Planning Tools for the Sturgeon River Watershed

Submitted to:

NSWA
NORTH SASKATCHEWAN WATERSHED ALLIANCE

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EXECUTIVE SUMMARY

Purpose

The North Saskatchewan Watershed Alliance (NSWA) has retained ParioPlan Inc. to update the *2014 Planning Tools for Protecting the Sturgeon River Watershed Report.* The report focuses on planning tools for the participating municipalities that have formed the Sturgeon River Watershed Alliance (SRWA). The SRWA consists of nine participating municipalities (Parkland County, Lac St. Anne County, Sturgeon County, City of Spruce Grove, City of St. Albert, City of Edmonton, Town of Onoway, Town of Stony Plain, Town of Bon Accord, Town of Gibbons, and Town of Morinville) that have formed a voluntary partnership group to protect the Sturgeon River Watershed (SRW) (**Section 1.0 and 2.0**).

This updated report is an opportunity to encourage more consistent and effective watershed protection and advance more consistent land use planning throughout the watershed. It will provide elected officials, policy-makers and the public with a snapshot of current policies and equip them with planning tools that can be applied for the protection of the SRW at multiple stages in the planning process. The intention of this report is to introduce and guide a watershed planning approach to municipal planning. It is an opportunity for the SRWA to become an example of balanced land use and environmental planning and lead the way for land use planning through a watershed lens within the Province of Alberta (**Section 1.0 and 2.0**).

Scope

The agreed upon scope of the updated Report includes:

1. A review of the current provincial legislative framework that set the parameters of municipal watershed policies;
2. A review of the watershed policies and regulations of each participating municipality focusing on the two main municipal documents: Municipal Development Plans (MDP) and Land Use Bylaws (LUB);
3. Stakeholder interviews from each of the municipalities to determine individual municipality watershed management issues and opportunities along with their suggestions and recommendations for policy alignment;
4. A toolkit of implementation strategies for Councils and Administration; and
5. A brief review of watershed management at provincial, regional, and local level of two watersheds that have similar characteristics to the SRW in terms of land uses and urban and rural areas (**Section 1.0**).

Legislative Framework

The existing federal and provincial legislation provides municipalities with the flexibility to regulate land use planning in a way that meets their individual needs and capacities. Through the *Municipal Government Act*, subject to provincial and federal legislation, municipalities have the power to regulate land adjacent to waterbodies, protect and/or acquire environmentally sensitive areas, as well as manage waterbodies within their jurisdiction. The creation of the provincial *North Saskatchewan Regional Plan* is underway and will provide further legislative support for land use planning through a watershed lens. The use of

Intermunicipal Development Plans can provide an opportunity to managed shared environmental resources. Ultimately, the implementation of watershed management rests within the statutory and non-statutory documents of individual municipalities (**Section 3.0**).

Project Review Checklist and Approach

The Project Team developed a policy review checklist in consultation with the NSWA and reviewed existing planning and policy tools used by the participating municipalities. It reviewed:

- the mapping of flood areas
- the management of wetlands and riparian areas
- the setback and buffer requirements
- techniques for stormwater
- wastewater
- groundwater management
- environmental monitoring and reporting methods, and,
- the development process within the participating municipalities (**Section 4.0**).

Point persons from each participating municipality were interviewed to discuss local issues and opportunities along with examples of effective local watershed planning techniques that have been applied and that could be used in other municipalities as well. All the feedback was used to develop a "Toolkit" that includes policy suggestions that municipalities can pick and choose from to incorporate in their own statutory and non-statutory documents (**Section 5.0**).

Implementation Strategies Toolkit

The Toolkit recognizes that participating municipalities have varying levels of environmental, human, and financial resources. Therefore, it provides tools to determine collective, measurable watershed management goals and targets that can be incorporated into Intermunicipal Development Plans, which can then then be adopted by participating municipalities. It also provides tools that municipalities can choose to incorporate within their respective Municipal Development Plans, Area Structure Plans, and Land Use Bylaws to reach those collective targets (**Section 5.0**).

1.0 INTRODUCTION

1.1 Purpose

The North Saskatchewan Watershed Alliance (NSWA) has retained ParioPlan Inc. to update the *2014 Planning Tools for Protecting the Sturgeon River Watershed Report* by reviewing the existing watershed municipal regulatory tools and recommending opportunities for policy alignment to better protect and enhance the Sturgeon River Watershed (SRW). Participating municipalities (Parkland County, Lac St. Anne County, Sturgeon County, City of Spruce Grove, City of St. Albert, City of Edmonton, Town of Onoway, Town of Stony Plain, Town of Bon Accord, Town of Gibbons, and Town of Morinville) sharing the SRW have formed the Sturgeon River Watershed Alliance (SRWA) recognizing their collective responsibility in protecting and enhancing a shared resource.

This updated report is an opportunity to encourage more effective watershed protection and advance more consistent land use planning throughout the sub-watershed. It will provide elected officials, policy-makers and the public with a snapshot of current policies and equip them with planning tools that can be applied for the protection of the Sturgeon River Watershed at multiple stages in the planning process.

This report encourages best practice policy tools and collective action to protect and enhance the watershed to the mutual benefit of every participating community. Included in this review is a description of relevant legislation at all three orders of government, a summary and analysis of existing watershed protection policies from the municipalities in the Sturgeon River Watershed, case studies for watershed protection, and recommendations to enhance plans and policies for these municipalities. The intent of this report is to introduce a watershed planning approach to municipal planning. It is an opportunity for the SRWA to become an example of balanced land use and environmental planning and lead the way for land use planning through a watershed lens within the Province of Alberta.

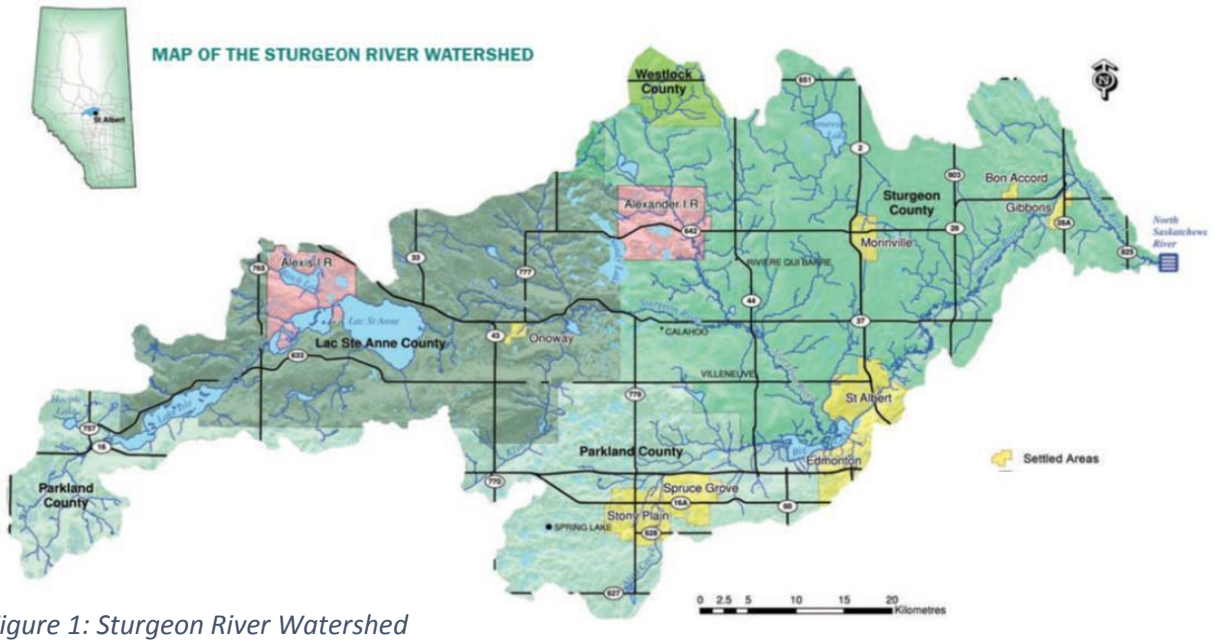

Figure 1: Sturgeon River Watershed
Source: North Saskatchewan Watershed Alliance

1.2 Scope

The agreed upon scope of the updated Report includes:

1. A review of the current provincial legislative framework that set the parameters of municipal watershed policies.
2. A review of the watershed policies and regulations of each participating municipality focusing on the two main municipal documents: Municipal Development Plans (MDP) and Land Use Bylaws (LUB).
3. Point persons interviews from each of the municipalities to determine individual municipality watershed management issues and opportunities along with their suggestions and recommendations for policy alignment.
4. A toolkit of implementation strategies for Councils and Administration.
5. A brief review of watershed management at provincial, regional, and local level of two watersheds in other provinces: the Humber River Watershed in Ontario and the Kettle River Watershed in British Columbia.

1.3 Approach

The approach includes eight tasks over which included the following:

Task 1: Project Initiation and drafting of a Project Backgrounder

Task 2: An analysis of current provincial legislation and regional policy that set the parameters of municipal watershed management. This included:

- The Municipal Government Act
- Alberta Land Use Framework
- Alberta Wetland Policy
- Edmonton Metropolitan Region Board Growth Plan
- Stepping Back from the Water: A Beneficial Management Practices Guide for New Development near Water Bodies in Alberta's Settled Region

Task 3: A review of the watershed management policies and regulations of each of the participating municipalities focusing on the two main municipal documents, Municipal Development Plans (MDP) and Land Use Bylaws (LUB) of the following participating municipalities:

- Parkland County
- Lac St. Anne County
- Sturgeon County
- City of Spruce Grove
- City of St. Albert
- City of Edmonton
- Town of Onoway
- Town of Stony Plain
- Town of Bon Accord
- Town of Gibbons
- Town of Morinville

Task 4: Key findings from Task 3 were shared with point persons from each of the municipalities who were then interviewed to determine individual municipality watershed management issues and opportunities along with their suggestions and recommendations for policy alignment.

Task 5: Research of watershed management at provincial, regional, and local level of two watersheds in other provinces: the Humber River Watershed in Ontario and the Kettle River Watershed in British Columbia.

Task 6: Discussion with Alberta Environment and Parks for the purpose of:

- ascertaining information on provincial programs for flood mapping and prevention;
- field surveying and testing on private property;
- timeline for the creation of the North Saskatchewan Regional Plan (NSRP); and
- the opportunity for the NSWA to provide input into the formulation of the NSRP.

Task 7: Stemming from the policy review and research, and interviews, key findings were established along with preliminary recommendations.

Task 8: All findings, comments, and preliminary recommendations were shared with the NSWA and SRWA Technical Advisory Committee (TAC). Over the following nine-week period, TAC reviewed and commented on the policy review. The policy review was also shared with key municipal staff to confirm the comments were correctly incorporated in the Report. All comments received were shared with the Project Team at the end of the circulation period.

Task 9: Incorporating feedback from Task 8, the Project Team prepared and developed the Final Report of the *Planning Tools for the Sturgeon River Watershed*.

1.4 Report Organization

An outline of the Report is provided below.

Section 1.0 INTRODUCTION

This section provides an overview of the purpose, scope, approach, and use of this Report.

Section 2.0 STURGEON RIVER WATERSHED

This section provides a snapshot of the state of SRW and SRWA that informed the studies review approach.

Section 3.0 LEGISLATIVE FRAMEWORK

This section provides a summary of federal and provincial policies and governing bodies that deal with the various aspects of watershed health and management. It also explains where watershed management planning fits within the Alberta Legislative Framework and provides context for municipal planning and development with respect to watersheds.

Section 4.0 LOCAL WATERSHED MANAGEMENT PLANNING TOOLS REVIEW PROCESS

This section provides a rationale and examples for the checklist that was developed and used to review Municipal Development Plans and Land Use Bylaws of the participating municipalities of the Sturgeon River Watershed Alliance.

Section 5.0 IMPLEMENTATION STRATEGIES TOOLKIT

This section provides a summary of strategies for watershed protection and outlines goals and objectives for inter-municipal collaboration for consistent management practices applicable to the Sturgeon River Watershed.

Section 6.0 GLOSSARY OF TERMS

This section provides definitions of select terms used within the Report.

Section 7.0 REFERENCES

This section provides the sources of data used during the preparation of this Report.

Appendices

Appendix 1 Stakeholder Consultation: What We Heard

This appendix contains explains the stakeholder consultation process throughout the project and a summary of feedback. That is, feedback from NSWA Administration, TAC members. Circulation feedback, and key municipal staff.

Appendix 2 City of St. Albert Environmental Master Plan Goals and Targets

This appendix contains a local example of measurable environmental (watershed management) goals and targets.

Appendix 3 Watershed Policy and Regulation Review of Participating Municipalities

This appendix contains a summary of the review of the policy and regulation in the Municipal Development Plans and Land Use Bylaws of the participating municipalities based on the eight aspects explained in section 4.0.

Appendix 4 Case Studies: Inter-Jurisdictional Review of Watershed Management

This appendix contains examples of monitoring processes and their application during the development process at a provincial, regional, and local level.

2.0 STURGEON RIVER WATERSHED

2.1 State of the Sturgeon River Watershed

Land that drains and feeds into a shared body of water such as a river, stream, lake, pond, ocean or groundwater source constitutes a watershed. Within this system, there are many smaller sub-watersheds that feed into a main watershed. The Sturgeon River is a sub-watershed which is part of the greater, North Saskatchewan River Watershed. The following table summarizes the key statistics for the Sturgeon River Watershed.

Table 1: Sturgeon River Watershed Summary

River Origin	Hoople Lake		
Drainage Basin	~ 3,301 sq. km.		
Length of River	~ 260 km.		
Predominant Land Uses	71% Agriculture; 20% Natural Features; 5% Water; 4% Developed		
Municipalities		**2016 Population**	**Type**
	City of St. Albert	65,589	Urban
	City of Spruce Grove	34,066	Urban
	City of Edmonton	932,550	Urban
	Parkland County	32,097	Rural
	Sturgeon County	20,495	Rural
	Lac Ste. Anne County	10,899	Rural
	Town of Stony Plain	17,189	Urban
	Town of Gibbons	3,159	Urban
	Town of Onoway	1,029	Urban
	Town of Morinville	9,848	Urban
Key Features	• Prairie or 'brown water' river • Flows dependent on snow and rain events within basin • Base flows linked to groundwater • A highly developed watershed with strong influences from agriculture and urban environments		

In 2012, the City of St. Albert produced a *State of the Watershed Report* that addressed current conditions of the Sturgeon River Watershed and identified goals for the future. The report aimed to better understand the health of the watershed in a way that ensures Albertans have access to safe, secure drinking water supplies; healthy aquatic ecosystems; and, reliable, quality water supplies for a sustainable economy (NSWA, 2005?).[i] The report indicated that in the Sturgeon River Watershed:

- Peak flows of water are experienced in spring while lower flows are experienced during summer and fall;
- Major pressures on water supply occur due to population growth and agriculture;

- There was a lack of sufficient information for certain key factors of the Sturgeon River Watershed, namely: riparian health, aquatic macrophytes, benthic invertebrates, surface water quality index, wetland inventory, fish populations;
- Primary pollutants of concern that affect water quality in the Sturgeon River sub-watershed were nutrients, bacteria, pesticides, nitrogen and phosphorus, all of which exceeded scientific guidelines at the majority of sampling locations, as reviewed by the study;
- Only 20% of the Sturgeon River Watershed was left in its natural state which could impact water quantity and quality because vegetation such as trees, shrubs, grasses and forests help absorb and hold water, prevent soil erosion and filter out harmful nutrients, before water reaches the watershed.

The report concluded with an overall grade of FAIR for the Sturgeon River Watershed. Out of the 15 indicators, the SRW ranked highest in water quantity indicators and lowest in biological indicators. However, four of the indicators had insufficient data.

Table 2: Summary of Assessed Health Ratings for Selected Indicators of the Sturgeon River Watershed

Indicator Category	Indicator	Assessed Health Rating
Land Use Indicators	Land Use Inventory	Fair
	Linear Developments	Fair
	Livestock Density	Fair
	Riparian Health	(Insufficient Data)
	Wetland Inventory	Fair (with uncertainty)
Water Quantity Indicators	Water Allocations by Sector	Good
	Groundwater Diversions	Fair
Water Quantity Indicators	Surface Water Quality Index	(Insufficient Data)
	Nitrogen and Phosphorus	Poor
	Pesticides	Good
	E.coli	Good
Biological Indicators	Vegetative Types	Poor
	Aquatic Macrophytes	(Insufficient Data)
	Fish	Poor (with uncertainty)
	Benthic Invertebrates	(Insufficient Data)
Overall Grade		**Fair**

Source: Sturgeon River, State of the Watershed Report, 2012

The study further identified some issues with current management practices, and recommended goals for future management practices and planning initiatives such as:

- reducing urban sprawl;
- preventing loss of natural areas such as wetlands and riparian areas;
- reducing pollutants such as pesticides and road salts;
- promoting watershed education and outreach programs;

- harmonizing intermunicipal planning;
- encouraging research to increase data required to monitor and evaluate the SRW;
- promoting sustainable urban development;
- identifying and prioritizing environmentally sensitive areas; and
- undertaking a drained wetland inventory. [ii]

Watershed and sub-watershed systems are naturally resilient as they continually adapt to the pressures of human-induced and environmental change, however, *"a limit exists to the magnitude of human-induced changes that a healthy watershed can withstand"* (North Saskatchewan Watershed Alliance, 2008). Best practices for watershed management and planning can and should be used to mitigate the impacts of anthropogenic forces on the environment, and specifically to the Sturgeon River Watershed.

2.2 Sturgeon River Watershed Alliance (SRWA)

The Government of Alberta initiated the *Water for Life: Alberta's Strategy for Sustainability* process in 2001 to address increasing pressure on existing water resources. Since that time additional key action items were identified resulting in the 2009 *Water for Life Action Plan*. It provides a framework that reflects changing priorities and objectives including watershed management. The objective is to preserve and enhance the province's rivers, streams, lakes, aquifers and wetlands. Under the *Water for Life Strategy*, the Province of Alberta has approved the creation of 11 Watershed Planning and Advisory Councils (WPACS), groups intended to advise governments and agencies on land and resource management. One of these groups is the North Saskatchewan Watershed Alliance (NSWA). The North Saskatchewan River Watershed contains 12 sub-watersheds, one of which is the Sturgeon River Watershed.

Several municipalities in the Sturgeon River Watershed have formed the Sturgeon River Watershed Alliance (SRWA), a voluntary partnership intended to oversee the development of a management plan for the watershed. The member municipalities of the SRWA include:

- Parkland County
- Lac St. Anne County
- Sturgeon County
- City of Spruce Grove
- City of St. Albert
- City of Edmonton
- Town of Onoway
- Town of Stony Plain
- Town of Bon Accord
- Town of Gibbons
- Town of Morinville

3.0 LEGISLATIVE FRAMEWORK

3.1 Distribution of Powers

Federal jurisdiction over environmental matters includes federal lands, trade and commerce, taxation, navigation and shipping, seacoast and inland fisheries, migratory birds and their habitat, inter-provincial waters, toxic substances, treaties and matters not specifically designated to the provinces (Environmental Law Centre, 2003)[iii]. Provincial jurisdiction over environmental matters delegated to the province under the *Constitution Act, 1867* include natural resource management, provincial public lands, timber and wood management and sales, and provincial property and civil rights (Environmental Law Centre, 2003). As such, this project focuses largely on provincial jurisdiction. In addition, items the provincial courts have interpreted and regulated over the years include activities related to the beds and shores of all naturally occurring, permanent wetlands, wildlife on private or public land, and conservation and management of non-renewable natural resources and forestry resources in the province (Environmental Law Centre, 2003).

The breakdown of federal and provincial jurisdiction that guide regulation for the protection and health of watersheds is shown below.

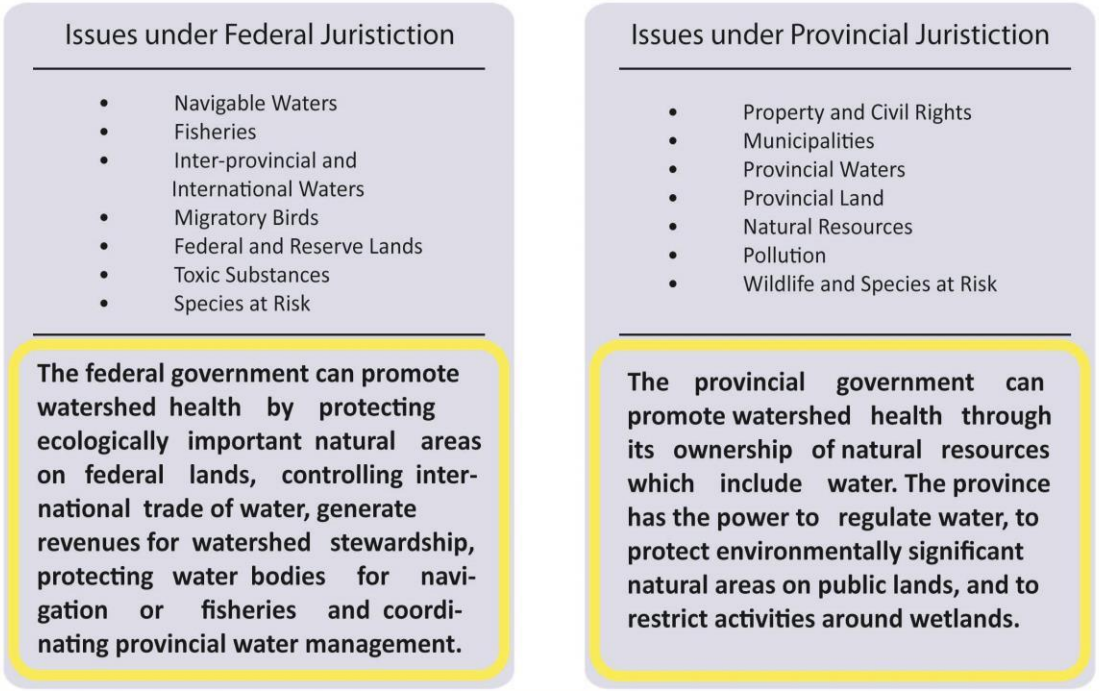

Figure 2: Federal and Provincial Jurisdiction Important to Watershed Health
Source: North Saskatchewan Watershed Alliance (2008), Municipal Guide: Planning for a Healthy and Sustainable North Saskatchewan River Watershed

Table 3: Federal and Provincial Legislation Protecting and Managing Watersheds

Level	Legislation/Policy	Regulatory Authority	Description in Relation to Watershed Health
FEDERAL	Canada Water Act	Environment Canada	Provides a framework for provincial and territorial cooperation in the conservation, development and utilization of Canada's water resources.
	Canadian Environmental Protection Act	Environment Canada	Contributes to sustainable development through pollution prevention and to protect the environment, human life and health from risks associated with toxic substances.
	Canadian Environmental Assessment Act	Environment Canada	Aims to ensure proposed projects do not cause significant adverse environmental effects through the environmental assessment process.
	Canada National Parks Act	Parks Canada	Regulates the protection of natural areas of national significance by designating national parks and reserves.
	Canada Wildlife Act	Environment Canada	Allows for the creation, management and protection of wildlife areas for research or for conservation or interpretation of wildlife. Its aim is to preserve habitats that are critical to migratory birds and other wildlife, particularly those at risk.
	Migratory Birds Convention Act	Environment Canada	Prohibits harming or killing of listed species at risk, aquatic species and migratory birds or their habitats. This Act requires consideration for activities within proximity to riparian areas that may disturb migratory birds or their nests.
	Species at Risk Act	Environment Canada	Assesses the conservation status of wildlife species that may be at risk of extinction in Canada.
	Fisheries Act	Fisheries and Oceans Canada	Regulates and enforces on harmful alteration, disruption and destruction of fish habitat in Section 35.
	Navigable Waters Protection Act	Transport Canada	Governs the construction of any structures on the bed and shores of navigable waterways within Canada.
PROVINCIAL	Environmental Protection & Enhancement Act	Alberta Environment and Parks	Management of contaminated sites, storage tanks, landfill management practices, hazardous waste management practices and enforcement.
	Alberta Land Stewardship Act	Alberta Environment and Parks	Supports implementation of the Land-Use Framework. It creates the seven land-use regions, establishes the Land-use Secretariat and gives authority for regional plans, creation of Regional Advisory Councils and addresses the cumulative effects of human and other activity.
	Agricultural Operations Practices Act	Natural Resources Conservation Board	Regulates and enforces on confined feedlot operation and environment standards for livestock operations.
	Historical Resources Act	Alberta Culture and Tourism	Concerns any work of nature or of humans that is primarily of value for its paleontological, prehistoric, historic, cultural, natural, scientific or esthetic interest including a natural site. Work may be buried or partially buried in land or submerged beneath the surface of any watercourse or permanent body of water.

Municipal Government Act	Alberta Municipal Affairs	Provides municipalities with authorities to regulate water on municipal lands, management of private land to control non-point sources, and authority to ensure that land use practices are compatible with the protection of aquatic environment.
Public Health Act	Alberta Health	Protects public health including issues related to protection of potable water supplies.
Public Lands Act	Alberta Environment and Parks	Regulates and enforces on activities that affect Crown-owned beds and shores of water bodies and some Crown-owned uplands that may affect nearby water bodies.
Safety Codes Act	Alberta Municipal Affairs	Regulates and enforces septic system management practices, including installation of septic field and other subsurface disposal systems.
Natural Resource Conservation Board Act	Natural Resources Conservation Board	Provides a framework for an impartial review process of projects that may affect the natural resources of Alberta, including water management projects.
Regional Health Authorities Act	Alberta Health	Has the mandate to promote and protect the health of the population in the region and may respond to concerns that may adversely affect surface and groundwater.
Wildlife Act (Alberta)	Alberta Environment and Parks	Regulates and enforces on protection of wetland-dependent and wetland-associated wildlife, and endangered species (including plants).
Fisheries Act (Alberta)	Alberta Environment and Parks	Mechanism to enter into agreements with the federal government regarding licensing of the use of fish for different purposes and the culture, use and marketing of fish for commercial purposes within the province.
Water Act	Alberta Environment and Parks	This Act is meant to ensure support and promotion of the conservation and management of water, including the wise allocation and use of water to sustain the environment and quality of life in the present and the future. This Act regulates all developments and activities that might affect streams, rivers, lakes, wetlands and aquifers.
Forests Act	Alberta Environment and Parks	Deals with allocation of Crown timber on public land. Forest Management Agreements administered under this Act may provide framework for watershed protection.
Provincial Parks Act	Alberta Parks	Used to minimize the harmful effects of land use activities on water quality and aquatic resources in and adjacent to parks and other protected areas.
Wilderness Areas, Ecological Reserve and Natural Areas Act	Alberta Environment and Parks	Used to minimize the harmful effects of land use activities on water quality and aquatic resources in and adjacent to parks and other protected areas.

Source: Sturgeon County (2012), Riparian Setback Matrix Model; North Saskatchewan Watershed Alliance (2008), Municipal Guide: Planning for a Healthy and Sustainable North Saskatchewan River Watershed; and Government of Alberta (2012), Stepping Back from the Water: A Beneficial Management Practices Guide for New Development Near Water Bodies in Alberta's Settled Region.

The hierarchy of planning processes and regulations in Alberta between provincial, regional, municipal and local organizations is illustrated in Figure 3 below.

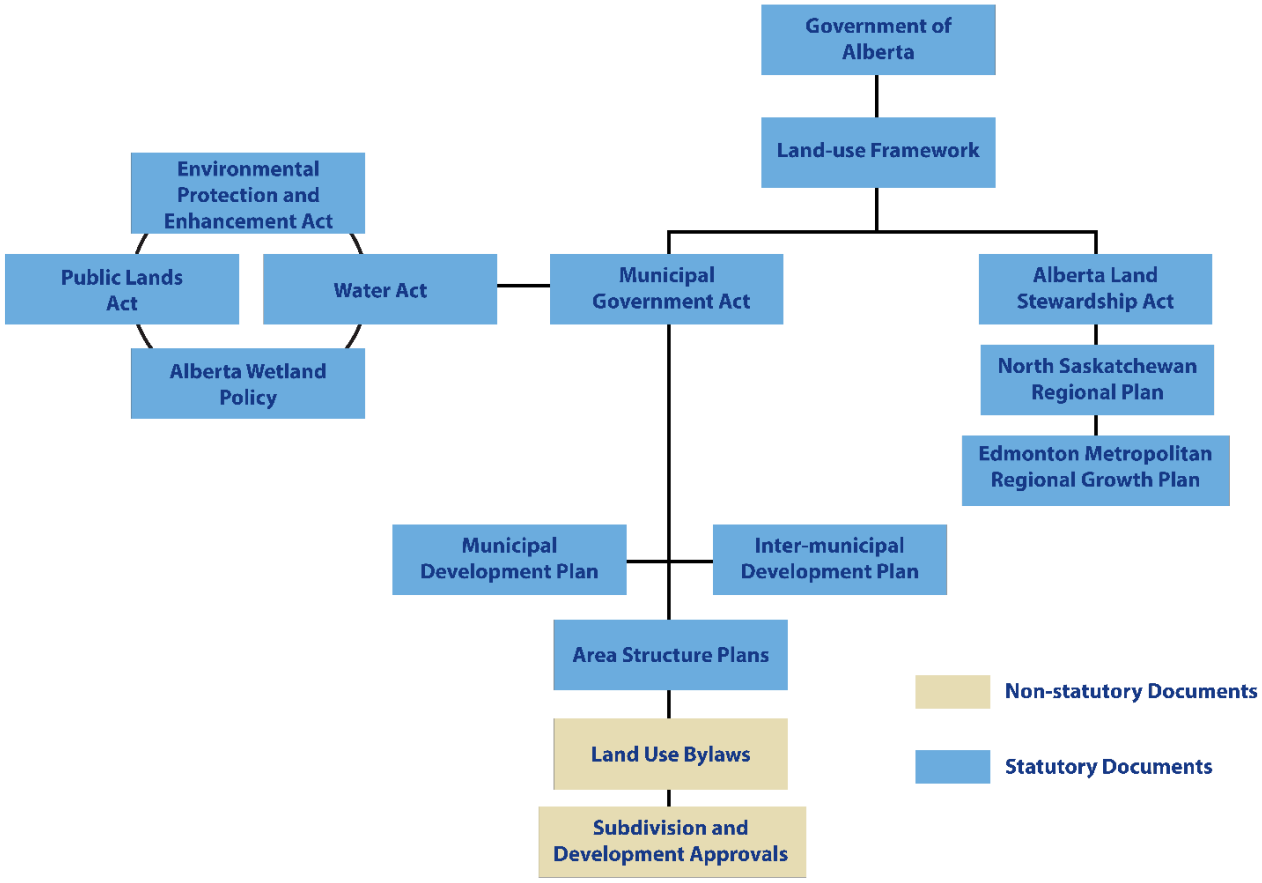

Figure 3: Alberta Planning Hierarchy

3.2 Provincial Legislation

The Province of Alberta has several pieces of legislation to regulate land use planning in Alberta. This section focuses on the *Land-use Framework* (LUF), *Alberta Land Stewardship Act* (ALSA), and the *Municipal Government Act* (MGA), as it is the main document that gives municipalities the authority to govern, as well as establishes limits to these powers. The *Alberta Wetland Policy* was also reviewed in the preparation of this report. Although implementation of the *Wetland Policy* is in its infancy, it is the first document within Alberta at the provincial level to regulate a specific component of the watershed province-wide. The provincial legislation establishes the general planning context and authority for municipalities. Within this planning hierarchy, the plans, bylaws, and approvals that are lower in the hierarchy cannot contradict plans that are situated higher.

3.2.1 Alberta Land Use Framework

In 2008, the Government of Alberta adopted a Land-Use Framework (LUF) as a blue-print for managing public and private lands and natural resources while balancing growth pressures. The LUF sets out an

approach to manage public and private lands and natural resources to achieve long-term economic, environmental, and social goals.

The LUF sets out seven strategies to improve land-use decisions in Alberta:

- *Develop seven regional land-use plans based on seven new land-use regions;*
- *Create a Land Use Secretariat and established a Regional Advisory Council for each region;*
- *Cumulative effects management will be used at the regional level to manage the impacts of development on land, water and air;*
- *Develop a strategy for conservation and stewardship on private and public lands;*
- *Promote efficient use of land to reduce the footprint of human activities on Alberta's landscape;*
- *Establish an information, monitoring and knowledge system to contribute to continuous improvement of land-use planning and decision-making;*
- *Inclusion of aboriginal peoples in land-use planning."*

3.2.2 Alberta Land Stewardship Act

The Alberta Land Stewardship Act (ALSA) became law in October 2009. This is the supporting regulation for the implementation of the regional plans under the LUF. The legislation directs the integration of provincial policies at the regional planning level and signifies a change in the land use planning and decision-making process in Alberta.

The key implementation tool for the Land-Use Framework are seven (7) regional plans, of which two have been adopted by the province – the *Lower Athabasca Regional Plan* in 2012 – and the *South Saskatchewan Regional Plan* 2014. Pursuant to **Section 13.2** of the ALSA, Regional Plans once approved, become regulations.

The Sturgeon River Watershed basin is within the third largest region that falls under the *North Saskatchewan Regional Plan.* The overarching desired outcome of the NSRP is to "[manage watersheds] to support healthy ecosystems and human needs through shared stewardship." In 2014, the Cabinet appointed a Regional Advisory Council (RAC) that provided 69 recommendations in their North Saskatchewan Regional Advisory Council Recommendations Report. As of October 2018, Alberta Environment and Parks was in Phase 2 of developing the plan where they were distilling the information from the province-wide online survey that aimed to collect feedback on the recommendations provided by the Regional Advisory Committee (RAC). The survey generated considerable interest in and will provide input into the development of the North Saskatchewan Regional Plan and the Province is currently reviewing the results received from stakeholders both within the region and from across Alberta. Now that public consultation for the RAC recommendations has been completed, Stage 3: Completing the Plan will be initiated where the recommendations along with feedback from on-going stakeholder consultation will be used to complete the Draft Plan.

The Draft Plan will be presented to the public for input however, at the time of this Report, a timeline has not been made public. The SRWA and the NSWA should monitor the progress and provide recommendations from this Report as input on the Draft Plan. The majority of the lands within the Sturgeon River Watershed will fall under the NSRP.

**During this Project, Project Team members contacted AEP to determine specific opportunities for the NSWA to provide input into the development of the Regional Plan. As such, the NSWA (along with the contact information of key personnel) is now on the distribution list and will be contacted by AEP to review the results from the survey and provide input. A timeline was not provided.*

3.2.3 Municipal Government Act

Through the recently updated *Municipal Government Act* [iv] the Province of Alberta has delegated land use regulations and environmental considerations to all municipalities in Alberta. The MGA delegates the authority to municipalities to control development within their boundaries. As stated in **Section 1(3)**, the purpose of the municipality is:

> *a) to provide good government,*
> *(a.1) to foster the well-being of the environment,*
> *b) to provide services, facilities or other things that, in the opinion of council, are necessary or desirable for all or part of the municipality,*
> *c) to develop and maintain safe and viable communities, and*
> *d) to work collaboratively with neighbouring municipalities to plan, deliver and fund intermunicipal services.*

With respect to control and management of land, municipalities are given the direction to regulate watercourses and water bodies, subject to other legislation in accordance with **Section 60(1)**:

> *Subject to any other enactment, a municipality has the direction, control and management of the rivers, streams, watercourses, lakes and other natural bodies of water within the municipality, including the air space above and the ground below.*

These policies allow municipalities to adjust their land use regulations and development standards to complement the human, financial, and environmental resources of each municipality. This has provided the flexibility required for land use planning at the local level. However, due to this municipal lens, each municipality has interpreted and executed their authority to control development adjacent to water bodies differently as there is a difference in financial and human resources amongst the municipalities. This has resulted in inconsistent standards of development within the Sturgeon River Watershed.

The MGA recognizes the need to protect and preserve sensitive natural areas adjacent to waterbodies to the extent that it allows municipalities to demand Environmental Reserves, Conservation Reserves, and Environmental Reserve Easements at the time of subdivision application. To accommodate for all municipalities, the MGA has a low baseline for minimum setback standards as stated in **Section 664 (1)**:

> *Subject to section 663 and subsection (2), a subdivision authority may require the owner of a parcel of land that is the subject of a proposed subdivision to provide part of that parcel of land as environmental reserve if it consists of*
>
> *(a) a swamp, gully, ravine, coulee or natural drainage course,*
> *(b) land that is subject to flooding or is, in the opinion of the subdivision authority, unstable, or*

(c) a strip of land, not less than 6 metres in width, abutting the bed and shore of any body of water.

The regulation allows a municipality to require a setback greater than 6 metres for environmental reserve where it can be proven that the larger setback would benefit lands subject to flooding, areas considered to be unstable, areas required to prevent pollution and allow public access. However, this has also left critical development considerations such as delineation of a flood line, establishment of top-of-the-bank, and permitted and discretionary uses on lands abutting waterbodies to the municipalities. This is then interpreted and approved at the discretion of subdivision and development authorities, that is, Municipal Planning Commissions, Development Officers, and Subdivision and Development Appeal Boards.

The first step in the planning process, is to determine if the Crown has claim to the bed and shore of a water body through a legal survey to determine the legal bank. The province does not necessarily claim all bed and shore (defined as land covered by water long enough to impact vegetation and soils - bed is land covered by water; and shore is land between bank and water). Alberta Environment and Parks includes the Water Boundaries Unit which determines claims and the process is resource and time intensive. Under **Section 17(2) and (3) of the Alberta *Surveys Act***, the legal bank should extend through the wetland vegetation and be located where distinct vegetation or soils exist. This process is most effective when a certified Alberta Land Surveyor conducts the legal survey and the developer and a representative from the Water Boundaries Unit are present. This method can also be used to determine buffer setbacks. If the developer opts not to carry out a legal survey of the bed and shore, a qualified environmental consultant should be retained to define the wetland or water body boundary subject to municipal approval.

Through **Section 664** of the MGA, reserve dedication applies during a subdivision application. In many instances, development permit applications are made on lands that have not been subdivided. This does not trigger a reserve dedication. Therefore, municipalities should not rely on reserve dedication alone to protect land adjacent to water bodies. Instead, Municipalities should utilize the powers given to them by the MGA and require development permits applicants within proximity to waterbodies to take a watershed management approach.

The MGA also requires municipalities to pursue Intermunicipal Collaboration Frameworks with their adjacent neighbours. These Frameworks are a mandatory regional planning mechanism for land-use planning and require municipalities to work together to deliver services at a shared cost. Among other things, it is mandatory for ICFs to address water and wastewater strategies. Addressing watershed management within ICFs may increase awareness surrounding the impacts on water quality and watershed management of neighbouring municipalities.

A recent example is the IDP between Parkland County and Brazeau County[v] that was adopted on July 17, 2018 and applies to the area along the borders of the two municipalities, part of which includes a section of the North Saskatchewan River. The IDP has set overarching goals to *"identify and conserve environmental features, recreation and open space*" and to *"harmonize and confirm future land uses, infrastructure, transportation and development within the Plan Area"*. As per **policy 7.1** of the IDP, Environmentally Significant Areas wetlands and other provincially and locally significant areas) have been identified. **Policy 7.3** addresses setbacks from Natural Areas and Hazardous Landscapes:

Setbacks from Natural Areas and Hazardous Landscapes – Through respective Land Use Bylaws, both municipalities shall enforce appropriate development setbacks

from the North Saskatchewan River, waterbodies, watercourses, and hazardous landscapes. The governing municipality may require the applicant to supply recommendations, prepared by a qualified professional, regarding development setbacks and/or other required mitigation measures.

Additionally, **policy 7.7** requires both municipalities to review proposals within the Plan Area through a watershed lens:

Watershed Management – Both municipalities shall recognize the importance of wetlands, riparian areas, watercourses and waterbodies, and will collaborate when reviewing proposals which may impact watershed(s) within the Plan Area. Participation by both municipalities in regional watershed alliance groups will be encouraged, and information and recommendations provided may be considered, where appropriate.

3.2.4 Wetland Policy

As part of the *Water for Life Action Plan* enabled through the provincial *Water Act* and direction set under the *Land Use Framework*, the Government of Alberta introduced the *Alberta Wetland Policy* in 2013[vi]. Perhaps the Province's most detailed policy document regulating uses adjacent to wetlands, the Alberta Wetland Policy provides direction and tools to manage wetlands in a way that conserves, restores, and protects wetlands while also balancing economic development. It promotes avoidance and minimization of impacts on wetlands, however, where proven that impact is unavoidable, the Policy directs users to use the Wetland Replacement Matrix. This matrix provides a replacement ratio that takes into account the value of the wetland and the location. As this is a value-based system, it provides opportunity for cost-effective measures and technological advancement.

As part of the planning process for developing the *North Saskatchewan Regional Plan*, the Regional Advisory Council appointed by the Cabinet recommended the Province *"implement the full suite of tools it has within the Water Act and Alberta Wetland Policy"* along with the use of the *Alberta Wetland Policy* to "support the recovery of stressed lakes." These recommendations along with the others will be used to draft the regulations of the *North Saskatchewan Regional Plan*.

A study by Ducks Unlimited Canada showed that 6.8 per cent of the Sturgeon River Watershed has permanent and temporary wetlands[vii]. This implies, that 6.8 percent of lands within the watershed are directly regulated by the *Alberta Wetland Policy*.

The City of Edmonton was represented on the Provincial Wetland Policy Working Group. The City actively uses the *Wetland Policy* to supplement its own City Council approved Wetland Strategy. The City's Wetland Strategy toolbox contains legislative and physical programing tools to secure and acquire wetlands, manage and research wetland practices, and finally, to engage its citizens to increase awareness and stewardship towards wetland areas. For example, the City has integrated constructed wetlands within the Stormwater Quality Control Strategy and Action Plan as well as their Stormwater Servicing Strategy. Constructed wetlands are a proven cost-effective method to naturalizing the stormwater systems while providing ecological benefits. City's constructed wetlands have been largely self-sustaining, with few requirements for intervention. The City also utilizes a series of wetland acquisition tools, starting with its Natural Areas Reserve Fund and Natural Areas Acquisition Strategy.

For more information, refer to *City of Edmonton Wetland Strategy*, 2012[viii].

3.3 Regional Legislation

At the time of this Report was being prepared, the *Edmonton Metropolitan Region Growth Plan*[ix] (Growth Plan) was the only completed plan that applies to majority of the participating municipalities of the SRWA. In order to increase policy alignment, the Growth Plan mandates that municipal policy documents incorporate and/or have regard for the policies set by the Edmonton Metropolitan Region Board.

**This Report acknowledges that the policies within the Growth Plan do not apply to the municipalities that are not part of the EMRB.*

3.3.1 Edmonton Metropolitan Region Growth Plan

The Edmonton Metropolitan Region Board (EMRB), formerly known as the Capital Region Board approved the new Edmonton Metropolitan Region Growth Plan in October 2017. Through this Plan, the EMRB seeks to implement the 50-year vision of transforming the region comprised of 13 diverse municipalities into a hub for "*economic diversity, entrepreneurialism, leadership in energy development, environmental stewardship, and excellent quality of life"*. It addresses issues of land use, transportation, transit, housing and economic development at a regional level.

Under the Policy Area 2: Natural Living Systems of this Plan, the EMRB establishes a broad goal for watershed conservation and protection, as stated in the **Objective 2.2**:

> *Protect regional watershed health, water quality and quantity.*

Through this, it reinforces the *Water for Life Strategy* and guides all municipalities to consider a watershed management approach to planning. It includes policies to manage floodplains and riparian areas and protects links between surface and groundwater during private and public projects. **Policy 2.2.1 (a) (c) (d)** reads as follows:

> *2.2.1 The provincial Water for Life and Alberta's Strategy for Sustainability will guide statutory plans, regional plans and regional infrastructure projects to protect, enhance, and restore the water quality in the Region. Statutory plans, regional plans and regional infrastructure projects will include policies and initiatives to:*
>
> *a. conserve natural areas along waterways;*
>
> *c. incorporate best practices to minimize soil erosion, protect and enhance riparian zones, and conserve and enhance areas that contain habitat for significant, rare or endangered plant species; and*
>
> *d. conserve wetlands with sufficient buffers to maintain their water quality and hydraulic function, as well as upland habitat necessary to support the life cycle needs of the wetland ecosystem.*

As mandated by the MGA, all statutory plans from member municipalities are referred to the EMRB for approval. Approval is received based on the Regional Evaluation Framework (REF). The above stated policies play a fundamental role during the REF when used to determine provisions for buffer areas from ecologically sensitive lands. This process also allows a level of consistency within the watershed (for EMRB municipalities).

Non-statutory plans are exempt from this evaluation procedure; however, non-statutory plans may be referred to neighbouring municipalities for comment. Although it will not be mandatory for municipalities to reflect the comments made by their neighbours in the plans, it can make municipalities aware of the fact that the natural resources are shared between the municipalities. The development of lands not falling under Area Structure Plans (ASP) are also exempt from this evaluation procedure.

The following policy requires municipalities to adhere to Regional Plans. **Policy 2.2.2** states:

> *In accordance with the Alberta Land Stewardship Act, member municipalities will adhere to the Groundwater Management Framework and the Water Management Framework for the North Saskatchewan Region. These provincial management frameworks provide guidance to protect watershed health and manage water quality and quantity in the North Saskatchewan River watershed including its sub-regional watersheds.*

Part of the implementation strategy will be to potentially partner with provincial agencies and private organizations to monitor the progress of each member municipality through performance indicators listed in Appendix F: Key Performance Indicators of the *Growth Plan*. Appendix F lists the following indicators to measure the performance of natural living systems:

1. *Fuel sales and GHG emissions, per capita*
2. *Ambient air quality, AQHI ratings*
3. *Amount of land locations of provincial parks, protected areas and ESAs*
4. *Estimated total area of wetland loss by wetland type (and if possible by location for analysis by land use zoning; i.e., zoned agriculture vs. other zoned areas)*
5. *Amount of wetland loss and amount of wetlands saved (conserved) and/or restored*

Measuring the state of the wetlands is a proven indicator of watershed health. However, the above list does not include any of the indicators listed in the *Handbook for State of the Watershed Reporting: A Guide for Developing State of the Watershed Reports in Alberta*[x]. This guide has been used to develop numerous watershed report cards across Alberta, including one for the Sturgeon River Watershed. Therefore, the performance indicators listed in the *Growth Plan* could be used in addition to those mentioned in the Handbook to provide an accurate picture of the municipality's health of a watershed.

3.4 Municipal Legislation

Municipal authority is delegated under the *Municipal Government Act*, and subject to other provincial legislation such as the *Water Act* and the *Environmental Protection and Enhancement Act*. However, the artery of a municipal government's power is derived from the MGA. As noted in section 3.2.3, the MGA states that the purpose of a municipality is to provide services and facilities necessary for the community. A well-maintained watershed provides many essential ecosystem functions that benefit a community and help ensure safe, reliable water resources over time (North Saskatchewan Watershed Alliance, 2008).

Municipal powers for environmental protection, as stipulated within the MGA include:

- The "Natural Person" power that permits municipalities the same rights as a natural person;
- The power to pass bylaws;

- Control over lakes, streams, lakes and other natural bodies of water within the municipality subject to any other enactment; and
- The power to create and pass statutory plans and bylaws to make decisions on subdivision and development proposals.

Municipalities are responsible for developing land use planning documents that incorporate watershed protection. At the municipal level, land use planning is carried out through Statutory Plans (Municipal Development Plan, Area Structure Plan, and Area Redevelopment Plan), Non-Statutory Plan, and their respective Land Use Bylaws (LUB). Decisions made by federal and provincial authorities, including the Natural Resources Conservation Board, the Alberta Energy Regulator, and the Alberta Utilities Commission, supersedes the policies contained within Statutory Plans and Non-Statutory Plan.

Several statutory and non-statutory plans are described below, in terms of the tools they provide for watershed stewardship. Several ideas expressed below have been adapted from the North Saskatchewan Watershed Alliance report *Municipal Guide: Planning for a Healthy and Sustainable North Saskatchewan River Watershed* (2008).

Table 4: Land Use Planning Documents as a Tool for Watershed Stewardship

Regional Land-Use Plans	• Set the vision and desired future for the region • Integrate economic, environmental and social outcomes • Outline objectives/goals (quantitative, measurable targets, trade-offs and choices) • Include strategies/action (both regulatory and non-regulatory) • May include management frameworks for the region
Statutory Plans	• Inter-municipal Development Plan – coordinate efforts between adjacent municipalities for watershed stewardship practices and policies • Municipal Development Plan – address watershed issues and management within a municipality • Area Structure Plan – ensure local watershed protection by requiring studies to determine the condition of the specific components of a watershed, prior to development • Area Redevelopment Plan – steer redevelopment to areas that will not compromise the health of a watershed, and in fact helps ensure its protection
Land Use Bylaw	• Regulates development in proximity to watershed components through zoning, development standards and granting of subdivision approvals and development permits • Impacts to watersheds that can be addressed in a land use bylaw include zoning districts that capture natural features; vegetated buffers in the form of environmental reserve, municipal reserve or conservation easement to separate a water feature from adjacent land uses; and, landscaping requirements for infiltration or storm water retention within development permits
Non-statutory Plans	• Long-range municipal plans and policies provide important direction regarding watershed management to council and municipal staff

	• Environmental plans, natural area plans, community plans and growth management plans can impact watersheds and provide recommendations to decision makers • Municipal Engineering Standards outline the minimum design standards expected for new development and infrastructure
Municipal Bylaws	• Municipal bylaw powers allow municipalities to enact bylaws that address watershed protection strategies such as wetland protection, park protection, restriction of landscape alteration, protection of environmental health, water conservation and storm water and wastewater procedures and facilities
Inter-municipal Planning	• Economic, social and environmental importance of coordination of local planning initiatives between municipalities has been realized in Alberta, and can be emphasized with inter-municipal plans to collaborate interests in watershed management

Source: North Saskatchewan Watershed Alliance. *Municipal Guide: Planning for a Healthy and Sustainable North Saskatchewan River Watershed* (2008).

The development process heavily relies on the tools mentioned in Table 4. Each tool is applied at a different stage of the development process. Furthermore, not all tools are applied to every subdivision and/or development application. For example, An MDP and LUB apply to all lands within the municipal boundary, but an Area Structure Plan can only apply where it has been initiated. Therefore, there is an increased possibility that policies for watershed management goals, protective measures, or development study requirements to protect the SRW during the Development Permit stage will apply to all lands within the municipal boundary if included within the Municipal Development Plan than the Area Structure Plan or Plan of Subdivision. Policy makers should consider the areas that need protection or further study, and the tools from Table 4 that will apply to those areas. This is a critical concept that affects the implementation of watershed management policies within the SRW.

3.5 Guidelines

Stepping Back from the Water

The *Stepping Back from the Water: A Beneficial Management Practices Guide for New Development near Water Bodies in Alberta's Settled Region (2012)* handbook is designed to assist municipalities, watershed groups, developers and landowners in Alberta to determine appropriate water body setbacks for development around lakes, rivers and wetlands. The handbook was prepared by Alberta Environment and Parks based on an extensive review of scientific studies and accepted beneficial management practices but does not necessarily reflect the Ministry's views or policies. It recommends that riparian setbacks be determined on a case-by-case basis by a qualified person. Emphasis in this document is placed on protecting environmentally significant areas, sensitive wildlife habitats and rare species.

Land use planning must include methods for determining setbacks and buffers that legitimately protect significant features to be able to continue to function. This handbook describes methodologies recommended to determine riparian setbacks and methods for calculating buffer widths for the protection of water bodies and helps with consistent requirements that can be applied to the Sturgeon River and the entire watershed. Setbacks are measured from the Legal Bank of a Water Body as defined in the Alberta *Surveys Act.* Total setbacks are determined by the incline of the slope and slope stability, which are determined through a geotechnical investigation of soil composition. Results of geotechnical

studies yield recommended setback widths for a vegetated buffer strip required to protect the feature. Some examples of effective widths calculated for vegetated filter strips are provided below:

- Permanent Water Bodies (lakes, rivers, streams, seeps, springs) – 20 m;
- Class III and IV Wetlands – 50 m;
- Ephemeral and Intermittent Streams, Gullies – 6 m; and,
- Class I and II Wetlands – 10 m.

This handbook clearly explains the importance of riparian areas and riparian buffers. Apart from explaining the irreplaceable ecological benefits of riparian areas, it demonstrates the positive economic benefits of buffers. Through extensive research in the real estate sector, this handbook shows that properties with higher vegetation, or properties adjacent to vegetated land are more likely to attain higher property prices. Furthermore, this handbook explains that riparian forest buffers have the ability to "*decrease the public's investment needs*"[xi].

4.0 LOCAL WATERSHED MANAGEMENT PLANNING TOOLS REVIEW PROCESS

Policy and regulation in Municipal Development Plans and Land Use Bylaws of the participating municipalities were reviewed to determine existing watershed management policies and regulations adopted by the participating municipalities of the Sturgeon River Watershed. Throughout the process, the review was shared with the members of participating municipalities and comments were incorporated to determine existing watershed management tools, issues, and opportunities at the local level.

The Project Team developed, in consultation with the SRWA Project Manager, the following checklist to guide the review of existing watershed management policies and regulations.

1. Flood Areas
2. Wetlands and Riparian Areas
3. Setbacks and Buffer Strips
4. Planning for Stormwater Management
5. Wastewater Management
6. Groundwater Management
7. Inventory, Monitoring and Health Indicators of Natural Areas
8. Development process and environmental impact studies

The checklist was developed based on the conclusions from the *Sturgeon River State of the Watershed Report, May 2012,* conclusions from the *Planning Tools for the Protection of the Sturgeon River Watershed Report, 2014*, components of the watershed , and factors affecting the components of the watershed (illustrated in Figure 4).

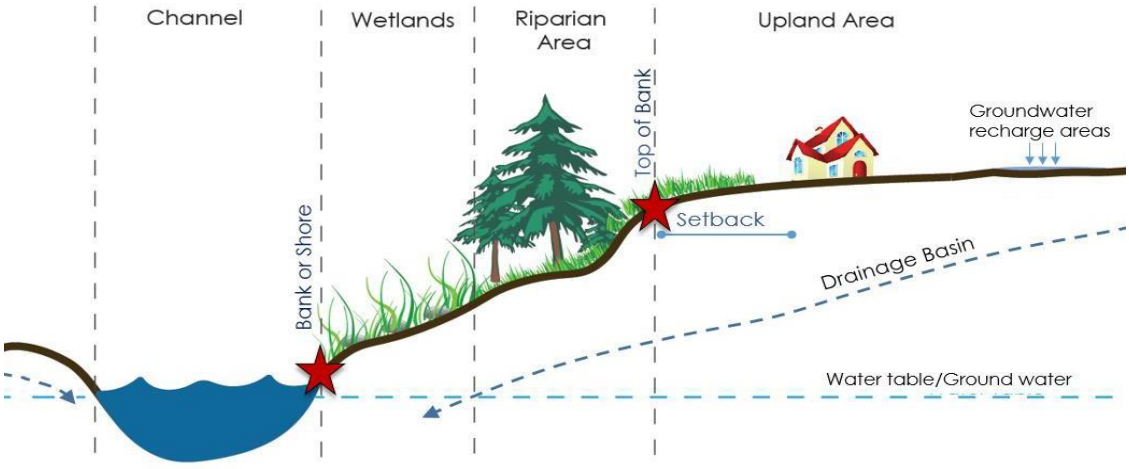

Figure 4: Components of a watershed and factors that affect watershed management
Source: ParioPlan Inc. 2019

Refer to **Section 6.0 Glossary of Terms** of this Report for the definitions of the components and factors illustrated in Figure 4.

A summary of outcomes of the interviews and feedback from other consultation activities can be found in **Appendix 1 Stakeholder Consultation: What We Heard**.

Table 5: Checklist and Rationale for MDP and LUB Review

1. Flood Areas • **Have flood areas (flood fringe, flood hazard areas, floodways) been identified and mapped?** • **According to their MDP and/or LUB what land uses are allowed on lands adjacent to a waterbody?** • **Is there an established to-of-bank? If not, what is the criteria to determine top-of-bank? Who is responsible for determining top-of-bank?**
Rationale
Planning Tools for the Protection of the Sturgeon River Watershed Report, 2014, recommended municipalities to map the standard flood plain (1:100) as the initial steps towards policy alignment. Water is a shared resource. The level of protection and management by one municipality will impact other municipalities. For example, the cumulative effects from upstream municipalities can result in higher levels of sedimentation for downstream municipalities. This will require additional watershed management measures from the downstream municipalities that uses local human and financial resources. The cost of projects required to restore the health of an environmental resource (example water filtration plant) is almost always more than the cost of preventative measures (example identify and regulating permanent development in flood areas).[xii] In addition, despite the risk of overland flow, land adjacent to waterbodies is often high demand real estate. There is an associated risk to property damage and public safety in these areas (Figure 5). Refer to **Section 6.0 Glossary of Terms** of this Report for the definitions of flood areas indicated in Figure 5.
Examples
In 2007, Alberta courts ruled that "planning authorities may be liable for damages related to negligently issued planning approvals (e.g., In Bowes v. Edmonton (City of), 2007 ABCA 347 The City of Edmonton was sued for approving the development of houses that fell down a hill. The court ruling stated the City *"was under a duty, if [it] knew or ought to have known of the risk… to prevent or minimise the risk"*)."[xiii] In response, the City of Edmonton worked with industry experts and professionals, community and environmental representatives, and developed the new Top of Bank Policy (C542 - Development Setbacks from River Valley/Ravine Crests[xiv]) which was approved by City Council in February 2010. The objectives of the policy are to protect public and private property from slope instability, protect the geological integrity from urban development, and to optimize public access to environmental assets. through this policy, *"separation [is] created through establishment of a scientifically-derived Urban Development Line demarcating the boundary between developable upland area (urban development) and non-developable upland area or Environmental Reserve."* This policy provides definitions and rationale for separation requirements that in turn reduces ambiguity and educates property developers adjacent to the river valley.
Another example is that of City of St. Albert. Building upon the Flood Hazard Identification Mapping Program by the Province, the City has identified floodways, flood fringe, and overland flow areas for

the Sturgeon River, Carrot Creek and Big Lake. In addition, the City's MDP requires a 50-metre setback from the top of bank of Carrot Creek.

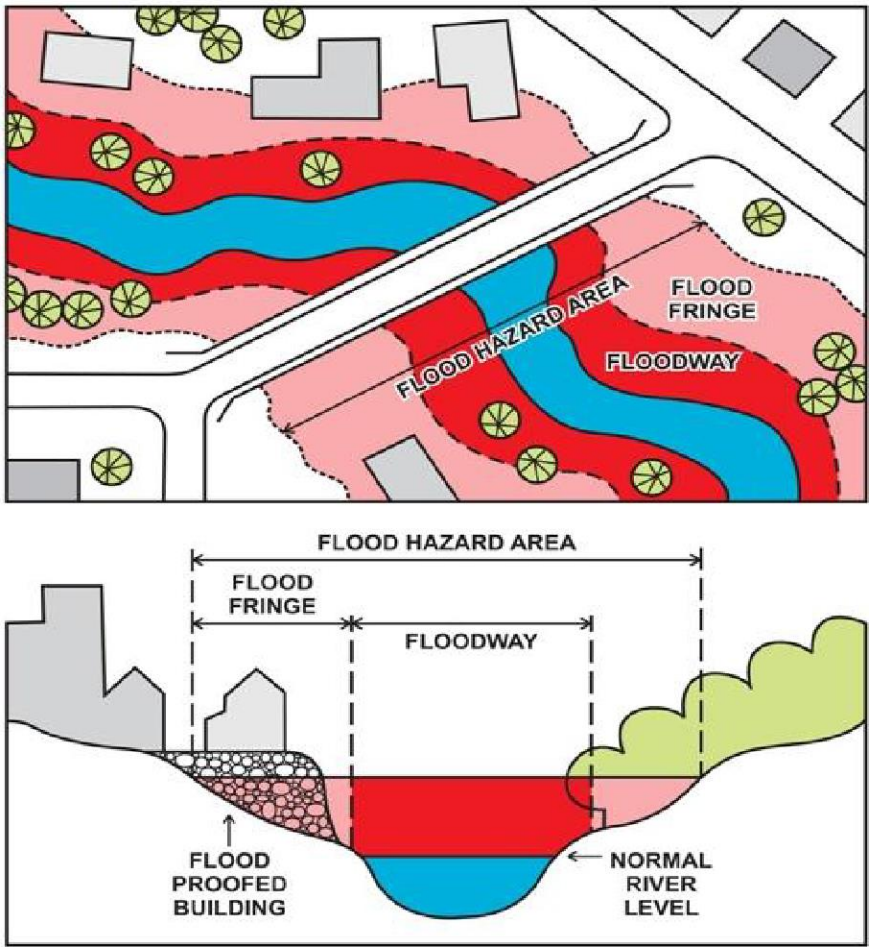

Figure 5: Flood Hazard Areas Diagram
Source: Government of Albert, 2017

2. Wetlands and Riparian Areas

- **How does the municipality use its MDP and/or LUB to protect wetlands and riparian areas?**
- **Have wetlands and riparian areas been identified?**
- **What setbacks are required from identified wetlands and riparian areas in the LUB?**
- **Are environmental reserves used for the protection of wetlands and riparian areas?**
- **Are there any public education tools to increase the awareness around ecosystem benefits from wetlands and riparian areas?**

Rationale

Wetlands provide ecological services such as water storage and infiltration, along with cultural and traditional uses to many First Nation and Metis people. All wetlands are carbon sequestration systems (ability to store excess carbon, a major greenhouse gas) making them "carbon sinks". They are a key component to the adaptation and mitigation of climate change. If designed appropriately, they can be incorporated into a larger, constructed stormwater management system. According to Alberta Environment and Parks, Alberta has lost between 60 - 70 % of the wetlands in settled areas. Wetlands are recognized as a key component to maintaining healthy farms, acreages and communities and therefore need to be retained. Ducks Unlimited Canada in 2008 studied the Broughton Creek watershed in Manitoba which revealed a 70 % loss of wetlands over a 37-year period that was linked to an 18 % increase in peak flows following rainstorms, a 30 % increase in water flow in receiving water courses and a 41 % increase in the amount of sediment dumped into downstream waters[xv].

Riparian areas improve water quality, flood water conveyance and storage, bank and shoreline stabilization, and habitat and biodiversity functions. The *Sturgeon River State of the Watershed Report, 2012* evaluated the nitrogen and phosphorus levels as one of the water quality indicators and was given a rank of "poor". "*Studies across Canada and the USA have linked high nitrogen concentrations in streams to agricultural land use and the widespread application of fertilizers and manure*"[xvi]. The same studies have also shown that wetlands and riparian areas can play a crucial role in reducing the nitrogen and phosphorus contents in waterbodies. Riparian areas are important landscape features that can buffer water bodies from non-point sources of nitrogen pollution. According to Alberta Environment and Parks, riparian areas have disproportionately positive impacts on our natural and built systems, making them *"the most productive and valuable of all landscape types."*[xvii].

Example

The City of Edmonton has a Wetland Strategy that integrates wetlands with stormwater. In addition, the City relies on a suite of management, and public education tools to protect its wetlands, for instance:

1. Ecological Information Requirements (Policy C-531)
2. Terms of Reference for Area and Neighbourhood Structure Plans
3. Environmental Reserve Guidelines
4. The Wetland Loss Compensation Site Framework
5. Wetland Mitigation Bank
6. Ecological Restoration Plans
7. Corporate Reporting
8. Communication, Education and Public Awareness (CEPA) Initiative
9. Master Naturalist Program

10. School and Facility-based Programs

Parkland County completed a Wetland Inventory and Historical Loss Assessment in 2016 that created a wetland inventory and compared it to the historic wetland inventory. This assessment allows the County to measure cumulative wetland loss. In addition, an objective ecological value score is used to ascertain which wetlands require higher protection and conservation. Comparing existing wetlands with important baseline information also helps track the rate of change, that is, areas that have seen the high loss of wetlands in a short amount of time as well as monitor restoration and conservation efforts. Based on the results, the decision makers can implement targeted/site specific environmental policies to protect and conserve wetlands.

3. Setbacks and Buffer Strips

- **Is there criteria established for determining setbacks in the MDP and/or LUB?**
- **What setbacks are required from environmentally significant areas MDP and/or LUB??**
- **Are setbacks determined from top-of-bank or the bank/shore of the waterbody?**
- **Does the MDP and/or LUB require vegetative buffers between waterbodies and certain uses (agricultural uses, residential uses, industrial uses)?**

Rationale

Not only do setbacks and buffers protect environmental resources from development, but also protect development from damage. However, studies have shown that permanent structures within riparian areas reduce their ability to perform invaluable ecosystem buffers and can lead to increased risk to people and property from flooding, ice damage, unstable ground, and lower water quality.

Setbacks and buffer strips are more effective when they are designed to respond to their function. That is, while recommending a setback or buffer width, policy makers should consider the purpose of them in the particular area. For example, Agriculture and Agri-Food Canada recommends 5 – 10 meter wide riparian buffer strips between agricultural land uses and waterbodies with the objective of protecting water bodies from non-point source run-offs from waterbodies. Where as, depending on what the land use is, urban areas have higher setbacks ranging from 30 meters – 50 meters.

Examples

Through their MDP, Lac Ste. Anne County has adopted the Riparian Setback Matrix Model (RSMM) as a means to determine setbacks and frequently relies on it. It has used the RSMM to develop a map to specifically show required setbacks from waterbodies and where a slope stability study is required. This map is included in the County's MDP.

In Sturgeon County, for the purposes of Environmental Risk Management, setbacks are not given a specific distance. *Table 1. Setback Determination Criteria* of the MDP classifies criteria in terms of conditions such as slope, groundwater, floodplain, and vegetation, etc. and provides professional qualifications for those involved in setback determination.

In the City of Edmonton, Urban Development Setback from the River Valley and Ravine System (or Environmental Reserve in this case) is determined by the Urban Development Line (UDL). The UDL is largely determined by the Estimated Long Term Line of Stability, subsurface conditions (mines), excavations or sinkholes, or flooding or any other lands contemplated as Environmental Reserve under the MGA.

4. Planning for Stormwater Management

- **Are there specific policies or regulations targeting the interface between stormwater and its discharge into a waterbody?**
- **Are end-of-pipe treatments required?**

Rationale

Stormwater is designed to ultimately be discharged into waterbodies. Most municipalities require stormwater management plans that study flow rates. However, during discharge, stormwater can be at a higher temperature than what is favourable to aquatic ecosystems. In addition, although flowrates can match those of pre-development levels, there can be a higher sediment content. Municipalities should include policies and/or regulations to regulate the interface of stormwater (treated and untreated) with waterbodies. Requiring a lot-level stormwater management plan helps monitor and reduce impacts of stormwater on a lot basis.

Example

The City of St. Albert Stormwater Management Master Plan, 2004 includes a recommendation that covers an end-of-pipe method. Specifically, it recommends the City *"install oil/grit separators at storm sewer outfalls to reduce the discharge of sediment to the river … estimated cost $3.1 million dollars for the five highest priority sites and $7.3 million for eighteen other sites (over 10 years)."* In addition, the Master Plan also recommends "*that stormwater management facilities be designed to enhance and to be integrated with the parks and open spaces of St. Albert and be used to provide buffer zones between Red Willow Park and adjacent development*."[xviii]

5. Wastewater Management

- **Does the municipality rely more on public or private wastewater systems?**
- **Are there policies and regulations for private wastewater systems in the MDP and LUB?**
- **Are there any enforcement measures for private wastewater systems?**

Rationale

The *Sturgeon River State of the Watershed Report, 2012* evaluated the nitrogen and phosphorus levels as one of the water quality indicators and was given a rank of "poor". Improper wastewater has been linked to increases in nutrient content within water bodies.

Due to the increased risk of contracting illnesses from wastewater, municipalities set high engineering and design standards. Wastewater can also add to the nitrates, phosphates, and organic matter that can lead to eutrophication. These systems require appropriate design as well as regular maintenance. For private systems, an approval of a land use application can ensure appropriate design and engineering standards are applied. Maintenance of private systems require supplementary tools and measures.

Example

For the past 14 years, Lac Ste. Anne County has an unofficial enforcement procedure to carry out annual random sewage inspections on 100-150 properties adjacent to waterbodies. On average, 15% of tanks inspected are not compliant with their engineering standards and therefore are required to be brought up to code.

6. Groundwater Management

- **Have groundwater recharge areas been identified/mapped?**
- **What type of land uses are permitted in areas with high groundwater susceptibility?**
- **What studies are required to determine the impacts of development on groundwater? When in the development process are the studies required?**
- **Does the MDP and/or LUB address groundwater monitoring? If so, to what detail? How is the information used to inform policy development?**

Rationale

According to the *Sturgeon River State of the Watershed Report*, 2012, "*groundwater contributes little to surface water flows, suggesting a high risk for groundwater contamination and emphasizing the importance of wetlands in this region*."

Watersheds are connected by the movement of water through groundwater systems and networks. As surface water is drawn down through soil, it travels to recharge areas such as aquifers.

Municipalities should identify/map groundwater recharge areas. Policies can be used to curb the effects of development on groundwater. Policy can be used to protect and conserve groundwater.

Example

Parkland County has mapped Groundwater Susceptibility. Hydrologic assessment is required for proposed multi-parcel and major development applications on sites located in areas with a medium or above groundwater susceptibility.

For relevant proposed developments, a Groundwater Assessment may be required as per Appendix 2 of their MDP. This must be completed by a professional engineer, geologist or geophysicist, that identifies:

"(a) the quantity and quality of Groundwater available to Households within the Proposed Subdivision;

(b) potential interference with Existing Groundwater Users; and

(c) and consistency with an Applicable Approved Water Management Plan"

As per section 10.4.3, the County supports a "no-net increase of post development nutrient discharges in sensitive groundwater areas, including waterbodies, wetlands and watercourses, as identified in the County's Environmental Conservation Master Plan."

7. Inventory, Monitoring and Health Indicators of Natural Areas

- **Is there a publicly accessible inventory of natural areas/environmentally significant areas?**
- **Is there a local inventory for wetlands, riparian areas, and other environmentally significant areas?**
- **Are the cumulative impacts of development on the watershed measured?**
- **What are the environmental performance indicators used? Are there any specifically for the health of the watershed?**
- **If and how are results/data from the environmental inventory/monitoring used? How is it used to inform policy development?**

Rationale

Environmental monitoring and assessment are done at the local level to match the local resources and capacities. Monitoring and assessment are completed using a variety of methods and indicators, and not necessarily through a watershed lens. This can result in insufficient data or inaccurate comparison of municipal watershed management efforts and performance.

Municipalities should have an inventory of environmental resources that is also publicly accessible. Watershed performance indicators included in the Sturgeon River State of the Watershed Report should be part of municipal environmental indicators.

Examples

The City of Edmonton has developed a Natural Area Systems Policy (C531) that states the City "*will balance ecological and environmental considerations with economic and social considerations in its decision making and demonstrate that it has done so*." An annual report to the City's Council provides an assessment of the natural areas acquired through environmental reserve dedication and other land acquisition methods, which is also used to inform subdivision authority.

The City also outlined policies in their MDP for the enhancement of natural areas inventory as well as provided access to online maps that overlay existing protected and unprotected natural areas (2007).

The City of St. Albert has established an Environmental Master Plan (EMP) that sets out specific goals and targets for key environmental issues for the City. This plan has 21 quantifiable and measurable targets for the following nine goals:

1. *Manage Air Quality*
2. *Reduce Energy Consumption and Greenhouse Gas Emissions*
3. *Promote Sustainable Neighbourhoods and Transportation Choices*
4. *Preserve and Manage Trees, Parks and Natural Areas*
5. *Reduce Solid Waste Generation*
6. *Protect and Improve the Sturgeon River Watershed*
7. *Improve Water Quality of the Sturgeon River*
8. *Reduce Water Consumption*
9. *Foster Community Environmental Stewardship*

Some examples of Targets for Goals 4, 6, 7, 8 and 9 are:

- *Measure existing tree canopy cover and set future target.*

- *Create watershed group by 2015.*
- *Reduce municipal pesticide use to 0.25 kg of active ingredient (ai) per hectare or lower by 2020.*
- *Reduce residential pesticide use to 0.5 kg of active ingredient (ai) per hectare or lower by 2020.*
- *Reduce total water consumption to 200 litres or less per person per day by 2020.*
- *Grow participation in Clean and Green RiverFest, Arbor Day and Naturalization projects to 1000 participants or more by 2020.*

As such, performance indicators are consistently monitored and reported on annually in the City's annual Report on the Environment. For example, each year, the City tests water quality at six locations on the Sturgeon River and four locations on Carrot Creek. This has helped the City track the changes and the reason for changes in municipal pesticide use and determine if additional initiatives are required in order to reach their water quality targets (Figure 6). For a detailed list of the City of St. Albert's Environmental Goals and Targets, refer to **Appendix 2 City of St. Albert Environmental Master Plan Goals and Targets.**

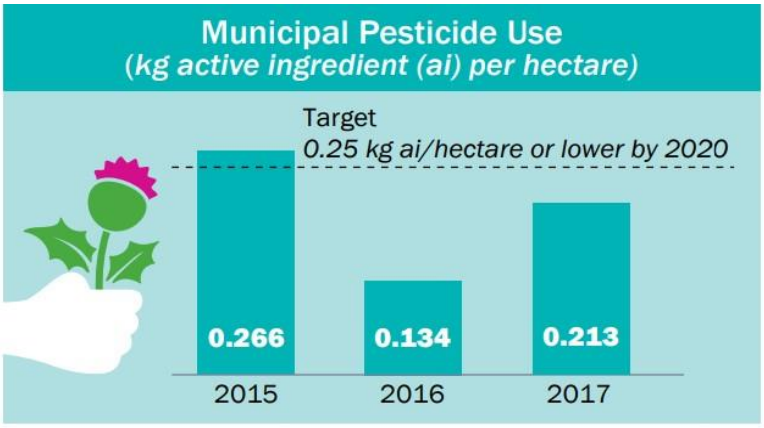

Figure 6: City of St. Albert Water Quality Indicator
Source: City of St. Albert, 2017

Parkland County has an inventory of Environmentally Significant Areas (ESAs) provided in their Environmental Conservation Master Plan that identifies/informs the establishment of High Priority Landscapes (HPL – overlapping features of ecological importance) in the County's MDP.

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8. Development process and environmental impact studies

- **What development process is most commonly used within the municipality (ASP/ARP →OP →SD →DP)? Is it the same for lands adjacent to waterbodies?**
- **When and what studies are required during each stage?**
- **To what detail does the MDP and/or LUB address the environmental studies requirements?**

Rationale

As mentioned in section 3.4 of this Report, the stage at which specific studies are required affect the implementation and level of protection of the watershed. Furthermore, the requirements under each study can vary between municipalities. A MDP and LUB apply to all lands within the municipal boundary, but an Area Structure Plan can only apply where it has been initiated. Therefore, there is an increased possibility that policies for watershed management goals, protective measures, or development study requirements to protect the SRW during the Development Permit stage will apply to all lands within the municipal boundary if included within the Municipal Development Plan than the Area Structure Plan or Plan of Subdivision. Policy makers should consider the areas that need protection or further study, and the tools from *Table 4 - Land Use Planning Documents as a Tool for Watershed Stewardship* that will apply to those areas. This affects the implementation of watershed management policies. The stage at which they are implemented during the development process can impact the effectiveness of the watershed management planning tool. Supplementary measures are required to regulate lands that are not affected by the development process, that is, lands that do not have a land use application.

Examples

Parkland County requires biophysical studies and geotechnical studies for all planning, development, subdivision, and capital projects if they are adjacent to ESAs. In addition, Appendix 2 of their MDP gives details specifies the requirement for technical reports and studies.

The County also has a Biophysical Assessment Policy. Recommendations from the biophysical are presented to the subdivision authority that can make an informed decision about the application.

The City of Edmonton requires technical Studies at different phases in the ASP and NSP process. For the preliminary report, an Ecological Network Report (ENR), Hydraulic Network Analysis (HNA), and Parkland Impact Assessment (PIA) are required. This report is to be submitted in the initial phase to the planning department. For the Final Report to be submitted to the Planning Department, an Environmental Site Assessment (ESA) is required.

Policy and regulation in the Municipal Development Plans and Land Use Bylaws of the participating municipalities were reviewed based on the above mentioned eight aspects. A summary of the review is found in **Appendix 3 Watershed Policy and Regulation Review of Participating Municipalities**. Prior to the stakeholder interviews (Task 4), the policy review for each municipality was shared with interview subjects. Feedback from interviews were added to the review and shared with the NSWA administration and Technical Advisory Committee (TAC) during Task 8. TAC reviewed and provided feedback on the policy review. The policy review was also shared with key municipal staff to confirm the comments were correctly incorporated in the Report. For examples of monitoring processes and their application during the development process at a provincial, regional, and local level, refer to **Appendix 4 Case Studies: Inter-Jurisdictional Review of Watershed Management**.

5.0 IMPLEMENTATION STRATEGIES TOOLKIT

The Toolkit recognizes that participating municipalities have varying levels of environmental, human, and financial resources. Therefore, it provides tools to determine collective, measurable watershed management goals and targets that can be incorporated into the North Saskatchewan Regional Plan, and Inter-municipal Development Plans, which can then then be adopted by participating municipalities. It also provides tools that municipalities can choose to incorporate within their respective Municipal Development Plans, Area Structure Plans, and Land Use Bylaws to reach those collective targets. The following table lists policy and regulation strategies for watershed management at regional and municipal level.

Planning Level	Strategy
Regional Plans (North Saskatchewan Regional Plan, Sturgeon River Watershed Plan)	• Establishing development standards for new developments within 100 meters of waterbodies.
	• Establishing top of bank/set backs determination and evaluation criteria to be applied to all municipalities.
	• Establishing consistent Terms of References for biophysical and geotechnical assessments along with a consistent evaluation criterion. Cumulative analysis of technical studies offers valuable information to measure change and impacts regionally.

Planning Level	Strategy
Intermunicipal Development Plan	• Addressing methods and cost-sharing for water quality monitoring and water conservation strategies.
	• Recognizing the goals and targets of the SRWA watershed plan.
	• Establishing protocols and/or agreements for co-monitoring and evaluation of effects of water quality changes from upstream to downstream locations.
	• Developing intermunicipal protocols for erosion and sediment control, topsoil and land disturbance, illegal dumping, and encroachment to serve as compliance and enforcement measures.
	• Developing restoration programs to be applied to degraded areas within 100 meters of waterbodies within the watershed.
	• Establishing definition for low-impact development.

Planning Level	Strategy
Municipal Development Plan	• Establishing watershed management targets as set out by the SRWA for water quality.
	• Establishing a goal to protect and maintain links between natural areas.
	• Using examples from *Sustainable Technologies Evaluation Program (STEP)* to develop policies to conserve and protect natural areas (i.e. Rainwater collection and re-use, permeable pavement, groundwater and soil contamination risk with infiltration technologies, and long-term performance and maintenance costs of any green technology).
	• Establishing environmental public awareness strategies in sustainability/community development objectives.

	• Set environmental protection guidelines for[xix]:
	  ○ Groundwater
	  ○ Aquatic Communities
	  ○ Terrestrial Communities
	  ○ Stream Morphology

	• Establishing an inventory of environmentally significant areas (ESAs) and encouraging all participating municipalities to use the inventory to protect and conserve high priority ESAs at the watershed level.

	• Requiring stormwater master plans to:
	  ○ Set stormwater release rates equivalent to pre-development conditions.
	  ○ Use wet stormwater ponds and wetlands to reduce release rates and treat stormwater prior to discharge to waterbodies
	  ○ Encourage restoration of partially drained wetlands as part of a larger stormwater management plan
	  ○ Assess the integration of recreation fields within dry stormwater ponds and
	• Consider, where feasible, designing subsurface storage and/or infiltration systems beneath playfields within parks or school yards when retrofits are required.

	• Requiring that transportation master plans:
	  ○ Strive to reduce the width of paved areas on roads;
	  ○ Include opportunities to implement SWMFs such as grassed swales, within the road right-of-way;
	  ○ Include enhanced potential to increase canopy cover through street tree planting;
	  ○ Include porous pavements; and
	  ○ Pocket detention storage.

Planning Level	Strategy
Area Structure Plan	• Requiring that stormwater management to include: ○ detailed design of environmental restoration works for outfalls (e.g., stream protection works); ○ delineation/confirmation of constraint boundaries (e.g., significant woodland, top-of-bank, geotechnical hazard area); ○ sediment/erosion control plans for construction; ○ detailed reports relating to geotechnical and water resources of outfall; ○ major/minor systems connections to major/minor stormwater systems; ○ delineation of grading limits and tree preservation planning of outfall; and ○ landscape features including trails, benches and other recreational and interpretive amenities. ○ set design guidelines for discharge of stormwater into waterbodies, including mandatory end-of pipe treatment for stormwater discharge into rivers and lakes.
	• Determining the following: ○ Used established flood hazard and riparian set back/top of bank mapping to assess permitted or discretionary uses within restricted areas. ○ Where flood hazard or riparian set back/top of bank mapping is not available use a minimum setback of 30 metres for all new development from waterbodies. ○ Encourage a 10 metre setback from waterbodies and agricultural uses. ○ Terminology: Set standard definitions, for example, permanent and temporary structures. ○ Required studies for development applications and timeframe: establish when biophysical and geotechnical studies are required during the development process.

Planning Level	Strategy
Land Use Bylaw	• Requiring freeboard elevation of buildings within a flood hazard area to be 0.5 meters above an established flood line.
	• Restricting most permanent structures in flood hazard areas (except for roads, bridges and essential utilities).
	• Requiring mandatory buffer strips of 30 meters between developments and the bed or shoreline of waterbodies if the Riparian Setback Matrix Model (RSMM) is not applied.
	• Promoting and encouraging soft surfaces in residential areas to allow groundwater recharge and filtration. Municipalities should offer incentives to home owners that opt for water conservation methods, for example, through landscaping requirements.
	• Requiring the 3-zone design riparian buffer set out by Agriculture and Agri-Food Canada that establishes a minimum 10 meter riparian buffer between agricultural uses and waterbodies[xx]
	• Developing compliance and enforcement protocols for Environmental Reserve and Environmental Reserve Easement.
	• Incorporating environmentally friendly design elements into developments, including vegetation buffers, barrier plantings and natural trails.
	• Require the use of local native species in site restoration planting plans.
	• Requiring lot-level stormwater management plans during the development permit stage.

	• Requiring a biophysical and geotechnical assessment at development permit stage for lots within where there are no area structure plans applicable to the development.
	  ○ Urban municipalities should apply this regulation to areas within 100 meters of a waterbody.
	  ○ Rural municipalities should apply this regulation to areas within 50 meters of a waterbody.

6.0 GLOSSARY OF TERMS

For the purposes of this Report, the following definitions were used:

- **Bank (or Shore):** The boundary of the bed and shore of a body of water; means the natural boundary as defined by section 17 of the *Surveys Act*. It is generally synonymous with what is commonly referred to as the ordinary high-water mark[xxi].
- **Channel**: Those parts of the bed and banks of a water body that are without terrestrial vegetation[xxii].
- **Cumulative impacts**: the environmental impacts of an action in combination with the impacts of other past, existing and proposed actions. Each increment from each action may not be noticeable but cumulative impacts may be noticeable when all increments are considered together (Nevada Division of Water Planning).
- **Design Flood -** The current design standard in Alberta is the one per cent flood, defined as a flood whose magnitude has a one per cent chance of being equaled or exceeded in any year. Although it can be referred to as a 100-year flood, this does not mean that it will only occur once every hundred years[xxiii].
- **Design Flood Levels -** Modelled water elevations within a flood hazard area based on design flood (one per cent flood event). Design flood levels do not change as a result of development or obstruction of flows within the flood fringe[xxiv].
- **Drainage Basin/ Watershed:** The surface area which drains to a lake or contributes to the flow at a particular point in a stream or river. Also referred to as a catchment area or watershed [xxv].
- **Encroachment Conditions** - The flood hazard design case that assumes a scenario where the flood fringe is fully developed[xxvi].
- **Flood Fringe** - The portion of the flood hazard area outside of the floodway. Water in the flood fringe is generally shallower and flows more slowly than in the floodway. New development in the flood fringe may be permitted in some communities and should be flood-proofed[xxvii].
- **Flood Hazard Area** - The flood hazard area is typically divided into floodway and flood fringe zones and may also include areas of overland flow[xxviii].
- **Floodway** - The portion of the flood hazard area where flows are deepest, fastest and most destructive. The floodway typically includes the main channel of a stream and a portion of the adjacent overbank area. New development is discouraged in the floodway[xxix].
- **Groundwater Recharge Areas**: The land area where the rain or snow seeps down into an aquifer is called a recharge area. An aquifer is an area of soil or rock under the ground that has many cracks and spaces and has the ability to store water. Water that seeps into an aquifer is called recharge[xxx].
- **Groundwater**: All water under the surface of the ground whether in liquid or solid state[xxxi] .
- **Impervious surfaces:** surfaces of land where water cannot infiltrate back into the ground such as roofs, driveways, streets and parking lots. Total imperviousness means the actual amount of surface taken up with impervious surfaces. A site with total impervious of 60% can act like a site with only 10% imperviousness if strategies such as channeling roof runoff into the garden and using swales to capture rainwater from the driveway and sidewalk are used (Curran 2003b).

- **Non-point source pollution**: pollution caused by diffuse sources with no discernible distinct point of source (e.g., runoff from agriculture, urban areas, mining sites, construction sites).
- **Overland Flow (Flood Fringe) -** Areas of overland flow are part of the flood hazard area outside of the floodway, and are typically considered special areas of the flood fringe[xxxii].
- **Point source pollution:** pollutants discharged from a discrete, identifiable point of source (e.g., pipes, ditches, sewers, wells, animal feeding operations).
- **Riparian Area:** The area along streams, lakes and wetlands where water and land interact. The areas support plants and animals and protects aquatic ecosystems by filtering out sediments and nutrients originating from upland areas [i].
- **Setback**: A minimum distance that must be maintained between a land use or development and a water body. The distance is measured from the legal bank of the water body to the boundary line of the adjacent development [xxiii].
- **Stream order**: Using the Strahler stream classification system, waterways are given an 'order', that is a hierarchy according to the number of additional tributaries feeding into it (Strahler, 1952). For example, a stream with no tributaries feeding into it is called a first-order stream. A Stream with two first-order streams feeding into it is called a second-order stream, and so forth.
- **Top of Bank:** Legal line that separates private land from the bed and shore of a water body [xxiii].
- **Upland Area:** An area of land, usually terrestrial land (not aquatic), either upstream or surrounding the wetland. It is not part of the wetland but may contribute to the integrity of the wetland.[xxxiii]
- **Wetland:** Land saturated with water long enough to promote wetland or aquatic processes as indicated by the poorly drained soils, hydrophytic vegetation, and various kinds of biological activity that are adapted to a wet environment [vii].

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Appendix 1

Stakeholder Consultation: What We Heard

1.0 STAKEHOLDER CONSULTATION ACTIVITIES

Recognizing that the health of the Sturgeon River Watershed was largely dependent on the policies and programs implemented within each municipality that share the Watershed, the Project Team consulted with policy makers of all participating municipalities along with the administration of the North Saskatchewan Watershed Alliance (NSWA). Below is a snapshot of stakeholder consultation throughout the duration of the project:

Project Initiation	**June 15, 2017** The Project Team met with the NSWA to confirm scope of work and understand focus areas. It was agreed that the final outcomes would include an inventory of changes to municipal policy that would stem from an update to the previous report completed in 2012, a Gap Analysis, and consultation with key staff at participating municipalities.
Project Backgrounder	**August 2017** The Project Team developed a public notice that could inform stakeholders and the public about the project as well as contact information for anyone who wanted to discuss the project with the Project Team.
Headwater Alliance Conference Call	**September 07, 2017** As a follow up to the North Saskatchewan Headwater Alliance Workshop in April 2017 where the need for education regarding municipal responsibilities around riparian areas became apparent, the Project Team participated in the conference call to provide an explanation and discuss municipal responsibility for watershed planning and intermunicipal alignment.
Joint Steering and Technical Advisory Committee Meeting	**September 21, 2018** The Project Team presented key land use issues and preliminary policy solutions that impact watershed health to the group. At the same time, they were informed about the status of the policy review underway and the steps for the interviews in the next phase.
Interview Prep with NSWA Administration	**September 28, 2017** The Project Team discussed emergent themes from the policy review with the NSWA Administration at a meeting. Based on the discussion, interview focus areas and questions were identified. Interviews would also inform the selection of case studies, and as discussed, could be modeled to be an inter-provincial comparison to understand regional watershed planning.
Stakeholder Interviews	**October 2017**

	The Project Team conducted nine stakeholder interviews with land use and environmental policy makers from participating municipalities. Prior to the interviews, the policy review for each municipality was shared with interview subjects which was then discussed and confirmed during the interviews. Stakeholders also provided input on municipality specific issues and opportunities while suggesting policy changes that could improve the Watershed. It became apparent that: • watershed planning required supplementary tools to policy, such as public education, incentive programs, and enforcement; and • watershed planning is often covered in separate policy documents other than Municipal Development Plans and Land Use Bylaws or non-statutory documents. All information gathered was used to update the policy review and develop preliminary findings which was then shared with the NSWA Administration.
Review of Key Findings and Draft Recommendations with NSWA Administration	**February 20, 2018** At the meeting, the Project Team discussed the key findings from the policy review and consultation. The group also discussed the implications of the conclusions and the recommendations. Based on the discussion, changes were made to the recommendations which would then be shared with the Technical Advisory Committee.
Technical Advisory Committee (TAC) Meeting	**February 21, 2018** Key findings and draft recommendations were presented to TAC where they verified the Key Findings and discussed the implementation of the recommendations. The discussion resulted in splitting the recommendations into urban and rural municipality specific.
TAC Feedback	**February – April 2018** Over a nine-week period, TAC reviewed and provided feedback on the policy review, key findings and draft recommendations. This was also shared with key municipal staff to confirm the comments were correctly incorporated in the Report. Areas that required more detail or clarification were highlighted. The Project Team addressed each comment and incorporated the changes where possible.
Alberta Environment and Parks (AEP) Input	**March – June 2018** During the consultation, stakeholders identified areas where they needed provincial assistance or guidance, such as mapping, flood mitigation, and North Saskatchewan Regional Plan. In response, the Project Team contacted the Land Use Secretariat and the Watershed Adaptation and Resilience branch with AEP. Final recommendations were tailored to reflect the advice from AEP.

The next two sections contain a summary of the discussions.

2.0 INTERVIEW SUMMARIES

As previously indicated, the Project Team conducted nine stakeholder interviews with participating municipalities which was then used to update the policy review and develop preliminary findings and shared with the NSWA Administration. Table 1 includes a list of interview subjects. Table 2 on the following page contains key discussion themes from the interviews.

Table 1: Interview Schedule

Municipality	Date/Time
City of St. Albert Leah Kongsrude, Director, Environment	October 06, 2017 1:30 pm – 2:00pm
County of Lac Ste. Anne Matthew Ferris, Manager, Planning and Development	October 27, 2017 9: 00 am -9:30 am
Parkland County Councillor AnnLisa Jensen, Chair of Sturgeon River Watershed Alliance Krista Quesnel, Environmental Engagement Advisor Martin Frigo, Manager, Long Range Policy Planning Craig Thomas, Manager, Development Planning	October 11, 2017 2:00 pm – 2:30 pm
City of Edmonton Achyut Adhikari, Ecological Planner and Wetland Scientist	October 12, 2017 1:30 am - 2:00 pm
Sturgeon County Mike Klassen, Planning Officer	October 13, 2017 10:30 am- 11:00 am
Town of Onoway Councillor Pat St. Hilaire	October 17, 2017 2:00 pm - 2:30 pm
Town of Stony Plain Miles Dibble, Sustainability Planner	October 24, 2017 1:30 pm- 2:00 pm
City of Spruce Grove Patrick Inglis, Senior Sustainability Advisor Debra Irving, Planning and Development Director	October 27, 2017 9:00 am-9:30 am
Town of Morinville Tim Vrooman, Senior Planner	October 27, 2017 2:30 pm - 2:50 pm

***Note 1**: Three attempts were made to contact the Town of Gibbons to participate in phone interviews but did not receive any response*

***Note 2**: For convenience, the following abbreviations were used:*

- *MDP – Municipal Development Plan*
- *ASP – Area Structure Plan*
- *NSP – Neighborhood Structure Plan*
- *SPO – Statutory Plan Overlay*
- *ER – Environmental Reserve*
- *ERE – Environmental Reserve Easement*
- *RSMM – Riparian Setback Matrix Model*

Table 2: Key Outcomes - Stakeholder Interviews

	Municipality	
Background	**City of St. Albert**	• The Natural Areas Inventory and Assessment was last updated in 2015 during growing season and also includes a conservation and management plan for existing protected natural areas. • The reports were presented to council and the recommendations included updates to the MDP and the ASP process for areas that do not have ASPs (yet to be implemented). • This report also covers areas within 2 kilometers of the City's existing borders to provide information for intermunicipal development plans. .
	County of Lac St. Anne	• The County is not part of the Edmonton Metropolitan Region Board and therefore targets from the Growth Plan are not enforceable within the County.
	Parkland County	• County has successfully applied programs offered by Alternative Land Use Services (ALUS) and the Green Acreages Owners that allowed landowners, farmers and ranchers to find alternative ways (such as fencing and off site watering systems) to use privately owned lands to provide ecosystem services.
	City of Edmonton	• The City of Edmonton shares a very small portion of the Sturgeon River Watershed – the City has five subdivisions applications in that area. That area is entirely residential.
	Sturgeon County	• There are currently no developments around major waterbodies except the Sturgeon Valley Country Residential subdivision which is adjacent to the Sturgeon River. • Agricultural Master Plan: The County is currently working on this master plan that addresses the interface between agricultural lands and water bodies. • The County's environmental philosophy focuses on compliance with Federal and Provincial legislation.
	Town of Onoway	• The Town of Onoway is a small town and therefore does not have a big impact on the Sturgeon River Watershed. There are no identified riparian areas or any development (permanent or temporary) around water bodies within the town boundaries. • The Town contains one seasonal creek and that eventually connects to the Sturgeon River that flows through the Town. This creek is used mainly for stormwater drainage.

		• There are gravel pits in the County adjacent to the town that contribute to the storm water drainage. • Sewage from the Town as well as some surrounding villages is directed to a sewage lagoon adjacent to the Sturgeon River. Bacteria is added to it and it is allowed to settle for approximately 2 years before it is discharged into the Sturgeon River. • Developers are mostly locals, but some are from other places in the Capital Region.
	Town of Stony Plain	• The Town continues to follow the engineering standards set out in the Big Lake Stormwater Management Plan (2004).
	City of Spruce Grove	• The Town has a vast variety of natural areas. • Mostly residential development.
	Town of Morinville	• The Town updated their MDP in September 2017. They have added policies to their Sustainability and Stormwater Management sections. They also considered the changes to the CRB Growth Plan, namely, the restoration of ecological network. The new MDP also makes specific references to *Water For Life Act* and the Wetland Policy. • A man-made stormwater facility discharges its contents into the Sturgeon River. • Council was supportive to the updated MDP and the increase in environmental protection policies. **Municipal Sustainability Plan** • Geared more towards parks • This was guided by the old MDP • Offers guidance at a high-level
Process	**City of St. Albert**	• The environmental section (s.10) of the MDP was a combined effort between the Planning and Environment departments but was last updated in 1999. • The Designated Flood Line and overlay builds on the Alberta Flood Hazard Mapping/ 1:100 Floodplain (1979) but adds factors for urbanization, sedimentation and a factor of safety for the Big Lake basin. The new line is based on updated modelling used by Alberta Environment and science based. It was calculated and mapped for the Sturgeon River, Carrot Creek and Big Lake. • St. Albert does not have top of bank or riparian setback guidelines. The Sturgeon River has a very small channel and large, low gradient floodplain so it is hard to define a top of bank. So far

	the designated floodline has been used as the setback guideline for development. May need to develop a setback guideline for numerous steep sloped ravines in St. Albert.
County of Lac St. Anne	• The County has an unofficial procedure to control septic system wastewater impacts on waterbodies by carrying out to annual random sewage inspections of about 100-150 properties close to waterbodies. This has been done for the past 14 years. Usually 15% of tanks inspected are not compliant and therefore are then required to be bought up to code. • Land owners do have the choice to shorten the setback distance from waterbodies as determined by County mapping but the onus of proof (that the pre-defined distance set out by the RSMM is unnecessary) is on them.
City of Edmonton	**ASP and NSP requirements:** • During Phase I, an Environmental Network Report (ENR) is required. This provides biophysical information about the lands within the plan area. • During Phase II a Natural Area Management Plan (NAM) is required. This shows high level management plans in response to the findings from Phase I. • After the approval of the NAM, the application passes to the Subdivision Authority. **MR, ER, and ERE** During MR or ER dedication, lands claimed by the City that are wooded areas are designated as MR. • The City takes ownership of Lands designated as MR. If they are over 10% of the Gross Developable Area, then the City will purchase them at Market Price. • These lands are then zoned *(NA) Natural Areas* and follow the regulations set under Section 531 of the Edmonton Zoning Bylaw. • A 30m setback is taken from the high waterland in addition to the Provincial Land (Crown Land). • The City has a top-of-bank policy that sets out the criteria for determining top-of-bank. It is the developer's responsibility to establish top-of-the bank using that criteria. Once established, setbacks are determined from that line. This information when presented to the City is evaluated by internal staff. The City can approve or deny their top-of-bank mark. • The City has a target amount of land to be achieved through Subdivision for the purpose of environmental conservation.

Therefore, the acquisition of land for Natural Areas is monitored and yearly reported to Council.

Wetlands

- The City has its own Wetland Strategy that follows the Alberta Wetland Policy and feeds into multiple land development processes.

ER guidelines

- Developers are usually well aware of this requirement or at least that they will have to dedicate land to ER before they submit their application.
- The guidelines encourage a 30m setback but does not specify a criterion on how to measure this setback. They provide how the City will evaluate the setback. Some of the evaluation criteria include public access and the 1:100 year flood line. It is the developer's responsibility then to provide a geotechnical study to prove the setback can be reduced.
- The evaluating body changes on a case-by-case basis. Usually it is the City's Geotech Engineer, Hydrologist or Biologist that evaluates these setback proposals by developers.
- At present they are waiting for the province to establish a more definitive evaluating criterion for setbacks.

*As of October 2017, the City was drafting an RFP to hire consultants to develop criteria based model to determine setbacks. This is scheduled to be sent out by 2018.

ER versus ERE

- There is no set guideline as to when subject lands need to be designated as ER or ERE. This is usually negotiated with the applicant/developer.
- The City prefers ER or MR rather than ERE.
- Usually ERE is only used with NGOs or environmental groups and rarely entered into with private developers.

Sturgeon County	• The LUB was updated and approved in September 2017 ○ S.511 Hazardous Lands and 17.1 Development Constraints Overlay are now the two main policies within the LUB that affect development near water bodies. • If an ASP does not exist for an area, the regulations in the MDP still apply. • The County follows the EMRB Growth Plan Appendix F: Performance Indicators for the natural environment. Based on

		these indicators, the County is developing performance indicators for the natural environment that they would include in their MDP. The goal is to be able to monitor and report findings on a yearly basis to Council.
	Town of Stony Plain	• At the ASP level a biophysical is required. Based on the findings, a geotechnical is completed during the Subdivision stage.
	City of Spruce Grove	• Any land identified as a natural area within the MDP requires a Natural Areas Assessment during the ASP stage. A biophysical is required to understand the functions of the natural areas. Based on the outcome of this assessment and the location, a geotechnical is required during the subdivision stage (2nd level of assessments). Studies are asked based on the ecological nature of the area. • ASP Applications are also referred to Alberta Environment and Parks. • At present, there is only one development proposed within the Atim Creek floodplain but the area around has extremely high levels of peat and therefore no development can occur. • The City is attempting to undertake a natural area study for the quarter section in the northwest part of the City however most of it is privately owned and gaining access is an issue. **ER** • ER is usually taken from the floodplain of Atim Creek. **Alberta Wetland Policy** • This provincial support has given municipalities more authority to demand a higher standard of environmental conservation and therefore can improve their negotiations with developers.
	Town of Morinville	• During the ASP stage, a biophysical assessment is required to identify wetlands and other sensitive areas. This is reviewed by internal staff and then carried to the subdivision stage. At the subdivision stage a geotechnical is required to demonstrate how these sensitive areas are affected and what measures are taken to protect them. • Applications are also referred to Alberta Environment and so far, the Town's administration has a good working relationship with them. • ASPs are usually initiated by private developers.
Planning Tools	**City of St. Albert**	**SPO**

	• There are special regulations for lands within and adjacent to the Designated Flood Line. The Designated Flood Line mapping overlay builds on the Alberta Flood Hazard Mapping/ 1:100 Floodplain (1979) but adds factors for urbanization, sedimentation and a factor of safety for the Big Lake basin. The new line is based on updated modelling used by Alberta Environment and science based. It was calculated and mapped for the Sturgeon River, Carrot Creek and Big Lake. This acts as an SPO. **RSMM** • One of the main benefits of this method is that is scientific and considers slope but may be too technical/complex for every municipality or situation. This makes it difficult to implement consistently. • Therefore, there is a need for a simpler model for people to understand and municipalities to follow – perhaps a less technical method combined with overlay mapping and supported by policy.
County of Lac St. Anne	**RSMM** • Setbacks are usually 30m, with the RSMM it changes to 50-60m • The RSMM is used frequently and has not received much push back. • Map 12 and 14 of the MDP shows sensitive areas that would require additional due diligence which makes people aware of the restrictions right away. • The RSMM mapping almost acts as an overlay. • There are exceptions for agricultural land, including a 6 meters setback from top of the bank. If the setbacks take up a lot of their property, they then can request to reduce it.
Parkland County	• Provincial guidelines of a minimum of 6 meter setback from waterbodies act as a starting point. **RSMM** • Was developed for Parkland County about 3 years ago, however, this is just one of the tools used by the County to protect natural areas and the watershed. • Drawbacks: o when completed, does not provide very detailed information about the site. Therefore, only used for simpler or smaller subdivisions. o the information obtained from the RSMM is primarily related to water quality. Which is good, however,

	there are many other factors that are indicative of water quality as well.
	Other **Biophysical Policy** • More detailed than the RSMM • Based on the findings of the biophysical report, the County works with developers to modify the application/plan submitted. Often the requirements will only be applied to sections of the land that are environmentally sensitive or may have an impact on the natural environment. • Appendix 2 Requirements for Technical Reports and Studies, Section 2.1 clearly outlines the process, methods and other requirements for a biophysical report with or without an ASP. • The recommendations from the biophysical report are presented to the subdivision authority that can use the information to make an informed decision about the application. • The Subdivision Authority consists of internal staff and usually includes the Director of Planning and Development Services. **Environmental Monitoring** • The County has a database to monitor the ecological health of all environmentally sensitive areas, not just riparian areas. This was started in 2012 and is due for its first five-year review. Through this, future projects will be monitored and will better inform the Development Officer or the Subdivision Authority. • The County is also developing a Best Management Practices model for the protection of environmentally sensitive areas. Its progress/findings would be annually presented to council.
City of Edmonton	**SPO** All rivers and creeks within the City's boundaries fall under an SPO. This is the one way to protect the natural areas. **Wetland Policy and Natural Area Policy** *they are both high level policy tools • The Natural Area Policy identifies ecological connectivity shown in a map within City of Edmonton and the Big Lake area. • Policy 531 Natural Area System – requires the City's internal staff to evaluate and work with applicants/developers before it is presented to Council. It also requires substantial public participation.

	RSMM • The RSMM is not used. • Instead the above-mentioned tools (Wetland Policy, Natural Area Policy, ER guidelines) and the Top of Bank Policy are used instead.
Sturgeon County	**SPO** • The Neighborhood F Overlay of the Sturgeon Valley in the MDP acts as an SPO. It requires due diligence in addition to what the current zone requires. • Land Owners/Developers are aware of this or are informed about this early on in the development process. **RSMM** • It only applies to Riparian areas and so far, it has not been applied in any development or subdivision application yet. **Density Transfers** - They have not yet been introduced into their policy framework but the County is considering its use and it may be implemented in 2018. **Other policy tools:** **Restrictive Covenant on Title**- a 30 m setback is usually applied however; the due diligence is completed by the land owner/developer. **Outline Plans** along with their supportive technical studies in main developable lands are reviewed by a third party (usually IBI or Urban Systems). **Regional Master Plan**: this is a site assessment tool geared towards agricultural lands. **Conservation Easements**: historically, this has been initiated by land owners. **Provincial Expropriation**: The Province has already expropriated land around lakes within the County.
Town of Stony Plain	• If within 30m of a floodplain, applicants are required to do additional studies to prove there is not flood risk. • Currently, the Town has wetlands delineated. • During the subdivision, through a geotechnical study, developers have to prove there is no risk of flooding.

		• A geotechnical report is required is an application is within the 1:100yr floodline. Areas that are still at risk are then designated as Environmental Reserve. **SPO** • The Map 3.1.0 and 3.2.0 in the MDP serve as a SPO. There are additional regulations and requirements for developments within environmentally sensitive areas to those already enforced through the current designation. **RSMM** • The town does not have a substantial amount of riparian lands to have the RSMM applied that often. Furthermore, these creeks are part of private lands and have not been acquired by the Town. • The RSMM "usually works as long as it is followed properly." Issues rise when developers/applicants try to do things differently. **ER and MR** • They are considered the same district within the Town as residents are not aware of the difference.
	City of Spruce Grove	**SPO** • Due to the diversity in natural areas a SPO would be a "one-size-fits-all" and therefore would not suit the City.
	Town of Morinville	**SPO and RSMM** • Neither are applicable to the Town as the Town does not have any riparian areas. **Water Quality** • The public works department monitors water quality.
Inter Municipal Cooperation	**Parkland County**	• Usually smaller municipalities do not have the same resources as the bigger municipalities and therefore have requested support to carry out certain studies. However, in the case of Parkland County, the Villages have not reached out to the County to date. Some villages do not have a planning department or an employee with proper planning knowledge and therefore development decisions are made based on developer and Council/CAO discussions. There are some instances where they have contracted these services to an external planning/engineering company.

		• Within the next two years the County will be reaching out to the smaller villages for an IDP process. Currently they have 10 active ICFs. • Inter-municipal cooperation also benefits from provincial funding, however bigger municipalities supply more of the other resources, such as technical labor.
Public Education	**City of St. Albert**	• The City has extensive public education on the Sturgeon River Valley, natural areas and biodiversity. • There is an annual Clean and Green RiverFest that has been ongoing for two decades. It is in one day in May where resident volunteers clean up the river valley, ravines and natural areas of the City. There is also a native tree/shrub planting event along the Sturgeon River at an accessible location where residents learn about the benefits of riparian vegetation and native plant biodiversity. • The City also hosts an Arbor Day field trip for all grade 1 students in St. Albert. Students come to a park area within the City to plant native trees to expand natural areas as well as participate in educational activities related to the benefits of trees, their identification and all receive a white spruce seedling to take home. • The City also has designated trails in natural areas throughout the City such as the Grey Nuns White Spruce Forest, Grandin Pond EcoPark and Forest Lawn Ravine. There are also nature signs along the 80 km Red Willow Park trail system. The City and local groups also host major birding or wildlife events near Big Lake such as 'Springing to Life' and the annual Christmas Bird Count. • The City also has a Partners in Parks program where residents can adopt a park or natural area and provide volunteer hours to their maintenance and upkeep
	County of Lac Ste. Anne	• Public education consists of few handouts, website notices, and newspaper articles. • Only those who need to change the use of their property/who are in need of development services, are directed to planning maps. • Environment stewardship is focused around agriculture best management practices
	Parkland County	• The Lake Wabamum Management plan has an educational component to it related to shoreline developments.
		ALUS

- This is directed towards farmers and to increase stewardship and best practices on agricultural lands.
- Financial incentives are provided such as cost-share start ups and annual payments for any land used from privately owned agricultural land for natural area preservation.

Green Acreages Owners

- This is mainly used to improve land use practices on acreages.

Waterfront Living Guide

- This initiative includes informative videos on the County's website to educate people on their impacts on water bodies as well as encouraging them to be more conscious in their water management and land use decisions.

City of Edmonton	**Master Naturalist Program** • Approximately 30 volunteers are trained yearly to raise awareness about natural areas. • Offered to anyone who is interested in learning more about ecology and naturalization in our city and being involved in the stewardship of local natural areas. 1. **Natural Area Steward:** "Adopt" a natural area through activities like ongoing litter control, removal of invasive plants, placement of bird/bat houses, photography, monitoring and reporting damage. 2. **Naturalization Volunteer**: Assist City staff and community groups with naturalization and restoration projects, including possible participation in plant rescue and plant propagation projects. 3. **Nature Educator**: Educate the public about natural areas and local species at fairs, conferences and community events. Provide information to students, residents and businesses about natural areas. 4. **Ecological Monitor:** Conduct inventories of plant or animal species in a certain area over time. Monitor water quality in natural and constructed water bodies or participate in a river valley wildlife census. 5. **Community Volunteer**: Volunteer with one of the many local conservation organizations in Edmonton. **6. Communication and Administrative Support**: Work on the Master Naturalist newsletter or blog, communication efforts, attend meetings and any other activities that maintain and support the program.

Sturgeon County	**Highway 2 Conservation Focus Areas** • Awareness: Local newspaper articles, tours of local projects, seminars and workshops dealing with agricultural sustainability keep area producers well informed. • Farm Calls and Environmental Farm Plans: Sturgeon County works with agricultural producers to find innovative solutions to sustainability issues pertinent to their operation. The primary goal is to help producers adopt beneficial management practices that will make farms more profitable and sustainable. **ALUS** • The County is working towards implementing the ALUS program where agricultural land owners are financially compensated for their conservation efforts (similar to Parkland County). **General knowledge of the planning process** • Land owners/developers undertaking a single lot subdivision are usually unaware of the due diligence required.
Town of Stony Plain	• The Town recently invested in signage within their park areas to increase awareness about the impact of everyday actions and use of the area on the Willow Park Natural Area. • The Town has a Park and Open Space Master Plan. • The Town's conservation efforts have not received much push back from the development community.
City of Spruce Grove	**Developer response** • Most are aware of the requirement for environmental protection. However, the City has seen some push back, namely from one agricultural land owner that refused to collaborate on the natural areas study. • Workshops • The workshops that were organized to inform residents about watershed protection and management has seen a lack of interest. **Natural Areas Conservation Program** • Includes tree planting. • Partnership with Ducks Unlimited to organize workshops but they all had very low turnouts. **Signage** • The Town is investing in signage.

		*Current demographic consists of young families that are not very environmentally conscious (interested in sports).
	Town of Morinville	• The Town requires a public education program that can increase understanding among the public of the affect of development and other uses of the waterbodies downstream. • The Low-Flow Toilet Rebate Program to encourage water conservation was well received and is performing well. • The Town has seen minimum pushback to development standards from developers.
Issues	**County of Lac St. Anne**	• The County does not have the capacity to implement environmental measures on farmland.
	City of Edmonton	• There is a lot of sensitive land below the top of bank, e.g. North Saskatchewan River, Mill Creek, etc, that is affected by development or is unregulated. Therefore, although not a priority, they need to be studied and measures need to be taken to protect them • Accidental beaches: due to the removal of the Old Walterdale Bridge, accidental beaches have formed on the North Saskatchewan River where people have begun to use them recreationally. These are in sensitive areas and do not have any regulations for the type of use.
	Sturgeon County	• Will need supportive policies in the LUB for Agricultural uses near environmentally sensitive areas. Currently, Industrial lands are the most regulated and are also extensively regulated by the Province. • Capital Region Board: the land within the Sturgeon Valley ASP has already been designated as Country Residential by the CRB. The county is attempting the change that since pre-districting land to Country Residential accelerates that type of use. Therefore, without the pre-districting Country Residential lots can build out organically and allow better environmental conservation.
	Town of Onoway	• Currently, the Town relies on groundwater wells as a source of drinking water but now they are becoming depleted. Therefore, the Town has requested pipes to bring in water from the North Saskatchewan River. However, the planning process is taking a long time. • For reasons yet to be determined, the water from the groundwater wells have an extremely high level of Sodium that ruins infrastructure and house appliances.

	City of Spruce Grove	• Sustainability indicators are reported on a bi-annual basis. However, there is a data collection issue and therefore they focus on the MDP review. • It is a challenge to balance economic development with the need for environmental protection. Residents are encroaching on parks and natural areas and this is an enforcement issue. • Data that is more specific to each site is difficult to ascertain.
	Town of Morinville	• Level of communication between Town and Developers/ property owners
Suggestions	**City of St. Albert**	• Smaller municipalities may not have the staff/capacity to undertake research and analysis to support technically intensive methods and therefore choose to have a simple guideline or standard. • Many municipalities also do not have the Sturgeon River flowing through them like St. Albert or be adjacent to a major waterbody and therefore an increase in protection or environmental standards for watershed protection many not seem logical. • The updated Designated Flood Line could be mapped and used for the river and major creeks and lakes. This would be useful for the public and developers as well as municipal planners. Final recommendations of the report should provide concrete examples of what and how effective watershed management policies can be used by both large and small municipalities. • Environmental assessments have to be conducted during growing season to be of value. • Rural and urban municipalities have different planning issues and may require separate policy tools. • The Big Lake Stormwater Masterplan(2004) contains 12 planning tool recommendations that serve as good starting point for this document. • Instead of a "one-size-fits-all" approach to regional watershed management, municipalities could select tools that apply to their specific situation and that they have the capacity to implement with the understanding that the goal of improving the health of the Sturgeon River Watershed is common to all the municipalities within the Sturgeon watershed.
	Parkland County	• The RSMM needs to be more adaptive to different landscapes and development types. It needs to be reassessed and updated.

	• Policy needs to make it to development standards. MDP requirements need to make it into the LUB to be effective.
Town of Stony Plain	• Would be beneficial if recommendations from the Planning Tools Study make it into the participating municipalities' MDPs ad LUBs. This can ensure they are linked to the development process.
City of Spruce Grove	• Can increase environmental awareness by having materials distributed at show home- so people are aware about natural areas and their conservation responsibilities before they purchase properties.

3.0 SUMMARY OF FEEDBACK FROM THE TECHNICAL ADVISORY COMMITTEE (FEBRUARY – APRIL 2018)

Approach to regional watershed management

1. Protecting the watershed is a collective responsibility. Therefore, setting measurable watershed management goals and targets that all municipalities can adopt can help increase policy alignment. Municipalities within the Sturgeon River Watershed have varying levels of capacity in terms of staff, knowledge, and capital. This affects each municipality's ability to carry out studies to support the proper management of the watershed. Additionally, each municipality has varying types of natural areas and levels of impact on the watershed. Therefore, each municipality can select and apply tools that suit their capacity and the level of watershed management required to reach the regional watershed management goals and targets.

Intermunicipal resource sharing and cooperation

2. In some instances, smaller municipalities that have limited resources have requested support from larger municipalities to carry out studies/evaluations when required. Sharing of resources requires collaboration and effective relationships between municipalities.

Underestimation of agricultural impacts on the watershed

3. It is difficult to control development on agricultural zoned lands. In most cases land is cultivated/used for agricultural purposes that go right up to the edge of a waterbody. They are privately owned and so far, not legally required to provide buffer strips. It will be challenging to require them to provide a buffer strip to protect waterbodies.

4. Key agricultural studies within the region include the Edmonton Metropolitan Region Board *Regional Agriculture Master Plan* (RAMP) and the *Sturgeon County Agricultural Engagement Strategy.* The EMRB Master Plan is scheduled to be completed in May 2020 and will have environmental considerations while addressing agricultural development for the next 50 – 100 years. Sturgeon County is in the process of completing their *Agricultural Engagement Strategy* that will serve as preliminary input into the RAMP. This strategy can be used as a two-way communication opportunity; stakeholders of this sector can voice their issues and opportunities while the County can also educate stakeholders about best management practices and the impact of agriculture on the watershed.

Consistency in development standards when they are clearly defined in provincial legislation, and inconsistency in development standards when they are not.

5. All municipalities have attempted to addressed aspects of watershed management but not to the same level of detail. It would be beneficial to have some alignment of policy and regulations.

6. The MGA requires a minimum setback of 6 meters from the "bed and shore of any body of water." The onus of proof for increasing the setback distance rests on the municipality. Currently, there is no specific criteria set by the MGA for increasing the setback distance, especially if a swamp, gully, ravine, coulee or natural drainage course has not been identified. Some municipalities have conducted studies to identify environmentally sensitive lands and have increased the setback distance from waterbodies. However, not all municipalities have the means to carry out the

studies to support an increase in setback distances. There is an opportunity to accomplish this through the work of the SRWA.

Ensuring application of statutory plans (MDP, ASP/ARP, OP) to environmentally sensitive areas where assessment requirements for development and subdivision applications are clearly defined can help establish a consistent minimum development standard as well as monitor cumulative affects of development.

7. As of now, development permit applications are reviewed by local authorities on a case-by-case basis without a formal or established process to measure the cumulative affects of development on the natural environment at a sub-watershed or watershed level. For municipalities that require environmental impact assessments at the ASP or OP stage rather than the DP stage, subdivision and development permit applications have a higher probability of being reviewed in isolation or being exempt from these studies if a statutory plan (other than an MDP) is not applicable to the site. To avoid reviewing development applications in isolation, environmentally sensitive areas should fall under statutory documents that stipulate how development permit applicants should demonstrate the impacts of the proposed development on the natural environment, and simultaneously require local authorities to use this information to monitor the cumulative impacts of development.

8. Most municipalities implement environmental conservation through policies and regulations for development standards. In some municipalities, the MDP stipulates that development applications in and around natural, environmentally sensitive, and flood hazard areas must demonstrate the positive and negative affects of the development on the natural environment, usually through a natural area and/or geotechnical assessment (example, Sturgeon County, City of Edmonton, City of St. Albert). On occasion, this has been used by applicants to request and demonstrate a reason for reduced development standards. It was indicated that higher scientific evidence and legal support for the development standards help municipalities implement the intent of the policies. For example, the extensive scientific and legal support for the City of St. Albert's Designated Flood Line has helped the City require applicants to uphold the development standards within areas near the Sturgeon River.

9. Most municipalities within the Sturgeon River Watershed have non-statutory environmental management plans and other strategic planning documents that guide natural resource management at a local level. Through the new Growth Plan, the Edmonton Metropolitan Region Board can comment on non-statutory plans during the plan preparation phase. The new Growth Plan has specific objectives related to watershed, wetland and natural protection. Although regional approval is not required, it will provide the opportunity for a third-party to review non-statutory plans within a regional context, allowing for a more holistic approach to long range planning.

Monitoring and/or protecting environmentally sensitive areas on privately owned lands

10. Municipalities indicated that when natural areas are located on privately owned lands, it was challenging to gain access to conduct studies or encourage the owners to preserve those areas. Certain tools such as Environmental Reserve, Environmental Reserve Easements, and/or Municipal Reserve can only be used when a land development application is initiated by the owners of those lands.
    In some instances, municipality officials have been refused entry onto privately owned lands when there was a need to conduct environmental monitoring/testing procedures. It was indicated that one of the reasons for this was that property owners may be under the misconception that if it

was confirmed that their property held environmentally sensitive areas, there would be higher development regulations/restrictions on their property that could result in lower property values.

11. According to AEP, where access is denied, alternate nearby locations where access is not an issue can be used to identify, map, and monitor environmentally sensitive areas. According to AEP, most of the land adjacent to the rivers is privately owned and large portions can be heavily treed. Traditional photogrammetric mapping, LiDAR mapping, as well as river cross-section surveys can be carried out without accessing private property. When access to private property is required, surveyors are used to carry out those studies. Section 16 of the *Surveys Act* permits a surveyor and his/her assistants to enter private property without the consent of the owner, as long as reasonable care is taken:

    > *"Right to enter private property*
    >
    > *16. A surveyor and the surveyor's authorized assistants may, using reasonable care, pass over, measure along and ascertain the bearings of any line or boundary, and for those purposes may pass over or through the land of any person, but the surveyor is liable for any damage the surveyor or the surveyor's assistants cause*."

    Similar methods can be used by municipalities to identify areas that require protection. In addition, watershed management policies are more effective if and when they are supplemented with educational strategies.

Voluntary participation at SRWA

12. The North Saskatchewan Watershed Alliance (NSWA) is a Water Planning and Advisory Council designated by the province to support the implementation of the Water for Life Strategy. One of their roles is to facilitate collaborative partnerships that encourage watershed planning and stewardship. The Sturgeon River Watershed Alliance (SRWA) is a voluntary intermunicipal group where administration and elected officials from the participating municipalities volunteer to meet on a regular basis and share watershed management techniques, tools and achievements. Most municipalities with the Surgeon River Watershed are part of the Alliance but the voluntary nature does not guarantee participation from all municipalities within the watershed. Individual participants convey the knowledge received from these meetings to their respective municipalities. Adoption and /or utilization of those methods depend on decision-makers of individual municipalities.

Lessons from the Alberta Wetland Policy

13. By having a set criterion for wetland monitoring, evaluating, and a compensation certification system, it has provided some guidance for province-wide consistency in protecting identified wetlands. Having clear municipal wetland policy and a good working relationship with Alberta Environment and Parks is crucial to protecting wetlands on a sub-watershed basis.

Wastewater impacts

14. Private wastewater systems require enforcement procedures to ensure they are designed and maintained up to health codes. Techniques such as random inspections use by the County of Lac St. Anne, can reduce the impact of private wastewater systems on the watershed.

Groundwater

15. There is limited data on groundwater movement and discharge and recharge areas. Some municipalities (example, Parkland County) have mapped groundwater susceptibility and this is

considered at the ASP stage. This can affect how groundwater is considered during land development applications.

16. Most municipalities have significant portion of land dedicated to single-detached residential dwellings and most have created policies specifying maximum lot coverage. Programs and policies to encourage surface water infiltration for the rest of the lot surface are limited. there The Cities of Edmonton and St. Albert have stormwater utility rates that are assessed based on the percentage of permeable versus impermeable surface on a lot. This acts as a proxy to encourage less 'hard-scaping' such as concrete surfaces and encourage more 'soft-scaping' such as green areas.

Consistent performance indicators used by all participating municipalities can help accurately compare watershed management progress.

17. It was indicated that many municipalities within the Sturgeon River Watershed focus on compliance with federal and provincial standards. Some have developed their own indicators, others rely on those listed in the *EMRB Growth Plan* to measure environmental progress. For example, one of the City of Edmonton's performance indicators include a target amount of land that is to be achieved through subdivision for the purpose of environmental conservation, which is then annually reported to Council. Different performance indicators make it challenging to accurately compare each municipality's efforts and progress for watershed management.

18. Despite the reliance on the performance indicators of the EMRB Growth Plan to measure individual municipality's environmental progress, they are not likely accurate measures of the health of a watershed or a municipality's watershed management progress.

Complexity of the Riparian Setback Matrix Model (RSMM) makes it a challenge to use.

19. The RSMM, although site specific, is not commonly used as it is complex to implement. It considers slope, groundwater risk, vegetative cover, and soil texture and type and can only be applied to riparian areas. Therefore, municipalities have opted to create their own setback assessment methods. A current example is the use of a Biophysical Impact Assessment (BIA) rather than an RSMM by Parkland County, as it was said to be more versatile. The BIA is used for Area Structure Plans, redesignation, redistricting, subdivision or development permit application and must identify and evaluate ecologically sensitive areas and recommend appropriate measures to mitigate impacts.

Inventory/information database of natural resources

20. While most municipalities may record natural or ecologically sensitive areas, there is no consistency in the method or classification.

21. Currently Alternative Land Use Services (ALUS) and the Green Acreages Owners serve as a simple database for environmental stewardship on acreages and farms.

22. Larger municipalities maintain databases classifying environmentally sensitive areas to inform development decisions.

Watershed protection versus economic development

23. All MDPs highlight the importance of environmental health. However, a significant amount of land adjacent to water bodies are high demand residential locations and it can be difficult to balance both needs.

Public awareness

24. Few municipalities offer financial incentives to residents/developers/farmers to encourage environmental stewardship but there is the opportunity to expand the ALUS or Green Acreages programs to new municipalities. Furthermore, although there are numerous resources for living next to a waterbody, e.g. Respect our Lakes, Shoreline Living, not many residents living near a waterbody are aware of the resources. .
25. Most municipalities, especially the towns and counties attract more local developers than non-local developers. There is a need for educational strategies among both development communities.

Enforcement

26. Once environmental standards are introduced into the LUB, they are enforceable during development applications. However, it is a challenge to ensure users abide by the standards set out in the LUB once a development permit/subdivision approval is completed. There are also issues with people encroaching onto natural areas, environmental and municipal reserves over time and there needs to be a method to monitor and enforce these encroachments.

Appendix 2

City of St. Albert Environmental Master Plan Goals and Targets

CITY OF ST. ALBERT ENVIRONMENTAL MASTER PLAN GOALS AND TARGETS

Goal	Target(s)
Manage Air Quality	• Establish baseline of St. Albert's air quality by 2020. • Maintain air quality below Level 2 triggers (nitrogen dioxide, sulphur dioxide, fine particulate matter and ozone) as outlined in the Capital Region Air Quality Management Framework completed by Alberta Environment and Sustainable Resource Development.
Reduce Energy Consumption and Greenhouse Gas Emissions	• Achieve 20% reduction of total corporate greenhouse gas emissions from 2008 levels by 2020. • Achieve 6% reduction of total community greenhouse gas emissions from 2008 levels by 2020.
Promote Sustainable Neighbourhoods and Transportation Choices	• Achieve a minimum density of 30-45 dwelling units per net residential hectare for new neighbourhoods. • Achieve a minimum of 30% medium and/or high-density residential units for new neighbourhoods. • Increase transit ridership equal to or greater than the overall rate of population growth for St. Albert.
Preserve and Manage Trees, Parks and Natural Areas	• Measure existing tree canopy cover and set future target. • Protect top three priority natural areas in the undeveloped areas of St. Albert.
Reduce Solid Waste Generation	• Reduce solid waste generation to 105 kilograms or less per person per year by 2020. • Increase diversion rate to 75% by 2020.
Protect and Improve the Sturgeon River Watershed	• Create watershed group by 2015. • Complete a watershed management plan by 2020.
Improve Water Quality of the Sturgeon River	• Reduce nutrients, pesticides and bacteria levels detected in the Sturgeon River by 2020 as measured by future River Water Quality Index. • Capture 75% or greater of municipal winter sanding material by 2020. • Reduce municipal pesticide use to 0.25 kg of active ingredient (ai) per hectare or lower by 2020. • Reduce residential pesticide use to 0.5 kg of active ingredient (ai) per hectare or lower by 2020.
Reduce Water Consumption	• Reduce total water consumption to 200 litres or less per person per day by 2020.

Goal	Target(s)
Foster Community Environmental Stewardship	• Grow participation in Clean and Green RiverFest, Arbor Day and Naturalization projects to 1000 participants or more by 2020. • Allocate funding to a total of 150 Environmental Initiatives Grant applications by 2020. • Develop one or more new community and/or interdepartmental partnerships each year by 2020.

Appendix 3:

Watershed Policy and Regulation Review of Participating Municipalities

1.0 CITY OF ST. ALBERT

Type: Urban

Predominant uses: Urban Land uses (residential, commercial)

Designated flood line	The trunk of the Sturgeon River diagonally bisects the City. The City of St Albert has well-established development control measures for lands within or near the flood plain. The Designated Flood Line outlined in Section 1.6 and 6.10 of the Land Use Bylaw (LUB) delineates flood hazard lands within the 1:100 year flood elevation, along the Sturgeon River and Carrot Creek. This designation has extensive scientific and legal backing which gives the City leverage to negotiate with developers who choose to develop in close proximity to the Sturgeon River. In particular, requiring the incorporation of a freeboard elevation at 0.5 metres above the designated flood line. The Designated Flood Line identified in the LUB delineates flood hazard lands within the 1:100 year flood elevation, along the Sturgeon River and Carrot Creek. The associated regulations in the LUB provide direction for development proposals within or in proximity to the flood line. In particular, requiring the incorporation of a freeboard elevation at 0.5 metres above the designated flood line. The City has provided publicly accessible digital maps showing flood hazard areas. This designation restricts development to the following: (a) development for the purpose of flood control; (b) public utility building; (c) public utility; (d) bridge or public roadway; (e) temporary campgrounds; (f) pedestrian walkways, parks and trails; (g) golf courses; (h) uninhabited accessory buildings; (i) outdoor recreation service use that would not obstruct the area below the designated flood line; and (j) naturalized stormwater management facility that meets the approval of the City Engineer.
Top-of-bank	Not mentioned in the City's MDP
Setback	For lands within 100 m of the bed or shore of the Sturgeon River, the Development officer may impose additional conditions and require the following studies: a. requiring soils and geotechnical reports to be completed prior to or concurrently with the construction of any development; b. requiring foundations, footings, drainage and any other aspects of the building to be designed and certified by a professional engineer; c. requiring the development to be constructed in accordance with the plans and recommendations of a professional engineer; d. requiring that a professional engineer inspect all or part of the proposed development; e. requiring compliance with specified design criteria; and

	f. requiring a certificate from a professional engineer that all inspections have been satisfactorily completed, that all design criteria have been complied with and that all conditions have been met.
Wetlands	Wetlands are considered during the ASP stage. However, there is no mention of the Alberta Wetland Policy in the City's MDP.
Riparian Area	According to the City's Natural Area assessment "*the vast majority of natural land units along Carrot Creek and the Sturgeon River that are considered critical to the [Detailed Study Area's] riparian corridor are also situated below the designated flood line and/or within the 50 m Carrot Creek setback. Despite this, some natural land units remain vulnerable to development.*" Riparian areas are not mentioned in the City's MDP.
Stormwater management	The City exercises the same management practices and principles of Edmonton's Stormwater Quality Control Strategy as well as its own Stormwater Management Master Plan prepared for the City in 2004. Currently, the majority of the City discharges stormwater into the Sturgeon River, and the impacts of the discharged sediment deposits, erosion etc. had not been assessed at the time of the document's development. However, the City recognizes that sediment discharge needs to be reduced and has been working towards building stormwater systems (i.e. Heritage Lakes Stormwater System) that will better manage stormwater discharge and sediment removal upon discharge. The City has an annual water quality monitoring project for their stormwater ponds and outfalls. For more information refer to: Storm Water Management Plan, 2006 and Storm water Master Plan, 2015
Wastewater management	Wastewater from the City is treated at the Alberta Capital Region Wastewater Commission (ACRWC) before being discharged into the North Saskatchewan River.
Groundwater	No mention of groundwater/groundwater recharge areas/aquifers in the City's MDP or St. Albert Natural Areas Assessment - 2015 Update. Limited policies to regulate groundwater.
Inventory of Natural Areas	The City conducted a Natural Areas Assessment in 2015 that updated the City's Natural Areas Inventory which identified a total of 193 natural areas totaling a combined 491 ha within city limits. For more information refer to Urban Forest Management Plan 2004, Urban Forest Management Plan Addendum - East Campsite Forest, 2007.
Performance Indicators	The City's Environment department prepares an annual report on the environment that is publicly accessible. One of the goals is to protect and improve the Sturgeon River Watershed. According to the City's 2016 Report on the Environment, water quality is measured at five different locations of the Sturgeon River.
Planning Process and Tools	During the ASP stage, respective technical studies such as geotechnical, environmental, natural areas, traffic impact, and/or waster/storm water servicing studies are required.

The City has several guiding documents that inform staff decisions for wetlands, waterbodies and watercourses. For more information, refer to the City's Stormwater Master Plan, Natural Areas Assessment in 2015, Big Lake Basin Implementation Plan, and the City's Community Report on the Environment.

2.0 CITY OF SPRUCE GROVE

Type: Urban

Predominant uses: Residential, commercial

Designated flood line	Areas located adjacent to Dog Creek or Atim Creek are prone to frequent flooding and have been mapped. According to Section 31.4 no permanent building is permitted within a 1:100 year floodplain, unless the developer is able to demonstrate adequate flood proofing.
Top-of-bank	Determined by the Development Officer as outline in Section 31 of the LUB
Setback	No permanent building is permitted within 20.0 m of the top of bank of any water body, or the top or bottom of a slope that exceeds a 15% Grade as outlined in Section 31.6 of the LUB.
Wetlands	Wetland locations are indicated within the MDP (figure 6) and included in conservation Section 4.4.1.3.
Riparian Area	Riparian Zones are defined as "*Areas bordering streams, lakes, rivers, and other watercourses. These areas have high water tables and support plants requiring saturated soils during all of part of the year*" and are to be protected from development according to Section 4.4.1.3 of the MDP.
Stormwater management	The City ensures that all stormwater operations are in compliance with the Big Lake Basin *Stormwater Management* Plan 2004. The MDP has set provisions to incorporate stormwater management facilities into their parks and open space in Section 5.5.2.2, Stormwater is managed through ponds or wetlands as well as their Stormwater Management Plan referenced in Section 5.7.1.3 Furthermore, the City aims to ensure the discharge rates and pollutant loadings of runoff entering Atim Creek and Dog Creek are at predevelopment levels.
Wastewater management	Wastewater from the City is treated at the Alberta Capital Region Wastewater Commission (ACRWC) before being discharged into the North Saskatchewan River.
Groundwater	The MDP mentions polices for appropriate groundwater discharge into groundwater in policy 4.4.1.4 but is not refer to in the LUB.
Inventory of Natural Areas	An Open Space Inventory and Analysis was completed in the *Parks and Open Space Master Plan* in 2007, that lists all available parks, fields, etc. within the City. Figure 6 of the MDP shows environmentally significant areas. Atim Creek, a tributary of the Sturgeon River follows the NW boundary of the City. Lands adjacent to the Atim Creek that fall within the City boundary are considered environmental significant "Area A" and are subject to flooding.
Performance Indicators	Included in the strategies to monitor the MDP's success are Community Sustainability Indicators (has yet to be developed), of which include Environmental Management Indicators. The MDP also lists provisions to develop water quality indicators in Policy 7.2.1.6.
Planning Process and Tools	All lands identified as Natural Areas within the MDP require a Natural Areas Assessment during the ASP stage. A biophysical is required to understand the functions of the natural areas. Based on the outcome of this assessment and the location, a geotechnical is required during the subdivision stage (2nd level of assessments). Studies are asked based on the ecological nature of the area.

	Applications are also referred to Alberta Environment. At present, there is only one development proposed within the Atim Creek floodplain. The area has extremely high levels of peat and therefore no development can occur. A Development on or near a slope requires a geotechnical assessment conducted by a professional engineer licensed in the Province of Alberta as part of the Development Permit application. The report must demonstrate defined flood hazard areas, bank stability, safe building elevations, and mitigation of the potential for flood damage or erosion of the bank, to the satisfaction of the Development Officer.

The City has several guiding documents that inform staff decisions for wetlands, waterbodies and watercourses. For more information, refer to the Big Lake Basin Implementation Plan, the City's Open Space Master Plan, and Environmental Sustainability Action Plan.

3.0 CITY OF EDMONTON

Type: Urban

Predominant uses: Residential, commercial, industrial

Designated flood line	Flood Hazard Areas have been identified and are shown digitally making them publicly accessible information. Majority of the lands abutting water bodies in the Sturgeon River Watershed that are within the City's boundaries are zoned (A) Metropolitan Recreation Zone and allow the following uses: "540.2 Permitted Uses 1. Urban Gardens 2. Minor Home Based Business 3. Public Park 4. Fascia On-premises Signs 5. Projecting On-premises Signs 6. Temporary On-premises Signs 540.3 Discretionary Uses 1. Carnivals 2. Child Care Services 3. Community Recreation Services 4. Exhibition and Convention Facilities 5. Greenhouses, Plant Nurseries and Garden Centres 6. Indoor Participant Recreation Services 7. Major Home Based Business 8. Minor Impact Utility Services 9. Natural Resource Development 10. Natural Science Exhibits 11. Outdoor Participant Recreation Services 12. Protective and Emergency Services 13. Public Libraries and Cultural Exhibits 14. Single Detached Dwelling 15. Spectator Entertainment Establishments 16. Spectator Sports Establishments 17. Tourist Campsites 18. Freestanding On-premises Signs" The City has developed a Floodplain Protection Overlay Map showing flood prone areas and is outlined in Section 812 of the LUB.
Top-of-bank	A Top of Bank Policy has been developed (Policy C542 – Development Setbacks from River Valley/Ravine Crests), specifically pertaining to the River Valley. Top of Bank within the policy is dependent on the following factors:

	An assessment of environmental hazards is required within lands Abutting the Crest. The study area will be established as a function of the slope height or vertical distance between the Crest and Toe of the Slope. The Estimated Long Term Line of Stability will be the primary scientific methodology for determining slope instability and failure. An Urban Development Line, which primarily delineates developable and nondevelopable land, will be established on the Upland Area. Fire risk will be considered in the context of the Wildland/Urban Interface and evaluated under the Wildfire Hazard Assessment System. For Major Slopes where the geotechnical assessment identifies landslide hazards or areas deemed to be of higher geotechnical risk, a TOB Roadway will be the predominant form of urban development used.
Setback	Urban Development Setback from the River Valley and Ravine System (or Environmental Reserve in this case) is determined by the Urban Development Line (UDL). The UDL is largely determined by the Estimated Long Term Line of Stability, subsurface conditions (mines), excavations or sinkholes, or flooding or any other lands contemplated as Environmental Reserve under the MGA.
Wetlands	A Wetland Strategy Policy document was developed in 2012 to address the protection, management and engage of wetland and wetland initiatives for the City, as well as specific wetland preservation policies outline in the MDP. The City of Edmonton was represented on the Provincial Wetland Policy Working Group. The City actively uses the *Wetland Policy* to supplement its own City Council approved Wetland Strategy. The City's Wetland Strategy toolbox contains legislative and physical programing tools to secure and acquire wetlands, manage and research wetland practices, and finally, to engage its citizens to increase awareness and stewardship towards wetland areas. For example, the City has integrated constructed wetlands within the Stormwater Quality Control Strategy and Action Plan as well as their Stormwater Servicing Strategy. Constructed wetlands are a proven cost-effective method to naturalizing the stormwater systems while providing ecological benefits. The City's constructed wetlands have been largely self-sustaining, with few requirements for intervention. The City also utilizes a series of wetland acquisition tools, starting with its Natural Areas Reserve Fund and Natural Areas Acquisition Strategy. Since 2005, the City dedicates $1.0 million to the fund annually and has leveraged this fund to borrow $20 million and is applying this to natural areas with strong potential for public education as well as areas with the highest biodiversity and conservation potential. The City also uses research and monitoring tools to identify and rank ecologically significant areas. To date, natural, constructed and storm-water influenced wetlands within the City have all been studied. Monitoring has included features like amphibian abundance, plant diversity, bird nesting behaviour, and ecological connectivity. Invertebrate richness and diversity are also measured, in part to learn more about the water quality of each site. Based on these observations, recommendations are made each year that guide the City's design of constructed wetlands and the ongoing management of natural and

	constructed sites. In addition, the City relies on a host of managing, and public education tools to protect its wetlands, some being: 1. Ecological Information Requirements (Policy C-531) 2. Terms of Reference for Area and Neighbourhood Structure Plans 3. Environmental Reserve Guidelines 4. The Wetland Loss Compensation Site Framework 5. Wetland Mitigation Bank 6. Ecological Restoration Plans 7. Corporate Reporting 8. Communication, Education and Public Awareness (CEPA) Initiative 9. Master Naturalist Program 10. School and Facility-based Programs 11. Land Trust Partnerships
Riparian Area	Riparian Zones are classified as Riverine Habitats in the Biodiversity Report (2008) and include the tributary creeks and the slopes of both the river valley and ravines.
Stormwater management	A formal Stormwater Quality Control Strategy & Action Plan had been implemented in 2008. Stormwater drains into the North Saskatchewan River or tributary creek.
Wastewater management	Treated by the Gold Bar Wastewater Treatment Plan.
Groundwater	Groundwater is referenced in the Municipal Environmental Strategic Plan, The Way We Green in section 4.1.1; "*Protect groundwater quality and quantity in the watershed*"
Inventory of Natural Areas	The City has outlined policies for the enhancement of natural areas inventory in its MDP (section 7.4.2), as well as provided access to online maps that overlay existing protected and unprotected natural areas (2007).
Performance Indicators	The Way We Green's follow up document, Edmonton's Report on the Environment, outlines several indicators/measures that provide quantitative estimates of the state of the City's ecological resources, including water which is measured by the Alberta River Water Quality Index, and index that summarizes water quality, and a specific annual measure that measures the discharge of contaminants into the North Saskatchewan River. The City has a target and monitors and annually reports their land acquisitions through Subdivision within their Natural Areas zone (generally lands adjacent to the river) to its Council. This is used as one of their environmental performance indicators.
Planning Process and Tools	Technical Studies are required at different phases in the ASP and NSP process. For the preliminary report, an Ecological Network Report (ENR), Hydraulic Network Analysis (HNA), and Parkland Impact Assessment (PIA) are required. This report is to be submitted in the initial phase to the planning department. For the Final Report to be submitted to the Planning Department, an Environmental Site Assessment (ESA) is required. Section 14.4 states that proposed developments within the Floodplain Protection Overlay areas are required to submit information regarding the geodetic elevation of the building location and lowest point of access for the buildings; as well as a

	certificate from a registered professional Engineer or Architect entailing the design considerations for floodproofing that include: (a) Canada Mortgage and Housing Corporation guidelines for building in flood-susceptible areas; (b) the flood-proofing of Habitable Rooms, electrical panel and heating units, and operable windows; (c) Basement drainage; and (d) Site Drainage. The City also uses various planning tools to protect land adjacent to waterbodies. Some include the appropriate acquisition of wetlands, riparian areas, and buffers according to the MGA. The City also works with owners of privately held wetlands through conservation easements, compensate them for easements.

The City has several guiding documents that inform staff decisions for wetlands, waterbodies and watercourses. For more information, refer to the Big Lake Basin Implementation Plan, the City's Natural Connections Strategic Plan, 2007, Natural Areas systems Policy, City of Edmonton's Guidelines for Determining Environmental Reserve (ER) Dedication for Wetlands and Other Water Bodies, City of Edmonton Wetland Strategy 2012, City of Edmonton Biodiversity Report, 2008, Edmonton's Report on the Environment, 2015.

4.0 PARKLAND COUNTY

Type: Rural

Predominant uses: Agriculture, country residential

Designated flood line	Two separate floodplain overlays have been provided online for the County's two major waterbodies. One of these, the Atim Creek/Big Lake Overlay, is within the Sturgeon River Watershed. The overlay outlines uses that may be considered on a discretionary basis. A Flood Plain (1:100 Year) Analysis is required for proposed multi-parcel and major development applications on sites located adjacent to a significant waterbody. As per section 10.3 of the LUB, regardless of the underlying land use districts, only the following uses are considered on a discretionary basis within the Atim Creek/Big Lake Floodplain Overlay: a) private open space; b) environmental reserve or natural areas; c) existing uses, provided such uses were approved by the County prior to the passing of this Bylaw; d) alterations or the reconstruction of an existing building or structure may be permitted within the building footprint that existed at the time of passing of this Bylaw; e) extensive agriculture; f) forestry; g) public utilities; h) passive outdoor recreation; i) golf courses with environmental protection plan, excluding a clubhouse;" As per Appendix 2 section 2.4 of the MDP, all proposed multi-parcel and major development applications on sites located adjacent to a significant waterbody require a Floodplain (1:100 Year) Analysis. A hydrologist shall confirm: a. Where the floodplain and flood-prone/fringe areas are; b. How often the floodplain will be covered by water; c. How long the floodplain will be covered by water; and d. At what time of year flooding can be expected.
Top-of-bank	Section 11.3 of the LUB indicates that Top-of-bank is to be determined by a survey conducted by a geotechnical engineer or by any other method determined satisfactory to the Development Authority.
Setback	Building setbacks from "hazard lands" should be as follows: "(a) A minimum of 30.0 m; (b) A minimum of 50.0m, in industrial land use districts (c) A lesser distance specified in a geotechnical analysis required pursuant to Subsection 11.3.2; or

	(d) A lesser distance that in discretion of the Development Authority, is considered acceptable, from the top of bank, as determined pursuant to Subsection 11.3.2, or any other escarpment or steep slope where the grade exceeds 30%." The MDP also references the use of the Parkland County Riparian Setback Matrix model in Section 10.4.4 to determine the setbacks for new developments adjacent to riparian areas along waterbodies. Section 10.4.4 also requires Best Management Practices and Provincial guidelines be incorporated where applicable.
Wetlands	A map of relevant wetlands (figure 6 of the MDP) is provided in the MDP and references multiple policies that include wetland and context in section 10.4. Specifically, Section 10.4.2 acknowledges Council support for implementing the Alberta Wetland strategy. A Wetland Inventory & Historical Loss Assessment was completed in 2016 that documents wetland locations, an estimate of the historical loss of wetlands in the area, as well as the assignment of ecological value to the individual wetlands. This document is used in addition to County's Environmental Conservation Master Plan to identify and address the scale and type of wetlands in the sub-watershed. During development, the first preference is avoidance of any impact on wetlands.
Riparian Area	The Parkland County Riparian Setback Matrix Model is used to determine the area of Environmental Reserve between waterbodies and urban development but has been applied limitedly. The County requires comprehensive biophysical assessments for multi-parcel subdivisions and along with identified setback expectations from riparian area that are further refined at development permit stage. At minimum, a desktop biophysical for rural subdivisions near wetlands and significant tree stands.
Stormwater management	Section 7.1.8 (c) of the MDP mentions the considerations for stormwater management when examining Low Impact Development (LID) practices for new lakefront and riparian developments. Low Impact Development is defined in the County's Sustainability Plan as *"…an engineering approach to storm water runoff management. The approach is based on employing on-site natural features (i.e. storm swales) to contain the runoff entirely within the property.* "
Wastewater management	Wastewater from the County is treated at the Alberta Capital Region Wastewater Commission (ACRWC) before being discharged into the North Saskatchewan River.
Groundwater	The County has mapped Groundwater Susceptibility. Hydrologic assessments are required for proposed multi-parcel and major development applications on sites located in areas with a medium or greater groundwater susceptibility. For relevant proposed developments, a Groundwater Assessment may be required as per Appendix 2 of the MDP. This must be completed by a professional engineer, geologist or geophysicist, that identifies: "(a) the quantity and quality of Groundwater available to Households within the Proposed Subdivision; (b) potential interference with Existing Groundwater Users; and (c) and consistency with an Applicable Approved Water Management Plan" As per section 10.4.3, the County supports a "no-net increase of post development nutrient discharges in sensitive groundwater areas, including waterbodies,

	wetlands and watercourses, as identified in the County's Environmental Conservation Master Plan."
Inventory of Natural Areas	The County has an inventory of Environmentally Significant Areas (ESAs) provided in their Environmental Conservation Master Plan that identified/informed the establishment of High Priority Landscapes (HPL – overlapping features of ecological importance) in the County's MDP. The County's MDP also addresses natural ecological capital and ecological goods and assets.
Performance Indicators	The County has no formally outlined environmental performance/quality indicators aside from key indicators of the success of the MDP implementation.
Planning Process and Tools	The County requires biophysical studies and geotechnical studies for all planning, development, subdivision, and capital projects if they are adjacent to ESAs. The Biophysical Assessment Policy is more versatile than the RSMM. Recommendations from the biophysical are presented to the subdivision authority that can make an informed decision about the application. In addition, the MDP refers to Conservational Easements as a tool to conserve Environmentally Significant Areas. The County also has established a Parklandia Program that is an educational tool for community planning.

The County has several guiding documents that inform staff decisions for wetlands, waterbodies and watercourses. For more information, refer to Detailed review of Environmental Conservation Master Plan.

5.0 STURGEON COUNTY

Type: Rural

Predominant uses: Agricultural uses

Designated flood line	Section 4.3.8 of their MDP outlines provisions for identifying Flood Risk Areas. The County has identified flood risk areas and includes policies restricting the subdivision and development within those lands. Lands adjacent to water bodies require further due diligence. According to Section 4.3.4 of the MDP, all applications that are non-agricultural development require the identification of Flood Risk Areas, in areas recognized as prone to flooding. Where development is proposed near the 1:100 year flood plain, the developer will be responsible for defining the precise boundary/contour of the Flood Risk Area. Section 2.4.3 of the LUB requires a qualified professional to confirm proposed development is suitable and prescribe preventative engineering measures to be taken to make the site suitable for the proposed development on lands that may be prone to flooding, erosion, subsidence or other naturally occurring hazard.
Top-of-bank	A separation line (development line) between developable and non-developable land has been established and is covered under their Conservation buffer. The County defines top-of-bank as the development line, which is "an area to be delineated, by a qualified professional within which a proposed development can safely proceed without negatively impacting natural features. The development Line is set back from the crest of the slope. Area between the crest and the development line is the non-developable area.
Setback	For the purposes of Environmental Risk Management, setbacks are not given a specific distance. Table 1. Setback Determination Criteria of the MDP classifies criteria in terms of conditions such as slope, groundwater, floodplain, and vegetation, etc. and provides professional qualifications for those involved in setback determination.
Wetlands	Wetlands are part of Aquatic Resources and Natural Areas Shown in MAP 11-Neighbourhood F (overlay) - Context Map of the MDP
Riparian Area	The County also has adopted the RSMM but as of December 2017 has not applied them to development or subdivision applications.
Stormwater management	Big Lake Stormwater Management Plan for recommended practices and policies regarding stormwater management, flood-plain management and sediment management in close proximity to the Sturgeon River and Big Lake.
Wastewater management	Wastewater from the City is treated at the Alberta Capital Region Wastewater Commission (ACRWC) before being discharged into the North Saskatchewan River.
Groundwater	A comprehensive groundwater assessment was completed for the county in 2001 that outlines information to assist the management of the groundwater resource within the County.
Inventory of Natural Areas	MAP 11-Neighbourhood F (overlay) - Context Map of the MDP shows Aquatic and natural areas.
Performance Indicators	The County has outlined several environmental stewardship actions within its MDP that involve developing inventories for aquifers, wetlands, and land (still in

	development) as well as Environmental Indicators that will serve to establish environmental considerations pertaining to the natural environment (still in development)
Planning Process and Tools	Rely on a Geotechnical and a biophysical. Planning tools include Restrictive Covenants, Outline Plans, Regional Master Plan, Conservation Easements, and Provincial Expropriation.

Additional Information:

Sturgeon County is currently in the process of developing an Agricultural Engagement Plan.

Section 4.3.8 of the MDP mentions the County's goal to initiate the development and implementation of a Watershed Management Plan in consultation with regional stakeholders and provincial authorities to identify and map significant water resources (and associated lands) including riparian lands, wetlands, flood zones, natural drainage systems and dedicated reserve lands.

The County has several guiding documents that inform staff decisions for wetlands, waterbodies and watercourses. For more information refer to the County's Strategic Plan 2012-2021.

6.0 LAC STE. ANNE COUNTY

Type: Rural

Predominant uses: Agricultural uses

Designated flood line	The County has identified locally relevant flood hazard zones (Map 12 of the MDP) with high flood risk. Development is generally prohibited, and potential developments require a site-specific study to identify the 1:100 flood plain level if the site is within flood prone areas. According to Sections 9.10.17 – 9.10.20 of the LUB, development of permanent enclosed structures is generally prohibited within these areas. A site-specific study to identify 1:100 years flood plain level for new developments within or adjacent to the potential flood prone areas is required.
Top-of-bank	The County indicates in Section 3.4.9 (b) of the LUB that the top-of-bank "shall be determined by a survey conducted by a geotechnical engineer or by any other method determined to be satisfactory to the Development Authority"
Setback	Map 12 of the LUB shows required setback distances from key waterbodies as well as areas where Slope Stability Studies are required. No specific regulations for the interface of agricultural operations with waterbodies.
Wetlands	Sections 9.10.25 – 26 identify and require conservation of priority wetlands. Wetlands that meet the following conditions are to be preserved in the natural state: a. All bogs in the County; b. All fens greater than 20.0 hectares (49.42 acres); c. All wetlands identified as the Very High Groundwater Risk areas in accordance with the Hydrogeological Study prepared by the County; and d. All wetlands identified within the inventories of ESAs and Aquatic ESAs identified by the Province with Lac Ste. Anne County shall be preserved in their natural state Development restrictions within wetland areas are referenced multiple times in the LUB, and typically only permits wetland development if there are minimal impacts to natural surface and groundwater flow, and protects the wetlands from general pollution/pesticides/infilling practices.
Riparian Area	Section 110.2.21 shows the adoption of the Riparian Setback Matrix Model (RSMM). According to County Administration, the RSMM is regularly used. However, according to Section 9.11.25 of their MDP, apart from CFOs the RSMM does not apply to agricultural operations, thereby deregulating the interface between agricultural operations and waterbodies. As for residential developments on lakefronts, Section 9.10.7 prohibits removal of the natural riparian buffer. Lakefront residential properties also require an erosion and sediment control plan by a Certified Professional in Erosion and Sediment Control according to Section 9.10.6.
Stormwater management	Rely on the use of wetponds where if off-site discharge is created, it is diverted onto adjoining privately owned lands or municipal/provincial drainage networks such as road ditches as mentioned in Section 9.6.22.

Wastewater management	Wastewater in the County is primarily serviced by on-site sewage treatment systems such as holding tanks, fields, open discharge or mounds in accordance with the municipal and provincial regulations. For the past 14 years, the County has an unofficial enforcement procedure to carry out annual random sewage inspections on 100-150 properties in the watershed. On average, 15% of tanks inspected are not compliant with their engineering standards and therefore are required to be bought up to code.
Groundwater	High Groundwater Risk areas have been identified and shown in Map 13 of the MDP A Hydrological Ground Water Impact Report is required for any commercial, industrial, or multi-parcel development as per Section 3.4.7 of the MDP.
Inventory of Natural Areas	The County references a Lac St. Anne Environmental Inventory Study completed in 2014. Map 11 of the MDP shows Locally Relevant Environmentally Sensitive Areas.
Performance Indicators	The MDP has an ongoing provision to establish indicators to measure the quality of water in its waterbodies and underground reserves but no immediate watershed indicators available.
Planning Process and Tools	A Geotechnical and Biophysical Study is required during a development permit or subdivision approval stage for lands in or near environmentally sensitive areas. A geotechnical study or a slope stability study may be required in accordance with Map 12 and to the satisfaction of the development authority to confirm that the proposed development would not cause a negative impact on the slope stability of the subject site or any adjacent lands.

Additional Information:

Being a smaller municipality with lesser resources than the cities, one of their challenges is the capacity to control farmers or undertake extensive studies to increase water conservation stewardship.

The County has several guiding documents that inform staff decisions for wetlands, waterbodies and watercourses. For more information refer to the County's website.

7.0 TOWN OF STONY PLAIN

Type: Urban

Predominant uses: Residential

Designated flood line	Atim Creek, a tributary of the Sturgeon River vertically bisects the eastern half of the Town. Flood risk areas have been identified and require technical studies during the development and/or subdivision stage. According to the Land Use Bylaw Districts Map, large portion of lands within the flood risk areas have been designated for residential uses. Subject to the required technical studies, at the discretion of the Development Authority, buildings and/or structures have and can be permitted within flood risk and flood fringe area.
Top-of-bank	Top-of bank criteria was not mentioned in the MDP or LUB
Setback	Development or subdivision proposals within 30 meters of a floodplain require technical studies that could increase the minimum setback distance mentioned in the land use district the lot is zoned for.
Wetlands **Riparian Area**	The MDP or LUB do not contain policies explicitly prohibiting development or certain uses within wetlands or riparian areas. However, Direction 6.2 (c) of the MDP broadly mentions environmental goals where wetlands, water courses, and water bodies and their associated riparian areas require protection, enhancement and conservation through "environmental reserve dedication and conservation easements, donations and bequests," or any other means. Wetlands and riparian areas are considered during the development and or subdivision stage. However, apart from broad goals set out in the MDP
Stormwater management	Stormwater throughout the Town is managed through storm ponds that are gradually released through an outfall structure, into creeks, rivers or other water systems. Development within the Natural Conservation Areas and flood risk areas may require enhanced stormwater drainage and maintenance. The Town also has mandatory standards for onsite erosion and sediment control, including planning, maintenance, operation and inspection to minimize stormwater impacts on creeks, streams and rivers.
Wastewater management	Wastewater from the City is treated at the Alberta Capital Region Wastewater Commission (ACRWC) before being discharged into the North Saskatchewan River.
Groundwater	The MDP not LUB explicitly mention Groundwater or aquifers.
Inventory of Natural Areas	The land use map of the MDP shows parks and natural areas, but a break down of the type of natural areas is not given making it challenging to identify areas riparian areas.
Performance Indicators	The MDP mentions the development of "comprehensive indicators" that will monitor the approach for the region's land use plan – of which includes protecting the environment and minimizing the regional footprint.
Planning Process and Tools	The Town requires a biophysical and environmental review at the ASP stage prepared by an accredited professional environmental scientist and a geotechnical at the subdivision stage.

For areas specific to water bodies, Policy 3.2.0. of the LUB states:

"3.2.0. Proximity to a Water Body or a Stream Course

1. Where any proposed development or subdivision is within 30.0 m of a water body or a stream course, the Development Authority may require a study to determine the location of:

a. flood risk areas; and

b. flood fringe areas.

2. In the case of the lands adjacent to Atim Creek where the flood risk areas are shown on Figure 3.2.0., the Development Authority may require a study to determine the location of flood fringe areas.

3. Notwithstanding any other provision of this Bylaw, where the study specified above indicates the presence of flood risk and flood fringe areas, the Development Authority may:

a. not permit any new buildings or other structures, or storage in the flood risk area;

b. allow land to be improved in order to provide an opportunity for development where:

i. a deeper channel that ensures adequate storage capacity is constructed;

ii. a drainage outlet with mitigation to achieve no net loss of flood storage is constructed; and

iii. reclamation and naturalization of the drainage channel to re-establish riparian areas is constructed;

c. required that all windows and opening in new buildings within the flood fringe area be located a minimum of 0.50 m in elevation above the 1 in 100 year flood level;

d. require the determination of a safe building elevation; and

e. require a stormwater drainage plan be established."

The Town has several guiding documents that inform staff decisions for wetlands, waterbodies and watercourses. For more information refer to the Town's Environmental Stewardship Strategy 2007.

8.0 TOWN OF GIBBONS

*Could not interview

Type: Urban/Rural

Predominant uses: Agricultural Land, Residential

Designated flood line	No designated flood line. The path of the trunk of the Sturgeon River coincides with the western edge of the Town. The area abutting the Sturgeon River falls under the Sturgeon River Valley Joint Area Structure Plan, 1983. According to the ASP, this area was envisioned to be park and developed recreational uses with natural, undeveloped areas. These lands are designated Semi-Public (SP). Section 4.15 of the LUB allows the following uses: "(a) Permitted Uses (i) Institutional uses (ii) Places of worship (iii) Public education facilities (iv) Public parks (v) Recreational facilities (vi) Buildings and uses accessory to permitted uses (b) Discretionary Uses (i) Cemeteries (ii) Day care facilities (iii) Exhibition and convention facilities (iv) Extended medical treatment facilities (v) Government services (vi) Group care facilities (vii) Health services (viii) Libraries and cultural exhibits (ix) Private clubs (x) Protective and emergency services (xi) Public uses (xii) Recreational trailer parks (xiii) Other uses which, in the opinion of the Development Authority, are similar to the above mentioned permitted and discretionary uses (xiv) Buildings and uses accessory to discretionary uses"
Top-of-the-bank	No criteria to determine top-of-bank mentioned in MDP or LUB
Setback	A minimum setback distance of 6 meters from the top-of-bank is required and will be considered as Municipal Reserve (MR).
Wetlands	No reference to Wetlands in the MDP or LUB
Riparian Area	No reference to riparian areas in the MDP or LUB

Stormwater management	Stormwater often infiltrates into the sewage system causing the system to run close to capacity during sever rainstorms. Therefore, every development application provision or adherence to the Stormwater management plan for subject lots if required by Alberta Environment. A stormwater management plan has not been established by the Town, however, Policy 70 of the MDP calls for a Town stormwater management plan. However, the discharge of treated stormwater and interface with waterbodies is not mentioned.
Wastewater management	Wastewater from the City is treated at the Alberta Capital Region Wastewater Commission (ACRWC) before being discharged into the North Saskatchewan River.
Groundwater	Developers may be required to conduct water table testing. Development is restricted on lands with high water table, according to the Town, is 2.1 meters below the ground surface.
Inventory of Natural Areas	Not mentioned in MDP or LUB
Performance Indicators	No mention of environmental Performance indicators in MDP or LUB
Planning Process and Tools	As per Section 3.4.4 of the LUB, during the development permit stage the Development authority may require "engineering information in order to assess the stability of the site from the perspective of potential bank 31 erosion or slumping and storm water management, especially in areas close to the valley of the Sturgeon River." Policy 44 of the Town's MDP sets out development regulations as follows for lands abutting the Sturgeon River that fall within the Town boundary: 1. "ensure that development is compatible with the development of the river valley as a recreational and conservation area; 2. ensure that development is directed away from steep or unstable slopes, significant tree stands, and/or areas considered to be wildlife habitat and that these features be left in their natural state; 3. require that development occurring above the valley break be set back a minimum of 6 m from the top-of-the-bank; 4. require that land be dedicated as municipal or environmental reserve as per Policy 44: Reserve Dedication; and 5. require that, prior to any development being approved near the Sturgeon River Valley, a bank stability assessment be undertaken by the development's proponent, which indicates the current stability of the river valley walls, the manner in which stability is to be ensured during the construction period, and the manner in which stability is to be maintained afterwards. Development will be set back from the top of the Valley as is required to ensure that the development will not be subject to a subsidence hazard."

The Town has several guiding documents that inform staff decisions for wetlands, waterbodies and watercourses. For more information refer to the Town's website.

9.0 TOWN OF ONOWAY

Type: Urban

Predominant uses: Residential

Designated flood line	No designated floodline The trunk of the Sturgeon River does not flow through the Town.
Top-of-bank	As per Section 4.11.1, the Town requires Top-of-bank to be determined "by the Development Officer or Municipal Planning Commission in consultation with Alberta Environment"
Setback	Section 4.11.2 does not permit any permanent buildings within 6.0 m. of the top of the bank of any water body nor any development within 6.0 m of the top or bottom of an escarpment bank or slope where the grade exceeds 15 percent. However, at present there are no temporary or permanent developments around the waterbodies.
Wetlands	n/a
Riparian Area	n/a
Stormwater management	The Town only has a dry creek bed that connects to the Sturgeon River as the only source of direct run-off. This creek bed is used for stormwater drainage.
Wastewater management	Wastewater from the Town as well as some surrounding villages is directed to a sewage lagoon where it is treated and allowed to settle for approximately 2 years before it is discharged into the Sturgeon River.
Groundwater	The level of its impact on groundwater is unclear at this point.
Inventory of Natural Areas	n/a
Performance Indicators	n/a
Planning Process and Tools	Largely at the discretion of the Development Officer and Municipal Planning Commission

The Town has several guiding documents that inform staff decisions for wetlands, waterbodies and watercourses. For more information refer to the Town's website.

10.0 TOWN OF MORINVILLE

Type: Urban

Predominant uses: Residential

Designated flood line	No designated floodline. The trunk of the Sturgeon River does not flow through the Town.
Top-of-bank	Not referred to in the MDP or LUB As the Sturgeon River does flow through the Town of Morinville, there is no direct run-off from the Town into the River. Policies and or programs to protect land between top-of-bank to the bed or shore of the river would not be applicable to the Town.
Setback	n/a
Wetlands	Policy 9.19 of the MDP calls for adherence to the Alberta Wetland Policy. The MDP also encourages wetland habitat creation preservation of wetlands. Areas abutting the Sturgeon River are class 1 wetlands that are designated as Parks and Open Spaces and temporary structures are permitted on those lands. However, wetlands are not mentioned in the Town's LUB.
Riparian Area	No identified riparian areas or floodplains within the Town
Stormwater management	The Town is part of the drainage basin and has indirect impacts through stromwater and groundwater. The LUB briefly references stormwater management through drought-resistant landscaping considerations and parking area grade and drainage. Section 7.7 of the MDP requires "*Storm water management systems [to] be naturalised, combine function with open space, reduce impervious surfaces, and protect natural flows*." Furthermore, the Town considers the interface between stormwater discharge areas and waterbodies as stated in Section 11.22. "Morinville shall support stormwater management techniques that improve stormwater discharge quality into Manawan Canal and ditches that lead to the Carrot Creek basin, including but not limited to preserving and enhancing existing wetlands, creating wetlands, and cultivating vegetative areas"
Wastewater management	Wastewater from the City is treated at the Alberta Capital Region Wastewater Commission (ACRWC) before being discharged into the North Saskatchewan River.
Groundwater	No mention of groundwater recharge areas/aquifers in the Town's MDP.
Inventory of Natural Areas	The Town has designated parks and natural areas but has no formal natural inventory.
Performance Indicators	The Town has a Water Conservation, Efficiency & Productivity Plan (CEP) that promotes education and reduction of water consumption. It is monitored and reported on annually. The Low-flow rebate program has met success and been well received by residents. The Town relies on a few performance indicators from the Edmonton Metropolitan Region Growth Plan but includes no environmental indicators. The

	MDP or LUB make no specific reference to environmental/water quality indicators.
Planning Process and Tools	During the ASP stage, a biophysical assessment is required to identify wetlands and other sensitive areas. All areas that would be subject to flooding must be identified during this stage. This is reviewed by internal staff and then carried to the subdivision stage. At the subdivision stage a geotechnical is required to demonstrate how these sensitive areas are affected and what measures are taken to protect them.

The Town has several guiding documents that inform staff decisions for wetlands, waterbodies and watercourses. For more information refer to the Town's Public Works Department.

Table 1: This table shows policies and regulations in the MDPs and LUBs of the participating municipalities that were highlighted during the review. However, each municipality has several guiding documents that inform staff decisions for natural areas, waterbodies, and watercourses as shown above.

Existing Watershed Management Policies and Regulations	Parkland County		Lac Ste Anne County		Sturgeon County		City of Spruce Grove		City of St. Albert		City of Edmonton		Town of Onoway		Town of Stony Plain		Town of Gibbons		Town of Morinville	
	MDP [i]	LUB [ii]	MDP [iii]	LUB [iv]	MDP [v]	LUB [vi]	MDP [vii]	LUB [viii]	MDP [ix]	LUB [x]	MDP [xi]	LUB [xii]	MDP [xiii]	LUB [xiv]	MDP [xv]	LUB [xvi]	MDP [xvii]	LUB [xviii]	MDP [xix]	LUB [xx]
Flood areas are identified/mapped		✓	✓	✓	✓				✓	✓		✓				✓			✓	
Temporary structures are permitted within flood areas		✓		✓		✓		✓				✓				✓				
Permanent Structures are permitted within flood areas		✓				✓		✓				✓				✓				
Agricultural uses are permitted within flood areas		✓		✓		✓						✓								
There is a designated Top-of-Bank																				
There is a Top-of- Bank determination criteria					✓									✓						
There is a 50 m setback from waterbodies			✓	✓					✓	✓										
There is a minimum 30 m setback from waterbodies		✓																		
There is less than 30 m setback from waterbodies						✓		✓						✓		✓	✓			
There is a setback determination Terms of Reference from waterbodies		✓			✓															
Setback/buffer strip are required between agriculture lands and water bodies																				
Wetlands should be protected	✓		✓	✓			✓		✓		✓				✓				✓	
Riparian Areas should be protected	✓		✓	✓											✓					
Riparian Setback Matrix Model is used	✓		✓	✓																
End of pipe treatment is required to manage the interface between treated stormwater and waterbodies																				
Stormwater management plan required during the Development Permit stage	✓	✓		✓				✓				✓								
Groundwater recharge areas are identified/mapped	✓		✓		✓															
There is an inventory of natural areas	✓		✓		✓		✓		✓		✓									
Apart from the performance indicators in the Growth Plan, the Municipality has its own environmental performance indicators	✓		✓				✓													
At what stage is a biophysical analysis required?	ASP			ASP		DP	DP		ASP		ASP/ NSP				DP		DP		ASP	
At what stage is a geotechnical analysis is required?	ASP			ASP		DP	DP	DP	ASP	DP	ASP/ NSP				DP		DP			DP
Wastewater is treated at Alberta Capital Region Wastewater Commission	✓				✓		✓		✓						✓		✓		✓	

Subject to further study **ASP** Area Structure Plan Stage **NSP** Neighbourhood Structure Plan Stage **SD** Subdivision Stage **DP** Development Permit

[i] Parkland County. (2017). *Parkland County Municipal Development Plan – One Parkland: Powerfully Connected. Bylaw 2017-14.* Retrieved from https://www.parklandcounty.com/en/county-office/resources/Documents/MDP/Bylaw-2017-14---Municipal-Development-Plan.pdf

[ii] Parkland County. (2018). *Parkland County Land Use Bylaw 2017-18.* Retrieved from https://www.parklandcounty.com/en/county-office/resources/Documents/Bylaw-2017-18-Land-Use-Bylaw-POST-TO-WEB-JAN-2-18.pdf

[iii] Lac Ste. Anne County. (2015). *Lac Ste. Anne County Municipal Development Plan Bylaw 23-2014.* Retrieved from http://www.lsac.ca/development/municipal-development-plan

[iv] Lac Ste. Anne County. (2016). *Lac Ste. Land Use Bylaw 24-2014.* Retrieved from http://www.lsac.ca/development/land-use-bylaw#113-land-use-bylaw-sections

[v] Sturgeon County. (2014). *Sturgeon County Municipal Development Plan Bylaw 1313/13*. Retrieved from https://www.sturgeoncounty.ca/Portals/0/Documents/Planning-Development/Municipal-Development-Plan.pdf

[vi] Sturgeon County. (2017). *Sturgeon County Land Use Bylaw 1385/17*. Retrieved from https://www.sturgeoncounty.ca/Portals/0/Documents/Bylaws/Bylaw-1385-17-Land-Use-Schedule-A.pdf

[vii] City of Spruce Grove. (2016). *Your bright future Municipal Development Plan 2010-2020.* Retrieved from https://www.sprucegrove.org/media/2063/municipal-development-plan-bylaw-c-960-16.pdf

[viii] City of Spruce Grove. (2013). *City of Spruce Grove Land Use Bylaw*. Retrieved from https://www.sprucegrove.org/media/1800/land_use_bylaw.pdf

[ix] City of St. Albert. (2013). *Municipal Development Plan Bylaw 15/2007*. Retrieved from https://stalbert.ca/uploads/PDF-reports/Complete-MDP.pdf

[x] City of St. Albert. (2017). *Land Use Bylaw 9/2005.* Retrieved from https://stalbert.ca/cosa/bylaws/

[xi] City of Edmonton. (2010). *The Way We Grow Municipal Development Plan Bylaw 15100* Retrieved from https://www.edmonton.ca/city_government/documents/PDF/MDP_Bylaw_15100.pdf

[xii] City of Edmonton. (2017). *Zoning Bylaw No. 12800*. Retrieved from https://webdocs.edmonton.ca/InfraPlan/zoningbylaw/bylaw_12800.htm

[xiii] Town of Onoway. (2009). *Town of Onoway Municipal Development Plan Bylaw 686-09.* Retrieved from https://onoway.civicweb.net/document/1125

[xiv] Town of Onoway. (2013). *Town of Onoway Land Use Bylaw No. 712-13.* Retrieved from https://onoway.civicweb.net/document/1532

[xv] Town of Stony Plain. (2013). *Uniquely Stony Plain Municipal Development Plan 2013.* Retrieved from http://www.stonyplain.com/Assets/Planning+$!26+Infrastructure/Uniquely+Stony+Plain+-+MDP+2013+-+FINAL+Draft.pdf

[xvi] Town of Stony Plain. (2017). *Town of Stony Plain Land Use Bylaw 2576/LUO/17.* Retrieved from http://www.stonyplain.com/AssetFactory.aspx?vid=5646

[xvii] Town of Gibbons. (2007). *Municipal Development Plan.* Retrieved from https://www.gibbons.ca/public/download/documents/12954

[xviii] Town of Gibbons. (2006). *Land Use Bylaw No. PLU 8/06.* Retrieved from https://www.gibbons.ca/public/download/documents/12953

[xix] Town of Morinville. (2017). *Town of Morinville Municipal Development Plan Bylaw 11/2012.* Retrieved from https://www.morinville.ca/doc-library/plans/278-municipal-development-plan

[xx] Town of Morinville. (2017). *Morinville Land Use Bylaw 3/2012*. Retrieved frm https://www.morinville.ca/doc-library/bylaws/282-morinville-land-use-bylaw-3-2012

Appendix 4

Case Studies:

Inter-Jurisdictional Review of Watershed Management

Watershed across the Province of Alberta and across Canada were considered to study different watershed management approaches, best management practices, and the type of implementation. The two specific watersheds chosen have similar land uses, urban and rural make up, as well as similar physical characteristics to the SRW. Although both case studies are from outside Alberta, they were included because they showcased resource management of similar recourses but had different approaches and results.

Table 1: Watershed Characteristics

Watershed	**Sturgeon River Watershed, Alberta**		**Humber River Watershed, Ontario**		**Kettle River Watershed, British Columbia**	
River Origin	Hoople Lake		Niagara Escarpment and Oak Ridge Moraine		Keefer Lake (Monashee Mountains)	
Drainage Basin	~ 3,301 sq. km.		~ 911 sq. km.		9800 sq. km.	
River	Sturgeon River		Humber River		Kettle River	
Length of River	~ 260 km.		1, 800 km		~ 175 km.	
Biodiversity	Bird - 235 species Mammals - 19 species Amphibians and Reptiles - 7 species Fish - 13 species Out of these, 49 species are classified as Species at Risk.		Plants – 755 species Fish – 42 species Birds – 138 species Amphibians – 14 species Mammals – 24 species Reptiles – 9 species Of these, 504 are considered Species of Regional Conservation Concern.		fish -27 species	
Predominant Land Uses	Rural	96%	Rural	54%	Rural	98%
	Urban	4%	Urban	33%	Urban	2%
			Urbanizing	13%		
	Total	100%	Total	100%	Total	100%
Watershed Authority/Advocacy Body	North Saskatchewan Watershed Alliance (NSWA)		Toronto Regional Conservation Authority (TRCA)		Kettle River Watershed Authority (KRWA)	

Source: North Saskatchewan Watershed Alliance. *State of the Watershed Report* (2012), Toronto Regional Conservation Authority. *Humber River Watershed Management Plan,* Kettle River Watershed Authority. *The Kettle River Watershed Management Plan.*

Watershed management is implemented at a regional and local level. However, the degree of effectiveness can be related to the support municipalities receive from other levels of government and agencies. This section of the report briefly compares legislation affecting watershed management in Ontario and British Columbia, with specific examples of watershed planning at the regional and local level.

1. Watershed Planning in Ontario

The Province of Ontario uses a top-down approach to pursue consistency in a province-wide watershed planning process. Similar to the Watershed Planning and Advisory Councils (WPACs) of Alberta, the Province of Ontario has established 36 Conservation Authorities (CAs) that are responsible to deliver services and programs to conserve, restore, and manage watersheds in partnership with rural and urban stakeholders, as well as municipal and provincial government agencies. Conservation Authorities were established through the *Conservation Authorities Act*[i] in 1946, which gave them jurisdiction over natural areas based on watersheds. Through this approach, the Province of Ontario pursues consistency in watershed-wide development standards in environmentally sensitive areas.

The difference between WPACs and CAs is that unlike WPACs, CAs are also regulatory authorities that have the power to "make regulations applicable to the area under [their] jurisdiction to prohibit, restrict, regulate or give required permission for certain activities in and adjacent to watercourses (including valley lands), wetlands, shorelines" (Government of Ontario, 2010). Furthermore, they are delegated "Provincial Interest" during plan reviews where they provide comments on behalf of the Province on applications involving municipal policy documents such as zoning bylaws. Pursuant to the *Planning Act*[ii] of Ontario (equivalent to the MGA of Alberta), CAs are "Public Commenting Bodies." This requires that CAs be notified and comment as local resource management agencies to the municipality or planning approval authority on municipal policy documents and planning and development applications[iii].

CAs use a science-based Integrated Watershed Management Approach (IWM)[iv] that considers the environment, economy, and society. Through this approach, they aim to achieve a balance between human, environmental, and economic needs. Using this method, they develop watershed plans that are then integrated into the participating municipalities' planning documents. Through provincial legislation, all municipalities within Ontario are required to adhere to the watershed planning requirements of the *Conservation Authorities Act* and the *Planning Act*, and integrate watershed planning as shown in Figure 2.

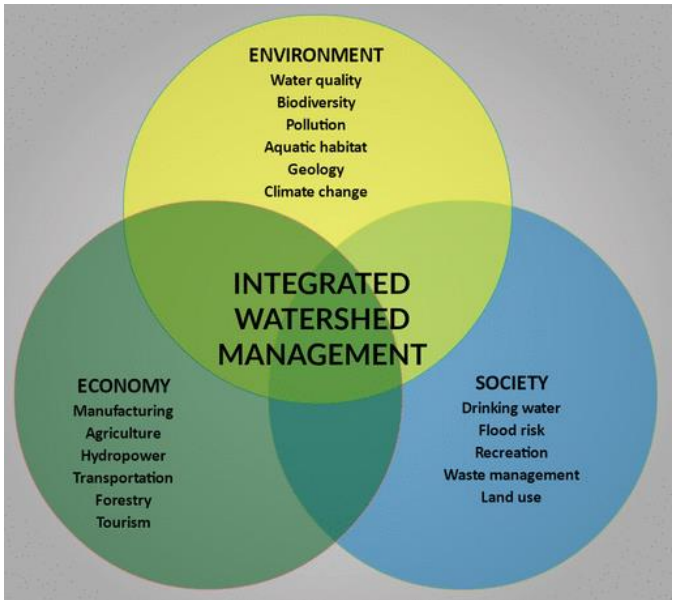


Figure 1: Integrated Watershed Management Approach

Source: TRCA Report Cards – Humber River Watershed

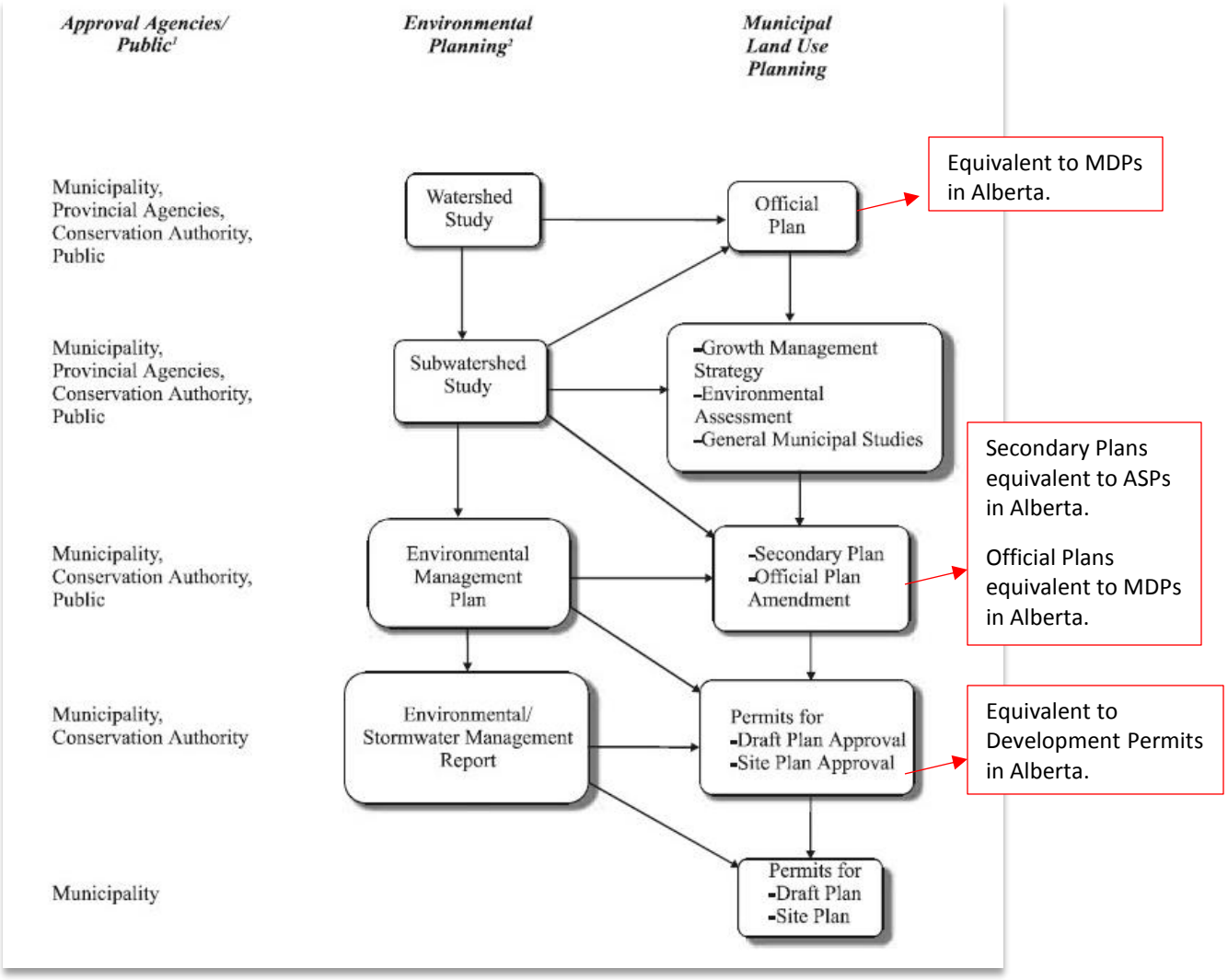


Figure 2: Ontario Watershed Planning
Source: Stormwater Management Planning and Design Manual, Government of Ontario

The following provides a specific example of the creation of a Watershed Plan and its implementation in Ontario: The Toronto and Region Conservation Authority (TRCA) and the Humber River Watershed that falls within its jurisdiction. The TRCA is one of 36 Conservation Authorities across Ontario under the umbrella organization of Conservation Ontario.

Case Study 1: Humber River Watershed, Ontario
Humber River Watershed Plan, Ontario

Table 2: Humber River Watershed Summary

River Origin	Niagara Escarpment and Oak Ridge Moraine
River Mouth	Lake Ontario
Basin	Lake Ontario Basin
Drainage Basin	~ 911 sq. km.
River	The Humber River
Length of River	1, 800 km
Biodiversity	Plants – 755 Fish – 42 Birds – 138 Amphibians – 14 Mammals – 24 Reptiles – 9 Of these, 504 are considered Species of Regional Conservation Concern.

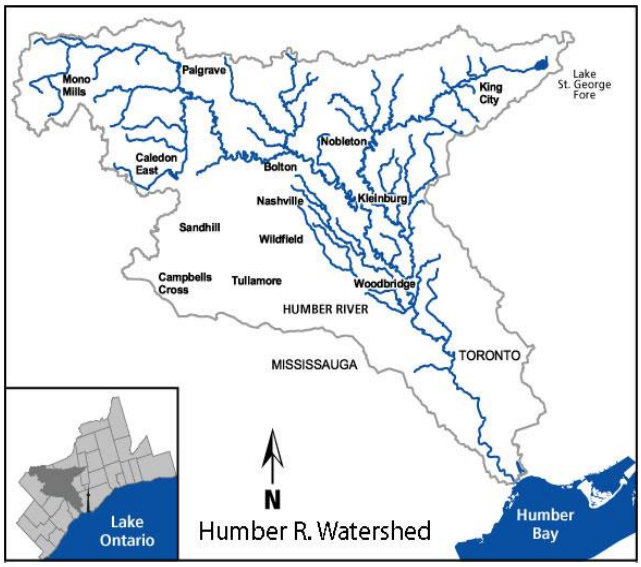


Figure 4: Humber River Watershed Map (source: Humberriver.ca)

Municipal share of the Humber River watershed (% total area)	Town of Caledon	Rural	35%
	City of Vaughan	Urban	20%
	King City	Rural	16 %
	City of Toronto	Urban	15%
	City of Brampton	Urban	8%
	Town of Richmond Hill	Urban	6%
	Town of Mono	Rural	
	Adjala - Tosorontio	Rural	
	Town of Aurora	Urban	
	City of Mississauga	Urban	
Natural Cover	33%		
Land Use (by area)	Rural	54%	
	Urban	33%	
	Urbanizing	13%	
	Total	100%	
Total Population	856,200 people		
Key Features	• Humber River designated as a Canadian Heritage River • Includes (3) education centers, (5) conservation areas, (3) urban farms		

State of the Watershed		2008	2018
	Groundwater Quality Indicators: Nitrate and Nitrite Chloride	Insufficient Data	A (Excellent)

	Forest Conditions Indicators: % Forest Cover, % Forest Interior, % Riparian Zone Forested	D (Poor)	D(Poor)
	Surface Water Quality Indicators: Total Phosphorous, E. coli Bacteria, and Benthic Macroinvertebrates (BMI)	D (Poor)	C (Fair)
	a. Stormwater Management Indicator: % of Developed Area with Stormwater Controls Quality and Quantity (i.e., stormwater management pond) b. Land Cover Indicators: % of Natural Areas, % of Urban, % of Rural, Distribution of Natural Area	F	C (Fair)

Plan Development and Success:

Based on the outcomes of the Humber watershed report card, *Listen to Your River*[v], the *Humber River Watershed Plan Pathways to a Healthy Humber*[vi] (HRWP) was prepared in 2008 by Toronto and Region Conservation Authority (TRCA) with the advice from the Humber Watershed Alliance, consisting of private businesses, non-profit organizations, representatives from all levels of government, and the public. Numerous years of monitoring environmental conditions provided for a strong technical foundation that helped experts identify best practices and recommendations to achieve the watershed's objectives (TRCA, 2008). Consistent monitoring over the following 10 years has shown improvement in most indicators, except for Forest Conditions.

Policy Alignment:

Implementation strategies cover surface and groundwater, storm water, natural areas and the link to different groups of stakeholders and municipal planning. Furthermore, the Watershed Plan is supported by the *Humber River Watershed Plan Implementation Guide*[vii], a follow-up by the TRCA to the *Listen to Your* River report; which lists Policy, Regeneration, Land Securement, Stewardship and Education, Operation and Maintenance, Enforcement, and Monitoring implementation tools to allow all stakeholders to implement the recommendations.

In the Implementation section of the Watershed Plan, Section 6.1 uses existing provincial policies and guidelines to describe ways in which municipal documents should interpret the plan. The following is an excerpt from the *Humber River Watershed Plan*:

> *Section 24 of the Oak Ridges Moraine Conservation Plan (ORMCP) requires every upper-tier municipality and single-tier municipality to begin preparing a watershed plan … The objectives and requirements of each watershed plan are to be incorporated into the municipality's official plan…**The watershed plan objectives and requirements will be interpreted and implemented in the process of developing municipal official plan policies.** The Humber River Watershed Plan provides an understanding of the overall health of the watershed and sets out strategies to maintain and improve its ecological and hydrological integrity. These strategies will help guide the development of official plan policy so that the ORMCP*

> *conformity requirements for major development are clearly linked to municipal official plans and the land use planning process.*
>
> *2. ORM [Oak Ridges Moraine] Municipalities – recognize the Humber River Watershed Plan in their official plans, as required by the Oak Ridges Moraine Conservation Plan (ORMCP) (1-7).*

*The *Oak Ridges Moraine Conservation Plan* is one of the four provincial land use plans established by the Province of Ontario to provide high-level land-use direction to manage growth, build complete communities and manage the natural environment in Southern Ontario.

Due to this mandatory requirement, Official Plans of member municipalities must incorporate the Watershed Plans within their own policies, which are then included in the Secondary Plan (ASP stage), Plan of Subdivision, Zoning Bylaw, and Development Agreement (Development Permit stage). For example, the Official Plan of the Town of Caledon, a Town within the Humber River Watershed, includes policies to ensure the objectives of watershed plans are followed. See excerpt from section 7.10.5.3.1 of the *Town of Caledon Official Plan*[viii]:

> *The applicable objectives and policies of a completed watershed plan shall be incorporated into [Official Plan] Plan, as appropriate, by official plan amendment.*

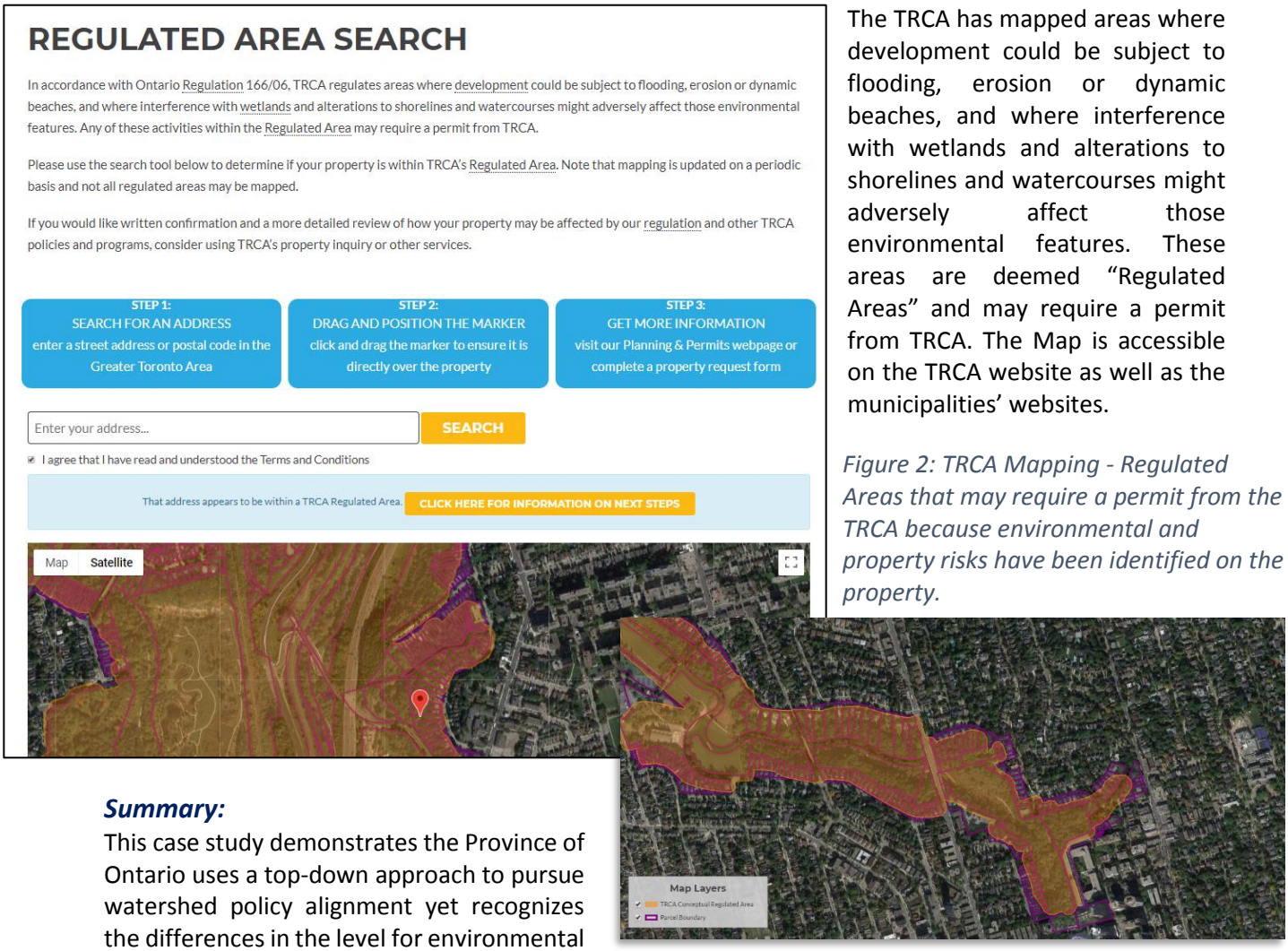
The Watershed Plan also recommends that provincial and regional agencies set design standards to ensure consistency throughout the watershed. Below is an excerpt from the *Humber River Watershed Plan Implementation Guide:*

> *MPIR [Ministry of Public Infrastructure Renewal], MMAH [Ministry of Municipal Affairs and Housing], MOE [Ministry of Environment], municipalities, TRCA, AMO [Association of Municipalities of Ontario, BILD [Building Industry and Land Development Association] - Establish development standards for sustainable community design for application to new development proposals or urban expansions (1-3).*

Lastly, the Watershed Plan follows a net gain approach to create a balance between development and the natural habitat. Below is an excerpt from the *Humber River Watershed Plan Implementation Guide* recommending municipalities to adopt this strategy:

> Apply the principle of "net gain" to provide compensatory habitats to replace features and habitats within the NHS [National Household Survey] that cannot be retained during private development, infrastructure and other public-sector projects.

Monitoring and Mapping



The TRCA has mapped areas where development could be subject to flooding, erosion or dynamic beaches, and where interference with wetlands and alterations to shorelines and watercourses might adversely affect those environmental features. These areas are deemed "Regulated Areas" and may require a permit from TRCA. The Map is accessible on the TRCA website as well as the municipalities' websites.

Figure 2: TRCA Mapping - Regulated Areas that may require a permit from the TRCA because environmental and property risks have been identified on the property.

Summary:

This case study demonstrates the Province of Ontario uses a top-down approach to pursue watershed policy alignment yet recognizes the differences in the level for environmental conservation and capacity among municipalities.By setting watershed management standards at the provincial level, all municipalities within Ontario are required to follow the same process and provide the same studies when and where applicable. As such, in this case study, all 10 municipalities within the Humber River Watershed refer to the Humber River Watershed Plan (HRWP) within their respective statutory plans.

Recognizing that not all municipalities require the same level of watershed planning or have the resources, these requirements only apply to areas where an environmentally significant and/or sensitive feature is located. The Toronto and Region Conservation Authority (TRCA) has mapped and identified environmentally significant and/or sensitive features along with flood areas within the watershed. Development and design standards to be used in these areas are set out in the HRWP. All land development applications arising from within these areas, irrespective of municipality, require the TRCA to comment and approval. The TRCA usually recommend lot-level best management practices that can be applied to the land development application and approve the application if the applicant demonstrates no damage to any watershed features. This is the TRCA's approach to ensuring consistent development standards are applied to environmentally significant areas throughout the Humber River Watershed.

Furthermore, the case study showed that watershed planning bodies, that is, the Conservation Authorities are given regulatory power as well as the power to comment on behalf of the province. This when exercised during municipal policy documents and planning and development applications give CAs the opportunity to advocate for the watershed from the municipal land use planning stage to the site plan review stage. In Alberta this would be the equivalent of requiring WPACs to comment on MDP reviews, ASP approvals, Development Permit Applications, etc. that fall within areas identified as environmentally significant or flood areas.

2. Watershed Planning in British Columbia

As of 2018, there exists limited legislative authority of watershed management within the British Columbia policy framework. Instead, there exists "enabling" legislation.

The newly revised *Water Protection Act* (2018)[ix] defines major watershed bodies and prohibits development/projects that enable "large scale transfers" between major watersheds. However, the specifics of watershed management authorities/plans are not included in the Act.

Instead, most watershed management initiatives have been undertaken by local/regional organizations or individual cities that have developed their own watershed management plans for their municipality/region/individual watershed(s). These plans however, are more policy-based and have no concrete authority/statute in municipal/provincial planning. The plans do however, discuss provisions for implementation, as discussed next. The following provides a specific example of the creation of a Watershed Plan and its implementation in British Columbia.

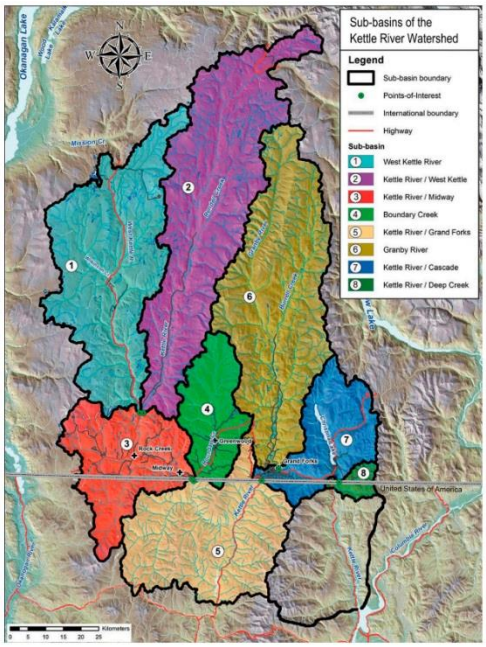


Figure 7: Kettle River Watershed & Sub-basins Map - http://kettleriver.ca/wp-content/uploads/2014/12/KRWMP_final_webv2.pdf

Case Study 2: Kettle River Watershed, British Columbia

Table 4: Kettle River Watershed

River Origin	Keefer Lake (Monashee Mountains)		
Drainage Basin	~10, 878 sq. km.		
River	Kettle River		
Length of River	~ 175 km.		
Biodiversity	Various fish species		
Predominant Land Uses	Forestry, Agriculture, Mining		
Surrounding Municipalities	Midway	649 (Residents)	Rural
	Greenwood	665 (Residents)	Rural
	Grand Forks	4,049 (Residents)	Rural
	Rock Creek	200 (Residents)	Rural
Key Features	• The River and Watershed overlap the Canada & USA Boundary • Several "ghost-towns" exist within the watershed (Eholt, Anaconda, Phoenix)		

Process

The *Kettle River Watershed Management Plan*[x] was developed through a three-year collaborative initiative endorsed by the Regional District of Kootenay Boundary (RDKB) – the region in which the Kettle River Watershed resides, in British Columbia. RDKB contracted Summit Environmental to complete an initial technical assessment of the Watershed after having established the terms of reference for the project with the Kettle River Watershed Authority committee. The study was then used to develop goals, issues and strategies by a Stakeholder Advisory Group (who acted as a hub for public involvement), who

worked in collaboration with the Steering Committee, Project Coordinator and Regional District to develop the final Watershed Plan.

Implementation

The Watershed Plan references several actions that work towards Plan implementation regarding existing governance frameworks:

Action 1.1.2 – Study and recommend governance model for long-term watershed management that includes greater sharing in decision-making for water management, in consultation with the Province and community members;

Action 1.1.4 – Integrate the [Kettle River Watershed Management Plan] into local government decision-making through coordinated environmental planning and services, sustainability-oriented (green) bylaw development, and municipal conservation and park management planning;

Action 1.3.2 – Assess and improve the consistency, alignment and application of policies and regulations for protecting water quality, water quantity, and habitat in aquatic and related upland ecosystems. Address any issues with capacity for regulatory compliance and enforcement.

As well as some provisions (Action 1.1.5) that will enable further collaboration between the Province and community members, First Nations, and local governments regarding regional strategy.

Furthermore, Section 4 of the Watershed Plan outlines a three-year suggested course of action plan prepared for the Regional District of Kootenay, who is set to provide continuing support for the implementation process. The work is governed by the Steering Committee (a Committee comprised of the Stakeholders from the Stakeholder Advisory Group) and an Implementation Team that will continue to meet semi-annually to review progress, discuss research/project findings as they work towards updating the Plan every year. As the Plan indicates, there are many organizations that share responsibilities (among their various jurisdictions) for managing and protecting water and watersheds, and the Plan and respective Committees/Teams will work to ensure municipal polices and practices ar e connected both consistently and effectively.

Summary

The *Kettle River Watershed Management Plan*[xi] was developed through a three-year collaborative initiative endorsed by the Regional District of Kootenay Boundary (RDKB) – the region in which the Kettle River Watershed resides, in British Columbia.

The Kettle River Watershed case study demonstrated how local municipalities and organizations in the Province of British Columbia have undertaken watershed management initiatives despite having no formalized provincial watershed management regulations. Through the method of voluntary participation, municipalities are responsible for developing regulations at their own discretion. The Province does however facilitate watershed planning through policies such as the *Water Protection Act* - which defines watershed bodies and broadly prohibits developments that adversely affect the watersheds. Beyond this Act, however, there is no structure for watershed-related policies or governing bodies.

With no formalized procedure for watershed policy development, policy structure and content will inevitably differ from municipality to municipality, and trigger inconsistencies regarding the types of

regulations provided and more importantly, the legislative power these policies hold in municipal watershed planning. Subsequently, municipalities have no incentive or requirement to develop these policies, and thus certain municipalities and local organizations have stepped up to develop their own watershed management plans for their respective watershed bodies and waterbodies.

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[i] Government of Ontario. (2018). *Conservation Authorities Act, R.S.O. 1990, c. C.27.* Retrieved from https://www.ontario.ca/laws/statute/90c27

[ii] Government of Ontario. (2018). *Planning Act, R.S.O. 1990, c. P.13*. Retrieved from https://www.ontario.ca/laws/statute/90p13

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[iv] Conservation Ontario. (2018). *Integrated Watershed Management.* Retrieved from http://conservationontario.ca/policy-priorities/integrated-watershed-management/

[v] Toronto and Region Conservation Authority. (2007). *Listen to Your River: A Report Card on the Health of the Humber River Watershed*. Retrieved from https://reportcard.trca.ca/wp-content/uploads/2018/03/humber_river_report_card_2007.pdf

[vi] Toronto and Region Conservation Authority. (2008). *Humber River Watershed Plan Pathways to a Healthy Humber*. Retrieved from http://www.trca.on.ca/dotAsset/50159.pdf

[vii] Toronto and Region Conservation Authority. (2008). *Humber River Watershed Plan Implementation Guide*. Retrieved from http://www.trca.on.ca/dotAsset/196566.pdf

[viii] Town of Caledon. (2018). *Town of Caledon Official Plan*. Retrieved from https://www.caledon.ca/en/townhall/resources/Official_Plan_Master_Copy_-_complete.pdf

[ix] Government of British Columbia. (2018). *Water Protection Act [RSBC 1996] Chapter 484.* Retrieved from http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_96484_01

[x] Regional District of Kootenay Boundary. (2014). *Kettle River Watershed Management Plan*. Retrieved from http://kettleriver.ca/wp-content/uploads/2014/12/KRWMP_final_webv2.pdf

[xi] Regional District of Kootenay Boundary. (2014). *Kettle River Watershed Management Plan*. Retrieved from http://kettleriver.ca/wp-content/uploads/2014/12/KRWMP_final_webv2.pdf