Module 23: Revegetation

[§77.456(5)]

23.1 Soil Test Plan

Provide a soil test plan for determining plant nutrients and soil amendments required to establish vegetation and achieve the approved postmining land use.

Example: Soil samples will be collected using a soil auger. A composite sample will be obtained from individual core samples from each type of existing land use. These samples will be analyzed by Blank Laboratory using "Soil Mailing Kits", or another accredited laboratory.
Overburden Soils will be utilized for final reclamation and for establishing a growing media for vegetative cover. Prior to redistribution of overburden soils the regraded land will be scarified to eliminate slippage surfaces and to promote root penetration. Overburden soils will be redistributed to achieve a uniform thickness consistent with the plan in all respects. Wind and/or water erosion shall be avoided. A hand auger shall be used to gather samples of the redistributed overburden, and delivered to the Penn State University Soils Lab. The website that lists the procedures to complete the sampling is as follows: https://extension.psu.edu/don't-guess-soil-test. Resuts of such testing will be provided to the Department.

23.2 Temporary Cover. Provide the following information for each seed mixture to be used for temporary cover:

Example: Standard Seed Mixture

Seed Mixture No.	Seed Mixture (Species)	Rate of Appl. 100% PLS* (lbs./acre)	Seeding Dates (Months)
B	*Annual Ryegrass*	*40*	*Early spring till Late fall*
	If storage areas are to be left longer than one growing season the following will be used: Perennial Ryegrass	*10*	

a)

Seed Mixture No.	Seed Mixture (Species)	Rate of Appl. 100% PLS* (lbs./acre)	Seeding Dates (Months)
1TC	Annual Ryegrass	40	Early spring - May 30 and August 10 - September 15
	Small Grain	50	"
	Perennial Ryegrass	10	"

* PLS means pure live seed. PLS is the product of the percentage of pure seed times percentage germination divided by 100.

b) Use.
The above mixture shall be used for the temporary stabilization of constructed berms, embankments or any disturbed area that is not to be re-affected for longer than 20 days.

c) Method(s) of seeding.
Hydroseeding or broadcast seeding, depending on the weather condition.

d) How seedbed will be prepared for planting.
Soil will be loosened by discing, harrowing, or other stanfdard methods.

e) Type(s) of mulch to be used and rate(s) of application.
Example: Hay or straw at a rate of 2 ½ tons per acre.
Hydro mulch at a rate of 2 tons per acre.

23.3 Permanent Cover. [Insert standard seed mixture option(s)] Provide the following information for each seed mixture to be used for permanent cover: (Note: Key to Exhibit 18)

a)

Seed Mixture No.	Seed Mixture (Species)	Rate of Appl. 100% PLS* (lbs./acre)	Seeding Dates (Months)
A	ERNMX-181 Native Steep Slope Mix w/ Annual Ryegrass or equivalent	See Attached detail sheet	March, April, May Aug 10 to Sep 15
or			
or			
D	Johnstone Fescue	15	March, April, May
	Birdsfoot Trefoil (low growing variety)	6	Aug 10 to Sep 15
	Red Top	3	
	Annual Ryegrass	4	
1PC	Perennial Ryegrass	10	Early spring - May 30 and August 10 - September 15
	Annual Ryegrass	5	"
	Timothy	5	"
	White Clover	3	"
2PC	Orchardgrass (Steep slopes only)	5	"
	Birdsfoot trefoil (Steep slipes only)	5	"

* PLS means pure live seed. PLS is the product of the percentage of pure seed times percentage germination divided by 100.

b) Use.
The berms required by West Donegal Township shall be planted in accordance with 23.3 immediately upon construction, No Temporary Cover required. Apply to the remainder of the quarry area as required.

c) Method(s) of seeding.
Hydroseeding or broadcast seeding, depending on the weather condition.

d) How seedbed will be prepared for planting.
Soil will be loosened by discing, harrowing or other standard methods. The soil suplements recommended by the Soil Test results will be incorporated into this activity.

e) Type(s) of mulch to be used and rate(s) of application.
Hay or straw at a rate of 2 ½ tons per acre.
Any prime farmland soil areas will be mulched with 3 tons/acre of straw or hay.
Hydro mulch at a rate of 2,500 pounds /acre.

23.4 Woody Plants. [Insert standard stocking species option(s)] For areas that will also be planted with woody plants, provide the following: (**Note**: Key to Exhibit 18)

a)

Woody Plant Mixture No.	Woody Plant Species	No./ac.
1WP	Crab Apple (5%) Eastern White Pine (15%) Northern Red Oak (15%) Norway Spruce (15%) Yellow Poplar (15%)	600 plants per 1.5 acre (14' x 4600' grid)
2WP	Black Cherry (10%) Sugar Maple (10%) Red Bud Crab Apple	100 plants per acre "
3WP	Black Locust (hydro seed)	0.5 lb. per acre

See 23.3 Permanent Cover – seed mixture D for grasses to be used with these woody plants.

b) Method of planting.
Black Locust shall be hydroseeded. Bareroot evergreens, hardwoods, and flowering tree seedlings will be planted by hand. 1WP, 2WP, and 3WP WOODY PLANT MIXTURES SHALL ONLY BE USED ON THE FRONT FACE OF THE WEST DONEGAL TOWNSHIP REQUIRED BERM. APPROXIMATELY 14' X 4600' OR 1.5 ACRES. Intersperse 2WP within the 1WP. Hydroseed the front face of the berm with 3WP as a final step.

c) If the area is to be planted for wildlife habitat, identify the grouping and distribution of the plants.
N/A

23.5 Cropland. For areas that will be planted to crops (agronomic or horticultural), identify the crops to be grown and the management plans to achieve the crop yield standards. (**Note**: Key to Exhibit 18: Land Use and Reclamation Map)
N / A

Ernst Conservation Seeds
8884 Mercer Pike
Meadville, PA 16335
(800) 873-3321 Fax (814) 336-5191
www.ernstseed.com

Date: May 01, 2024

Native Steep Slope Mix w/Annual Ryegrass - ERNMX-181

	Botanical Name	Common Name	Price/Lb
29.00 %	*Andropogon gerardii, 'Southlow'-MI Ecotype*	Big Bluestem, 'Southlow'-MI Ecotype	10.80
20.00 %	*Lolium multiflorum*	Annual Ryegrass	1.20
15.00 %	*Sorghastrum nutans, PA Ecotype*	Indiangrass, PA Ecotype	15.22
13.40 %	*Elymus virginicus, Madison-NY Ecotype*	Virginia Wildrye, Madison-NY Ecotype	9.96
6.60 %	*Elymus canadensis*	Canada Wildrye	13.02
4.80 %	*Panicum virgatum, 'Shawnee'*	Switchgrass, 'Shawnee'	12.10
4.00 %	*Agrostis perennans, Albany Pine Bush-NY Ecotype*	Autumn Bentgrass, Albany Pine Bush-NY Ecotype	16.80
2.80 %	*Panicum clandestinum, Tioga*	Deertongue, Tioga	22.08
1.00 %	*Rudbeckia hirta*	Blackeyed Susan	31.20
0.70 %	*Coreopsis lanceolata*	Lanceleaf Coreopsis	28.80
0.70 %	*Echinacea purpurea*	Purple Coneflower	43.20
0.70 %	*Heliopsis helianthoides, PA Ecotype*	Oxeye Sunflower, PA Ecotype	33.60
0.60 %	*Chamaecrista fasciculata, PA Ecotype*	Partridge Pea, PA Ecotype	12.00
0.20 %	*Aster pilosus, PA Ecotype*	Heath Aster, PA Ecotype	264.00
0.20 %	*Monarda fistulosa*	Wild Bergamot	96.00
0.10 %	*Apocynum cannabinum, PA Ecotype*	Indianhemp, PA Ecotype	192.00
0.10 %	*Asclepias syriaca*	Common Milkweed	96.00
0.10 %	*Solidago rugosa, PA Ecotype*	Wrinkleleaf Goldenrod, PA Ecotype	264.00

100.00 % **Mix Price/Lb Bulk: $12.12**

Seeding Rate: 60 lb per acre, or 1.5 lb per 1,000 sq ft

Erosion Control & Revegetation; Grasses & Grass-like Species - Herbaceous Perennial; Herbaceous Flowering Species - Herbaceous Perennial

The native grass and forb species tolerate poor soils typically found on steep slopes in the eastern United States. Mix formulations are subject to change without notice depending on the availability of existing and new products. While the formula may change, the guiding philosophy and function of the mix will not.

Price quotes guaranteed for 30 days.
All prices are FOB Meadville, PA.
Please check our web site at www.ernstseed.com
for current pricing when placing orders.

ERNST SEEDS

SEEDING METHODS

DRILL SEEDING

Drill seeding is a mechanical means of creating furrows (openings) in the soil and metering seed in at a uniform rate. A drill seeder is practical for seeding multiple acres in larger areas.

Conventional drills can work in tilled and partly tilled soil. No-till drills are designed to work in soil that has not been tilled. They have heavy openers that cut through vegetation and sod to make a furrow for seed placement. With the proper adjustment, a no-till drill can work in tilled soil. It has discs that aid in loosening the soil. All drills should be equipped with a closing or packing wheel that follows seed placement.

The goal of drill seeding is to achieve uniform seed distribution over the site with seed placement at the correct depth (1/4"-1/2") and good seed-to-soil contact. Calibrating a drill or broadcast seeder depends on seed bulk density and required application rates. Manufacturers provide manuals with charts to guide seeding rate calibration. To ensure uniform application of seed, conduct a test run over a small area using the appropriate amount of seed for that area, then make any necessary adjustments.

Most traditional seed drills are designed to handle seeds with high bulk densities, such as oats and wheat. Some drills may have a small seed box able to plant small seeds, such as alfalfa, clover, and switchgrass.

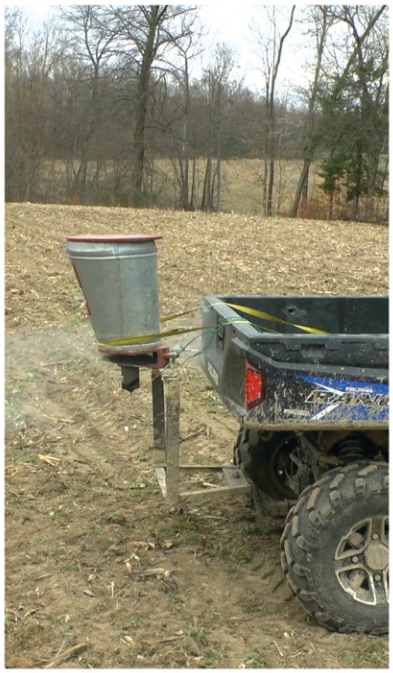
Many native and naturalized species are fluffy and will not readily flow through a traditional seed drill. Examples of fluffy seed include little bluestem, big bluestem, and indiangrass. With the aid of a bulking agent, some fluffy seeds may be planted through the large seed box of a traditional drill. Bulking agents include kitty litter, dry sawdust, vermiculite, or rice hulls. Test with a small amount of seed. Native seed drills, such as Truax, have specialized seed boxes that are effective for planting fluffy seed. When seed will not readily flow through a native seed drill's fluffy seed box, a bulking agent may be needed.

HAND SEEDING

Hand seeding is the casting of seed onto the soil. Hand seeding is used on small plots or difficult terrain where seeding with machinery is not an option. The goal is to achieve an even distribution of seed over the site. This can be accomplished by spreading half of the seed in one pass and the balance in a perpendicular pass. To ensure uniform application of seed, conduct a test run over a small area using the appropriate amount of seed for that area. To know how wide to make your passes, check the width of seed distribution. If possible, a light raking to a depth of 1/4" and/or firming with a lawn or Brillion-type roller is recommended to achieve good seed-to-soil contact. Cover with straw mulch at 70 lb per 1,000 sq ft or hydromulch at 34 lb per 1,000 sq ft. When the volume of seed to be applied is small (less than 50 lb per acre), a bulking agent may be helpful to provide the volume necessary to get uniform application. Such bulking agents include kitty litter, dry sawdust, vermiculite, or rice hulls.

ERNST SEEDS

SEEDING METHODS

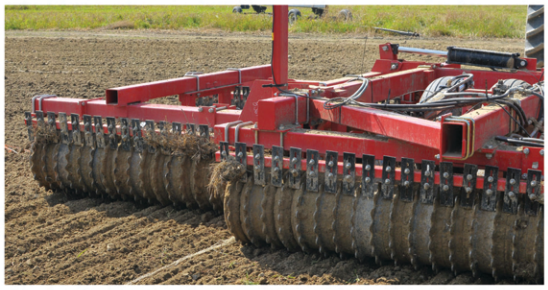


BROADCAST SEEDING

A broadcast seeder consists of a hopper with an adjustable door that regulates seed flow onto a spinner. Some broadcast seeders have an agitator that aids with seed flow in the hopper. Broadcast seeders are commonly used to spread seed, fertilizer, lime, and other granular products. The goal is to achieve an even distribution of seed over the site. To ensure uniform application of seed, conduct a test run over a small area using the appropriate amount of seed for that area. To know how wide to make the passes, check the width of seed distribution from the spreader. The settings can then be adjusted as needed. To achieve better distribution, spread half of the seed in one pass and the balance in a perpendicular pass. We recommend refilling the hopper when it is 1/3 full rather than letting it empty out. Follow up by tracking or firming the seed into the soil with a lawn or Brillion-type roller to achieve good seed-to-soil contact. Do not roll or track the seed if the soil is wet. Cover with straw mulch at 70 lb per 1,000 sq ft or hydromulch at 34 lb per 1,000 sq ft. Many native seeds are fluffy and will not flow uniformly through a broadcast seeder. To enhance the flow, mix the seed with a bulking agent of similar density. Dry sawdust, vermiculite, or rice hulls are some options. An agitator in the hopper may be required in these circumstances. We recommend a minimum rate of 50 lb per acre of seed and bulking agent. A bulking agent can also be helpful if you are planting small quantities of seed. It provides the volume necessary to get uniform application. For fine seeds, kitty litter is a more appropriate bulking agent.

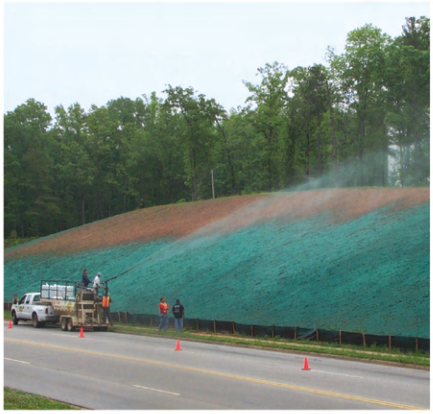
CULTIPACKING

A cultipacker is an excellent way of covering the seed with a minimum amount of soil to ensure proper seed-to-soil contact. It resembles a large rolling pin with evenly spaced ridges and dimples. The primary functions of a cultipacker are to break up clods, remove excess air spaces from loose soil, and smooth the soil. The heavy-duty smooth, spoke, or crowfoot rollers provide clod-breaking and smoothing capabilities. As with any tillage, it is important not to overwork the soil or work it when it is too wet.



STRAW MULCHING

A straw-mulch blower distributes mulch over a seeded area. It has a slide (or chute) in which to feed the mulch, chopper blades to break up the mulch, and a blower to spread the mulch over large areas. Straw mulch may be spread by hand in smaller areas. It is important to use weed-free straw from small grains, such as oats or grain rye, to minimize potential weed issues.

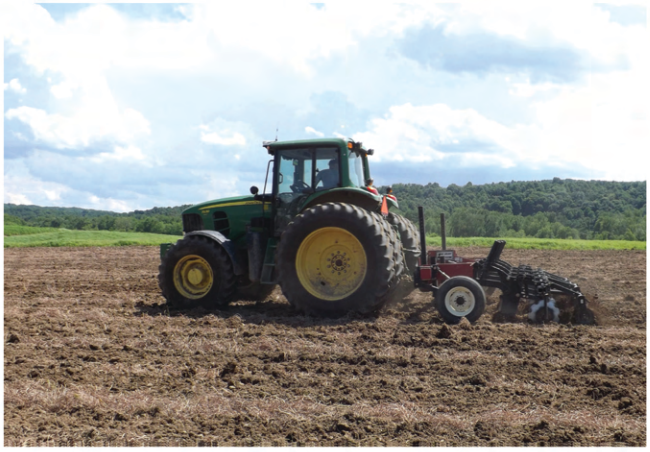


HYDROSEEDING

A hydroseeder combines water, seed, fertilizer and, sometimes, hydromulch into a mix that is pumped through a nozzle and sprayed uniformly over the area to be seeded. Hydroseeders can distribute this mix at 150' or more, allowing for the ability to seed terrain that may not be accessible with other seeding methods, such as steep slopes, roadside cuts, or sites that are too wet. Using hydromulch aids in seed placement and reduces erosion on slopes. Depending on site conditions, use of erosion control blankets or straw mulch may be needed to cover the seed. Many native seeds should be broadcast with 500 lb per acre of mulch as a marker. Do not exceed this amount as native seeds may die if suspended in the mulch with little or no seed-to-soil contact. The balance of the hydromulch, often 1,000 lb per acre, may be applied on top in a secondary application.

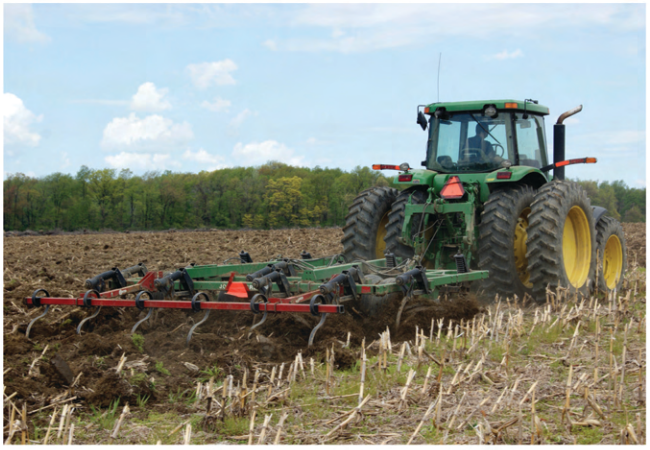
ERNST SEEDS

TOOLS FOR PREPARATION



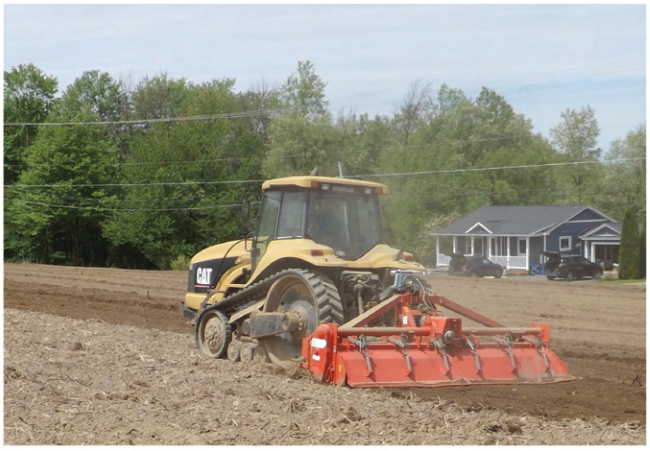
MINIMUM-TILL EQUIPMENT

Minimum-till equipment incorporates a portion of the surface vegetation into the soil and levels uneven surfaces. One of the most common tools is a disc which cuts through vegetation, sod, or hard soil and partially turns or tills it into the soil. Similar equipment that turns part of the vegetative residue into the soil is known as Aerway® or Turbo® Till.



CHISEL PLOW

A chisel plow is primarily used to break up hardpan soil or loosen compacted soil while leaving a high percentage of debris on top. It is a minimum-till plow because it does not dislodge or turn over the entire soil profile the way a moldboard plow does. A chisel plow may be adjusted to till shallow or deep and typically has C-shaped shanks mounted on dual coil springs. The frame, shanks, and springs are of sufficient weight, size, and strength to provide a cutting depth of 8”-12”. To make the soil smooth enough for planting after the use of a chisel plow, use a disc harrow, tandem disc harrow, or offset disc harrow of sufficient weight and size to provide a cutting depth of 6”-8”.



ROTOTILLER

A rototiller pulverizes the soil with rotating blades and incorporates soil amendments and surface vegetation. Most units till up to 6” deep.

TRACKING

Tracking is the use of a crawler or rubber-tired tractor to make depressions and firm loose soil after construction or tilling. Tracks should be oriented perpendicular to the slope of a site. Tracking depressions aid in reducing erosion and retaining seed and moisture. The firm, but not compacted, seedbed will not dry out as quickly as loose soil.

ERNST SEEDS

TOOLS FOR MAINTENANCE

ROTARY MOWER

A heavy-duty rotary mower can be utilized as a brush hog to tame heavy grass and light brush, such as multiflora rose, honeysuckle, and small tree seedlings, on under-utilized fields difficult to mow with a discbine or sickle bar mower.

DISCBINE MOWER

A discbine mower is a hay-harvesting machine with high-speed rotary discs for mowing and baling biomass and assembling the material into a windrow.

WHEN TO MOW

Following the establishment year, typically, mowing during the growing season should not be necessary unless it is in lieu of herbicides to control weeds. Mowing height should be no lower than 8".

To prevent succession of woody species in an established meadow, an important aspect of a maintenance program is an early spring mowing close to the ground (2"). Mowing should occur every one to three years in late winter or early spring and shortly before spring nesting season. Spring mowing will leave food and cover for wildlife through the winter without disrupting nesting of grassland birds.

SPRAYER

Sprayers come in various sizes and styles, including common hand-held units like the one shown here. They are often preferred for carefully targeted spraying of unwanted or invasive vegetation. Larger areas may be sprayed effectively using tractor or ATV-drawn tank units.

The use of herbicides for controlling undesirable vegetation can be an important part of an integrated pest management (IPM) program when applied according to the manufacturer's label. Prior to using any herbicide, read the label for safe handling and application information. Many herbicides are only available to licensed applicators. In these cases, a licensed professional should be employed.

DISTURBED SITES & STEEP SLOPES

A steep slope and retaining wall utilizing ERNMX-181 Native Steep Slope Mix with Annual Ryegrass at the Millcreek Mall in Lancaster, Pennsylvania.

DISTURBED SITES & STEEP SLOPES HAVE various soil types and conditions typically distinguished by lower quality soils and a predisposition to runoff and erosion. Examples: Landfills, surface mines, road cuts, or construction sites.

ERNMX-181 Native Steep Slope mix with Annual Ryegrass in Morgantown, West Virginia.

HABITAT:
Various soils with exposed clay, sand, and rock outcropping without topsoil as a result of construction; generally populated with upland species.

FERTILITY:
Typically low in fertility; therefore, adding topsoil or organic matter (compost) can be very beneficial. Check soil pH and select species adapted to that pH. Add lime and fertilizer as recommended by soil analysis. Incorporate amendments into the soil in a way that will leave the soil rough and minimize soil erosion and rapid runoff (e.g., tracking). If there is a weed problem, fertilizing is not recommended.

SEEDING METHOD:
Hand seed, broadcast seed, hydroseed, or drill seed. For areas with slope less than 3:1, cover the seed 1/8”-1/4” deep by dragging with a spring-tooth harrow or firmly pressing the seed into the soil using a cultipacker, lawn roller, or ATV.

SITE PREPARATION

Eradicate existing vegetation by having a licensed spray technician apply an approved herbicide. Perennial weeds not addressed before establishment will be difficult to remove later. Whenever possible, regrade the site to reduce slope and build diversions to reduce erosion and minimize seed loss.

For areas with slope greater than 3:1, final tracking should be perpendicular to the slope. The tracks will aid in reducing erosion and retaining seed and moisture.

Mulching with straw, hydromulch, or straw/coconut fiber mats is recommended on these sites to protect the seed from drying out or washing away. For areas steeper than 3:1, the use of erosion control blankets or flexible growth medium (e.g., Flexterra®) is recommended. When using erosion control blankets, be sure they are toed in at the top of the slope.

GROWING SEASON MAINTENANCE

FIRST GROWING SEASON

› Post-planting maintenance will provide improved results if the ground is not too rough or steep. Whenever canopy height (overall vegetation) reaches 18”-24”, use a brush hog mower or string trimmer to

A 1-year-old *Andropogon gerardii* (Big Bluestem) meadow at Fishkills Landfill on Staten Island, New York.

trim the meadow to 8". Trimming reduces competition by fast-growing weeds for sunlight, water, and nutrients needed by slower growing perennial natives. A lawn mower is not recommended as the mower height will be too low and native seedlings will be killed.

- If bioengineering materials were used on the site, mowing should be above the new growth of these materials. Trimming should cease by mid-September.
- Problem weeds should be hand pulled or spot sprayed with an approved herbicide, such as Roundup®, Rodeo®, Garlon®, Garlon® 3A, Stinger®, or Milestone®. Be vigilant in controlling vines or spiny plants if they were not part of the mix. These are more easily pulled early than after two to three months of growth. Examples include bindweed, blackberry, multiflora rose, mile-a-minute, and Japanese hops. Be equally vigilant in the control of other invasive species, such as autumn olive, Canada thistle, and mugwort.

DISTURBED SITES & STEEP SLOPES SEED MIXES

ERNMX-101	Non-Native Ernst Best Strip Mine & Gas Production Mix
ERNMX-102-1	Pipeline Mix with Switchgrass
ERNMX-103	Non-Native Good Value Mine Mix
ERNMX-104	Quick Erosion Control Cover Mix
ERNMX-109	Crownvetch Seeding Mix (Naturalized)
ERNMX-110	Ernst Native Biomass Mix for Strip Mines & Natural Gas Production Sites
ERNMX-111	Ernst Native Habitat Mix for Strip Mines
ERNMX-181	Native Steep Slope Mix with Annual Ryegrass

THESE MIXES ARE GOOD FOR CONTROLLING EROSION AND PROVIDING FOOD AND/OR COVER FOR WILDLIFE.

VISIT *ERNSTSEED.COM* FOR MORE OPTIONS.

Mix formulations are subject to change without notice depending on the availability of existing and new products. While the formula may change, the guiding philosophy and function of the mix will not.

This wetland was constructed on a former mine site.

SECOND & SUBSEQUENT GROWING SEASONS

- Prior to new spring growth reaching 2" (e.g., shortly after forsythia or redbud blooms), trim any material standing from the previous year close to the ground (approximately 2") on sites that are not too rough or steep. This will allow the soil to warm more quickly, stimulating emergence and growth of native plants and reducing the likelihood of shrub invasion.
- If bioengineering materials were used on the site or seed of shrubs/trees were part of the mix, the site should not be trimmed after the establishment year.
- Problem weeds should be hand pulled or spot sprayed with an approved herbicide, such as Roundup®, Rodeo®, Garlon®, Garlon® 3A, Stinger®, or Milestone®. Be vigilant in controlling vines or spiny plants if they were not part of the mix. These are more easily pulled early than after two to three months of growth. Examples include bindweed, blackberry, multiflora rose, mile-a-minute, and Japanese hops. Be equally vigilant in the control of other invasive species, such as autumn olive, Canada thistle, and mugwort.

SPECIAL CIRCUMSTANCES

If there is a heavy infestation of ragweed or foxtail in the second growing season, trim the meadow to 8". Trimming should cease by mid-September. However, vegetation allowed to grow without mowing provides more protection for wildlife and aids in erosion control.

Seedlings from a steep slope mix poking through an erosion control blanket.