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DEPARTMENT OF ENERGY & ENVIRONMENT

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RiverTools **Field Manual**

A Caretaker's Guide
for Inspection
and Mainentance

ACKNOWLEDGEMENTS

RiverTools Kit is available on the Department of Energy and Environment's RiverSmart Schools webpage.

doee.dc.gov/riversmart

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TABLE OF CONTENTS

INTRODUCTION

WHAT IS THE RIVERTOOLS FIELD MANUAL?

The RiverTools Field Manual is a guide to the routine inspection and maintenance of RiverSmart Schools' installed green infrastructure (BMP) facilities and landscaping. It is intended to be used in conjunction with the five (5) RiverTools narrated PowerPoint modules and the associated checklists. The caretaker should watch the following modules prior to using the Field Manual.

1. Watershed Science
2. Conservation Landscaping
3. Rain Gardens and Bioretention Cells*
4. Permeable Pavement
5. Rainwater Harvesting

* For the purposes of this document Rain Garden will refer to both Rain Gardens and Bioretention Cells.

WHO SHOULD USE THE RIVERTOOLS FIELD MANUAL?

The RiverTools Field Manual is intended to give RiverSmart Schools' garden caretakers maintenance guidelines for stormwater BMPs and conservation landscaping. Caretakers might be Office of State Superintendent of Education (OSSE) Garden Coordinators, school facilities staff, Parent Teacher Organization (PTO) members, and other stakeholders. These guidelines are developed to support DOEE and OSSE objectives.

HOW TO USE THE RIVERTOOLS FIELD MANUAL?

The Field Manual provides a streamlined approach for routine inspection and maintenance of the BMP facilities and their associated plantings. Maintenance calendars and on-site checklists will assist in scheduling and performing maintenance activities to ensure the ecological, functional, and aesthetic viability of these installations over time.

Not all sites have all the BMP facilities covered in this manual. It is up to the caretakers to determine which facilities are present on the site and which portions of this Field Manual are relevant.

The Field Manual covers the following topics:

- Before You Go
- Tools Needed
- Checklists
- Maintenance Calendars
- Maintenance Guidance
- Trash and Debris
- Erosion & Sediments
- Vegetation & Plant Care

PREPARATION

BEFORE YOU GO

Be Prepared!

A little preparation prior to a site visit will ensure you have the information and tools needed to make the most of your time needed to properly maintain the facility.

Review the RiverSmart School Operations and Maintenance Manual, the as-built plans, and plant lists provided to the school by the consultant.

Make sure you note which green infrastructure facilities you will be inspecting and where they are located. Contact the school's front desk or office to get permission to be on the school grounds prior to your inspection date.

WHAT TO BRING

Always use the appropriate safety equipment when maintaining BMPs.

Necessary Tools:

Rake
Broom
Trowel
Paper Trash bags for compost
Plastic trash bags for solid trash and invasive plants

Optional Tools:

Tape Measure
Flashlight
Crow bar
Soil Probe
Shovel (Flat & Round)
Plumber's Wrench
Grabber
Plastic 5 Gallon Bucket

Safety Equipment:

Eye Protection
Gloves
Safety Vest
First Aid Kit
Steel toe Boots

WHAT TO BRING:

RiverTools Field Manual

RiverTools Checklists

As-Built Plans

Tools & Safety Equipment

INSPECTION & MAINTENANCE

HOW TO INSPECT

All Rain Gardens, other BMP facilities, and conservation landscaping sites need to be inspected and maintained seasonally to ensure they are functioning well and to determine what maintenance is needed. Consult the maintenance calendars included in this manual for the best times to target your inspections.

Document

Document all inspections first by filling out the checklist. Fill out one checklist for each stormwater BMP at the school.

Take Photos

Inspection documents should include photographs of the project site before and after completing maintenance activities.

EXAMPLE OF A CHECKLIST

RiverTools Checklist for Inspection of Bioretention Cells or Rain Gardens									
Location					Caretaker				
Current Conditions									
Rain	None	Drizzle	Steady	Downpour	Time			AM	PM
Temperature	Above Freezing		Y	N	Date				
Recent Events: General Characteristics									
Prior 3 Days	Dry	Damp	Wet		Prior 3 Weeks	Dry	Damp	Wet	
Last Known Rain Event									
Date			Intensity		Light	Moderate	Heavy		

Log the Tasks below as S for Satisfactory or U for Unsatisfactory by checking the appropriate column. Mark an X by all completed Corrective Actions. Record details on following page.

Watching Tasks	S	U	X	Corrective Action
1. Initial inspection after planting. Check within one month from installation.				
Plants are stable and roots are not exposed				Replant
Surface design level and ponding depth are correct				Contact Facilities Manager
Overflow bypass and inlet are functional				Contact Facilities Manager
2. Debris Clean Up (2 times/year minimum)				
Litter, leaves and dead vegetation removed				Remove debris
Prune perennial vegetation (late winter)				Prune
3. Standing Water (1 time/year, after large rain event)				
No evidence of standing water after 72 hours				Remove debris from inlet
Verify underdrain is working by checking observation well				Contact Facilities Manager
4. Erosion & Blowouts (1 time/year, after large rain event)				
No evidence of erosion channels in or out of BMP				Contact Facilities Manager
No evidence of sediment build up in or out of BMP				Contact Facilities Manager
5. Overflow Bypass / Inlet Inspection (1 time/year, after large rain event)				
No evidence of blockage or accumulated leaves				Remove leaves or blockage
Good condition, no need for repair				Repair
6. Drought Conditions (As needed)				
Dead or dying plants, wilted leaves				Photo:
Watering plants as needed				Water
7. Vegetation Coverage (1 time/year)				
No evidence of weeds > than 15%				Remove weeds
50% coverage established throughout by first year				Weed and/or replant
75% coverage or > by year 2				Replant
8. Mulch Depth (if applicable 1 time/2 years)				
Mulch at original design depth (2-3”)				Mulch
9. Vegetation Health (1 time/2 years)				
Plants are thriving				
Dead or decaying plants removed from BMP				Remove dead plants
Prune broken, diseased, or crossing branches from trees				Prune

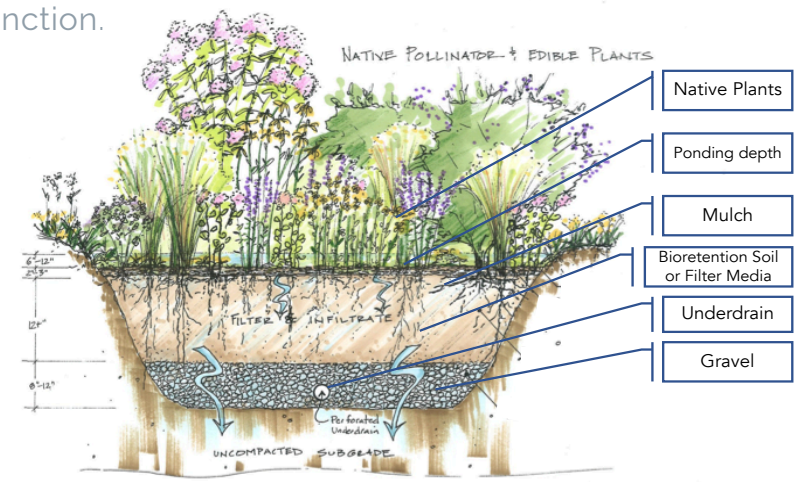
RAIN GARDENS

Routine rain garden maintenance is easy. You need to take care of the plants and inspect the rain garden structures. Most important, is frequent observation. Visit the rain garden a few days after both small and large rain events. If water ponds more than three (3) days, an immediate maintenance intervention may be needed.

COMMON RAIN GARDEN STRUCTURES

Most BMPs have structures like these pictured to the right that are required for proper functioning. They can become damaged, clogged or fail. Regular inspections and maintenance when needed will help extend their life and keep it functional.

In a rain garden, the plants look beautiful above ground, but it is what is happening below ground that matters. What you don't see is critical in order for the rain garden to function.



A mulch layer visible at the surface acts as a stormwater filter and helps the plants retain moisture around their roots. The soil below is a specially designed Bioretention Soil that finely filters stormwater as it infiltates. Beneath the soil layer, an underdrain and gravel layer store and convey excess water to the storm sewer system.

Overflow Device

Clean Out or Observation Well

Pretreatment Bay

Inlet Pipe

MAINTENANCE OF RAIN GARDEN STRUCTURES

Maintenance Basics

- Inlet pipes & overflow devices:
  Remove any leaves, trash, or debris blocking the devices.
- Pre-treatment bays:
  Shovel out sediment and remove from rain garden.
- Observation well or cleanout:
  Check observation wells during an inspection.

How to Check an Observation Well

1. Locate the observation well(s).
2. Open the observation well(s) using a plumber's wrench.
3. Look inside using a flashlight.
4. Pour water into wells to verify that the underdrains are functioning and are not clogged. If they are clogged the water will stand in the pipe. Contact the facilities manager if there is standing water in an observation well.
5. If the underdrain does not have water and the rain garden is dry 72 hours after a rain event the system is working.

STANDING WATER

Water that has not infiltrated into the gound 72 hours after a rain event is a sign that something is not working right.

Check to see if the underdrains are working by opening the observation well. Standing water in the observation well may indicate the underdrain is clogged.

Contact the facilities manager to clean out the underdrains.

PROBLEM

Standing water after 72 hours..

SOLUTION

Inspect the observation well to verify no standing water.

WHAT IF THERE IS STANDING WATER BUT THE OBSERVATION WELL IS CLEAR?

If the observation well is not holding water and the surface water is still standing after 72 hours, this means there is a clogged soil or gravel layer.

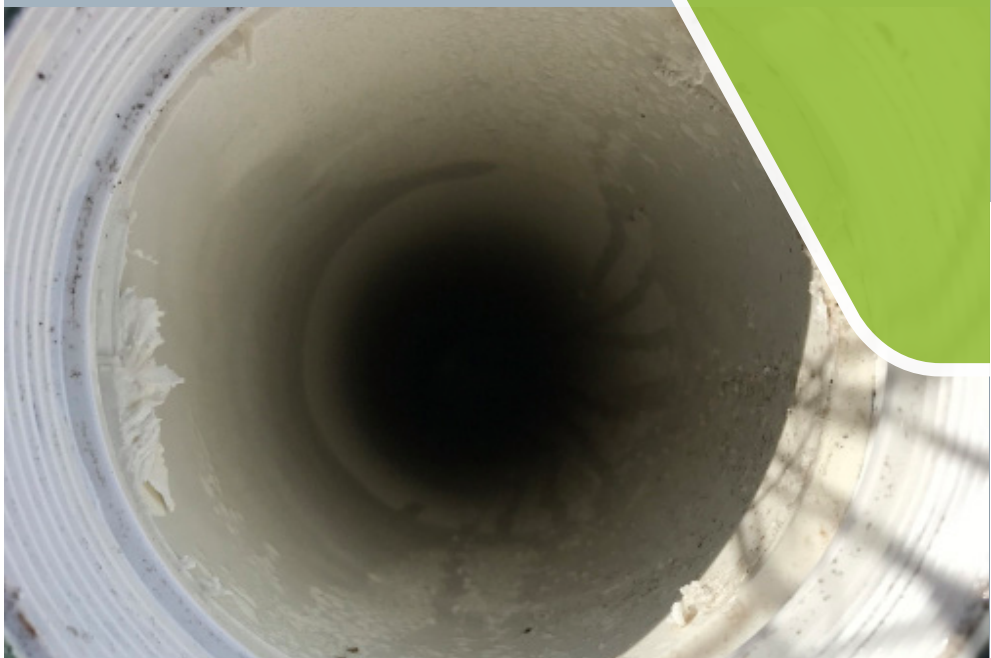
Check to see if sediment or fine particles have built up above the mulch or soil layer. If this is the case, remove the sediment and hand till the top 4-6" of soil to allow water to infiltrate into the soil. If there is no sediment build up or the removal of the sediment does not resolve the drainage issue contact the facilities manager to resolve the clogged soil layer.

PROBLEM

Standing water 72 after rain event and there is no water in the underdrains, then there is a clogged soil layer.

SOLUTION

Ovservation well is clear of water. Contact DOEE.



DEBRIS

Trash and other debris can add pollutants and clog up a rain garden making it non-functional. Remove all debris from the BMP.

Be safe and use a rake, flat shovel, grabbers, and puncture resistant gloves. Dispose of trash appropriately.

- Throw trash in solid waste bin.
- Recycle items like water bottles and other recyclables.
- Place invasive plants in plastic trash bags and throw away.
- Place pet waste in plastic bags and throw away.
- Compost leaves and other plant debris.

PROBLEM

SOLUTION

LEAVES

Leaves can block water from entering a rain garden and fill up the pond space. Be sure to remove leaves from the pre-treatment bay, inlets, and overflow devices (as seen on pg. 11), especially in the fall.

PROBLEM

Leaves can build up in pretreatment bay or inlet

SOLUTION

Clean out the leaves and compost

EROSION

Erosion often occurs in BMPs when the vegetation is insufficient to hold the soil or if the structures in the facility are not functioning properly. Common fixes for erosion include adding additional plants or repairing energy dissipaters and check dams.

PROBLEM

SOLUTION

SEDIMENT

Sediment buildup can prevent runoff from entering a BMP or increase the amount of time it takes for the water to soak into the soil.

Regularly removing sediment by shoveling off the concrete forebay, inlet, or the top of the mulch or engineering soil will allow water to flow through the facility properly. It will also keep sediment out of the stormsewer system and ultimately the local waterway.

Remove sediment during your quarterly inspections and maintenance visits, but definitely when it accumulates up to 2-3" deep.

PROBLEM

SOLUTION

CONSERVATION LANDSCAPING

What is the difference between plantings in Rain Gardens and Conservation Landscapes?

Plantings in a rain garden must be able to tolerate both high levels of water and droughty conditions.

Conservation landscaping plants (if they are not planted in a bioretention cell) will have more stable moisture conditions, so a more diverse selection of plants may be used.

Weeding, watering, and mulching are common to both rain gardens and conservation landscapes. See typical rain garden plants in Appendix D.

VEGETATION

The following recommendations are true for rain gardens and conservation landscaping.

Vegetation Watering

Wilted leaves are a good indicator that plants need watering. Dead and brown leaves indicate extreme lack of watering.

Water weekly during drought prone months like July and August.

WEEDS

Remove weeds from rain gardens and conservation landscaping beds. See typical weeds in Appendix C.

1. Remove weeds by hand. Pull from the base and be sure to remove the roots, too. Sometimes they need to be dug out.
2. Try to weed before plants begin producing seeds from old blooms.
3. Weeding when the soil is moist makes it easier.
4. Remove all weeds and dispose of them in plastic trash bags and put in solid waste containers.
5. Replant newly exposed soil areas where you have removed the weeds with plants that are growing well in the garden
6. Contact a certified Licensed Pesticide Applicator if an herbicide is needed.

PLANT COVERAGE

Rain gardens and conservation landscaping beds absorb and filter more stormwater and need less maintenance if they are densely planted. Once the plants have grown in, there should be between 75% -90% plant coverage. Bare soil is the perfect place for weeds to get established. High plant coverage means there is less need for mulch, watering, and on-going maintenance.

Rain Garden after 3 months after planting. 40-50% bare soil.

Rain Garden after 1 year of planting, 90% plant coverage.

PLANT REPLACEMENT

Before replacing plants

- Determine why the plants did not do well. Make sure to fix chronic problems so that the new plants will survive.
- Review the original planting plans and plant schedules.
- Determine which plants are doing well and which plants are not thriving.
- Choose plants that are doing well but are not too aggressive to replant.
- Make notes of replacement plants and document new plantings.
- Generally speaking, good plant spacing is 12-15" between the center of each plant.
- Plan on mulching around new plants right after they have been planted. While mulching is a regular maintenance step in early spring and fall to help supress seasonal weed growth, it is also an important step of plant replacement. Mulching will help delicate new plants retain soil moisture as their roots get established.

Rain Garden

Conservation Landscaping

PRUNING AND MAINTENANCE

Pruning trees, shrubs, grasses, and perennials is part of the on-going care of plants. Prune grasses and perennials in late winter or early spring in order to preserve their wildlife habitat value through the winter. Prune shrubs and trees as needed to maintain shape, size, sight lines, and remove broken or diseased branches.

Prune grasses back to 2-6"

Cut back perennials to 2-4" from the ground

Prune to lateral buds or branches

MONTHLY MAINTENANCE SCHEDULE

Bioretention cells and rain gardens need "on-going" care to get established and stay functional. Below is a monthly calendar.

Month	Water (as needed)	Weed (hand weed)	Watch	Clean Up & Mulch	Pruning & Maintenance
Nov-Feb					
March					Cut perennials and grasses back to 6"
April					
May					Remove dead plants and replace plants
June					
July					
August					
September					
October					

Legend

Water

Weed, mulch, plant, clean up

Watch

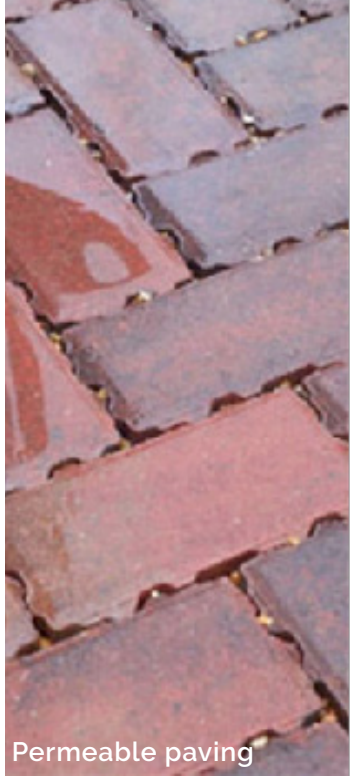
QUARTERLY MAINTENANCE SCHEDULE

Maintenance or Problem	Inspection	Where	Task (as needed)	Frequency
Maintenance & Ponding in front of Rain Garden		Pre-Treatment or Forebay	Remove sediment & trash	Quarterly
Ponding in Rain Garden longer than 72 hrs		Observation Wells	Open and observe if standing water is in observation well	Annually
Ponding in Rain Garden longer than 72 hrs		Clean Outs	If underdrain is clogged, jet stream out via clean outs	As Needed
Ponding in Rain Garden longer than 72 hrs		Overflow Devices/ Drain inlets	If trash or sediment is blocking the overflows, clean it out	Quarterly
In-flow or Outflow Stability		Inflow – Outflow Areas	Check for erosion, stabilize based upon situation	Quarterly
Slope Stability		Sides of Rain Gardens	Check for erosion, plant heavily or armor with riprap	Annually

Legend

Weed, mulch, plant, clean up

Watch


Permeable paving


Impervious

PERMEABLE PAVING

Pervious, permeable, or porous paving are all terms used for a green infrastructure practice that allows water to infiltrate down through the spaces between the paving or concrete pavers into a stone reservoir below. The spaces in the paving must be kept clean of dirt, sediment, and other fine debris to prevent clogging.

PERMEABLE PAVING MAINTENANCE

Permeable pavements are susceptible to failure due to sediments, weeds, and leaf litter. Sediments can flow onto permeable pavements and clog the openings that allow the rainwater to infiltrate into the paving. Additionally, soil, seeds, and mosses can build up in the cracks. Leaves will break down into smaller pieces and clog up the joints, too. Frequently remove built up sediment, weeds, and leaf litter in order to prevent blockage. If the system relies on the stone filled spaces between blocks or grids then use caution with equipment that might dislodge the stone. Check these spaces annually and refill with stone as needed.

Precaution

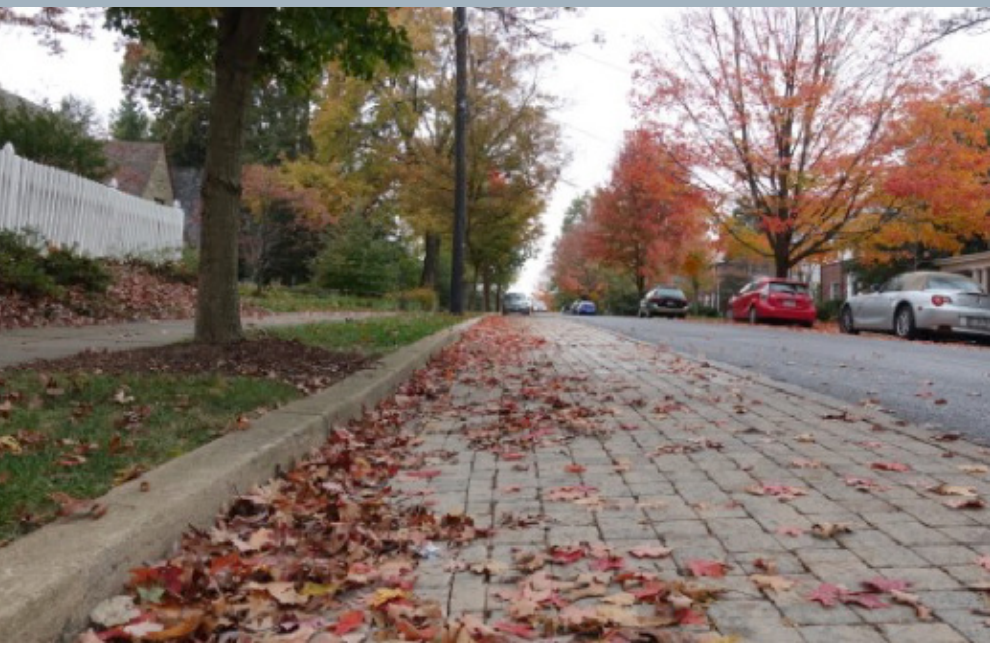
When gardening or working around permeable paving, be sure to protect the paving with a tarp. Once the dirt or stone dust gets into the cracks or spaces, the clogged surface permeability will be reduced. Cleaning may not adequately recondition and restore its performance. In that case, the BMP may require resurfacing or replacement.

Permeable paving maintenance

- Sweep or blow sediments to avoid build up which will clog the system.
- Remove leaves so they do not block water from infiltrating.
- Hand weed when seedlings appear.
- Contact the facilities manager when weed coverage is extreme.
- Contact the facilities manager when the permeable paving is no longer infiltrating water.

PROBLEM

Leaves on permeable paving.



PROBLEM

Weeds grow in between pavers.

SOLUTION

Sweep leaves off the paving.

SOLUTION

Remove weeds without disturbing the pavers.

PERMEABLE PAVING MAINTENANCE SCHEDULE

Maintenance or Problem	Inspection	Task (as needed)	Frequency
Sediment buildup		Sweep shovel or blow	Quarterly, or for an accumulation of 2" or more
Leaf debris buildup		Sweep or shovel	Fall and quarterly
Weed growth in joints		Handweed or use weed burning torch for excessive growth	Twice per year
Ponding on surface		Contact facility manager	48 hrs after major storm event
Missing stone in joints		Contact facility manager to refill or replace	Annually

Legend

Weed, Sweep Clean up

Watch

PERMEABLE PAVING MAINTENANCE CALENDAR

Month	Sweep	Weed	Watch	Vacuum or Power Wash
Nov-Feb				
March				
April				As Needed
May				
June				
July				
August				
September				
October				As Needed

Legend

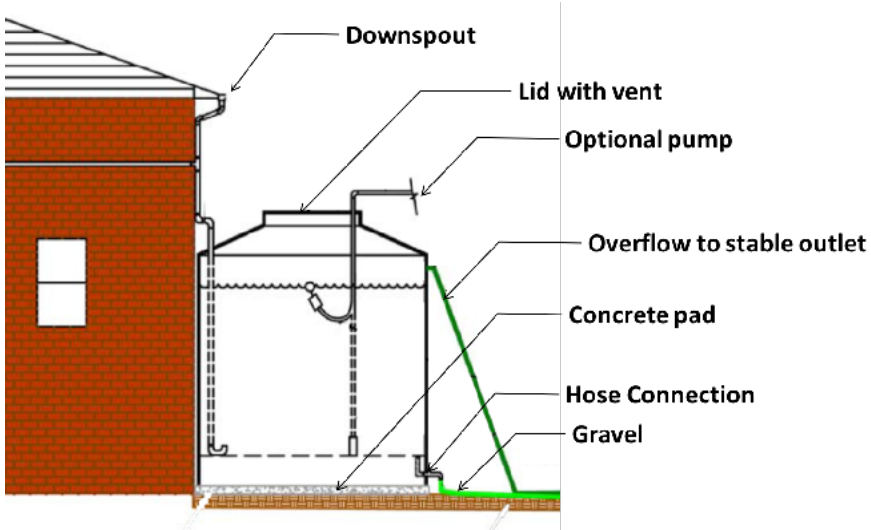
Weed,

Sweep

Watch

RAINWATER HARVESTING

Rainwater harvesting refers to the collection of rainwater from downspouts into containers for reuse. The contaniers that store the rainwater are called cisterns. Cisterns above ground and below ground need at least annual maintenance and need to be monitored before every rain event in order to function properly. This is so the cistern has room to store more rainwater. Otherwise new rain water will overflow into the storm sewer system. Rain barrels are small cisterns and need more frequent attention.



CISTERN MAINTENANCE

1. Before rain events drain your cistern, so that the cistern has space to store additional rain.
2. Before freezing weather drain your cistern completely and divert water from going into the cistern during the winter months.
3. Check to make sure there are no leaks at the inlets, joints, or spigot.
4. Annually drain the cistern completely and flush out sediments that may have collected in the bottom of the cistern.
5. Clean out leaves from inlets, filters, or other intakes.
6. Make sure the overflow device is functioning by filling the cistern completely to check it.

CISTERN MAINTENANCE CALENDAR

Month	Water Levels	Drain	Clean
Nov-Feb			
March			
April			
May			
June			
July			
August			
September			
October			

Legend

Watch

Drain

Clean

APPENDICES

APPENDIX A: INSPECTION & MAINTENANCE CHECKLIST

Bioretention Cells/Rain Gardens

RiverTools Checklist for Inspection of Bioretention Cells or Rain Gardens									
Location					Caretaker				
Current Conditions									
Rain	None	Drizzle	Steady	Downpour	Time			AM	PM
Temperature	Above Freezing		Y	N	Date				
Recent Events: General Characteristics									
Prior 3 Days	Dry	Damp	Wet		Prior 3 Weeks	Dry	Damp	Wet	
Last Known Rain Event									
Date			Intensity		Light	Moderate		Heavy	
Log the Tasks below as S for Satisfactory or U for Unsatisfactory by checking the appropriate column. Mark an X by all completed Corrective Actions. Record details on following page.									

Watching Tasks	S	U	X	Corrective Action
1. Initial inspection after planting. Check within one month from installation.				
Plants are stable and roots are not exposed				Replant
Surface design level and ponding depth are correct				Contact Facilities Manager
Overflow bypass and inlet are functional				Contact Facilities Manager
2. Debris Clean Up (2 times/year minimum)				
Litter, leaves and dead vegetation removed				Remove debris
Prune perennial vegetation (late winter)				Prune
3. Standing Water (1 time/year, after large rain event)				
No evidence of standing water after 72 hours				Remove debris from inlet
Verify underdrain is working by checking observation well				Contact Facilities Manager
4. Erosion & Blowouts (1 time/year, after large rain event)				
No evidence of erosion channels in or out of BMP				Contact Facilities Manager
No evidence of sediment build up in or out of BMP				Contact Facilities Manager
5. Overflow Bypass / Inlet Inspection (1 time/year, after large rain event)				
No evidence of blockage or accumulated leaves				Remove leaves or blockage
Good condition, no need for repair				Repair
6. Drought Conditions (As needed)				
Dead or dying plants, wilted leaves				Photo:
Watering plants as needed				Water
7. Vegetation Coverage (1 time/year)				
No evidence of weeds > than 15%				Remove weeds
50% coverage established throughout by first year				Weed and/or replant
75% coverage or > by year 2				Replant
8. Mulch Depth (if applicable 1 time/2 years)				
Mulch at original design depth (2-3”)				Mulch
9. Vegetation Health (1 time/2 years)				
Plants are thriving				
Dead or decaying plants removed from BMP				Remove dead plants
Prune broken, diseased, or crossing branches from trees				Prune

Conservation Landscaping/Native Plant Gardens

RiverTools Checklist for Inspection of Conservation Landscaping/Native Plants								
Location					Caretaker			
Current Conditions								
Rain	None	Drizzle	Steady	Downpour	Time		AM	PM
Temperature	Above Freezing		Y	N	Date			
Recent Events: General Characteristics								
Prior 3 Days	Dry	Damp	Wet		Prior 3 Weeks	Dry	Damp	Wet
Last Known Rain Event								
Date			Intensity		Light	Moderate	Heavy	

Log the Tasks below as S for Satisfactory or U for Unsatisfactory by checking the appropriate column. Mark an X by all completed Corrective Actions. Record details on following page.

Watching Tasks	S	U	X	Corrective Action
1. Initial inspection after planting Check within one month from installation.				
Plants are stable and roots are not exposed				Replant
2. Debris Clean Up (2 times/year minimum)				
Litter, leaves and dead vegetation removed				Remove debris
Prune perennial vegetation (late winter)				Prune
3. Drought Conditions (As needed)				
Dead or dying plants, wilted leaves				Photo
Watering plants as needed				Water
4. Vegetation Coverage (1 time/year)				
No evidence of weeds > than 15%				Remove weeds
50% coverage established throughout by first year				Weed and/or replant
75% coverage or > by year 2				Replant
5. Mulch Depth (if applicable 1 time/2 years				
Mulch at original design depth (2-3”)				Mulch
Once plants or ground cover is established, do not mulch in that area				
6. Vegetation Health (1 time/2 years)				
Plants are thriving				
Dead or decaying plants removed from BMP				Remove dead plants
Prune broken, diseased or crossing branches from trees				Prune
7. Pest Damage (1 time/year)				
Is there pest damage on leaves, twigs, branches?				Apply IPM
Is there evidence of animal burrows or nuisance nesting?				Contact school facilities
8. Wildlife Habitat				
Evidence of eggs, chrysalis, beneficial insects, nests.				Protect

Permeable Paving

RiverTools Checklist for Inspection of Permeable Pavements									
Location					Caretaker				
Current Conditions									
Rain	None	Drizzle	Steady	Downpour	Time			AM	PM
Temperature	Above Freezing		Y	N	Date				
Recent Events: General Characteristics									
Prior 3 Days	Dry	Damp	Wet		Prior 3 Weeks	Dry	Damp	Wet	
Last Known Rain Event									
Date			Intensity		Light	Moderate	Heavy		

Log the Tasks below as S for Satisfactory or U for Unsatisfactory by checking the appropriate column. Mark an X by all completed Corrective Actions. Record details on following page.

Watching Tasks	S	U	X	Corrective Action
1. Locate the site's Permeable pavement areas. Is there a facility manager? Once every spring.				
Identify all the site's permeable surfaces. Is there a facility Manager? Meet with them to review the locations and professional maintenance schedules.				Identify areas and the maintenance protection plan; If no plan exists then Contact facilities manager
Discuss the landscape plan to protect surfaces when gardening. Always use a tarp when gardening materials are used near Permeable pavement. Do not place soil, mulch, plants, tools directly on pavements.				Contact facilities manager
2. Check surface conditions. Look at least once in spring + fall when leaf/litter are greatest.				
Check integrity of permeable surfaces. Are they chipping, deforming, breaking apart?				Contact facilities manager
Are pavers settling unevenly? Is there excessive cracking?				Contact facilities manager
Check between pavers for adequate rock in joints. Add new rock between joints as needed.				Sweep new approved rock into joints; Contact facilities manager
Check for weeds; remove weeds. Excessive weeds may require a weed burning tool.				Extensive weeds may require burning; Contact facilities manager
3. Is the surface clogging? Check seasonally and after large rain events.				
Is there standing water 48 hours after a big rain?				Contact facilities manager
Is there dirt and debris piling up on the pavement? Clean it! Remove litter and large debris items.				Sweep and shovel as needed
Examine for tears or punctures. Replace as needed.				Contact facilities manager
4. Locate the observation well? Check seasonally and 48 hrs after large rain events.				
Locate the observation well. Remove the cap and look down the pipe with a flashlight. If you see water, the system may be clogged. Don't forget to return the cap!				Remove cap and look with a flashlight; Contact facilities manager
Support structures are solid; no settling; no cracks				Contact facilities manager
Decommission the tank during winter.				Turn Bypass on
Recommission the tank in Spring.				Turn Bypass off

Rainwater Harvesting

RiverTools Checklist for Inspection of Rain Water Harvesting								
Location					Caretaker			
Current Conditions								
Rain	None	Drizzle	Steady	Downpour	Time		AM	PM
Temperature	Above Freezing		Y	N	Date			
Recent Events: General Characteristics								
Prior 3 Days	Dry	Damp	Wet		Prior 3 Weeks	Dry	Damp	Wet
Last Known Rain Event								
Date			Intensity		Light	Moderate	Heavy	

Log the Tasks below as S for Satisfactory or U for Unsatisfactory by checking the appropriate column. Mark an X by all completed Corrective Actions. Record details on following page.

Watching Tasks	S	U	X	Corrective Action
1. Conveyance: is the flow path clear? Check weekly in spring + fall when tree leaf/litter are high.				
Roof (under one story): Gutters and Downspouts.				Remove leaves + debris
Ground: Trench Drains.				Remove leaves + debris
High Structure: Confirm cleaned with Facility Manager.				Contact facilities manager
2. Are your filters clean + good condition? Check seasonally and after large rain events.				
Remove screens or bags, rinse and return.				Rinse and Reinstall
Examine for tears or punctures. Replace as needed.				Contact facilities manager
3. Does the "first flush" diverter device work? Check seasonally and after large rain events.				
Place a bucket below the device and unscrew its bottom. Have a safe disposal place for the dirty water-- not the roadway.				Drain and Remove Debris
Rinse the unscrewed bottom cap and any of its components.				Rinse
Reassemble everything as you found it.				Reinstall
4. Is the Conveyance clogged frequently? Was it clogged this time and at the previous check?				
Inspect and clean more frequently.				Note the frequency
Add gutter guards or downspout screens.				Contact facilities manager
5. Water Quality: Observe stored water color + odor. Check seasonally and during dry stretches.				
If a dark color or foul odor is observed add bleach.				¼ tsp/Rainwater gallon
Treatment System? Confirm with Facility Manager.				Contact facilities manager
6. Tank: is the storage structure sound? Check before the first freeze and after a large spring rain.				
Tank Structure is solid; no cracks				Contact facilities manager
Support structures are solid; no settling; no cracks				Contact facilities manager
7. Overflow Bypass: good working order? Check before the first freeze and after a large spring rain.				
The overflow is properly connected,				Reconnect/Contact facilities manager
Ground protected against erosion where tank overflows.				Add rock/ Contact facilities manager
8. Dry Weather Conditions. Check frequently throughout the growing season.				
Is the stored water being used?				Use the water/Draw down
Is the outflow spigot working?				Test/Contact facilities manager
9. Freezing Temperatures. Check once mid-December and early March.				
Decommission the tank during winter.				Turn Bypass on
Recommission the tank in Spring.				Turn Bypass off

APPENDIX B: SAMPLE INSPECTION AND MAINTENANCE LOG

Date	Task #	Observation and Corrective Action Taken	Initials

APPENDIX C: TYPICAL WEEDS

Weeds are the biggest threat to a newly planted garden. They usually only grow where there are open spaces in the soil, so once the rain garden's plants grow in, they are usually not a problem. Rain gardens and conservation landscaping plants should be planted 12-15" center-to-center to promote rapid growth and leave little room for weeds to get established.

Weed early and often. It is much easier to weed out a few plants frequently than to try to control a weedy outbreak. Once you have weeded, plant in the open spaces as soon as possible.

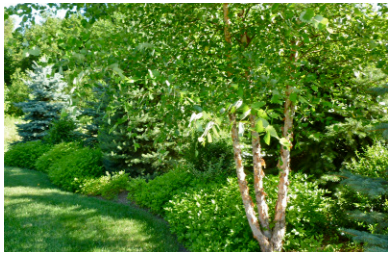
Crabgrass (Digitaria) is an annual weed and easy to pull up by hand. Be sure to get the roots out. Crabgrass needs open space to grow so once the rain garden plants grow in you will not have it as a nuisance weed.

Foxtail (Setaria spp.) is a common late summer weed. Its tufty seed heads make it easily identifiable. Manual control includes cutting off the seed heads before digging it out, as the seeds will drop easily. Then dig out the long roots.

Mugwort (Artemesia vulgaris) leaves look like chrysanthemum leaves. It is a persistent weed with short root systems. It is difficult to control though pulling it annually may eliminate it.

Nutsedge (Cyperus esculentus) is commonly found since it thrives in any soil. It is aggressive and difficult to control. Nutsedge spread by tubers underground. To control it dig out 10" deep and 8-10" beyond the leafy portion.

APPENDIX D: TYPICAL RAIN GARDEN PLANTS



River Birch

Virginia Sweetspire

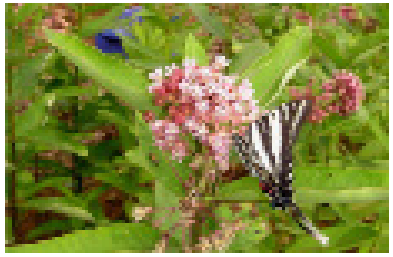
Winterberry

Blueflag Iris

Blackeyed Susan

Switchgrass

Joe Pye Weed



Swamp Milkweed

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