

Rain Gardens

Holding back and soaking in runoff in small, depressed planting beds allow you to passively water plants without touching a tap. They are meant to both hold and cleanse runoff. They deliver a similar range of environmental benefits as ponds and wetlands, while avoiding the challenges of standing water.





Benefits of Rain Gardens

Low maintenance. Rain gardens look good for weeks at a time without any attention.

Grows quickly. Extra moisture and loose, deep soil make plants thrive and quickly fill in a space.

Provides habitat. Rain gardens can provide abundant food, water, and shelter for wildlife such as birds, bees and butterflies.

Diversifies plant possibilities. Extra natural moisture means you can have a water-wise garden that includes more moisture-loving plants you might otherwise have to leave out.

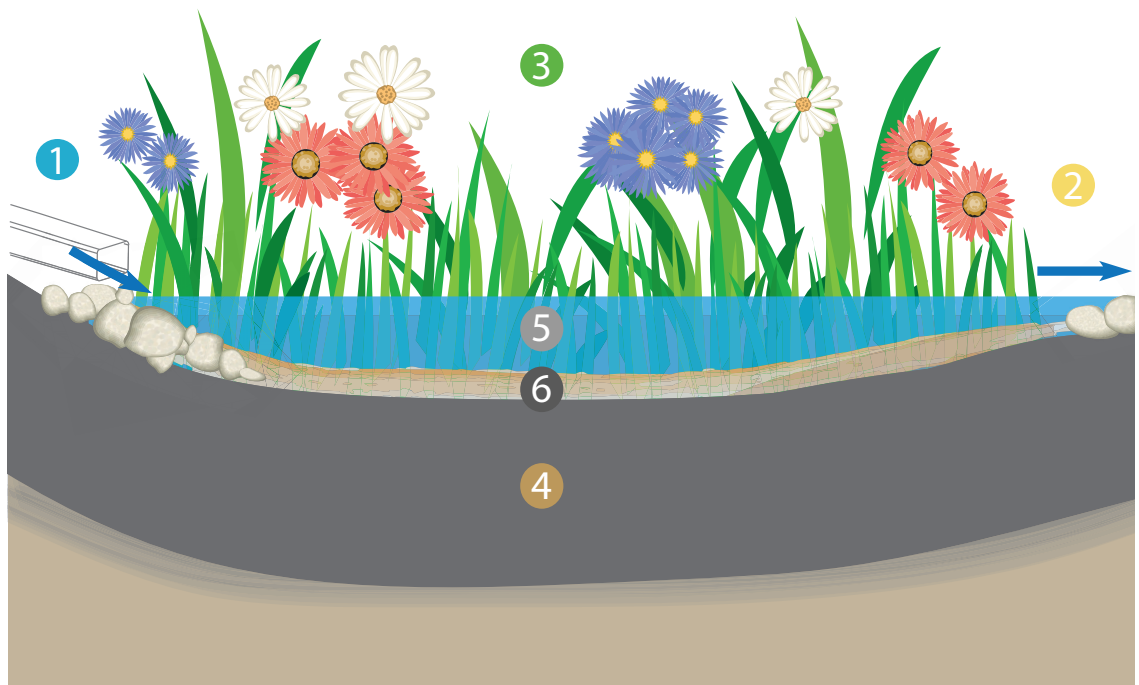
Improves aesthetics. Rain gardens add visual interest to your yard and your community.

Rain Gardens are Best for...

Properties with more space. Rain gardens are simplest to install when you can stay at least two metres away from basements and crawl spaces.

Newer properties with mostly manicured turf. Typical groomed turf is usually underlain with a shallow soil that is inhospitable to plant survival, doesn't clean up contaminants, and creates a lot of runoff. Adding rain gardens to this type of property (newer than about 1970) will instantly and dramatically improve its performance.

Areas where a tree canopy is yet to establish. If you have mature trees, your property is working hard already, and rain gardens are a type of feature that might be difficult to add without disturbing tree roots. You can still direct downspouts to your trees and maybe add shallow depressions if a full-on rain garden won't fit. Where you don't have trees, rain gardens are a major performance booster.



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Components

1 Inlet. Rain gardens can collect runoff from any source: a downspout off a roof, directly from a hard surface like a driveway or patio, as part of an overflow route from rain barrels, or even from lawn areas. Downspouts are the most common source.

Once you get water to your rain garden, protect the location where it flows in. If flow is concentrated to a small inflow area, say from a downspout, add some small stones to slow the water down so it doesn't wash soil away.



2 Overflow. Most of the time, water will soak in. Occasionally, a big storm will cause the rain garden to spill. For these times, an overflow location needs to be provided on the downhill side of the garden. Wider overflows disperse water best.

Add some small stones similar to the inlet, and provide a half-metre vegetated surface between the overflow and any hard surfaces in order to absorb flows during the spring melt and prevent icing.

3 Plants. Any combination of trees, shrubs, grasses, or perennials will work, as long as they are species that have a wide range of moisture tolerance. You can tell good candidates if the plant is shown as suitable across a range of moisture levels - dry, average or moist. Only a few types of plants bridge all three categories. Place species that enjoy drier conditions around the edge and species that enjoy more moisture near the inlet. Choose a groundcover or two that spread to stabilize the edge, particularly on the side around the overflow (for example, Creeping Jenny, Wild Strawberry). Note that if your water source includes a driveway or other area that has de-icers applied, you'll need to choose salt-tolerant plants such as Daylily, Feather Reed Grass, Meadow Arnica and Showy Milkweed, Gooseberry, Golden Currant and Willow.

When selecting plants to include in your rain garden, consider using native plants as much as possible. While usually not as showy as ornamental species, native plants are fully cold-hardy and require little maintenance, while being highly adaptable to a variety of soil and light conditions. They are often the first to leaf out in the spring and the last to drop their leaves in the fall. They are adapted to provide habitat for local species.

4 Soil. The most significant part of a rain garden is the depression that holds water, and what you can't see—the deep soil underneath that absorbs and treats stormwater. Unlike sandy mixes that are recommended in parts of the world with more regular rainfall, our humble native loam (also known as topsoil) provides excellent nutrient-binding and moisture-buffering capacity in our highly variable climate. Plain loam rather than a garden blend is recommended, and is the basis of the rain garden sizing calculations in this guide. **Compost** and other **Organics**, on their own or as part of a garden blend, can be added to make the soil easier to work and for their other benefits, but they can make a rain garden too nutrient-rich. Compost made from yard waste or other plants is okay. Because they leach nutrients, be sure the amendments do not include animal manures. Whatever soil you choose, blend the lowest 10 cm together with the lighter-coloured subsoil below. It helps water soak in better.



5 Ponding Depression. In order to keep runoff from taking too long to drain, the final surface of the rain garden should only be depressed by 10 cm. If the subsoil is not a tight clay, verified by a percolation test, you can go deeper. See the *Trenches and Soakaways* module for how to do a percolation test. See the *Put a fine point on it* section for the relationship between percolation rate and ponding depth.

6 Mulch. If you use mulch, it should be *shredded* wood. Unlike *chipped* wood, shredded mulch has rough edges that grip together, like Velcro. Avoid rubber mulch as it may leach metals. Avoid gravel mulch, as it inhibits desirable plants from spreading. Don't use filter fabric, as it will clog.



Mulch is not critical, but it does reduce weeds and retain moisture. If you use it, cover bare ground and between plants to a depth of 8 to 15 cm, with 10 cm being the most common depth. When it rains the mulch will float, but then it will settle back down when the rain garden empties, as long as the bottom is more or less flat. Over time, the mulch will stabilize and begin to break down, feeding the soil. As an alternative, **cover crops** are becoming increasingly popular, such as Berseem Clover. Cover crops quickly stabilize soil and keep weeds at bay while other plants fill in.

Plants for Rain Gardens.

Plant anything drought-tolerant on the sides, average to dry on the bottom, and more moisture-loving near the inlet, if you like. Some plants can tolerate any of these conditions.



Siberian Iris
(bottom and inlet)



Daylily
(any)



Tufted Hairgrass
(native - any)



Feather Reed Grass
(native - any)



Spotted Joe Pye
(native - inlet)



Creeping Jenny
(any plus edging)



Meadow Arnica
(native - any)



Showy Milkweed
(native - any)



Dogwood
(native - any)



Spirea
(any)



Dwarf Birch
(native - any)



Raspberry*
(any)



Willow
(some native - any)



Currant†
(some native - any)



Potentilla
(native - sides and bottom)



Snowberry†
(native - sides and bottom)

† Photo compliments of TreeTime.ca — all rights reserved
*Aggressive spreading by roots can occur

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ABOVE: Rain garden shared between neighbours in Edmonton

Considerations. Rain gardens can be built wherever it makes sense in relation to downspouts and hard surfaces. Take care to account for these factors.

Distance from foundations. To avoid seepage, position downslope and away from basements and crawlspaces (2 to 3 m recommended). Slabs, e.g., garages and driveways, don't need as much of an offset.

Distance from downslope sidewalks. To avoid icing, give your rain garden about 1 m of horizontal distance after the overflow with a soft surface (usually lawn) so any large melt events have somewhere to re-freeze.

Distance from steep slopes. Position at least 15 m back from the top of steep slopes (slopes over 15%), as there is a potential to cause slope instability and slumping.

Distance from septic systems. Rain gardens must not be placed within 4 m of a septic field and, if uphill from a septic system, should be at least 15 m away.

Neighbours. Keep overflows on your own property.

High groundwater. The height of the bottom of the soil

in a rain garden must be at least 1 m above the height of groundwater. A sump pump that needs to run in August is one way to know you have high groundwater.

Drainage capability of the subsoil. The layer below the soil may drain easily, especially if you live in a river valley or near a shoreline. In this case, your rain garden will drain easily and depressions deeper than 10 cm are okay. On the other hand, if your subsoil is more like clay (which is typical in much of Alberta), then shallower depression depths and deeper soil depths are more desirable, in order to ensure that water doesn't linger for more than a few days. Do a percolation test if you want to know how fast your soil drains (see the Trenches and Soakaways section for this procedure).

Natural low spots. Places in your yard that are naturally too wet for turf but not wet enough for wetland plants may enjoy *wet meadow* species, whereas rain gardens fluctuate in moisture and need drought-tolerant species.

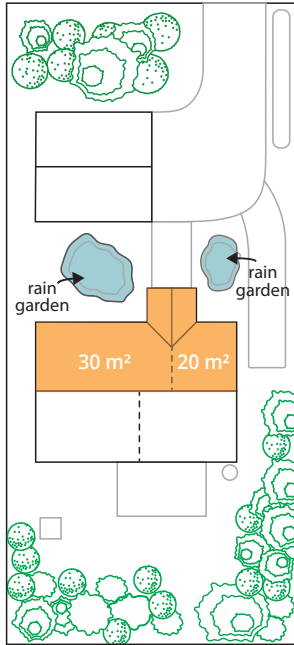
Milkweed for Monarchs

Monarch caterpillars will only eat Milkweeds. Talk about fussy! Fortunately, rain gardens provide perfect conditions for growing Showy Milkweed (*Asclepias speciosa*, pictured at right). It is hardy in Alberta and available through native growers. Monarchs in your area? Include milkweed in your planting plan.



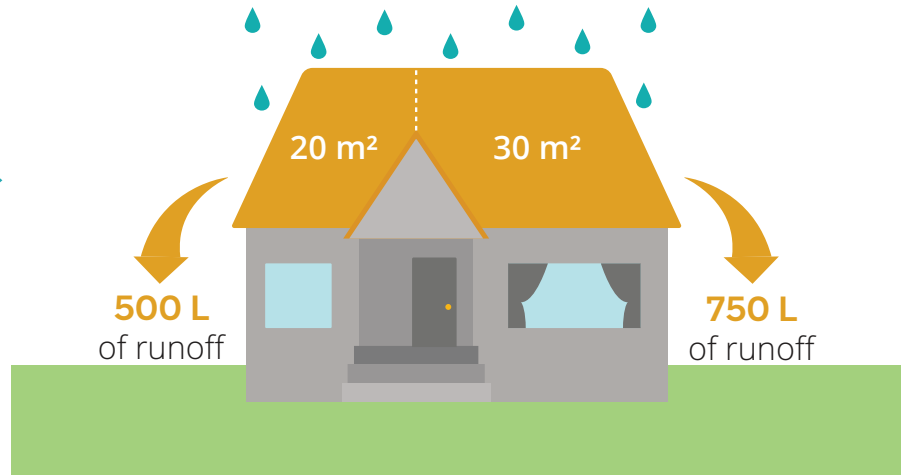
CONSIDER THIS EXAMPLE

EXAMPLE PLAN



HOW MUCH RUNOFF?

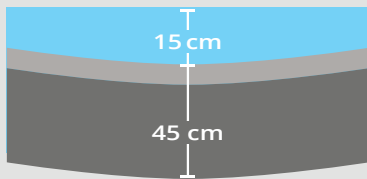
On one side of the house's roof, a 2.5-cm rain event generates...



IDEAS

Our example lot has **two rain gardens** in its front yard, collecting runoff from either side of the house separately, which is typical. There is enough space in this yard for the preferred rain garden configuration (see below). The flow from the lawn itself is sloped towards the rain gardens, so the rain gardens should be upsized a bit to accommodate those flows as well.

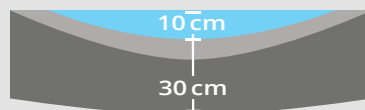
750 L
Deeper Option



Phone a Friend
(difficulty: intermediate)

\$\$\$

750 L
Preferred Option



Weekend Warrior
(difficulty: intermediate)

\$\$ - \$\$\$

Rain gardens for Alberta are optimized at a 10-cm ponding depth so that there isn't a danger of water standing for more than a few days. If you are short of space, you can increase the ponding depth, but then you have to also increase the soil depth to hold that extra runoff, or accept that you will have standing water for longer durations, which will also impact plant selection.

It is usually more expensive to rent equipment to dig and fill a bigger hole than to plant more plants over a larger area. However, if you have a friend with a backhoe, then you will happily have a different equation (don't forget the refreshment budget!)

? Have you evaluated your site yet? Our **Evaluate Your Site** section walks through the steps of identifying source flows, calculating runoff volumes, identifying opportunities to reduce runoff, and sizing your solutions.

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Put a fine point on it

Your turn to do the math! You can use something like Google Earth to measure your hard area. Or you can get up on your roof if you are keen. If the goal is protection of our water bodies, your rain garden should be one-quarter the size of the contributing hard area. At one-third the size of the contributing area, there's additional flood mitigation enhancement. The numbers below are all based on a one-quarter ratio.

Sizing Your Rain Garden				
Contributing Area (typically roof area)	Generates (in a 2.5 cm rain event)	Minimum recommended surface area (assumes that the soil has 25% void space to absorb runoff)		
		for a 10 cm ponding depth / 30 cm soil depth	for a 15 cm ponding depth / 60 cm soil depth	for a 20 cm ponding depth / 60 cm soil depth
10 m ²	250 L	2.5 m ²	1.0 m ²	1.25 m ²
20 m ²	500 L	5.0 m ²	2.1 m ²	2.5 m ²
50 m ²	1250 L	12.5 m ²	5.2 m ²	6.25 m ²

Using the chart above, you can quickly determine how big your rain garden needs to be. Most residential rain gardens have a surface area of about 10 m² and they almost always have a 10-cm ponding depth and 30-cm soil thickness. To determine your rain garden solution:

1. Measure, eyeball, or calculate the contributing area from an online map. This is the area that will send flow to the rain garden.

2. Use the chart above to fill in the blanks. For example, if the roof area that drains into a downspout is 50 m² (the contributing area) and you want to construct a rain garden that has a 15-cm ponding depth with 60-cm-deep soil underneath, then the area of the rain garden needs to be at least 5.2 m² to capture all of the runoff from a 2.5-cm (one-inch) rain event and to ensure that water drains within 48 hours after a rain event.

Is your available surface area limited?

Performance won't be as good, but something is better than nothing if you have no other option.

Use the minimum 10-cm ponding depth so water won't linger. A bigger surface area provides more flood mitigation.

Lots of space, not much appetite for digging?

You can use shallower ponding depths, say 5 cm with 15 cm soil depth and a surface area of 5 m². Rather than digging a basin, as an alternative you can often go up, using raised beds and elevated downspouts.

NOTE: Rain gardens in Alberta are sized assuming there is slow-draining subsoil. Performance is based on the volume stored in the basin, with the soil thickness calculated to provide capacity so water does not linger on the surface. For areas on faster-draining subsoils, the soil depth is not critical. If you want to do a percolation test, see the *Trenches and Soakaways* module for a procedure. Assuming a 24-hour *drawdown* time (how long it takes for the surface to be dry), for every mm per hour of percolation rate, you can have 24 mm of ponding depth.

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Maintenance

Watering. Water plants regularly for the first one to three years in order to establish them properly. Watering may be necessary during prolonged dry periods, even if plants are established. During these periods watch for signs of stress, such as wilting leaves or fading evergreen needles.

Plant care. Maintaining healthy plants in your rain garden minimizes weed seed germination, improves drainage, and reduces erosion. If plants continue to do poorly or fail, they may be the wrong plants for that location. Consider the sun exposure, soil moisture, adjacent plants, and other growing factors and replace the poorly performing plants with varieties better suited for that location in the rain garden. You may need to thin out some plants — plants often grow rapidly to full size in lush rain gardens.

Fertilizer. Rain gardens are meant to help use up nutrients in runoff. Adding fertilizer defeats this purpose and increases the hazard of leaching nutrients into water sources. Native plants don't need added fertilizer. If you suspect fertilizer is needed in your case, do a soil test to confirm. If a test reveals this is necessary, compost will probably do the job.



Call before you dig

Before you start digging your garden — or do any sort of ground-disturbing landscape work — you need to “know what’s below.” Damage to buried utility lines can cause loss of essential services for you and your neighbours, or even serious injury or death. Contact **Alberta One-Call** at least two full days (more during the busy spring and fall seasons) to locate and mark your property. You can reach them at **1-800-242-3447** or **albertaonecall.com**. Note that **Shaw Cable** is not covered by Alberta One-Call and they need to be contacted separately.

Check with your municipality

Some municipalities have developed their own rain garden advice and requirements. Check early in your planning to see if there are any permits or other requirements, for example to disconnect a downspout.

More Information

Alberta Low Impact Development Partnership
alidp.org

Pigeon Lake Watershed Association
plwa.ca

The Canadian Mortgage and Housing Corporation website has a rain garden page with lots of useful details
bit.ly/cmhc_raingarden

The David Suzuki Foundation's Monarch and Milkweed FAQ
bit.ly/monarch_milkweed



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