

Technical Guide: Establishment and Maintenance of Pollinator-Friendly Solar Projects

Northern Indiana
June 2021

SOURCES

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"Minnesota Department of Natural Resources Prairie Establishment & Maintenance Technical Guidance for Commercial Solar Projects". 2016. Minnesota Department of Natural Resources. New Ulm, Minnesota, USA. 13pp. Revised 2019.

Photos:

Rob Davis, Fresh Energy

<https://fresh-energy.org/beeslovesolar/>

Intended Usage: This document is not intended to be adopted as a regulatory document, but to be used as a resource and a starting place to understand pollinator-friendly solar and identify organizations, vendors, and experts who can provide more site-specific guidance. Best practices may differ depending on site conditions and best practices are evolving as large-scale pollinator-friendly solar projects are implemented and studied. Local governments considering pollinator-friendly requirements are encouraged to work with organizations such as Soil and Water Conservation Districts and USDA NRCS.

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Introduction

This technical guide serves as a starting point for the establishment and management of pollinator-friendly ground cover at ground-mounted solar photovoltaic arrays. Best management practices are continuing to evolve as low-impact solar development projects are implemented. General information about seed mix development, planting layout, and maintenance is included in this document. You will also find resources and contacts for organizations that will help you further develop a project. Solar developers are encouraged to work with relevant experts such as their local planning staff, Indiana Department of Natural Resources (IN DNR) wildlife biologists, farm bill biologists, USDA Natural Resource Conservation Service (NRCS) staff, or local seed companies to develop a vegetation plan specifically tailored to their site. This guide is not intended to be prescriptive, as appropriate plan community composition varies from site to site due to site differences (slope, soil, moisture, etc.)

Audience

The goal of this document is to provide a brief overview of the pollinator-friendly solar benefits, establishment, and maintenance guidelines for a variety of audiences:

- Local Governments - Assist in developing and implementing pollinator-friendly standards in the permitting process or local ordinance.
- Solar Developers - Serve as a local resource to identify and understand the reasons for any local or state requirements in northern Indiana related to solar and pollinator-friendly standards. Provide maintenance recommendations to ensure the best outcome and long-term success of the planting.
- Landowners - Understand the benefits of pollinator-friendly practices and negotiate with solar developers for land lease agreements in the absence of other requirements.

Benefits of Ground Cover at Solar Sites

Nearly every development, no matter the form, has some impact on the landscape and an obligation to manage storm water and stabilize soil. A standard approach used by many solar developers has been to establish shallow rooted turf grass or in some cases gravel. Planting perennial vegetation has emerged as a low-cost best management practice in order to close out storm water permits, generally for less than 1% of the total project cost if appropriately designed. Large-scale solar is a relatively new land use and is primarily proposed and being developed on agricultural land in Indiana. A more strategic approach to ground cover—diverse mixes of deep-rooted and flowering plants—has been shown to offer significant additional public, environmental, and operational benefits. Increasingly corporate, municipal, and utility energy buyers, including NIPSCO, an electric utility serving northern Indiana, are cognizant of the potential land use impacts of solar PV particularly on farmland, and are asking that solar projects include these co-benefits.

Establishing low-growing pollinator-friendly ground cover under and around solar PV panels can:

- Significantly reduce wind and surface water erosion;
- Reduce applications of fertilizer, herbicide, and pesticides, to improve water quality;
- Provide food and habitat for butterflies, bees, and other insects that provide important ecological and agricultural services, such as crop pollination and natural pest control;
- Provide food, cover, and nesting habitat for some mammals, birds, reptiles, and amphibians;
- Increase organic matter and water-holding capacity of soils, leading to higher quality soils for farming when the site is decommissioned; and
- Improve the aesthetics of the solar facility.





Studies are underway to quantify these benefits. A U.S. Department of Energy funded study named [InSPIRE](#) (Innovative Site Preparation and Impact Reductions on the Environment) is generating a wealth of information about best practices for low-impact solar development. Detailed information is available on site preparation, site design and construction, operation and maintenance, and ground cover for native vegetation and pollinator habitat. The National Renewable Energy Laboratory summarizes the InSPIRE projects in the article [Beneath Solar Panels, the Seeds of Opportunity Sprout](#) (2019). Purdue Extension also provides information in [Best Management Practices for Indiana Pollinator Habitat](#) and [Entomology Today](#) (2021) provides a perspective on pollinator conservation.

Seed Mix Development

This guide lays out a framework that solar developers should consider when working with a seed company to design a low-stature pollinator-friendly seed mix. These high performance seed mixes can be adapted to include only shorter-stature species that can result in significant savings as a result of needing just a single annual mow or graze.

Seed Mix Costs

Companies should review the literature and obtain bids from several seed suppliers. To achieve reasonable costs of less than 1% of the total project, companies should communicate to seed suppliers and experts that the purpose is not to achieve complete ecological restoration or mimic conservation prairie standards. Seed mixes that include naturalized or native seed mixes can cost more than exclusively non-native seed mixes. Shallow-rooted grasses (like turf-type grass) can seem cheap up front, but require supplemental investments (fertilizer) and are vulnerable to extended drought. Higher upfront seed cost can be offset by the following:

- More resilient ground cover that is less-prone to weed invasion because more ecological niches are filled;
- Limited use of mulch is necessary, requiring erosion control blankets only on steep banks and highly erodible areas. Experts may recommend stabilizing soil with oats, rye, or wheat as a temporary cover crop, depending on site conditions;
- Fertilizer is rarely needed prior to or after planting;
- Watering recently established plantings is not necessary in the optimal planting window with sufficient time for establishment except in years of extreme drought; and
- Developers choosing a minimum panel height of 3 feet from grade to the lower edge of the panels will allow for a lower cost seed mix, while also reducing the risk of panel shading and panel damage due to debris impacts during mowing
- Incentives may be available. To learn about [Habitat and Wildlife Landowner Assistance](#) such as the Wildlife Habitat Cost-Share Program, contact the [Indiana Department of Natural Resources Biologists](#) or the [local USDA Natural Resource Conservation Service \(NRCS\) office](#).

Seed Source

To the extent it is available and cost effective, seeds may be sourced from areas with similar conditions within the county or adjacent counties. The preferred sequence according to USDA NRCS guidance ([Minnesota Technical Note #31](#)) is: within the ecological sub-section, ecological section and then within a 200 mile radius of the project site unless otherwise specified.

However, some species such as key grasses/sedges may not be available locally or in Indiana. On the other hand, plants brought from significantly different climactic conditions may not produce viable seed. It is also important to ensure the seeds are of good and clean quality. See the USDA guide to [Purchasing Seed for Conservation Plantings](#).

Seed Specification and Diversity

Native plantings with high diversity, meaning many different plant species co-existing together, are the most successful at resisting weed invasion, and also the most ecologically functional, supporting a wide variety of pollinators and other wildlife. In other words, diversity is key to a planting's success. This can help reduce management costs. Over the years, there will be variations in invasive species pressure, soil conditions, and climate, such as extreme drought or extreme moisture. Having a diversity of plants ensures that more species are able to adapt to the extremes and can therefore respond to changing environmental conditions. Balancing cost with the diversity of seed mixes can lead to better outcomes.

Species planted near and under panel arrays should have a maximum height at or below the lower edge of the solar panels and should include shade-tolerant species for fixed panel sites. Fixed panel sites have more shade under the panels than tracking panel sites. For these fixed-tilt projects, it is recommended to use two different seed mixes: shade-tolerant for under the array and sun-tolerant for in between the rows and edge areas. Established vegetation under the array reduces storm water impacts.

Again, keep in mind that the managed landscape of a solar array is not an ecological restoration project intended to return the land to pre-colonial conditions. Tall warm season grasses (big bluestem, Indian grass, switchgrass) are not recommended in seed mixes at solar sites. The height and density of these grasses may interfere with operations or dominate the stand and out-compete the shorter stature species. If tall warm season grasses are used, they should comprise less than 5% of the total seed mix and only in the buffer/open areas.

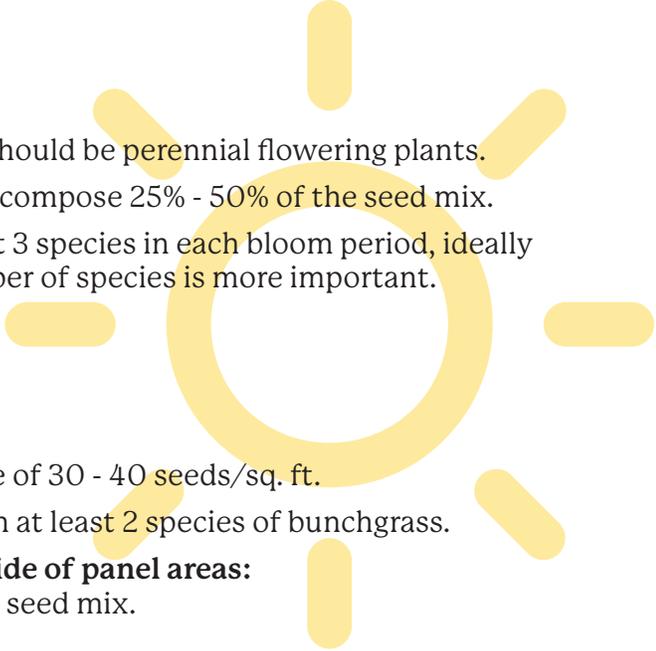
Please note that state-listed species (endangered, threatened, or special concern) seed should not be included in any of the mixes, to avoid creating hurdles to decommissioning and returning it to farmland.

The Purdue University scorecard (Appendix D) provides for broad flexibility in seed mix designs throughout a project. For solar projects not using the Purdue scorecard, the following guidance is provided.

Forb (flowering plants) and Grass Mixes:

- Seed mixes should have a minimum seeding rate of 30 - 40 seeds/sq. ft. Site conditions (wet/dry), species selected, time of planting, weather, and other factors can affect the seeding rates. Higher seeding rates may have a greater likelihood of success. It is highly encouraged to work with an experienced seed company or landscaper to ensure proper seeding rate.



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- At least 40% of the total seeding rate by count should be perennial flowering plants.
 - Deep-rooted and native grasses / sedges should compose 25% - 50% of the seed mix.
 - 9 or more native wildflower species with at least 3 species in each bloom period, ideally with 3 colors per bloom period though the number of species is more important.
 1. Early (April-May)
 2. Mid (June-August)
 3. Late (August-October)

Grass-only seed mixes:

- Seed mixes should have a minimum seeding rate of 30 - 40 seeds/sq. ft.
- 5 or more deep-rooted grass / sedge species with at least 2 species of bunchgrass.

Wetland / Farmed wetland seed mixes to be used outside of panel areas:

- Work with relevant experts to develop a custom seed mix.

Low-stature seed mixes are being developed and tested specifically for solar sites. For, example the [Pheasants Forever Seed Program](#) solar farm seed mixes (under 24", 30", 36") and the [MN BWSR](#) low growing solar seed mixes can be adapted with native Indiana species. Purdue Extension provides a list of [Recommended Indiana-native Plants for Attracting Pollinators](#). Consult relevant experts for assistance, as best practices continue to evolve through InSPIRE and other projects.

Visual Screening

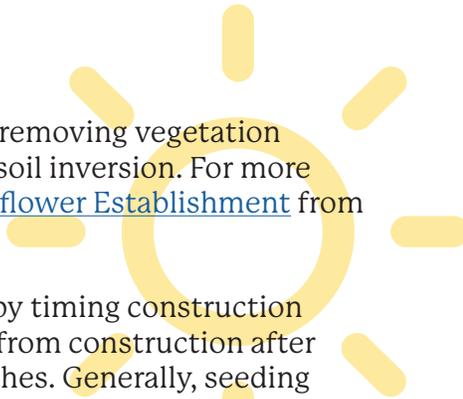
If visual screening is considered for the project site, a taller seed mix or native flowering shrubs could be planted around the perimeter to both provide screening and supplement early-blooming species requirements. Wildflowers and grasses taller than 3 feet should be limited to the perimeter of the site where they will not shade the array.

Use of tree species should only be used when required by approving bodies or to address adjacent landowner concerns. Like shrubs and taller forbs and grasses, trees should be limited to the perimeter to avoid shading the solar panels. Do not plant invasive tree species. Careful selection should be taken when selecting trees to ensure they don't compete and aggressively spread into the other portions of the site and surrounding landscapes. Select native trees and shrubs with value for wildlife, such as food, cover, and nesting sites. Selection should be based on site conditions and species native to the region. Suitable shrubs include, but are not limited to: dogwood, mapleleaf viburnum, common elderberry, chokeberry, spicebush, hawthorne, wild plum, and native willow. Whenever possible, counties should avoid requiring use of evergreens such as arbor vitae.

Planting Specifications

Site Preparation

To have a successful planting, it is important to ensure your site is prepared for seeding. The goal is to eliminate competition with the new seeds until they can get established. Ideally, all existing vegetation should be removed prior to seeding. The easiest, most efficient way to remove vegetation from the current site is to use a non-persistent herbicide application. Glyphosate is most effective. Repeated applications may be necessary. Applications are most effective if applied when the vegetation is actively growing. It is important to follow all of the directions on the label when applying herbicide.



For small-scale projects, it may be feasible to use alternative methods of removing vegetation and reducing competition such as sheet mulching, smother cropping, or soil inversion. For more information about alternatives, see the [Organic Site Preparation for Wildflower Establishment](#) from the Xerces Society.

For agricultural land, the need to apply herbicide can be greatly reduced by timing construction and planting to occur after harvest and tilling. If the soil will be exposed from construction after the installation of the panels, plant before existing vegetation re-establishes. Generally, seeding should not occur before construction because heavy equipment would compromise the planting. To reduce soil compaction, prepare only the top few inches of soil immediately prior to planting with a cultipacker, a disc-like farm implement. Fertilizer is not necessary before seeding, and may promote competition from undesirable weeds.

Planting Design Recommendations

Planting design is affected by soil, site conditions, and other factors. The location of the different plants is important to consider to ensure the success of the planting. For example, different mixes may be needed for wet and dry areas. Again, plant species chosen for areas under and near the panels should have a maximum height based on the lower-edge of the PV panels so that they do not interfere with solar operations. Appendix A provides example seed mixes which are low-stature and have some shade tolerance for being planted under the panels.

Appendix B shows four basic layout options that will work for the majority of solar sites. Although maximizing the percentage of the site planted with a pollinator mix may be recommended, the choice to use a grass only mix on a portion of the site is based on preference or on the planned uses for the site, such as access through the site for tours or maintenance. The perimeter may have taller species or be only grass. For example, it may be desirable to provide a 40 - 125 foot non-flowering buffer to protect the planting from pesticide drift from adjacent agricultural practices. See the guide [Protecting Conservation Plantings from Pesticides](#) from the MN DNR. Work with relevant experts on the layout.

Planting Method

Refer to additional technical guidance for information on planting methods. Methods may include hand broadcasting, PTO broadcasting, dropseeding, drilling, etc. If drilling is a preferred method, seed drills designed specifically to plant prairie grasses and flowers should be used. Consult with the seed provider or relevant experts for the best planting method for the chosen seed mix. See the IN DNR [Habitat Fact Sheets](#) or the [Upper Midwest Habitat Installation Guide](#) from Xerces.

Timing

Planting should occur post-construction of the solar panels. Attempting to plant after grading and before post and panel installation will result in poor soil to seed contact due to equipment maneuvering. Depending on site conditions and timing, a temporary cover such as 20 lbs/acre of oats can be used as erosion control and site stabilization until construction is complete and the pollinator seed mixes are planted. For example, after the cover crop is winter killed, frost seeding could take place. However, it may not be necessary to use a temporary cover crop and oats may also be included in the seed mix.

Consult relevant experts on when to plant, as planting dates will vary depending on the weather in a particular year and location and when construction occurs. Spring planting should not occur until soil temperatures are above 65°F, but should be completed before June 15. Planting after June 15 is not recommended as supplemental irrigation would likely be needed in July and August so the planting does not fail. If dormant/frost seeding, seed should be broadcast in the fall or winter when soil temperatures are below 55°F to avoid risk of germination, generally around November 1, but before soils freeze. Seeding rates may need to be increased by 25% for dormant seeding due to lower germination rates and loss of seed consumed by wildlife over the winter months. However, dormant seeding may actually improve the establishment of many wildflower species the following spring due to exposure to cold conditions breaking dormancy.

Most sites will be open fields with minimal vegetation. However, if working on a site with known wildlife presence, habitat work, especially with heavy machinery, should be completed by April 15th. April through July are prime nesting season for wildlife.

Establishment and Maintenance Guidelines

Prairie plantings have both an establishment and a long-term maintenance phase. The establishment phase takes approximately 1-3 years. Long-term maintenance will begin in years 3-5 and continue for the life of the planting. The first year of growth is primarily for root development. In the second and third year of establishment, the above ground growth and flowers are more prevalent as the plants mature. The goal in the first few years should be to control the density of aggressive or fast growing plants, whether native or non-native, and allow the pollinator planting to become established. It is not necessary to eliminate all weeds, as the goal is to focus on removal of noxious weeds.

Maintenance Guidelines

A vegetation management plan should be developed and implemented on a site by site basis, and may depend on equipment and funding available.

Prescribed burning is not an option for solar sites. Management tools like spot mowing, strip disking, spot spraying and controlled use of selective herbicides may be needed from time to time to promote plant regrowth and to reduce competition from woody and other vegetation. For more information, consult the [IN DNR Habitat Fact Sheets](#) on strip disking, and strip spraying, wildflowers, and cool and warm season grass establishment and maintenance.

Spot mowing to control of noxious weeds can be done any year to ensure planting health, even during establishment years. It focuses on specific problem areas which is distinct from mowing the entire site during establishment or portions of the site during long-term maintenance, described later. More care should be taken during spot mowing in establishment years, at a raised height of at least 5" in order to target specific areas with noxious plants and to not damage the desired species. It could also be useful for controlling the height of plants if they grow taller than anticipated and are shading the panels. In some cases desired species that were selected to have a certain maximum height may grow taller under the right conditions. Discuss management tools with relevant experts, as some may have unintended effects depending on the species and timing. For example, mowing may further the spread of noxious seeds on-site or from off-site. Mowing equipment should be

cleaned prior to and after use to prevent the spread of non-native and invasive species into the planting and to other sites. Other methods such as hand pulling may be helpful at times but could stir up the existing seed bank. Grazing with sheep could be an option in certain circumstances.

Spot spraying should target only invasive or noxious plant species. Care should be taken when spot spraying because there is a risk of drift. A licensed applicator can be hired to apply the appropriate selective herbicide. Avoid spraying on windy days or when heavy rainfall is likely. Avoid spraying when pollinators are likely to be foraging. Plantings that include both grasses and wildflowers should not be broadcast-sprayed. To prevent inadvertent spraying of the pollinator planting, it is recommended to be placed on the local Do Not Spray list. This will help prevent damage to your pollinator planting.

To learn about specific invasive or noxious plants and control methods, consult the IN DNR [Invasive Plan Species](#) webpage or the [Midwest Invasive Plant Control Database](#).

Year One

There will be little to no flowering in the first season. The goal is to control weed density, height, and seed setting during establishment and in future years, not to eliminate weeds.

Annual weeds can be controlled by mowing the entire site. In the first year, it is typically recommended that there are at least two mows, one in July and another in August. Mowing should occur in early July (near the 4th of July) and again in late August (before Labor Day). The vegetation at these times should be about 12 -18 inches tall and should be mowed back to approximately 6 - 8 inches. If the vegetation has not reached 18 inches at the beginning of July, hold off until the Labor Day mow. Relevant experts may recommend up to 3-4 times to reduce shading of seedlings from annual weeds for more rapid establishment, but this may need to be balanced with the increased costs and labor. Growth should be monitored closely to adjust plans if necessary. Mowed vegetation can be collected or, depending on the amount, bagged and removed off site to prevent smothering new growth.

Year Two

Weed monitoring and control is still paramount in year two. This is when many natives will either be blooming or emerging for the first time. Mowing twice, in early July and late August, will benefit native grasses and wildflowers

Do not hesitate to mow desired plants. The mowing encourages establishment and root growth while preventing the seed set and spread of undesirable plants. As in year one, mowing should occur when growth is approximately 18 inches and should be mowed down to about 8 inches. Keep a watchful eye on the height of unwanted plants compared to the native planting, and adjust mowing plans accordingly. When appropriate, hand-pulling and spot treatment of herbicide can be used on unwanted plants as in the previous year. It may be necessary to reseed areas if they did not fully establish, or if site conditions changed or don't meet the original specifications (i.e. standing water).



Year Three and Beyond

Once established, timing of maintenance is important to avoid disturbance to grassland birds and other wildlife. April 1st through August 1st are primary nesting and brood rearing seasons and it is recommended that maintenance is limited at these times. Typically, year three marks the beginning of management with prescribed burning. As this is likely not an option near a solar array, mowing part of the site is the primary alternative that will be used.

Mowing in year three and beyond will be less frequent and the entire site should not be mowed. Vegetation can be cut shorter than in the first two years. The grasses and wildflowers can be mowed to approximately 4 inches tall if clippings can be removed. If not, only mow to 8 inches. Plan to have one annual mow either in early spring (March to April) or fall (September to October). An early spring mow may allow for more standing vegetation in the winter to provide cover for wildlife. In some cases, a fall mow may be preferred if aesthetics are a concern.

In general, plan to disturb (by mowing) one third to one half of the site annually, rotating thirds or halves every year. The same area should not be mowed in consecutive years. Rotating portions of established area to be disturbed is better as the varying stages of development will help increase plant diversity and structure. Assess the weed encroachment on the site to make decisions regarding how large of an area to mow. Always feel free to contact partners for site-specific guidance on mow times and area. Keep in mind that plantings like these are never truly finished. Because this type of habitat is successional, it will always need some maintenance and it is important to be flexible.

With any management activity it is very important to establish refugia (undisturbed areas). These areas play an important role in pollinator conservation and allow for the completion of pollinator life cycles. If possible, 10% of the site should be set aside as semi-permanent refugia that receives limited mowing on a longer return interval of 15 years. Spot-treat undesired plants if necessary, but well-established natives should reduce the need at this point.

Seed Suppliers & Landscape Companies

It is recommended that project developers work with a company that has significant experience with successfully establishing low-growing perennial vegetation. Look for companies that are experienced and have a history of successful prairie restorations projects. See the seed supplies list in Appendix C.

Evaluation and Long-Term Success

Purdue University published an extension document (Appendix D) establishing a [Scorecard](#) (Appendix D) as a planning tool that developers and landscape service provider can use to design pollinator-friendly vegetation with meaningful benefits. The MN BWSR Habitat Friendly Solar Program has [Sample Specifications](#) that local governments might use this as a template to create specifications as part of local approval processes. It is recommended that established plantings be evaluated every 3 years beginning in year 3.

Developers should strive to meet the project planning standard in Appendix D and ensure the long-term success of the pollinator planting. Solar projects are more likely to be accepted by the community if they have environmental benefits, provide conservation habitat, restore the soil over the life of the project, and have a natural aesthetic that is compatible particularly with rural areas.

Resources and Information

Through the [Department of Energy SolSmart program](#) in 2017 and 2019, 7 local governments in the MACOG region were designated as solar-friendly, solar-ready communities for making it easier, faster, and more affordable to go solar. These communities were recognized for leasing underutilized land for solar projects, training inspectors and fire fighters, and participating in the regional Solarize initiative to educate the public, among other activities. Local governments have made information available online related to zoning, permitting, and inspections for solar. Additional information can be found on the [MACOG Solar Energy Resources](#) page.

Solar developers are encouraged to consult with local planning offices to identify which ordinances or requirements may affect their projects. St. Joseph County was the first in Indiana to require pollinator-friendly solar in February 2020, and other counties have followed suit: Johnson, Lake, Marshall, Posey, Porter, Randolph, Shelby, Tippecanoe, White, with more counties proposing similar requirements. A 2020 [EQ Research](#) report highlights the role of local governments, importance of scorecards, and provides model language for ordinances and Requests for Proposals.

Resource Links

- [Best Management Practices for Indiana Pollinator Habitat](#), Purdue Extension
- [Center for Pollinators in Energy](#), Fresh Energy
- [Environmental Quality Incentives Program](#), USDA NRCS
- [Habitat and Wildlife Landowner Assistance](#), IN DNR
- [Innovative Site Preparation and Impact Reductions on the Environment \(InSPIRE\)](#), U.S DOE
- [Invasive Species Resources](#), IN DNR
- [Invasive Plant List](#), Indiana Invasive Species Council
- [Invasive Plant Control Database](#), Midwest Invasive Plant Network
- [MACOG Solar Energy Resources](#), Michiana Area Council of Governments
- [Native Plants of Indiana](#), Indiana Wildlife Federation
- [Organic Site Preparation for Wildflower Establishment](#), or [Overview](#), Xerces Society
- [Protecting Conservation Plantings from Pesticides](#), MN BWSR
- [Purchasing Seed for Conservation Plantings](#), USDA
- [Recommended Indiana-Native Plants for Attracting Pollinators](#), Purdue Extension
- [Sample Habitat Friendly Solar Planting Plan Specifications](#), MN BWSR
- [Upper Midwest Habitat Installation Guide](#), Xerces
- [Wildlife Habitat Fact Sheets](#), IN DNR

Contacts

- [DOE InSPIRE Project](#)
- [IN DNR Wildlife Biologists](#)
- [IN DNR Seed Supplier List](#)
- [Pheasants Forever / Quail Forever Farm Bill Biologists](#)
- [USDA NRCS Local Service Center](#)
- [Bee and Butterfly Habitat Fund](#)





Appendix A

Example Forb (Flowering Plants) & Grass Mix

Permanent Grasses and Sedges

Botanical Name	Common Name	Ounces/ac	Seeds/oz	Seeds/sq. ft.	Bloom Period
<i>Bouteloua curtipendula</i>	Side-Oats Grama	24.00	9375	5.17	-
<i>Carex bicknellii</i>	Copper-Shouldered Oval Sedge	3.50	33422	2.69	-
<i>Koeleria macrantha</i>	June Grass	1.50	150000	5.17	-
<i>Schizachyrium scoparium</i>	Little Bluestem	64.00	8800	12.93	-
<i>Sporobolus heterolepis</i>	Prairie Dropseed	3.00	14000	0.96	-
		96.00		26.91	

Temp Nurse Crop

Botanical Name	Common Name	Ounces/ac	Seeds/oz	Seeds/sq. ft.	Bloom Period
<i>Avena sativa</i>	Seed Oats	320.00	8125	59.69	-
		320.00		59.69	

Native Forbs

Botanical Name	Common Name	Ounces/ac	Seeds/oz	Seeds/sq. ft.	Bloom Period
<i>Allium cernuum</i>	Nodding Onion	6.00	7700	1.06	Mid
<i>Aquilegia canadensis</i>	Wild Columbine	1.00	25000	0.57	Early
<i>Chamaecrista fasciculata</i>	Partridge Pea	16.00	3800	1.40	Late
<i>Coreopsis lanceolata</i>	Sand Coreopsis	11.00	12500	3.16	Mid
<i>Dalea purpurea</i>	Purple Prairie Clover	7.00	20000	3.21	Mid
<i>Liatris aspera</i>	Rough Blazing Star	2.00	13000	0.60	Late
<i>Lupinus perennis v. occidentalis</i>	Wild Lupine	2.00	1000	0.05	Early
<i>Monarda punctata</i>	Horse Mint	1.50	94000	3.24	Mid
<i>Penstemon hirsutus</i>	Hairy Beard Tongue	1.50	125000	4.30	Early
<i>Solidago nemoralis</i>	Old-Field Goldenrod	1.00	240000	5.51	Late
<i>Symphyotrichum ericoides</i>	Heath Aster	1.00	140000	3.21	Late
<i>Zizia aurea</i>	Golden Alexanders	2.00	12000	0.55	Early
		52.00		26.86	

Total ounces per acre	468.00	Total seeds per square foot	53.77
Total pounds per acre	29.25		

Appendix A

Example Grass Only Mix

Permanent Grasses and Sedges

Botanical Name	Common Name	Ounces/ac	Seeds/oz	Seeds/sq. ft.	Bloom Period
Bromus pubescens	Woodland Brome	5.50	7187.5	0.91	-
Carex normalis	Spreading Oval Sedge	2.50	25000	1.43	-
Carex swanii	Downy Green Sedge	2.50	74000	4.25	-
Chasmanthium latifolium	Indian Wood Oats	13.00	7500	2.24	-
Elymus villosus	Silky Wild Rye	10.00	7800	1.79	-
Hystrix patula	Bottlebrush Grass	10.00	4700	1.08	-
Juncus tenuis	Path Rush	1.50	1000000	34.44	-
		45.00		46.13	

Temporary Nurse Crop

Botanical Name	Common Name	Ounces/ac	Seeds/oz	Seeds/sq. ft.	Bloom Period
Avena sativa	Seed Oats	320.00	8125	59.69	-
		320.00		59.69	

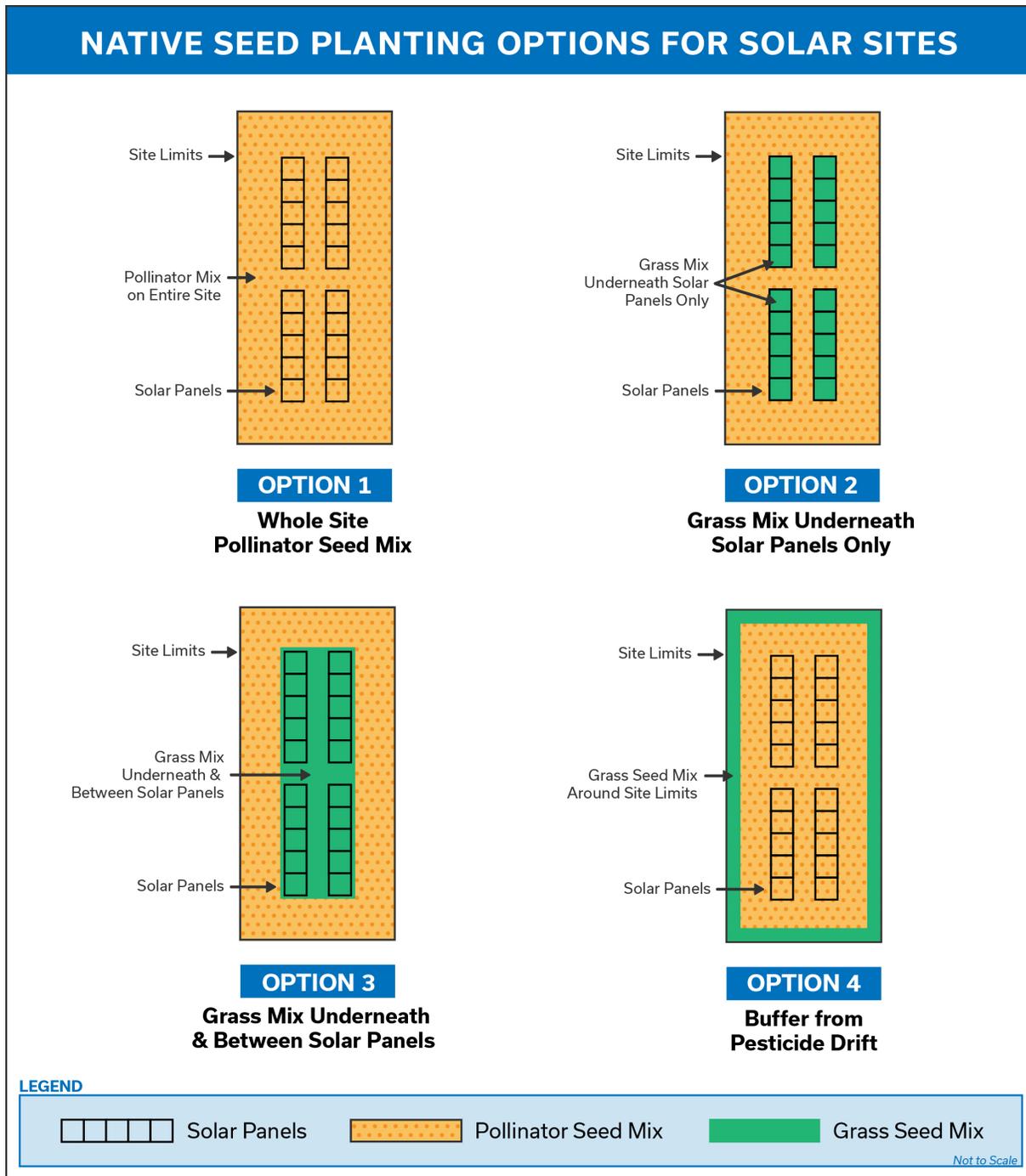
Total ounces per acre	365.00		46.13
Total pounds per acre	22.8125	Total seeds per square foot	

Appendix B

Seed Planting Layout Recommendations

It is recommended to work with your seed provided, DNR, or NRCS staff to develop an appropriate seed mix distribution and planting layout for your specific site.

Native Seed Planting Layout Options and Seed Mix Examples for Solar Sites



Appendix C

Seed Supplier List

This list of seed suppliers adapted from the IN DNR is not intended to be all inclusive or a recommendation by the Michiana Area Council of Governments. The listing can be accessed on the [DNR website](#). District biologists and farm bill biologists as well as NRCS staff can help develop seed mixes appropriate for individual sites.

Allender Seed Service
7655 S 100 W
North Judson, IN 46366
574-896-5074

Applegate's Seed House
76 E CR 700 S
Brook, IN 47922
219-275-3664

Bio Town Seeds, Inc.
373 N Diener Road
PO Box 299
Reynolds, IN 47980
219-984-6038
www.biotownseeds.com

Cardno / JFNew
708 Roosevelt Road
Walkerton, IN 46574
574-586-3400
cardnonativeplantnursery.com

Country Feed & Seed Store
10002 Belshaw Road
Lowell, IN
219-696-2767

Elrod Grain Services
5363 E US 50
Dillsboro, IN 47018
812-654-3177

Family Farm Supply
9150 S Gore Road
Bloomington, IN 47403
812-824-1150
www.familyfarmsupply.com

Grazing Systems Supply
2300 E CR 1100 N
Batesville, IN 47006
800-808-4474
grazingsystemssupply.com

Grazing Systems Supply
1131 B. Westbridge Parkway
Greensburg, IN 47240
888-635-8588
grazingsystemssupply.com

Heartland Restoration Services
14921 Hand Road
Fort Wayne, IN 46818
260-489-8511
www.earthsourceinc.net

Jackson-Jennings Farm Bureau
Co-op
Multiple Locations
See Website
www.jacksonjennings.com

Lacrosse Seed
PO Box 445
Elwood, IN 46036
800-562-2459
www.lftseed.com

Langdon Bros. Seed
3590 S 100 E
Hartforn City, IN 47648
800-526-4366
www.langdonbrosseed.com

Laughery Valley Ag Co-op
336 N Buckeye Street
Osgood, IN 47037
800-221-9731
www.laugheryvalleyag.com

Pheasants Forever Seed
Program
(866) 914-7373
www.pheasantsforever.org/seed

Spence Nursery
2220 E Fuson Road
Muncie, IN 47302
765-286-7154
www.spencenursery.com

Tenbarga Seeds
100 E Haub Street
Haubstadt, IN 47639
800-467-0158
www.tenbargeseeds.com

Appendix D

Planning Scorecard for Indiana

This form published by [Purdue University Extension](#) for Indiana may be used to evaluate a project in the planning stage. Established plantings should also be evaluated every 3 years beginning in year 3. See example forms for established plantings prepared by Virginia ([Centers for Pollinators in Energy](#)) or Minnesota ([MN BWSR Assessment Form](#)).

2020 INDIANA SOLAR SITE POLLINATOR HABITAT PLANNING SCORECARD

Use this scorecard as a starting point for solar projects to be considered "pollinator-friendly" in Indiana.

Note: In Indiana it is illegal to plant any invasive pests designated by the Terrestrial Plant Rule. Consult this list during your planning phase.

1. Planned percent of native species in array area (select one)

<input type="checkbox"/> 10-25%	+4 pts
<input type="checkbox"/> 26-50%	+6 pts
<input type="checkbox"/> 51-75%	+8 pts
<input type="checkbox"/> >75%	+10 pts

Remove 20 points for the inclusion of invasive species as per the Indiana Invasive Species Council

2. Vegetative buffer planned adjacent to the solar site (select all that apply)

<input type="checkbox"/> Buffer planned outside and/or inside of array fencing	+5 pts
<input type="checkbox"/> Buffer is at least 30 feet deep (or as deep as property allotment allows) as measured from array fencing	+5 pts
<input type="checkbox"/> Buffer has native shrubs/trees	+10 pts

3. Percentage of seeds across the site sourced within 150 miles (select one)

<input type="checkbox"/> 5-15%	+5 pts
<input type="checkbox"/> 16-49%	+10 pts
<input type="checkbox"/> >50%	+20 pts

Add an additional 5 points if all seeds are also local ecotypes

4. Planned number of species in site perimeter and buffer area (select one)

<input type="checkbox"/> 5-9 species	+4 pts
<input type="checkbox"/> 10-15 species	+6 pts
<input type="checkbox"/> 16-19 species	+8 pts
<input type="checkbox"/> >20 species	+10 pts

Exclude all non-native species (From un-matched USDA zones)

5. Planned number of species under array area (select one)

<input type="checkbox"/> 5-9 species	+4 pts
<input type="checkbox"/> 10-15 species	+6 pts
<input type="checkbox"/> 16-19 species	+8 pts
<input type="checkbox"/> >20 species	+10 pts

6. Additional diversity of species in site perimeter and buffer (select all that apply)

<input type="checkbox"/> Plant mix includes at least 5 grasses	+5 pts
<input type="checkbox"/> Plant mix includes at least 5 forbs	+5 pts
<input type="checkbox"/> Plant mix includes at least 2 milkweeds	+2 pts

7. Additional diversity of species under site array and between rows (select all that apply)

<input type="checkbox"/> Plant mix includes at least 5 grasses	+5 pts
<input type="checkbox"/> Plant mix includes at least 5 forbs	+5 pts
<input type="checkbox"/> Plant mix includes at least 2 milkweeds	+2 pts

8. Planned percentage of native species in perimeter and buffer area (select one)

<input type="checkbox"/> 10-25%	+4 pts
<input type="checkbox"/> 26-50%	+6 pts
<input type="checkbox"/> 51-75%	+8 pts
<input type="checkbox"/> >75%	+10 pts

Remove 20 pts for the inclusion of invasive species as per the Indiana Invasive Species Council

9. Planned percentage of the entire site's vegetative cover that includes flowering plants (select one)

<input type="checkbox"/> 15-25 %	+2 pts
<input type="checkbox"/> 26-50 %	+5 pts
<input type="checkbox"/> 51-75 %	+10 pts
<input type="checkbox"/> More than 75%	+15 pts
<input type="checkbox"/> No flowering plants	-15 pts

10. Planned seasons with at least three blooming species present

<input type="checkbox"/> Blooms from spring (April-May) to fall (September-October)	+15 pts
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11. Site preparation prior to implementation (select all that apply)

<input type="checkbox"/> Soil preparation done to promote germination and reduce erosion as appropriate for the site.	+10 pts
<input type="checkbox"/> Temporary site seed mix uses native plant mix	+10 pts
<input type="checkbox"/> Measures taken to control weeds prior to seeding	+10 pts
<input type="checkbox"/> None	-10 pts

12. Site planning and management (select all that apply)

<input type="checkbox"/> Detailed establishment and future site management plan developed	+10 pts
<input type="checkbox"/> Signage legible at 40 or more feet stating "pollinator-friendly solar habitat"	+5 pts
<input type="checkbox"/> Plan to engage with or educate the public on the benefits of pollinator-friendly solar	+5 pts
<input type="checkbox"/> Site is involved in an ongoing research project with a university or other organization	+10 pts

13. Insecticide risk (select all that apply)

<input type="checkbox"/> Planned on-site use of broadcast insecticide or pre-planting seed/plant treatment (excluding buildings/electrical boxes, etc.)	-40 pts
<input type="checkbox"/> Communication/registration with local chemical applicators or on www.fieldwatch.com to prevent drift	+5 pts

Does not meet standards - < 100
Meets preliminary standards - 100 or greater
Provides exceptional habitat - 125 or greater



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