RAIN GARDENS

Rain gardens are small, landscaped depressions that are filled with a mix of native soil and compost, and are planted with trees, shrubs and other garden-like vegetation. They are designed to temporarily store storm water runoff from rooftops, driveways, patios and other areas around your home while reducing runoff rates and pollutant loads in your local watershed. A rain garden can be a beautiful and functional addition to your landscape.

LOCATION

- Rain gardens should be located to receive the maximum amount of storm water runoff from impervious surfaces, and where downspouts or driveway runoff can enter garden flowing away from the home.
- Swales, berms, or downspout extensions may be helpful to route runoff to the rain garden.
- Locate at least 10 feet from foundations, not within the public right of way, away from utility lines, not over septic fields, and not near a steep bluff edge. Call Missouri One Call before you dig to locate the utility lines on your property.
- Rain gardens on steep slopes (>10%) may require an alternative design with terracing.

DESIGN

- The size of the rain garden will vary depending on the impervious surface draining to it and the depth of the amended soils. Use the table to determine the required surface area.
- A maximum ponding depth of 6 inches is allowed within rain gardens. On average, rain gardens drain within a day which will not create a mosquito problem.
- Design the rain garden entrance to immediately intercept inflow and reduce its velocity with stones, dense hardy vegetation or by other means.

Contributing Drainage Area (square feet)	Depth of Amended Soil (inches)			
	18	24	30	36
	Area of Rain Garden (square feet)			
100	7.7	6.7	6.0	5.3
500	40	35	30	28
1000	80	70	60	55
2000	155	135	120	110
3000	135	205	180	160
4000	310	270	240	215
5000	390	340	300	270

- If sides are to be mowed, rain gardens should be designed with side slopes of 3:1(H:V) or flatter.
- For best results, it is suggested to test your soil characteristics as you would for a garden, or contact your local County Extension Service for help (extension.missouri.edu/stlouis).
- Soils for rain gardens should be amended native soils containing: 2/3 native soils and 1/3 compost.
- A mulch layer consisting of 2-3 inches of non-floatable organic mulch (fine shredded hardwood mulch, pine straw, or leaf compost) should be included on the surface of the rain garden. Pine bark and wood chips should not be used.
- Often rain gardens have a better appearance and can be more easily maintained if they have defined edges similar to a normal garden.
- The overflow from the rain garden should be non-eroding and can consist of a small berm or even an inlet grate set at the proper elevation in the garden. The grate should be set at a slant or be domed to allow clogging debris to fall off.

- **NOTE: This method can only be used with an infiltration rate greater than 0.25 in/hr. If the rate is less than 0.25 in/hr, this method can only be used with an underdrain as described in Appendix D.**

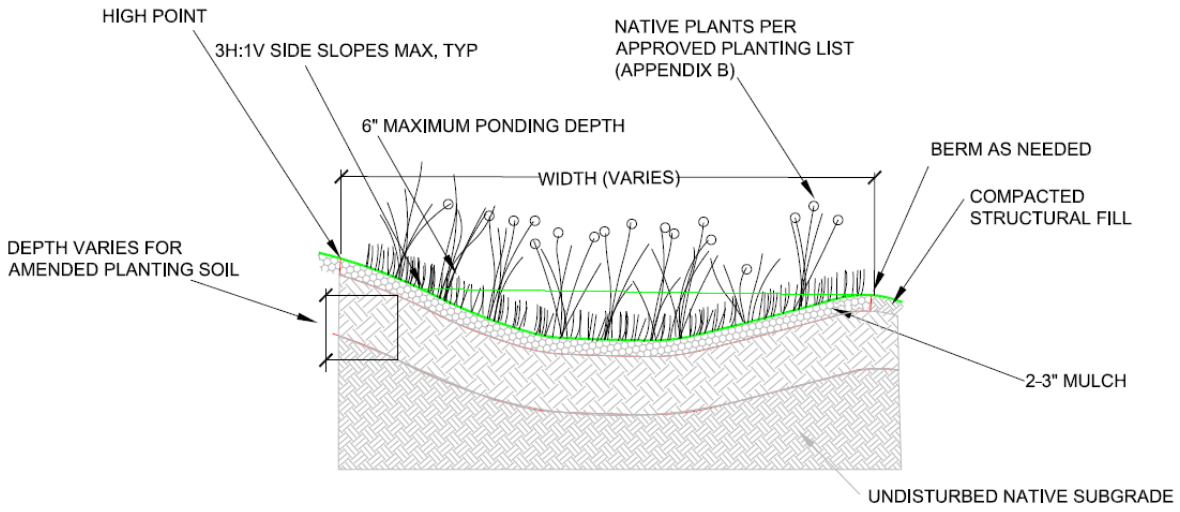
VEGETATION

- Vegetation commonly planted in rain gardens includes native trees, shrubs and other herbaceous vegetation. When developing a landscaping plan, you should choose vegetation that will be able to stabilize soils and tolerate the storm water runoff rates and volumes that will pass through the rain garden.
- Vegetation used in rain gardens should also be able to tolerate both wet and dry conditions. Please refer elsewhere within this document for additional information on plants appropriate for rain gardens.
- As with any garden, in the first season the vegetation may require irrigation to become well established.
- It may be appropriate to plant more densely than a normal garden to obtain the benefit of plant soil stabilization and evapotranspiration as soon as possible.

MAINTAIN

Routine garden maintenance should include weeding, deadheading, replacing dead plants, and replenishing mulch when depleted. Catching areas of erosion is also important as is correcting standing water problems. If standing water persists it may be necessary to place a perforated underdrain in the garden daylighting downstream.

RAIN GARDEN – LAYOUT SKETCH



CONSTRUCTION STEPS:

1. Locate rain garden(s) where downspouts or driveway runoff can enter garden flowing away from the home. Locate at least 10 feet from foundations, not within the public right of way, away from utility lines, not over septic fields, and not near a steep bluff edge.
2. Measure the area draining to the planned garden and determine required rain garden surface area from the table on the next page and your planned excavation depth.
3. Perform an infiltration test according to Appendix A, if the rate is less than 0.25 in/hr an underdrain will be necessary. If the rate is more than 0.50 in/hr the size of the garden may be decreased 10% for every 0.50 in/hr infiltration rate increase above 0.50 in/hr.
4. Measure elevations and stake out the garden to the required dimensions insuring positive flow into the garden, the overflow elevation allows for six inches of ponding, and the perimeter of the garden is higher than the overflow point. If the garden is on a gentle slope a berm at least two feet wide can be constructed on the downhill side and/or the garden can be dug into the hillside taking greater care for erosion control at the garden inlet(s).
5. Remove turf or other vegetation in the area of the rain garden. Excavate garden being careful not to compact soils in the bottom of the garden. Level bottom of garden as much as possible to maximize infiltration area.
6. Mix compost, topsoil, and some of the excavated subsoil together to make the 'amended soil'. The soil mix should be 1/3 compost, 2/3 native soil (topsoil and subsoil combined).
7. Fill rain garden with the amended soil, leaving the surface eight inches below your highest surrounding surface. Eight inches allows for 6 inches ponding and 2" of mulch. The surface of the rain garden should be as close to level as possible.
8. Build a berm at the downhill edge and sides of the rain garden with the remaining subsoil. The top of the berm needs to be level, and set at the maximum ponding elevation.
9. Plant the rain garden using a selection of plants from elsewhere in this manual.
10. Mulch the surface of the rain garden with two to three inches of non-floating organic mulch. The best choice is finely shredded hardwood mulch.
11. Water all plants thoroughly. As in any new garden or flower bed, regular watering will likely be needed to establish plants during the first growing season.
12. During construction build the inlet feature as a pipe directly connected to a downspout or use a rock lined swale with a gentle slope. Use of an impermeable liner under the rocks at the end of the swale near the house is recommended to keep water from soaking in at that point. Test the drainage of water from the source to the garden prior to finishing.
13. Create an overflow at least 10 feet from your property edge and ensure it is protected from erosion.

CITY OF KIRKWOOD	NAME/ADDRESS:	RAIN GARDEN SPECIFICATIONS PAGE 1 OF 2

SKETCH LAYOUT

PROVIDE PLAN VIEWS OF RAIN GARDEN AND HOUSE SHOWING DRAINAGE AREA DIRECTED TO RAIN GARDEN AND KEY DIMENSIONS AND OVERFLOW AREA RELATIVE TO PROPERTY LINE.

SIZING CALCULATION:

SITE INFILTRATION RATE= _____ IN/HR

- IS UNDERDRAIN REQUIRED? YES NO N/A
- CAN BMP SIZE BE REDUCED? YES NO N/A

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4000	310	270	240	215
5000	390	340	300	270

MEASURE CONTRIBUTING DRAINAGE AREA AND READ AREA FOR GIVEN MEDIA DEPTH.

CONTRIBUTING DRAINAGE AREA= _____ SQ FT
DEPTH OF STONE MEDIA= _____ INCHES
PAVER AREA= _____ SQ FT

MAINTENANCE:

1. IRRIGATE VEGETATION AS NEEDED IN FIRST SEASON
2. REMOVE WEEDS
3. REPLACE UNSUCCESSFUL PLANTINGS
4. REPLENISH MULCH
5. REPAIR ERODED AREAS
6. RAKE CLOGGED SURFACE TO RESTORE INFILTRATION
7. MONITOR RAIN GARDEN FOR APPROPRIATE DRAINAGE TIMES. IF GARDEN DOES NOT DRAIN, AN UNDERDRAIN MAY BE NECESSARY

CITY OF KIRKWOOD	ATTACH THIS TWO-PAGE SPECIFICATION TO HOUSE PLAN SUBMITTAL	RAIN GARDEN SPECIFICATIONS PAGE 2 OF 2