PIGEON LAKE WATERSHED ASSOCIATION

ALIDP Alberta Low Impact Development Partnership

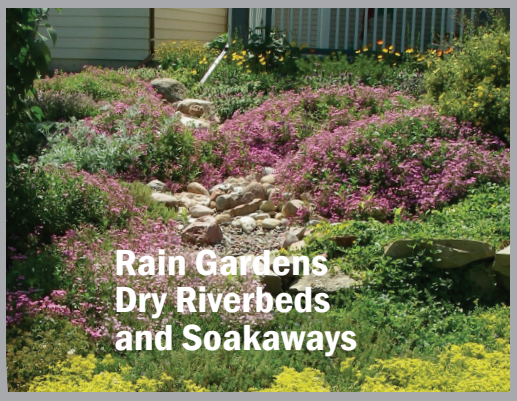
Alberta

CLEAN RUNOFF ACTION GUIDE

2020

Resilient, low-maintenance landscaping resources for a sustainable future

Gardening advice
Drainage solutions
Green roof basics
and so much more!



Development of the Alberta Clean Runoff Action Guide was a collaborative effort of the Pigeon Lake Watershed Association and the Alberta Low Impact Development Partnership.

Project Leads

Bob Gibbs, Pigeon Lake Watershed Management Plan Steering Committee (PLWMP)
Leta van Duin, Alberta Low Impact Development Partnership (ALIDP), Editor.

Contributors

Individuals from the following organizations have participated in attending meetings or providing input to the guide:

Alberta Agriculture and Forestry
Alberta Environment and Parks
Alberta Lake Management Society
Alliance of Pigeon Lake Municipalities
Battle River Watershed Alliance
City of Edmonton
County of Wetaskiwin
exp Services Inc.
intrinsic design
Land Stewardship Centre
MPE Engineering Ltd.
Nature Alberta
North Saskatchewan Watershed Alliance
Strathcona County Utilities
The City of Calgary
Wizard Lake Watershed & Lake Stewardship Association
WSP Canada Inc.

Funding

With thanks to our funders for their generous support to make this guide possible:

This project was undertaken with the financial support of:
Ce projet a été réalisé avec l'appui financier de :

Environment Canada Environnement Canada

Disclaimer

This guide is intended to be used for general informational purposes. This guide does not take the place of professional advice for your specific situation.

Copyright Notice

Intellectual Property

Contents

What's this guide about?

This guide is about things you can do at home and on individual properties to help keep our waterways healthy. The biggest idea (after stopping or minimizing the use of fertilizers and ecocides*) is that reducing the *amount* of runoff is key to maintaining and improving water *quality* and *health* in our lakes, river and streams. Most of this guide is about ways to do that.

Why do we want to minimize runoff?

In our modern world, we think that water running off surfaces almost every time it rains is a natural thing — but it's not!

If we minimize the amount of runoff, we also minimize the amounts of pollutants that reach our water bodies.

As more and more land is developed, and with smaller, older residences routinely replaced by larger ones on smaller lots, the landscape is less able to absorb rainfall than it would naturally. This exacerbates flooding, causes stream and ditch erosion, and contributes pollutants to our water bodies. These are just a few of the impacts of land development. All over the province, the impacts of polluted runoff are already felt in the form of **algae blooms** and unacceptably polluted water for agricultural **irrigation.** In addition, there is a growing awareness that, in areas where surface waters are used as a **supply for drinking water**, runoff from developed land is polluted in ways that water treatment plants may not be set up to dealing with. As land development encroaches and intensifies, the cost and difficulty to treat these waters increases.

This guide is written with water quality in mind, but minimizing runoff is equally relevant for other stormwater management drivers and contexts. Below are a few other key impacts from increased runoff.

Urban Stream Syndrome

Small streams cope by turning into bigger streams. They flood more often — a lot more often. Their banks collapse, sometimes taking trails and bike paths with them. Culverts are blown out. Sediment clouds their waters and covers the spawning beds of fish. Sensitive organisms die or struggle. Ecology degrades. This is known as *Urban Stream Syndrome.*

*Ecocides include fertilizers, herbicides, pesticides, fungicides, and the like.

Recharge Pathways

When there is more runoff, you would think it would mean more water. And it does — that's why the small streams erode to cope. But it also means that where the water used to travel naturally, it no longer goes. The **recharge pathways** are greatly impaired.

Before land development, there was very little runoff in Alberta. Most rainfall went back into the atmosphere in the form of evaporation before it ever touched the ground, or was quickly pumped back into the atmosphere by plants (transpiration). The rest of the rainfall that soaked into the soil either turned sideways (interflow) or went downwards (groundwater). **Interflow** is the path that water slowly takes to make its way to lakes and streams to maintain water levels and flows in the dry season. **Downward flow** is what recharges aquifers. Both of these pathways for rainfall are cut off by hardened surfaces like roofs and roads. On an increasingly hardened landscape, rainfall is not given many places or ways to soak in.

Cumulative Effects

Taken individually, property by property, the impact of traditional land development practices does not seem significant. However, over time and space, small, incremental changes lead to noticeable impacts. These are called **cumulative effects**.

LEFT: Bank collapse of a small stream caused by continued upstream land development.

Cumulative Solutions

The good news is that, since cumulative effects are caused by many small, incremental, seemingly insignificant changes, they can also be fixed by many small, incremental changes for the better. And that is where you come in. **You can take action to make your property part of the solution.** The hard part for people is that we want to see results right away. And that is what is difficult about cumulative effects. It is hard to connect the dots between what you do and how you are changing the situation, one way or the other.

Detecting improvement will only happen when a large proportion of people step up to manage their land in a better way. And in some of the places that are currently witnessing impacts, there is a long legacy to undo. One thing is certain: if we don't change the way land is typically developed, more impacts will become easy to spot in more places, and the options to undo the damage will become fewer and more costly.

Talk about it!

Are you in the market to purchase a home? Ask the builder or realtor what low-impact or sustainable-stormwater features they have implemented. Are you selling a home? Mention the tools you have implemented in your amenities listing. If builders and realtors begin to understand that people expect these features the way they expect expensive countertops and stainless steel appliances, they will incorporate them. Raise expectations. Remember what's at stake.

What strategies do we use to minimize runoff?

In our climate there are three main strategies to reduce runoff, including:

1. spreading out and directing flows through robust landscaping
2. adding storage capacity with things like rain barrels
3. reducing hard surfaces

There are a number of tools for each strategy. This guide covers the tools of resilient landscaping; rainwater harvesting; rain gardens; dry riverbeds, soakaways and infiltration trenches; permeable pavements; green roofs; and construction practices.

ABOVE: Algae bloom.

A comprehensive approach to runoff management

There isn't a one-size-fits-all solution to mitigating the impacts of land development. Planning, design and management of the built landscape need to replicate the essential functions of the natural landscape. The function of every plant, every centimetre of soil, every wetland and stream that was present pre-development must be accounted for in the post-development system.

Many different tools are available for stormwater management at all stages and for all types of development — planning, design, construction, and maintenance — at the individual property, neighbourhood, and community levels. Strategies and elements of a comprehensive stormwater management program include:

1. Better **planning** practices.
2. Better **construction** practices.
3. **Good housekeeping** and **pollution prevention**.
4. Better general **landscaping** practices.
5. Managing rainfall at the individual property level to **reduce the amount of rainfall that turns into runoff.**
6. Managing runoff at the individual property level to **reduce the amount of runoff that makes it off the lot, and improving its quality**.
7. Managing runoff at the neighbourhood scale with **green infrastructure** (often combined with civic amenities).
8. Managing runoff at the "**end-of-pipe**," with the proper use of engineered treatment devices, ponds, constructed wetlands, and wetlands, just before all of the accumulated runoff enters water bodies.

The subject of this guide

Supplementary Resources

Interested in what can be done in public spaces, at the community level? Check out the companion **Municipal Drainage Guide** (future).

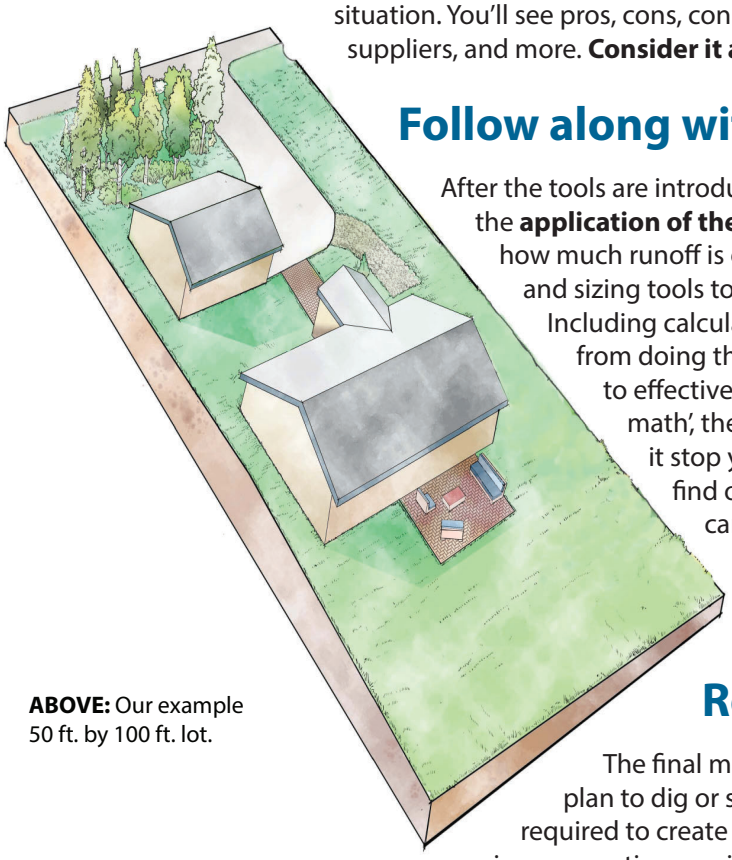
Looking for more info about rationale? Check out the ALIDP **Stormwater Primer** (future)**.**

How to use this guide

The guide is arranged in colour-coded modules, with one type of tool in each module. The tools are presented roughtly in order from easiest and most universal to most costly and complex. From tree planting (everyone can do it!) to green roofs (professionals required), there are many creative options. Some things are more feasible for new construction (e.g., deeper topsoil) while others are more suited to existing properties (e.g., rain gardens). The best solutions have a vegetated component, as these have the most added environmental benefits. Rarely is there only a single option, and usually tools are combined.

What is covered in the modules?

Each module is part inspiration, part how-to, and part where to go for more information. The guide is meant to inspire you and help you figure out what is right for you and your situation. You'll see pros, cons, considerations, components and sizing; maintenance, suppliers, and more. **Consider it a sampling menu of possibilities**.



ABOVE: Our example 50 ft. by 100 ft. lot.

Follow along with our example lot.

After the tools are introduced, the module *Evaluate Your Site* leads you through the **application of the tools to an example 50 ft. x 100 ft. lot.** Calculating how much runoff is generated from different surfaces and then choosing and sizing tools to capture that runoff is the principle of **water balance**. Including calculations in the toolkit is an important part of moving from doing things that are tokens, to actually knowing what it takes to effectively improve conditions. If you are interested to 'do the math', the guide equips you. If you're not there yet, don't let it stop you from taking action! You might be surprised to find out that it's easier than you expected to do a significant amount of good. (**Teckie note**: the calculations are based on simple single-event amounts with an objective to retain approximately 90% of average annual runoff, or the 2.54 cm (1 inch) event.)

Ready to build?

The final module is about **construction projects**. Any time you plan to dig or strip vegetation and soil , you should or you may be required to create an erosion and sediment control plan. Limiting stripping, preventing erosion, controlling sediment, and practicing environmentally sound site management during construction are techniques that are all part of the Clean Runoff approach.

And now...on to the tools!