation, surface water or runoff infiltrate the soil and bedrock to the saturation zone or aquifer. (Alberta Environment, *Focus on Groundwater)*

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.

Water Body
Means an area that remains wet long enough for the water to influence plant and soil characteristics. A water body is any location where water flows or is present, whether the flow or the presence of water is continuous, intermittent, or occurs only during a flood, and includes but is not limited to wetlands and aquifers. The water boundary is considered bound by its ecological boundary. Water bodies can be natural or man-made.

Water Table
Means the water level below which the ground is saturated. (Government of Alberta, *Alberta Wetland Classification System)*

Watercourse
Means a flowing water body, such as a river, stream, or creek. This includes watercourses that may be ephemeral, intermittent, temporary, or seasonal in nature. (Government of Alberta, *Stepping Back from the Water)*

Watershed

Means an area of land that catches all the water, including snowmelt, rainfall and surface runoff, and drains it to a specific point such as a marsh, lake, stream, or river. A watershed can be made up of a number of sub-watersheds that contribute to the overall drainage of the watershed. A watershed is sometimes referred to as a basin, drainage basin, or catchment area.

Wetland
Means land saturated with water long enough to promote wetland or aquatic processes as indicated by the poorly drained soils, 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 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.

Riparian Areas and Assets

DEFINITIONS RELATED TO RIPARIAN AREAS ADJACENT TO WATER FEATURES TO AID IN DELINEATING FEATURES OF RIPARIAN LANDS.

BMP RECOMMENDATION:
Define Riparian Areas and Assets in Municipal Land Use Bylaws

Alluvial Aquifers
Means a non-confined aquifer comprised of groundwater that is under the influence of surface water. (Government of Alberta, *Stepping Back from the Water)*

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.

Riparian Areas (or Lands)
Means the transitional area between upland and aquatic ecosystems. They have variable width and extent above and below ground and perform various ecological 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.

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)*

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.

Soakaway
Means a trench or pit filled with sand or gravel into which storm water is directed so that the water may soak into the ground.

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.

Hazard Lands

DEFINITIONS OF HAZARD FEATURES INCLUDING STEEP SLOPES, RAVINES, AND FLOODWAYS WHICH ARE FREQUENTLY PRESENT WITHIN RIPARIAN AREAS.

RECOMMENDATION:
Define Features Associated with Hazard Lands in Municipal Land Use Bylaws

Floodplains
Means the 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 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).

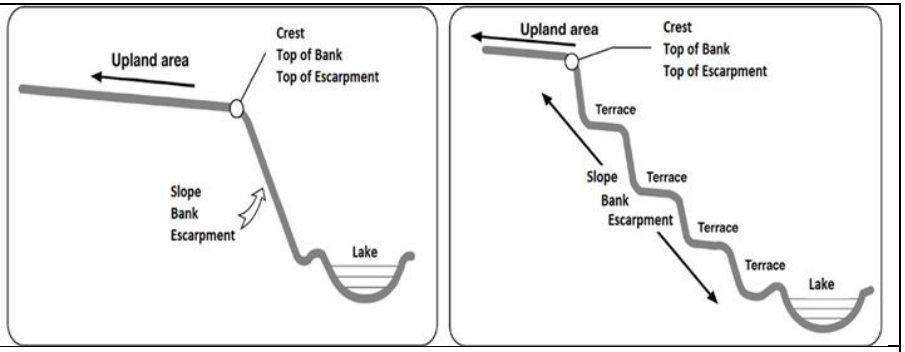
Grading
Means the recontouring or sloping of the land in such a way that surface drainage from rainstorms, snowmelt or groundwater is directed away from the buildings and is controlled in a manner that eliminates or minimizes the impact on adjacent properties

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-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.

Ravines/Escarpments

Means an extended linear topographical feature of relatively steep slope and significant change in elevation, as per the diagrams below. Where an escarpment line has been previously altered, the top of the escarpment shall be considered from the original escarpment line as determined by an Alberta Land Surveyor. (*Summer Village of Norglenwold LUB*)



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)*

Subsidence

Means a lowering of the soil surface due to a reduction in volume through settling or other means. (Government of Alberta, *Glossary of Reclamation and Remediation Terms Used in Alberta)*

Development Terms

DEFINITIONS RELATED TO THE DEVELOPMENT OF LANDS NEAR WATER FEATURES AND WAYS TO ENSURE APPROPRIATE MITIGATION.

RECOMMENDATION:
Define Development terms that describe development activities

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.

Biophysical Assessment

Means an assessment, prepared by a qualified professional that complies with applicable municipal policy and/or design standards. The assessment 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 buffer is 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 Agreement

Means a conservation easement granted under the provisions of the *Act* and as defined in the *Act. (Source: Ducks Unlimited)*

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.

Development
Depending on the context of its use, the construction of buildings, removal or placement of materials, use of land for human occupation or benefit, or the subdivision and improvement of land through development as defined by the *Municipal Government Act*.

Erosion and Sediment Control Plan
Means a plan, prepared by a qualified professional that complies with applicable municipal policy and/or design standards, which are 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, and how the disturbance of vegetation and topography will be minimized. (Sometimes referred to as a Construction Management Plan)

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 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, dikes, 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 complies with applicable municipal policy and/or design standards, 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.

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)*
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.
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.
Phase 1 Environmental Assessment Means an assessment, prepared by a qualified professional that complies with applicable municipal policy and/or design standards, 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)*
Pruning Means the removal of branches in a way that does not jeopardize the vitality of the tree, shrub, or vegetation being altered.
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.

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.

Reserve, Conservation (CR)
Means land designated Conservation Reserve (CR) pursuant to the *Act*.

Reserve, Environmental (ER)
Means land designated Environmental Reserve (ER) pursuant to the *Act*.

Reserve, Environmental Reserve Easement (ERE)
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.

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.

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.

Site-Specific Storm Water Management Plan
means a plan prepared by a qualified professional that complies with applicable municipal policy and/or design standards, that outlines the design and implementation of a system for on-site and off-site storm water management related to a specific site. The plan 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.

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 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.

Stripping
Means the removal of some or all vegetation and topsoil on lot in preparation for construction activities.

Storm Water Management Plan (SWMP)
means a plan prepared by a qualified professional that complies with applicable provincial and municipal policy and/or design standards, 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).

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 minimizes runoff (e.g., vegetated areas, flower beds, grass, gravel, etc.).

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 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.

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 landscape and climate.

Wetland Assessment
means an assessment prepared by a qualified wetland professional that complies with applicable provincial and municipal policy and/or design standards, 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*.

Environmentally Significant Areas & Biodiversity

DEFINITIONS RELATED TO ENVIRONMENTALLY SIGNIFICANT AREAS TO SUPPORT BIODIVERSITY, MAINTAINING HABITAT AREAS AND CORRIDORS.

RECOMMENDATION:
Define Features Associated with Environmentally Sensitive Areas in Municipal Land Use Bylaws

Biodiversity
Means the variability among living organisms – within species, between species, and in ecosystems. (City of Edmonton, *Biodiversity Report)*

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.

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

Ecological Corridor
Means a geographical space that is governed and managed over the 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.

Ecosystem Services
Means the direct and indirect benefits humans receive from nature.

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)*

Government of Alberta Environmentally Significant Area (ESA)
Means areas that have been identified as important to the long-term maintenance of biological diversity, physical landscape features and/or other natural processes, either locally or within a larger spatial context. Government of Alberta ESAs are determined by the Government of Alberta as per the criteria and evaluation matrix outlined in Environmentally Significant Areas in Alberta: 2014 Update.

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)*

High Human Activity Centre
Means an area with greater than 20 human activity events per day. High human activity centres impede wildlife movement.

Local Environmentally Significant Area (ESA)
Means areas that have been municipally or regionally identified as important to the long-term maintenance of biological diversity, physical landscape features, and/or other natural processes, either locally or within a larger spatial context. These areas may include any or all of the following features:

a. hazard lands and areas that are unsuitable for development in their natural state (i.e., floodplains, steep slopes (greater than 15%), unstable slopes); areas that perform a vital environmental, ecological, or hydrological function (i.e., aquifer, groundwater recharge areas, or peatlands);
b. areas that contain unique geological or physiological features;
c. Areas that contain large, relatively undisturbed habitats and provide shelter for species that are intolerant of human disturbance;
d. Areas that provide an important link for the natural migration of wildlife;
e. Riparian areas of water bodies, wetlands, and watercourses; and/or
f. Areas with protective notations.

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* and Government of Alberta, *Alberta Wetland Classification System)*

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 reservations, which are placed by public agencies in consultation with the public land/crown land manager. They identify land and resources that are managed to achieve 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)*
Significant Wildlife Area Means regions recognized for their importance in supporting diverse wildlife populations and habitats.

Figure 4: Examples of Riparian Areas. Retrieved from: Riparian Web Portal. (www.riparianresourcesab.info/riparian-101 Photos are courtesy of Cows and Fish (www.cowsandfish.org), except for the following: Bottom left: Mulhurst Bay Pigeon Lake Alberta Canada (https://commons.wikimedia.org/wiki/File:Mulhurst_Bay_Pigeon_Lake_Alberta_Canada_02A.jpg)

1.11 ACTION 2 - IMPLEMENT SUBDIVISION APPLICATION REQUIREMENTS AND CONDITIONS TO SUPPORT RIPARIAN INTACTNESS

Municipal authority to consider and approve subdivision applications is established in the MGA and in the *Matters Related to Subdivision and Development Regulation (the Regulation)*. These documents enable municipalities to make decisions about subdivision applications and identify procedural requirements relating to specific aspects of the subdivision process including conditions, setback requirements and variances for subdivision applications. Municipal authority to issue decisions regarding the subdivision development

The *MGA i*dentifies mechanisms whereby a municipality may require the dedication of Environmental or Municipal Reserves. In certain instances, Environmental Reserve (ER) may be required by the Subdivision Authority at the time of subdivision where the land consists of: a swamp, gully, ravine, coulee, or natural drainage course; where the land is subject to flooding or is considered unstable; or, a strip of land, not less than six (6) metres in width, abutting the bed and shore of any body of water. Where an ER lot is required, municipalities may increase the width of the parcel to ensure that the environmentally sensitive area are included in the ER or to provide a buffer width that is more consistent with recommendations from *Stepping Back from the Water*.

The Subdivision Authority may require land to be provided as ER only for one or more of the following purposes:

- To preserve the natural features of lands as listed above;
- To prevent pollution of the land or the bed and shore of the adjacent body of water;
- To ensure public access to and beside the bed and shore of the body of water on or adjacent to the land;

To prevent the subdivision of land where the natural features of the land would present a significant risk of personal injury or property damage occurring during the development or use of the land. Municipalities and landowners may also agree to address such lands through an Environmental Reserve Easement (ERE) registered against the land in favour of the municipality. The easement remains in effect despite any future sale and is to protect and enhance the environmental character o*f the land.*

Municipalities are required to undertake an assessment of the suitability of a proposed lot when considering a subdivision application. Factors that impact suitability include assessing slope stability, flood hazard, and groundwater table. These are features that are commonly present in some riparian lands. Requiring the identification of these features and design mitigations to avoid creating lots that do not have a building pocket outside of these features supports riparian intactness and is consistent with municipal obligations as identified in *the Act* and *the Regulation.*

Additionally, municipalities have the authority to restrict development in these areas using tools that are only implementable at the time of subdivision.

Many of the features that are considered “hazards” to future development are also features that characterize riparian areas. Requiring these features to be identified at the time of subdivision and including regulations to minimize impacts on these features from future development can reduce municipal risk, and financial costs to landowners and help to achieve riparian health goals.

The recommended BMPs in this section are intended to support the implementation of **Action 2** by:

- Recommending new subdivision application requirements that support enable the approving authority to consider potential impacts from the application on riparian intactness and minimize risks and costs associated with developing in areas which exhibit riparian features.
- Identifying regulations affecting site design, parcel layout, reserve requirements, and other buffering considerations to assess site

suitability in areas characterized by riparian features, to minimize riparian disturbance.
- Recommending conditions of subdivision approval to implement and enforce regulations that support riparian intactness at the time of subdivision.

Benefits of Riparian Area Intactness			
Water Quality	**Water Quantity**	**Hazard Management**	**Habitat & Ecosystem Health**
			

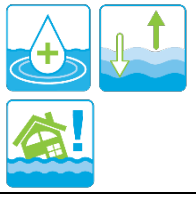
RECOMMENDED BMPS: SUBDIVISION APPLICATION REQUIREMENTS

To enable the Subdivision Authority to consider how a proposed application may impact or support riparian intactness, the LUB should include application requirements for information required to accurately delineate waterbodies, watercourses, wetlands, and any associated riparian lands within or adjacent to the subject parcel. Such information may include the location of water features on or adjacent to the subject site, flood hazard delineation, etc.

The following recommendations outline specific subdivision application requirements aimed at preserving riparian integrity throughout the subdivision process. The focus of these recommendations is to minimize impacts from municipal subdivision approvals and human use on riparian intactness and support improvements to water quality, water quantity, and biodiversity while enabling municipalities to better manage risks associated with subdivision in and adjacent to riparian lands.

RECOMMENDATION:	BENEFITS	LEGAL RESPONSIBILITY/ JUSTIFICATION
Within the application requirements section of the land use bylaw, identify specific riparian features that, when present within a proposed subdivision area, would trigger the provision of additional application requirements in alignment with applicable municipal, regional and provincial conservation priorities. The following features are recommended for inclusion: • Waterbody, watercourse or wetland within or adjacent to the subject site • Flood hazard lands affecting the subject site • Areas with steep slopes and areas susceptible to landslide risk • Environmentally Significant Areas (ESAs) within or adjacent to the subject site		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies • Wetland Policy • Land Stewardship Act
Develop and implement municipal policies or design guidelines to clarify for subdivision proponents what must be included in required supporting studies, assessments and/or engineering reports required to accompany an application. An example policy is included as Appendix C.		

Identify supporting studies, assessments and/or engineering reports s required to accompany a subdivision application when the triggering features are present to identify, classify, and delineate the location of riparian features within a subject site. Reports and studies may include:			
Triggering Feature	**Required Supporting Information**		
Waterbody, watercourse or wetland within or adjacent to the subject site.	**Wetland Assessment, or Biophysical Assessment** • Require assessment report by a professional engineer or other qualified professional as necessary.		**Shared - Municipal/Provincial** • MGA • Matters Related to Subdivision and Development Regulation • AB Wetland Policy
Flood Hazard Lands (Floodway, Flood Fringe, Flood Construction Levels (FCL)) as identified in the Alberta Flood Hazard Mapping, municipal flood hazard mapping or in a report prepared by a qualified professional submitted by the proponent.	**Building pocket elevation data** • Require contour information and FCLs on the site plan. • Require the delineation of these areas on the tentative plan of subdivision.		**Shared - Municipal/Provincial** • MGA • Matters Related to Subdivision and Development Regulation
Slope stability hazards, identified in municipal data, the Relative Landslide Susceptibility Mapping Data and/or in a geotechnical report prepared by a qualified professional submitted by the proponent.	**Geotechnical Report** • Require the preparation and submission of a geotechnical report or slope stability assessment to confirm areas subject to landside risk (slope instability) and recommended development setback distance to be provided by a qualified professional. • Map Identifying Land Susceptibility in relation to the development area (where data is available).		**Shared - Municipal/Provincial** • MGA • Matters Related to Subdivision and Development Regulation
Environmentally Significant Areas (ESAs) within or adjacent to the subject site are identified in provincial data, municipal data, or in a report prepared by a qualified professional submitted by the proponent.	**Biophysical Assessment** • Require the preparation and submission of a biophysical assessment, prepared by a qualified professional to identify riparian features and areas within the subject site that should be included within protected areas of a		**Shared - Municipal/Provincial** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies • Land Stewardship Act • Environmental Protection and Enhancement Act

	permanent nature such as: Environmental Reserves, Environmental Reserve Easement lands, Conservation Easement Areas or otherwise excluded from the building pocket(s) on the lot(s).		
Important ecological corridors for ungulate and carnivore habitat	**Ecological Corridor Mapping** • Require the preparation and submission of ecological corridor mapping and/or the identification of ecological corridors within the project area where important ecological corridors, identified as high-priority conservation areas by the municipality, may be impacted by the proposal.		• Provincial Land Use Policies
Require the inclusion and delineation of vegetative buffer areas on pre- and post-construction lot grading and drainage plans for proposed multi-lot subdivision applications where a proposed subdivision includes riparian features to reduce erosion and minimize landslide susceptibility.			**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies
All applications for subdivision within a Flood Hazard Area shall include, to the satisfaction of the approving authority, a detailed site plan that identifies the location of all proposed permanent buildings on the site and the proximity of these buildings to the floodway and flood fringe, and flood construction levels.			**Municipal** • MGA • Matters Related to Subdivision and Development Regulation

RECOMMENDED BMPS: SUBDIVISION REGULATIONS

Recommendations in this subsection identify general and specific regulations for inclusion in municipal and local government regulatory documents such as the LUB to minimize impacts on riparian intactness when a subdivision is proposed in an area that includes or is adjacent to water bodies, watercourses, wetlands, and associated riparian lands. Recommended subdivision regulations that support riparian intactness include:

RECOMMENDATION:	BENEFITS	LEGAL RESPONSIBILITY/ JUSTIFICATION
Require that environmental and/or municipal reserves be provided at the time of subdivision affecting lands between proposed lots and the legal bank [10] of water bodies, watercourses, and wetlands. The width and size of the reserve should be informed by the recommendations provided: • By qualified professionals; and/or • The Riparian Setback Matrix Model (RSMM); and/or • The Government of Alberta's *Stepping Back from the Water: A Beneficial Management Practices Guide for New Development Near Water Bodies in Alberta's Settled Region*; and/or • AB Environment Recommended Guidelines for Minimum Environmental Reserve/Easement Widths (see Appendix D).		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies
Require lands characterized by hazard features, characteristic of riparian lands, including: • unstable slopes; • ecological corridors of high conservation significance; • floodway or flood fringe lands; and/or • lands affected by environmentally significant features. identified in municipal or provincial mapping or in a report prepared by a qualified professional, such as a biophysical assessment, to be dedicated as environmental and/or conservation reserves or affected by an Environmental Reserve Easement or to be excluded from the development pocket on the lot(s) through the registration of a restrictive covenant. The width and area of the reserves or buffer area should be determined by identifying the location and delineating the boundaries of floodway and/or flood fringe lands, and/or environmentally sensitive areas using one of the following tools: • Recommendations in a biophysical assessment prepared by a qualified professional; and/or • The Riparian Setback Matrix Model (RSMM); and/or		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies • Land Stewardship Act • Environmental Protection and Enhancement Act

[10] As defined in Section 17 of the *Surveys Act*, the bed and shore of a body of water ends at the legal bank, also known as the ordinary high-water mark. The legal bank is a natural boundary formed by the presence of water that typically results in vegetation distinct from the upland vegetation. The legal bank may fluctuate over time.

• The Government of Alberta's *Stepping Back from the Water: A Beneficial Management Practices Guide for New Development Near Water Bodies in Alberta's Settled Region*; and/or • AB Environment Recommended Guidelines for Minimum Environmental Reserve/Easement Widths (see Appendix D).		
Prohibit the subdivision of new residential, commercial or industrial lots within a floodway.		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies
Discourage subdivision of vacant or undeveloped land for residential and/or higher intensity uses within ecological corridors that could negatively impact the function of the corridor.		**Municipal** • MGA • Provincial Land Use Policies
Prohibit the inclusion of lands identified in Levels 2-6 on the AGS Relative Landslide Susceptibility Risk Mapping data within residential use parcels.		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies
Require vegetative buffer areas to be included within Reserve parcels and/or easement areas adjacent to: • lands identified in Levels 2-6 on the AGS Relative Landslide Susceptibility Risk Mapping data; and • steep slope areas (greater than 15%) where the subdivision lands include riparian features to reduce erosion and minimize landslide susceptibility.		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies
Identify requirements for design mitigations at the time of subdivision to support biodiversity and protect ecological corridors with high conservation value, including: • Adopt a 50% intactness target for ungulate habitat and carnivore habitat • Require high-human activity centres to locate outside or close to the corridor edge • Where corridor intactness can not be maintained, offset loss of ecological corridor function through conservation opportunities, including securement/protection in other ecological corridors. • Limit recreational access in highly productive grizzly bear habitat. • Restrict road density below 0.6 km/km² in grizzly bear habitat.		• MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies

RECOMMENDED BMPS: SUBDIVISION CONDITIONS

Recommendations in this subsection are related to proposed conditions of approval that may be applied at the time of subdivision to support riparian intactness. Conditions should include:

RECOMMENDATION:	BENEFITS	LEGAL RESPONSIBILITY/ JUSTIFICATION
Include a condition for the provision of Environmental Reserves, Conservation Reserves, an Environmental Reserve Easement Agreement, a Conservation Easement Agreement of a permanent nature, or a restrictive covenant, where defined riparian features are present and were enabled to do so, in accordance with the MGA. Where an easement has been required in accordance with sections 661.1 and 664(3) of the MGA, the Easement should be registered against the titles of the affected lots.		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies
Where riparian features are present, include conditions of subdivision approval requiring compliance with: • an Erosion and Sediment Control Plan, which conforms to municipal design standards; • a Lot Grading and Drainage Plan, which conforms to municipal design standards; • a Stormwater Management Plan which conforms to municipal design standards; • a landscaping plan that conforms to municipal design standards; where these plans were provided as part of the application submission.		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies
Where a Development Agreement is required as a condition of subdivision approval, the Development Agreement should be registered against the affected title(s) and should include provisions for detailed engineering and securities associated with the following elements of the subdivision to conserve and/or enhance the riparian features: • Lot Grading and Drainage Plan • Erosion and Sediment Control Plan • Storm Water Management Plan • Landscaping Plan		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies

1.12 ACTION 3 - IMPLEMENT DEVELOPMENT PERMIT APPLICATION REQUIREMENTS AND CONDITIONS TO SUPPORT RIPARIAN INTACTNESS

Municipal authority to consider and approve development applications is established in the MGA and in the Matters Related to Subdivision and Development Regulation (the Regulation). These documents provide direction on development application processes. The Regulation also includes certain directions related to conditions, setback requirements, and variances for development applications.

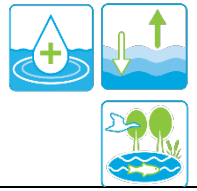
Through the LUB, municipalities can exert specific control on the types of development allowed, the location of development, design standards, landscaping, the excavation or filling in of land, and the development of buildings. Further, municipalities can implement development setbacks to protect all riparian areas, including those associated with watercourses, waterbodies, and wetlands throughout the watershed. Municipalities can also establish restrictions on the clearing of vegetation within these areas.

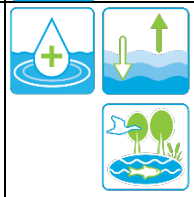
RECOMMENDED BMPS: APPLICATION REQUIREMENTS

To enable the Development Authority to carefully consider how a proposed application may impact or support riparian intactness, the LUB should include application requirements for information required to accurately delineate waterbodies, watercourses, wetlands, and any associated riparian lands within or adjacent to the subject parcel. Such information may include: the location of water features on or adjacent to the subject site, flood hazard delineation, etc.

The following recommendations identify specific development permit application requirements for incorporation into municipal Land Use Bylaws. These recommendations are intended to minimize impacts to riparian intactness and support improvements to water quality, water quantity and biodiversity while enabling municipalities to better manage risks associated with development in and adjacent to riparian lands.

RECOMMENDATION:	BENEFITS	LEGAL RESPONSIBILITY/ JUSTIFICATION
Within the application requirements section of the land use bylaw identify specific riparian features that when present within a development area would trigger the provision of additional application requirements in alignment with applicable municipal, regional, and provincial conservation priorities. Features may include: • waterbody, watercourse, or wetland within or adjacent to the subject site; • flood hazard lands affecting the subject site; • areas within or adjacent to steep slopes and /or areas susceptible to landslide risk; and • Environmentally Significant Areas (ESAs) within or adjacent to the subject site.		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies • Water Act • AB Wetland Policy

Identify supporting reports or studies required to accompany a development permit application when the triggering features are present to identify, classify, and delineate the location of riparian lands within a subject site. Where not previously provided in support of an approved Area Structure Plan, Conceptual Scheme, or subdivision application, additional reports and studies required to accompany a development permit application should include:			**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies • Water Act • EPEA
Triggering Feature	**Required Supporting Information**		
Waterbody (including wetland), watercourse, or other riparian feature within or adjacent to the subject site	• Require a wetland assessment report or biophysical assessment by a professional engineer or other qualified professional as necessary to delineate and classify the water feature and provide recommended development setbacks. • Require the provision of an Erosion and Sediment Control Plan.		**Shared - Municipal/Provincial** • MGA • Matters Related to Subdivision and Development Regulation • AB Wetland Policy
Flood Hazard Lands (Floodway, Flood Fringe, Flood Construction Levels (FCL))	• Require contour information and FCLs on the site plan. • Require the delineation of these areas on the tentative plan of subdivision.		**Shared - Municipal/Provincial** • MGA • Matters Related to Subdivision and Development Regulation
Slope stability hazards, identified in municipal data, the Relative Landslide Susceptibility Mapping Data and/or in a geotechnical report prepared by a qualified professional submitted by the proponent	• Require the preparation and submission of a geotechnical report or slope stability assessment to confirm areas subject to landside risk (slope instability) and recommended development setback distance to be provided by a qualified professional.		**Shared - Municipal/Provincial** • MGA • Matters Related to Subdivision and Development Regulation
Environmentally Significant Areas (ESAs) within or adjacent to the subject site	• Require the preparation and submission of a biophysical assessment by a qualified professional to identify features and areas within the subject site that		**Shared - Municipal/Provincial** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies

	should be identified as Environmental Reserves or excluded from the proposed parcels.		• Land Stewardship Act • Environmental Protection and Enhancement Act
Important ecological corridors for ungulate and carnivore habitat	• Ecological corridor mapping.		• Provincial Land Use Policies
Require at the time of development permit application, the provision of an assessment of riparian intactness within the development area and site design requirements to ensure riparian intactness will be maintained or improved by the proposed development. Consider utilizing existing riparian area assessments where data is available, utilizing the *riparian web portal* or other available data sources.			**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies • Water Act
Development within Flood Hazard Areas • All applications for development within a Flood Hazard Area shall include to the satisfaction of the approving authority a detailed site plan that identifies the location of all proposed permanent buildings on the site and the proximity of these buildings to the floodway and flood fringe and flood construction levels. • Where a proposed development is within or adjacent to a flood hazard area where the flood construction levels, flood fringe, and floodway are undefined, a report prepared by a qualified professional in support of the application, which addresses, as a minimum, the following, should be provided with the application: a. the location of all proposed permanent buildings on the site and the proximity of these buildings to the floodway and flood fringe; b. the ground elevation of all living spaces, areas used for the storage of goods damageable by floodwaters, and private sewage disposal systems located at or above the applicable flood construction level; c. proposed site alterations necessary to elevate the proposed development of any permanent buildings; d. if fill is required, the fill material(s) proposed to be used to elevate buildings and private sewage disposal systems; e. the type(s) of foundation, weeping tile and drainage that are required and suitable for permanent buildings within the flood hazard area; f. all erosion protection that will be required to protect the site; g. the impact that the proposed development and any necessary site alternations will have on off-site lands within the flood hazard area; and			**Shared - Municipal/Provincial** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies • Fisheries Act

h. all proposed flood mitigation measures required to ensure that developments or lands adjacent to the lands on which the proposed development is situated are not adversely affected by the proposed development; • Where a proposed development is located within or adjacent to a flood hazard area where the flood construction levels, flood fringe, and floodway have been delineated, the following application requirements shall be required: • That site plan provided with the application must identify the location of proposed buildings, water, and wastewater services in relation to the FCL. **If the proposed development cannot be located at or above the identified FCL**, the following additional information shall be required to be provided by a qualified professional, to the satisfaction of the Development Authority: • proposed site alterations necessary to elevate all living spaces, areas used for the storage of goods damageable by floodwaters, and private sewage disposal systems located at or above the applicable flood construction level; • acceptable types of fill material that can be used to elevate permanent buildings or private sewage disposal systems; • the type(s) of foundation, weeping tile, and drainage that are required and suitable for permanent buildings within the FHA; • statements identify how Canada Mortgage and Housing Corporation guidelines for building in flood-susceptible areas have been addressed; • plans for the flood mitigation of habitable rooms, electrical panels, heating units, and operable windows; • site drainage plans; • plans for erosion protection to mitigate future erosion within and off of the site; • report, prepared by a qualified professional, indicating the anticipated impact that the proposed development and any necessary site alterations may have on off-site lands within the FHA; and		

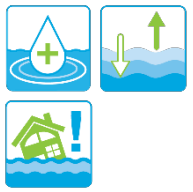
• a report, prepared by a qualified professional indicating all proposed flood mitigation measures required to ensure that developments or lands adjacent to the lands on which the proposed development is situated will not be adversely affected by the proposed development.		

RECOMMENDED BMPS: DEVELOPMENT REGULATIONS

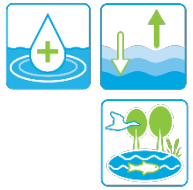
Recommendations in this subsection identify general and specific regulations for inclusion in municipal and local government regulatory documents, such as the LUB to minimize impacts on riparian intactness when a development is proposed in an area that includes or is adjacent to a water body, watercourse, wetland, and/or associated riparian lands. Recommended development regulations that support riparian intactness include:

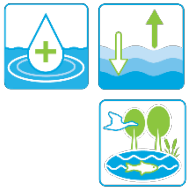
RECOMMENDATION:	BENEFITS	LEGAL RESPONSIBILITY/ JUSTIFICATION
Require development permits for development that is proposed on lots which include or are adjacent to riparian areas for: • Modifications to lot grading or drainage that could alter the quantity or quality of surface water runoff into a watercourse or water body; • Clearing of vegetation; • Landscaping which could alter the quantity or quality of surface water runoff into a watercourse or water body.		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies • Water Act
Require that development buffers or setbacks be provided and identified on the site plan affecting lands between proposed lots and the legal bank [11] of water bodies, watercourses, and wetlands. The width and size of the development setback or buffer area should be informed by recommendations provided: • By qualified professionals; and/or • The Riparian Setback Matrix Model (RSMM); and/or • The Government of Alberta's *Stepping Back from the Water: A Beneficial Management Practices Guide for New Development Near Water Bodies in Alberta's Settled Region*; and/or • AB Environment Recommended Guidelines for Minimum Environmental Reserve/Easement Widths (see Appendix D).		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies • Water Act
Require development setbacks to be applied to lands characterized by hazard features, characteristic of riparian lands, including unstable slopes, floodway or flood fringe lands and lands affected by environmentally significant features identified in municipal or		**Municipal** • MGA

[11] As defined in Section 17 of the *Surveys Act*, the bed and shore of a body of water ends at the legal bank, also known as the ordinary high-water mark. The legal bank is a natural boundary formed by the presence of water that typically results in vegetation distinct from the upland vegetation. The legal bank may fluctuate over time.

provincial mapping or in a report prepared by a qualified professional, such as a site-specific biophysical assessment. The width and area of the development setback should be determined by identifying the location and delineating the boundaries of unstable slopes, floodway and/or flood fringe lands, and environmentally sensitive areas using one of the following tools: • Recommendations in a biophysical assessment prepared by a qualified professional; and/or • The Riparian Setback Matrix Model (RSMM); and/or • The Government of Alberta's *Stepping Back from the Water: A Beneficial Management Practices Guide for New Development Near Water Bodies in Alberta's Settled Region*; and/or • AB Environment Recommended Guidelines for Minimum Environmental Reserve/Easement Widths (see Appendix D).		• Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies • Water Act
Consider, allowing the setback to be reduced where the Development Authority is provided with a biophysical and/or geotechnical assessment prepared by a qualified professional that verifies that a lesser setback is warranted. Where an environmental and geotechnical assessment indicates that a greater setback is warranted, enable the Development Authority to require a setback greater than normally required where determined by the assessment.		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies • Water Act
Enable the Development Authority to reduce or eliminate the minimum setback and the requirements for an environmental and geotechnical assessment where the Development Authority determines that: • The proposed development does not involve the clearing or vegetation or a ground disturbance or the proposed structure; or • The building is incidental to the operation of a utility service (i.e. a pump shack); and • The Development Authority is satisfied that there is no risk or adverse effect on development or the riparian area.		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies • Water Act
Insert new General Provisions Section: **Conservation of Riparian Features.** The following regulations are recommended for inclusion in this section of the LUB: • Require new development on sites with riparian features to be designed to avoid riparian features of high ecological value. • Require new development to include restoration of riparian areas to High intactness where the development site has been assessed as having low or very low riparian intactness.		**Shared - Municipal/Provincial** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies • Water Act

• When resource extraction development is proposed in a riparian area where impacts to the riparian features cannot be avoided require, as a condition of development approval, compliance with the restoration plan, to the satisfaction of the municipality, which will meet or exceed pre-development riparian function and intactness of the site.
• Prohibit the clearing or removal of trees from any land which lies within the minimum setback from the top of bank to a watercourse or water body, unless the Development Authority receives written confirmation from a qualified professional indicating:
  ○ that the removal is necessary to provide access to the watercourse or water body; and
  ○ the area where trees or vegetation may be removed will be revegetated or landscaped to prevent erosion, increased landslide susceptibility and increased runoff.
• Require, where established in an approved regional plan, municipal statutory plan or municipal policy, lot grading and drainage to be designed to comply with established conservation and restoration goals, objectives and targets.
• Require new development in areas with riparian features to be designed to ensure riparian intactness will be maintained or improved through the design of the proposed development.
• Require development permits for shoreline modifications on lands above and abutting the riparian areas of waterbodies, watercourses, wetlands, and other water bodies.		

Include the following regulations in the **Landscaping Provisions Section** of the LUB:
• Where established in an approved regional plan, municipal statutory plan or municipal policy, landscaping plans shall be designed to comply with established conservation and restoration goals, objectives and targets.
• Require landscaping plans in riparian areas to maintain existing trees and vegetation within the riparian area and identify a vegetative buffer adjacent to the riparian area.
• Require landscaping plans to incorporate (where possible) Low Impact Development (LID) design elements and recommendations from the Alberta Clean Runoff Action Guide 2020 including:
  ○ Grading of lots to drain and retain runoff to control and reduce surface water leaving the lot;
  ○ Inclusion of the following LID clean runoff landscaping strategies:
		**Municipal**
		• MGA
		• Matters Related to Subdivision and Development Regulation
		• Provincial Land Use Policies

▪ Within planting beds and natural areas, keep the areas rough, with dished areas for trapping water. ▪ Where possible, include a depression to intercept surface water (including snowmelt) before it leaves the site. ▪ Minimize turf areas on lakefront lots to decrease soil compaction and the proliferation of invasive weeds. ▪ Incorporate tools for capturing, treating, and using runoff into lot grading and landscaping. ▪ Incorporate deciduous native plant species and wildflowers into landscaping plans to encourage fire suppression, support biodiversity, and increase evapotranspiration.		
Include the following regulations in the **Stripping and Grading Section** of the LUB: • Require a development permit for stripping and grading, not associated with extensive agriculture, where the stripping and grading activities will impact the conveyance of surface water in or adjacent to a riparian area. • Where established in an approved regional plan, municipal statutory plan or municipal policy, stripping and grading plans shall be designed to comply with established conservation and restoration goals, objectives, and targets. • Prohibit stripping and grading activities of land that lies within the minimum setback from the top of the bank to a watercourse or water body, unless the Development Authority receives written confirmation from a qualified professional indicating: o that the removal is necessary to provide access to the watercourse or water body; and o the area where trees or vegetation may be removed will be revegetated or landscaped to prevent erosion, increased landslide susceptibility, and increased runoff. • Require adherence to an Erosion and Sediment Control Plan and the incorporation of Low Impact Development (LID) practices to prevent soil or debris from entering riparian areas, water bodies or watercourses on the site during or after construction, such as silt fences or traps;		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies

Include the following regulations in the **Lot Grading and Drainage Section** of the LUB: • Require a development permit for activities on a lot that will impact lot grading and drainage within and off of the lot. • Require new development to maintain predevelopment lot grading and drainage patterns off the site or, where available, adherence to the approved lot grading and drainage pattern identified within an approved stormwater management plan. • Where redevelopment is proposed within a riparian area (for example: lake lot or river lot) establish maximum lot coverage percentages for non-permeable surfaces including buildings, driveways, and hard landscaped areas to minimize runoff and establish minimum lot coverage for vegetation and trees. • Require the integration of 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.		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies
Insert a new General Provisions Section: **Development Within Flood Hazard Areas** The following regulations are recommended for inclusion in this section of the LUB: Development Within Flood Hazard Area Section of the LUB the following regulations in the Flood Hazard Section of the LUB: • The development of permanent buildings will not be allowed within a floodway. However, at the discretion of the Development Authority, the development of parks or parking lots that have been constructed with flood mitigation measures, to the satisfaction of the Development Authority, may be allowed. • Where the floodway, flood fringe and FCL have not been identified for a water body or watercourse, the development or placement of permanent buildings will be prohibited within the 1:100 year floodway of any lake, river, creek, watercourse, or water body.		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies
Where flood hazard area(s) have been delineated and the floodway, flood fringe and FCL have been defined, the LUB should identify a Flood Hazard Area (FHA) Overlay on the LUB map and the following additional regulations should be included in the Special Regulations section of the LUB: • The Overlay should apply to those lands identified on the Land Use Districts Maps. • Notwithstanding language to the contrary in the Bylaw, all uses in the FHA Overlay shall be discretionary.		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies

• When an application for a subdivision or a development permit within the FHA Overly is made the application must include the information in Application Requirements Section of this Bylaw. • The Development Authority shall not allow the development or placement of any permanent building, nor shall the Subdivision Authority allow the subdivision of lands for purposes other than agricultural operations, public utilities or public parks in areas identified as a floodway. • The Development Authority may allow development within the flood fringe area subject to being provided additional information including but not limited to a report prepared by a qualified professional which includes the information identified in the Application Requirements section of the Bylaw and subject to the development having been designed in accordance with all the recommendations in the report. • Where development may be allowed within the PFHA Overlay, the ground elevation of all living spaces, areas used for the storage of goods damageable by floodwaters, and private sewage disposal systems shall be located at or above the applicable flood construction level. The flood construction level for sites located between flood construction levels identified on the LUB maps shall be determined by the Development Authority, who shall: o Draw a straight line between the nearest portions of the two adjacent flood construction levels (one downstream and one upstream of the site); and o Determine the applicable flood construction level to the nearest tenth of a metre. • Within the Flood Fringe Area, the Development Authority shall not approve a development application that includes living spaces, areas used for the storage of goods damageable by floodwaters, and private sewage disposal systems unless: o all information identified in the application requirements section has been provided to the satisfaction of the Development Authority; and		

○ flood mitigation measures have been incorporated into the development's site design.		
Insert a new General Provisions Section: **Development within High Value Ecological Corridors. The following regulations are recommended for inclusion in this new section:** New development must comply with the following design mitigations to support biodiversity and protect high value ecological corridors: • Require new development to meet a 50% intactness target for ungulate habitat and carnivore habitat[12] where there are features are present within the development area. • Require high-human activity centres to locate outside or close to the corridor edge • Where corridor intactness can not be maintained, offset the loss of ecological corridor function through conservation opportunities, including securement/protection in other ecological corridors. • Limit recreational access in highly productive grizzly bear habitat. • Restrict road density below 0.6 km/km² in grizzly bear habitat. • Require new development within corridors to meet the following design requirements: ○ Maintain an unobstructed corridor width of >350 m and less than 30 degrees (average) slope. ○ Install a berm to block the corridor from the development. The berm should be planted with natural vegetation. ○ Use wildlife-friendly fencing to create a barrier between wildlife movement and human activity. • Require new development within corridors to meet the following design requirements: ○ Maintain an unobstructed corridor width of >350 m and less than 30 degrees (average) slope. ○ Install a berm to block the corridor from the development. The berm should be planted with natural vegetation.		**Municipal** • MGA • Provincial Land Use Polices

[12] 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.

○ Use wildlife-friendly fencing to create a barrier between wildlife movement and human activity. ○ Group linear disturbances together where possible to reduce the number of crossings. ○ Align the linear infrastructure so it runs perpendicular to the direction of the ecological corridor (avoid infrastructure that bisects the corridor) • Minimize the disturbance of native vegetation within ecological corridors to maintain hiding cover and forage. • Limit recreational access in highly productive grizzly bear habitat. • Identify and restrict road density below 0.6 km/km² in grizzly bear habitat.		

RECOMMENDED BMPS: DEVELOPMENT CONDITIONS

Recommendations in this subsection identify conditions of development permit approval to support riparian intactness. They are intended to assist municipalities in addressing challenges with monitoring and enforcement and to improve riparian intactness. Conditions include:

RECOMMENDATION:	BENEFITS	LEGAL RESPONSIBILITY/ JUSTIFICATION
Where riparian features are present, and where these plans were required and provided as part of the development permit application submission, include conditions of development approval requiring compliance with: • an Erosion and Sediment Control Plan, which conforms to municipal design standards; • a Lot Grading and Drainage Plan that conforms to municipal design standards; • a Stormwater Management Plan that conforms to municipal design standards; and • a Landscaping Plan which conforms to municipal design standards.		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies
Where a Development Agreement is required as a condition of development permit approval, the Development Agreement should be registered against the affected title(s) and should include provisions for detailed engineering and securities associated with the following elements of the development to conserve and/or enhance the riparian features: • Lot Grading and Drainage Plan; • Erosion and Sediment Control Plan' • Storm Water Management Plan; and/or • Landscaping Plan.		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies

Where flood hazard lands are present, and where these Flood Construction Levels (FCL) were required and provided on the site plan as part of the development permit application submission, include conditions of development approval requiring development to be located at or above the FCLs identified on the site plan.		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies
Where flood hazard lands are present, the decision should include a condition for compliance with all required flood mitigation measures.		**Municipal** • MGA • Matters Related to Subdivision and Development Regulation • Provincial Land Use Policies

APPENDIX A | REFERENCES

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APPENDIX B | RESOURCES

1. North Saskatchewan Watershed Alliance Resources:

Overview: The NSWA assessed the condition (i.e., "intactness") of approximately 17,300 km of riparian areas located in the North Saskatchewan River watershed through a detailed desktop study of riparian lands. Using these baseline datasets (i.e., intactness data and prioritization data), stakeholders can identify hotspot areas for priority action. Resources include:

- **The Riparian Web Portal** (www.riparian.info)
  The Riparian Web Portal was designed to support Albertans build healthier riparian areas by providing:
  - access to condition assessments
  - summary statistics for waterbodies
  - resources for conservation and restoration
- **North Saskatchewan River Watershed Riparian Conservation and Restoration Strategy** (2021)
  www.//efaidnbmnnnibpcajpcglclefindmkaj/https://www.nswa.ab.ca/public/download/files/243731
  Establishes management goals objectives, and identifies actions required to protect riparian areas in the North Saskatchewan River Watershed.

2. Alberta Geological Society - Relative Landslide Susceptibility Model of the Alberta Plains and Shield Regions

(https://ags.aer.ca/publications/all-publications/map-605)

Overview: The map and model predict the degree to which terrain can be affected by landslides based on a statistical procedure that establishes the relationship between the spatial distribution of past landslides, and predisposing geological, topographic, and climatic factors.

The model results portray the spatial distribution of landslide susceptibility as a relative ranking from low to high. It is intended to be used for educational purposes and regional-scale planning initiatives. Importantly, it does not evaluate the probability of landslide occurrence over any specific period of time, nor does it evaluate the magnitude or impact of any potential landslide activity.

A raster dataset is available for inclusion in municipal planning documents and in models. The raster dataset is a 90 m grid used for producing the Landslide Susceptibility Model of the Alberta Plains and Shield Regions, Alberta Geological Survey Map 605. It represents the degree to which terrain can be affected by landslides based on a statistical procedure that establishes the relationship between the spatial distribution of past landslides, and predisposing geological, topographic, and climatic factors.

3. Environmentally Significant Areas of Alberta (ESAs)

(https://www.arcgis.com/home/item.html?id=ee24f800bee94b6aa1634ad1f41c10dc)

Overview: Environmentally Significant Areas of Alberta are generally defined as areas that are important to maintaining long-term biodiversity, physical landscape features, and other natural processes that preserve ecosystem services. A raster dataset is available for inclusion in municipal planning documents and in models. See the *Environmentally Significant Areas Report* for additional information.

4. Municipal Engineering and Design Standards

Overview: Municipal Engineering and Design standards provide information and guidance to Developers, Engineering Consultants and Utility companies regarding the minimum standards for municipal infrastructure improvements and the design, preparation of plans, specifications, and construction standards relating to applications for areas structure plan, LUB amendments, subdivisions and in some cases, development permits. The information required in the supporting studies, assessment, and reports enables the municipality to assess site suitability, impacts from development on environmental features, including riparian areas, and assess impacts on municipal infrastructure. Examples of studies, assessments and reports to be included:

- Geotechnical Report
- Slope Stability Evaluation
- Hydrogeological Report
- Technical Stormwater Analysis Requirements (Stormwater Management Plan)
- Construction Management Plan
- Environmental Assessment
- Biophysical Impact Assessment
- Phase I and Phase II Environmental Assessment

These standards, once implemented, should be regarded as the “minimum” allowable information that must be included in any required study, report, or assessment. Two examples are listed below for additional information.

- **Parkland County Engineering and Design Standards** (https://www.parklandcounty.com/en/business-and-development/resources/Documents/Engineering-Design-Standards.pdf)
- **Rocky View County Servicing Standards (2025)**. (https://www.rockyview.ca/Portals/0/Files/BuildingPlanning/Standards/Servicing-Standards.pdf)

APPENDIX C | BIOPHYSICAL ASSESSMENT REQUIREMENTS GUIDE

During the Area Concept Plan, Area Structure Plan, and/or subdivision application process, each property will require a Biophysical Assessment to identify potential Conservation Reserve, Conservation Easement, Environmental Reserve, Environmental Reserve Easement, and Municipal Reserve. The Biophysical Assessment must be completed by a qualified professional in the environmental field. In order for the municipality to accurately assess the Biophysical Assessment, the report should include the following:

1. **INTRODUCTION**
    a. Scope (subject property location)
    b. Development Project Description (proposed development as per the current Municipal Development Plan)
    c. Objectives
2. **DISCUSSION**
    a. Study Area
    b. Location (in context of surrounding landscape)
        i. Climate (average precipitation, seasonal temperatures)
        ii. Physiographic Description (in context of Natural Regions and Subregions
        iii. of Alberta)
    c. Approach and Assessment Methods (information review, field surveys, inventories)
    d. Applicability of Federal, Provincial and Municipal Legislation
3. **ASSESSMENT RESULTS**
    a. Historical Air Photos (dating back to 1950, focus on surface water, wetlands, land use changes)
    b. Field Reconnaissance, Sampling and Surveys (landscape characteristics, species lists, plant community mapping)
    c. Topography (landform classification)
    d. Geology (surficial geology classification)
    e. Soil (soil classification)
    f. Riparian area Identification and Intactness
    g. Hydrology
        i. Surface water (ephemeral and permanent drainage patterns)
        ii. Groundwater (potential for groundwater recharge)
    h. Wetlands (wetland classification)
        i. Wetland delineation (vegetation community classification, species list, exotic species)
        ii. Wetland classification
    i. Uplands (vegetation community classification, species list, exotic species)
        i. Tree conservation at single tree and/or tree stand scale (resource evaluation, conservation suitability)

j. Wildlife (species list of direct and indirect observations)
    i. Birds
    ii. Fish
    iii. Herptiles (reptiles and amphibians)
    iv. Invertebrates
    v. Mammals
    vi. Rare, threatened and endangered species (as per Alberta Natural Heritage Information Centre, Alberta's Biodiversity Species Observation Database and/or Committee on the Status of Endangered Wildlife in Canada)
    vii. Ungulate and carnivore corridors

4. CONSERVATION RECOMMENDATIONS

a. Environmental Reserve/Environmental Reserve Easement (boundaries of recommended Environmental Reserve and Environmental Reserve Easement lands)
b. Municipal Reserve (potential upland habitats for ecological/pedestrian connectivity)
c. Conservation Reserve/Conservation Easement (potential upland habitats for ecological connectivity and conservation)
d. Development setback buffers
e. Design mitigations to support corridor intactness

APPENDIX D | RECOMMENDED ENVIRONMENTAL RESERVE GUIDELINES

Sustainable Resource Development Recommended Guidelines for Minimum Environmental Reserve/Easement Widths

In reference to Section 664 of the *Municipal Government Act*, the following are recommended where a boundary to a proposed subdivision is a water body or watercourse.

Table 1. Standard recommended minimum widths for Environmental Reserves or Environmental Reserve Easements based on type of water feature.

Water Feature	Minimum ER Width[2]	Notes
Reservoirs & Regulated Lakes	30 m from right of way or easement boundary	A regulated lake is a lake where water levels are established to a predetermined elevation and actively managed through use of a licensing requirement (e.g. to pump water into the water body).
Lake (natural & controlled)	30 m from natural boundary	On controlled lakes, 30 m from sill elevation of licensed control structure.
Swamp/wetland[1]	Variable, include wet meadow zone	Wet meadow zone can be extensive in some situations, and in these instances the ER should be wide enough to preserve ecological function.
Large River (≥ 15m width)	30+ m	See additional requirements for hazardous lands.
Small River/Large Steam (6-15 m)	15 m	See additional requirements for hazardous lands.
Medium Stream (3 - 6 m)	10 m	See additional requirements for hazardous lands.
Small Stream (≤ 3 m)	6 m	See additional requirements for hazardous lands.
Ephemeral watercourse (no defined channel)	0 m	Use bylaw to regulate tree cutting within a defined distance from feature to maintain riparian vegetation and drainage.
Braided Stream	10 m from outside boundary of active floodway	

[1] Sustainable Resource Development views the term "swamp" to mean any area with hydrological conditions of sufficient duration to have developed saturated soils and hydrophytic vegetation (i.e. wetlands or peatlands).
[2] In addition to the recommended ER width for the water feature itself, associated landscape features may require the ER width to be modified to factor in additional inherent hazards to development.

For lands described in section 664(1)(b) of the *Municipal Government Act* (unsuitable for development because they are subject to flooding, have high risk of erosion, or have existing topographical or geo-technical constraints) the following are recommended.

Table 2. Additional factors that may necessitate an increase in the width of an Environmental Reserve or Environmental Reserve Easement.

Hazardous Lands	ER Modifier	Notes
Floodplain	• The width of the 1:100 year flood line or 30m from the natural boundary of a watercourse or lake, whichever is less. • The width of meander belt for watercourses that tend to meander or entire floodplain if it is highly constrained within a confined valley.	• Residential development within a floodplain is discouraged. • Development within flood fringe area should only be considered if flood proofing undertaken to reduce risk of flood damage. Flood risk mapping or delineation of the 1:100 year flood line generally defines the extent of expected flood occurrence (see Alberta Environment policy and guidelines). • The width of a meander belt is determined by multiplying bankfull width by 20 for each reach, and is split equally on either side of creek along axis of meander belt.
Erosion prone areas	Provide for a toe erosion allowance.	Consider highly erosive soils and annual recession rates.
Gully, ravine, coulee, or valley escarpments	Provide for a stable slope allowance. Apply construction and building setbacks from this line.	Boundary of stable slope allowance measured from top of crest of plateau (terrace), valley slope or tableland.
Steep Slopes (>15%)	3X escarpment height or as recommended by a geotechnical report on slope stability, rate of erosion, etc.	