



STORMWATER MAINTENANCE AGREEMENT

Short Form for Small Redevelopment

Runoff from hard surfaces such as pavement and rooftops picks up sediment and pollution and carries it into our streams and creeks. As Boone County develops, areas are converted from fields and forests to parking lots and buildings. Rain water that was once able to soak into the soil now flows down streets or across rooftops. The increased amount of water reaching our streams and the pollution in the runoff can harm aquatic life, damage property by destabilizing stream banks and increase flooding.

Boone County enacted a Stormwater Ordinance on April 15, 2010. Your recent request to build triggers the requirements in the ordinance. However, your activity may be eligible to meet the lower criteria for runoff reduction without requiring additional water quality treatment. To determine if you are eligible, all of the following must apply: your property is greater than 2.5 acres; there is less than 10% impervious area; the proposed activity is disturbing less than one acre; the activity falls under redevelopment if the use remains the same; and there is not a request for a zoning change.



Runoff Reduction

Runoff reduction is the removal of a portion of the runoff volume by one of the following methods:

1. Retain deep-rooted native vegetation and trees.
2. Re-establish trees or deep-rooted native vegetation.
3. Capture and reuse runoff by installing rain barrels or rain gardens.

Option 1 Retain deep-rooted vegetation

Trees and native prairie vegetation provide numerous water quality benefits. The foliage captures rainfall, which may evaporate before it reaches the ground. Leaf litter acts like a sponge, soaking up rain. Native grasses contain up to 70% of their biomass below ground. This extensive root system increases infiltration and organic matter content of the soil. The soils under these plants absorb and hold water in pore spaces throughout the entire rooting depth.

University Extension

Requirements:

Retain 10% of the site in trees, grassland or deep-rooted vegetation (shallow-rooted turf grass is not allowed).

Maintenance:

Trees should be pruned in spring so they can recover faster. Avoid extensive pruning in summer or late fall as this removes the nutrients stored in the branches that are needed through dormancy.

Once established, **native prairie vegetation** should be mowed once a year and burned every two to three years. Burning in late April to June 1st will reduce fescue dominance and limit woody invasion by removing litter and stimulate forbs. This should be done when wind speed is negligible and humidity is below 40%.

Missouri Department of Conservation

EFFECTS OF VEGETATION IN MINIMIZING EROSION (MENASHE, 1993)

EVAPOTRANSPIRATION

FROM FOLIAGE:

Removes water from the soil

GROUND

COVERS:

Protect Soil

SHRUB ROOTS:

Hold surface soil

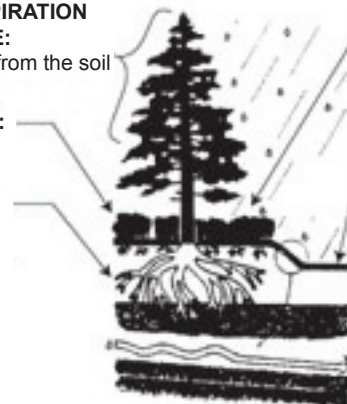
VEGETATION:

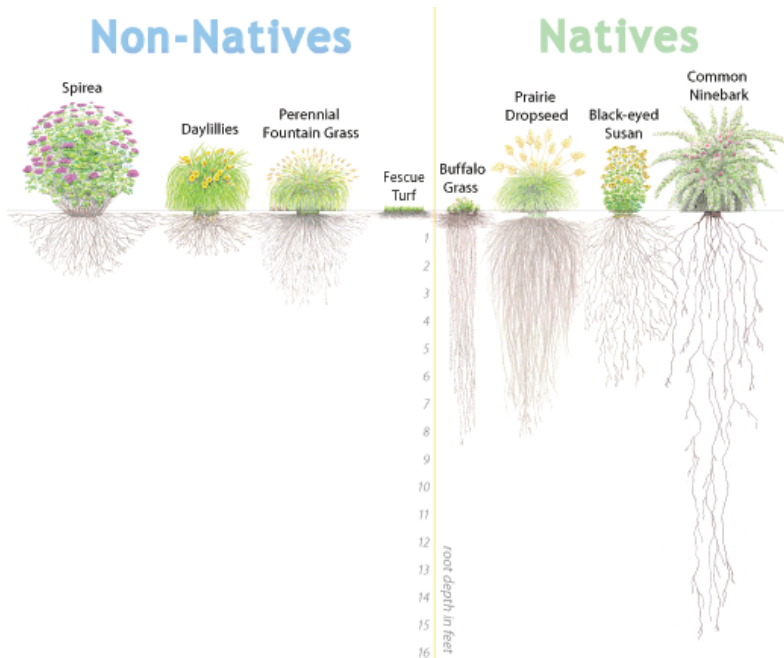
Helps to maintain absorptive capacity

DEEP ROOTS:

Help hold and stabilize bank materials, ties layers together

VEGETATION
Slows the velocity of runoff and acts as a filter to catch sediment.





Our dense clay soils make it difficult for water to soak into the ground quickly. Native plants have deeper root systems that significantly increase the ability of soil to absorb and retain water. As natural vegetation is replaced with popular turf grasses, less stormwater is absorbed into the ground, leading to more stormwater runoff and water pollution.

- MARC

3. Remove enough soil to expose the root flare. Measure the height of the root ball from the ground to the root flare.
4. Subtract two inches from the height of the root ball and dig the hole to that depth.
5. Position the tree in the hole. When placed how you want, remove the wire basket from the root ball.
6. Remove the twine and burlap from the root ball. Loosen tightly packed soil around the root ball to expose the roots.
7. Combine correct fertilizer with excavated soil and backfill, leaving the root flare exposed.
8. Form a six inch curb around the tree and fill the crater with water. Knock the curb down once water is soaked in.
9. Spread three inch bark mulch over the exposed soil, keeping the mulch away from the tree trunk.
10. Water the tree every day for six weeks.

- This Old House

Option 2 - Replant deep-rooted vegetation

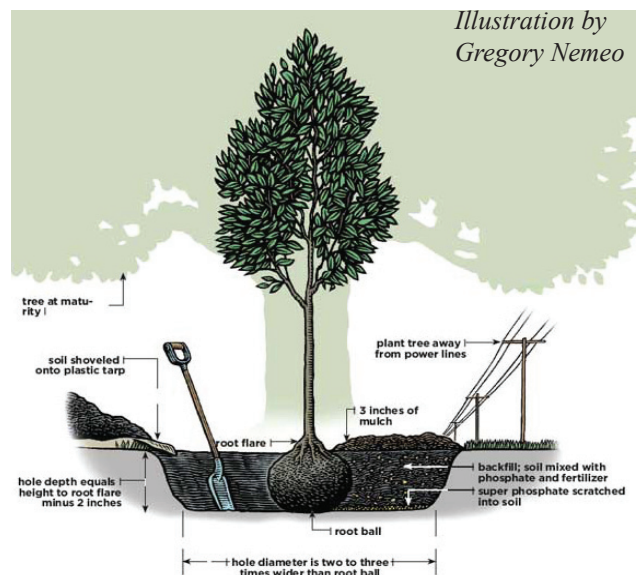
Re-establishing deep rooted vegetation can improve soil organic matter content and water infiltration in as little as six years. (Bharati et al., 2002)

Requirements:

Re-establish 12% of the total site in trees, grassland or deep-rooted vegetation (shallow-rooted turf grass is not allowed). If planting trees, the density requirement is six (6) trees per acre with a minimum size of 1.5 caliper. If re-establishing native vegetation, the requirement is 80% coverage after two years.

Planting a Tree Properly

1. Stake the ground where you want to plant the tree. Stay at least 15 feet away from other objects, such as houses, trees, and sidewalks.
2. Measure the tree's root ball and mark a circle two or three times wider than the root ball's diameter around the stake.



Planting time is a good time to correct minor structural problems a tree may have. Remove branches that are broken, rubbing or crossing each other. Cutting a few of the smallest branches back to the trunk will help direct growth into the terminal leader and stronger lateral branches,

promoting the development of a well-spaced branch scaffold system. For plants dug from a nursery (not grown in a container), moderate thinning at planting time will also help compensate for the loss of roots due to digging. Removing more than 20 percent of the branches may reduce the tree's ability to produce food through photosynthesis, thereby slowing the establishment process.

- *University of Missouri Extension*

Planting Deep-rooted Native Vegetation



When seeding a large area, site preparation begins the spring before seeding in early winter. For best results, begin in May with an application of non-selective herbicide. If (or when) weeds sprout, mow them before they produce seed heads. In September, evaluate the site. If a healthy stand of vegetation is present, apply a second application of non-selective herbicide. In December, plant native grass and forb seed either by broadcast or drilling. Water until the planting is established.

Any time soil is disturbed, a burst of weed growth is triggered. These weeds can quickly shade new native seedlings. For large areas, mowing is the best option for maintaining your seedlings. The first year, mow when vegetation is six to 12 inches high. Native plants are sending down roots and will be shorter than non-desirable vegetation. It may be necessary to mow several times to keep vegetation below 12 inches. The second year, continue to mow, but less frequently. By the third year, native grasses and forbes should be able to hold their own. In future years, plan to mow or burn every third year.

- *Missouri Grow Native*

Option 3 - Capture and Reuse

Thousands of gallons of water run off the average Missouri rooftop each year. Storage and reuse techniques range from small rain barrels to large underground cisterns or rain gardens. Water from the roof is relatively clean and can be used for gardens, flower pots or vehicle washing.

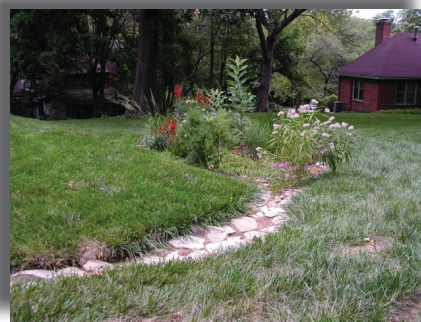
Requirements:

Utilize cisterns, rain barrels, or rain gardens to capture and reuse 0.14 inches of runoff. To determine the volume requirements, multiply the net increase in impervious area in square feet by 0.011667 ft. That gives you cubic feet. Then multiply this number by 7.48051 to get gallons. For example, you've added 3,000 ft² to your house; the runoff reduction requirement is 262 gallons ((3,000* 0.011667) * 7.48051 = 262 gallons). Therefore, you will need five 55-gallon rain barrels (262 gal/55 gal = 4.8 rain barrels).

Maintenance:

Rain Barrels: Disconnect the down-spout from the barrel prior to the first hard freeze. Turn the barrel upside down with all valves open. After the last frost (middle of April) reconnect your rain barrel to capture rainfall from your roof.

Rain Gardens: Keep your rain garden looking neat by maintaining the boundary with rocks or decorative border. Mow or remove dead vegetation in spring to stimulate new growth, and weed periodically.



Stormwater Maintenance Plan and Agreement

Short form for Runoff Reduction on Redevelopment

Name: _____

Site Address: _____

Current Zoning: _____

(Must be zoned residential, transitional or agricultural)

1. Stream Buffer on Site? ☐ No ☐ Type I ☐ Type II ☐ Type III

2. Environmentally Sensitive Areas? ☐ No ☐ Yes (cave, spring, sinkhole, etc.)

3. Total Site Area: _____ acres (must be greater than 2.5 acres)

4. Total Disturbed Area: _____ acres (must be less than one acre)

5. Existing Total Site Impervious: _____ acres _____ %

6. Proposed Total Site Impervious: _____ acres _____ % (must be less than 10%)

7. Net Change in Total Site Impervious _____ acres * 43,560 to get _____ ft²

Proposed Total Impervious - existing impervious

Insert this number in the first blank under Option 3 below (if chosen)

I/We are aware of the Boone County Stormwater requirements, and I/We have chosen to employ the following practice(s) on our property.

☐ **Option 1**

Retain 10% of the total site in trees, grassland or deep-rooted native vegetation

_____ Acres preserved.

☐ **Option 2**

Re-establish 12% of the total site in trees or deep-rooted native vegetation

If planting trees, the minimum requirement is 6 trees per acre (Total site in acres * 0.12) * 6 = _____ trees

If planting deep-rooted vegetation, the minimum requirement is 12% of the site with 80% coverage after two (2) years.

(Total site in acres * 0.12) = _____ Acres planted

☐ **Option 3**

Capture and reuse 0.14 inches of runoff by installing rain barrels, cisterns or rain gardens.

(Enter number from 7 above)(_____ ft² * 0.011666) * 7.48051 = _____ gallons to capture.

I/We realize that I am/We are responsible for maintaining the above practice(s) in accordance with the maintenance guidance in this document while I/We retain ownership of the property, or for at least five years. I am/We are responsible for any and all costs and expenses of maintaining the practice(s) chosen above.

LANDOWNER

DATE

LANDOWNER

DATE

BOONE COUNTY, MISSOURI

DATE

Please fill out two copies of this Agreement. Submit one copy of the Agreement, Stormwater Forms 1B and 4B, a map of the property showing locations of the selected practice(s), and the Stormwater Discharge Permit fee of \$50 made payable to "Boone County Public Works". Keep the other copy of the Agreement for your files. Mail or deliver the packet to:



Boone County Resource Management

Attn: Stormwater Coordinator

801 E Walnut, Rm. 315

Columbia, MO 65201-7732

If you have any questions, please call 573-886-4330.