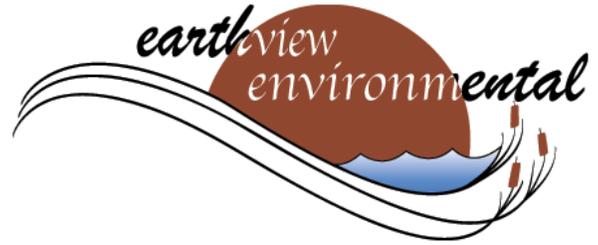


October 26, 2015

Mayor and City Council
City of University Heights
City Hall 1004 Melrose Ave
Iowa City, Iowa 52246



RE: OUP East Ravine Restoration

To The Mayor and City Council of University Heights:

At the request of the City of University Heights and Jeff Maxwell, Developer, I have completed a review of the proposed ravine restoration plan for the OUP East Ravine. On the morning of 10/20/2015, Mr. Maxwell and myself met onsite along with Josiah Bilskemper, City Engineer, Mayor Louise From, and Council Member Silvia Quezada. Also attending were residents David Shriver, Larry Wilson, Pat Yeggy and Ken Yeggy. After some discussion, we concluded that there were three issues the group wanted me to address in my review. Those concerns include:

- Light Pollution and Screening
- Erosion/slope grade
- Vegetation Restoration Plan

Concern 1: Light Pollution and Screening

Based on discussions, the developer will have his landscape architect (Confluence) design a planting plan which addresses light pollution. Our field discussion led to a consensus that evergreens, such as arborvitae, would be placed along the north side of the development exit drive to sunset to screen vehicle lights. The evergreen screen would also serve to separate the urban landscape of the development from the native plantings in the ravine.

Currently there is a grouping of three (3) trees on the southeast corner of the ravine which provide some additional screening. On the current plan provided by MMS Consultants, the design shows them protected with a retaining wall. It is worth noting:

- 1) Tree species include 2 hackberry and 1 black walnut (See Photos 1-3)
 - a) One of the hackberries has had one of its branches recently removed. Both hackberries are 10-12 inches in diameter. This species is one of our most common trees and is a moderately fast growing tree.
 - b) The largest tree is a walnut with a diameter of approximately 24". It has had several large branches removed and one large branch is split, possibly due to wind.
- 2) These trees were impacted during construction. In addition to some recent branch removal, there is a good chance that the roots of those trees were impacted by construction activities such as the installation of the storm sewer and compaction within the dripline/root zone. Soil compaction is the single largest killer of urban trees.
- 3) The proposed retaining wall is needed in order to keep fill away from the trees and to keep the three trees standing. However, it is possible and likely that those trees are stressed and may die in the near future.

My background and experience is not in structural engineering, therefore my review does not address the viability or constructability of the retaining wall. I understand the desire for the city, the developer and the neighbors to preserve as many trees as possible. However, I would urge the group to reconsider installing a retaining wall to protect trees that do not have a good chance for long term survival. Another option is to allow those trees to be removed and modify the slope to a more stable, manageable grade. Additional evergreen trees could be planted along Sunset Street to provide screening until newly planted native trees are established in the ravine.



Photo: 3



Photo: 1

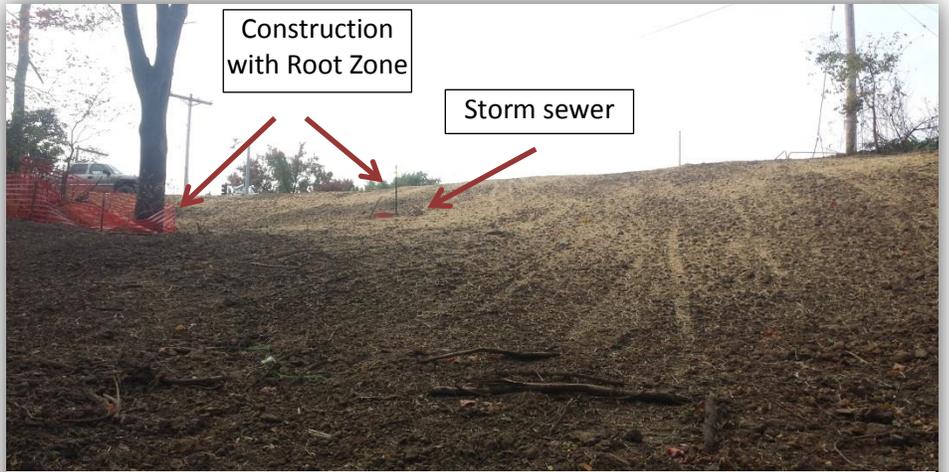


Photo: 2

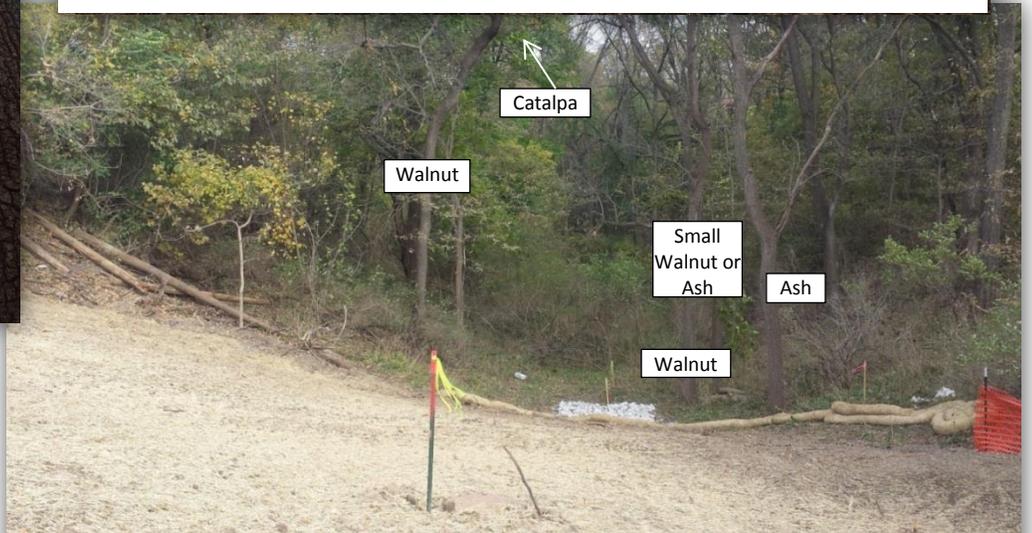


Photo 4:

Concern 2: Erosion/slope grade

Preserving trees while controlling erosion and achieving a manageable slope were two of the goals expressed by the city engineer, the council representatives, the neighbors and the developer. Initially, I was provided with a proposed plan showing a 2.5:1 slope. I also reviewed two other grading plan options with slopes at a 4:1 and 3:1.

Proposed 2.5:1 Slope:

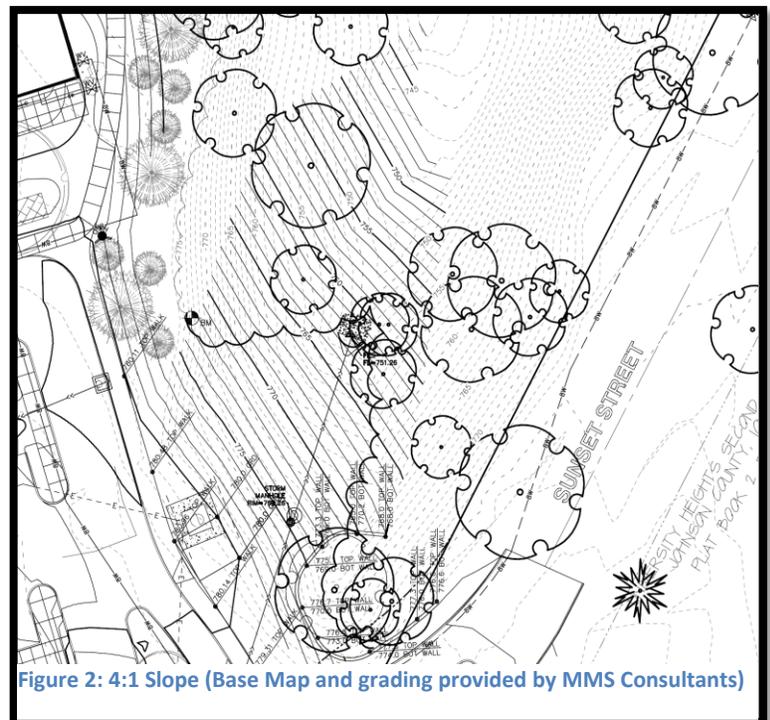
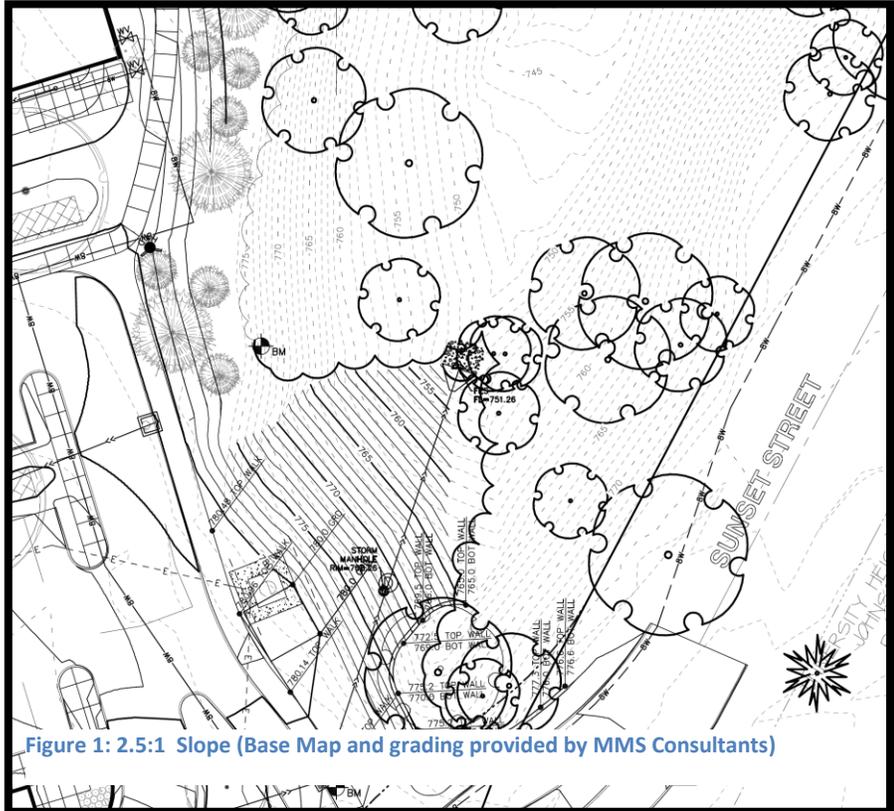
The proposed plan shows a 2.5:1 slope with a retaining wall protecting three (3) trees in the southeast corner and no additional trees to be removed. It is worth noting that there will be some tree removal along the west slope following the remove of “junk” along the bank.

2.5:1 slopes can be difficult to stabilize, but can be done with fabric to control erosion. Establishing vegetation, especially native vegetation, can be difficult because a 2.5:1 slope is NOT considered a “mowable” slope. To establish native plants with seeding, the area needs to be mowed in order to control weeds. If the area cannot be mowed, controlling weeds will need to be done by hand. To establish a native planting from seed takes a minimum of 3 years. Long term maintenance to control weeds is needed.

In summary, this plan meets the goal of keeping trees, but the proposed slope is steep. I recommend this option ONLY if the desire to keep the trees outweighs the desire of easier short and long term management of the site.

Option 1: 4:1 Slope:

This would be the most stable of the three options. The slope could be mowed to control weeds to help with the establishment of new trees and shrubs. However, as you can see in Figure 2, a 4:1 slope will require at least six (6) medium to large trees to be removed including a large Catalpa tree with a significant canopy (Photo 4). The roots of other trees may be impacted if grading occurs within the drip line of the trees. This meets the goal of having a stable slope but does not meet the second goal of protecting trees because it removes a large tree with a large canopy.



Option 2: 3:1 Slope:

For this option, the slope would not be “mowable” but would be more stable than the 2.5:1. Four Trees would need to be removed. Those trees include ashes and smaller walnuts. The Ash trees will most likely be impacted by the Emerald Ash borer in the near future and walnuts are fairly quick growing and there are many other walnuts in the area. They are also small enough and at a low elevation, with many other surrounding trees, so removing them would not significantly alter the canopy, as visible from the road. In summary this would remove some trees, but would provide a more stable slope than that proposed. If this level of tree removal is acceptable, I recommend the site graded at a 3:1 slope. We recommended at least 4” of topsoil be placed along the slope. Following seed bed preparations, the slope should be seeded with a temporary seed mix of Winter Wheat (*Triticum aestivum*) at a rate of 10lbs per acre along with the recommended permanent seed mix (see below). Caution: No other erosion stabilization mix other than the winter wheat should be used as it will hinder the establishment of native vegetation. We recommend the use of erosion control matting following the temporary seed and permanent seed mix.

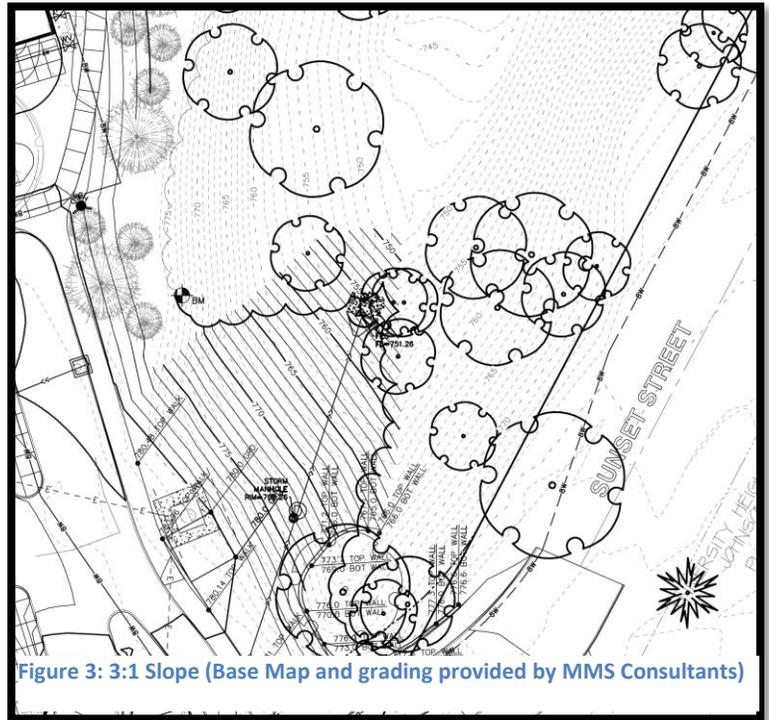


Figure 3: 3:1 Slope (Base Map and grading provided by MMS Consultants)

Concern 3: Vegetation Restoration Plan

For the re-vegetation of the ravine, I recommend the following native trees and shrubs from the list below. The developer’s landscape architect can work with the list to develop a planting plan OR they can contract the services to us at EVE. We recommend planting 80% trees and 20% shrubs. For spacing, I recommended planting 3 shrubs grouping with each shrub spaced 3 feet apart and each grouping spaced 25 feet apart. For the tree spacing, I recommend 1 tree every 25 feet. Standard best management practices should be used for planting, including the installation of fabric and mulch.

Note, EVE has experienced better long-term success with planting smaller tree sizes (<1” diameter) especially with natives, such as hickories, which have a large tap root. It takes longer for larger transplanted trees to become established due to the longer time required to reestablish a root. We have had the most success with trees less-than 1 inch in diameter and less-than 4 feet in height. Therefore, a smaller size is preferred over larger ball and burlap trees. Cages and/or tubes should be added to protect from deer and small rodents. Maintenance of cages/tubes is required. Exact locations should be flagged in the field by the designer. If vegetation is present, the flagged areas may be sprayed by hand with herbicide 7-10 days prior to planting. Caution, many times nursery provides non-native substitutions or varieties (nativars). Planting materials should come from a native nursery source and species should be verified on-site to insure that natives specified are planted.

Trees - Total 80%

- 20% White Oak (*Quercus alba*)
- 20% Bur Oak (*Quercus macrocarpa*)
- 20% Hackberry (*Celtis occidentalis*)
- 20% Shagbark Hickory (*Carya ovata*)

Shrubs – Total 20%

- 4% Highbush Cranberry (*Viburnum trilobum*)
- 4% Witch-hazel (*Hamamelis virginiana*)
- 4% American Hazelnut (*Corylus americana*)
- 4% Spicebush (*Lindera benzoin*): **low elevations in wet soils**
- 4% Indigo Bush (*Amorpha fruticosa*): **low elevations in wet soils**

Following standard best management practices for seed bed preparations, the area should be seeded with the temporary (cover crop) and permanent mix. The seed should be mixed thoroughly using ten parts moist sand to one part seeds. Mixing seeds in this manner ensures an even broadcast and minimizes waste. Seeding rate should be at the rate specified by the supplier (see recommended mix below). The seed can be hand cast or broadcast using equipment. This site is too steep to be mechanically drill seeded. Given the timing of construction, a dormant seeding (October through December) is recommended. Dormant seeding allows the freeze/thaw processes to work the seeds into the ground.

A Tallgrass woods edge or Savanna Seed Mix from Prairie Moon Nursery is recommended (see below). For seed order information and more information on establishing a native plant community see this website at <https://www.prairiemoon.com/seed-mixes/tallgrass-woods-edge-savanna.html>

| Tallgrass Woods Edge Savanna Seed Mix © | | | |
|---|----------|--|-----------------|
| | | Seeding Rate : 117 seeds / sq. ft. lbs per Acre : 9.69 lbs / acre | |
| WILDFLOWERS | | WILDFLOWERS (continued) | |
| Species | % by wt. | Species | % by wt. |
| Agastache nepetoides (Yellow Giant Hyssop) | 1.29 | Rudbeckia subtomentosa (Sweet Black-eyed Susan) | 0.64 |
| Aster laevis (Smooth Blue Aster) | 1.42 | Rudbeckia triloba (Brown-eyed Susan) | 1.29 |
| Aster prenanthoides (Crooked-stemmed Aster) | 1.29 | Scrophularia lanceolata (Early Figwort) | 0.77 |
| Aster sagittifolius (Arrow-leaved Aster) | 0.64 | Scrophularia marilandica (Late Figwort) | 1.29 |
| Cacalia muehlenbergii (Great Indian Plantain) | 0.97 | Smilacina racemosa (Solomon's Plume) | 7.09 |
| Camassia scilloides (Wild Hyacinth) | 2.58 | Veronicastrum virginicum (Culver's Root) | 0.97 |
| Campanula americana (Tall Bellflower) | 1.93 | Zizia aurea (Golden Alexanders) | 3.87 |
| Coreopsis tripteris (Tall Coreopsis) | 0.71 | Total % by wt. WILDFLOWERS : | 52.92% |
| Desmodium illinoense (Illinois Tick Trefoil) | 1.29 | GRASSES, SEDGES & RUSHES | |
| Echinacea purpurea (Purple Coneflower) | 4.35 | Species | % by wt. |
| Eupatorium purpureum (Sweet Joe Pye Weed) | 1.40 | Andropogon gerardii (Big Bluestem PLS) | 2.58 |
| Gaura biennis (Biennial Gaura) | 1.29 | Bromus kalmii (Prairie Brome PLS) | 5.80 |
| Gentiana flavida (Cream Gentian) | 1.39 | Bromus pubescens (Hairy Wood Chess PLS) | 10.32 |
| Heliopsis helianthoides (Early Sunflower) | 1.42 | Elymus canadensis (Canada Wild Rye PLS) | 7.74 |
| Napaea dioica (Glade Mallow) | 5.80 | Elymus hystrix (Bottlebrush Grass PLS) | 5.16 |
| Penstemon digitalis (Foxglove Beardtongue) | 1.42 | Elymus villosus (Silky Wild Rye PLS) | 7.74 |
| Polygonatum biflorum (Solomon's Seal) | 4.26 | Elymus virginicus (Virginia Wild Rye PLS) | 7.74 |
| Pycnanthemum verticillatum var. pilosum (Hairy Mountain Mint) | 0.97 | Total % by wt. GRASSES, SEDGES & RUSHES : | 47.08% |
| Rudbeckia hirta (Black-eyed Susan) | 2.58 | | |



To ensure success of any native, or non-native planting, short-term and long-term maintenance is required. We recommend a qualified vegetation manager/maintenance provider who specializes in the establishment of native plants be hired to manage the vegetation within the ravine area. The area outside the ravine (proposed arborvitae, for example) would be maintained along with the more conventional vegetation. I have attached a BMP that EVE hands out to contractors. The following maintenance is recommended for the ravine area:

Maintenance

- 1) Faster growing herbaceous species will need to be trimmed back occasionally; especially those that threaten to shade the slower growing trees.
- 2) During the first and second growing seasons, the vegetation should be mowed regularly to a height of 10 to 12 inches, where possible. Subsequent years should be mown once a year.
- 3) In the Spring, the trees and shrubs should be monitored to evaluate their conditions and determine if there has

been any winter damage due to harsh conditions, deer, other animals or other. Replace damaged/dead shrubs as needed.

- 4) Once per month during the growing season of the first two years.
 - a) Make adjustments and/or repairs to tree/shrub cages/tubes and manipulate branches so they don't grow improperly through spaces in the cages/tubes. Remove vegetation around bases.
 - b) Monitor mulch depth and condition. Note any areas of erosion.
 - c) Weeds and invasive species shall be sprayed or mechanically removed.
 - d) Remove Trash.
 - e) Repair damage/erosional issues as needed.
 - f) Add additional mulch as needed to control weeds and retain moisture.
 - g) Areas disturbed should be reseeded with the specified seed mix.
 - h) Other required maintenance as needed.
- 5) To ensure establishment and long term management of the area, we recommended that at the end of the two years of monitoring/management, an adaptive management plan be submitted to the City identifying updates to the monitoring and maintenance plan.

Summary

In summary, I was asked to address 3 main concerns. The following is a quick summary of those concerns and my comments/recommendations:

| Concerns | Comments/Recommendations |
|-------------------------------|--|
| Light Pollution and Screening | <p>The developer's Landscape Architect (Confluence) can come up with a planting plan which addresses light pollution.</p> <p>A 7' retaining wall is proposed to protect one large walnut and two hackberries. They have been impacted by wind/storm events and construction activities so their long term viability is uncertain. Unless the desire to keep those trees is very strong, I recommend the trees be removed and that the slope be modified to a more stable, manageable grade. Additional evergreen trees could be planted along Sunset Street to provide screening until newly planted native trees are established in the ravine.</p> |
| Erosion/slope grade | <p>The proposed 2.5:1 slope does not require removal of any additional trees, however that is a steep slope and more difficult to maintain long term. A 4:1 slope would be preferred, but would remove a large tree with a large leaf canopy. A 3:1 slope would only remove a few trees low in the landscape and would provide a more stable, manageable slope. Anything steeper than a 4:1 would need to be mowed with a hand held brush cutter.</p> |
| Vegetation Restoration Plan | <p>Native trees and shrubs are recommended with a native seed mix. Recommending a minimum of 2-years of maintenance with an adaptive management plan provided to the city by the end of the second growing season (year two).</p> |

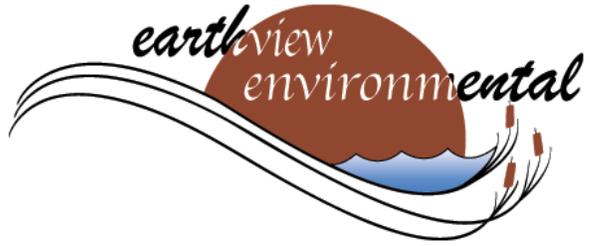
The overall goal is to restore the ravine to a stable and natural condition while addressing light pollution. I have provided my comments and recommendations with some options. The options address additional removal of trees in exchange for gentler, more manageable slopes which would make establishment of native plants and long term management of the area easier and more cost effective.

Please let me know if you have any questions, comments or concerns.

Sincerely,


Judith E. Joyce, PWS & Geologist
EarthView Environmental Inc.

Attachment: EVE - Native Seeding Establishment BMP



EarthView Environmental Inc. (EVE) Native Seeding Establishment Best Management Practices

General Practices

- Site monitoring by EVE should be conducted at regular & frequent intervals during the first 1-2 growing seasons.
- ALWAYS sweep off ALL equipment before entering a native establishment area.
 - Pickup trucks, tractors, mowers, sprayers, booms, ATVs, etc.

Communications

- Ground condition can change very rapidly, necessitating rapid mobilization.
- Clear, concise, & timely communication needed between:
 - Monitors, Inspectors, Contractors, & Operators.
 - We are all responsible to keep communication lines open and active.

Seeding

- The PREPARED seed bed must be inspected by EVE not more than 1 week before seeding is conducted.
- Use fresh (less than 2 years old) seed from reputable & widely-recognized sources.
- Drill Seeding
 - Use a recognized NATIVE seed drill with an agitator in the hopper.
 - Examples: Truax Native Grass Drill, John Deere Rangeland Drill.
 - Never drill seed deeper than 1/8" depth.
 - For small to medium size plantings, filler is needed (moist sawdust) in the hopper.
 - Not for use when seeding less than 1 acre of contiguous area.
- Broadcast Seeding (with hopper or by hand)
 - Mix seed thoroughly using ten parts moist sand to one part seed to aid in distribution.
 - Use crisscross pattern wherever possible.
 - Compact surface after seeding wherever possible using a roller or cultipacker.
- Seed with a nurse crop (one only), type-dependent on season:

| | Spring Plantings April - May | Summer Plantings June - August | Dormant (Nurse crop optional) October - March |
|---|--|--|---|
| Oats (<i>Avena sativa</i>) | 20lbs/acre | 20lbs/acre | Not used. |
| Winter Wheat (<i>Triticum aestivum</i>) | Not used | Not used | 10 lbs./acre |

Mowing

Timing frequency and height of mowing in early years of prairie establishment is CRITICAL, but is also highly variable depending on many factors, such as: predominance of weedy species and which species, predominance of native species and which species, recent rainfall or drought conditions, seasonal timing and level of establishment. It is up to the site inspector/monitor to determine when mowing is needed, and at what height. Basic guidelines are:

- Timing is critical to hinder weedy seed production.
 - Frequency may vary from every 2 weeks to 2 months dependent on conditions.
- Sweep BEFORE entering a native planting, sweep off mower deck and tractor.
- Sweep AFTER mowing a patch of weeds in a native planting, move the equipment to a safe road, field or ditch and sweep it before returning to any native planted areas.
- When mowing adjacent weedy or non-native areas, the following are critical to reducing spread of weed seed:
 - FINISH one area BEFORE moving into the other.
 - Do not mow in and out of the native planting.
 - Clean the mower deck before entering the native planting.
 - Be aware of the wind and where it is blowing weed seed, just like herbicide drift.
- Mower deck height should be based on current field conditions, optimizing damage to weedy species while minimizing damage to natives. GENERALLY:
 - Never below 8". Raise higher if ground is uneven to avoid scalping.
 - First Year Plantings - 10-12"
 - Second Year Plantings - 14-20"
 - Third Year - only individual weed patches or dormant season mowing should be needed.
- Trimmers, Brush Cutters, or Hand Mowers may be required in some instances for finer levels of control.

Herbicide Application

- Sweep all tractors and booms before entering a Native Planting.
- Avoid drift & be aware of surrounding assets:
 - Some plantings have trees planted IN and AROUND them. Be aware that you may be liable for replacement of trees if your chemical drifts onto or otherwise affects them.
- Chemical persistence.
 - Do not use herbicides or additives that may hinder future plantings; coordinate with EVE.
- Aquatic Safe
 - Many of our plantings are IN or AROUND wetland areas. The applicator is responsible for knowing if the chemical is being used appropriately and in conformance with the label.
- No Substitutions & Adjuvants
 - NO SUBSTITUTIONS or additions (dyes, surfactants, etc.) without prior approval from EVE.