



**Exhibit D**

**Vegetation Management Plan**

**Case No. 20-0972-EL-BGN**



# **Vegetation Management Plan**

## **Yellowbud Solar Energy Facility**

Prepared for  
Yellowbud Solar, LLC  
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## **I. Goals and Objectives**

Yellowbud Solar, LLC (“Yellowbud”), a wholly owned subsidiary of Geronimo Energy, LLC (“Geronimo”), a National Grid Company, is developing a solar energy facility (SEF) which is planned to cover approximately 2,040 acres in Pickaway and Ross Counties (Ohio) and generate up-to 274 megawatts (MW) of energy (“the Project”). Yellowbud has developed this Vegetation Management Plan (“Plan”) to guide site preparation, installation of prescribed seed mixes, management of invasive species and noxious weeds, and control of erosion/sedimentation. The goal of this Plan is to establish vegetative cover that complies with all permits and regulations. The required management is designed to continue for the life of the Project.

This document is intended to be a working document. Revisions will be made as new information is obtained with respect to vegetation management, site characteristics, and availability of management practices at the time of procurement of services.

## **II. Vegetation Installation Plan**

After the solar panels and other infrastructure are installed, native seed mixes developed for the Project will be installed on site as instructed by the Owner. In a review of the proposed project, the Ohio Department of Natural Resources, in conjunction with the Ohio Pollinator Habitat Initiative, recommended several low-growing grasses and forbs to include in the planting. These recommendations, as well as information obtained by conducting a site visit, were incorporated into the two native seed mixes developed for the Project, an Array Mix and a Wet Mix (Appendix 1).

The Array Mix is intended to be planted across the site, both under/between the arrays and in the open areas of the Project. The Wet Mix is intended to be planted in any areas of the site that are predicted or known to hold water for part or most of the growing season. The mixes prepared for the site can be used whether Yellowbud employs mowing or grazing with sheep for perpetual maintenance. All plant material must be installed as instructed, and at the correct time, as described below. Any exceptions must be discussed with the Owner, and the Contractor shall receive written authorization for any changes prior to the start of work.

All seed mixes must adhere to the specifications described in the Plan. Genetic source origin of all native seed shall be local, and a reasonable effort will be made to source seeds within a 200-mile radius of the site. Plant species should be native to the county where the site is located (considerations of range shifts due to climate change may modify this guidance). Species shall be true to their scientific name as specified. Seed tags or nursery confirmation of the order must be provided to Yellowbud prior to installation. Any species eliminations, substitutions, or source origin exceptions must be approved by Yellowbud prior to installation. If planted in the spring, seeds shall have been properly stratified and/or scarified to break seed dormancy. All legumes shall be inoculated with proper rhizobia at the appropriate time prior to planting.

The protocol for installing the native seed mixes is dependent on the time of the completion of construction. If construction is completed in spring, allowing for seeding between the time when the soil is free of frost and in a workable condition but no later than June 30, native seed mixes shall include 20 pounds per acre pure live seed (PLS) of oats (*Avena sativa*) as a cover crop. If construction is completed in summer, allowing for seeding between July 1 and August 15, the site shall be seeded immediately with 15 pounds per acre PLS of oats and 15 pounds per acre PLS of annual wheat (*Triticum aestivum*) to stabilize the soil and prevent erosion. In the same year, the native seed mixes shall be installed as a fall dormant seeding (after November 1 but before the soil starts to freeze) with no additional cover crop added. If construction is completed in late summer or early fall, allowing for seeding between August 16 and October 31, the site shall be seeded immediately with 20 pounds per acre PLS of winter wheat to stabilize the soil and prevent erosion. In the same year, the native seed mixes shall be installed as a fall dormant seeding with no additional cover crop added. If construction is completed in late fall, allowing for seeding after November 1 but before the soil starts to freeze, native seed mixes shall include 30 pounds per acre PLS winter wheat to provide a cover crop for the following year. If agreed to by both the Owner and the Contractor, a spring seeding the following year can be substituted for a fall dormant seeding after a late fall completion of construction. If a cover crop has already been installed during the calendar year, native seed mixes must be installed the same year with a fall dormant seeding.

Prior to seeding, it is anticipated that soil decompaction will occur in disturbed areas across the site via disking. Decompaction of soils will ensure vegetation establishment across the site.

Seeding may be conducted with a seed drill (preferred) and/or by broadcast seeding; the Contractor shall evaluate the site and determine which technique will produce the best results. Seed installed into a previous cover crop or other vegetation must be installed with a seed drill. Prior to installation, seed shall be divided into two equal parts. The first half shall be installed in one pass, and the second half installed in a second pass (perpendicular to the first pass, where possible). If broadcast seeding is used, gentle raking of seeded areas may be needed to ensure good seed-to-soil contact.

### **III. Vegetation Management Tasks**

After the land is cleared and the panels are installed, a range of invasive plants will take advantage of the open soil and abundant light and germinate across the site. For the purpose of this Plan, “invasive plants” refers to both non-native species and native species that grow in an invasive manner or have the potential to negatively affect the establishment of vegetation for the Project. Ohio publishes both a noxious weed list and a list of invasive species (Ohio Department of Agriculture 2018); these lists are included as Appendices 2 and 3. While species from both lists are prohibited from being introduced to the site, only the noxious weeds (Appendix 2) are required to be controlled. However, all listed plant species must be managed effectively during the first three years to ensure that the planted native species are given the opportunity to establish successfully, which will help resist weed invasion in the

future. The care taken in the first three years after installation strongly determines the quality of the resulting plantings. The initial period of work onsite is referred to as the “establishment phase”, while management after that period is called the “perpetual maintenance phase”.

## **A. Establishment Phase**

The first three years of vegetation management are a concerted effort to remove invasive vegetation from the site while also helping the planted native vegetation establish. If possible, grazing during this time should not occur. If grazing must occur, stocking should be light so that native plants can develop root systems that will enable them to survive future continuous grazing at higher stocking rates. Grazing during the establishment period may favor some invasive plant species, requiring more frequent monitoring and greater weed control efforts than if grazing were not occurring. Additional invasive species control, if required, will consist of mechanical or chemical methods, or a combination of the two, as needed to achieve desired outcomes. General tasks described below will be applied as directed, while other management techniques will be used only if required by the unique conditions at the Yellowbud Facility.

### **1. General Tasks for Managing Vegetation**

***Establishment Year 1.*** The first year of establishment is focused on consistent invasive plant control on a site-wide basis. Mowing during the first year should prevent invasive plants from adding new seeds to the soil and begin to exhaust the soil seed bank (a process that often requires several years to complete). From June 1 of the first establishment year, site-wide mowing to a height of 6-9 inches shall occur whenever vegetation reaches a height of 18-24 inches. Care shall be taken during the nesting season (April 1 to August 1) to avoid the nests of upland grassland birds.

Repeated mowing may produce a buildup of organic thatch, which discourages the development and persistence of diverse native vegetation. To help prevent thatch buildup onsite, either mowing shall be conducted with a flail-type mower to mulch the cut vegetation, or the site shall be hayed so that cut vegetation is removed. A swing arm specifically designed for mowing under solar panels is recommended for cutting beneath panels, but spot-mowing with brush saws, weed whips, and similar equipment may also be utilized. It may be possible to coordinate with Yellowbud to adjust the orientation of the panels to increase the ease of mowing, but the Contractor should not depend on this coordination to complete its work. Any other techniques must be approved by Yellowbud prior to the start of work. Mowing equipment shall be cleaned prior to use on site to prevent the introduction and spread of invasive and non-native species. This mowing regime will prevent annual and perennial weeds from flowering and setting seed, prevent weeds from shading out the solar panels, and help control woody plant growth onsite. Additionally, noxious and perennial weeds shall be treated by spot-herbiciding, as described below, to prevent roots from resprouting.

***Establishment Year 2.*** The second year of establishment continues invasive plant control but generally employs more targeted techniques. Site-wide mowing to a height of 6-9 inches shall occur when vegetation height reaches 18-24 inches. Care shall be taken during the nesting season (April 1 to August 1) to avoid the nests of upland grassland birds.

Spot-mowing may be employed to treat specific problem areas as needed. Noxious and perennial weeds shall be treated with spot-herbicide at least twice, with the focus on achieving the required performance standards (described below).

**Establishment Year 3.** In the third year of the establishment phase, invasive plant control should consist of spot-herbicide to control the remaining small patches of persistent weeds. Efforts should be focused on achieving the required performance standards (described below). Additional onsite treatment with spot-mowing or hand weeding can be employed at the discretion of the Contractor.

## **2. Prescribed Treatment for Common Invasive Species**

Every SEF harbors a range of invasive plant species determined by the makeup of the seed bank and the seed inputs from the surrounding environment. Management must be flexible and respond to the specific needs of the Yellowbud site. This Plan describes common techniques to manage a variety of invasive plants and common weeds growing in Ohio, but not every technique will be required. In the Establishment Phase, monthly evaluations of the plantings during the growing season (May to September) shall be conducted to determine the appropriate treatment techniques to use and the timing of those treatments. Management techniques for five categories of weeds are described below.

The Contractor is required to have the botanical expertise to correctly identify plant species and know the difference between invasive species to be removed and similar native species being established.

### **a. Annual Weeds**

Annual weeds include all unwanted species that grow for a single year, set seed, and die. Common annual weeds include grasses like barnyard grass (*Echinochloa crus-galli*) and foxtails (*Setaria* spp.), and broadleaf weeds like lambsquarters (*Chenopodium* spp.), velvetleaf (*Abutilon theophrasti*), Pennsylvania smartweed (*Polygonum pennsylvanicum*), and black nightshade (*Solanum nigrum*) (University of Minnesota, 2018).

The most important purpose and result of treating annual weeds is preventing seed production. Beginning around June 1, the site shall be mowed as described above to prevent annual weeds from flowering and setting seed. Repeated mowings, however, may produce a buildup of organic thatch, which discourages the development and persistence of diverse native vegetation by changing soil nutrient composition and keeping the soil cool. Thatch favors cool-season forage and turf grasses and many species of agricultural weeds. Use of a flail mower or raking, baling, and removing cut vegetation can reduce thatch build-up.

### **b. Ohio Department of Agriculture Noxious Weed List**

The Ohio Department of Agriculture maintains a list of prohibited noxious weeds which must be controlled. Additional prohibited species were added to the list with an update to the State of Ohio Administrative Code in 2018 (OAC 2018). The complete list of prohibited noxious weeds is presented in Appendix 2. All species of noxious weeds present at Yellowbud shall be treated by mowing, herbicide, or a combination of both methods, with the intention of preventing the weeds from setting seed or spreading by rhizomes, stolons, or other vegetative means.

### **c. Perennial Weeds**

Perennial weeds include all unwanted species that persist for two or more years after germination, from biennials to those that live for many years. Many of these weeds greatly diminish during the establishment phase with proper maintenance, but several require special attention due to their highly competitive behavior. Perennial weeds include grasses like Kentucky bluegrass (*Poa pratensis*), reed canary grass (*Phalaris arundinacea*), common reed (*Phragmites australis*), and several species of bromes, especially smooth brome (*Bromus inermis*). Broadleaf weeds in this category include sweet clovers (*Melilotus alba*, *M. officinalis*), crown vetch (*Securigera varia*), musk thistle (*Carduus nutans*), and spotted knapweed (*Centaurea stoebe*). Additionally, the Ohio Department of Agriculture Invasive Plant Species list (Appendix 3) is primarily composed of perennial weeds that should be controlled.

Mowing is important to prevent seed production (as described above), but herbicide is generally required to prevent the spread of perennial weeds. Perennial grasses shall be treated by spot-spraying or boom spraying, as warranted, with glyphosate or comparably effective herbicide, or the aquatic formulation of the same if near open water. Perennial broadleaf weeds shall be treated by spot-spraying or boom spraying, as warranted, with glyphosate, triclopyr, clopyralid, or comparably effective herbicides. All herbicides shall be applied by a licensed applicator, following instructions provided by the manufacturer.

### **d. Problematic Native Plants**

Several native species that are present in the soil seed bank or enter the site by seed rain from neighboring properties have the potential to interfere with the functioning of the solar panels. Giant ragweed (*Ambrosia trifida*) grows tall enough to shade the panels. Several native vines have the potential to overgrow installations, including wild grape (*Vitis riparia*), wild cucumber (*Echinocystis lobata*), bur cucumber (*Sicyos angulatus*), and Woodbine/Virginia creeper (*Parthenocissus* spp.). Giant ragweed, or any other native species shading the arrays, should be controlled by mowing (see above). If growing under or near the solar panels, wild cucumber and bur cucumber can be pulled and removed manually, but woody vines such as wild grape and Woodbine/Virginia creeper shall be cut to within 1 inch of the ground and the stump treated with glyphosate, triclopyr, or a comparable herbicide by a licensed applicator, following instructions provided by the manufacturer.

### **e. Woody Species**

Almost all woody species on site can shade or otherwise interfere with the operation of solar panels. During the establishment phase, all woody plants shall be removed from the solar panel area. This can be done by mowing, herbiciding, or a combination of both methods. All woody plants over 0.5 inches DBH (diameter at breast height, about 4.5 feet) shall be cut to within 1 inch of the ground and the stump treated with triclopyr or a comparable herbicide by a licensed applicator, following instructions provided by the manufacturer.

## **3. Re-seeding Bare Soil**

Areas of bare soil are detrimental to successful establishment of native vegetation. Bare soil provides opportunities for the common invasive species described above to colonize and spread. Bare soil also contributes to soil loss by sheet erosion and may prevent Yellowbud from discharging its SWPPP permit



in a timely fashion. If areas of bare soil greater than 75 ft<sup>2</sup> are found on site, the Contractor shall remedy the issue at its own expense by re-seeding the area, using the seed mix previously installed and following the timing instructions laid out in Section II (Vegetation Installation Plan).

## **B. Perpetual Maintenance Phase**

### **1. Mowing for Perpetual Maintenance**

Following the end of the Establishment Phase of vegetation management, yearly management is still required to control the re-establishment and spread of invasive species, combat the establishment of undesirable and invading trees and shrubs, and reduce biomass/fuel load on site. This management may take the form of mowing or haying, depending on Yellowbud preference and site feasibility. Some degree of hand weeding, spot-mowing, and/or spot-herbicide may be warranted thereafter to maintain vegetation quality and achieve the Project goals.

Annual site-wide haying (preferred) or mowing to a height of 6-9 inches shall occur each October, or when prairie plants have gone dormant. Where feasible, mowed vegetation shall be raked, baled, and removed to prevent the buildup of organic thatch, which will discourage the development and persistence of diverse native vegetation. If vegetation removal is not achievable, mowing shall be conducted with a flail-type mower to finely chop plant material and accelerate decomposition. Should Yellowbud enter into a haying partnership for some or all of the site prior to construction, seed mixes will be reviewed and potentially revised to meet the local agricultural needs.

### **2. Grazing for Perpetual Maintenance**

Yellowbud may decide to use grazing as a long-term vegetation management technique. Well-managed grazing can restrict woody vegetation and non-native species encroachment into grasslands, prevent excessive litter accumulation, improve forage production, and accelerate decomposition and nutrient cycling. Should grazing be selected as a management technique for some or all of the site, the section below should be consulted when setting up the grazing plan for the site. Grazing SEFs with livestock is a developing management approach; the instructions in this plan should be considered a guide, but the actual practices must adapt year-to-year to evolving vegetation conditions at the Yellowbud Project.

#### **a. Site Setup for Grazing**

Portions of the site designated for management with grazing shall be managed with rotational grazing, wherein animals are moved periodically from place to place with the aim of maintaining a vegetation height of 18 inches. For SEFs, sheep are the preferred grazers. The implementation of grazing depends on the identification of willing partners in the surrounding community, as large solar facilities require large numbers of grazers.

In order to achieve management goals while preserving the health of the established native vegetation, each area under grazing management will be divided into grazing units, with each unit consisting of four equal-size paddocks. As described below, a scalable rotational grazing unit is 16 acres, divided into four 4-acre paddocks, so a grazing area of 160 acres would be divided into 10 grazing units (and 40 total paddocks). The sheep in each grazing unit will rotate between the four paddocks (Paddocks A-D) over the course of one month. For the first week of the month, the sheep in each unit will graze Paddock A.

The sheep will graze Paddock B for the second week of the month, Paddock C for the third week, and Paddock D for the fourth week. This pattern will result in each paddock in a grazing unit being grazed for one week and rested for three weeks each month. Grazing will continue for the growing season (approximately May 15 – September 15), but warm-season grass height should also be used as a guide. A rule of thumb is to first begin grazing when warm-season grass height reaches 12-14 inches; subsequent grazing should begin before vegetation reaches 18 inches. The Operator shall continuously evaluate the standing forage and make adjustments in the stocking rate in each paddock so as to prevent weakening of the prairie sod, soil erosion and the introduction and spread of weeds that must be controlled (see Appendices 2 and 3).

The preferred method for fencing the site is poly-wire or net electric fencing with plastic step-in poles that are easily removed; the Contractor shall consult with the Owner before other options are installed. The electric fencing shall be grounded independently of the solar facility infrastructure, with the grounding stakes at least 66 feet from the facility grounding systems. The contractor shall consult local utilities prior to installation and take underground utilities and maintenance travel corridors into account when placing the grounding stakes. The energizing unit for the electric fence must be independent of Yellowbud infrastructure. The energizer can run on 110 V electrical current or be charged from a battery. The Contractor shall be responsible for any damage to the solar facility infrastructure due to improper setup or maintenance of the electric fencing.

While sheep are grazing each paddock, they need to be provided with drinking water. The method of watering the flock will be left to the Contractor, with approval from Yellowbud. A mobile watering trough, especially one that does not kill vegetation while it remains in place, is preferred. Moving the watering trough from paddock to paddock as the flock moves will reduce damage to the vegetation beneath the trough and prevent the formation of dead vegetation areas, which are susceptible to erosion and colonization by weeds. Watering shall occur as near to the center of the paddock as possible; water is an attractant, and a trough set at paddock's edge or in its corner can lead to uneven grazing, trampling and death of vegetation, erosion, and the introduction and spread of weeds.

The size and layout of each grazing unit can change depending on the number of acres under grazing management and other logistical issues on site. The Contractor shall prepare a grazing plan for approval by Yellowbud that includes a proposed layout of grazing units and paddocks, equipment to be used by the contractor for both fencing and watering, and a schedule of management activities. This plan must be approved by Yellowbud before the commencement of any work on site by the Contractor.

#### **b. Stocking Rate and Management**

The number of sheep in a paddock at any time is the stocking rate. The concept used to describe the stocking rate, or grazing pressure, is animal unit month (AUM). One animal unit is 1,000 lbs. of livestock, so one AUM is 1,000 lbs. of livestock grazing for one month. AUM is usually considered on a per acre basis, so the final unit for stocking rate is AUM/acre. Depending on the variety of sheep used, 1 animal unit is approximately six ewes. If grazing sections at Yellowbud are divided into grazing units of 16 acres, 1 AUM/acre would be about 100 sheep grazing the entire unit for one month. As described above, the size of grazing units must be agreed to by the Contractor and the Owner before the commencement of

grazing. The US Fish and Wildlife Service recommends that stocking on SEFs start at 0.5 AUM (J. Duchene, personal communication, December 27, 2018). In the example where 16-acre grazing units are used, this would mean an initial stocking rate of 50 sheep per unit. Each 16-acre unit, divided into four paddocks of four acres each, would start with 50 sheep grazing Paddock A for one week, then all 50 sheep would be moved to Paddock B for the second week, and so on.

During the grazing period, the Contractor shall be responsible for monitoring the response of the vegetation to grazing and adjusting stocking and timing to meet the goals of the site. The management goal for Yellowbud is to have a vegetation height of approximately 18 inches when the sheep are first moved into a paddock and a uniform vegetation height of 4-6 inches when the sheep are removed a week later. Each paddock must be grazed completely to the correct height before the livestock are moved on to the next section. If grazing does not achieve the desired vegetation height and is shading the arrays, the Contractor shall immediately contact the Owner and be responsible for mowing the paddock to a uniform height of 4-6 inches. The Contractor shall determine with the Owner a change in stocking rate in order to improve the effect of grazing in the future. The Contractor shall have access to additional livestock in case the stocking rate needs to be increased to achieve the vegetation management goal.

#### **IV. Vegetation Quality Targets**

Vegetation management should result in a diverse plant community dominated by native species. Permits and regulations impose additional requirements on the final quality and performance of native plantings.

##### **A. Native Vegetation Targets**

By the end of the first growing season of the vegetation establishment phase, at least 80 percent of the site shall be vegetated. In order to discharge the SWPPP permit for the site, at least 70 percent of the site must be covered with uniform perennial vegetation; the contractor shall endeavor to achieve this by the end of the first growing season and must achieve this in the second growing season. By the end of the vegetation establishment phase (approximately 36 months after vegetation installation), at least 95 percent of the site shall be vegetated, and at least 90 percent of the cover shall be comprised of native species. Seven or more species of planted native graminoids and six or more species of planted native forbs shall be well-established across the site.

##### **B. Noxious Weeds and Problem Plants**

All Ohio prohibited noxious weeds and invasive plant species (Appendices 2 & 3) shall be treated repeatedly with herbicide and mowed where appropriate at a frequency sufficient to prevent seed set and remove target weeds over time. Each treatment shall show evidence of at least 90 percent of the target vegetation having been affected by herbicide or removed. Two weeks after treatment, at least 95 percent of all herbicide-treated plants shall be dead or dying within any 100 square foot area.

By the end of the vegetation establishment phase (approximately 36 months after vegetation installation), all prohibited noxious and other problem plants shall not exceed 5 percent aerial cover within any 100 square foot area across the site.

## **V. References**

Duchene, J. 2018. Personal communication.

Ohio Administrative Code. 2018. Chapter 901:5-37 Noxious Weeds. Accessed May 2020 at <http://codes.ohio.gov/oac/901:5-37-01v1>

Ohio Department of Agriculture. 2018. Invasive Pests. Accessed April 2020 at <https://agri.ohio.gov/wps/portal/gov/oda/divisions/plant-health/invasive-pests>

Ohio Environmental Protection Agency. 2019. Guidance on Post-Construction Storm Water Controls for Solar Panel Arrays. Accessed April 2020 at <https://epa.ohio.gov/Portals/35/storm/Guidance%20on%20Post-Construction%20Storm%20Water%20Controls%20for%20Solar%20Panel%20Arrays.pdf?ver=2019-10-22-122431-753>

University of Minnesota. 2018. Common annual weeds. Accessed April 2020 at <https://extension.umn.edu/weed-management/weed-identification>

## Appendix 1. Seed Mixes for the Yellowbud Project

### Array Mix

Botanical Name	Common Name	Oz/Acre	Lbs/Acre	% by Weight	Seeds/Sq Ft
<i>Bouteloua curtipendula</i>	Sideoats grama	32.00	2.00	25.0	4.4
<i>Carex brevior</i>	Short beak sedge	2.00	0.13	1.6	1.3
<i>Elymus trachycaulus</i>	Slender wheat grass	32.00	2.00	25.0	5.1
<i>Festuca rubra</i> ssp. <i>rubra</i>	Red fescue	9.00	0.56	7.0	7.1
<i>Festuca subverticillata</i>	Nodding fescue	1.00	0.06	0.8	0.5
<i>Juncus tenuis</i>	Path rush	0.25	0.02	0.2	5.7
<i>Poa compressa</i>	Canada bluegrass	3.25	0.20	2.5	11.2
<i>Schizachyrium scoparium</i>	Little bluestem	20.00	1.25	15.6	6.9
<b>Total Graminoids</b>		<b>99.50</b>	<b>6.22</b>	<b>77.7</b>	<b>42.1</b>
<i>Achillea millefolium</i>	Yarrow	0.75	0.05	0.6	3.1
<i>Chamaecrista fasciculata</i>	Partridge pea	16.00	1.00	12.5	1.0
<i>Geum canadense</i>	White avens	1.00	0.06	0.8	0.6
<i>Monarda fistulosa</i>	Wild bergamot	1.00	0.06	0.8	1.6
<i>Oligoneuron rigidum</i>	Stiff goldenrod	2.00	0.13	1.6	1.9
<i>Rudbeckia hirta</i>	Black-eyed Susan	3.00	0.19	2.3	6.3
<i>Solidago nemoralis</i>	Old-field goldenrod	0.50	0.03	0.4	3.4
<i>Symphyotrichum ericoides</i>	Heath aster	0.25	0.02	0.2	1.1
<i>Zizia aurea</i>	Golden alexanders	4.00	0.25	3.1	1.0
<b>Total Forbs</b>		<b>28.50</b>	<b>1.78</b>	<b>22.3</b>	<b>20.1</b>
<b>Total</b>		<b>128.00</b>	<b>8.00</b>		<b>62.2</b>

## Wet Mix

Botanical Name	Common Name	Oz/Acre	Lbs/Acre	% by Weight	Seeds/Sq Ft
<i>Carex hystericina</i>	Bottlebrush sedge	5.00	0.31	4.5	3.4
<i>Carex lurida</i>	Shallow sedge	3.25	0.20	2.9	0.9
<i>Carex vulpinoidea</i>	Fox sedge	1.50	0.09	1.3	3.4
<i>Elymus virginicus</i>	Virginia wild rye	67.00	4.19	59.8	6.5
<i>Leersia oryzoides</i>	Rice cut grass	3.00	0.19	2.7	2.3
<i>Muhlenbergia mexicana</i>	Leafy satin grass	2.00	0.13	1.8	8.0
<i>Poa palustris</i>	Fowl bluegrass	4.00	0.25	3.6	11.9
<i>Schizachyrium scoparium</i>	Little bluestem	20.00	1.25	17.9	6.9
<i>Scirpus atrovirens</i>	Green bulrush	0.40	0.03	0.4	4.2
<b>Total Graminoids</b>		<b>106.15</b>	<b>6.63</b>	<b>94.8</b>	<b>47.7</b>
<i>Anemone canadensis</i>	Canada anemone	3.00	0.19	2.7	0.6
<i>Euthamia graminifolia</i>	Common grass-leaved goldenrod	0.75	0.05	0.7	6.0
<i>Mimulus ringens</i>	Allegheny monkeyflower	0.10	0.01	0.1	5.3
<i>Verbena hastata</i>	Blue vervain	2.00	0.13	1.8	4.3
<b>Total Forbs</b>		<b>5.85</b>	<b>0.37</b>	<b>5.2</b>	<b>16.1</b>
<b>Total</b>		<b>112.00</b>	<b>7.00</b>		<b>63.8</b>

## Appendix 2. Ohio Noxious Weed List

Scientific Name	Common Name
<i>Acroptilon repens</i>	Russian knapweed
<i>Amaranthus palmeri</i>	Palmer amaranth
<i>Amaranthus tuberculatus</i>	Water hemp
<i>Bassia prostrata</i>	Forage Kochia
<i>Bassia scoparia</i>	Kochia
<i>Calystegia sepium</i>	Hedge bindweed
<i>Carduus nutans</i>	Musk thistle
<i>Cirsium arvense</i> L. (Scop.)	Canada thistle
<i>Conium maculatum</i>	Poison hemlock
<i>Convolvulus arvensis</i>	Field bindweed
<i>Conyza canadensis</i>	Marestail
<i>Euphorbia esula</i>	Leafy spurge
<i>Heracleum mantegazzianum</i>	Giant Hogweed
<i>Lepidium appelianum</i>	Hairy whitetop
<i>Lepidium draba</i> sub. <i>draba</i>	Heart-podded hoary cress
<i>Lythrum salicaria</i>	Purple loosestrife
<i>Nassella trichotoma</i>	Serrated tussock
<i>Nicandra physalodes</i>	Apple of Peru
<i>Pastinaca sativa</i>	Wild parsnip
<i>Phyllostachys aureasculata</i>	Yellow groove bamboo <sup>1</sup>
<i>Polygonum cuspidatum</i>	Japanese knotweed
<i>Polygonum perfoliatum</i>	Mile-A-Minute weed
<i>Pueraria montana</i> var. <i>lobata</i>	Kudzu
<i>Salsola kali</i> var. <i>tenuifolia</i>	Russian thistle
<i>Senecio glabellus</i>	Cressleaf groundsel
<i>Sonchus arvensis</i>	Perennial sowthistle
<i>Sorghum x almum</i>	Columbus grass
<i>Sorghum bicolor</i>	Shatter cane
<i>Sorghum halepense</i> L. (Pers.)	Johnsongrass
<i>Vitis</i> spp.	Grapevines <sup>2</sup>

<sup>1</sup> When the plant has spread from its original premise of planting and is not being maintained

<sup>2</sup> When growing in groups of one hundred or more and not pruned, sprayed, cultivated, or otherwise maintained for two consecutive years

### Appendix 3. Ohio Invasive Plant Species

Trees, Shrubs, and Vines	
Scientific Name	Common Name
<i>Ailanthus altissima</i>	Tree-of-heaven
<i>Berberis vulgaris</i>	Common barberry
<i>Celastrus orbiculatus</i>	Oriental bittersweet
<i>Elaeagnus angustifolia</i>	Russian olive
<i>Elaeagnus umbellata</i>	Autumn olive
<i>Frangula alnus</i>	Glossy buckthorn
<i>Lonicera japonica</i>	Japanese honeysuckle
<i>Lonicera maackii</i>	Amur honeysuckle
<i>Lonicera morrowii</i>	Morrow's honeysuckle
<i>Lonicera tatarica</i>	Tatarian honeysuckle
<i>Pyrus calleryana</i>	Callery pear (effective January 2023)
<i>Rhamnus cathartica</i>	European buckthorn
<i>Rosa multiflora</i>	Multiflora rose
Herbaceous	
Scientific Name	Common Name
<i>Alliaria petiolata</i>	Garlic mustard
<i>Brassica kaber</i> var. <i>pinnatifida</i>	Wild mustard
<i>Butomus umbellatus</i>	Flowering rush
<i>Centaurea stoebe</i> ssp. <i>micranthos</i>	Spotted knapweed
<i>Chrysanthemum leucanthemum</i> var. <i>pinnatifidum</i>	Oxeye daisy
<i>Daucus carota</i> L.	Wild carrot, Queen Anne's lace
<i>Dipsacus fullonum</i>	Common teasel
<i>Dipsacus laciniatus</i>	Cutleaf teasel
<i>Egeria densa</i>	Brazilian elodea
<i>Epilobium hirsutum</i>	Hairy willow herb
<i>Hesperis matronlis</i>	Dame's rocket
<i>Hydrilla verticillata</i>	Hydrilla
<i>Hydrocharis morsus-ranae</i>	European frog-bit
<i>Lythrum virgatum</i>	European wand loosestrife
<i>Microstegium vimineum</i>	Japanese stiltgrass
<i>Myriophyllum aquaticum</i>	Parrotfeather
<i>Myriophyllum spicatum</i>	Eurasian water-milfoil
<i>Nymphoides peltata</i>	Yellow floating heart
<i>Phragmites australis</i>	Common reed
<i>Potamogeton crispus</i>	Curly-leaved pondweed
<i>Ranunculus ficaria</i>	Fig buttercup, lesser celandine
<i>Trapa natans</i>	Water chestnut
<i>Typha angustifolia</i>	Narrow-leaved cattail
<i>Typha x glauca</i>	Hybrid cattail
<i>Vincetoxicum nigrum</i>	Black dog-strangling vine, black swallowwort



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