



BlueScaping Our Neighbourhoods

Practical ways to slow, store, spread, and soak stormwater on your property in the Kawarthas

Are you concerned about lake recreation and property value? Could flooding become a problem in your neighbourhood? Are you planning a landscaping project?

This guide will help answer the following questions:

- What is runoff?
- Why is runoff a problem?
- Where is runoff on my property?
- How can I reduce runoff and improve water quality in the Kawarthas?

A Vision of Clean and Abundant Waters

Water lies at the heart of the Kawarthas' remarkable history, sustains us today, and provides promise for our future. Clean water is essential for human health. It maintains property values, and enables agriculture and tourism. As a landowner, you play an important role. How each of us manages water on our property is a key starting point to better stormwater management and clean water.

Acknowledgments

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Cover image: A backyard woodland garden by © Paul LaPorte



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How to use this guide

This guide is designed to introduce the concept of BlueScaping and to encourage readers to BlueScape their properties either by themselves or by a qualified professional, as appropriate.



This symbol is located throughout the guide. When it appears, it means you can access more information online by clicking the icon, or going to the web address provided.

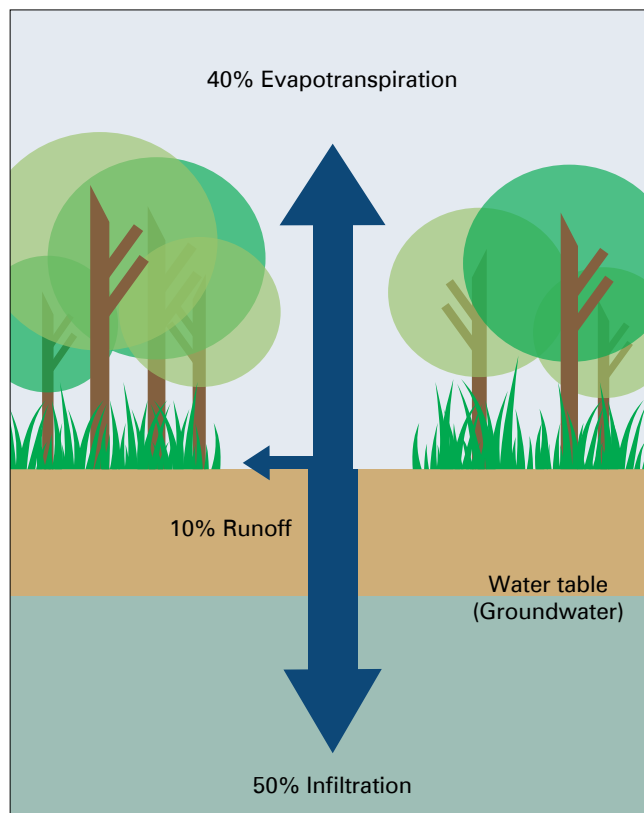
Runoff: What's the problem?

What is runoff?

Runoff is a natural part of the water cycle. It is either rain or snowmelt that flows across the ground surface, instead of being absorbed into the ground or evaporated.

The amount of runoff generated from a property depends on the following factors:

- **precipitation amount** - larger volumes of rainfall or snow melt will result in more runoff
- **permeability** - the ability of the ground to absorb water, if a site is highly permeable, less runoff will be generated
- **slope** - a flat surface will allow more water to be absorbed than a steep surface and a steeper surface will result in water flowing quickly down slope
- **vegetation** - vegetated areas tend to have less runoff because a plant's root system is designed to absorb water from the soil



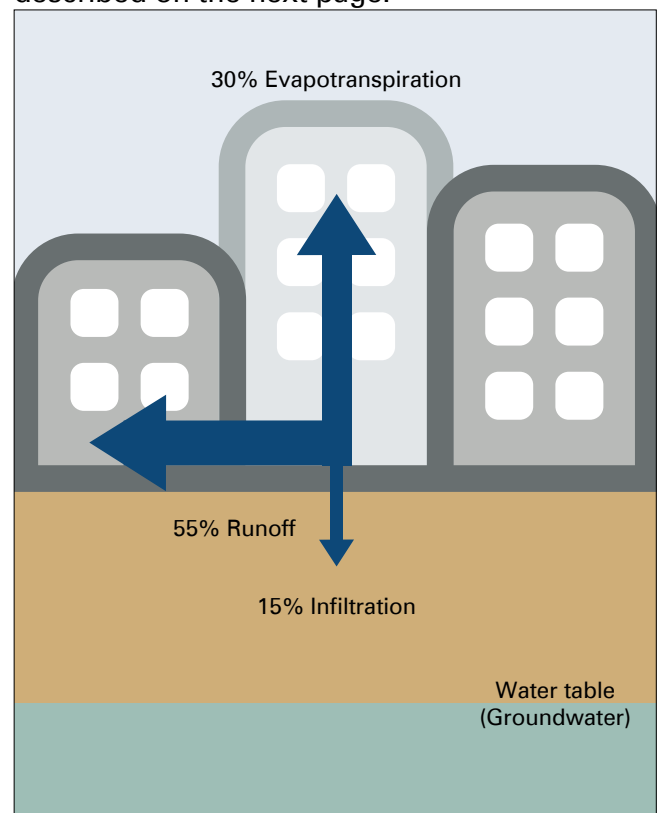
Natural areas seep most of their water into the ground for plant use or for recharging groundwater.

When is runoff a problem?

In most natural environments a small amount of precipitation becomes runoff. This relatively small amount of precipitation flowing across the landscape is normal and doesn't typically lead to problems. The Kawartha watershed was originally forested. Most of the precipitation that falls on a forest is absorbed by plants and soil.

Changes in the natural environment from development can lead to an increased volume of runoff. This is because compacted, pavement, buildings, and other hardened surfaces seal the earth from water and prevent infiltration. When this occurs more water is forced to flow away from where it falls, resulting in an increase in runoff volume.

Decreased infiltration and increased runoff results in an increased rate of flow across the land. These factors contribute to the problems described on the next page.



Built-up areas cause a dramatic shift in the local water budget, changing infiltration to runoff.



Find out more about the effects of runoff and other pressures on local lakes by reviewing lake management plans: KawarthaConservation.com/watershed/management-plans

What are the problems?

Flooding. When large areas are covered with impervious surfaces, flooding can be rapid and severe. With an increasing frequency of extreme weather events such as large thunderstorms and rain-on-snow, capacities of traditional stormwater systems are being exceeded more frequently than ever. Flooding causes damage to property and infrastructure, and poses risks to safety.

Groundwater and baseflow reduction. When stormwater runs off the land rather than being absorbed, groundwater supplies are reduced. This decreases groundwater flows to streams that depend on a cool, continuous baseflow in summer. In this way, baseflow is essential to streams and fisheries. It is also essential to healthy drinking water systems, since it affects local well levels.

Erosion and sedimentation. As runoff volume increases, so does its speed. This increased energy enables water to pick up larger particles and move them elsewhere. The erosive power of runoff can cause damage to properties, especially those along streams and shorelines. Sediment particles tend to attach to other pollutants such as phosphorus and carry them along as well. Finally, the deposition of sediment downstream pollutes aquatic habitat, smothers fish spawning areas, and can lead to shallower lakes over time.

Pollution. Even small rain events can create runoff that can pick up oil, road salt, antifreeze, fertilizers, pesticides, trash, and animal waste and deposit them directly into lakes and rivers. Over time, these contaminants can compromise drinking water and recreational opportunities such as swimming and fishing.



Flooding in a parking lot in Lindsay.



Soil sediments are picked up from runoff over exposed soil.

Your practices make a difference



Respecting Stormwater Drains

Stormwater drains concentrate runoff into storm sewers that drain directly—without any treatment—into local streams, rivers, and lakes. Whatever goes into those drains, goes straight into our lakes! For this reason it is so important to responsibly dispose of liquid wastes and not pour them down the storm drain. Your municipality has locations where hazardous wastes such as paints and thinners can be dropped off, or even days when they can be picked up—check with your municipality.



Maintaining Your Lawn

Lawn fertilizers are a major source of nutrients for waterbodies in built-up areas, so reduce their use as much as possible. If you do fertilize, use zero-phosphorus mixes, or, even better, apply a thin layer of leaf compost in spring to provide a slower release of nutrients and water-holding benefits to your lawn over the drier summer months. Easier still, mow your fall leaves into your lawn and prevent a trip to the dump! You can find more about lawns on page 9.



Raking Leaves

Your leaves are a great resource for your lawn and gardens. There's no need to blow or rake them for landfill. If you use a blower, be careful not to blow leaves on to the street. Leaves add nutrients to stormwater and easily clog drains and fill catch basins, increasing maintenance costs and the chance of flooding. Instead, use leaves as a protective layer for other plants, mow them into your lawn for a slow-release fertilizer in spring, or create the premium compost: "leaf mould".



Picking Up After Your Pet

Picking up after your pet isn't just common courtesy, it is a health imperative! Pet waste contains bacteria, pathogens, and nutrients that affect drinking water quality and beach closures, among other public health issues. The best options for disposal are to use a pet waste composter, or to flush it down the toilet for proper treatment. At the very least, pick it up and dispose of it in the nearest waste receptacle.



Managing Waterfowl

Geese produce a significant amount of waste that will foul waters with bacteria and nutrients (similar to pet waste). Geese prefer environments where they have a clear view of their surroundings for predator awareness. Often the best and simplest strategy is to leave a 3 metre wide "no mow" zone along shorelines that not only discourages geese from coming ashore, but treats surface runoff as well. Also: don't feed geese near swimming areas. This is an especially hard habit for both parties to break once started.



Find out more about these and other environmental best practices for your property: KawarthaConservation.com/Stewardship

Maintaining Vehicles & Driveways

Car washes are more lake-friendly than washing at home because their water is treated afterward. If you do wash at home, use a phosphate-free soap, and pour leftover wash water in a vegetated area or a sink drain, not the storm drain. Wash your car on the lawn to prevent runoff into the nearest storm drain. Sweep your driveway and walkway instead of using a hose to keep them clean.



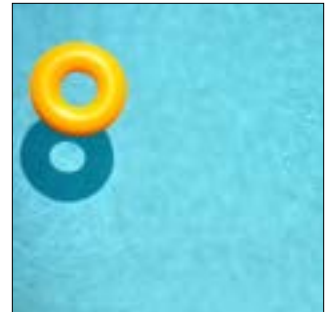
Storing and Handling Hazardous Materials

Garden and pest control products, paints, solvents, batteries, and other materials labeled corrosive, flammable, explosive, or poisonous should all be properly stored, handled, and disposed of. When stored, hazardous materials should be labeled and sealed in original packaging away from heat sources and direct sunlight. Follow instructions regarding precautions during use. You should never put hazardous waste into your garbage or recycling. Household hazardous waste disposal is a free service provided by your municipality.



Emptying Your Pool

Pools and hot tubs contain chemicals that are intended to kill organisms such as algae and bacteria. These make the water hostile to other life too. Let water sit for at least 4 days to decrease chemical concentration, or for a week after adding dechlorination tablets. If using algaecides, do not use them at least 2 weeks before closing. When emptying your pool, direct water over vegetation such as your lawn.



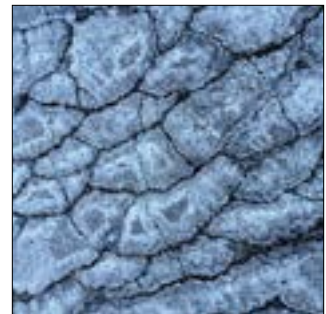
Managing Snow

Only shovel in areas where required for access, and shovel as soon as snow starts and during snowfall to prevent compaction and ice formation. Pile snow in a depression on the downhill side of paving so that snowmelt does not cross paths and create an ice hazard. Finally, keep piles away from the curb and from covering storm drains, and low enough to maintain lines of sight to pedestrians. With good shoveling practices, the salt use can be dramatically reduced.



Spreading Salt

Salt, or sodium chloride, is used for safety to keep ice and snow from building up on paved surfaces. But meltwater containing salt harms our shoreline and aquatic ecosystems, contaminates water supplies (both intakes and wells), and damages our urban infrastructure along the way. It also impacts lawns and other landscaping, and can irritate animal paws. Try sand or cat litter for icy patches instead of salt, and make sure downspouts are directed away from pathways! You can always sweep up excess sand or cat litter in the spring for re-use next year.

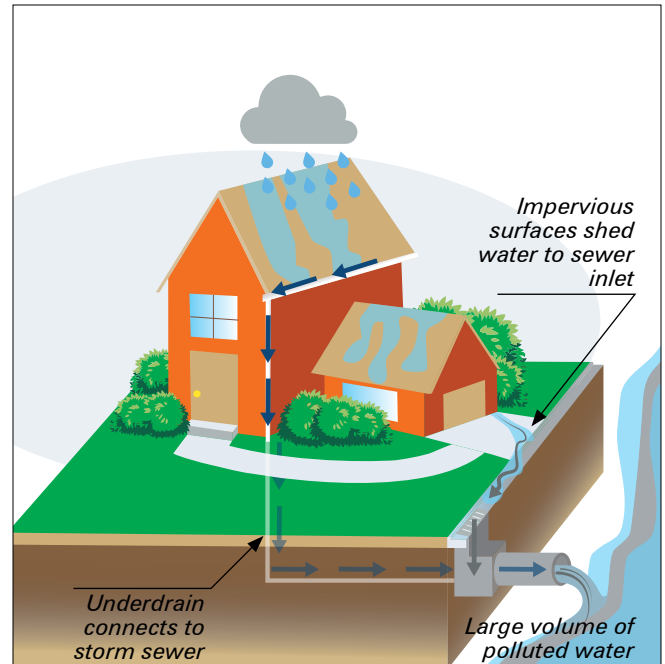


Stormwater management

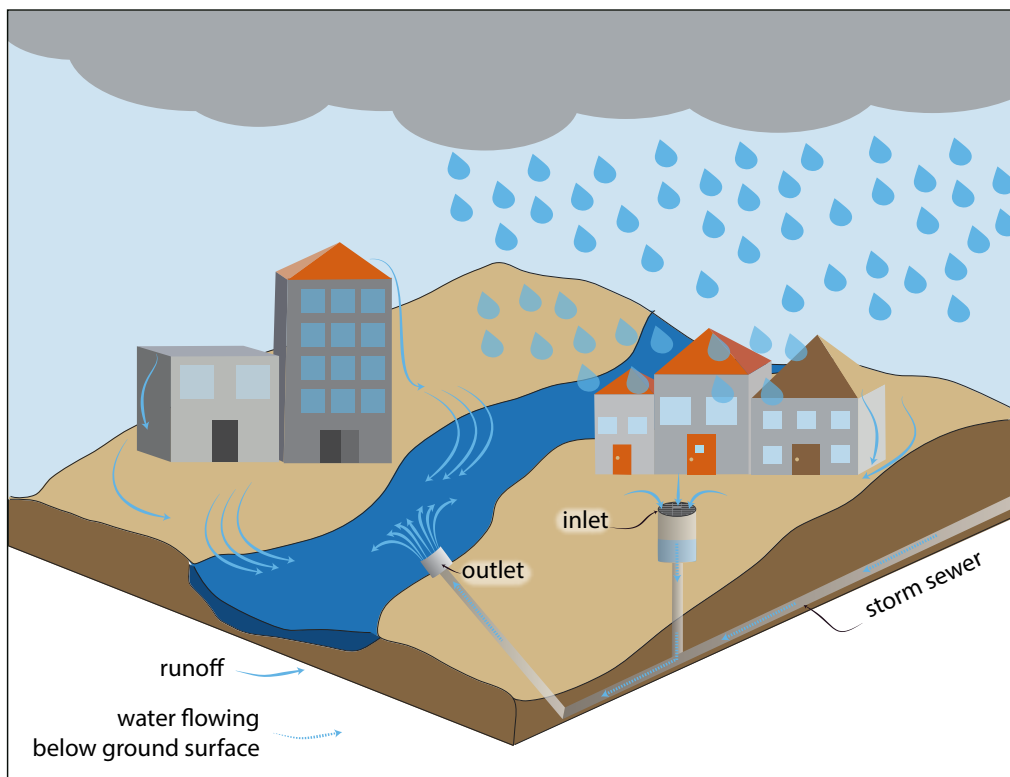
Stormwater as a nuisance

Stormwater has typically been treated as a nuisance: to be moved off site directly into a river or lake or held in a stormwater pond for controlled release. Depending on the age of your neighbourhood, you may have noticed a stormwater pond. This approach is meant to buffer lakes and rivers from large runoff and pollutant loads from built-up areas. Unfortunately, this approach still tends to concentrate flows and pollutants, and with worsening storms and droughts, is proving inadequate.

There is growing recognition that stormwater is best managed at its source: right where it falls. Compensating for and reducing impervious surfaces means water that would otherwise run off elsewhere stays on site and infiltrates into the ground, avoiding the pitfalls of holding and treating large volumes elsewhere.



Typical sewerage layout of a residence.



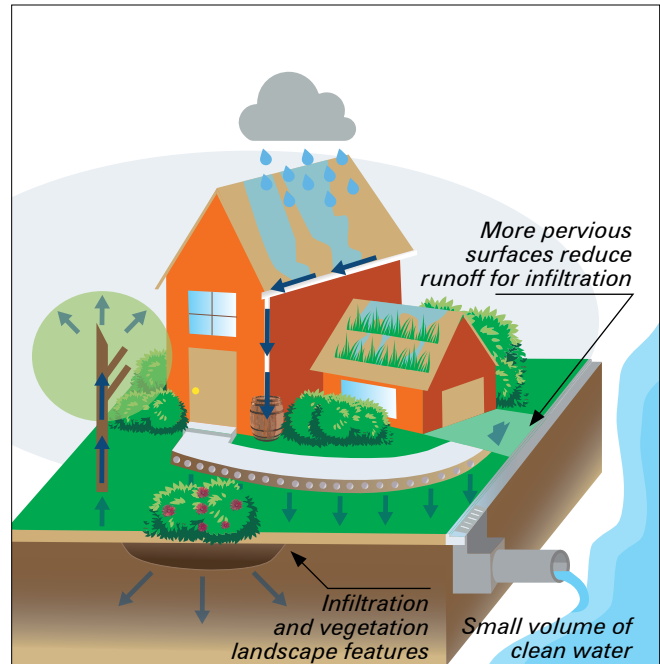
On a neighbourhood level, typical stormwater management leads to changes in water levels as runoff flows quickly overland and sheds directly to a waterbody or into a sewer system where it flows quickly underground to an outlet - usually a water body. This results in high volumes flowing into water bodies during rain events and low volumes of water infiltrating into the ground to replenish groundwater supplies.

What is BlueScaping?

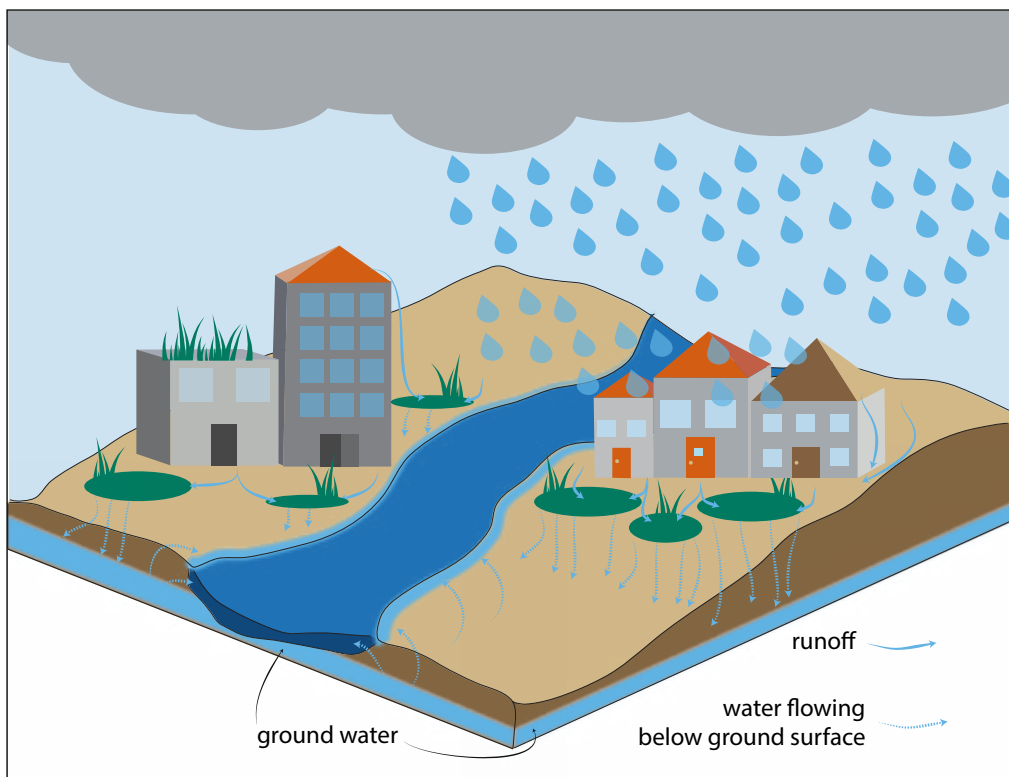
Stormwater as a resource

BlueScaping is landscaping for stormwater, reducing runoff, increasing infiltration, and improving our lakes and rivers. It has other benefits such as reducing well and municipal water use, better plant nutrition, reducing the urban heat island effect, creating habitat for pollinators, birds, and other animals, and adding resilience when droughts and floods occur.

Different BlueScaping features are outlined in the following pages and are illustrated with brief descriptions and suggestions for appropriateness on your property. At the end of the guide, there are instructions for a basic analysis of your property so that you can decide what type of features may work best for you, and where to place them.



A complement of stormwater landscaping features.



A BlueScaped neighbourhood can have a positive impact on water levels as more water is encouraged to infiltrate into the ground where it flows slowly, replenishes the groundwater supply and provides a more constant source of underground flow into waterbodies.

Downspouts

Downspout function

Downspouts provide an escape for water accumulating on a roof. Each downspout is responsible for draining a different-sized part of your roof, so some downspouts will be bigger sources of water than others. Houses typically have at least four downspouts.

Many BlueScaping projects depend on downspouts that are disconnected from a sewer connection underground. If your downspouts are still connected to a pipe leading underground, consider disconnecting them. In doing so, you can help to reestablish a more natural hydrology on your property, replenishing groundwater, and reducing the amount of water in storm sewers and the risk of flooding.

Remember: direct runoff 2 to 3 meters away from your house downslope towards a vegetated area, and do not direct it over a paved surface or directly off of your property to your neighbour!



Connection: rainfall immediately leaves the site.

Implementation

- Cost of downspout disconnection is minimal
- Use splash blocks, river rock, or other means to reduce erosion at outfall. This cost can be minimal but can also be beautifully and elaborately detailed
- Install interesting variations such as rain chains which vary in cost and maintenance requirements
- Ensure downspouts are directed toward vegetation and away from foundations and paving

Maintenance

- Normal eavestrough cleaning (late spring and fall as well as before and after storm events)
- Add wire mesh guards for additional protection from clogging



Avoid directing downspouts across paved surfaces.



Direct downspouts to stone or vegetation.

Water Harvesting



Search "Rainwater Harvesting" at the Canadian Mortgage and Housing Cooperation Website for some useful resources: cmhc-schl.gc.ca

How it works

About half of residential water consumption in the summer is for watering lawns, gardens, and washing cars and driveways. Rain water is of better quality for all of those applications, and it is free! Your plants will appreciate the softer, warmer water without additional chemicals such as chlorine.

Rain barrels are an easy way to collect rain water for use when you need it. There are many styles and sizes of rain barrels available, and they are often easy to decorate or modify as you like. When setting up a rain barrel, be aware that site selection is important for access to where you want to use the water, and also for positioning overflow. You will want to be sure that the barrel is adequately supported, as a full 220-litre barrel will weigh 220 kg, or nearly 500 lbs!

Cisterns are the next step to making full use of the free resource rainfall provides!



An example of a rainwater cistern. These are available in many shapes and sizes and may be above or below ground.

Implementation

- Cost varies depending on size and system
- Strong, level base to support weight of full of the water: 220 litres = 220 kilograms!
- Elevated height makes filling containers easier, increasing pressure in hose
- Ensure overflow is directed downhill to vegetation, not towards buildings, pathways, or neighbours
- If in a windy location, anchor the barrel down with a cinder block or a few large cobbles to prevent movement when empty

Maintenance

- Normal eavestrough and barrel filter cleaning (late spring and fall as well as before and after storm events)
- Winterize by storing the barrel empty - if full of water, it may crack upon freezing



An elevated rainbarrel provides a garden resource.

Better lawns



Find out more about lawns, their maintenance, and alternatives to them in "Green Lawns the Green Way" which can be found on the BlueScaping web page: KawarthaConservation.com/BlueScaping

About lawns + alternatives

Turfgrass has many negative environmental impacts, including excessive water consumption, nutrient runoff, pesticide and herbicide use, and associated equipment emissions. As well, lawn fertilizers are the largest and most constant source of nutrient loading to urban waterways and waterbodies. Every 100 sq m (approx. 1,000 sq. ft.) of lawn requires 2,400 litres (624 gallons) of water to receive 2.54 cm (1 inch) of water every week during the growing season.

How do we reduce these inputs and impacts? We can manage our lawns differently, and also substitute them for something else less water- and nutrient-intensive such as fescue mixes, clover and native ground cover. Side benefits to replacing lawn with less intensive and natural vegetation include providing habitat for birds, butterflies, bees, and other pollinators, as well as improving air quality around your home.



Lawn aeration helps grass health and water infiltration.

Implementation

- Cost is minimal; amount of labour varies
- Sample your soil to determine what soil treatments are appropriate
- For lawn alternatives, the grass must first be killed through tarping or burying, then amended (if appropriate) and hard raked to provide good soil-to-seed contact
- Mow and water 2 to 3 times a season for an eco-grass fescue-type blend

Lawn maintenance

1. De-thatch: remove accumulated matting
2. Aerate: remove soil plugs to increase root access to air and water
3. Fertilize with leaf compost: steady nutrient release, breaks up clay, increases moisture
4. Over-seed to out-compete weeds
5. Cut to 3" and leave clippings behind
6. Water deeply and only when required



Fescue turf is an example of a low maintenance lawn option that looks very similar to more conventional lawns.

Naturalization



Find out more about different naturalization techniques, in the “Naturalizing your Local Park or Backyard”
KawarthaConservation.com/BlueScaping

What is naturalization?

Naturalization is replacing existing lawn, gardens, and pavements with plants native to your particular area. Native trees, shrubs, and herbaceous plants help restore your property’s soil, water balance, and ecological value.

The native plant palette can accommodate all styles of landscaping with an additional, original style all its own: the ecosystem landscape. If you take a walk around your local conservation areas and other natural green spaces, you’ll find which plants tend to grow together in dry conditions, wet conditions, bright locations, shaded locations, etc., and you can replicate these environments at home. You may also wish to create a habitat garden to attract bees, butterflies, birds, and more.

Contact your local native plant supplier for your native plant needs – do not transplant wild specimens from wild spaces to your yard!

Implementation

- Cost varies on the size of the project
- Sample your soil to determine what soil texture and nutrient profile you currently have, and what may be appropriate
- Even in high clay soils, naturalization will be better at absorbing rain water than lawn
- Plant in spring or fall; some plants prefer one over the other
- Watering will be needed for initial establishment of the plants
- Existing vegetation must first be killed by covering it with a tarp for a period of time, or by tilling and overseeding

Maintenance

- Typical mulching, weeding, and pruning of woody and herbaceous plants



An example of a naturalized woodland backyard in Port Perry in spring. Photo courtesy of Paul LaPorte.

Rain gardens



For resources and ideas for your raingarden, visit raingardentour.ca

About rain gardens

Rain gardens are attractive depressions in the landscape that receive, absorb, and infiltrate runoff into the ground.

Rain gardens work well receiving water from downspouts and rain barrel overflows, especially when connected with a soakaway, or infiltration trench. The kinds of plants grown in a rain garden can vary depending on the soil type that is found there. For maximum stormwater storage and infiltration, soils with at least 70% sand (up to 90%) should be used.

Rain gardens can have many themes and styles. All of their action is below ground, so their surface treatment can be whatever you wish provided that the plants selected match the soil type and expected moisture level of the rain garden. Rain gardens can provide wildlife habitat and passive recreation opportunities.

Implementation

- Must be in a downslope position
- Install > 3 m from buildings and utilities
- Conduct infiltration test to size appropriately (see page 16)
- Cost varies depending on size and materials

Maintenance

- Low once plants are established
- Weeding and watering in first few years
- Thinning in later years



This rain garden receives, absorbs, and treats the runoff from the adjacent paving. (Brian Ash)

Soakaways

About soakaways

Soakaways are very similar to rain gardens, but are filled with stones instead of growing medium, and they are usually deeper and can hold more water. They are a good alternative to rain gardens when space is limited or when you wish to hide a water infiltration feature, e.g., under turf.

Like rain gardens, soakaways work well in tandem with downspouts and rain barrel overflows, and can be used as a landscaped streambed terminating in a rain garden. An arrangement such as this would be appropriate for a downspout that contributes a large amount of rainfall to the landscape.

Also similar to rain gardens are the many options for topping them: with more ornamental river stone or larger boulders, for example, or covering them completely to disappear into the surrounding environment.



A soakaway trench beside a Port Perry driveway

Implementation

- Must be in or graded towards a downslope position
- Install > 3 m from buildings and utilities
- Infiltration test to size appropriately
- Install a monitoring pipe so that you can easily determine if the pit is working
- Cost varies depending on size and materials; generally more costly than a rain garden because of excavation

Maintenance

- Extremely low; maintenance is a matter of keeping its water source clean e.g., eavestrough cleaning, downspout screen



A soakaway pit at the end of the trench

Pervious pavements

Types of paving

It is common for a typical neighbourhood to have over half of its area impervious to rain. This is mostly accounted for by roofs, asphalt, concrete, and pavers; all of which effectively seal the earth below from receiving water. There are many paving alternatives that have varying degrees of perviousness.

Pervious (also known as permeable) paving works best to treat the water that falls directly upon it. Landscaped areas should drain away from permeable paving so that the paving is not clogged by sediments arriving from elsewhere. Because pervious pavement drains so well, less salt is required in winter. Sand should not be used with pervious paving systems.

In all types, the base (or gravel layers underneath) must be specially prepared since it must act as a reservoir. It is critical that product specifications are followed.

Implementation

- Cost varies depending on size and materials
- Infiltration test to help determine storage requirements (see page 16)
- Works best on slopes between 1 and 5%
- Be aware that spilled hazardous materials, de-icers, and other chemicals can contaminate groundwater
- Requires trained and experienced contractors to produce and install

Maintenance

- Low; depending on sediment loading, may require annual commercial vacuuming and sweeping
- If grass grid pavers, grass clippings should be removed
- Snow piles should be stored off of permeable pavement to reduce the chance of sediment loading



Three examples of pervious paving on driveways: concrete grid, plastic grid, and a "ribbon" driveway for treads only.

Green roofs

About green roofs

Roofs are a major contributor to runoff - they are impervious for good reason! Green roofs can reduce the amount of water that reach your downspouts, and have a host of money-saving and ecological benefits.

There are two basic types of green roofs: extensive and intensive. Extensive green roofs are relatively light because of their shallow soil profile. Because of their limited soil depth, extensive roofs are often planted with smaller, non-woody, drought- and heat-resistant perennials. Sometimes there are opportunities to add minimal structural support to retrofit existing roofs into extensive roofs. Intensive roofs can handle the significant loading of soil depths appropriate for larger plants such as shrubs and even trees. Both types of roofs require professional design and review.

Implementation

- Structural test by an engineer; design by a landscape architect or other qualified design professional
- Professional installation is required
- Initial cost can be high, but this higher design standard means that the roof will last much longer than a traditional roof

Maintenance

- Extremely low: will typically require weeding or removal of dead (and possible replanting of) vegetation once or twice a year
- Periodic inspection of flashing, edging, and drains



Green roof benefits: reduces runoff and urban heat island effect, adds to urban ecology and has longer lasting construction.

Evaluating your property

1. Map your property

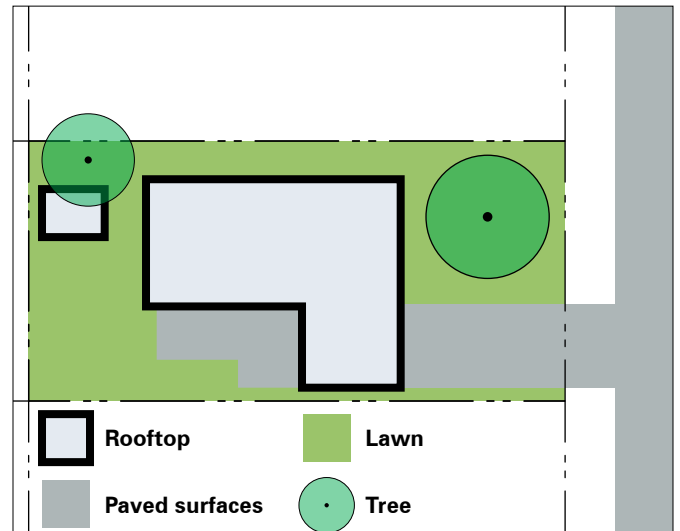
You can scale your property to graph paper, or to an aerial photo. The first thing to draw is your property line, which you can find on your deed or property tax assessment. You do not need the exact location of lines, but you need to know if your landscaping will affect other property.



Locate your lot lines first to know your bounds.

2. Inventory your surfaces

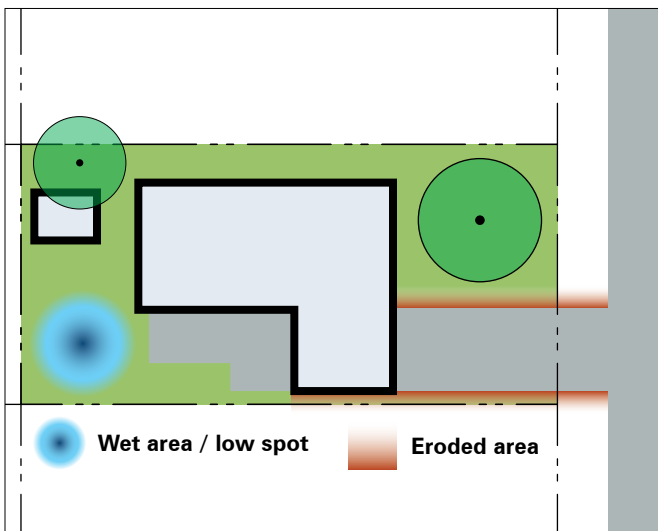
The next step is to mark off all building footprints; all paved surfaces; decks; streams, ponds, and pools; grass and garden areas; and naturally vegetated areas. This will help determine what areas are contributing most to, or being affected by, runoff.



Map the different surfaces of your property.

3. Spot problem areas

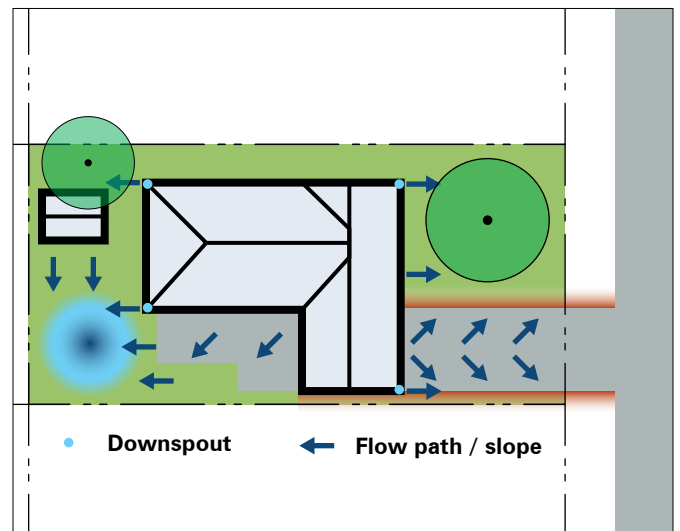
Do you have areas that are wetter or drier than others? Spots that are eroding from downspouts or concentrated flows (little rills or gullies) on or around your yard? Note these locations on your map, as they may greatly benefit from ideas in this guide.



Indicate areas of concern.

4. Look at slopes & flows

Map your roof ridges, valleys, and downspouts, and walk your property during a rain. Watch how water is moving around: how much, where it is coming from, where it is going, and how fast it is getting there. The ideal slopes for projects in this guide are from 1 to 5%.



Indicate flow directions to highlight opportunities.

for BlueScaping

5. Look at soils & infiltration

For many of the landscaping projects described in this guide, it is critical to know the type of soil you have on your property. Generally, soils can be considered clay, sand, or loam. Clay retains water and nutrients very well, though it doesn't absorb or shed water quickly. Water readily infiltrates sand and sand dries out quickly as a result. Sand also does not hold nutrients well. Loam is a mix of these with silt, and tends to provide a good balance of water, drainage, and nutrients for many plants.

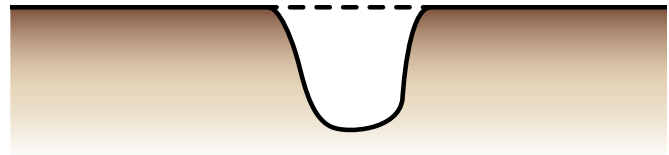
If your property is sandy, you will probably have good soils for infiltration that will be suitable for the projects in this guide. If your property has mostly clay soil, infiltration rates will be much slower, and at the very least you will have to add volume to your infiltration features to ensure that your feature does not become waterlogged for too long or too frequently.

To determine your infiltration rate, follow the instructions in the diagram and chart to the right. Bear in mind that the pre-existing moisture conditions can affect the results of this test (very dry during drought or very wet soil after snowmelt), so it is best to conduct it in different conditions for an average infiltration rate.

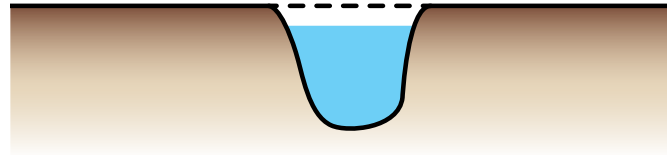
6. Troublesome situations

There are some areas on your property that you can generally disqualify from infiltration features: those within 3 m of your house's foundation; those with the seasonally high water table (measure in April) or bedrock within 1 m of the bottom of your infiltration feature; and those over utilities. Utility locates are free, essential, and required by law, so request them once you've decided that you'd like to do some landscaping on your property!

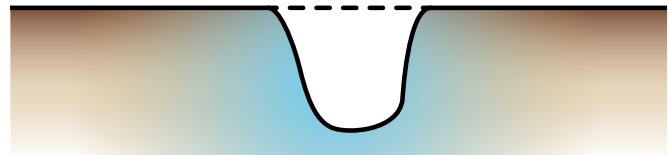
Some basic rules for placing features include keeping any possible overflow from crossing paths, including sidewalks, and from entering your neighbour's property to become their problem!



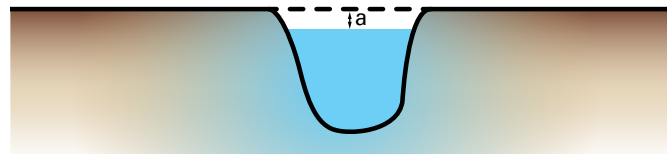
1. Dig a hole about 30 cm across and 50 cm deep.



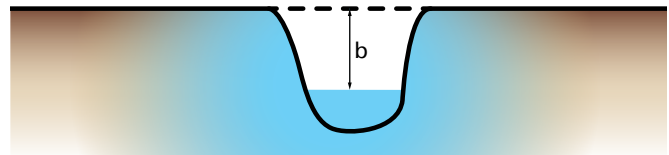
2. Fill the hole with water.



3. Let the water drain completely.



4. Refill and measure depth (mm) from top of hole to water (a).



5. Remeasure depth (mm) 1 hour later (b): $(b) - (a) = \text{mm/hr}$.

The steps to rating infiltration on your property are outlined from 1 to 5. This test should be done where you wish to locate an infiltration project. Match your infiltration rate against the chart below to determine whether you have an appropriate soil type for the projects in this guide.

| Soil Type | Infiltration Rate (mm/hr) | Drainage Type | Drainage Time (hrs) |
|------------|---------------------------|---------------|---------------------|
| Sand | > 30 | Excellent | < 2 |
| Sandy loam | 20-30 | Very good | 2-6 |
| Loam | 10-20 | Good | 6-10 |
| Clay loam | 5-10 | Satisfactory | 10-16 |
| Clay | 1-5 | Poor | 16-24 |

Soil infiltration rates (after *Greening Your Grounds*).

Native plants



Find out more about native plants by visiting:
KawarthaConservation.com/NativePlants

What is a native plant?

The term “native plant” refers to plants that were found in this area prior to European settlement; that is, before the introduction of new species from elsewhere.

Why native?

Native plants have evolved with climate, soil, local wildlife, and with each other over thousands of years. Because of their adaptations and those of the wildlife that depend on them, non-native plants often cannot provide ecological benefits comparable to native plants.

What is the difference between a species, subspecies, variety, and cultivar?

The basic test of a species is whether two individuals can successfully breed. A subspecies is a group of individuals that could breed, but haven't because of geographic isolation. The genetics of a subspecies show that they have adaptations specific to a particular location.

A variety is an individual or group of plants that has a different appearance than is typical of that species. A cultivar is short for “cultivated variety”. It is a variety deemed to have desirable characteristics that is propagated usually through types of cloning, including cuttings and grafting.

Why these distinctions?

The foundation of biodiversity is genetic diversity. Locally-sourced native species and subspecies contain genes selected through evolution that help them best adapt to their environment. Varieties and cultivars do not offer the same genetics to draw from since their characteristics are selected by humans for aesthetic or production purposes. Their genes can possibly spread to native populations, changing their gene pool and affecting their resiliency to environmental change.

What are invasive species?

Not all non-native species are problematic, but some can become invasive, causing economic, ecological, or social harm. Because non-native species have not evolved in the same ecosystem as native species, they can have growth strategies that no native species has evolved to compete with, exploit, or control. Invasive species displace native species as a result. Dog-strangling vine, Japanese knotweed, and European common reed are some examples that seriously threaten the integrity of our landscapes and even our infrastructure. These species were originally introduced as novel garden plants.

Where can I find native plants?

Fortunately there are a number of native plant nurseries in the Kawartha watershed and beyond. Try to purchase from a nursery that sources their seed locally for the best genetics for your landscaping.

Materials

Mulch

Mulch is a layer of material, usually of wood, that is spread to help retain moisture and discourage competition from other plants. In stormwater landscape applications, it also helps treat stormwater. No more than 50-75 mm (2-3") is required to achieve these benefits. Adding more than this prevents oxygen from entering the soil and may result in mould or pest problems. The best mulch for BlueScaping is shredded hardwood mulch. Its pieces lock together to prevent floating and movement in heavy rainfall and flows. Bark mulch should be avoided for the opposite reasons.

When mulching around plants, try to create a "donut" of mulch around the stem of the plant, keeping the stem mulch-free. Mulch can cause disease if piled up directly against living plant material.

Soils & additives

Depending on the soil that you have and what landscaping you have planned, you may need to make adjustments. If you send a soil sample away for analysis, you will receive recommendations for what amendments you may need to improve it for plants, including nutrient, pH, and texture considerations. These recommendations will be adequate for naturalization purposes, and can be adjusted for stormwater performance if for use in a rain garden, for example.

For maximum infiltration rates and storage capacity while maintaining water retention sufficient for plants, your soil mix should be at least 70% sand. Concrete sand has a larger average diameter particle and is preferred over brick (or mason) sand for BlueScaping.

Compost is an important soil component, and is an excellent top dressing for lawns and garden beds. Compost is both a texture and fertilizer amendment that will last for months. Compost should always have a fine, light texture with a fresh, forest-type smell to it: if it smells sour or like ammonia, it is not properly decomposed. Leaf compost is best; avoid peat or animal-derived compost.

Aggregates

Aggregates are larger materials such as gravel that allow for superior drainage and storage capacity of BlueScaping features. The most commonly used aggregate for stormwater purposes is 19 mm (¾") washed clear stone. While granitic aggregate is preferred, limestone can be used if washed free of dust. Some others include river rock, which is often used decoratively on top of soakaway pits, trenches, or in rock gardens or xeriscapes. Pea gravel and high performance bedding (HPB) are smaller clear stones that are also useful for drainage purposes. Pea gravel is rounded and has a nice decorative look, but its roundness means it moves around easily. The angular faces of granular aggregates such as HPB shift much less because their faces lock against each other.

Geotextiles

The primary purpose of a geotextile is to separate media of very different sizes to prevent migration of one into the other. The most common use is to separate clear stone from native soils. Two types of geotextile are best for BlueScaping applications: non-woven, needle-punched; or woven monofilament. Overlap geotextile at least 30 cm (12").

Glossary

An **Aquifer** is a natural underground geologic formation made of gravel, sand, and fractured rock. Water can move through these formations because they have large connected spaces.

Base flow is the portion of water in a water body that seeps in from the ground slowly over time. Water bodies which have adequate base flow dry up less quickly during times of drought.

Erosion is the wearing away of soil due to forces such as wind, water and landuse practices. Water erosion occurs when soil is lost due to the force of water. Raindrops fall directly onto the soil loosening the materials and causing pieces to detach. If rainfall continues, water gathers and produces runoff, which carries the detached pieces of soil away and deposits them elsewhere.

Groundwater is the water found in the spaces between rocks and soil and sand particles below the ground surface. Groundwater is stored in and moves slowly through geologic formations of soil, sand and rocks called *aquifers*.

Sedimentation occurs when loose soil particles enter lakes, streams and rivers carried by runoff overland or through a sewer system. Sedimentation is also known as sediment pollution because extra sediment degrades water quality for fish, wildlife and human use.

Before you begin

Consider your Neighbours

All of the projects in this guide have the potential to change the flow of runoff. Always consider the potential impacts and don't do a project if you are unsure.

Consult with your Municipality

Some projects may require permits from your municipality, others may be in conflict with municipal bylaws. Contact your municipality to be sure.

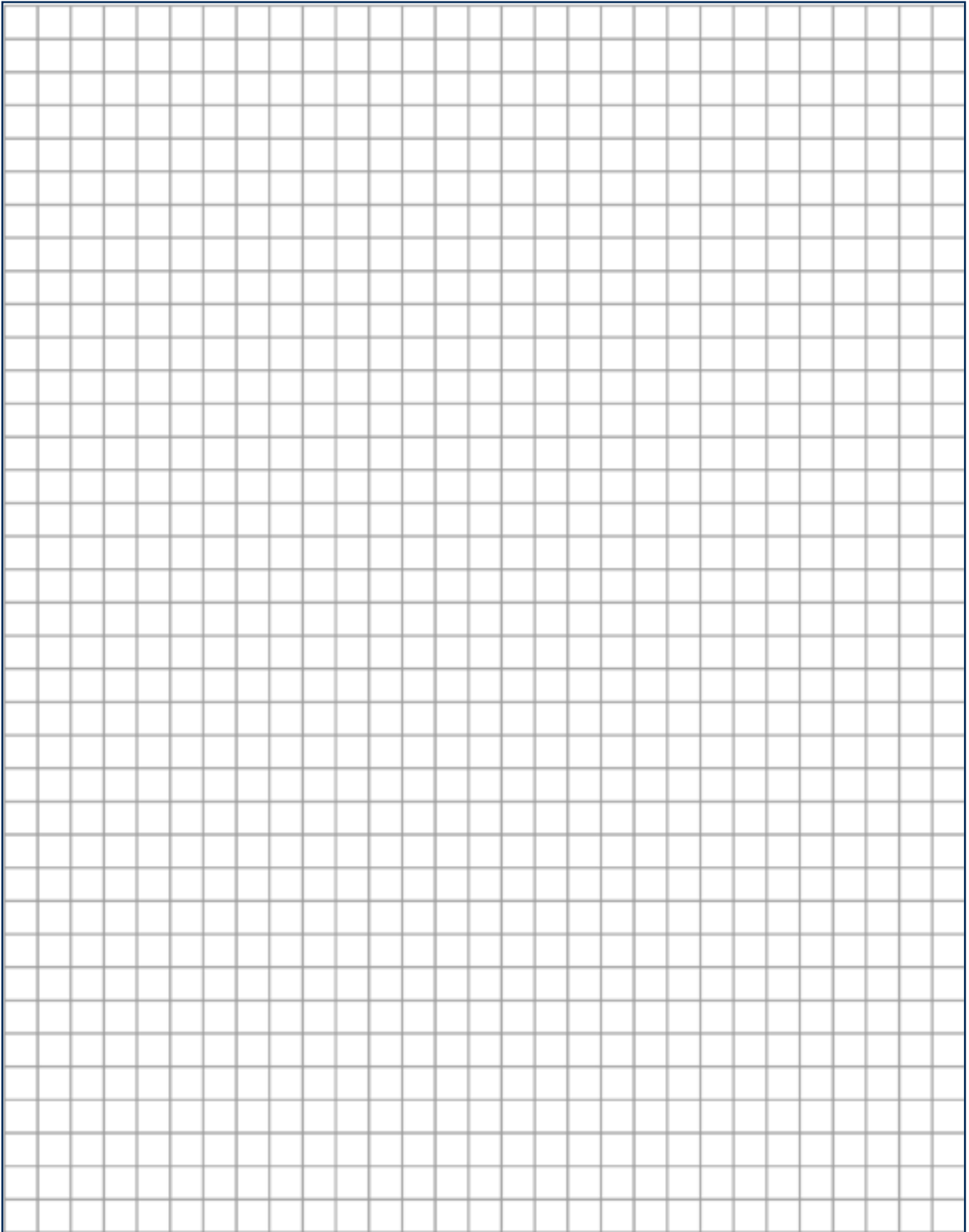
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|-----------------------------|--------------|--|
| The City of Kawartha Lakes | 705-324-9411 | www.kawarthalakes.ca |
| The Township of Scugog | 905-985-9914 | www.scugog.ca |
| Township of Brock | 705-432-2355 | www.townshipofbrock.ca |
| Municipality of Clarington | 905-623-3379 | www.municipality.clarington.on.ca |
| Municipality of Trent Lakes | 705-738-3800 | www.trentlakes.ca |
| Township of Cavan Monaghan | 705-932-2929 | www.cavanmonaghan.net |

Call or Click before you dig

Always locate underground infrastructure and ensure you are cleared before digging any hole. Locate requests can be made online or over the phone through the Ontario One Call service.

1-800-400-2255
www.on1call.com

Record your ideas here

A large rectangular area filled with a light gray grid pattern, intended for recording ideas. The grid consists of 20 columns and 30 rows of small squares.



KawarthaConservation.com/BlueScaping