

Draft

Watershed Land Use Planning Toolbox

**Based on the Lessons Learned through the Development of the
Wabamun Sub-Watershed Land Use Plan**



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Introduction to the Toolbox

Jurisdictions within Alberta, across Canada, and around the world have used various tools and approaches to plan for improving the health of a watershed. While traditional land use planning is generally based on jurisdictional boundaries, this does not always reflect the relationships of land use to natural systems in a watershed, which follow natural, not jurisdictional boundaries.



Land use decisions within the context of a watershed can contribute to a sustainable system that preserves its health and the community within it. The intent of a watershed based land use plan is to protect and enhance the health of the watershed while supporting appropriate land use so that the watershed community's social, environmental, and economic values are met. No single decision maker, community member or visitor has all the resources,

technical expertise, or authority to develop or implement a successful watershed based land use plan. To be successful it needs a collective coordinated community effort.

In general, a successful watershed based land use planning process and land use plan:

1. Increases knowledge of the watershed and raises awareness of the potential impacts of land use decisions and actions;
2. Develops a shared community vision, goals, objectives, and actions to help ensure that the health of the watershed is protected for current and future generations;
3. Undertakes appropriate land use and control of the development/redevelopment of lands, buildings, and infrastructure to reduce environmental impacts; and,
4. Supports land use practices that improve the overall health of the watershed.

To assist land use planners, decision makers and members of the community in developing future watershed based land use plans, this toolbox has been created using the experience and knowledge gained through the development of the Wabamun Lake Sub-Watershed Land Use Plan in Parkland County. It offers a suggested process, ideas, and concepts for consideration in the development of a watershed based land use plan and includes examples of associated visions, goals, objectives, actions, tools, procedures, and Beneficial Management Practices.

Although this toolbox is intended to be a source of information, ideas, and a potential process for the development of watershed based land use plans, each watershed is unique. A planning process and land use plan must be based on the specifics of your watershed and the priorities of the watershed community.

The toolbox follows the process used by Parkland County and its partners in developing the Wabamun Lake Sub-Watershed Land Use Plan as summarized in **Figure 1**. Each section of the toolbox starts with a short explanation of each component, and contains some examples and references for your consideration.

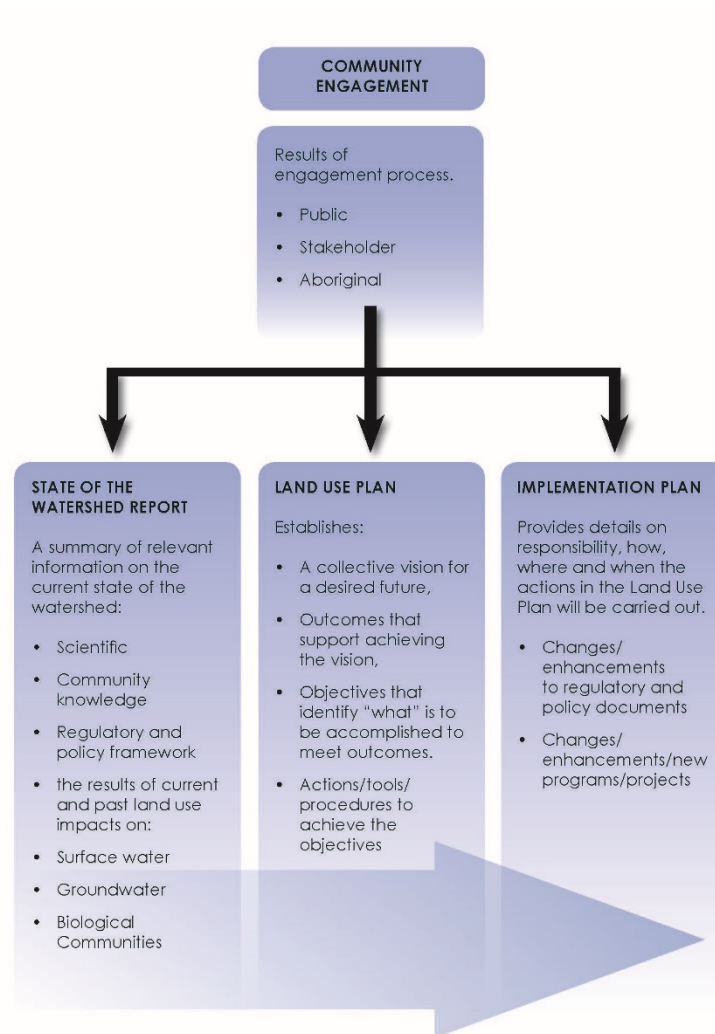


Figure 1. Watershed Based Land Use Plan Development Process

Community Engagement

A watershed community includes any individual, stakeholder, indigenous community member, or government decision-maker with an interest in the watershed. An effective way to identify members of the community are to consider the extent to which individuals, groups or others are both potentially impacted by the plan and care about the potential impacts on them.

Effective, inclusive, and timely community engagement recognizes that community members want to participate in decisions that affect them. It provides a critical opportunity to understand the community's values/wishes, and what it considers most important for the plan to address. In addition, it provides an opportunity for scientific, traditional, and local knowledge to be shared in the community and reflected in the plan. A better understanding of the watershed and the issues within it by the community, and recognition that the plan reflects member's contribution to it, will create better support for implementation.

Critical to the success of the development of a plan is the engagement process used to share information, and gather and reflect community input. An engagement process should provide multiple ways for the community to access information and participate in the planning process. These could include stakeholder meetings and public open houses, online forums, First Nations engagement sessions, formal presentations, and face-to-face meetings. Transparency is also a key aspect of a successful planning process.



It is important that First Nations peoples are included in the community engagement process so that their local knowledge, traditional use, and the potential impacts to their constitutionally protected rights are understood and considered in the planning process. Their understanding of the watershed, their close relationship with the land and water, and the needs of their community allows them to contribute to land-use-planning in a unique way. This traditional knowledge can be combined with contemporary science as a valuable contribution to the land planning process.

A community engagement process should include multiple opportunities and mechanisms to:

1. Create awareness and a common understanding of the scope, purpose, and plan development process so realistic expectations are created;
2. Create awareness and a common understanding of the health of the watershed and the impact that land use decisions have on it;
3. Contribute traditional, scientific, and local knowledge to the planning process;
4. Create safe, efficient, effective, and transparent ways for community input to be captured especially at key milestones in the process, and
5. Demonstrate to the community how their input was used in the planning process.

Sources for Additional Information and Ideas

1. Planning for Effective Public Participation, International Association for Public Participation, 2006.
2. Techniques for Effective Public Participation, International Association for Public Participation, 2006.
3. Communication for Effective Public Participation, International Association for Public Participation, 2006.
4. International Association of Public Participation Toolbox, online at:
http://c.ymcdn.com/sites/www.iap2.org/resource/resmgr/imported/06Dec_Toolbox.pdf

State of the Watershed Report

The planning process starts with the development of a State of the Watershed Report. The report provides an overview of the watershed and summary of the best information available on its current situation. It identifies the key environmental challenges and issues facing it, and how land use planning is relevant to these issues. The State of the Watershed Report provides the rational and context for the subsequent phases of the land use planning process.



Scientific Information

Outlines how available scientific information was compiled, reviewed, and summarized in the report.

Land Use Examples

1. Soils and Geology (e.g. ecoregion, major soils, topography)
2. Agriculture (e.g. Intensive, non-intensive)
3. Municipal Services (e.g. solid waste, water, and waste water)
4. Recreation (e.g. boat launches, private/public campgrounds, golf courses)
5. Residential and Permanent/Seasonal Population (e.g. Villages, Summer Villages, County)
6. Commercial/Industrial (e.g. mining, oil and gas, gravel)
7. Conservation (e.g. Natural Areas, Environmentally Significant Areas)

8. Linear development (e.g. pipelines, powerlines, road, rail lines)
9. First Nation Reserves

Water Quantity Examples

1. Water Inputs to the Watershed:
 - a) direct precipitation
 - b) surface runoff (including tributary inflows)
 - c) artificial water discharges
 - d) groundwater inflows
2. Water Outputs from the Watershed
 - a) evaporation
 - b) groundwater outflows
 - c) licenced consumptive surface water withdrawals
 - d) surface water outflows (streams, etc.)

Surface Water Quality Examples

1. pH;
2. Hardness;
3. Total dissolved solids;
4. Nutrients such as Phosphorous;
5. Lake trophic status;
6. Metals;
7. Polycyclic aromatic hydrocarbons;
8. Pesticides;
9. Parasites such as Cryptosporidium.

Groundwater Examples

1. Main aquifers;
2. Main recharges areas;
3. Ground water levels and trends;
4. Groundwater use (licensed and unlicensed);
5. Groundwater well distribution;
6. Groundwater vulnerability;
7. Groundwater quality.

Biological Communities Examples

1. Aquatic Environment

- a. Status of the fish community and related aspects (e.g. habitat, fishing pressure, connection with other watersheds);
- b. Status of the Benetic invertebrates community to assess biological lake health.

2. Terrestrial Environment

- a. Vegetation and land cover (open water, exposed land, developed land, shrub land, grassland, agriculture, coniferous forest, broadleaf forest, mixed forest);
- b. Wetlands (Riparian areas, marsh, bog, fen, swamp, and open water);
- c. Main wildlife species and the condition and importance of their main habitat;
- d. Environmentally Significant Areas;
- e. Invasive Species that are a concern.

Air Examples

1. Sources of emissions;
2. General air quality.

Community Knowledge

Provides a summary of the community knowledge of the watershed collected through the community engagement process.

Community Knowledge Examples

1. Fish Population Strategy is Working;
2. Some small communities cannot afford enforcement officers;
3. Speed boats going too close and too fast near nesting sites;
4. This area has been clear cut and bulldozed;
5. This bay contains extensive bird nesting sites.

Policies + Regulations

Provides a summary of the current Provincial, and Federal regulatory framework and related Provincial, Federal, and Municipal policy within that framework related to land use in the watershed. A regulation has the force of law with the intent to help ensure uniform application of the law. Although policies must be consistent with these regulations, they generally provide more specific direction to influence and direct decisions, actions, and activities that take place within the context/boundaries set by them.

Examples of Policies and Regulations

1. Municipal
 - a. Municipal Development Plan;
 - b. Municipal Land Use Bylaws;
 - c. Municipal Area Structure Plans.
2. Provincial
 - a. *Water Act*;
 - b. *Environmental Protection and Enhancement Act*;
 - c. *Land Stewardship Act*;
 - d. *Agricultural Operations Practices Act*;
 - e. *Municipal Government Act*;
 - f. *Parks and Wilderness Areas, Ecological Reserves, and Natural Areas Acts*;
 - g. *Public Lands Act*;
 - h. *Safety Codes Act*;
 - i. *Regional Health Authorities Act*;
 - j. *Wildlife Act*;
 - k. *Wetlands Policy*.
3. Federal
 - a. *Fisheries Act*;
 - b. *Canadian Environmental Protection Act*;
 - c. *Environmental Assessment Act*;
 - d. *Water Act*;
 - e. *Wildlife Act*;
 - f. *Navigation Protection Act*;
 - g. *Species at Risk*;
 - h. *Migratory Birds Convention Act*.

Examples of Jurisdictions and their Authorities

1. Municipal
 - a. Regulates and controls terrestrial land use and development;
 - b. Regulates safety code related to plumbing, electrical and private septic systems.
2. Provincial
 - a. Development within the bed and shore;
 - b. Protecting wildlife and endangered species;
 - c. Regulates Confined Feeding Operations;

- d. Regulates oil and gas and electrical industries;
 - e. Provincial Parks.
- 3. Federal
 - a. Activities on First Nation Reserves;
 - b. Fish habitat;
 - c. Navigable waters;
 - d. Railway operations;

Watershed Issues

Key Issues

Identifies the key watershed policy and biophysical issues identified through the development of the State of the Watershed Report.

Examples of Key Policy Issues

1. Lack of a coordinated approach to managing land use, development, enforcement between jurisdictions;
2. Current land use planning not effectively considering cumulative environmental effects of development activities;
3. Lack of coordinated enforcement of land use, environmental and safety regulations;
4. Carrying capacity of the watershed (number of watercraft on the lake, etc.)

Examples of Key Biophysical Issues

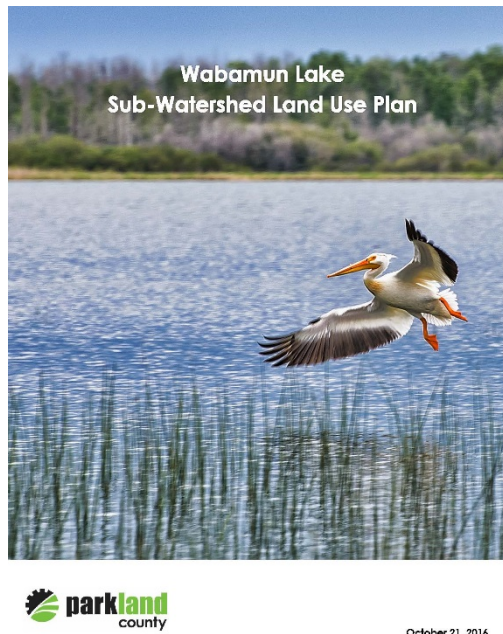
1. Lack of understanding of groundwater resource;
Lack of understanding among residents and visitors of how their actions affect the watershed.

Sources for Additional Information and Ideas

1. Wabamun Lake Sub-Watershed Land Use Plan Technical Report, County of Parkland 2016
2. The State of the North Saskatchewan River Watershed Report, North Saskatchewan Watershed Alliance, 2005.
3. Stepping Back from the Water, Government of Alberta 2012,
4. State of the Watershed Report, Government of Saskatchewan online at: <https://www.wsask.ca/About-WSA/Publications/State-of-the-Watershed-Report---2010/>
5. Handbook for State of the Watershed Reporting: A Guide for Developing State of the Watershed Reports in Alberta, Alberta Government, 2008.

Watershed Land Use Plan

A watershed based land use plan establishes the collective vision for a desired future in the watershed, outcomes that support achieving the vision, and land use objectives that identify “what” is to be accomplished to meet these outcomes. The plan also identifies the actions and tools/procedures that will be used to achieve these objectives. These are developed through community engagement and consideration of the information gathered through the development of the State of the Watershed Report.



The plan provides direction and support to all land use decision makers in the watershed.

Vision

Describe a vision for the watershed developed through the planning process and community engagement. The vision could include aspects:

1. Recognizing that land use not only affects the land but also the environment and people who use or live in the watershed;
2. Recognizing that land use challenges are complex and requires the community to work together; and
3. Recognizing land use decisions should improve the quality and sustainability of the ecosystem while meeting the economic and social needs of the community.

Examples of Visions

“A multi-stakeholder land use plan that, as a component of an integrated watershed plan, will improve the health and resiliency of the Wabamun watershed

and sustain our communities through the improved stewardship of our land and water.”¹

“Buffalo lake, as a locally and regionally important recreational lake, continues to provide Albertans with: a high quality lake environment that supports natural landscape values; healthy and sustainable fish and wildlife populations and supporting habitats; publicly accessible shorelands; a variety of recreational activities, and: residential development opportunities on adjacent private land, today and into the future.”²

The Vermilion River Basin is a healthy and sustainable watershed.³

The Red Deer River watershed will be healthy, dynamic, and sustainable through the efforts of the entire community.⁴

“Ensure the long-term sustainability of a Balsam Lake and Cameron Lake ecosystem that provides a high-quality destination for living and working, boating, swimming, fishing, tourism, and access to water for household uses.”⁵

“Sylvan Lake and its watershed are a healthy, treasured resource where a responsible, collaborative planning approach achieves a balance between development, nature, and recreation.”⁶

Outcomes, Objectives + Actions

Describe the outcomes that support the vision and supporting objectives, and actions that provide the basis for future land use decision-making in the watershed. Actions have the best chance of implementation if they have a specified accountable leader with the required decision making authority, have a specific timeline for completion, and are defined as accurately and precisely as possible.

Examples of Outcomes:

- Our Land Use Practices Protect the Environment;
- Our land Use Practices Provide Economic Opportunities that Support the People and Health of the Watershed;
- Reduce the Environmental Impacts of Development;
- Coordinated Governance;
- Our Stewardship Programs Inspire us to Action.

¹ Wabamun Lake Sub-Watershed Land Use Plan, P 18.

² Buffalo Lake Integrated Shoreland Management Plan, P28.

³ Vermilion River Watershed Management Plan, p 1.

⁴ Red Deer Watershed Alliance

⁵ Balsam Lake and Cameron Lake Management Plan, p9.

⁶ Sylvan Lake Cumulative Effects Management Plan, Phase 1, p15.

Examples of Objectives

- Our Land Use Practices Improve Surface Water Quality;
- Our Land Use Practices Improve Groundwater Quality and Quantity;
- Our Land Use Practices Improve Upland/Riparian Health;
- Our Land Use Practices Attract Economic Opportunities that Support the People and Health of our Watershed;
- Our Land Use Practices Reduce the Environmental Impacts from Development;
- Coordinated Policy, Planning, and Enforcement;
- Community Programs that Inspire Action;
- Improve Our Knowledge;
- Create/Enhance Voluntary Community Stewardship Programs;
- Successful Plan Implementation.

Examples of Actions

Improve Surface Water Quality

1. No new confined feeding operations will be located within the watershed boundaries except as designated in the plan and in compliance with all applicable regulations;
2. Establish water quality objectives for the lake and watershed and manage within these limits;
3. Minimize the potential for future impacts of the linear infrastructure on the watershed;
4. Reduce nutrients, manure, pesticide, and other chemicals in runoff from agricultural operations, acreages, and lots with a focus in 1:100 flood plain and identified high phosphorous concentration areas;
5. Develop and delivery education programs focused on:
 - a. Reducing the use of phosphorous-based fertilizers, pesticides, and other chemicals in runoff;
 - b. Repairing/replacing faulty septic systems;
 - c. Enhance and encourage landowner hazardous waste collection, waste reduction, and composting programs.
6. Develop a Storm Water Management report for the watershed including an Area Drainage Master Plan that provides an integrated, comprehensive approach for all catchment areas and directs the management, planning and operations of municipal storm drainage systems to prevent discharge of pollutants from municipal operations, and minimizes direct runoff to the lake;
7. Undertake a Watershed Capacity Study, which explores the potential residential carrying capacity of the watershed. Findings from the study should be used to promote appropriate infilling, cluster development, higher density, and mixed-use developments

adjacent to existing municipal infrastructure (e.g. water, sewer, and road), protection of natural drainage patterns, steep slopes, sensitive groundwater recharge areas, and major vegetation cover types.

Ground Water Protection and Use

1. Identify and protect groundwater recharge and discharge areas from new developments and contamination from existing and new land uses, reduce groundwater use in depleted areas and rehabilitate recharge areas that are negatively impacted;
2. Amend regulatory documents and standards so that groundwater is given more consideration in the design and construction of new developments and storm water management systems.

Riparian Areas

1. Reduce fragmentation of upland and riparian areas and maintain/enhance intact habitat types and connectivity by discouraging development/activities and manage invasive, and/or non-native species that threaten ecological integrity and connectedness;
2. Undertake a Habitat Conductivity Study, and improve wildlife habitat and range by locating municipal reserve lands in strategic locations and connecting them to privately owned or public natural areas where habitat and features that provide for and function as movement corridors or landscapes in new development proposals exist;
3. Undertake a Hazards and Assessment analysis identifying hazard lands (flood plain, steep slopes greater than 15%, soils that could become unstable if cleared) and protect these lands from development;
4. Establish municipal programs to support and monitor riparian areas and Conservation Easements to protect sensitive areas;
5. Encourage voluntary developer contributions for the provision of parks, open space amenities, and protection of sensitive lands;
6. Redistrict lands within the watershed as appropriate including an evaluation of existing Reserves (roadway, municipal, environmental) to ensure that they have the appropriate designations and change designations if required;
7. Seek opportunities for the sale or exchange of reserve lands not required to protect sensitive lands and use the proceeds to acquire sensitive lands including funding from the provincial Land Stewardship Fund and Alberta Land Trust Grant Program;
8. Pursue designation as a Wetlands Restoration Agency to allow the use of developer funds to restore wetlands;
9. Amend regulatory documents and Standards to include requirements that:

- a. Preserve natural features, minimize impacts on agricultural lands, and provide adequate setbacks and protection of the environmental integrity of riparian areas, steep slopes, shorelines, wetlands, and watercourses;
 - b. A minimum of 30 meters from the legal bank of a lake and any key areas of important upland and riparian areas be dedicated as Environmental Reserve and retained in their natural state;
 - c. An approval for tree clearing will be required on all lands identified as hazard/sensitive;
 - d. Only approve naturalized approaches using best management practices for the construction/reconstruction of erosion protection within 3 meters of the legal bank of the lake;
- 10. Maintain infrastructure that regulates lake levels;
 - 11. Designate areas and design trails for off highway vehicle use that minimizes environmental impacts and watershed health;
 - 12. Develop and implement a regular watercraft inspection to reduce opportunities for the spread of invasive species (e.g. Responsible Boat Care, PlayClean Go);
 - 13. Develop management plans for the priority Environmentally Significant Areas.

Attract and Support Economic Development Opportunities that Support Watershed Health

- 1. Agricultural lands will be protected from non-agricultural development;
- 2. Any new non-agricultural development must achieve a healthy synergy with any new development that is adjacent to existing farming operations or the lake;
- 3. Explore the potential to establish municipal programs including Conservation Easements to preserve environmentally sensitive lands in the watershed;
- 4. Amend Land Use Bylaw to provide better protection of significant biophysical and aesthetic features in these areas, while at the same time encouraging where appropriate extensive recreational opportunities that occur.

Reduce Environmental Impacts from our Developments

- 1. Development practices will encourage the use of low impact design and construction methods and landscaping techniques that reduce impacts on the environment;
- 2. Amend regulatory documents and standards so that the subdivision, major development, or redevelopment of land will enhance and protect existing natural resources and avoid fragmentation of habitat and natural features as much as possible as follows:
 - a. Structures may be prohibited if they are within the 1:100-year flood plain, adjacent to the shore of a lake or in an ESA;
 - b. A site plan is required at the time of development application that includes the following:
 - The location of the geotechnical "top of bank" of the lake or any other watercourse if the development is adjacent to it. Ground disturbance at

the top of bank will be prohibited unless supported by a geotechnical report confirming that it will not negatively affect the environment.

- The location and dimension of existing natural features and how impact or loss of these natural features including shoreline vegetation, and riparian lands will be avoided, mitigated, or restored;
- The location and dimensions of all yards, buildings, parking areas, driveways, and other developments located or proposed to be located on the site;
- Location of all proposed accesses on to public roads and locations of all municipal services to and within the site;
- How low-impact principles will be implemented including dust control and emission reduction.
- A Storm Water Management Plan is required at the time of development application, designed so that post development runoff does not exceed predevelopment natural flows. The plan will include How storm and other runoff will be managed prior to discharge into the natural environmental.

This could include:

- Use of the exiting topography, construction/enhancement of ponds and landscaping to naturally collect, retain, filter, and filter runoff that maintain existing topography and drainage patterns, and minimizes grading to improve water quality and control peak discharge rates;
- Reducing amounts of impervious surface areas (rooftops, paved areas, buildings), and increasing the permeability of developed areas by maximizing the amount of green space;
- Lot level storm water re-use using Best Management Practices.

3. Determine an appropriate percentage of required indigenous plants and permeable surfaces in all new and redeveloping development sites;
4. Providing Incentive programs to encourage low-impact designed construction and technologies for built form and servicing that protects the natural environment and reflects innovative sustainability practices and design standard requirements;
5. Explore the possibility of communal potable water, wastewater, systems;
6. Determine minimum building setback from the lake, waterbodies, and watercourses;
7. Review permitted potential uses within existing development setbacks and determine how to better manage their impacts;
8. Promote and develop low impact development strategies and technologies;
9. Maximum combined site coverage of all buildings and other impervious structures;

10. Requiring an Environmental Impact Statement prepared by a qualified expert as part of an application for subdivision, major development, or redevelopment of lands within 100 metres of the lake, other identified natural environmentally sensitive areas or features, water sources, or Environmental Reserves in the watershed;
11. Implement a salt and snow regulation and or plan for the watershed to minimize the negative impacts on surface water quality;
12. Implement engineered wetland and discharge of storm water opportunities that reduce the impact on the watershed as development is proposed and opportunities present themselves;
13. Implement an inventory of all private septic systems and testing of all systems for leakage and impact on the lake;
14. Only approve individual and community seasonal docks, piers and associated mooring structures on the bed and shore of the lake that are consistent with local municipal plans.

Coordinated Governance

1. Coordinate inter-agency planning, policy, and processes to improve alignment and transparency of permitting, enforcement, and education initiatives between jurisdictions.
 - a. Develop an Environmentally Significant Areas Overlay for the watershed identifying the boundaries of Environmentally Significant Areas and develop management plans to protect the ecological attributes of these areas. Land use decisions within each Environmentally Significant Area will be consistent with the relevant management plan and the applicable underlying land use bylaw district regulations;
 - b. Develop a Phosphorous Overlay identifying areas with high phosphorous concentrations. Implement strategies and practices to reduce phosphorous concentration and runoff from these areas;
 - c. Develop a Riparian Shoreline Health Overlay to protect and remediate, where feasible, riparian areas along the shore of the lake. Within this area, the remaining natural shoreline riparian areas (low impacted area) will be retained to the greatest extent possible in their natural state. They will not be altered or existing vegetation removed or damaged through construction, or the addition of hardened surface like riprap or break walls. The regulations of the underlying land use bylaw district regulations will continue to apply in these areas.
2. Amend existing plans, bylaws, policies, and create standards aligned with the watershed plan and communicate these to the public and development industry;
3. Amend Regulatory documents, standards, and other documents as required to support the framework for development within the watershed consistent with this plan including:

- a. Developing an Inter-Municipal Area Structure Plan to describe the sequences of development, population density, and the location of major transportation routes and public utilities consistent with the watershed plan;
- b. Identifying and establishing a protocol and process to coordinate approvals and referrals within the watershed for applications for major developments;
- c. Actively participating in the development of broader Regional and other plans to ensure they support this plan.

Stewardship Programs

1. Undertake a stream classification study to aid the understanding of stream condition and potential behavior under the influence of different types of changes. This will provide a consistent frame of reference for understanding and communicating stream morphology and condition including:
 - a. Predicting a stream's behavior from its appearance;
 - b. Developing specific hydraulic and sediment relationships for a given stream type and its state;
 - c. Providing a mechanism to extrapolate site-specific data to stream reaches having similar characteristics.
2. Undertake a detailed study to identify and quantify point sources of nutrients such as nitrates and phosphorus, and to identify and estimate non-point sources;
3. Undertake Water and Land Use Carrying Capacity Studies, to identify the limits of recreational and other activities that protect the health of the watershed based on anticipated population, land use, watercraft numbers, and access and road requirements. It will also identify opportunities and limitations for expanded/new swimming areas, areas for restricted (watercraft speeds), and infrastructure to protect riparian habitat, other land uses while promoting and supporting sustainable recreational activities;
4. Undertake a boat wash facility and feasibility study;
5. Develop/improve and implement multi-media education programs with incentives to foster an ethic of environmental stewardship;
6. Development of a multi-year communications and engagement plan to promote watershed stewardship through:
 - a. Developing a "Living in the Watershed" education package and seasonal based watershed newsletter and factsheets to keep residents informed of current watershed management practices, programs, and educational opportunities including:

- responsible maintenance of septic systems;
 - reduction of personal water consumption;
 - proper disposal of waste;
 - responsible off highway vehicle use;
 - appropriate development and the impacts of improper clearing, landscaping, fertilizer, and chemical use;
 - the purpose of, and activities permitted in Environmental Reserves, parks, open spaces, and trails;
 - prevention and control of invasive species.
- b. Develop a BMP guide for contractors, consultants, project managers, developers, and residents;
 - c. Highlighting and enhancing stewardship recognition as part of the existing community awards programs;
 - d. Provide information to local school curricula, local youth environmental education programming, and support internship, co-op, summer student, and/or volunteer opportunities related to watershed health.
7. Promote watershed stewardship community activities (e.g. lake cleanup days, hazardous waste collection, Yellow Fish storm sewer program, waste reduction, composting, and invasive species).
 8. Develop/expand the ALUS and Green Acreages Programs to encourage and provide financial support to agricultural producers and other rural landowners to retain and improve the environmental function and quality of their properties.
 9. Obtain "Lake Friendly" Aquavist Certification in the watershed. This will include evaluating the level of compliance with the program requirements (governance, wastewater, surface water, landscape, facilities and roads, and education and engagement) with respect to:
 - a. Nutrient reduction and recycling;
 - b. Increased infrastructure capacity for drought and flood resilience;
 - c. Enhanced ecosystem health;
 - d. Reduced greenhouse gasses;
 - e. Education, information sharing and engagement.

10. Establish new incentive programs for:

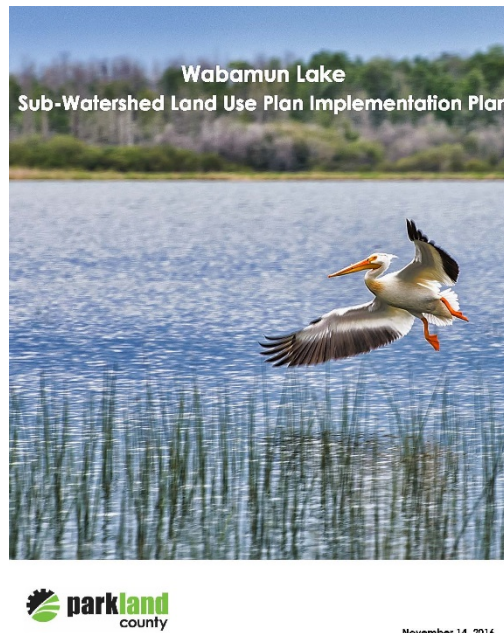
- a. Source control of storm water to maintain and enhance water quality and manage runoff;
- b. Building and/or landscaping including features, fixtures that encourage water harvesting and savings, maintain water quality, and enhance area biodiversity;
- c. Collection of wastewater in community and multi-subdivision shared systems;
- d. Septic System Repair Program including dye testing requirement to determine leakages and requirement for permits and cost share funding for needed repairs/replacement.

Sources for Additional Information and Ideas

- 1. Vermillion River Watershed Management Plan, North Saskatchewan Watershed Alliance, 2012.
- 2. Bow River Project, at: [www: brbc.ab.ca](http://www.brbc.ab.ca)
- 3. Balsam Lake and Cameron Lake Management Plan, City of Kawartha Lakes, 2015.
- 4. Buffalo Lake Integrated Shoreland Management Plan, Alberta Sustainable Resource Development, 2010.
- 5. Wabamun Lake Sub-Watershed Land Use Plan, County of Parkland 2016.
- 6. Municipal Guide (Planning for a Healthy and Sustainable North Saskatchewan Watershed), North Saskatchewan Watershed Alliance, 2006.
- 7. Municipal Guide: Planning for a Healthy and Sustainable North Saskatchewan Watershed
- 8. Sylvan Lake Watershed Stewardship Society [www: slwss.org](http://www.slwss.org)
- 9. Central Alberta Recreational Lake Initiative at: <https://exts2.aep.alberta.ca/CR-RecLakes/default.aspx>

Implementation Plan

An implementation plan provides in more detail how, when and where critical components of the land use plan will be implemented and which organizations are responsible for leading and delivering each component. It provides a guide so that decision-makers can proactively move forward with implementation by identifying the specific changes/enhancements to regulatory documents, policies, standards, etc. needed to implement the plans actions. In addition, it specifies the timeframe for each, and any budget or other requirements.



Tools and Procedures to Implementation Actions

Describes the tools and procedures that will be used to implement the actions in the Land Use Plan including:

1. Changes/enhancements to regulatory and policy documents;
2. Changes/enhancements to existing programs;
3. New programs/projects; and,
3. Additional budget requirements.

Examples of Regulatory and Policy Documents Tools and Procedure

1. Within 1-3 years, Planning and Development will lead the amendment of the County's Municipal Development Plan confirming that the County will only consider the approval of new CFOs on lands identified within the watershed.
2. Within 1-3 years, Planning and Development will lead the amendment of the County's Municipal Development Plan and the Environmental Conservation Master Plan to

encourage the use of Beneficial Management Practices in reducing the environmental impact of runoff on the watershed.

3. Within 3-5 years, Planning and Development will lead the amendment of the County's Municipal Development Plan and Land Use Bylaw to require applications for development/redevelopment to be consistent with and support the results of the Storm Water Management Study and 1:100 floodplain study when completed.

Examples of Changes/ Enhancements/New programs/projects

1. Within 3-5 years, Alberta Environment and Parks will lead the development and implementation of a Surface Water Quality Management Framework for the watershed and incorporate the framework into the North Saskatchewan Regional Plan's Surface Water Quality Management Framework as it is developed.
2. Within 1-3 years, Planning and Development will complete a 1:100 Floodplain Study to redefine the 1:100-year floodplain in the watershed.
3. Within 1-3 years, Environment will coordinate with Cows and Fish to develop and deliver a multi-media education in the watershed that focus on:
 - a. Encouraging livestock watering and salt/mineral sites to locate away from riparian areas and discourage livestock grazing adjacent to waterbodies/lakes/streams/wetlands;
 - b. Reducing pesticides, fertilizers, petroleum products and manure in runoff;
 - c. Reducing tillage/ summer fallow and returning stubble to the soil to reduce soil erosion and increase water infiltration.
4. Within 1-3 years, Alberta Environment and Parks, Environment and Community Suitability, and Planning and Development will undertake a Regional Groundwater Assessment Study for the watershed.

Sources for Additional Information and Ideas

1. Wabamun Lake Sub-Watershed Land Use Implementation Plan, County of Parkland 2016

Beneficial Management Practices

A Beneficial Management Practice is any management practice that reduces or eliminates an environmental risk. Each watershed is unique. Not all beneficial management practices are suited to every situation. Decision-makers will need to consider their watershed's specific environmental risks, and review the various options available to address those risks. They can then choose options best suited to the needs of the watershed community, and if needed to adapt them to the specific conditions in the watershed.

This section provides examples of Beneficial Management Practices that can be used to improve watershed health. They have been grouped into the following categories:

- Land Use Practices that Improve Surface Water Quality;
- Stormwater Management;
- Private Sewage;
- Land Use Practices that Improve Groundwater Quality and Quantity;
- Land Use Practices that Improve Upland/Riparian Health;
- Land Use Practices that encourages a built environment that improves watershed health and the people within it; and,
- Land Use Practices that Reduce Environmental Impacts from Development.

Many of these Beneficial Management Practices can address challenges in multiple categories.

Land Use Practices that Improve Surface Water Quality

Hazardous Waste

There are several measures that can be taken to protect communities and the environment from exposure to hazardous wastes. One of the most effective is to provide an easy way for residents to dispose of these wastes safely and conveniently.



Source: Surterre Properties

Some municipalities have created waste management facilities (e.g. eco stations) that accept household hazardous wastes either year-round or during annual or biannual hazardous waste roundup events.

The following are some organizations in Alberta that offer programs for recycling hazardous wastes:

- The Alberta Recycling Management Authority oversees provincially mandated tire, electronics recycling programs in Alberta.
- The Alberta Used Oil Management Association establishes and administers used oil material waste minimization and recycling programs directed at the private sector.

- The Rechargeable Battery Recycling Corporation coordinates the collection of portable rechargeable batteries for recycling.
- The Recycling Council of Alberta promotes and facilitates waste reduction, recycling, and resource conservation.

Pesticide Use

Pesticides include insecticides, herbicides, and fungicides. Improper selection, handling and application of pesticides can be a significant source of land and water contamination. Pesticides can travel through surface runoff and subsurface flow and can eventually end up in drinking water sources.



Source: writeoptions

Raising awareness about the effects of improper pesticides use on the environment is key to promoting better pesticide application practices. This includes the impacts of the overuse of pesticides, the differences between various types of pesticides, alternatives to pesticides and the importance of avoiding the application of pesticides near water bodies or before rain events.

There are several options for decreasing the use of pesticides through Integrated Pest Management programs. These programs use a wide variety of management practices and

control measures that are environmentally sound, and economically feasible including:

1. Preventative Measures that prevent or minimize pest problems;
2. Physical and Mechanical Controls such as manual weeding, string trimming and mowing;
3. Chemical Controls that are highly selective, with low toxicity and applied with target-specific techniques;
4. Some municipalities have created bylaws that control the use of pesticides on residential properties.

Snow Disposal and Road Salts

Road salts are used by many municipalities as de-icing and anti-icing chemicals for winter road maintenance. In addition to road salts, snow from roads may contain a mixture of suspended solids, chemicals, heavy metals and trash and oil.

There are generally two ways municipalities can ensure environmental protection while maintaining roadway safety using road salts.

1. Develop salt management plans, based on a review of existing road maintenance operations to achieve reductions of the negative impacts of salt runoff.
2. Implement Beneficial Management Practices in the areas of salt application, salt storage and snow disposal such as:

- a. Removing snow before it melts to keep substances from contaminating the environment;
- b. Depending on the level of contamination of the snow, snowmelt may need to be treated prior to it being discharging it into storm water drainage systems and watercourses; and
- c. Do not locate snow disposal near environmentally sensitive places such as near water bodies or groundwater recharge areas.



Source: Buchheit Concrete

Storm Water Management

Beneficial Management Practices for storm water management help to minimize the impact of polluted runoff flowing into lakes and streams, and reduce the pressures that storm water places on municipal infrastructure. This is done by managing storm water near or at its source by natural systems through:

- Storm water volume control;
- Storm water peak flow control; and
- Storm water quality enhancement

Although there are various types of storm water management systems, they all follow the same principle of "slowing it down, spreading it out, and soaking it in". They aim at replicating the natural hydrological processes of absorption, infiltration, evaporation, and evapotranspiration.

Storm water pollutant removal occurs through five primary removal mechanisms including:

- a. sedimentation through reduced runoff velocities and extended detention;
- b. filtering through soil and sand;
- c. straining and settling of particulates passing through standing vegetation;
- d. infiltration reducing pollutant loadings in runoff by allowing percolation into underlying soils; and



Source: Landscapes2.org

- e. biological uptake of nutrients and contaminants by plants and soil microbes.

Site design for storm water management seeks to:

- a. reduce storm water peak flow and volume;
- g. minimize land and vegetation disturbance;
- a. capitalize on the natural hydrology of the site;
- b. utilize, or accommodate, the natural topsoil, subsoil, and vegetation;
- c. minimizing soil compaction and impervious area;
- d. reduce or prevent storm water runoff during small storm events;
- e. provide treatment for storm water runoff as close to the source as possible; and
- f. reducing pollutants by implementing source controls that prevent pollutants from entering storm water.

Storm Water Pollution Prevention

Storm water quality is an important aspect of storm water management.

The most effective means of improving storm water quality is through pollution prevention.

There are many ways municipalities can protect storm water from non-point source pollution and point source pollution:

- a. Managing the use of fertilizers and pesticides;
- b. Promoting stewardship on agricultural lands and by industry;
- c. Designating safe routes for dangerous goods;
- d. Controlling the disposal of toxic substances in storm water drains;
- e. Encouraging industry to minimize storm water contamination (e.g., require that storm water from parking lots is treated prior to disposal into storm water sewers);
- f. Utilizing good road salt and snow disposal practices;
- g. Controlling disposal of animal wastes; and
- h. Addressing private sewage system issues relating to siting, construction, and management.



Source: wilsonemi.com

Minimizing Erosion on Construction Sites;

Construction sites, especially those on previously natural sites can be a significant source of storm water contamination if soil erosion is not controlled and if measures are not taken to keep soil and other debris out of storm water. Some of the Beneficial Management Practices for erosion and sediment control that can be used during construction include:

- a. Locating and stabilizing stockpiles away from watercourses and environmentally sensitive areas;
- b. Designating access points for construction vehicles to leave construction sites and construct access roads with non-erodible material;
- c. Protecting existing catch basins and sewer inlets Control on-site drainage through temporary storage facilities;
- d. Using dust control measures such as water trucks, mulching and temporary vegetation;
- e. Establishing wind erosion control using options such as barriers, vegetative controls, soil retention blankets and soil sealants;
- f. Establishing rainfall and water erosion controls using structural options (e.g., sediment traps and basins, inlet filters, straw barriers, sand bags, terracing, paving, blankets) and non-structural options (e.g., temporary, and permanent seed planting, mulching, sod installation, netting, erosion control blankets, weed control);
- g. Using dry or wet ponds for ponding and filtering water;
- h. Removing accumulated sediment and debris; and
- i. Regularly inspecting and maintaining erosion and sediment control systems.

Rain Gardens

Rain gardens are storm water management and treatment areas that provide water quality treatment, reduce runoff, and promote infiltration near where runoff originates, such as roofs, driveways, and sidewalks. On the surface, rain gardens appear like flower/shrub beds and can range from urban environments with hard walls to extensive areas within parks, blending into the topography. They may be designed to permeate water into the underlying soils for groundwater recharge or may have excess water directed to storm sewers through an under drain.



Source: Woodbridge Greenhouse1

A rain garden utilizes engineered soils and vegetation to capture and treat rainwater and are located at the low point of a landscape.

Depending on the ability of the sub-soils to permeate water, a rain garden may have four layers.

1. plantings and aged mulch;
2. topsoil, natural or amended;
3. gravel drainage layer; and
4. under drain with cleanouts.

Rain Gardens can be incorporated into either new or retrofit sites. They can also be used for snow storage during winter, provided salt tolerant plants and soils are used. Depending on the runoff volume to be controlled, site locations and soil conditions, enhanced infiltration may be required.

Bioswales

Bioswales are open channels with dense vegetation specifically designed to improve storm water quality by filtering and settling particulates from the water, slowing flow velocity, and reducing volumes through surface infiltration and evaporation and biodegradation from soil microbes.



Source: soils.org

Bioswales must be designed to fit the unique characteristics of each site. The drainage area to a bioswale is based on the soil type, ponding depth, and surface area. They are constructed with amended topsoil, selected plantings, and may include an infiltration layer to provide enhanced water quality treatment and promote infiltration.

Bioswales can be applied in most development situations, including residential areas, along roadways, parking lots, parks, and other green spaces. They are well suited to treat roadway runoff because of their linear nature and ability for receiving sheet flows. They

are often located within utility rights-of-way along property boundaries for serving one or multiple properties.

Using bioswales to replace existing road ditches is a common retrofit opportunity to enhance infiltration and pollutant removal. Bioswales used in these areas must be constructed so they do not compromise the road structure due to water infiltration and may require the use of salt tolerant grasses and plants to accommodate road salt.

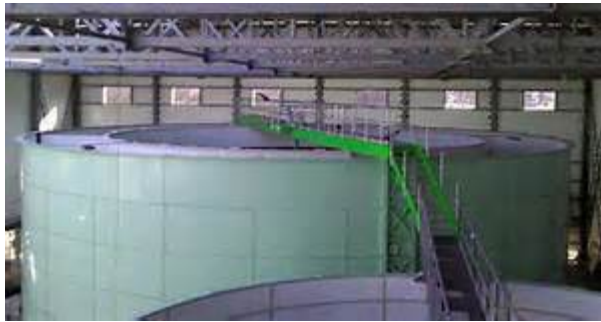
Private Sewage Systems

Municipalities can encourage owners of private sewage systems to practice regular maintenance including:

- a. Checking that their septic systems are large enough to meet changing needs;
- b. Inspecting the system every two years;
- c. Cleaning it when required, and
- d. Regularly ensuring that their operations meet or exceed legislation requirements.

Municipal Waste Water

Although technologies for treating wastewater have come a long way, they still can create environmental and human health risks. Ammonia, chloramines, and pharmaceuticals are just a few of the contaminants that enter municipal sewer systems and can be harmful to watershed health.



Source: ecologixsystems.com

Most municipalities provide wastewater services in their communities and as such have many opportunities to protect watershed health. These include opportunities related to:

- a. Wastewater collection, source control;
- b. Wastewater treatment;
- c. The use/disposal of biosolids, and
- d. The management of private sewage systems.

Wastewater Collection Systems and Source Control

Ensuring that wastewater collection systems are properly constructed and maintained is an important component of protecting ground and surface water. Poorly constructed or maintained wastewater infrastructure such as pipes, joints, connections, and tanks can cause environmental problems. Poor construction and maintenance problems may lead to overloading the system



Source: surveymonkey.com

and cause overflows and backups that can be a source of wastewater loss into the surrounding environment. The leaching of untreated wastewater into the ground can also be a source of groundwater and surface water contamination.

Municipalities have a responsibility to ensure that their wastewater collection systems have the capacity to handle their maximum quantity of wastewater flow.

For municipalities that have systems where wastewater and storm water sewers are combined, heavy rains create additional problems related to

water holding capacity of the system and can lead to the discharge of untreated wastewater into the environment through storm water outlets.

There are two general methods of addressing increased wastewater flow into a system.

1. Increase the holding capacity of the system through expansions in inline and offline storage; and
2. Decrease the quantity of wastewater into the system by encouraging the community to use less water.

Wastewater source control is a means of controlling the contaminants that enter wastewater sewers. By controlling what goes into sewers, municipalities can minimize wastewater treatment needs. Wastewater source control is particularly valuable for substances that are difficult to remove from wastewater (e.g. pharmaceuticals, phosphorus, and heavy metals). Some examples of municipal wastewater source control include:

1. Creation of sewer bylaws that control the substances that go into wastewater sewers;
2. Public education and outreach aimed to keep pharmaceuticals, household hazardous wastes and other contaminants out of wastewater sewers.

There are several wastewater treatment technologies being used throughout Alberta. These include:

1. Biological nutrient removal;
2. Activated sludge;
3. Digesters;
4. Dewatering techniques, and
5. Membrane and UV filtration.

Land Use Practices that Improve Groundwater Quality and Quantity

Reduction of Impervious Surfaces



Source: listlessonlove.wordpress.com

Permeable surfaces held the infiltration of rain water into the soil to enhance groundwater recharge and reduce storm water runoff. Impervious surfaces such as asphalt have the opposite effect.

Strategies to minimize impervious areas include:

1. Use pervious materials in construction;
2. Narrower road widths that reduce site imperviousness while decreasing requirements for clearing and grading;
3. Flat curbs and roadside bioswales in place of traditional curb and gutters;
4. Single sidewalks on one side of roads;
5. One sided on-street parking;
6. 'Green' laneways using pervious materials and surfaces;
7. Minimized building footprints by building taller, narrower dwellings;
8. Green roofs;
9. Limited width shared driveways;
10. Reducing the overall length of driveways, due to reduced lot setbacks; and
11. Alternate street layouts designed to maximize the number of lots with the minimum amount of pavement.

Groundwater Vulnerability and Source Protection

Municipalities can protect ground water sources by identifying areas where threats to the quality and quantity of source water exist, developing strategies to reduce these threats and monitoring water sources.

The Aquifer Vulnerability Index and Groundwater Vulnerability Index and the DRASTIC Intrinsic Aquifer Vulnerability Index are both tools developed by the Alberta Government for assessing the vulnerability of aquifers to surface contaminants.

In the assessment of aquifer vulnerability to potential contamination, the depth to the aquifer and the types of geological materials above them are considered. Generally, aquifers closer to



Source: Flickr.com

the surface overlain with pervious surface materials are more vulnerable to contaminants, as compared to aquifers found deeper and covered with thick layers of impervious materials.

Threats to groundwater sources include land uses and activities that result in the deposit of sediments, nutrients, pathogens, toxic contaminants, and debris into water bodies. Source protection is particularly important for contaminants that are potentially harmful to human health and difficult to remove from water, such as pesticides, herbicides, pharmaceuticals, nitrates, nitrites, phosphorus, and heavy metals.

Source protection involves the management of land uses and activities occurring throughout the watershed. Some important components of source water protection are:

1. Managing storm water runoff and pollution prevention;
2. Maintaining green spaces including healthy shorelines, riparian areas and other natural areas that serve as buffers between water sources (both water bodies and groundwater recharge areas) and potentially detrimental land uses;
3. Controlling point-source pollution.

Design and Construction of Waterwells

Improperly designed water wells potentially provide direct access to a groundwater aquifer for pollution. Most contaminants enter the well either through the top or around the outside of the casing. Sewage or other contaminants may percolate down through the upper layers of the ground surface to the aquifer.

The initial investment for a properly designed and constructed well not only protects the aquifer but also provides for:

1. A reliable and sustainable water supply consistent with the users' needs and the capability of the aquifer;
2. Good quality water that is free of sediment and contaminants;
3. Increased life expectancy of the well and reduced operating and maintenance costs;
4. Ease of monitoring well performance.

Provincial regulation requires that drilling companies have an approval to drill water wells and their drillers must be certified Journeyman Waterwell Drillers. A list of approval holders is available through Alberta Environment and Parks or the Alberta Waterwell Drilling Association.

The following Beneficial Management Practices also help prevent possible contamination of the well and the aquifer.

- a. Ensure the well is accessible for cleaning, testing, monitoring, maintenance and repair;
- b. The ground surrounding the well is sloped away from the well to prevent any surface run off from collecting or ponding;
- c. The well is up-slope and as far as possible from potential contamination sources such as septic systems, barnyards, or surface water bodies; and
- d. The well is not housed in any building other than a bona fide pump house, which is properly vented to the outside to prevent any build-up of dangerous gases.



Source: [bing.com/images](https://www.bing.com/images)

Land Use Practices that Improve Upland/ Riparian Health

Riparian Areas

The draining of wetlands or development on riparian areas has the potential to significantly affect water tables, water quality and quantity, and to reduce the resilience of the landscape during drought and flooding.

There are several Beneficial Management Practices that can be used to protect these riparian areas including:

1. Retain native vegetation and slopes, prevent disturbances in riparian areas, and buffer strip retention;
2. Avoid landscaping, building structures, or constructing in the floodplain, including watercourses, shorelines, and river banks;
3. Adhering to development setbacks and other regulations in riparian areas;
4. Minimize the use of drainage channels or culverts;



5. Provide awareness information to users/land owners on why land use in riparian areas and activities are controlled; and,
6. Plan for recreational use - use well defined trails and paths; designate sensitive areas for low impact activities; restrict access where vegetation is not fully established.

Riparian Setback Matrix Model (RSMM)

This scientifically and legally defensible model can be used to establish setbacks for development, determine the size of environmental reserves, and conservation easements.

The RSMM incorporates features such as vegetation type and abundance, bank slope and height, groundwater influence, and various soil characteristics to determine the most appropriate setback distance from sensitive areas to improve removal of nutrient pollutants, maintenance of wildlife habitat, and increase bank or shoreline stability and integrity.

Off-Road Vehicles in Riparian Areas

To minimize the environmental impact caused by the recreational use of Off-Road vehicles, municipal governments can initiate a public outreach process to encourage good stewardship among users focusing on:

1. Avoiding streams, rivers, lakes, marshes, beaches, and wetlands (e.g., maintain a distance of 30 meters from water bodies and construct bridges where needed);
2. Keeping vehicles on to hard roads and trails;
3. Avoiding wet weather conditions;
4. Avoiding crossing water bodies where the approaches are very steep (vulnerable to soil erosion);
5. Eliminating fuel or oil leaks;
6. Never washing an ATV or OHV in a water body;
7. Constructing cross ditches along the trail that direct water to vegetation (which will filter out soil and sediments).

Municipalities can encourage good stewardship by working with local groups to designate areas and design trails for ATV and OHV use that minimize environmental impacts.



Source: upsateatv.com

Minimizing Agricultural Impacts on Riparian Areas

The following Beneficial Management Practices will reduce the impact of agricultural operations on riparian areas.

1. Avoid cultivating through riparian areas;
2. Keep livestock areas away from the banks of streams and lakes;
3. Keep pesticides and fertilizers and other chemicals out of riparian areas;
4. Livestock Watering
 - a. Set up livestock watering sites away from water bodies;
 - b. Utilize remote watering systems (e.g., solar powered water pumps that allow for livestock watering away from riparian areas). Municipalities can promote the use of remote watering systems by making demonstration equipment available to producers to test.
5. Livestock Yards and Wintering Sites
 - a. Consider environmental factors when determining the location of livestock yards and livestock wintering sites. They should not be located uphill from waterways or other environmentally sensitive areas;
 - b. Protect groundwater by not siting livestock yards on or near: coarse-textured permeable soils, a water table that is near to the surface or a spring or water well;
 - c. Disperse animals on livestock wintering sites to minimize manure build-up.
6. Grazing Management
 - a. Promote the growth of healthy forage plants which protect against soil erosion from surface water runoff and have deep root systems that are efficient at harvesting moisture;
 - b. Avoid over grazing by managing herds so that grazing activity is distributed;
7. Silage Storage
 - a. Store silage safely to avoid seepage and potential contamination of ground and surface water;
 - b. Collect any seepage.

8. Pesticides

- a. Apply pesticides only in quantities needed and at times that decrease the risk of contaminating water bodies;
- b. Consider integrated pest management as an alternative (in some cases pesticides may not be needed);
- c. Store pesticides safely.



Source: news.psu.edu

9. Fertilizers

- a. Apply only the quantity of fertilizers that are needed (based on soil tests, crop type and expected yield);
- b. Apply fertilizers at appropriate rates and times to increase productivity and decrease the risk of contaminating water bodies;
- c. Store fertilizers safely;
- d. Explore alternatives to fertilizers with high phosphate content (phosphates are one of the chief sources of nutrients that promote undesirable plant growth in lakes).

10. Manure Use

- a. Manage manure with the same care as commercial fertilizers by calculating nutrient needs to avoid applying excess manure and compost (improper management can lead to nutrient runoff and problems associated with nutrient loading in water bodies).

11. Soil Erosion Control

- a. Inspect lands and identify places where soil is most likely to erode;
- b. Explore options for preventing erosion and consider re-vegetating areas with trees and grass;
- c. Reduce or eliminate tillage and summer fallow and return stubble and roots to the soil;
- d. Maintain ground cover (live plants and dead or decaying plant material) to reduce runoff and associated soil erosion and to increase water infiltration into the soil.

12. Petroleum Products

- a. Store liquid petroleum products (e.g., gasoline, diesel fuel and kerosene) safely by ensuring storage tanks are installed properly, inspected, and monitored to prevent leaks.

13. Disposal of Farm Wastes

- a. Dispose of toxic and other wastes (e.g., animal health care products, containers for fertilizer, oil and paint, preservatives) safely by bringing them to hazardous waste collection centres and landfill sites to prevent soil and water contamination

Land Use Practices that Encourage a Built Environment that Improves Watershed Health and the People within It.

Limiting Residential Lot Creation and Optimizing Lot Sizes in Rural and Agricultural Areas

The intent with limiting residential development in rural and agricultural areas is to support surrounding land uses such as agriculture by minimizing the amount of land that is converted to residential uses. This reduces the proliferation of residential uses in agricultural areas by using a variety of tools including:

1. Restricting the number of lots allowed in a specific area;
2. Establishing minimum or maximum lot sizes to restrict the intensity of development;
3. Outright banning of the creation of new rural residential lots.

Minimum Density Requirements

Minimum Density Requirements establish the minimum amount of development that is allowed on a given area of land. Approaches to establishing minimum density requirements include:

- The scale that it applies (e.g. individual lot, neighbourhood, municipality);
- Where it applies (e.g. urban, rural);
- The type of uses that it applies to (e.g. residential);
- The way it is calculated (e.g. net developable basis, gross basis)

Low Impact Design

Low impact design is an approach to land development (or re-development) that minimizes impacts on the environment. This approach focuses on maintaining or restoring the natural features of a site, providing opportunities for natural processes to take place. Key principles include:

1. preserving natural site features;
2. small scale, integrated storm water management controls throughout the site;
3. minimizing and disconnecting impervious areas;
5. controlling storm water as close to its source as possible;
6. creating multi-functional landscapes
7. practical engineered systems that use natural materials



Source: parioplan.com

These applications are based on the individual requirements and design of the development or site and can be applied at a lot, to a site or at a watershed level.

Leadership in Energy and Environmental Design for Neighbourhood Development (LEED-ND Standards)

Leadership in Energy and Environmental Design, is a third party certification program to guide and assess sustainable community development. New developments achieve certification based on the principles of smart growth, urbanism, and green buildings. The Canadian Green Building Council has developed an Alternative Compliance Path for the LEED-ND rating system that provide clarity and guidance for Canadian projects.

As with other LEED rating systems, LEED-ND has four levels of certification; certified, silver, gold and platinum based on the number of points a development achieves. The rating system is made up of prerequisites, which all projects under consideration must satisfy, and credits, which the developer can earn toward one of the certification levels based on the potential environmental impacts and human benefits of each credit. These are weighed using the environmental impact categories of the United States Environmental Protection Agency's Tools for the Reduction and Assessment of Chemical and Other Environmental Impacts and the environmental-impact weighting scheme developed by the National Institute of Standards and Technology.

To participate in LEED 2009, a building must comply with environmental laws and regulations, occupancy scenarios, building permanence and pre-rating completion, site boundaries and area-to-site ratios. Its owner must share data on the building's energy and water use for five years after occupancy (for new construction) or date of certification (for existing buildings).

Source: engineering.iastae.edu



A collection of reference buildings is used to estimate the environmental impacts of any building seeking LEED certification in a designated rating scheme.

From 2010, buildings can use carbon offsets to achieve Green Power Credits for LEED-NC (New Construction Certification). Additional performance categories in the LEED for Homes rating system are; locations and linkages (recognizing the importance of transportation access, open space, and physical activity outdoors), and awareness and education (recognizing the need for buildings and settlements to educate occupants).

The certification process for design teams is made up of two consecutive applications: one including design credits, and one including construction credits. The design credits include those that are the purview of the architect and the engineer, and are documented in the official construction drawings. The construction credits include those that are predominantly under the purview of the contractor, and are documented during the construction and commissioning of the building.

Some municipalities offer incentives to developers to build to LEED standards. These incentives usually come in the form of fast-tracked development application reviews or reduced development fees. Municipalities can also facilitate LEED standard development by reviewing their zoning bylaws to ensure they do not have barriers to achieving LEED certification. Some municipalities also promote LEED or similar standards through their MDPs.

Minimum Intensification Requirements

Minimum Intensification Requirements refers to development that takes place through infill or redevelopment within existing urban areas (e.g. development of vacant lots, redevelopment of brownfield areas, and reuse of buildings) so that less development takes place in previously undeveloped areas.

Many jurisdictions have developed intensification targets as part of local or regional growth strategies. These targets establish the proportion of growth that is to occur through intensification.

Adaptive Reuse

Adaptive Reuse refers to the reuse of buildings and sites for a purpose other than which it was originally built or designed. The adaptive reuse of buildings accommodates growth within the existing footprint of a community. Policies and programs to promote adaptive reuse can help reduce rates of land conversion, maximize the use of existing infrastructure, utilize existing disturbed areas, as well as increase the density in existing urban areas.

Building Forms that Reduce the Development Footprint

Building Forms that Reduce the Development Footprint are tools that accommodate increased land uses within a single building or land parcel (e.g. Additional residential units, residential units in commercial buildings).

Alternate Development Standards

Alternate Development Standards are designed to support development that is more environmentally sustainable and land efficient. They can facilitate more compact forms of development, allow for greater on-site storm water retention, support LEED criteria, and compatibility with other uses. These standards fall into two categories:

- a. Planning policies and regulations (e.g. Lot dimensions, parking requirements, minimum housing size, frontage, etc.), and
- b. Engineering standards (e.g. The location, dimensions, and designs of rights-of-way, storm water systems, utility corridors, etc.)

Checklists and Scorecards

Checklists and Scorecards identify a set of development objectives that a municipality is seeking as part of a development approval process. (e.g. Energy efficiency, water conservation, reducing development footprint). Completion of checklists or score cards can be mandatory or voluntary. They can function as an educational and reinforcement tool for developers on municipalities land use objectives and can provide the municipality with an assessment of how developments are meeting land use objectives. Examples include:

- a. Density of the proposed development relative to municipal targets;
- b. Location of the development relative to priority growth areas; and
- c. Alternate development standards

As a voluntary tool, development proponents can be encouraged to complete checklists by providing incentives such as reduced planning application fees or expedited approvals.

Cluster Development

Cluster Development refers to a pattern of residential development where the developed area is clustered together on smaller lots rather than spread out across the parcel. Cluster development is most often implemented by requiring that a minimum percentage of a parcel of land be retained as open space or agricultural land at the time of subdivision. It may also be supported by establishing maximum lot sizes and/or a maximum number of lots for a given area.

Cluster zoning policies vary in several ways from a mandatory requirement to an incentive-based or voluntary tool. In most mandatory approaches, a specifically designated area of a

municipality is zoned for cluster development where there is a requirement to preserve a prescribed amount of contiguous open space. An incentive-based approach allows a developer to create additional lots if they are smaller, and clustered in one area.



Source: parioplan.com

This is a very important tool for conserving natural areas at a site scale because it allows buildings to be concentrated away from sensitive natural features. Cluster development maintains the number of lots but clusters the development onto a smaller, buildable portion of the site. This is particularly useful when the intent is to protect specific features on a development site while still allowing development to occur. Cluster development can be promoted in a municipality's subdivision ordinance or required in a certain zone.

Form Based Codes

Form Based Codes control development by regulating its physical aspects as opposed to regulating the use of land. By regulating the dimensions and development standards for buildings, streets and open space, form-based codes aim to facilitate development that is more pedestrian friendly and compact than traditional zoning reducing the need for road and other infrastructure.

Form based codes can differ in terms of the scale they address and can be applied to a single street or to an entire urban area, although they are commonly implemented in small areas as part of urban redevelopment. They can also be used to ensure development meets certain LEED or other criteria.

Land Use Practices that Reduce Environmental Impacts from Development.

Transportation Infrastructure

To decrease the impact of transportation infrastructure on the watershed, the following practices can be considered.

1. Diverting transportation routes around environmentally sensitive lands.

2. Minimizing road width in urban areas by providing for parking in back alleys, creating one-way streets, etc.
3. Controlling surface water runoff along rural roads by slowing down surface water flows with vegetation or other materials that offer erosion protection, by directing runoff into nearby vegetated areas and by encouraging natural soil infiltration with infiltration trenches.
4. Providing alternatives to automobile transportation, which do not require large tracts of land for road infrastructure (e.g. creating or improving public transportation, encouraging the creation or redevelopment of walkable communities with amenities within walking distance from homes and connected with a system of walking paths).



Identification of Priority Growth areas

Identification of Priority Growth areas direct development to designated areas that are often supported by policies requiring a certain proportion of future growth to occur in these locations and may also be supported by incentives or infrastructure that are designed to attract development to them.

Land Budgeting

Land Budgeting is used to determine how much additional land is needed to accommodate future growth to avoid land supply shortages and provide the rationale and justification for establishing urban growth boundaries, greenbelts, intensification targets and the identity of priority growth areas.

Land budgeting can include both greenfield areas as well as underutilized industrial, commercial, or residential lands.

Agricultural Land Conversion Fees

Agricultural Land Conversion Fees are tools used in some jurisdictions in which a charge is applied to the conversion of agricultural land to other uses. The intent is to place a financial disincentive to reduce the fragmentation or conversion of agricultural land to other uses. This can be done at the time of sale by placing a surcharge on the sale of agricultural land, or when an application is made to change farmland to a different land use. While in most cases the money obtained

through the fees is used to purchase equivalent agricultural land for preservation, the funds can be used for other purposes.



Source: juniorachievementtuse.wordpress.com

Preferential Tax Treatment

Preferential Tax treatment allows land use assessments to assess and subsequently tax lands for their current use rather than at the "highest and best use" that is typically used.

Constructed Wetlands

Wetlands are an important part of natural drainage systems in Alberta and many rural and urban municipalities are taking measures to protect remaining wetlands and constructing new ones and incorporate them into their conservation area and storm water management planning.

Guidelines for the Approval and Design of Natural and Constructed Treatment Wetlands for Water Quality Improvements (Alberta Environment 2000) are available online at



Source: wetlandspacific.com

<http://environment.gov.ab.ca/info/library/5711.pdf>

Performance Zoning

Establishes environmental protection standards that must be met if development is to occur. Performance standards can be applied town/village wide, restricted to specific zones (including an overlay zone) or included in subdivision regulations and site plans.

Standards may include use of an open space ratio in intensity guidelines, habitat restoration requirements, maintaining wildlife corridors, limits on tree and vegetation removal, use of natural landscaping, and wetland buffer requirements. This Beneficial Management Practice allows for flexibility in design and layout if environmental conservation standards are met.

Transfer of Development Credits

Transfer of Development Credits (TDC) directs development away from areas of environmental, aesthetic, or agricultural value and redirects it into higher density clusters. To achieve this, two types of areas are identified; Sending Areas and Receiving Areas.

The sending area is the area that the municipality wishes to protect from development, such as an agricultural or natural area. The receiving area is a location where additional density could be accommodated. The goal of a TDC program is to "send" development from the sending area to the receiving area. To do this, development credits are sold or transferred by landowners in the sending area to developers in the receiving area. The credits that are purchased/transferred to

the receiving area can be used in the form of development bonuses (e.g. additional density, additional building heights) in the receiving area.

Priority Growth areas can be identified as receiving areas so that additional growth and development can occur in these areas. Green belts or agricultural reserves can be identified as sending areas to direct development away from them. TDCs are typically used in conjunction with conservation easements to protect lands in the sending areas from development.

In Alberta, the use of TDCs is enabled under the *Alberta Land Stewardship Act*. TDC programs must identify all parcels, which are to be conserved (sending area) and developed (receiving area) and what the value of the development credit is that is being transferred/sold. Municipalities require approval from the Alberta Government to proceed with a TDC program.

Urban Growth Boundaries

Urban Growth Boundaries limit or control the expansion of villages or towns into surrounding rural areas by defining the areas within which urban development can occur. A variation on Urban Growth Boundaries is Urban Service Areas or Urban Service Boundaries, which define the area to which urban services (e.g. water and wastewater) will be extended.

Variable Development Levies & Development Impact Fees

Variable Development Levies & Development Impact Fees are intended to recover from developers the infrastructure costs for servicing new developments. This can include physical infrastructure such as roads and sewers, and/or services such as police and fire protection.

Although many jurisdictions apply uniform fees on all new development, some use variable development levies. Variable development levies are intended to better reflect the true cost of servicing different forms of development while at the same time incenting developments supported by the municipality. These include such things as lower fees in priority growth areas, for higher density development, and alternative development standards.

Education Programs

Information helps form people's attitudes and behaviours. Schools, community organizations, community leaders and the media contribute to the knowledge and values held by the public. Local governments can play a significant role in educating their communities to raise awareness and appreciation of the watershed. The future of a watershed depends upon the support and involvement of its citizenship.



Source: kingcounty.com

Widely held community values will determine local land use and a community that is well informed on the issues in the watershed is more likely to be supportive of decisions that protect its health. Residents not only influence larger community decisions, but also make daily decisions affecting the health of the watershed ranging from the plants they choose to landscape with, to supporting local conservation efforts.

The goal of education programs is to help develop informed residents capable of making well-informed decisions about protecting the health of the watershed.

Effective education programs efforts lead to:

- a. Increased public support for measures by public agencies to protect the health of the watershed;
- b. Improved public understanding of how a healthy watershed contributes to a sense of living in a healthy, livable community and a sense of place;
- c. Improved understanding of the public's capability to act to support the health of the watershed and to motivate them to take action;
- d. Improved awareness of, and concern about economic, social, political, and ecological independence in urban and rural areas; and
- e. Improved skills for identifying, participating in, and solving issues in the watershed.

Cost of Servicing Study

A Cost of Servicing Study is a tool for comparing the financial costs to municipalities associated with alternative development scenarios. They can evaluate the costs to provide municipal services and infrastructure (transportation, water supply, sanitary sewers, and water treatment) to specific areas. This can be used to contrast the economic costs of directing growth to one area or another or the costs of servicing different forms of development.

Setbacks, Buffers, and Open Space Requirements

Building or development setbacks may be used to protect specific site features such as floodplains, wetlands, natural habitats, or steep slopes. Setbacks require new developments to be built beyond a specified distance from lot lines as stated in the zoning ordinance. Open space requirements are a form of setback that requires developers to leave a percentage of a site undeveloped.

Buffers help to separate incompatible land uses. Like setbacks, buffers can require a minimum amount of preserved land to protect natural features from disturbance. To protect habitat, buffers should remain as naturally vegetated as possible.

Density Bonusing

In these programs, local governments allow landowners to construct more units on their land than are normally allowed by the zoning regulations. In exchange, the developer agrees to set aside open space, protect habitat, buffer streams, and wetlands or contribute to a per-lot-fee to an open space fund. Alternately, a density penalty can be applied.

Greenbelts and Agricultural Reserves

Greenbelts and Agricultural Reserves are tools designed to protect large, contiguous natural or agricultural areas. Greenbelts are regulatory tools that set out a designated area that is to be preserved for agricultural uses and/or natural areas by strictly or limiting the allowed uses within the designated area to agricultural or conservation/non-intensive recreation. Most greenbelt policies make allowances for existing communities and other uses that predate the greenbelt.



Source: hopelodgecentre.co.uk



Source: ottawacitizen.com

Naturalization

Naturalization is a process of ecological restoration that involves returning an altered or degraded site to a more natural condition. It usually involves the use of trees, shrubs, grasses, and/or flowers that are native to an area.

Municipalities can begin naturalization projects by first identifying priority sites and appropriate plant species for use in the areas. Some municipalities have created policy documents such as a Naturalization Master Plan. These documents can address topics such as: appropriate plant species, criteria for selection of sites, roles and responsibilities of individuals involved, community outreach strategies and methods for implementation.

In terms of vegetation on private lands, municipalities can encourage landowners to consider watershed needs when planning their landscaping and to consider carrying out naturalization projects on their lands.

Municipalities can also create landscaping requirements for private lands in their land use bylaws.

Unified Governance

Lake Friendly Aquavist Certification Program

The Lake Friendly Aquavist Certification Program is designed to help local governments demonstrate excellence in water management through governance and leadership across their operations and with the community in the watershed.

The main objectives of the program are:

- a. Build awareness of the connection between current practice and the health of waterways;
- b. Provide a guide for best practices across all operations including planning for future infrastructure and service investment;
- c. Identify targets to allow for planning and budgeting as part of a continuous improvement approach;
- d. Provide a clear set of performance requirements to achieve certification levels;
- e. Provide an opportunity for local government to be recognized and rewarded as leaders in water management;
- f. Encourage innovative strategies in best practice and showcase success; and
- g. Provide measurable practices to incent operations and innovations for water management

The program has combined science and leading best practice to address:

- a. Nutrient reduction and recycling;
- b. Increased infrastructure capacity for drought and flood resilience;
- c. Enhanced ecosystem health;
- d. Reduced Green house gases; and
- e. Education, information sharing and engagement.



Source: [bing.com.images](https://www.bing.com/images)

To achieve certification, applicants are required to meet all water-related legislative and policy requirements as a prerequisite and to report actions across several categories. There are different levels of certification based on the degree of success in each of the following:

Governance

- a. Set Planning and Purchasing Policies by including requirements for wastewater and surface water management including the use of bioengineered systems into development plans, zoning bylaws, and development agreements;

- b. Set advanced wastewater treatment policies by developing strategies that incorporate planning and advanced wastewater treatment to minimize Nitrogen and Phosphorous in wastewater;
- c. Participate in local watershed planning in partnership with other municipalities and stakeholders within the watershed;
- d. Demonstrated protection of wetlands and shorelines by incorporating the protection of wetlands and shorelines in local government planning and bylaws;
- e. Developing a combined Sewer System Action Plan with priorities and timelines;
- f. Establish and implement a plan to support the management of surface water from commercial/industrial facilities within local government jurisdiction;
- g. Organizational capacity and resources are available to support water management in the local government; and
- h. Develop incentive programs to encourage private property owners to achieve defined lake friendly goals.

Waste Water

- a. Develop and implement a wastewater treatment monitoring program for nutrient assessment;
- b. Implement strategies for advanced wastewater treatment to exceed provincial standards for Nitrogen and Phosphorous;
- c. Develop a comprehensive program to prevent the unscheduled or emergency release of wastewater due to extreme vents, unplanned capacity, or system breaches;
- d. Develop and implement a biosolids management plan for the removal and recycling of Phosphorous and other nutrients;
- e. Implement a combined sewer system action plan including a combined sewer overflows pollution prevention program;
- f. Develop and implement a private sewage disposal management plan;
- g. Maintain bioengineered systems for wastewater management as per development plans;
- h. Develop or pilot innovative strategies in wastewater and or biosolids management;
- i. Implement strategies for Greenhouse Gas reduction as it relates to wastewater management.

Surface Water

- a. Develop and implement a municipal surface water management plan for both new and existing drainage systems including advanced surface water management requirements;
- b. Maintain Grey and Green (Bioengineered Systems) Infrastructure to achieve surface water quality requirements;
- c. Develop and implement a snow disposal site management plan;
- d. Monitor surface water management activities for commercial and industrial facilities to ensure conformance to standards;
- e. Develop and pilot innovative strategies in surface water management.

Landscapes

- a. Prepare and implement a landscape management plan;
- b. Develop or pilot innovative strategies for landscape management.

Facilities and Roads

- a. Develop and implement a Road Maintenance Plan;
- b. Develop and implement a sustainable procurement policy to protect water quality and ecosystem health;
- c. Promote recycling, hazardous waste removal and composting programs;
- d. Obtain building certification for existing local government owned facilities (e.g. LEED);
- e. Develop or pilot innovative strategies in facilities and roads.

Education and Engagement

- a. Develop and implement a water conservation plan for residents;
- b. Promote an Aquavist Certification;
- c. Advanced public education and communication.

The certification is valid for a five-year term and applicants can apply for recertification to ensure objectives are met and to achieve higher levels of certification and recognition.

Cooperation and Collaboration in the Watershed

Inter-jurisdictional initiatives provide an opportunity for the coordination of planning, servicing, and/or capacity building between two or more municipalities to achieve a shared set of goals and policies for land use, rural infrastructure, and services in the watershed.



Source: northeastmichiganwatersheds.org

These agreements recognize the economic, social, and environmental importance of coordinating local planning initiatives with those of neighbouring municipalities. From a watershed perspective, one municipality that is incorporating watershed considerations into planning decisions will have limited success if other municipalities in the watershed are not making similar efforts.

These initiatives can address compatibility of statutory plans, land use bylaws and subdivision and development decisions, opportunities for inter-municipal cooperation, protecting natural lands and/or agricultural lands and implementation strategies that address watershed health issues.

There are generally three approaches to these initiatives in Alberta.

1. Inter-municipal Development Plans are statutory plans prepared and adopted by bylaw by two or more neighbouring municipalities in accordance with the Municipal Government Act. The MGA outlines requirements of these plans and allows flexibility for municipalities to include in them a wide range of policy objectives that addresses watershed health;
2. Voluntary cooperation agreements that promote watershed health, inter-municipal planning, and resource sharing;
3. Establishment of inter-municipal planning bodies with responsibility for several activities within the watershed including creating inter-municipal plans and bylaws, advising councils, generating partnerships and collaborative projects between municipalities and making subdivision and development decisions;
4. Inter-Municipal Capacity Building that builds decision-maker awareness and staff capacity across the watershed including clear policies to guide staff, sharing information about watershed initiatives, and staff training.

Conservation Overlay Zoning

Overlay zones build on the underlying zoning by adding new standards to the density and uses allowed under the base-zoning district. Overlay zones are commonly used for environmental protection and could be effective at protecting areas such as streams, steep slopes, wetlands, wildlife corridors, rare landscape types, erosion and sedimentary control, and runoff/ storm water management. One of the advantages of an overlay zone is that the entire watershed need not be rezoned to accommodate conservation objectives.

Municipal Bylaws

A sewer bylaw regulates several infrastructure issues relating to building sewer connections. As a tool for source water protection, some sewer bylaws require the pretreatment of discharges from businesses and industry. These include, for example, the requirement of oil and grease interceptors in establishments that produce high quantities of these contaminants.

Creating or upgrading sewer bylaws should be considered regularly to accommodate for new regulations for effluents and biosolids, changes in technical and scientific information and changes in the types of industry and businesses in a community. When creating or upgrading a sewer use or a sewer bylaw, municipalities can phase in changes over time. This will allow affected businesses the time to find the best available treatment technology and/or make the necessary changes in their practices to meet the new requirements. Some municipalities have also phased in compliance programs that allow businesses time to make needed equipment modifications over time.

A pesticide bylaw that regulates pesticide use is a method of decreasing the risk of the contamination of water sources with pesticides. While banning the use of all pesticides in a

municipality may not be a realistic goal for many, a pesticide bylaw can be a tool for regulating the appropriate use of pesticides on municipal and private lands.

There are also several municipal bylaws that are currently being used to promote water conservation. These include bylaws addressing water rates, lawn watering and low flow fixtures.

Municipalities can create a bylaw to establish water rates that capture the true costs of pre-treatment, distribution, and post-treatment of water. They can also create bylaws that require low flow faucets in new building developments. A bylaw of this kind can require water efficient technologies such as low-flow toilets, low-flow showerheads and faucet aerators.

Glossary

Abstraction Potential – The ability of the landscape to retain runoff in surface storage on vegetation (leaves) and minor depressions (puddles) and through infiltration.

Area Structure Plans- Municipal Councils may, by bylaw, adopt an area structure plan to provide a framework for subdivision and development for a particular area. The area structure plan will generally describe the sequences of development, proposed land use, population density, and the location of major transportation routes and public utilities.

Catchment – The area draining to a single point such as an LID-BMP facility.

Effective Slope – Gradient governing flow velocity within a swale. If the slope of the surrounding terrain is too steep for a vegetated swale, the effective slope may be flattened by using check dams or drop structures.

Engineering Standards – Standards that deals with municipal operations and decision-making related to land use such as the constructing and maintaining sewer systems, waterworks, and pavements.

Greenfield – Land that has not been previously developed.

Green infrastructure – The ecological components, both natural and engineered, that serve and protect ecosystems.

Greywater – untreated used domestic water that does not include sewage (e.g. laundry, dishwashing, bath waters)

Hydrologically Sustainable Site – A development that minimizes its impact to the natural hydrological process.

Holistic – consideration of the importance of the whole system and the interdependence of its parts, including ecology, biology, hydrology, sustainability, economics, growth, etc.

Impervious Area – Areas covered with surface material that prevents water from passing through or penetrating to the sub-soils.

Infiltration – Process by which water penetrates into soil from the surface or upper soil layers.

Inter-municipal Development Plan - Two or more municipalities may adopt an inter-municipal plan to address issue of mutual concern with respect to designated lands. The plan may provide for the future use of land, manner and proposals for development or other matters relating to the area that the councils consider necessary.

Land use bylaws -All municipalities must have a land-use bylaw. This bylaw provides a specific means of implementing the policies that are expressed in a general way in the MDP. If a council wishes to adopt a direct control district in the land use bylaw, council must also adopt a municipal development plan. The bylaw provides for a system of development permits and divides the municipality into land use districts prescribing permitted and discretionary uses for land, buildings, and development standards.

Municipal development plan

A municipality with a population of 3,500 or more must adopt a Municipal Development Plan (MDP). It provides a general framework for development within the municipality and is the official statement of the municipality's policies concerning the desired future pattern of development.

Passive Recreation – emphasizes the open space aspect of a park and involves a low level of development, including picnic areas and trails.

Sensitive Ecosystem - Any fragile and/or rare portion of a landscape with relatively uniform dominant vegetation.

Storm Sewers – concrete or PVC pipes, buried below the frost line, designed to convey stormwater runoff from the surface to the receiving waterbody or an end-of-pipe facility such as a stormwater pond

Stormwater – water that runs off land and developed surfaces during a rain or snowmelt event.

Stormwater Management Facilities – manage stormwater runoff to provide controlled release into receiving streams LID-BMP – ecosystem-based approach to managing and treating stormwater runoff

Transpiration – the process of absorption of water by plants, usually through the roots, the movement of water through the plants, and the release of water vapour through small openings on the underside of leaves.

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