

## BMP Maintenance and Evaluation

Course Introduction: <https://www.youtube.com/watch?v=5h6Ue-gvE2I>

Dan Shaw's Webinar (6/14/16): <https://www.youtube.com/watch?v=GRPoC8hHwQM>

### Maintenance is important!

What's the significance of BMP maintenance?

Improved water quality, of course!

You will invest significant time (and money!) in a raingarden and/or other best management practices as part of your capstone project.



It's important that you know how to maintain BMPs—including rain gardens, rain barrels, dry creek beds, permeable pavers, cisterns, dry wells, holding ponds, and terraces—once they are established. This knowledge will also inform the maintenance of your own project and help you advise others as part of your Master Water Steward efforts.

### The Right Tools

Having the right tool for the right job makes BMP maintenance easier—and more enjoyable.

The “must haves” for every gardener? A pruning saw, Felco pruner and hoary-hoary knife.



Other essentials include some of the tools you used to install your rain garden or other BMP: shovels, spades, small cultivators and other weeding tools, pruning and deadheading tools, and assorted specialty tools.

Remember that you don't need to purchase everything—especially expensive items that you might rarely use. Seldom-used tools can be rented or borrowed.

## **Raingarden Maintenance**

Basic activities for maintaining your rain garden include:

- Inspections
- Soil tests & amendments
- Watering
- Weeding
- Plant control

Long-term maintenance involves dealing with:

- Pest problems (such as rabbits and rodents)
- Diseases & viruses (such as powdery mildew and leaf spot)
- Insects and insect damage (a good thing!—indicates biodiversity)

### **Inspections**

You will want to inspect a raingarden:

- Prior to the growing season
- At the end of growing season
- After large storm events

You will look for:

- Weeds and invasive species
- Plant health
- Sediment
- Land movement due to water

Be sure to use your Master Water Steward Raingarden Maintenance Guide to help you.

## Soil tests and amendments

Soil tests are best performed before the design and installation of a garden. Generally, if the community of plants remains healthy with proper maintenance, the need for future soil tests is unnecessary.

Amendments such as compost, fertilizers and microbes can improve soil texture and overall health. The type of amendment and timing of application will vary dependent upon the identified needs and desired outcomes for a healthy soil. If you discover a need to amend the soil, wait for a time when rain is not expected, so that you can minimize compaction when installing the amendment.

## Seasonal Raingarden Maintenance Guidelines

### Spring

- **Inspect Flows and moving parts**
  - Prior to the growing season, check for plugged drains
  - Make sure downspouts are directed to the right place
  - Dig out any silt buildup from spring melts
  - Inspect the berm for erosion or weak points
  - Inspect any overflows/popups, etc, for winter damage
- **Remove the duff layer**
  - Last year's growth insulates during winter
  - Removal of duff layer stimulates new season growth
  - Compost old material after removal
- **Weeding**
  - After duff removal, some new weeds will shoot up
  - Inspect for new weeds and remove
  - Cool-season weeds set seed by Memorial Day (dandelion, creeping charlie, lambs quarters, horseweed)
  - Avoid using herbicides
  - Keeping up on weeding the first and second year will benefit the garden for years down the road



- **Mulch**

- Primary defense against weeds
- Keeps soil moist during drought periods
- Degrades over time
- Maintain 3" layer of double-shredded hardwood mulch



- A possible alternative to mulch:

Living mulches or connector plants consist of select groundcovers planted in and around other plants, and over time, they establish a symbiotic relationship with one another to suppress weeds, regulate temperatures, control erosion and add nutrient value to soils. Such plants may include annuals such as legumes, clovers, fescues, ryes or may be more perennial, such as thyme, native geranium or sedums.



As living plants, maintenance will require ensuring they are not outcompeting desirable species and/or are not being lost to competition from undesirable diseases, pests, or other plants. The beauty of some living mulches or connector plants is that they do not typically need regular replenishment like wood mulches, and they add texture, structure and color to the garden, which may even be attractive to pollinators.

## Summer

- **Inspect flows and drainage**

- After large rain events, ensure it drains in 24-36 hours
- Inspect for erosion at inlets and outlets
- If eroding, replace existing plants with clump-formers
- ...Still eroding? Consider cobbles at erosion sources
- Always look for opportunity to 'slow the flow'



- **Weeding**

- Weeding is most beneficial early on (especially in yrs 1-2)
- Remove weeds and volunteer trees as necessary, especially warm-season weeds which flower or set seed near July 4



- Warm Season weeds (foxtail, thistle, crabgrass)
- Volunteer trees (boxelder, cottonwood, buckthorn, ash, elm, hackberry, mulberry)
- **Water**
  - Watering during garden establishment is 'approved'
  - Watering 'just to water' in year 3 is 'disapproved'
  - Water plants at their roots, not from above, to save water
  - Always check soil before watering to see if it's necessary
  - If a drought persists and plants are clearly stressed or dying, give them a little drink (unless water restrictions)
- **Take Pictures**
  - Take pictures when your garden is at its peak
  - Send them to Metro Blooms, maybe you'll be famous!



## Fall

- **Inspect drainage and garden performance**
  - Remove leaves/debris in flow paths as needed
  - Watch for silt buildup over the summer, remove as needed
  - Is your garden performing as intended?
  - Fall is a great time to reevaluate underperforming species and plant new ones
  - Are plants behaving like its too wet/too dry? Too sunny or shady?
- **Cleanup**
  - Remove excess leaves, 2" is fine, 6" is not
  - Trim/prune any shrubs or trees in late fall
  - Most duties are performed year-round



- **Deadhead**

- Usually deadheading is unnecessary, unless to prolong a summer bloom
- Only deadhead when plants looked diseased/mildewy
- Most natives provide cover and forage for wintering birds and small mammals
- Additionally, many natives provide visual interest during the winter (think red dogwood and ornamental grasses)



- **Division**

- Divide overgrown perennials (usually after year 3 or 4)
- Use divided stock for new gardens
- Plant a neighbor's new raingarden with divided stock from the surrounding neighborhood of gardens
- Donate divisions to Blooms Day Plant Sale (mid-May)



- **Mulch**

- Maintain 3" depth of double-shredded hardwood mulch (unless already done in spring)
- Don't use cypress mulch or peat amendments
- This is really a step that can be applied 'as needed'

## Winter

- **Snow removal and strategic placement**

- Don't plow driveways/shovel sidewalks into raingardens
- Raingardens rely on uncompacted soil to drain properly
- Find new places for snow piles
- Don't salt too heavily; many natives are salt tolerant to a degree but are not immune to salt accumulation



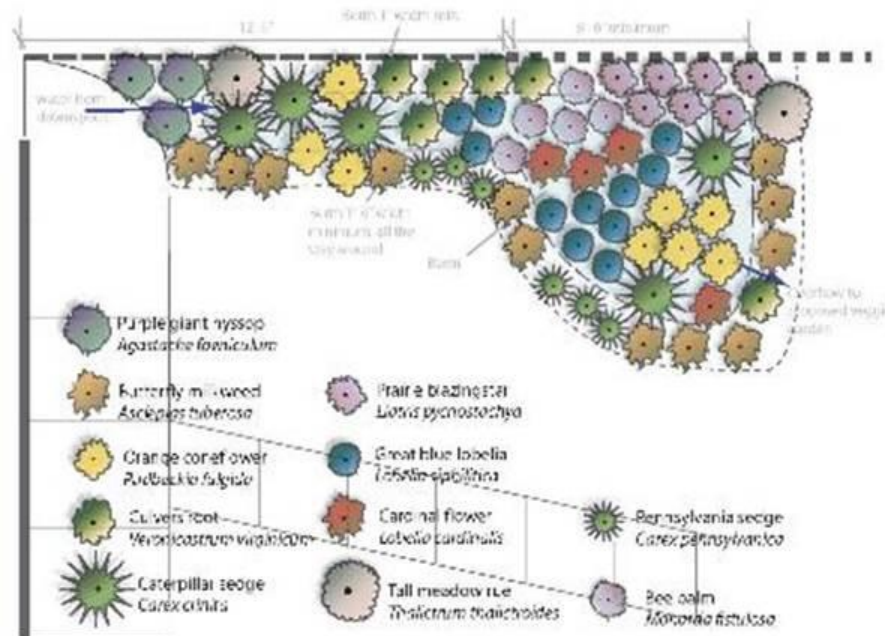
- **Bird watching**

- Not deadheading retains food-stock for birds, etc.
- Enjoy the form and subtle colors of your winter garden
- Juncos, Chickadees, Finches, etc



- **Next year's plans**

- Start planning for additions/alterations next year
- Winter is a great time to draw up new plans
- Spread the word! Help a neighbor plan a raingarden



## **Organic Weed Control Recipes**

Mechanical control of weeds is accomplished by pulling, cultivating or digging and is the preferred method of weeding. Chemical control or use of pesticides is not necessary or recommended. If you feel the need to use chemicals, here are some organic recipes.

### **Borax Weed Killer Recipe**

Dissolve 10 ounces of borax in 4 ounces of warm water. Once the borax is well dissolved, add 2 1/2 gallons of water and mix thoroughly. Because Borax is in a powdered form, you must first dissolve it.

Borax is inexpensive and readily available at grocery stores. Unused Borax can be stored in a cool, dry location for several months. However, Borax weed killer should be used immediately after you create it.

This mixture treats an area measuring about 1,000 square feet, but the quantity can be reduced or increased to fit your needs. For uniform application, pour the homemade weed killer into a garden sprayer and evenly apply the mixture to the unwanted plants.

Apply Borax weed killer in spring, when weeds are actively growing, once a year for no more than two years in a row. Borax-based weed killer is nonselective, meaning it will kill any vegetation it comes in contact with, including desirable plants and turfgrass. To reduce the chance of unintended damage to desirable vegetation, apply homemade weed killer on a day when the wind isn't blowing. This limits the possibility of the wind carrying the spray to other plants as you apply it to the weeds.

### **Vinegar-based Weed Killer Recipe**

- 4 cups apple cider vinegar or white vinegar
- 1 tsp. dish soap (helps mixture stick to plants)
- a pinch of salt (dehydrating)

Add a pinch of salt to an empty spray bottle. Add soap, then vinegar. Don't shake (BUBBLES!)

### **Application**

Use a pump sprayer to apply vinegar to weeds. Rinse the sprayer after use, to keep metal parts from corroding. Works best if sprayed on warm, sunny days (at least 78 degrees).



## Rain Barrel Maintenance

Regularly inspect rain barrels to remove debris at access points. Check overflow valves and other connections for functionality. Also clean your roof/gutters at least once a year to reduce debris entering your rain barrel(s).

Do not allow water to sit for more than 5-7 days and become stagnant. Use a screen to cover the input area to prevent mosquitoes from accessing the barrel and laying eggs.



Rain barrels placed in direct sunlight may grow algae, and if they do, empty and clean with vinegar.

Empty the rain barrel before winter and turn it upside down or store it.

## Dry Creek Bed Maintenance



Plant along the banks of the creek bed to control sediment and to filter debris before it enters the dry creek.

Perform regular inspections for debris that could prevent steady drainage.

Remove weeds regularly.

Replace stones that have shifted, exposing the subsurface of the dry creek bed, particularly after big rains.

## **French Drain Maintenance**

A French drain can also be called a weeping tile, blind drain, rubble drain, rock drain, drain tile, perimeter drain, land drain, French ditch, sub-surface drain, sub-soil drain or agricultural drain. The trench is filled with gravel or rock or contains a perforated pipe that redirects surface water and groundwater away from an area.



Deep drains generally should not need maintenance unless they get root clogged.

Shallow drainage pipes (a foot or two below the ground surface) can be cleared and flushed clean with a strong hose or power sprayer.

## **Permeable Paver Maintenance**

Regularly inspect pavers and test for infiltration.

Sweep and vacuum the pavers as needed to remove trash and weeds. Mechanical weed removal, without chemicals, is effective and does not impact water or wildlife quality.

Also remove areas of clogged aggregates and replace. Stains (oils) do not impact permeable pavers functionality, but can be removed with stain removers.



## Cistern Maintenance



Cisterns are tanks for storing water.

Cistern inlets/catch-basins need to be kept clear of debris and ice, whether above ground tanks or in-ground systems. Unless you have a heated system, the cistern should be drained in the winter to prevent damage from ice expansion.

Also regularly clear debris around vaults, which house mechanicals for in-ground systems.

## Catch basin, drain tile, and pop-up maintenance



This often ineffective addition to a downspout can be reworked to actually move water away from a building.





A catch-basin with grate (generally no smaller than 12 in x 12 in) should be set in level beneath a downspout. Water is then directed through drain tile underground.



On the left is a drain-tile installation ending in a raingarden. The outlet end will have a screened attachment or a pop-up (pictured on the right) to prevent mulch or animals from entering.

### **Maintenance:**

Periodically check both the inlets and the outlets for ice and debris and remove. The inlet cover shown here should be lifted at least twice a year to remove accumulated debris in the bottom of the housing before it enters and clogs the drain tile. In spring and fall, they should also be inspected for cracks and other damage and mended or replaced as necessary. The inlet (catch basin & grate) should be level side-to-side and tipped slightly toward the drain tile. If this is not true, adjust. The outlet (pop-up) should be checked to ensure its mechanical function. Note: If these are not maintained, they will soon become as ineffective as the first solution pictured.



## Dry Well Maintenance

A dry well is an in ground shaft or chamber to provide added drainage.



Routinely (weekly) check the inlet for debris or accumulated sediment that may block water flow. Remove accumulated debris and litter, especially around inlet and outlet areas.

Plant the area around the dry well, because plants act as natural filters and control erosion.

Use rock mulch around the inlets of dry wells, because rocks (3-6" size) do not easily move and disrupt water flow.

## Holding Pond Maintenance

Develop an annual maintenance plan and checklist for these large BMPs.



Routinely check holding ponds, particularly at inlets and outlets for:

- accumulated debris and litter
- broken inlets and outfalls
- eroding banks or failed erosion control
- invasive plant species (Wild parsnip, Lythrum, etc.)
- undesirable or destructive wildlife (carp, muskrats, etc.)

Regularly clean inlets, outlets and banks removing debris, litter, and invasive species. Install additional native species if areas have been compromised.



## **Terraces and Retaining Wall Maintenance**

Plant natives on a terraced area to reduce overland water flow and erosion.



Check retaining walls for any shifts in the materials and repair as needed.

Replace walls if disintegrated near the base of the structure either due to salt spray, or other environmental factors, thereby compromising integrity.

Seal mortared walls in cold climates to prevent freeze/thaw effects.

## **Calculator Instructional Videos**

Rusty's Raingarden calculator Part 1: [https://www.youtube.com/watch?v=O\\_4Oojalelc](https://www.youtube.com/watch?v=O_4Oojalelc)

Rusty's Raingarden calculator Part 2:  
<https://www.youtube.com/watch?v=AkKPsI13fi8&feature=youtu.be>

MIDS Calculator Demonstration: <https://www.youtube.com/watch?v=aExx7ZXuql>

## **Calculator Downloads**

Rusty's Raingarden Calculator: <http://masterwaterstewards.org/wp-content/uploads/2014/05/RG-Calculator.xls>

MIDS Calculator: <ftp://files.pca.state.mn.us/pub/MIDS> (Click on MIDSCalculatorGUIInstaller)

WCD BMP Pollutant Removal Calculator: [http://masterwaterstewards.org/wp-content/uploads/2014/05/WCD\\_BMP\\_Pollutant\\_Removal.xls](http://masterwaterstewards.org/wp-content/uploads/2014/05/WCD_BMP_Pollutant_Removal.xls)