

Storm Water Management



Water seems bountiful: flowing in our streams, rivers, lakes and oceans and cyclically being refreshed and renewed. We rely on it, in its pristine condition, as without it we couldn't survive. But in current times, many urban centres need to manage for both an abundance of rainwater while at the same time finding themselves rationing water during hot dry periods. The quality of water is also a large concern, as the issue of pollution in water is on the rise, whether it is high levels of phosphates and nitrates from fertilizers, discarded medicine chemicals that get into municipal water supplies, leaks of oil and other residues from driveways and streets or toxins and plastics from litter including

Storm water management is critical not only for the efforts to store more water where it falls, rather than inundate urban streams and rivers but also due to the fast washoff of these pollutants into our aquifers, streams and lakes. Managing overflow and storing water for the dry periods will also lessen the demand on potable (treated water) that should be prioritized for drinking and having a stored supply of rain water puts less of an energy demand on municipal treatment plants. Each decision regarding water use that is made on faith properties including memorial gardens and cemeteries makes an impact both upstream and downstream. For these reasons, stormwater management techniques for your faith community and the elimination of pollutants entering the water stream should be a high *Care for Creation* priority. Here is where you can get started:

Observe and address excess water run-off. Watch to see where your water overflow goes - both into municipal stormwater drains and also excess run-off that might be too close to foundations. Determine if any runoff from impermeable surfaces can be slowed down and/or diverted from municipal streets and drains and towards gardens. Alternatively, consider if any hard surfaces can be converted to a more permeable solution and or sloped to lessen the impact on the municipal system. Ensure water from roof is directed at least three metres away from buildings so that it will not impact foundations and basements.

Consider where you can direct and store rain water on your property. Identify the best places to site rain gardens, reroute water with French drains or drystream beds or opportunities to convert hard surfaces to permeable pavement which will allow water to sink into the ground on your property.

These types of measures allow natural cycles of water to filter down into underground aquifers. Excess water can also be stored for future use using rain barrels. More details are provided below.

Ensure that pollutants are not entering the local storm water catchment:

- Do not over fertilize lawns and never add fertilizer when rain is in the forecast.
- Ensure that there are no oil leaks in parking lots that can leach into municipal waters.
- Cut back on excess salt and deicing chemicals on your property. These may remain on pavement and be washed away in spring rains. These chemicals should not be used near flower beds.
- Remind neighbours to help ensure that certain pollutants do not get washed off of local streets and into storm sewers such as: animal waste, plastic and other non-biodegradable litter, cigarette butts (that include both plastic and toxins that pollute waterways) and other chemicals.
- If a smoking area is included on your property, provide a canister for butt disposal.
- Ask for litter receptacles to be placed in highly visible locations of your neighbourhood, such as at bus stops, etc. to help eliminate litter that is tossed on the street.

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Areas of the faith community property where there is high runoff can be opportunities to consider alternatives to keep stormwater on site. Some municipalities use the saying "slow it, spread



it, sink it” to remind property owners of the actions that can be undertaken.

The first opportunity is to slow the water down by decreasing impermeable hard surfaces wherever possible. Water can also be slowed down by installing green roofs where the rain is soaked into vegetation rather than quickly running off the roof and into rain gutters.

The second is to spread the water around on the property which can be done through the addition of permeable pavement such as pea gravel or flagstone, through effective use of downspouts to direct water to where it is needed or techniques that take advantage of gravity and the flow of water to do the same. Storing rain water is also consider a way of spreading water as stored water can be “spread” later on planters, gardens or lawns via hoses and hand watering. (See more about rain barrels below.)

The third is to let it sink into the ground on site. This again can be done through permeable pavement but can also be done by identifying areas where water can be encouraged to be soaked up through the creation of a rain garden or dry stream bed garden. Rain gardens are created with specific plants that are tolerant of fluctuating water levels. Do not confuse this with bog or wetland gardens as the latter need constant watering for the type of plants required.

For issues related to standing water or highly technical landscaping techniques such as green roofs, splash guards, rock dissipators, vegetated or rock-lined swales that can help with parking lot run off, consult a local engineering expert from a reputable business.

Rain barrels provide you with free water.

Rain barrels store water on site and allow ambient temperature water to nourish garden beds rather than having cooler municipal water shock plants. Rain water doesn’t have added chemicals (like fluoride) that your plants do not need and it has the added bonus of being highly oxygenated. Collecting rain water is easy with the simple installation of a rain barrel that will store water from a downspout for when you need to use

it. Drip irrigation systems can be added to your rain barrels and used with a timer if you have an electric plug nearby. Rain barrels come in various sizes depending on the need and space available. The barrels can even be lined up so that two or three can receive water from one downspout. Municipalities encourage rain barrel use as they help with local storm water management and also in water conservation as the stored water will help alleviate the demand for municipal water during drought periods. The visible rain barrels will also demonstrate your faith communities efforts towards *Care for Creation* and be a great example to others in the community.

Dry Stream bed Landscaping

A dry stream bed is a perfect landscaping option when you are trying to divert water run off and need to channel it in an attractive way. This can be used to direct water to a low area on your property (just ensure that the water table is not high in the designated catchment area) or a dry stream bed can be designed specifically as a landscape feature for overflow drainage towards the municipal stormwater system. This type of overflow drainage helps decrease the amount of water that enters the municipal stormwater system. The rock bed and green landscaping surrounding it, will provide an aesthetically pleasing design to your property.

As with all projects where you are digging in new areas: **Do not forget to call utility companies** as they will ensure that you are aware of any underground utilities that you need to avoid. They will mark your property, showing you **where NOT TO DIG**.

This landscape is intentionally designed to be dry for much of the year but will be able to handle spring run off and other occasional rain downpours that create water runoff on your property. Ensure that you work with a professional who understands water flow and stream engineering but who also has an eye for aesthetic design. Get local references. Some things to consider:

- Weed fabric is not recommended as the weave is usually too tight to allow water to percolate into the soil. Add sand or gravel before the stones for the stream bed are added to help with this percolation.



- Stones can be a variety of sizes but substantial enough to withstand the velocity of water flow. Curves in your stream bed help slow the water down and allows more of it to sink in.
- Plants should be added around the meanders (curves) of the stream to increase the visual interest of the dry stream bed. Ask for recommendations of native plants to help support local biodiversity.
- If there is enough room on your property, include some larger ponding areas that will help sink the water on your property rather than have it overflow into municipal storm-water catchment.

Rain Garden

A rain garden allows water to sink into your yard rather than having it directed off of your property. Rain gardens use plants to soak up excess water. Many native plants with fibrous roots are wonderful for filtering this type of water. Rain gardens will look like other garden beds full of perennials but these beds can tolerate large fluctuations in water and survive drought periods.

To install a rain garden, the first thing to do is site it at least three metres away from building foundations. Rain gardens should never be installed over a septic field. As with a dry streambed landscape feature, call before you dig so that you know where all underground utilities are and do not locate your rain garden over a utility. Some things to consider:

- Choose a natural low spot and/or location where water is being directed from your downspouts. Avoid areas on your property where the water table is high. Clay can be a great soil type for rain gardens. Always do a percolation test first before finalizing your location.
- A percolation test will help ensure that your rain garden is situated where water will drain properly. Water should slowly drain and sink completely into soil after 48 hours.
- Rain gardens flourish in full to partial sun. Many wet meadow native plants can handle

conditions of heavy flooding and then dry periods in full sun. These are great plants to include in your rain garden.

Rain gardens need to have a natural depression so that there is a pooling area for water to be contained within the perimeter. When you dig out the soil, the extra dirt can be used to create a berm that will hold in the water.

Rain gardens should be 60 centimeters deep. Dig out the soil and mix with sand and compost in equal parts. This mixture is then added back with consideration for the natural depression (that should be 15 to 20 centimeters high) which will ensure water is contained.

Once this is done, a beautiful flower and perennial garden bed can be planted in the new soil. Consider adding a mixture of flowers, sedges, grasses and shrubs. Foliage like grasses and sedges are great as they have deep root systems. Some grasses and sedges to consider include: Little Blue Stem, Switch Grass, Bebb's Sedge and Wild Rye. Other native plants to consider are: Cardinal Flower, Obedient Plant, Black-eyed Susan, Bee Balm, Echinacea, Cup Plant and swamp plants like Marsh Fern, Swamp Milkweed and Swamp Rose Mallow. Some native shrubs to consider are Chokeberry, Winterberry, Red Osier Dogwood and Elderberry.

Remember that for the first two years while being established, your rain garden plants will need extra care. Add extra mulch to help slow down evaporation and water weekly if there is no rain.

French Drain

French drains and vertical sinks are another helpful features that helps alleviate puddle areas. The French drain is a trench that is like a dry stream bed and a vertical sink works like a hidden pooling areas. These are typically made with gravel that allows water to flow through and sink quickly. The drain can be used in areas that slope down and away from problem areas, so that gravity can be used to move the water. This might help with terraced areas also if sloped properly to discharge areas.

As with the first two projects, call before you dig

so that you know where all underground utilities are before you locate your French drain and vertical sinks. Do not site any collection of water close to septic fields or utilities. Use a French drain to direct downspout water away from your foundation. Both the slope and velocity of the storm water will allow water to flow through the drain.

Ensure that your French drain and any vertical sinks will work by doing a percolation test. Dig a hole one metre deep in the area you want to locate your drain. Fill the hole with water and observe the drainage speed. Time how long it takes for the water level to do down a full decimeter. Ten minutes for ten centimeters is a good percolation rate. If the hole does not drain at this rate or does not drain at all, professional advice for other options is needed.

An open French drain can be easily created by identifying the slope, digging the trench to help lead water away from problem areas and filling the trench with gravel. Some permeable flagstone or other hardscaping that allows water to percolate through can be added as long as it doesn't impact the percolation rate. Ensure that as little dirt as possible gets into the drain when it is installed. The larger and wider the drain is, the longer it will last.

Any drain that is installed must be engineered so that it does not impact any neighbouring properties. Your water overflow should always be directed to municipal stormwater sewers and should not run onto any adjacent private property. Covered French drains need to be installed by a professional.

Links / Further Info:

Green Communities Canada – *Rain Community Solutions*:
www.raincommunitysolutions.ca/en/

