

References

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Appendix

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If you are planning to construct a basic or enhanced rain garden on your property and are applying for cost-share funding through a local municipality, SWCD, IDNR, or IDALS, a packet of required paperwork (based on the appendices in this guide) can be downloaded at the following link. Most forms are "fillable" and can be completed digitally. Contact your local municipality before completing any forms as they may use their own.

<https://iowastormwater.org/rainscaping/rain-gardens/>

Native and Non-Native Plants Lists

This appendix provides information on plant species that are well-suited to rain gardens in Iowa. This list is not exhaustive of all native and non-native plants suitable for rain gardens. It is provided to give homeowners and contractors recommendations for plants based on site conditions such as sun exposure and soil moisture.

In addition to an image of each plant, the following characteristics are provided:

- Common and scientific name.** Common names are given to plants regionally and can vary. Scientific names are given to plants in Latin, which is generally agreed upon nationally to avoid confusion with multiple common names for the same plant. A nursery may ask for a plant's scientific name to ensure the correct plant is being ordered.
- Height.** Predicted height of the fully grown plant.
- Soil moisture.** Four soil moisture classifications are provided in this guide: wet, moist, mesic, and dry. Soil moisture correlates to both soil type and the plant's location within a rain garden (see below). Mesic soils refer to areas that have average moisture content, neither constantly moist or dry.
- Bloom period and color.** Average time range when plant provides the majority of blooms and generalized color.
- Sun exposure.** "Full" exposure is typically considered as at least 6 hours of direct sunlight per day. "Partial" exposure is defined as between 3 and 6 hours of direct sunlight per day, or filtered sunlight all day. "Shade" exposure is less than 3 hours of direct sunlight per day.
- Location within rain garden.** Placement relates to how much moisture is available to the plant based on its location in the rain garden. Moisture depends on the natural soils at the site and if soil amendments are made. This guide provides 3 locations: in the bottom of the rain garden, along the sides (side slopes or along the perimeter), and on top of the berm (if installed). Plants that can sustain temporary periods of pondings will be more successful in the bottom of the rain garden whereas plants favoring dryer conditions are recommended on top of the rain garden's berm.

Native Iowa Forbs

	Anemone, Canada <i>Anemone canadensis</i> Height: 6" - 12" Bloom Period: May - June Moisture: Moist to Dry Bloom Color: White Comments: Will spread easily in the right conditions	Full Partial Shade  S B T Sides Bottom Top of Berm
	Aster, Smooth Blue <i>Symphyotrichum laeve</i> Height: 24" - 36" Bloom Period: August - October Moisture: Moist to Dry Bloom Color: Purple Comments: Spreads slowly, will persist for many years	Full Partial Shade  S B T Sides Bottom Top of Berm
	Beardtongue, Foxglove <i>Penstemon digitalis</i> Height: >36" Bloom Period: May - June Moisture: Moist to Mesic Bloom Color: White Comments: Clump-forming perennial, somewhat aggressive spreader	Full Partial Shade  B Sides Bottom Top of Berm
	Bergamot, Wild <i>Monarda fistulosa</i> Height: 12" - 36" Bloom Period: June - August Moisture: Mesic Bloom Color: Pink Comments: Spreads easily; divide every 2-3 years	Full Partial Shade  B Sides Bottom Top of Berm
	Blazing Star, Button (Rough) <i>Liatris aspera</i> Height: 24" - 36" Bloom Period: July - September Moisture: Mesic to Dry Bloom Color: Purple Comments: Rounded bracts give "rough" characteristic	Full Partial Shade  B Sides Bottom Top of Berm
	Blazing Star, Prairie <i>Liatris pycnostachya</i> Height: 24" - 36" Bloom Period: July - September Moisture: Mesic to Dry Bloom Color: Purple Comments: Blooms begin at top and work down	Full Partial Shade  S B T Sides Bottom Top of Berm
	Bloodroot <i>Sanguinaria canadensis</i> Height: 6" - 12" Bloom Period: March - April Moisture: Wet to Moist Bloom Color: White Comments: Nice groundcover beneath trees	Full Partial Shade  B Sides Bottom Top of Berm
	Bluebells, Virginia <i>Mertensia virginica</i> Height: 12" - 24" Bloom Period: April - May Moisture: Wet to Moist Bloom Color: Blue Comments: Fast growing, flowers start pink then slowly turn blue	Full Partial Shade  S B T Sides Bottom Top of Berm



Clover, Purple Prairie *Dalea purpurea*
 Height: 12" - 24" Bloom Period: July - September
 Moisture: Mesic to Dry Bloom Color: Purple
 Comments: Long-lived plant tolerant of heat and drought

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Columbine, American *Aquilegia canadensis*
 Height: 12" - 24" Bloom Period: April - June
 Moisture: Moist to Mesic Bloom Color: Red, Yellow
 Comments: Suitable in a variety of soils, locations, and sun conditions

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Coneflower, Gray-headed Prairie *Ratibida pinnata*
 Height: >36" Bloom Period: June - September
 Moisture: Moist to Mesic Bloom Color: Yellow
 Comments: Showy plant that prefers competition in small areas

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Coneflower, Orange *Rudbeckia fulgida*
 Height: >36" Bloom Period: July - September
 Moisture: Moist to Dry Bloom Color: Orange
 Comments: Long blooming season with vibrant color

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Coneflower, Pale Purple *Echinacea pallida*
 Height: 24" - 36" Bloom Period: July - September
 Moisture: Moist to Mesic Bloom Color: Purple
 Comments: Regarded as an important prairie forb

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Coneflower, Purple *Echinacea purpurea*
 Height: 24" - 36"+ Bloom Period: July - Septmber
 Moisture: Moist to Mesic Bloom Color: Pink
 Comments: Long lasting color, will reseed itself

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Coreopsis, Prairie *Coreopsis palmata*
 Height: 12" - 36" Bloom Period: June - August
 Moisture: Mesic to Dry Bloom Color: Yellow
 Comments: Good nectar source for pollinators

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Dutchman's Breeches *Dicentra cucullaria*
 Height: 6" - 12" Bloom Period: April - May
 Moisture: Moist to Mesic Bloom Color: White
 Comments: Flowers will wilt immediately upon touch

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Gentian, Cream *Gentiana flavida*
 Height: 12" - 24" Bloom Period: August - September
 Moisture: Moist to Mesic Bloom Color: Yellowish, White
 Comments: Distinct "closed mouth", bottle-shaped flowers

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Gentian, Bottle *Gentiana andrewsii*
 Height: 12" - 24" Bloom Period: August - September
 Moisture: Most to Mesic Bloom Color: Blue
 Comments: Distinct "closed mouth", bottle-shaped flowers

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Geranium, Wild *Geranium maculatum*
 Height: 12" - 24" Bloom Period: May - June
 Moisture: Moist to Mesic Bloom Color: Pink
 Comments: Will spread easily in the right conditions

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Ginger, Wild *Asarum canadense*
 Height: 6" - 12" Bloom Period: April - May
 Moisture: Wet to Mesic Bloom Color: Purple, Brown
 Comments: Low growing, spreading plant with heart-shaped leaves

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Golden Alexander *Zizia aurea*
 Height: 24" - 36" Bloom Period: May - June
 Moisture: Moist to Mesic Bloom Color: Yellow
 Comments: Long blooming period starting earlier than most forbs

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Iris, Blue Flag *Iris versicolor*
 Height: 24" - 36" Bloom Period: May - June
 Moisture: Wet to Mesic Bloom Color: Blue, Purple
 Comments: Clumps spread slowly by rhizomes (horizontal roots)

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Jacobs Ladder *Polemonium reptans*
 Height: 12" - 24" Bloom Period: April - June
 Moisture: Wet to Mesic Bloom Color: Blue
 Comments: Will self-seed in optimal conditions

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Lobelia, Great Blue *Lobelia siphilitica*
 Height: 24" - 36" Bloom Period: July - October
 Moisture: Wet to Mesic Bloom Color: Blue
 Comments: Clumps can be divided in the spring as desired

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Loosestrife, Prairie *Lysimachia quadriflora*
 Height: 12" - 24" Bloom Period: July - August
 Moisture: Wet to Moist Bloom Color: Yellow
 Comments: Prefers consistently moist conditions

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Milkweed, Butterfly *Asclepias tuberosa*
 Height: 12" - 24" Bloom Period: June - September
 Moisture: Mesic to Dry Bloom Color: Orange
 Comments: Favorite of the Monarch butterfly

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Milkweed, Common *Asclepias syriaca*
 Height: >36" Bloom Period: June - August
 Moisture: Wet to Mesic Bloom Color: Pink
 Comments: Fragrant blooms, one of the easiest milkweeds to grow

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Mint, Virginia Mountain *Pycnanthemum virginianum*
 Height: 12" - 24" Bloom Period: June - August
 Moisture: Moist to Dry Bloom Color: White
 Comments: Petals are spotted with purple flecks

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Monkey Flower *Mimulus ringens*
 Height: 24" - 24" Bloom Period: June - August
 Moisture: Wet to Moist Bloom Color: Purple
 Comments: Plant size depends heavily on moisture suitability

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Onion, Nodding *Mertensia virginica*
 Height: 6" - 24" Bloom Period: July - August
 Moisture: Mesic Bloom Color: White, Pink
 Comments: Most effectively planted in small groups

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Petunia, Wild *Ruellia humilis*
 Height: 12" - 24" Bloom Period: June - August
 Moisture: Mesic to Dry Bloom Color: Purple
 Comments: Nice border plant but watch for aggressive spreading

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Phlox, Prairie *Phlox pilosa*
 Height: 12" - 24" Bloom Period: May - June
 Moisture: Moist to Mesic Bloom Color: Pink
 Comments: Fragrant flower, rounded clusters, and a butterfly favorite

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Phlox, Woodland *Phlox divaricata*
 Height: 12" - 24" Bloom Period: June - August
 Moisture: Moist to Mesic Bloom Color: Purple
 Comments: Excellent ground cover in shady areas

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Prairie Smoke *Geum triflorum*
 Height: 6" - 12" Bloom Period: April - May
 Moisture: Mesic to Dry Bloom Color: Pink
 Comments: Nodding flowers arrive early in the spring

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Shooting Star *Dodecatheon meadia*
 Height: 6" - 12" Bloom Period: April - June
 Moisture: Wet to Mesic Bloom Color: Pink
 Comments: Short lived perennial, does not produce flowers in first year

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Sneezeweed *Helenium autumnale*
 Height: 12" - 36+ " Bloom Period: August - October
 Moisture: Wet to Moist Bloom Color: Yellow
 Comments: Divide every 3-4 years to maintain vigor

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Solomon's Seal *Polygonatum biflorum*
 Height: 12" - 24" Bloom Period: April - May
 Moisture: Moist to Mesic Bloom Color: White
 Comments: Unique flowers that hang from underside of stem

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Spiderwort, Ohio *Tradescantia ohioensis*
 Height: 24" - 36" Bloom Period: May - July
 Moisture: Moist to Mesic Bloom Color: Blue
 Comments: Flowers open early morning and will shrivel if touched

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Spiderwort, Prairie *Tradescantia bracteata*
 Height: 12" - 24" Bloom Period: May - June
 Moisture: Mesic to Dry Bloom Color: Blue, Purple
 Comments: Long-bract flowers close by midday and last only one day

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Susan, Black-eyed *Rudbeckia hirta*
 Height: 12" - 36" Bloom Period: June - September
 Moisture: Mesic to Dry Bloom Color: Yellow
 Comments: Short-lived perennial, reseeds itself

Full Partial Shade
 S B T
 Sides Bottom Top of Berm



Susan, Brown-eyed *Rudbeckia triloba*
 Height: 12" - 36" Bloom Period: June - September
 Moisture: Mesic to Dry Bloom Color: Yellow
 Comments: Will naturalize by self-seeding, even with die out

Full Partial Shade
 Sides Bottom Top of Berm



Sweet William, Wild *Phlox maculata*
 Height: 12" - 36" Bloom Period: May - June
 Moisture: Mesic to Dry Bloom Color: Purple, Brown
 Comments: Flowers are slightly fragrant, rabbits tend to like it

Full Partial Shade
 Sides Bottom Top of Berm



Grass Bottlebrush *Hystrix patula*
 Height: 12" - 36" Bloom Period: August - September
 Moisture: Mesic to Dry Bloom Color: Green, Brown
 Comments: Cool season, clumping grass best in light shade

Full Partial Shade
 Sides Bottom Top of Berm



June Grass *Koeleria macrantha*
 Height: 12" - 24" Bloom Period: June - July
 Moisture: Mesic to Dry Bloom Color: Green
 Comments: Requires good drainage conditions

Full Partial Shade
 Sides Bottom Top of Berm



Little Bluestem *Schizachyrium scoparium*
 Height: 24" - 36" Bloom Period: July - October
 Moisture: Moist to Dry Bloom Color: Green, Blueish
 Comments: Forms in dense mounds, colors remain over winter

Full Partial Shade
 Sides Bottom Top of Berm



Prairie Dropseed *Sporobolus heterolepis*
 Height: 12" - 24" Bloom Period: August - October
 Moisture: Moist to Dry Bloom Color: Green, Cream
 Comments: Produces good nourishment for seed eating birds

Full Partial Shade
 Sides Bottom Top of Berm



Sedge, Brown Fox *Carex vulpinoidea*
 Height: 24" - 36" Bloom Period: June - July
 Moisture: Wet to Mesic Bloom Color: Green
 Comments: Can spread easily and appear weedy

Full Partial Shade
 Sides Bottom Top of Berm



Sedge, Common Wood *Carex blanda*
 Height: 12" - 36" Bloom Period: May - June
 Moisture: Wet to Mesic Bloom Color: Green
 Comments: Versatile and low-profile

Full Partial Shade
 Sides Bottom Top of Berm



Sideoats Grama *Bouteloua curtipendula*
 Height: 12" - 24" Bloom Period: August - September
 Moisture: Mesic to Dry Bloom Color: Purple, Green
 Comments: Bracts hang from one side of stem

Full Partial Shade
 Sides Bottom Top of Berm



Switchgrass *Panicum virgatum*
 Height: >36" Bloom Period: July - September
 Moisture: Moist to Dry Bloom Color: Pinkish
 Comments: Can spread easily, take over other plants if not managed

Full Partial Shade
 Sides Bottom Top of Berm

Native Iowa Grasses, Sedges, and Ferns



Blue Grama *Bouteloua gracilis*
 Height: 6" - 12" Bloom Period: July - September
 Moisture: Mesic to Dry Bloom Color: Green, Blue
 Comments: Can be planted as turf grass mixed with Buffalograss

Full Partial Shade
 Sides Bottom Top of Berm



Fern, Lady *Athyrium Filix-femina*
 Height: 12" - 36" Bloom Period: N/A
 Moisture: Moist to Mesic Bloom Color: Green, Purple (Fronds)
 Comments: Deciduous fern will drop its leaves with first frost

Full Partial Shade
 Sides Bottom Top of Berm



Fern, Interrupted *Osmunda claytoniana*
 Height: >36" Bloom Period: June - August
 Moisture: Moist to Dry Bloom Color: Brown (Spores)
 Comments: Easy to cultivate

Full Partial Shade
 Sides Bottom Top of Berm



Fern, Maidenhair *Adiantum pedatum*
 Height: 6" - 12" Bloom Period: Not Applicable
 Moisture: Moist Bloom Color: Green (Fronds)
 Comments: Delicate, dark stems

Full Partial Shade
 Sides Bottom Top of Berm



Fern, Ostrich *Matteuccia struthiopteris*
 Height: 12" - 24" Bloom Period: June - September
 Moisture: Wet to Mesic Bloom Color: Green (Fronds)
 Comments: Fronds will persist through the winter

Full Partial Shade
 Sides Bottom Top of Berm

Non-Native Plants

	<p>Astilbe, Chinese <i>Astilbe chinensis 'Pumila'</i> Height: 6" - 24" Bloom Period: July - August Moisture: Moist to Mesic Bloom Color: Pink Comments: Provides ornamental interest even after bloom</p>	<p>Full Partial Shade  Sides Bottom Top of Berm </p>
	<p>Coralbells, Brandon Pink <i>Heuchera 'Brandon Pink'</i> Height: 6" - 24" Bloom Period: June - September Moisture: Moist to Mesic Bloom Color: Pink Comments: Bright display of color, attractive to hummingbirds</p>	<p>Full Partial Shade  Sides Bottom Top of Berm </p>
	<p>Coralbells, Plum Pudding <i>Heuchera 'Plum Pudding'</i> Height: 12" - 36" Bloom Period: June - September Moisture: Moist to Mesic Bloom Color: White Comments: Small white flowers arise from deep purple foliage</p>	<p>Full Partial Shade  Sides Bottom Top of Berm </p>
	<p>Coreopsis, Threadleaf <i>Coreopsis verticillata</i> Height: 24" - 36" Bloom Period: May - July Moisture: Moist to Dry Bloom Color: Gold, Yellow Comments: Low maintenance, rapid growth perennial</p>	<p>Full Partial Shade  Sides Bottom Top of Berm </p>
	<p>Feather Reed Grass <i>Calamagrostis acutiflora 'Karl Forester'</i> Height: >36" Bloom Period: May - February Moisture: Wet to Moist Bloom Color: Purple, Pinkish Comments: Nice backdrop to shorter perennials</p>	<p>Full Partial Shade  Sides Bottom Top of Berm </p>
	<p>Fern, Japanese Painted <i>Athyrium niponicum pictum</i> Height: 12" - 24" Bloom Period: N/A Moisture: Moist to Mesic Bloom Color: Gray, Burgundy (Fronds) Comments: Fronds provide colorful array of ground coverage</p>	<p>Full Partial Shade  Sides Bottom Top of Berm </p>
	<p>Fescue, Elijah Blue <i>Festuca glauca 'Elijah Blue'</i> Height: 6" - 12" Bloom Period: June - July Moisture: Moist to Mesic Bloom Color: Light Green, Purple Comments: Attractive border plant, does not spread outward easily</p>	<p>Full Partial Shade  Sides Bottom Top of Berm </p>
	<p>Gaillardia, Fanfare <i>Gaillardia x grandiflora 'Fanfare'</i> Height: 12" - 24" Bloom Period: June - September Moisture: Moist to Mesic Bloom Color: Orange Comments: Removing fading flowers can encourage more blooms</p>	<p>Full Partial Shade  Sides Bottom Top of Berm </p>

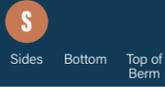
	<p>Hosta, Everlasting Love <i>Hosta 'Everlasting Love'</i> Height: 6" - 12" Bloom Period: July - August Moisture: Moist to Mesic Bloom Color: Lavender Comments: Forms hardy and low-maintenance clumps</p>	<p>Full Partial Shade  Sides Bottom Top of Berm </p>
	<p>Hosta, Shirley Levy <i>Hosta 'Shirley Levy'</i> Height: 12" - 24" Bloom Period: July - August Moisture: Moist to Mesic Bloom Color: Lavender Comments: Greenish-yellow foliage</p>	<p>Full Partial Shade  Sides Bottom Top of Berm </p>
	<p>Iris, Siberian <i>Iris sibirica</i> Height: 12" - 36" Bloom Period: May - June Moisture: Moist to Mesic Bloom Color: Purple, Blue Comments: Long-lasting blooms, foliage remains after blooms die off</p>	<p>Full Partial Shade  Sides Bottom Top of Berm </p>
	<p>Lily, Pardon Me <i>Hemerocallis 'Pardon Me'</i> Height: 12" - 24" Bloom Period: July - September Moisture: Moist to Mesic Bloom Color: Red Comments: Attractive to butterflies and hummingbirds</p>	<p>Full Partial Shade  Sides Bottom Top of Berm </p>
	<p>Lily, Rocket City <i>Hemerocallis 'Rocket City'</i> Height: 12" - 24" Bloom Period: July - September Moisture: Moist to Mesic Bloom Color: Yellow, Orange Comments: Extended daily bloom time of 16 or more hours</p>	<p>Full Partial Shade  Sides Bottom Top of Berm </p>
	<p>Lily, Stella De Oro Day <i>Hemerocallis 'Stella de Oro'</i> Height: 12" - 24" Bloom Period: June - August Moisture: Moist to Mesic Bloom Color: Orange Comments: Spent flowers can be deadheaded daily</p>	<p>Full Partial Shade  Sides Bottom Top of Berm </p>
	<p>Salvia, May Night <i>Salvia nemorosa 'May Night'</i> Height: 12" - 24" Bloom Period: May - August Moisture: Moist to Mesic Bloom Color: Purple, Blue Comments: Blooms vigorously with routine watering</p>	<p>Full Partial Shade  Sides Bottom Top of Berm </p>
	<p>Silver Grass, Variegated <i>Miscanthus sinensis 'Variegatus'</i> Height: >36" Bloom Period: September - October Moisture: Moist to Dry Bloom Color: White Comments: Plumes can extend as tall as 8 feet</p>	<p>Full Partial Shade  Sides Bottom Top of Berm </p>

Native Trees and Shrubs

	<p>Dogwood, Red Osier <i>Cornus sericea</i></p> <p>Height: 6' - 12' Bloom Period: May - June</p> <p>Moisture: Moist to Mesic Bloom Color: White</p> <p>Comments: Very conspicuous red branches in winter</p>	 
	<p>Redbud, Eastern <i>Cercis canadensis*</i></p> <p>Height: 15' - 30' Bloom Period: March - May</p> <p>Moisture: Moist to Mesic Bloom Color: Pink</p> <p>Comments: Short trunk, spreading branches, umbrella-like crown</p>	 
	<p>Serviceberry, Canadian <i>Amelanchier canadensis</i></p> <p>Height: 6' - 20' Bloom Period: April - May</p> <p>Moisture: Wet to Moist Bloom Color: White</p> <p>Comments: Lasting fall foliage is orange to rusty-red</p>	 

* More winter-hardy strains have been developed in Minnesota. For more information, visit: <https://bit.ly/2JHpe7a>

Non-Native Trees and Shrubs

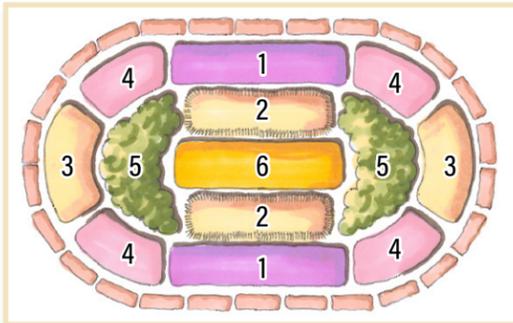
	<p>Dogwood, Pagoda <i>Cornus alternifolia</i></p> <p>Height: 15' - 25' Bloom Period: May - June</p> <p>Moisture: Moist to Mesic Bloom Color: Yellow, White</p> <p>Comments: Distinctive "layered" horizontal branching</p>	 
	<p>Hydrangea, 'Blushing Bride' <i>Hydrangea macrophylla</i></p> <p>Height: 3' - 6' Bloom Period: June - September</p> <p>Moisture: Moist to Mesic Bloom Color: White</p> <p>Comments: Prefers some shade, especially during hot dry spells</p>	 
	<p>Snowberry, Magic Berry <i>Symphoricarpos doorenbosii</i></p> <p>Height: 4' - 6' Bloom Period: March - June</p> <p>Moisture: Moist to Mesic Bloom Color: Pink, Red</p> <p>Comments: Provides nice winter interest</p>	 
	<p>Virburnum, Nannyberry <i>Viburnum lentago</i></p> <p>Height: 8' -16' (as shrub) Bloom Period: May - June</p> <p>Moisture: Moist to Mesic Bloom Color: White</p> <p>Comments: Produces edible fruits often used in jams and jellies</p>	 

Appendix A Photo Credits

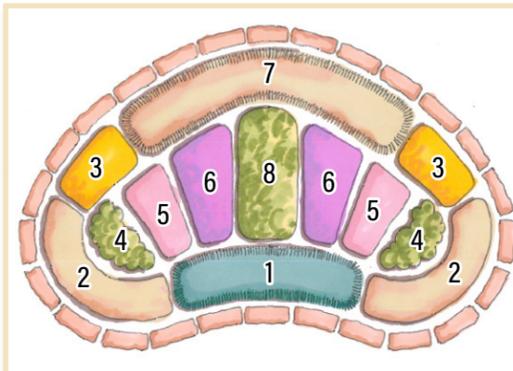
1. Anemone, Canada: Rob Routledge, Sault College, Bugwood.org
2. Aster, Smooth Blue: Katy Chayka, www.minnesotawildflowers.info, Bugwood.org
3. Beardtongue, Foxglove: Jennifer Welch, Polk County Soil and Water Conservation District
4. Bergamot, Wild: Elmer Verhasselt, Bugwood.org
5. Blazing Star, Button (Rough): John D. Byrd, Mississippi State University, Bugwood.org
6. Blazing Star, Prairie: William M. Ciesla, Forest Health Management International, Bugwood.org
7. Bloodroot: Joseph OBrien, USDA Forest Service, Bugwood.org
8. Bluebells, Virginia: Chris Evans, University of Illinois, Bugwood.org
9. Clover, Purple Prairie: Peter Dziuk, Minnesota Department of Agriculture, Bugwood.org
10. Columbine, American: Rob Routledge, Sault College, Bugwood.org
11. Coneflower, Gray-headed Prairie: Derek Namanny, Iowa Department of Agriculture, Bugwood.org
12. Coneflower, Orange: Dow Gardens , Dow Gardens, Bugwood.org
13. Coneflower, Pale Purple: Chris Evans, University of Illinois, Bugwood.org
14. Coneflower, Purple: John Ruter, University of Georgia, Bugwood.org
15. Coreopsis, Prairie: Katy Chayka, www.minnesotawildflowers.info, Bugwood.org
16. Dutchmans Breeches: David Cappaert, Bugwood.org
17. Gentian, Cream: Peter Dziuk, Minnesota Department of Agriculture, Bugwood.org
18. Gentian, Bottle: Steven Katovich, Bugwood.org
19. Geranium, Wild: Ansel Oommen, Bugwood.org
20. Ginger, Wild: Karan A. Rawlins, University of Georgia, Bugwood.org
21. Golden Alexander: Ansel Oommen, Bugwood.org
22. Iris, Blue Flag: Elmer Verhasselt, Bugwood.org
23. Jacobs Ladder: Chris Evans, University of Illinois, Bugwood.org
24. Lobelia, Great Blue: Rob Routledge, Sault College, Bugwood.org
25. Loosetrife, Prairie: Vern Wilkins, Indiana University, Bugwood.org
26. Milkweed, Butterfly: David Cappaert, Bugwood.org
27. Milkweed, Common: Ansel Oommen, Bugwood.org
28. Mint, Virginia Mountain: Katy Chayka, www.minnesotawildflowers.info, Bugwood.org
29. Monkey Flower: Ansel Oommen, Bugwood.org
30. Onion, Nodding: William M. Ciesla, Forest Health Management International, Bugwood.org
31. Petunia, Wild: Rebekah D. Wallace, University of Georgia, Bugwood.org
32. Phlox, Prairie: Katy Chayka, www.minnesotawildflowers.info, Bugwood.org
33. Phlox, Woodland: Chris Evans, University of Illinois, Bugwood.org
34. Prairie Smoke: Dave Powell, USDA Forest Service (retired), Bugwood.org
35. Shooting Star: Jerry A. Payne, USDA Agricultural Research Service, Bugwood.org
36. Sneezeweed: Beverly Turner, Jackson Minnesota, Bugwood.org
37. Solomon's Seed: Charles T. Bryson, USDA Agricultural Research Service, Bugwood.org
38. Spiderwort, Ohio: Elizabeth Moss, West Virginia State University, Bugwood.org
39. Spiderwort, Prairie: Katy Chayka, www.minnesotawildflowers.info, Bugwood.org
40. Susan, Black-eyed: Rob Routledge, Sault College, Bugwood.org
41. Susan, Brown-eyed: Peter Dziuk, Minnesota Department of Agriculture, Bugwood.org
42. Sweet William, Wild: John Ruter, University of Georgia, Bugwood.org
43. Blue Grama: Dave Powell, USDA Forest Service (retired), Bugwood.org
44. Fern, Lady: Chris Evans, University of Illinois, Bugwood.org
45. Fern, Interrupted: Rob Routledge, Sault College, Bugwood.org
46. Fern, Maidenhair: Steven Katovich, Bugwood.org
47. Fern, Ostrich: Ansel Oommen, Bugwood.org
48. Grass Bottlebrush: Rob Routledge, Sault College, Bugwood.org
49. June Grass: Dave Powell, USDA Forest Service (retired), Bugwood.org
50. Little Bluestem: Rob Routledge, Sault College, Bugwood.org
51. Prairie Dropseed: Pat Sauer, Iowa Stormwater Education Partnership, Bugwood.org
52. Sedge, Brown Fox: Rob Routledge, Sault College, Bugwood.org
53. Sedge, Common Wood: Charles T. Bryson, USDA Agricultural Research Service, Bugwood.org
54. Sideoats Grama: Sideoats Grama: Pat Sauer, Iowa Stormwater Education Partnership, Bugwood.org
55. Switchgrass: John Ruter, University of Georgia, Bugwood.org
56. Astilbe, Chinese: <http://www.missouribotanicalgarden.org>.
57. Coralbells, Brandon Pink: <https://vanstonenurseries.com/plants/brandon-pink-coral-bells/>
58. Coralbells, Plum Pudding: <https://www.gardenia.net/plant/heuchera-plum-pudding-coral-bells>
59. Coreopsis, Threadleaf: Rebekah D. Wallace, University of Georgia, Bugwood.org
60. Fern, Japanese Painted: John Ruter, University of Georgia, Bugwood.org
61. Fescue, Elijah Blue: <https://www.gardenia.net/plant/festuca-glauca-blue-fescue-grass>
62. Gaillardia, Fanfare: <https://www.gardenia.net/plant/gaillardia-grandiflora-fanfare>
63. Hosta, Everlasting Love: David Husband, <http://www.hostalibrary.org/e/everlastinglove.html>
64. Hosta, Shirley Levy: Russ O'Hara, <http://www.hostaregistrar.org/detail.php?id=4715>
65. Iris, Siberian: Dow Gardens , Dow Gardens, Bugwood.org
66. Karl Forester's Feather Reed Grass: John Ruter, University of Georgia, Bugwood.org
67. Lilly, Stella De Oro Day: <https://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=d160#Allimages>
68. Pardon Me Daylily: <https://www.gardenia.net/plant/hemerocallis-pardon-me-daylily>
69. Rocket City Daylily: <https://www.gardenia.net/plant/hemerocallis-rocket-city-daylily>
70. Variegated Silver Grass: John Ruter, University of Georgia, Bugwood.org
71. Chokeberry, Black: John Ruter, University of Georgia, Bugwood.org
72. Dogwood, Redosier: Richard Webb, Bugwood.org
73. Redbud, Eastern: Carl Dennis, Auburn University, Bugwood.org
74. Serviceberry: Dow Gardens , Dow Gardens, Bugwood.org
75. Dogwood, Pagoda: Richard Webb, Bugwood.org
76. Hydrangea, Endless Summer 'Blushing Bride': <https://www.whiteflowerfarm.com/63141-product.html>
77. Snowberry, Magic Berry: <https://landscapeplants.oregonstate.edu/plants/symphoricarpos-doorenbosii-magic-berry>
78. Virburnum, Nannyberry: Dow Gardens , Dow Gardens, Bugwood.org

Native Plant Layouts for Sun

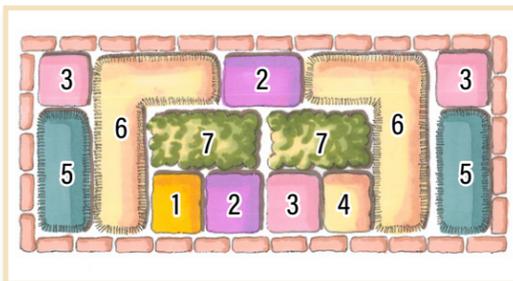
Primary species is provided in bold, followed by a substitution.



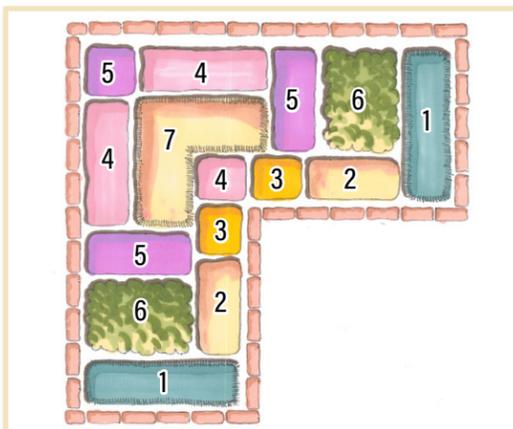
1. **Wild Geranium**, Prairie Smoke
2. **Prairie Dropseed**, Little Bluestem
3. **Bottle Gentian**, Smooth Blue Aster
4. **Foxglove Beardtongue**, Golden Alexander
5. **Monkey Flower**, Black-eyed Susan
6. **Pale Purple Coneflower**, Butterfly Milkweed



1. **Wild Sweet William**, Prairie Smoke
2. **Blue Gramma**, Prairie Dropseed
3. **Mountain Mint**, Purple Coneflower
4. **Black-eyed Susan**, Golden Alexander
5. **Butterfly Milkweed**, Ohio Spiderwort
6. **Prairie Blazing Star**, Grey-headed Coneflower
7. **Culvers Root**, Stiff Goldenrod
8. **Brown-eyed Susan**, Queen-of-the-Prairie



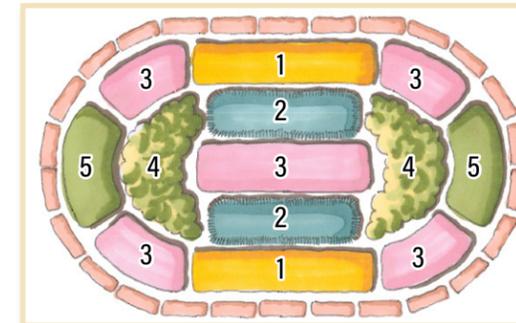
1. **Wild Sweet William**, Prairie Smoke
2. **Smooth Blue Aster**, Bottle Gentian
3. **Brown-eyed Susan**, Black-eyed Susan
4. **Wild Geranium**, Nodding Onion
5. **Foxglove Beardtongue**, Prairie Phlox
6. **Little Bluestem**, Prairie Dropseed
7. **Switchgrass**, Little Bluestem



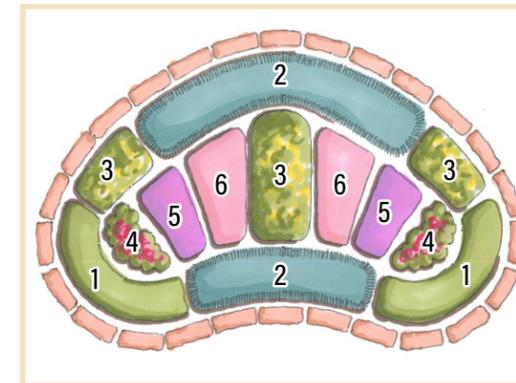
1. **Virginia Bluebells**, Prairie Smoke
2. **Smooth Blue Aster**, Bottle Gentian
3. **Wild Geranium**, Nodding Onion
4. **Monkey Flower**, Black-eyed Susan
5. **Foxglove Beardtongue**, Prairie Phlox
6. **Sideoats Grama**, Butterfly Milkweed
7. **Rough Blazing Star**, Prairie Blazing Star

Native Plant Layouts for Shade

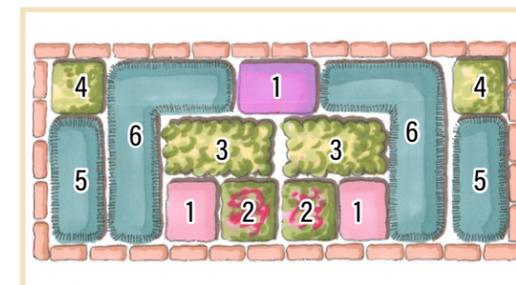
Primary species is provided in bold, followed by a substitution.



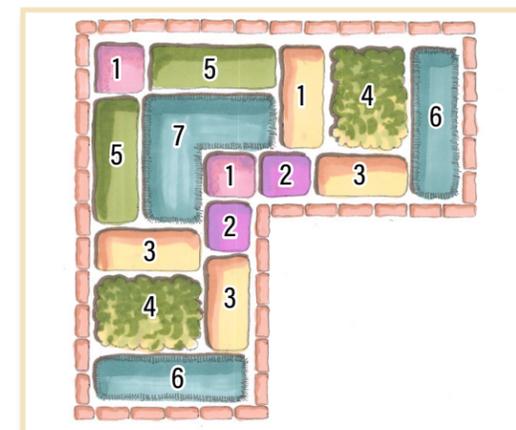
1. **Maidenhair Fern**, Prairie Smoke
2. **Bottlebrush Grass**, Common Wood Sedge
3. **Solomon's Seal**, Interrupted Fern
4. **Wild Geranium**, Jack-in-the-Pulpit
5. **Wild Ginger**, Columbine



1. **Bloodroot**, Wild Ginger
2. **Columbine**, Jacob's Ladder
3. **Fox Sedge**, Common Wood Sedge
4. **Virginia Bluebells**, Wild Geranium
5. **Maidenhair Fern**, Interrupted Fern
6. **Jack-in-the-Pulpit**, Ohio Spiderwort



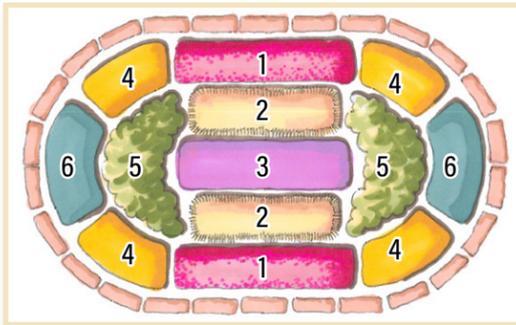
1. **Bloodroot**, Prairie Smoke
2. **Wild Ginger**, Dutchman's Britches
3. **Jacob's Ladder**, Columbine
4. **Lady Fern**, Interrupted Fern
5. **Wild Geranium**, Sweet William
6. **Solomon's Seal**, Jack-in-the-Pulpit



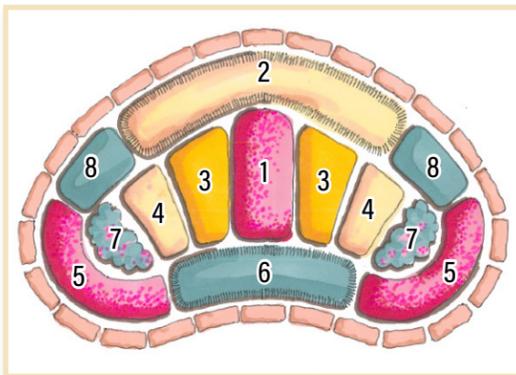
1. **Sweet William**, Ohio Spiderwort
2. **Bloodroot**, Dutchman's Britches
3. **Maidenhair Fern**, Lady Fern
4. **Columbine**, Jacob's Ladder
5. **Wild Geranium**, Virginia Bluebells
6. **Brown Fox Sedge**, Wild Geranium
7. **Solomon's Seal**, Interrupted Fern

Non-Native Plant Layouts for Sun

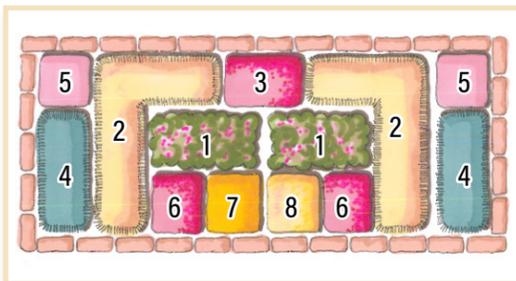
Primary species is provided in bold, followed by a substitution. Native plants and cultivar options can be mixed into non-native plant layouts. Consult your local nursery for additional plant options. Native plants are italicized.



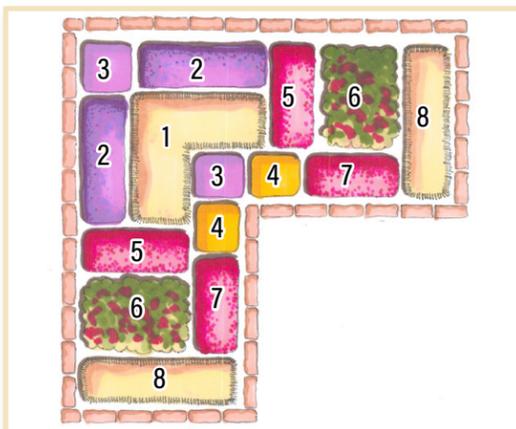
1. Fanfare Gaillardia
2. Variegated Silver Grass
3. *Purple Coneflower*
4. *Butterfly Milkweed*, *Black-eyed Susan*
5. Asiatic Lily (White)
6. Yellow Trumpet Daffodils



1. **Pardon Me Daylily**, Yellow Trumpet Daffodils
2. Karl Foerster's Feather Reed Grass
3. *Butterfly Milkweed*
4. *Black-eyed Susan*
5. Fanfare Gaillardia
6. Elijah Blue Fescue
7. Brandon Pink Coralbells
8. Triumph Tulips



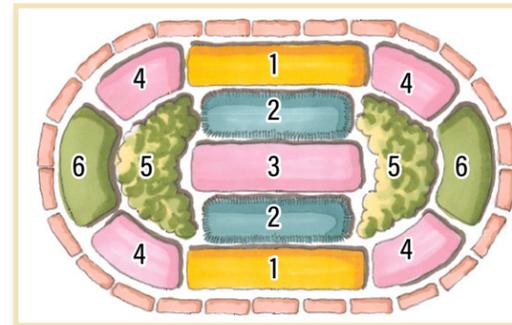
1. Nannyberry Viburnum
2. Karl Foerster's Feather Reed Grass
3. Pardon Me Daylily
4. Elijah Blue Fescue
5. Threadleaf Coreopsis
6. Fanfare Gaillardia
7. **Black-eyed Susan**, Double Early Tulips, Hibiscus
8. *Butterfly Milkweed*



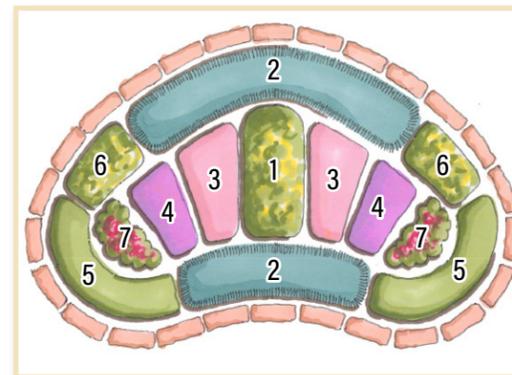
1. Karl Foerster's Feather Reed Grass
2. Threadleaf Coreopsis
3. **Purple Coneflower**, Triumph Tulips
4. Rocket City Daylily
5. Pardon Me Daylily
6. Plum Pudding Coralbells
7. Fanfare Gaillardia
8. *Prairie Dropseed*

Non-Native Plant Layouts for Shade

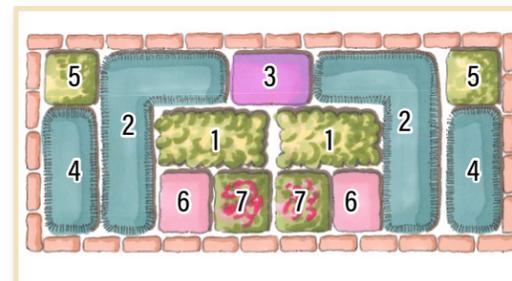
Primary species is provided in bold, followed by a substitution. Native plants and cultivar options can be mixed into non-native plant layouts. Consult your local nursery for additional plant options. Native plants are italicized.



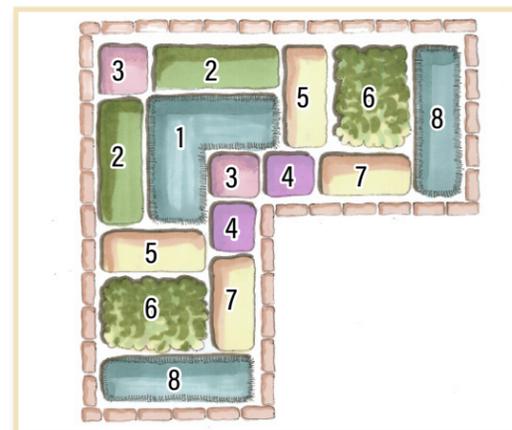
1. *Maidenhair Fern*
2. *Jacob's Ladder*
3. *Solomon's Seal*
4. Chinese Astilbe
5. *American Columbine*
6. Japanese Painted Fern



1. *Brown Fox Sedge*
2. *American Columbine*
3. *Solomon's Seal*
4. Plum Pudding Coralbells
5. Interrupted Fern
6. Shirley Levy Hosta
7. Everlasting Love Hosta



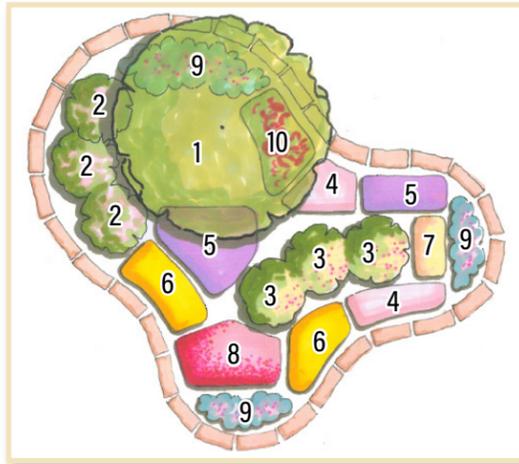
1. Everlasting Love Hosta
2. *Dutchman's Breeches*
3. *Jacob's Ladder*
4. *Lady Fern*
5. Brandon Pink Coralbells
6. Shirley Levy Hosta
7. Chinese Astilbe



1. Everlasting Love Hosta
2. Japanese Painted Fern
3. *Maidenhair Fern*
4. *American Columbine*
5. *Virginia Bluebells*
6. *Jack-in-the-Pulpit*
7. *Dutchman's Breeches*
8. Shirley Levy Hosta

Native Trees, Shrubs, and Plants Layout

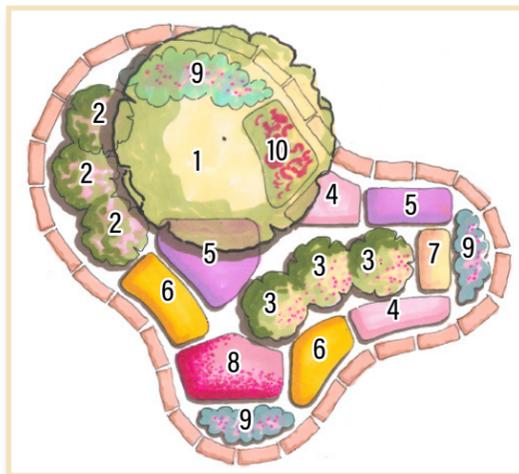
Primary species is provided in bold, followed by a substitution.



1. **Redbud**, Serviceberry
2. Wild Geranium
3. **Red Oster Dogwood**, Black Chokeberry
4. Butterfly Milkweed
5. Jacob's Ladder
6. Wild Petunia
7. Prairie Dropseed
8. Smooth Blue Aster
9. Prairie Smoke
10. Lady Fern

Non-Native Trees, Shrubs, and Plants Layout

Primary species is provided in bold, followed by a substitution. Native plants and cultivar options can be mixed into non-native plant layouts. Consult your local nursery for additional plant options. Native plants are italicized.



1. **Nannyberry Viburnum**, Pagoda Dogwood
2. Magic Berry Snowberry
3. Endless Summer Hydrangea "Blushing Bride"
4. Visions Astilbe
5. May Night Salvia
6. **Black-eyed Susan**, Double Early Tulips
7. Asiatic Lily (White)
8. Pardon Me Daylily
9. Brandon Pink Coralbells
10. Plum Pudding Coralbells

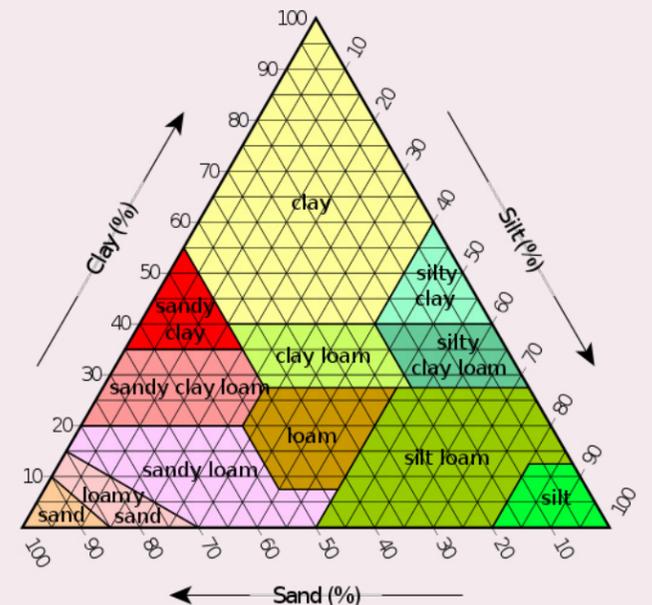
Infiltration Rates for Natural Soil Types

Almost every soil has a certain percentage of sand, silt, and clay. This is referred to as the soil texture. Soil texture plays a role in how fast rain will soak into or percolate through the soil in a rain garden. Water will move through or soak into sandy soils a lot faster than clayey soils. Percolation tests and ribbon tests are used to estimate how fast the water will move through the soils in a rain garden area which influences sizing.

Information is available on estimated infiltration rates and different soil textures. Similar data for percolation rates is not readily available. However, infiltration rates closely mimic percolation rates. The following table relates soil texture to infiltration rates. Sandy soils will have faster infiltration rates in inches per hour and clayey soils will have slower infiltration rates. A textural triangle follows and shows the relationship between the amount of sand, silt, and clay and the soil texture name.

Soil Textures and Minimum Infiltration Rates

Soil Texture	Minimum Infiltration Rates (inches per hour)
Sand	8.27
Sandy Loam	1.02
Loam	0.52
Silt Loam	0.27
Silty Clay Loam	0.06
Clay	0.02



Source: Rawls et al 1982. Infiltration rates provide an estimate of percolation rates.

Soil Amendment Basics

Most rain gardens in Iowa have been constructed with six inches of amended soils. Combining concrete sand, topsoil, and compost enhances rainwater infiltration and percolation and provides an excellent planting media for rain garden plants. These three layers can be placed individually by depth into the rain garden and then tilled together to mix it into an amended soil.

Not all basic rain gardens require the use of amended soils if the native soils have sufficient topsoil and percolation rates. However, a 6-inch layer of amended soils is required for enhanced rain gardens. This guide offers a recommended range for each material placed in an enhanced rain garden. The following table provides a starting point for recommended mixes.

Recommended Amended Soil Mixtures					
Material	Basic Rain Gardens		Suggested Range	Enhanced Rain Gardens	
	Depth (inches)	Material (feet)		Depth (inches)	Material (feet)
Concrete Sand	3 ½ (58%)	0.29	75-90%	4 ½ (75%)	0.375
Topsoil	2 (~33%)	0.17	0-25%	1 (17%)	0.083
Compost	½ (8%)	0.04	0-10%	½ (8%)	0.04

Previous editions of this guide have recommended a higher percentage of compost in amended soil mixtures. New research on phosphorus export from rain gardens in the past decade has led rain garden experts to lower the suggested amount of compost. While phosphorus is naturally-occurring, additional nutrient runoff from a rain garden can negatively impact local waterbodies and ecosystems.

Appendix H estimates the total quantity of each material in pounds (lbs.), tons, and cubic yards (cu. yds.). In most circumstances, topsoil and concrete sand are sold as tons while compost and mulch are typically sold in cubic yards. Some materials, depending on the size of the rain garden, can be bought by the bag. If this is the case, divide the weight of the bag by the total weight of the material in pounds generated in Appendix H. This will yield the minimum number of bags that should be purchased for the rain garden installation.

Throughout this guide, a 6-inch layer of amended soils is used for both basic and enhanced rain gardens. While uncommon, some designers may choose to design an amended soil layer greater than 6 inches. If this is the case, 0.5 (half of a foot), will not be used for calculations in Appendix H. For example, if an 8-inch layer is designed, calculations in Appendix H should utilize 0.66 as the depth of the amended soil layer (8/12=0.66). The table shown above assumes a 6-inch layer for both basic and enhanced rain gardens.

Basic Rain Garden Design Review Checklist

Applicant: _____ **Date:** _____

Submitted By: _____ **Project Location:** _____

- 1) Complete Appendix **F**, **G**, and **H** - Sizing Worksheet, Cross Section, and Materials List.
- 2) Attach a map of the drainage area, plan view, planting plan, and plant list.
- 3) Discuss soils investigation findings (i.e. soil type, texture, structure, depth to water table, etc.).

- 4) Describe any pretreatment techniques provided (what practice(s) was used, how were things sized, etc.).

- 5) Describe the overflow (i.e. stand pipe, notch in berm, etc.)

- 6) Spacing and size of plants _____
- 7) If seeding was done, describe type and quantity of seed used and the rate that was applied (i.e. lbs/ac or per 1,000 SF).

- 8) Separation distance from nearest foundation _____. If less than 10 ft, describe water proofing methods. _____
- 9) Please describe the Erosion and Sediment Control measures employed if the drainage area is not stabilized or the rain garden is not planted and stabilized immediately: _____

FOR REVIEWERS USE ONLY

Design appears to comply with the standards in the Iowa Rain Garden Design and Installation Guide and the Iowa Stormwater Management Manual.		Yes	No
Comments: _____ _____ _____			
Reviewer Name: _____		Date: _____ Signature: _____	

Enhanced Rain Garden Design Review Checklist

Applicant: _____ **Date:** _____

Submitted By: _____ **Project Location:** _____

- 1) Complete Appendix **F**, **G**, and **H** - Sizing Worksheet, Cross Section, and Materials List.
- 2) Attach a map of the drainage area, plan view, planting plan, and plant list.
- 3) Discuss soils investigation findings (i.e. texture, degree of compaction, percolation potentials, depth to water table, contamination, etc.). _____

- 4) Describe any pretreatment techniques provided (what practice(s) was used, how were things sized, etc.). _____

- 5) Describe where water exits the solid outlet pipe: _____

- 6) Describe how the water leaves the rain garden when it exceeds ponding depth (i.e. stand pipe, notch in berm, etc.): _____

- 7) Separation distance from nearest foundation _____. If less than 10 ft, describe water proofing methods. _____
- 8) Spacing and size of plants _____
- 9) If seeding was done, describe type and quantity of seed used and the rate that was applied (i.e. lbs/ac or per 1,000 SF). _____

- 10) Please describe the Erosion and Sediment Control measures employed if the drainage area is not stabilized or the rain garden is not planted and stabilized immediately: _____

Design appears to comply with the standards in the Iowa Rain Garden Design and Installation Guide and the Iowa Stormwater Management Manual. Yes No

Comments: _____

Reviewer Name: _____ Date: _____ Signature: _____

FOR REVIEWERS USE ONLY

Rain Garden Sizing Worksheet

Project Name: _____

Installation Date: _____

Step 1: Estimate Impervious Drainage Area

1a. What is the total surface area of the contributing roof section(s)?	ft ²
1b. What is the total surface area of the contributing driveway, sidewalk, or other impervious areas?	ft ²
1c. Total Impervious Surface Area = Step 1a + Step 1b	ft ²

Step 2: Estimate Pervious Drainage Area

2a. What is the contributing area of lawn upslope of the rain garden?	ft ²
2b. Has Soil Quality Restoration (SQR) been completed at the rain garden location?	Yes No
If "Yes" to step 2b, ignore Step 2 altogether. If SQR has been performed at the project site, then the lawn area will not contribute runoff to the rain garden. If "No" to Step 2b, multiply Step 2a by 0.5.	
2c. Total Pervious Surface Area = Step 2a x 0.5	ft ²

Step 3: Calculate Total Drainage Area

3a. Total Impervious Surface Area from Step 1	ft ²
3b. Total Pervious Surface Area from Step 2	ft ²
3c. Total Drainage Area = Step 3a + Step 3b	ft ²

Step 4: Selecting Footprint Area Percentage

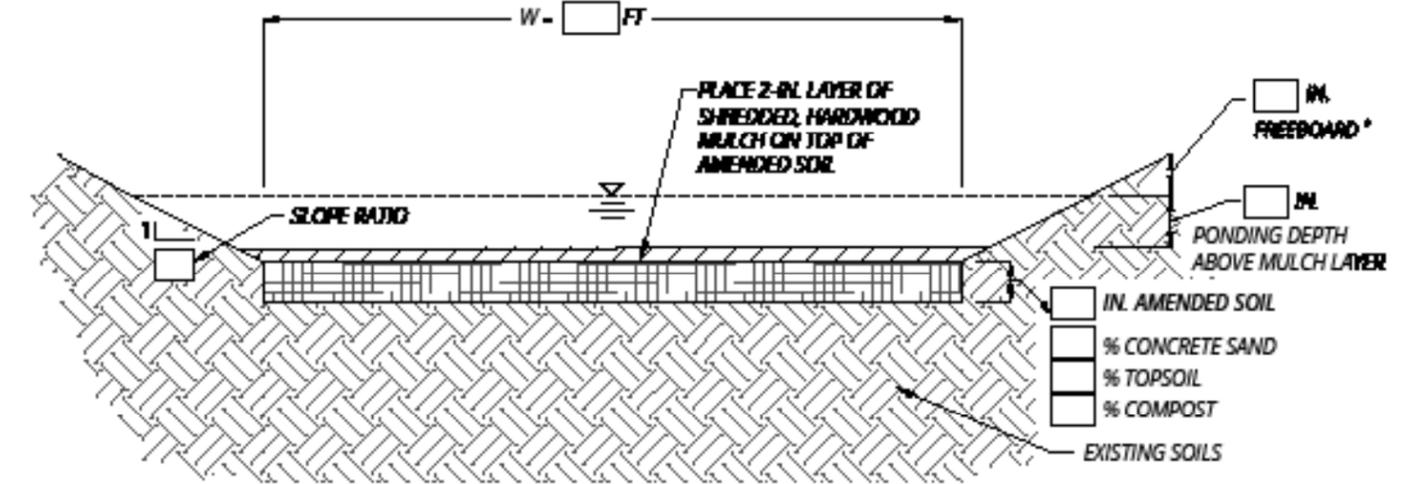
4a. Are you constructing a Basic Rain Garden (BRG) or an Enhanced Rain Garden (ERG)?	BRG	ERG
4b. What was the calculated percolation rate at the rain garden site?	inches/hour	
4c. What is the desired ponding depth?	6"	9" 12"
4d. Footprint of Rain Garden Area per Sizing Table Recommendation (shown below)	%	

Percolation Rate	Ponding Depths	Footprint Area %	Footprint Area Decimal
> 0.5 inches per hour	Enhanced Rain Garden	5%	.05
>= 1.0 inch per hour	Basic Rain Garden with 6" Ponding Depth	10%	.10
	Basic Rain Garden with 9" Ponding Depth	7%	.07
	Basic Rain Garden with 12" Ponding Depth	5%	.05
0.5 - 0.99 inch per hour	Basic Rain Garden with 6" Ponding Depth	21%	.21
	Basic Rain Garden with 9" Ponding Depth	14%	.14
	Basic Rain Garden with 12" Ponding Depth	10%	.10
< 0.5 inch per hour	Bioretention Cell (Follow ISWMM Guidance)	~3% - 4%	.03 - .04

Step 5: Calculate Footprint of Rain Garden Area

5a. Footprint of Rain Garden = (Step 3c Total) x (Step 4d Decimal) <i>Required surface area of proposed rain garden in order to manage WQv</i>	ft ²
5b. Temporarily Impounded Water by 1.25" Rainfall Event Total drainage area SF (3c) x 1.25 x 0.623 = gallons _____ gallons x 0.1337 = cubic feet	gallons ft ³

Basic Rain Garden Cross Section



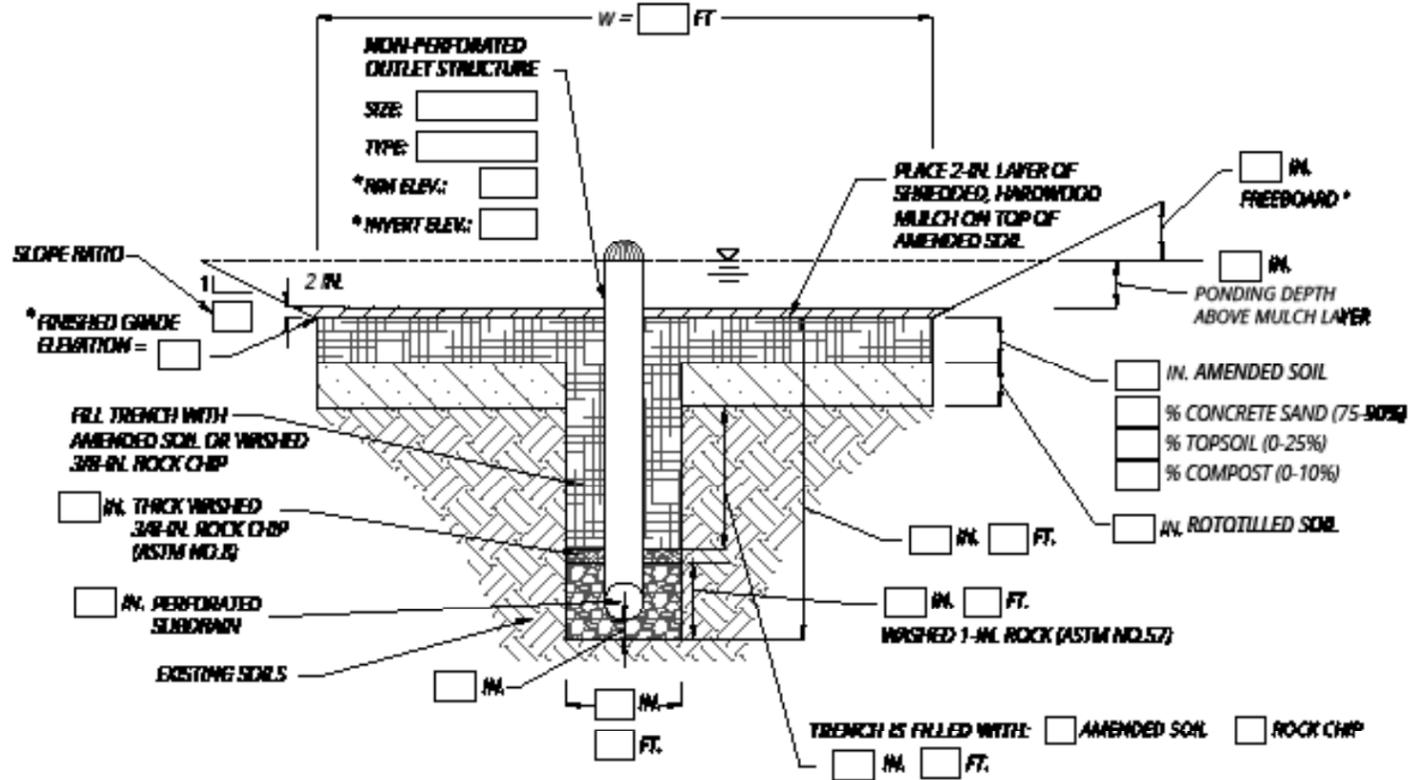
RAIN GARDEN AREA
L [] FT x W [] FT = [] FT²

BASIC RAIN GARDEN
NOT TO SCALE

SOILS NOTE
- AMENDED SOIL LAYER WILL BE INSTALLED
[] (Y/N)

* FREEBOARD IS THE ELEVATION DIFFERENCE BETWEEN THE OUTLET AND THE TOP OF THE BERM (OR HIGHEST ELEVATION OF THE RAIN GARDEN EDGE).

Enhanced Rain Garden Cross Section



ENHANCED RAIN GARDEN

NOT TO SCALE

* IF KNOWN, OTHERWISE LEAVE BLANK
 → FREEBOARD IS THE ELEVATION DIFFERENCE BETWEEN THE OUTLET AND THE TOP OF THE BERM (OR HIGHEST ELEVATION OF THE RAIN GARDEN EDGE).

RAIN GARDEN AREA
 L FT x W FT = FT²

Basic Rain Garden Materials List

Topsoil (Suggested **0.5** ft [6 in.] Amended Soil Layer = **0.33** [33%] of Mixture = 2 in. Layer of Topsoil)

ft² (rain garden SF) x ft = ft³ x % Mix (decimal) = ft³ / 27 = cubic yards (cu yd)
 cu yd x 2,400 lbs. = lbs. / 2,000 = tons

Compost (Suggested **0.5** ft [6 in.] Amended Soil Layer = **0.08** [8%] of Mixture = ½ in. Layer of Compost)

ft² (rain garden SF) x ft = ft³ x % Mix (decimal) = ft³ / 27 = cubic yards (cu yd)
 cu yd x 1,200 lbs. = lbs. / 2,000 = tons

Concrete Sand (Suggested **0.5** ft [6 in.] Amended Soil Layer = **0.58** [58%] of Mixture = 3 ½ in. Layer of Sand)

ft² (rain garden SF) x ft = ft³ x % Mix (decimal) = ft³ / 27 = cubic yards (cu yd)
 cu yd x 3,000 lbs. = lbs. / 2,000 = tons

Shredded Hardwood Mulch (Suggested **0.17** ft [2 in.] Depth)

ft² (rain garden SF) x ft (mulch depth) = ft³ / 27 = cubic yards (cu yd)
 ft² (SF of berm & slopes, if applicable) x ft (mulch depth) = ft³ / 27 = (cu yd)

TOTAL MULCH: cu yd (base) + cu yd (berm/slopes) = **total cubic yards (cu yd)**

Edging

Type of Edging _____ Approximate Linear Feet _____

Vegetation

The rain garden square footage only accounts for the flat bottom of the rain garden. If plants are desired for the side slopes and berms, measure the total square footage of the area to calculate needed plants. Spacing options include 1 plant per square foot, 1 plant per 1.5 square foot, and 1 plant per 2 square feet.

1 plant per square foot 1 plant per 1.5 square foot 1 plant per 2 square feet

ft² (basic rain garden SF) / ft² (average plant spacing) = total plants

ft² (SF of berms & slopes, if applicable) / ft² (average plant spacing) = total plants

Enhanced Rain Garden Materials List

"Mix" refers to the amended soil mixture used in enhanced rain gardens.

TOPSOIL (Suggested 0.5 ft [6 in.] Amended Soil Layer = 0.17 [17%] of Mixture = 1 in. Layer of Topsoil)

Mix: _____ ft² (rain garden SF) x _____ ft = _____ ft³ x _____ % Mix (decimal) = _____ ft³ / 27 = _____ cu yd

*Trench: L _____ ft x W _____ ft x D _____ ft = _____ ft³ x _____ % Mix (decimal) = _____ ft³ / 27 = _____ cu yd

* Complete if subdrain trench is filled with amended soils.

TOTAL TOPSOIL: _____ cu yd (mix) + _____ cu yd (trench) = _____ **total cubic yards (cu yd)**

_____ total cu yd x 2,400 lbs. = _____ **total lbs.** / 2,000 = _____ **total tons**

COMPOST (Suggested 0.5 ft [6 in.] Amended Soil Layer = 0.08 [8%] of Mixture = 1/2 in. Layer of Compost)

Mix: _____ ft² (rain garden SF) x _____ ft = _____ ft³ x _____ % Mix (decimal) = _____ ft³ / 27 = _____ cu yd

*Trench: L _____ ft x W _____ ft x D _____ ft = _____ ft³ x _____ % Mix (decimal) = _____ ft³ / 27 = _____ cu yd

* Complete if subdrain trench is filled with amended soils.

TOTAL COMPOST: _____ cu yd (mix) + _____ cu yd (trench) = _____ **total cubic yards (cu yd)**

_____ total cu yd x 1,200 lbs. = _____ **total lbs.** / 2,000 = _____ **total tons**

CONCRETE SAND (Suggested: 0.5 ft [6 in.] Amended Soils = 0.75 [75%] of Mixture = 4 1/2 in. Sand Layer)

Mix: _____ ft² (rain garden SF) x _____ ft = _____ ft³ x _____ % Mix (decimal) = _____ ft³ / 27 = _____ cu yd

*Trench: L _____ ft x W _____ ft x D _____ ft = _____ ft³ x _____ % Mix (decimal) = _____ ft³ / 27 = _____ cu yd

* Complete if subdrain trench is filled with amended soils.

TOTAL CONCRETE SAND: _____ cu yd (mix) + _____ cu yd (trench) = _____ **total cubic yards (cu yd)**

_____ total cu yd x 3,000 lbs. = _____ **total lbs.** / 2,000 = _____ **total tons**

CHOKER ROCK (Suggested Choker Layer: 0.17 ft [2 in.] Depth, Trench Depth from Cross Section in feet)

Choker Layer: L _____ ft x W _____ ft x D _____ ft (depth) = _____ ft³ / 27 = _____ cubic yards

*Trench: L _____ ft x W _____ ft x D _____ ft (depth) = _____ ft³ / 27 = _____ cubic yards

* Complete if subdrain trench is filled with rock.

TOTAL CHOKER ROCK: _____ cu yd (choker layer) + _____ cu yd (trench) = _____ **total cubic yards (cu yd)**

_____ total cu yd x 3,000 lbs. = _____ **total lbs.** / 2,000 = _____ **total tons**

WASHED ROCK (Suggested 0.83 ft [10 in.] Depth)

Trench: L _____ ft x W _____ ft x D _____ ft (depth) = _____ ft³ / 27 = _____ cubic yards

TOTAL WASHED ROCK: _____ cu yd (trench) = _____ **total cubic yards (cu yd)**

_____ total cubic yards x 3,000 lbs. = _____ **total lbs.** / 2,000 = _____ **total tons**

SHREDDED HARDWOOD MULCH (Suggested 0.17 ft [2 in.] Depth)

Surface Layer: _____ ft² (rain garden SF) x _____ ft (depth) = _____ ft³ / 27 = _____ cubic yards

Berm/Slopes: _____ ft² (SF of berm & slopes, if applicable) x _____ ft (depth) = _____ ft³ / 27 = _____ cu yd

TOTAL MULCH: _____ cu yd (surface layer) + _____ cu yd (berm/slopes) = _____ **total cubic yds**

Subdrain and Overflow Structure

Subdrain Material _____ Approximate Linear Feet _____

Overflow Stand Pipe Material _____

Solid Outlet Pipe Material _____ Approximate Linear Feet _____

Animal Guard? Yes No

Edging

Type of Edging _____ Approximate Linear Feet _____

Vegetation

The rain garden square footage only accounts for the flat bottom of the rain garden. If plants are desired for the side slopes and berms, measure the total square footage of the area to calculate needed plants. Spacing options include 1 plant per square foot, 1 plant per 1.5 square foot, and 1 plant per 2 square feet.

1 plant per square foot 1 plant per 1.5 square foot 1 plant per 2 square feet

_____ ft² (enhanced rain garden SF) / _____ ft² (average plant spacing) = _____ total plants

_____ ft² (SF of berms & slopes, if applicable) / _____ ft² (average plant spacing) = _____ total plants

▼ **Project Notes**

A large grid for project notes, consisting of 18 columns and 24 rows. A north arrow is located in the top-left corner of the grid, with the letter 'N' below it.

□ = _____

▼ Maintenance Checklist

Project Name:

Installation Date:

Inspection Point	Maintenance Activity	Maintenance Schedule
Inlet, Outlet, Pre-Treatment Area	Remove litter, trash, and accumulated sediment	Annually, spring or fall and after major rainfall events
	Repair, re-armor with rocks, erosion control blankets, or mats, and revegetate area if erosion is present	As needed
	Maintenance Completed: Year 1 Year 2 Year 3 Year 4+	
	Notes:	
Base of Rain Garden	Remove litter, trash, and debris	Annually, spring or fall and after major rainfall events
	Spread mulch evenly, 2-3" thick throughout	Annually, spring or fall
	If surface is plugged by sediment, find and eliminate source of sediment, then replace amended soils, re-plant and mulch. If the surface has been compacted, till the soils, re-plant and mulch.	As needed
	Maintenance Completed: Year 1 Year 2 Year 3 Year 4+	
Berm and/or Retaining Wall	Rebuild and compact berms in areas that have sunk over time or have blown out. Make sure there is a stabilized, notched out area for overflows from large rainfall events.	Inspect annually, repair as needed
	Remove bricks and rebuild retaining wall from lowest level, and level bricks at each course	Inspect annually, repair as needed
	Maintenance Completed: Year 1 Year 2 Year 3 Year 4+	
	Notes:	

Inspection Point	Maintenance Activity	Maintenance Schedule
Newly Established / Young Plants	Supplement plantings if at less than 75% vegetative cover	Inspect at end of first growing season, replant as needed
	Remove dead vegetation, maintain some winter habitat for pollinators	Annually, spring or fall
	Water young plants regularly until root systems have established, plants should receive around 1" of water per week	As needed depending on weather patterns
	Pull weeds and invasive species, avoid use of herbicides if possible	Monthly during first 3 years after installation
	Maintenance Completed: Year 1 Year 2 Year 3 Year 4+	
Established / Mature Plants	"Deadhead" non-native flowering plants at the end of blooming period, cut back perennials several inches above base	Annually, depending on species
	General pruning of healthy plants	Annually, fall or early winter
	Replace diseased or dead plants. Dig out or prune back volunteer trees. Herbicide treatment will be needed if the tree roots are not removed.	As needed
	Maintenance Completed: Year 1 Year 2 Year 3 Year 4+	
Overflow Structure (Enhanced Rain Gardens Only)	Remove debris and trash from overflow grate, within pipe, and at the outlet where the enhanced rain garden daylight	Annually, spring or fall and after major rainfall events
	Maintenance Completed: Year 1 Year 2 Year 3 Year 4+	
	Notes:	