

## **Example Plan for Using Native Plantings for Storm Water Infiltration**

The following information is provided to serve as a general guide for establishing native plantings especially for storm water infiltration. It has been compiled from information provided by staff at Retzer Nature Center – Waukesha County Department of Parks and Land Use. It is not intended to replace the guidance that would be provided by contracting with a qualified professional to prepare a site-specific plan and to direct or perform the plan implementation. It is assumed that:

- The site is a typical subdivision, with site grading operations starting in early summer.
- The topsoil is stripped and stockpiled, the infiltration areas are rough graded, the topsoil is reapplied, and the basins are then planted.

A separate outline is available upon request that discusses sites where no earth-moving is planned. That outline places more emphasis on weed-suppression prior to planting.

Site preparation is key to a successful planting, including the removal of invasive or nonnative species.

Following basin construction, if possible, keep the basin off-line for a growing season, to give the plants a chance to germinate and become established. Ways to do this include use of diversion swales or berms coupled with sediment traps, and conveying water from the pre-treatment BMP through the infiltration area via a temporary pipe.

### **Phase I - Site Preparation**

**1<sup>st</sup> year** June – Topsoil stripping and rough grading are completed. Infiltration basins are rough graded, but runoff is diverted around the basins. (*Note: To avoid soil compaction, minimize use of heavy equipment on basin bottom, especially with rubber tires.*)

### **Phase II – Planting**

At this point two options are available:

**Option 1:** Topsoil is reapplied and the native planting is performed starting with the procedures outlined in Clean/Firm Seed Bed and proceeding with the rest of the outlined steps. If this option is chosen, it is imperative that effective erosion control measures are implemented on the rest of the site.

**Option 2:** Topsoil is reapplied and the site is planted with an annual cover crop (annual rye or oats). Native planting will occur in the fall starting with the procedures outlined in Seed Drill Planting.

1. **Clean/Firm Seed Bed:** The seedbed needs to be clean and relatively firm before planting. The best seedbed will be free of sticks, grass clumps, and rocks. You can plant over some of these if your equipment will make it past them. It will also be level and firm. Planting over disked soil can work well if the disking is not too deep. If the soil has been deeply disked or tilled, seeds may settle too deep for new shoots to reach the surface. If the soil is too loose, a roller or cultipacker is required to compact the bed. If the area is small, vehicle tires will do the same job. This whole procedure is about achieving good seed-to-soil contact.
  - a. **Equipment:** Tractor with rock bucket/rock picker/hydraulic rake for removing rocks. A roller or cultipacker implement is needed for compaction. A 4-wheel drive vehicle may be used to pack an area.
  - b. **Other:** If time permits, allowing the weeds to germinate (preferably twice), and spraying with herbicide may reduce the weed seed bank, and reduce the amount of post-planting weed suppression will need to be done.
  
2. **Seed Drill Planting:** If your site contains few problem weeds, you can save a few steps by planting with a seed drill or slit seeder. After you have accomplished initial weed control, **and wait 2 weeks** to be certain it is safe to plant after spraying, you may plant using a seed drill without having to till up the soil
  - a. **Timing:**
    1. SPRING-May through August 10 for warm season species.
    2. FALL- Again in November through seasonal ground frost. **Wait 2 weeks after herbicide application.**
  - b. **Equipment:** Tractor and a Truax seed drill/slit seeder pull-behind implement.
  - c. **Seed rates:** Seeding rates and mixes shall conform to WisDOT Roadway Standard Section 630.
  - d. **Other:** You may drill over a disked/cultipacked prepared bed if you wish. A seed drill will pack the soil over the furrows as it goes. There is no need to cultipack afterwards.
  
3. **Broadcast Seeding:** This method requires fresh, open soil to be successful. Seed is dispersed by hand or by machine as evenly as possible over the prepared ground. You need to **wait a minimum of 2 weeks** after herbicide application.
  - a. **Timing:**
    1. SPRING- May through August 10 for warm season species.
    2. FALL- Again in late October and November through seasonal ground frost. **Wait 2 weeks after herbicide application.**
  - b. **Equipment:** Tractor/truck and Truax Wildflower Seeder/salt spreader/inverted cone spreader/etc.

- c. Mixing: Hand-cleaned contain much chaff and pappus (fluff) with the seeds. With most seeding equipment, hand-cleaned seed needs to be mixed with about the same amount (by volume) of moist sand. Torpedo sand is a good size for this. After mixing, plant immediately as the moisture will cause seeds to germinate if left too long with the sand.
  - d. Seed rates: Seeding rates and mixes shall conform to WisDOT Roadway Standard Section 630.
  - e. Other: The Truax Wildflower Seeder will cultipack behind it as you plant.
4. **Straw**: This can add to your plant survival rate. We suggest weed-free straw. **DO NOT USE HAY**. Hay contains enough seeds to cause problems with your planting. Landscape netting is expensive but also works well. It is especially useful and necessary on steep slopes.
- a. Timing: Immediately after you plant. Do this before you cultipack.
  - b. Equipment: Mostly by hand but tailgate straw mulcher/blowers do exist.
  - c. Rate: 1.5 tons/acre, per WDNR CPS 1058.
5. **Cultipacking**: This further improves germination and survival rates by providing better seed-to-soil contact. It also presses/crimps straw into the seedbed.
- a. Timing: Immediately after you plant (or immediately after you apply straw).
  - b. Equipment: Tractor and cultipacker/roller/crimper. A 4-wheel drive vehicle may also be used to pack an area.

### **Phase III – Establishment**

Native perennials put all their growing efforts below ground for the first few years. Moving cover crops and weeds in the first two years ensures they get enough sun and are not crowded out.

1. **Post-planting**: Management of a new planting requires diligent stand-wide cutting for the first two growing seasons. Most prairie species will remain very low to the ground in the first few years. This mowing gives them the light they need and reduces weed competition.
  - a. Timing: Variable. Whenever plants (**any** plants) are 18 inches tall.
  - b. Mowing height: 4-6 inches in the first growing season, 6-8 inches in the second growing season.
  - c. Equipment: Adjustable lawn mower or Tractor/Skid Steer/ASV with Flail/Woods/Davco mower.
  - d. Other: Mow in the second year even if the majority of the vegetation is comprised of planted natives. These

are likely early succession plants and many late succession species still need help competing at this stage.

- e. Watering: If germination is followed by inadequate rainfall, watering will be necessary to prevent loss of the plantings. Be prepared to truck water or to put a pump in a forebay or other water source.
2. **2<sup>nd</sup> year** May – Bring basins on-line, assuming rest of site is well-stabilized. Sediment from home construction can still damage basins, and enforcement by building inspectors of the residential erosion control requirements may help limit sedimentation.
    - a. Throughout growing season – Mow basins at 4-6 inch height to suppress weeds.
    - b. Assessment of plantings by Landscape Architect (LA) or qualified professional. (**See Marker Species discussion below**).
  3. **3<sup>rd</sup> year** May/June – Mow basins at 6- 8 inch height. Spot-spray. Assessment of plantings and determine if on correct trajectory.
  4. **4<sup>th</sup> year** April / May – Prescribed burn. Burning should be done at this point and once every 3-4 years in the future. The intent is to stimulate plant reproduction and flowering vigor. If you cannot or do not wish to burn you can perform a **simulated burn**. This is accomplished by mowing the planting as low to the ground as possible without hitting the soil surface. Be sure to remove the cuttings. Do not leave them to create a mulching effect.
  5. Verification of plantings by LA or qualified professional. (**See Marker Species discussion and Line Intercept and Subjective Evaluation Methodologies discussion below**).
  6. **Long-Term Maintenance:**
    - o Invasive Weed Control: This is the most important. Control of species such as Common Buckthorn, Glossy Buckthorn, Purple Loosestrife, Wild Parsnip, etc. is critical to prevent the planting from being dominated by exotics.
    - o Burning: Once every 3-4 years to stimulate reproduction and flowering vigor.
    - o Simulated Burning: If you cannot or do not wish to burn, you can mow the area during the dormant season (we recommend April) as low as you can without hitting the soil surface. Be sure to remove your cuttings. Do not leave them to create a mulching effect.
    - o Note: In order to avoid disrupting nesting activities for grassland bird species, it is recommended to avoid burning or mowing activities from May 15 through August 1.

## Considerations

**Plant Plugs:** Planting plugs gives quicker results than planting from seed. A site may be well established after two years by plant plugs instead of three or four for areas that are seeded. Plant spacing should be about one per square foot. However, plugs are generally more costly than seed, and for larger sites the use of plugs may not be affordable. *Plugs will require at least weekly watering for the first couple of months, especially in sandy or engineered soils*, unless adequate water is provided by precipitation.

**Persistent Herbicides:** If the land has been cropped, test the soil as early as possible for persistent herbicides such as Atrazine, unless it can be proven that persistent herbicides have not been used. If atrazine has been used, prairie plantings should not be attempted until 18 to 24 months after the most recent application. Starting at 18 months, soil samples should be tested for the herbicide, and test seeding may be attempted using annual rye, radishes, or native species to see if there are any lingering effects.

**Seed Mix Composition:** Native plantings for storm water infiltration function by trying to simulate the vegetative diversity that existed across the landscape prior to settlement. Although it is not necessary to establish all of the native plants that may have previously existed on a given site, it is vital to use a mixture of plant species to allow for site-specific limitations and provide visual appeal. A mixture of grasses, sedges, and rushes along with the more showy wildflowers results in a native planting that can withstand the periodic saturations it will receive as a storm water management practice. Over time, the plants will “sort themselves out” resulting in a functional storm water infiltration device that is also pleasing to look at.

Commercially available mixes can be obtained from vendors specializing in native plant species establishment. These mixes often contain at least 12-15 different species of wildflowers (forbs) and another 5-6 species grasses, sedges, and rushes. Most of these mixes also contain a nurse crop of annual rye that provides quick cover on a site but will not compete with the native species as the planting matures. If a seed mix is going to be customized for a given site, it must contain (at a minimum) 3 grasses, sedges and rushes and a minimum of 12 wildflowers.

If it is decided not to use a commercially available seed mixture, it is important that a proper ratio of grasses to wildflowers (forbs) be specified for reasons listed above. The grasses generally provide good weed fighting ability and promote infiltration. The wildflowers provide visual appeal and function well as “marker species” described in more detail below. In general it is recommended that seed mixes specify the following ratios:

Grasses/sedges/rushes – Maximum 60%/ Minimum 10%  
Wildflowers (Forbs) – Maximum 90%/Minimum 40%

In some areas it may be desirable to add trees and shrubs to the infiltration plantings. Trees and shrubs can be utilized to provide additional plant diversity, wildlife habitat benefits and add visual appeal. Species selected should be able to tolerate periodic saturation and drought. Future maintenance methods (i.e. burning, mowing, etc.) will need to consider the needs of these species as well. Species planted in loamy or clayey soils will generally need to be water-tolerant plants. Species planted in sandy or engineered soils will need to be more drought-tolerant, prairie plants that thrive in dry soils.

Seeding rates and mixes shall be specified in the planting plan. Seeding rates shall generally conform to WisDOT Roadway Standard Section 630.

**Marker Species:** Some species of native plants are fairly easy to establish and are also fairly easy to identify. For these reasons they serve well as “marker species” that can serve a vital role in the establishment of a planting for storm water infiltration. These are plants that are likely to flower in the short-term that provide a very visible indication if the planting took at all. Please note the **Suggested Species** section below. Marker species are in bold and show the year in which they should bloom. (**Note: This is the growing season in which they should bloom**). If an area is planted in the fall of 2014, 2015 is the first growing season even though it is the second year. Most commercially available seed mixes already contain a number of the indicated “marker species.” If a seed mix is going to be customized for a given site, it should specify a minimum of 6 marker species with at least 2 being from the grasses/sedges/rushes and the remainder being forbs.

**SUGGESTED SPECIES**

This list is a sample of the types of plants that are adapted to survive in the varying moisture regimes provided by infiltration practices for storm water management. Since this list is merely a sample of the types of native plants available, it is recommended that a professional be consulted when preparing the restoration plan for a given project site. This list is intended for a basin with loamy soils. For a site with sandy soil or an engineered soil mix, a selection of more dry soil- or drought-tolerant species should be considered, omitting wet-soil species.

**Forbs**

<u>LATIN</u>	<u>COMMON</u>	<u>MARKER YEAR</u>
<i>Asclepias incarnata</i>	Marsh Milkweed	
<i>Aster laevis</i>	Smooth Blue Aster	
<i>Aster lucidulus</i>	Swamp Aster	
<b><i>Aster novae-angliae</i></b>	<b>New England Aster</b>	<b>3</b>
<i>Aster simplex</i>	Marsh Aster	
<i>Eryngium yuccifolium</i>	Rattlesnake Master	
<i>Eupatorium maculatum</i>	Joe Pye Weed	
<i>Eupatorium perfoliatum</i>	Boneset	

<i>Gentiana alba</i>	Creamy Gentian	
<i>Gentiana andrewsii</i>	Bottle Gentian	
<b><i>Helenium autumnale</i></b>	<b>Sneezeweed</b>	<b>3(2)</b>
<i>Helianthus grosseserratus</i>	Sawtooth Sunflower	
<b><i>Heliopsis helianthoides</i></b>	<b>Early Sunflower</b>	<b>2</b>
<i>Liatris pycnostachya</i>	Prairie Blazing Star	
<i>Lycopus americanus</i>	Cut-leaved Horehound	
<b><i>Monarda fistulosa</i></b>	<b>Wild Bergamot</b>	<b>3</b>
<b><i>Oenothera biennis</i></b>	<b>Evening Primrose</b>	<b>2</b>
<i>Pedicularis lanceolata</i>	Swamp Lousewort	
<i>Pycnanthemum virginianum</i>	Virginia Mountain Mint	
<b><i>Ratibida pinnata</i></b>	<b>Gray-headed Coneflower</b>	<b>3</b>
<b><i>Rudbeckia hirta</i></b>	<b>Black-eyed Susan</b>	<b>2(1)</b>
<i>Rudbeckia laciniata</i>	Green-headed Coneflower	
<b><i>Rudbeckia subtomentosa</i></b>	<b>Sweet Black-eyed Susan</b>	<b>2</b>
<b><i>Rudbeckia triloba</i></b>	<b>Brown-eyed Susan</b>	<b>2(1)</b>
<i>Silphium integrifolium</i>	Rosin Weed	
<i>Silphium laciniatum</i>	Compass Plant	
<i>Silphium terebinthinaceum</i>	Prairie Dock	
<i>Solidago juncea</i>	Early Goldenrod	
<i>Solidago ohioensis</i>	Ohio Goldenrod	
<i>Solidago patula</i>	Fen Goldenrod	
<i>Solidago riddellii</i>	Riddell's Goldenrod	
<i>Solidago speciosa</i>	Showy Goldenrod	
<i>Thalictrum polygamum</i>	Tall Meadow Rue	
<b><i>Verbena hastata</i></b>	<b>Blue Vervain</b>	<b>2</b>
<i>Veronia fasciculata</i>	Ironweed	
<i>Veronicastrum virginicum</i>	Culver's-root	
<i>Zizia aurea</i>	Golden Alexanders	

**Grasses, Sedges and Rushes**

<u>LATIN</u>	<u>COMMON</u>	<u>MARKER YEAR</u>
<b><i>Andropogon gerardii</i></b>	<b>Big Bluestem</b>	<b>3</b>
<i>Andropogon scoparius</i>	Little Bluestem	
<i>Carex bebbii</i>	Bebb's Sedge	
<i>Carex hystericina</i>	Porcupine Sedge	
<i>Carex stipata</i>	Common Fox Sedge	
<b><i>Elymus canadensis</i></b>	<b>Canada Wild Rye</b>	<b>2</b>
<b><i>Elymus virginicus</i></b>	<b>Virginia Wild Rye</b>	<b>2</b>
<i>Juncus torreyii</i>	Torrey's Rush	
<i>Muhlenbergii mexicana</i>	Mexican Satin Grass	
<i>Panicum virgatum</i>	Switchgrass	
<i>Scirpus atrovirens</i>	Green Bulrush	

*Spartina pectinata*

Prairie Cord Grass

**Tree and Shrubs (may not be planted on berms)**

**LATIN**

**COMMON**

*Alnus incana*

Speckled Alder

*Amelanchier* sp.

Serviceberry

*Aronia* sps.

Chokeberry

*Carpinus caroliniana*

Musclewood

*Celtis occidentalis*

Hackberry

*Cephalanthus occidentalis*

Buttonbush

*Cornus stolonifera (sericea)*

Red Osier Dogwood

*Diervilla lonicera*

Dwarf Bushhoneysuckle

*Gymnocladus dioica*

Kentucky Coffeetree

*Ilex verticillata*

Winterberry

*Physocarpus opulifolius*

Ninebark

*Quercus bicolor*

Swamp White Oak

*Sambucus canadensis*

Elderberry

*Spirea alba*

Meadowsweet

*Spirea tomentosa*

Steeplebush

*Thuja occidentalis*

Arborvitae

*Viburnum trilobum*

Highbush Cranberry

## Evaluation of a Vegetative Stand Establishment for Storm Water Infiltration

In order for the storm water infiltration practices to function as intended, it is vital that the plant species identified in the seed mix become well established. In addition, return of the financial assurance collected from the permit holder is contingent upon verification of planting success by a professional qualified to evaluate percent cover and species diversity. A successful planting will have at least 70% cover and at least four of the species included in the approved restoration plan by the end of the third growing season. Ultimately it is the obligation of the permit holder to retain a professional whose qualifications have been accepted by LRD staff to verify the success of a native planting establishment for both percent vegetative cover and intended species diversity.

### Line Intercept Methodology

**Line Intercept Method:** This method is also known as the transect method. The first step in using this methodology is to establish a centerline through the approximate middle of the infiltration practice. Transects are then laid out perpendicular to the centerline and should be regularly spaced with a minimum of 8 transects per acre. Transects may be performed using a cord with knots or other markers at one-foot intervals or utilizing a tape measure. Transect length should be a minimum of 20 feet (10 feet on either side of the centerline). Using the markers on the transect cord or the one-foot intervals on the tape measure, the verifier shall note whether the marker was physically touching a plant from the approved planting list and state the species. At the end of sampling, percent coverage shall be calculated by dividing the total number of plants from the planting list on all transects by the number of markers on all transects. A location map showing the transects sampled and a list of plant species found at each marker site along with any observations of potential future maintenance concerns must be submitted with the planting verification letter.

