

## MAINTAINING STORMWATER CONTROL MEASURES

### *Guidance for Private Owners & Operators*

#### STORMWATER CONTROL MEASURES

### Rain Garden

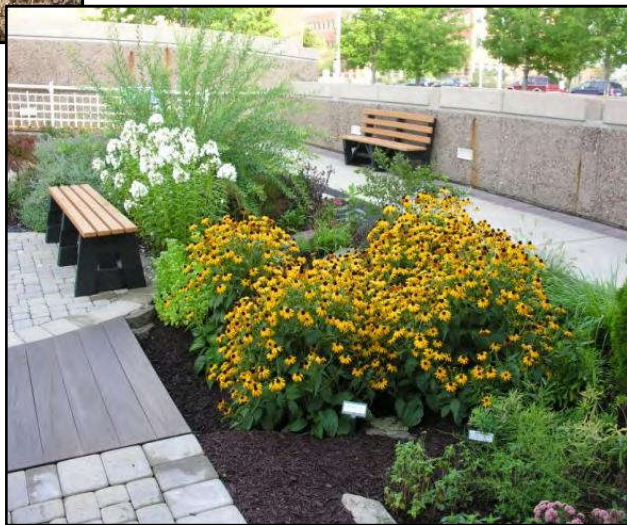
A rain garden is a shallow, landscaped depression that contains native plants that can tolerate both wet and dry conditions. It captures stormwater runoff from rooftops and driveways and allows it to soak into the ground before it reaches natural waters or sewer systems. Rain gardens also provide habitat for wildlife such as birds, butterflies and other pollinators.

Rain gardens typically do not contain drainage pipes or outlet structures to convey captured stormwater runoff from the shallow, landscaped depression as do bioretention areas and vegetated infiltration swales. Rain gardens rely solely on amended soils to allow stormwater runoff to soak into the ground and evapotranspiration by plants to remove stormwater runoff from the rain garden.



*Newly planted rain garden showing **shallow, landscaped depression** and earthen berm. Credit: Chagrin River Watershed Partners, Inc.*

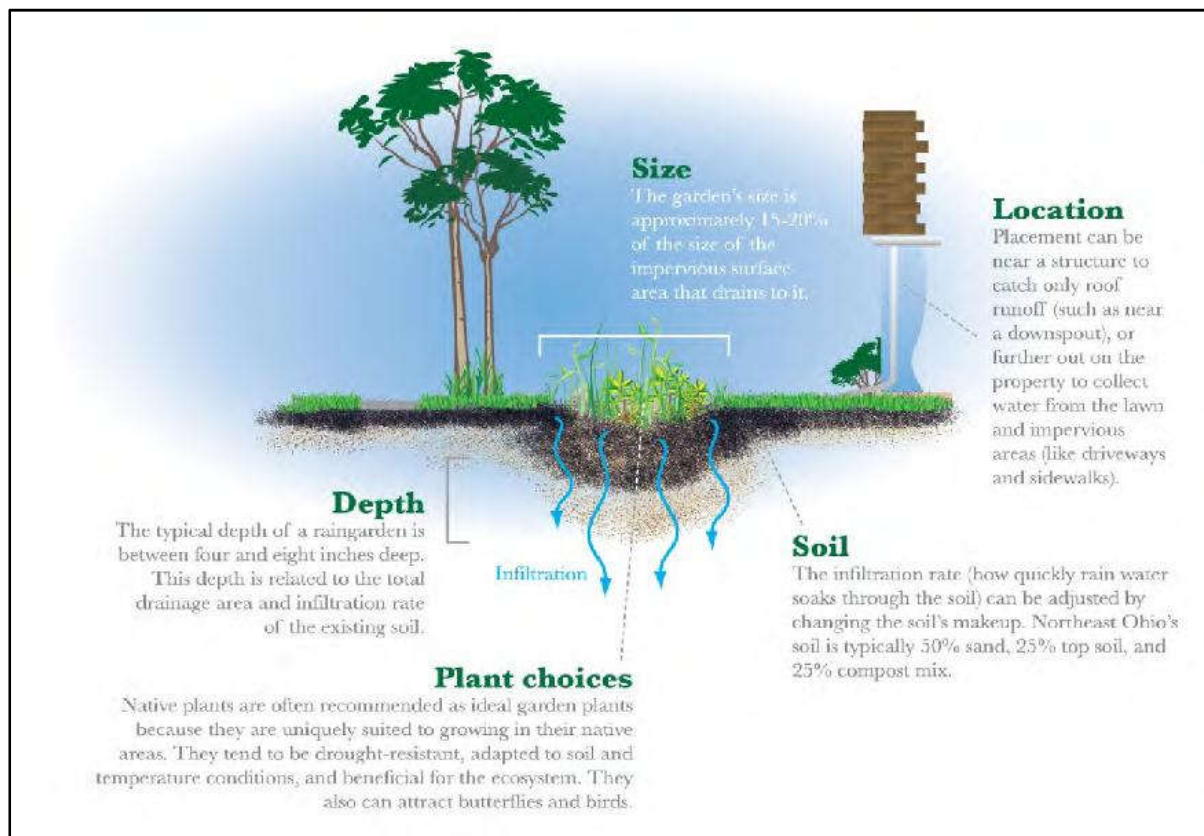
*Fully mature rain garden **capturing runoff** from paved surfaces at the Northeast Ohio Regional Sewer District administrative offices in Cleveland. Credit: Northeast Ohio Regional Sewer District*



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*Rain garden receiving disconnected downspout from residential roof.*

*Credit: Northeast Ohio Regional Sewer District*

#### MAINTENANCE REQUIRED WHEN:

- Standing water is visible 24 hours after a rain event.
- Erosion is visible within the rain garden, on the slopes and inlets leading into the rain garden, or on the berm if present.
- Vegetation, sediment or debris blocking inlets or is excessively present in rain garden.
- Vegetation is wilting, discolored, or dying.
- Foul odors present.
- Mulch cover is inadequate.

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#### ROUTINE AND NON-ROUTINE MAINTENANCE

##### *Non-Routine Maintenance:*

- Algae Control: If algae accumulate within the storage container, dewater and rinse thoroughly to remove algae.
- Pest Control: If mosquito larvae appear within the storage container, determine their point of access and seal the storage container to prevent access to the stored water.
- System Component Repair: Repair or replace damaged system components based on manufacturer's specifications.

##### **Rain Garden**

##### *Routine Maintenance:*

- Sediment and Debris: Remove accumulated sediment and debris from the mulch layer of the rain garden.
- Erosion and Scour: Repair soil erosion or scouring within the rain garden or side slopes leading into the rain garden.
- Mulch: Maintain a 2 to 3 inch depth of hardwood bark mulch layer within the rain garden. If an excessive depth of mulch exists, remove mulch until the mulch layer is 2 to 3 inches in depth.
- Curb Cuts: Keep curb cuts to rain garden free from blockage by sediment, debris and trash.
- Weeds: Remove weeds and invasive plants from rain garden.
- Vegetation Management: Inspect plant health seasonally to ensure vigorous growth. Prune plants, particularly shrubs and trees, during the dormant season (fall to early spring).
- Snow Removal: Do not pile or store snow within the rain garden as this will compact the specialized soils and add sediments from snow melt that may lead to clogging.

##### *Non-Routine Maintenance:*

- Plant Replacement: Replace diseased or dying plants.
- Ponding Water: When ponding continues beyond a 24 hour period, contact your local community stormwater manager for further consultation.

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#### ROUTINE AND NON-ROUTINE MAINTENANCE

- Specialized Soil Replacement: Clogging of the specialized soil by fine sediments may require complete replacement of the specialized soil, mulch and plant materials.

#### **Sand Filter System**

##### *Routine Maintenance:*

- Sediment and Debris: Remove accumulated sediment, debris, trash and oil/grease from sand filter bed and collection chambers per manufacturer's specifications.
- Outlet and Inlet Structures: Keep outlets and inlets of sand filter free from blockage by sediment, debris and trash.
- Erosion and Scour: Repair soil erosion or scouring at the outlet(s) of the sand filter.

##### *Non-Routine Maintenance:*

- Filter Media Replacement: Replace entirety of sand or other filter media if clogged.
  - Leaks or Damage: Inspect system components for leaks and damage based on manufacturer's specifications.
- \* *Do not enter sand filter chambers to inspect system unless Occupational Safety & Health Administration (OSHA) regulations for confined space entry are followed.*
- \* *Follow inspection and maintenance instructions and schedules provided by system manufacturer and installer.*
- \* *Properly dispose of all wastes removed from the sand filter system.*

#### **Underground Detention**

##### *Routine Maintenance:*

- Sediment and Debris: Remove accumulated sediment, debris and trash from inlets, detention chambers and outlets per manufacturer's specifications.
- Erosion and Scour: Repair soil erosion or scouring at the outlet(s) of the underground detention if overflow is discharged onto ground surfaces.

## Rain Garden Inspection and Maintenance Checklist

<b>Facility:</b>			
<b>Location/Address:</b>			
<b>Date:</b>	<b>Time:</b>	<b>Weather Conditions:</b>	<b>Date of Last Inspection:</b>
<b>Inspector:</b>		<b>Title:</b>	
<b>Rain in Last 48 Hours</b> <input type="checkbox"/> Yes <input type="checkbox"/> No <b>If yes, list amount and timing:</b>			
<b>Pretreatment:</b> <input type="checkbox"/> vegetated filter strip <input type="checkbox"/> swale <input type="checkbox"/> turf grass <input type="checkbox"/> other, specify: _____ <input type="checkbox"/> none			
<b>Inlet Type:</b> <input type="checkbox"/> swale <input type="checkbox"/> disconnected downspout <input type="checkbox"/> pipe <input type="checkbox"/> sheet flow			
<b>Site Plan or As-Built Plan Available:</b> <input type="checkbox"/> Yes <input type="checkbox"/> No			

Inspection Item		Comment	Action Needed
<b>1. PRETREATMENT</b>			
Sediment has accumulated.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
Trash and debris have accumulated.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>2. DEWATERING</b>			
Standing water is present after 24 hours. If yes, describe sheen, color, or smell.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>3. INLET</b>			
Structural inlet in poor condition.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
Sediment has accumulated and/or is blocking the inlet.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
Erosion is occurring around the inlet.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>3. VEGETATION</b>			
Vegetation is wilting, discolored, or dying due to disease or stress.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
Vegetation needs to be controlled through mowing or manual removal.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>4. RAIN GARDEN MAIN INFILTRATION AREA</b>			
Trash and debris have accumulated.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
Sediment has accumulated at the surface.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
Topmost layer is caked or crusted over with sediment.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
Erosion is evident.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
Mulch is compacted.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
Sinkholes or animal borrows are present.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>5. EDGES AND BERM</b>			
Erosion is evident.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
Sinkholes or instability is evident.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>6. OUTLET AND OVERFLOW STRUCTURE (i.e., catch basin)</b>			
Outlet or overflow structure in poor structural condition.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
Sediment, trash or debris is blocking the outlets or overflow structure.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
Erosion is occurring around the outlets or overflow structure.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
Height from surface of practice to top of overflow structure is insufficient to allow for ponding during rain events.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No

## Additional Notes

Wet weather inspection needed ☐ Yes ☐ No**Site Sketch:**

SHRUBS FOR BIORETENTION & RAIN GARDENS					
Genus	Species	Cultivar	Common Name	Height	Spread
<i>Aesculus</i>	<i>parviflora</i>		Bottlebrush Buckeye	8-12'	8-15'
<i>Aesculus</i>	<i>pavia</i>		Red Buckeye		
<i>Aronia</i>	<i>arbutifolia</i>	Brilliantissima	Red Chokeberry	6-9'	6-8'
<i>Aronia</i>	<i>melanocarpa</i>	Autumn Magic	Black Chokeberry	4'	
<i>Cephalanthus</i>	<i>occidentalis</i>		Buttonbush	3-6'	3-6'
<i>Clethra</i>	<i>alnifolia</i>		Summer Sweet	6-8'	4-6'
<i>Clethra</i>	<i>alnifolia</i>	Ruby Spice	Summer Sweet	3-6'	3-6'
<i>Clethra</i>	<i>alnifolia</i>	hummingbird	Summer Sweet	30"	4'
<i>Cornus</i>	<i>amomum</i>		Silky Dogwood	6-10'	6-10'
<i>Cornus</i>	<i>racemosa</i>		Gray Dogwood	10-15'	10-15'
<i>Cornus</i>	<i>racemosa</i>	Muskingum	Gray Dogwood	2'	4'
<i>Cornus</i>	<i>sericea</i>	Isanti	Compact Redosier Dogwood	5'	5'
<i>Cornus</i>	<i>sericea</i>	Silver and Gold	Silver & Gold Dogwood	5-7'	
<i>Cornus</i>	<i>sericea</i>	Flavirama	Yellow Twig	7-9'	7-9'
<i>Hamamelis</i>	<i>vernalis</i>		Witch Hazel	10-12'	
<i>Ilex</i>	<i>glabra</i>	Compacta	Compact Inkberry	3-4'	3-4'
<i>Ilex</i>	<i>glabra</i>	Nordic	Nordic Holly	3-4'	3-4'
<i>Ilex</i>	<i>verticillata</i>	Afterglow	Afterglow Winterberry	3-6'	
<i>Ilex</i>	<i>verticillata</i>	Red Sprite	Red Sprite Winterberry	2-4'	
<i>Itea</i>	<i>virginica</i>	Henry's Garnet	Virginia Sweetspire	3-4'	4-5'
<i>Itea</i>	<i>virginica</i>	Sarah Eve	Virginia Sweetspire	3-4'	
<i>Magnolia</i>	<i>virginiana</i>		Sweetbay Magnolia	15-20'	15-20'
<i>Myrica</i>	<i>pensylvanica</i>		Bayberry	5-12'	5-12'
<i>Physocarpus</i>	<i>opulifolius</i>	Diablo	ninebark	6-8'	6-8'
<i>Potentilla</i>	<i>fruticosa</i>	Goldfinger	Goldfinger Potentilla	2-3'	3-4'
<i>Potentilla</i>	<i>fruticosa</i>	Jackmanii	Jackman Potentilla	3-4'	3'
<i>Sambucus</i>	<i>canadensis</i>	Laciniata'	Elderberry	5-12'	
<i>Thuja</i>	<i>occidentalis</i>		Arborvitae		
<i>Vaccinium</i>	<i>corymbosum</i>		Highbush blueberry	4-8'	3-4'
<i>Vaccinium</i>	<i>hybrid</i>	Ornablue	Highbush blueberry	3'	3'
<i>Vaccinium</i>	<i>hybrid</i>	Tophat	Highbush blueberry	20"	2-3'
<i>Xanthorhiza</i>	<i>simplicissima</i>		Yellowroot	2-3'	
TREES FOR BIORETENTION & RAIN GARDENS					
Genus	Species		Common Name		
<i>Acer</i>	<i>rubrum</i>		Red Maple		
<i>Acer</i>	<i>saccharinum</i>		Silver Maple		
<i>Amelanchier</i>	<i>canadensis</i>		Service Berry		
<i>Betula</i>	<i>nigra</i>		River Birch		
<i>Celtis</i>	<i>occidentalis</i>		Hackberry		
<i>Gleditsia</i>	<i>triacanthos var.inermis</i>		Honey Locust		
<i>Gymnocladus</i>	<i>dioica</i>		Kentucky Coffee Tree		
<i>Hamamelis</i>	<i>vernalis</i>		Witchhazel		
<i>Liquidambar</i>	<i>styraciflua</i>		Sweetgum		
<i>Magnolia</i>	<i>virginiana</i>		Sweetbay Magnolia		
<i>Metasequoia</i>	<i>glyptostroboides</i>		Dawn Redwood		
<i>Nyssa</i>	<i>sylvatica</i>		Tupelo, Blackgum		
<i>Quercus</i>	<i>bicolor</i>		Swamp White Oak		
<i>Quercus</i>	<i>palustris</i>		Pin Oak		
<i>Salix</i>	<i>spp.</i>		Willows		
<i>Taxodium</i>	<i>distichum</i>		Bald Cypress		

FORBS FOR BIORETENTION & RAIN GARDENS			
Scientific Name	Common Name	Basin Bottom	Basin Side-Slope
<i>Anemone canadensis</i>	Canada Anemone		x
<i>Anemone virginiana</i>	Thimbleweed		x
<i>Asclepias incarnata</i>	Swamp Milkweed	x	
<i>Asclepias tuberosa</i>	Butterfly Weed		x
<i>Aster dumosus (novi-belgii)</i>	New York Aster		x
<i>Aster laevis</i>	Smooth Aster		x
<i>Aster novae-angliae</i>	New England Aster	x	
<i>Baptisia australis</i>	Blue False Indigo		x
<i>Baptisia leucantha</i>	White False Indigo		x
<i>Boltonia asteroides</i>	Boltonia (false aster)	x	
<i>Chelone glabra</i>	Turtlehead	x	
<i>Coreopsis tripteris</i>	Tall Coreopsis	x	
<i>Eryngium yuccifolium</i>	Rattlesnake Master		x
<i>Eupatorium maculatum</i>	Joe-pye Weed	x	
<i>Eupatorium perfoliatum</i>	Boneset	x	
<i>Geranium maculatum</i>	Wild geranium		x
<i>Heliopsis helianthoides</i>	Ox-eye Sunflower	x	
<i>Iris versicolor</i>	Blue Flag Iris	x	
<i>Liatris pycnostachya</i>	Prairie Blazing Star		x
<i>Liatris spicata</i>	Dense Blazing Star	x	
<i>Lysimachia ciliata</i>	Fringed Loosestrife		x
<i>Monarda fistulosa</i>	Wild Bergamot		x
<i>Oenothera fruticosa</i>	Evening Primrose		x
<i>Physostegia virginiana</i>	False Dragonhead	x	
<i>Pycnanthemum muticum</i>	Mountain Mint		x
<i>Ratibida pinnata</i>	Yellow Coneflower		x
<i>Silphium perfoliatum</i>	Cup Plant	x	
<i>Smilacina stellata</i>	Starry Solomon's Seal		x
<i>Silphium terebinthinaceum</i>	Prairie Dock		x
<i>Solidago rugosa</i>	Rough Goldenrod	x	
<i>Tradescantia ohiensis</i>	Ohio Spiderwort		x
<i>Thalictrum dasycarpum</i>	Meadowrue	x	
<i>Vernonia fasciculata</i>	Ironweed	x	
<i>Veronicastrum virginicum</i>	Culver's Root	x	
<i>Zizia aurea</i>	Golden Alexanders	x	x
GRASSES FOR BIORETENTION & RAIN GARDENS			
Scientific Name	Common Name		
<i>Andropogon gerardii</i>	Big Bluestem		
<i>Carex hystericina</i>	Porcupine Sedge		
<i>Carex vulpinoidea</i>	Fox Sedge		
<i>Elymus canadensis</i>	Canada Wild-rye		
<i>Panicum virgatum</i>	Switch Grass		
<i>Spartina pectinata</i>	Prairie Cord Grass		
FERNS FOR BIORETENTION & RAIN GARDENS			
Scientific Name	Common Name		
<i>Onoclea sensibilis</i>	Sensitive Fern		
<i>Matteuccia struthiopteris</i>	Ostrich Fern		
<i>Thelypteris noveboracensis</i>	New York Fern		