

Overall Project Goals

Drainage Goals:
 Aesthetic Goals:
 Maximum budget:

Garden Design

Step 1: Determine drainage area

What area will your garden capture water from?

Drainage Area	Area (m ²)
Roof - area #1:	
Roof - area #2:	
Roof - area #3:	
Driveway/Parking	
Walkway, Patio	
Lawn	X 0.20 =
Other:	
Total Drainage Area (m²)	

Step 2: Determine location

Does your location meet the following criteria?

- | | |
|---|--|
| <input type="checkbox"/> At least 2m from building foundations | <input type="checkbox"/> Not over a septic system |
| <input type="checkbox"/> Not within the dripline of existing trees/shrubs | <input type="checkbox"/> Has a slope less than 12% |
| <input type="checkbox"/> Not over a utility line | <input type="checkbox"/> Will not interact directly with water table |

To determine slope:

- Pound a stake into the uphill end of your site and another into the downhill end.
- Tie a string to the uphill stake at ground level and pull the other end to the downhill stake. Make it horizontal using a carpenter's level and tie to downhill stake.
- Measure the width between the stakes.
- Measure the height on the downhill stake between the ground and the string.

$$\frac{\text{Height}}{\text{Width}} \times 100 = \% \text{ Slope}$$

To locate utility lines:

- call the utility company for active lines
- call a utility locating consultant such as A-Cam Video & Locating Services 519-268-2797



Water table test:

- During a dry period, dig a hole 30-40 cm deep
- If water fills the hole from below after a couple hours, you have reached the water table and the location is not appropriate.

Step 3: Determine depth and size

$$\text{Size: } \frac{\text{Drainage Area (m}^2\text{)} \times 0.01\text{m}}{\text{Soil Infiltration Rate (m)}} = \text{Garden Area (m}^2\text{)}$$

Soil Type	Min. Infiltration Rate (mm/hr)	Depth (cm)
Sandy	210	15
Sandy Loam	25	12
Loam	15	7
Clay	1	5

Infiltration rate test:

- Pour water into the hole used for water table test
- measure the change in water's depth over 1 hour

Step 4: Consider amending soil

To increase your garden's infiltration rate, you might consider amending the soil.

The optimal rain garden soil is:

50% Sand	15% Shredded Hardwood Mulch
30% Topsoil	5% Peatmoss or Compost
Note: More mulch can be substituted for peatmoss/compost.	

Step 5: Determine water inlet method

Method	Required Materials	Cost
<input type="checkbox"/> Across lawn <input type="checkbox"/> Extended downspout <input type="checkbox"/> Buried pipe <input type="checkbox"/> Vegetated Swale <input type="checkbox"/> Rock trench (w/ or w/o lining) <input type="checkbox"/> Concrete spillway <input type="checkbox"/> Other		

Erosion Potential	Required Materials	Cost
<input type="checkbox"/> Velocity and erosion unlikely to be a problem <input type="checkbox"/> Erosion possible/likely: <ul style="list-style-type: none"> <input type="checkbox"/> Adjust slope along water's path <input type="checkbox"/> Use rocks or obstructions to slow flow <input type="checkbox"/> Use rocks or erosion control material to stabilize berm/inlet/outlet/flow path 		

Step 6: Determine water overflow route

Your design should meet the following criteria:

- | | |
|--|---|
| <input type="checkbox"/> Overflow direction is away from buildings | <input type="checkbox"/> Overflow direction not towards a neighbours property |
|--|---|

Your design may use the following overflow options:

- | | |
|---|--|
| <input type="checkbox"/> Overflow will sheet over lawn or garden | <input type="checkbox"/> Overflow will flow towards the backyard |
| <input type="checkbox"/> Overflow will sheet over driveway or walkway | <input type="checkbox"/> Overflow will flow towards the street |

Outlet Type	Required Materials	Cost
<input type="checkbox"/> Overflow outlets through a low-point in the berm <input type="checkbox"/> Overflow outlets through a pipe buried in the berm		

Construction Methods and Materials

Step 1: Locate utility lines

See Garden Design Step 2 for advice on doing this.

Step 2: Mark out and dig the garden

Mark out the garden perimeter using something temporary such as a garden hose, string, flour, stakes, etc.

How will you remove the soil?

Method	Cost
<input type="checkbox"/> Shovel	
<input type="checkbox"/> Mini-backhoe	
<input type="checkbox"/> Other	

Where will you put excess soil?

<input type="checkbox"/> Use for berm around garden
<input type="checkbox"/> Use elsewhere on site
<input type="checkbox"/> Store on site
<input type="checkbox"/> Haul off site

Make sure garden bottom is as flat as possible so water will distribute evenly throughout the garden.

Step 3: Construct a berm

If your site is sloped at all, pile excavated dirt on the low side of the garden to construct a berm.

The berm should be about 50cm wide and have gradually sloped sides.

Compact the berm thoroughly as it will be susceptible to erosion.

Use a carpenter's level to ensure your garden's edge is a uniform height all around with the exception of a dip which you may have left to serve as an overflow outlet.

If your site is very steep or you are not removing much soil from your garden to make room for amendments, you may need to bring in more soil to construct an adequate berm.

Step 3: Garden edging

You may choose to edge your garden with a shovel or other tool and leave it natural or you may choose to use an edging material to help deter the spread of grass or other vegetation into the garden.

Types of edging	Amount required	Cost
<input type="checkbox"/> plastic		
<input type="checkbox"/> metal		
<input type="checkbox"/> rock		
<input type="checkbox"/> brick		
<input type="checkbox"/> other:		

Step 4: Adding soil amendments

Calculate the volume of your garden:

$$\text{Volume} = \text{Length (m)} \times \text{Width (m)} \times \text{Depth (m)}$$

Soil and amendments are usually sold in bags or by the cubic yard (yard³)

For non-rectangular shapes look up formulas or make a good estimate

Useful conversions:	1 yard ³ = 0.765 m ³	1 yard ³ of soil = 0.92m ² of soil 5cm deep
	1 m ³ = 1.31 yard ³	1 yard ³ of mulch = 0.92m ² of mulch 2.5cm deep

How will you incorporate your soil amendments?

<input type="checkbox"/> No amendments
<input type="checkbox"/> Turn into soil with a shovel
<input type="checkbox"/> Till into the soil
<input type="checkbox"/> Other:

You must mix the soil and any amendments - do not make layers

Remember that you don't want to fill the garden completely - leave about 5cm of room to allow for ponding

Avoid compacting the soil once it's in the garden - limit all machinery or feet in the garden

Planting Design, Methods and Materials

Step 1: Determine site characteristics

Sun:

- Full
- Partial
- Shade

Moisture:

- High
- Mid
- Low

Soil:

- Sand
- Sandy Loam
- Loam
- Clay

Consider the average moisture availability at the site
Consider soil type after amending if amendments will be used

Step 2: Determine desired design elements

Style:

- Wild
- Natural but not too wild
- Formal
- Other:

Zones to be planted:

- Permanently wet zone
- Zone wet after rain
- Upland zone around edge
- Dry/Highland Zone (berm)

Plant types:

- Grasses
- Low/Groundcover
- Flowers
- Shrubs
- Sedges
- Trees
- Rushes
- Bulbs (Upland only)
- Ferns

Maximum height:

- No limit
- 1.2m (excludes taller grasses)
- 0.6m
- 0.3m

Colours:

- No pattern
- Red
- White
- Pink
- Green
- Orange
- Blue/Purple
- Yellow

Food/Habitat:

- Birds
- Hummingbirds
- Butterflies
- Bees
- Moths
- Small Mammals

Poisonous plants:

- Not an issue
- Must be child friendly
- Must be pet friendly
- Must be livestock friendly
- Other:

Native/Non-native:

- Natives only
- Native and non-native mix
- Non-natives only

Step 3: Create your final garden design

- A) List plants to use in each zone (Permanently Wet, Occasionally Wet, Upland, Berm)
- B) Decide how the plants will be arranged (Random, Clumps)
- C) Draw your design out on paper including plants and any rocks or other elements

How to space your plants:

30 - 45 cm spacing is good for young herbaceous plants (plugs or 2" - 4" pots).
Trees and shrubs depend on their size and species.



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