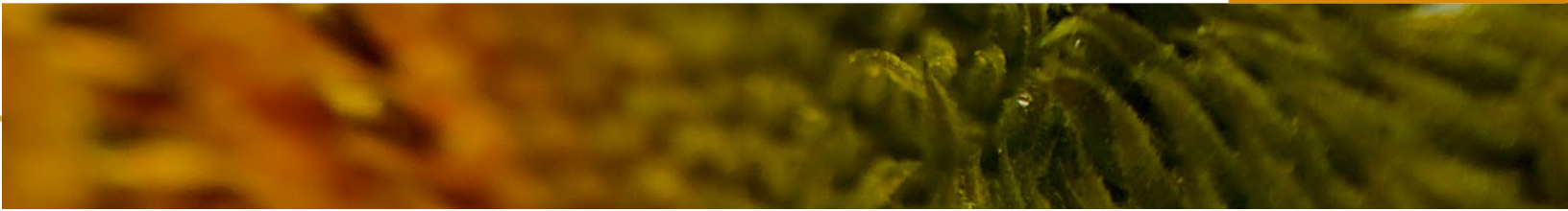
Standards for the use of Pollinator-friendly Native Plant Species and Seed Mixes in Grid Supply and select Net Metered Solar Facilities

August 2023



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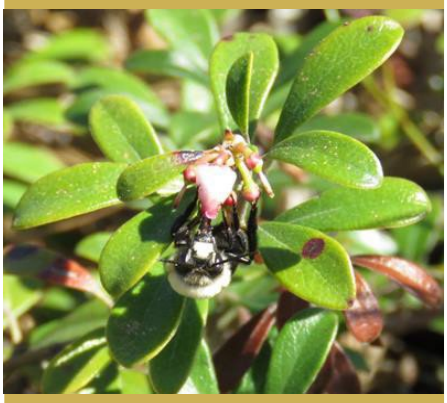
Introduction

Among the evolving threats or stressors affecting pollinators in New Jersey, climate change is perhaps the most daunting. Climate change is projected to alter habitat quality and condition and effect wildlife species assemblages due to gradual changes to temperatures and weather patterns. These changes are considered both direct threats and indirect stressors to pollinators. Individual states are increasingly recognizing their unique roles and opportunities to mitigate the effects of climate change. New Jersey, through the development and publication of the 2019 Energy Master Plan and the Global Warming Response Act 80x50 Report, has established a series of pathways for the state to reduce its greenhouse gas emissions. Chief among them is the build-out of more sustainable, renewable energy sources. As of May 31, 2023, New Jersey exceeded 4.4 Gigawatts (GW) of installed solar photovoltaic (PV) capacity from over 178,000 installed systems. By 2050, New Jersey will need to increase installations to 32 GW of solar capacity to achieve its greenhouse gas reduction goals.



The build-out of solar capacity will inevitably impact the landscape as solar grids are increasingly established on agricultural lands and open fields in addition to being co-located on existing infrastructure. However, impacts to wildlife can be avoided or minimized if done thoughtfully. By promoting native plantings at solar generation sites, this energy transition could even benefit certain wildlife species in the state. Conversion to renewable energy sources is among the conservation actions recommended in New Jersey's Wildlife Action Plan. The Plan also notes several conservation actions addressing how conversions to renewable energy sources could be sited and designed in consideration of New Jersey's "species of greatest conservation need" and the habitats upon which they rely. The recommendations include maintaining or increasing structural habitat diversity in and around solar facilities.

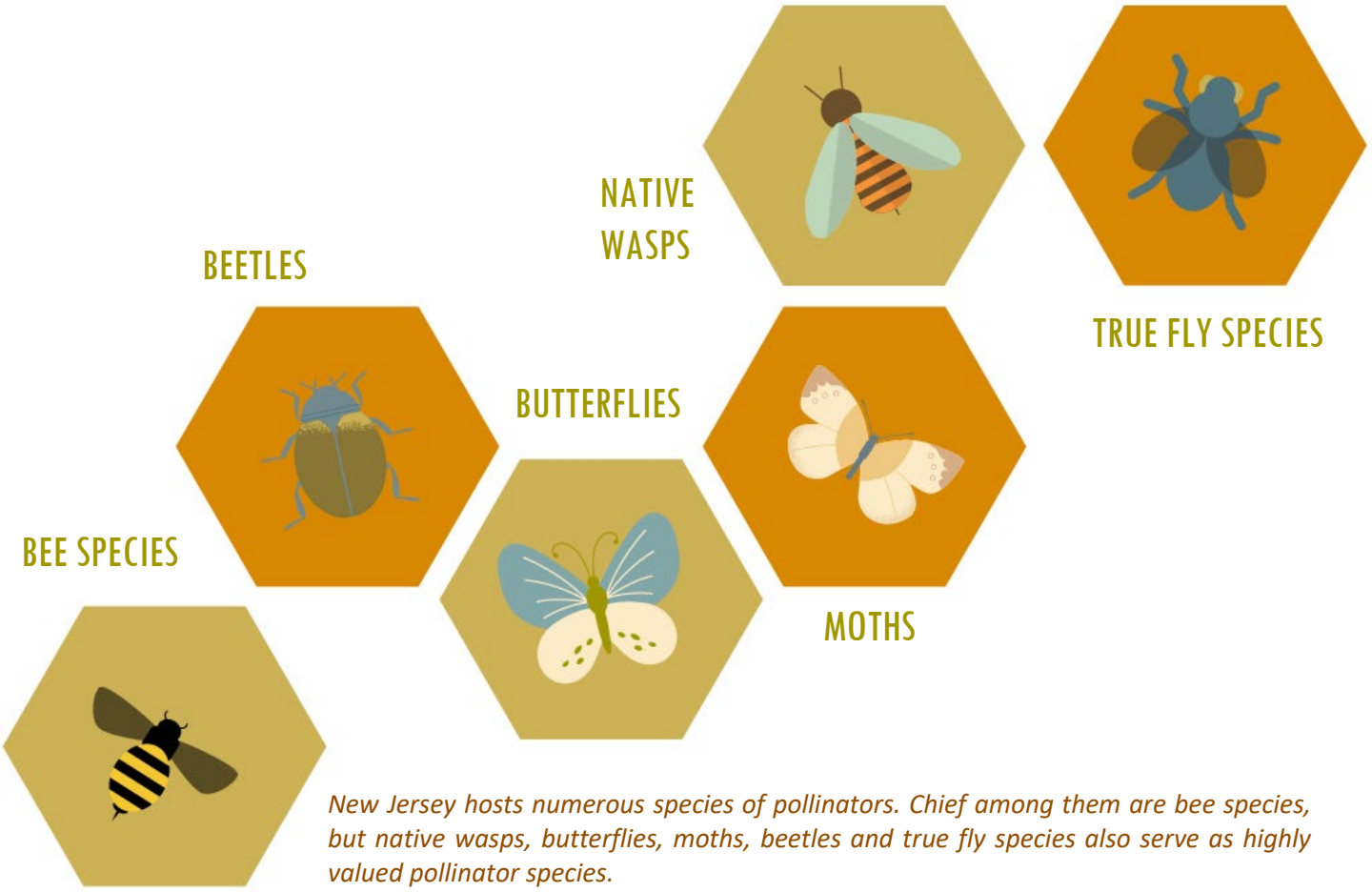
This document, and the standards outlined within it, serve to further the state's climate mitigation goals, and facilitate the implementation of The Solar Act of 2021[1] (hereafter, "Solar Act"), passed by the New Jersey Legislature in July 2021. The Solar Act re-envisions the state's process and policy regarding the planning, incentivizing, siting, and design of solar energy facilities. The State Legislature also recognized the critical importance of pollinators, and the opportunities solar facilities could provide by requiring habitat for pollinators and other wildlife to be incorporated into solar grid facilities. Consistent with New Jersey's Wildlife Action Plan, among the Solar Act's mandates is a requirement that the Department of Environmental Protection (DEP), in consultation with the Board of Public Utilities (BPU), establish standards for pollinator-friendly native plant species and seed mixes in grid supply solar facilities. These standards, developed in consultation with DEP Fish & Wildlife, will also be applied to net-metered non-residential solar facilities having a capacity greater than 5 Megawatts (MW). The standards herein

[1] P.L. 2021, C.169

address the creation and maintenance of pollinator habitats and meadows as well as specific issues associated with installing such habitats among solar facilities and infrastructure.

These standards are in addition to, and not a replacement for, any other rules and regulations applicable to the approval, installation, and operation of a solar grid array. For example, DEP Land Use Resource Protection requirements, Soil Erosion and Sediment Control rules, local permitting requirements etc.

This document also establishes a procedure for individual solar developers to demonstrate their use of pollinator-friendly native plant species and seed mixes in their proposed grid supply solar facilities via the development and submission of a Vegetation Management Plan. Developers shall certify in the Vegetation Management Plan that they have complied with the Standards set forth in this document.



New Jersey hosts numerous species of pollinators. Chief among them are bee species, but native wasps, butterflies, moths, beetles and true fly species also serve as highly valued pollinator species.

Legal Background and Overview of Standards

The Solar Act mandated that the DEP, in consultation with the BPU, establish standards for the use of pollinator-friendly native plant species and seed mixes in grid-scale solar facilities. Standards are designed to reduce stormwater run-off and erosion, provide native perennial vegetation and foraging habitat beneficial to gamebirds, songbirds, and pollinators, and consider compatibility with the security and reliability of grid supply solar facilities. As will be further detailed below, the DEP and BPU will consider a grid supply or net-metered solar facility to have effectively complied with the requirements of the Solar Act if the developer is at least 80% successful in planting all barren, agricultural, or herbaceously vegetated areas of the site using pollinator-friendly native plant species and seed mixes and that the facility is otherwise in compliance with the Solar Siting Rules for Grid Supply and Large Net Metered Solar Facilities (N.J.A.C. 14:8-12.1). Areas within the footprint of proposed solar panel arrays will be among the more challenging management units within which to accomplish such plantings. Yet, managing these areas is both the point of the Solar Act and critical to meeting the aforementioned success criteria.

To accomplish these goals, this document will:

1. **Identify appropriate standards for the creation of wildlife habitats for pollinators and beneficial insects; and,**

2. **Establish a process for developing a "Vegetation Management Plan" specific to each proposed development, via which solar facility developers will demonstrate compliance with the Solar Act, and associated rules (N.J.A.C. 14:8-12.1).**

The "**Standards**" portion of the document will rely on an existing resource for creating pollinator habitat in New Jersey. It will also provide additional "solar facility specific" recommendations and/or requirements that would either complement or need to be addressed explicitly in the site's Vegetation Management Plan. Developers shall certify compliance with the Standards when submitting the Vegetation Management Plan.

The "**Vegetation Management Plan**" portion of the document will identify the required components and contents of a properly developed habitat installation plan for solar facilities. A properly developed Vegetation Management Plan will detail all applicable site assessment and design elements, including identifying the facility's "**Vegetation Management Units**" (Vegetation Management Unit's). Vegetation Management Unit's are specific areas of a proposed facility that share unique vegetation planting opportunities or challenges, such as the areas immediately below solar panels, the areas that comprise the lanes between panel arrays, or the footprints of proposed stormwater facilities, site buffer areas, etc. A Vegetation Management Plan must establish, map, and specifically design pollinator habitat prescriptions for each type of Vegetation Management Unit on site. The Vegetation Management Plan must explain and support the specific pollinator habitat prescription (soil conditions, plants, and/or seed mixes) selected and establish both short (5 years) and continued long-term maintenance (throughout life of the solar array) and monitoring requirements for each type of Vegetation Management Unit. Collectively, the professional design, site prep, planting, maintenance, and monitoring of individual Vegetation Management Unit's result in a successful site habitat installation. A Vegetation Management Plan shall fully detail and document these efforts. This, in turn, facilitates the BPU's approval of a proposed solar facility as being compliant with the Solar Siting Rules for Grid Supply and Large Net Metered Solar Facilities (N.J.A.C. 14:8-12.1. These Standards serve as the facility manager's blueprint for long-term maintenance and monitoring requirements to remain in compliance with said standards.

Standards for the use of pollinator-friendly native plant species and seed mixes in grid supply solar facilities

Standards addressing the creation of pollinator habitat required by the Solar Act must address the following critical elements:

Element 1: Site assessment, planning, and design
Element 2: Plant selection
Element 3: Site preparation
Element 4: Planting methods
Element 5: Maintenance requirements
Element 6: Monitoring requirements

The DEP and BPU have identified the Conservation Cover (327) for Pollinators New Jersey Installation Guide and Job Sheet (2013) (see below), which developers can use, as providing appropriate standards regarding the generic creation and maintenance of pollinator habitats or native meadows in New Jersey. This resource (refer to throughout this document as the Habitat Installation Guide) should be relied upon as the primary Standards regarding the appropriate design, site preparation, plant selection, and maintenance requirements for specific site Vegetation Management Unit's, until an updated version is released. The Agencies have also established a series of additional complementary standards to guide developers.

Primary Standards: Habitat Installation Guide - Conservation Cover (327) for Pollinators New Jersey Installation Guide and Job Sheet (2013)

This guide, authored by the Xerces Society for Invertebrate Conservation; Rutgers University Department of Ecology, Evolution and Natural Resources, provides in-depth guidance on establishing and maintaining pollen- and nectar-rich wildflower habitats for pollinators and beneficial insects. The draft document notes that in achieving these habitat conditions, food and cover would also be afforded for other wildlife species. The efforts would also reduce soil erosion, protect water quality, and attract other beneficial insects such as predators and parasitoids of crop pests. These goals are entirely consistent with the mandate of the Solar Act. An update to this guide is scheduled for release during the Fall of 2023 titled "Habitat Installation Guide: Wildlife habitat (420) & Conservation Cover (327) for Pollinators and Beneficial Insects.

Elements Addressed:

Element 1: Site assessment, planning, and design → Addressed, though additional considerations are required for solar
Element 2: Plant selection → Addressed, with species recommendations (not solar-specific)
Element 3: Site preparation → Addressed
Element 4: Planting methods → Addressed
Element 5: Maintenance requirements → Addressed
Element 6: Monitoring requirements → Not specifically addressed for solar sites

Source:
https://www.xerces.org/publications/habitat-installation-guides/new-jersey-conservation-cover-327-for-pollinators

Notes: *There is a scheduled draft update to the 2013 Xerces/Rutgers guidelines regarding pollinator habitat installations and has been approved for reference herein by the Xerces Society. These standards address the key planning needs, steps, and considerations critical to the establishment of pollinator habitats in New Jersey. All elements except "Element 6 – Monitoring Requirements" are effectively addressed, and Element 6 is somewhat implied in the discussions regarding maintenance. The updated guidelines provide a list of recommended wildflowers for pollinators that site designers can select from, including information relating to the species' life cycle, heights, bloom time (season), water needs, soil preferences, and – importantly - shade tolerance. The species list also indicates any host-plant associations with stem-nesting bees or lepidoptera larval, as well as any generalized benefits to bumblebees, monarch butterflies, beneficial insects, and birds/wildlife. The guide also lists recommended native grasses and sedge species with all similar associations (noting that DEP does <u>not</u> recommend incorporating Big Bluestem (Andorogon gerardii) or Indiangrass (Sorghastrum nutans) at solar facilities due to plant height and aggressive nature). Native seed vendors or nurseries are cited current to 2023. A beneficial and state-specific reference standard that includes information about shade tolerance and wildlife benefits of specific plant species*. **This resource should be relied upon as the primary Standards regarding the appropriate design, site preparation, plant selection, and maintenance requirements for specific site Vegetation Management Units** and upon publication, the draft update to the current guide will supersede the current 2013 guide.

Additional DEP Standards related to Solar Installations

The Habitat Installation Guide cited above applies generically to creating native pollinator habitats and meadows in New Jersey but does not *<u>specifically</u>* address the challenges or constraints presented at solar installations. Primarily, these challenges involve the need to keep plant species from overtopping solar panels and the availability of plant species that would tolerate the shade conditions under solar panels and that may accommodate facility maintenance needs. Accordingly, the following additional standards should be adhered to.

Element 1: Site assessment, planning, and design

The Habitat Installation Guide cited above provides a comprehensive standard that addresses site assessment, planning, and design tasks regarding the general creation of pollinator habitats and native meadows. Pollinators have complex life-history-specific habitat needs. Many pollinators have species-specific nesting area preferences (such as bee species that nest in plant stems, within bare, friable soil, or incorporate available clay mud into constructed nest structures). Pollinators also have specific nectar resource needs and - when it comes to lepidoptera (butterflies) – require specific larval host plants. As such, optimal pollinator habitat design standards must include a variety of plants, grasses, and soil conditions purposefully selected to address these needs. This will ensure the final design provides for a multitude of pollen and nectar sources, larval host plants, and nesting habitats for pollinating bees, from hollow plant stems and grass clumps for nesting to bare soil patches for burrow or nest structure creation.

The final pollinator habitat design of a proposed solar facility will be reflected in a site's Vegetation Management Plan. A Vegetation Management Plan shall include details for each of the unique "Vegetation Management Units" that collectively represent all existing (i.e., "pre-construction") barren, agricultural, or herbaceously vegetated areas of the site.

The following additional standards specific to solar sites must also be considered and – where required – incorporated into the site's Vegetation Management Plan:

- Address potential soil compaction and soil health as a result of construction.
- All existing (i.e., "pre-construction") barren or herbaceously vegetated areas of the site must be planted in pollinator-friendly native plant species, and seed mixes designed to reduce stormwater run-off and erosion and provide native perennial vegetation and foraging habitat beneficial to gamebirds, songbirds, and pollinators. Pre-construction agricultural areas of the site that are not directly developed with solar facilities must either stay in active agricultural practices or be converted to pollinator or grassland bird habitat(s). Active haying with delayed harvest restrictions would qualify as an agricultural use that *<u>also</u>* serves the habitat needs of grassland birds and other wildlife and is advantageous in areas surrounding the solar facility.
- Evaluate existing vegetative conditions. Note any challenges regarding invasive or existing non-desirable species that may require pre-construction weed eradication/management.
- The development of each site's Vegetation Management Plan must acknowledge the constraints and opportunities presented by unique areas within or around a proposed solar facility. Such areas include, but are

not limited to, the solar panel array footprint, lanes between solar panel arrays, perimeter areas surrounding solar panel arrays and lanes, buffer areas, stormwater facilities, and any additional barren, agricultural, or herbaceously-vegetated portions of the site not directly proposed for solar facility development, but which would contribute toward compliance with the Solar Act of 2021. Such areas must each be recognized as, and where appropriate, grouped into specific "**Vegetation Management Units**". Each unique category of Vegetation Management Unit must be addressed in the Vegetation Management Plan and assigned a specific, purposeful habitat prescription designed to meet the unit's goals and objectives, with accompanying maintenance and monitoring requirements to ensure long-term success.

- A general category of Vegetation Management Unit, such as one established for "Footprint of Solar Arrays" (which might be assigned the label "VMU-A"), may be further divided into sub-categories to reflect slightly different prescriptions for otherwise similar vegetation management units. For example, Vegetation Management Unit's for "Footprint of Solar Arrays" would require more shade tolerant plant species or may span different soil moisture conditions. In such an example, the Vegetation Management Unit's would continue to share generally similar approaches to plant height and tolerances to shading, warranting their inclusion in the same Vegetation Management Unit. However, one "sub-category" of the Vegetation Management Unit (perhaps "VMU-A1") might need to incorporate plant species with slightly greater tolerance to drought conditions, while the other sub-category (perhaps "VMU-A.ii") may need to address higher moisture tolerances. In this manner, developing categories ***and*** subcategories of Vegetation Management Units facilitate appropriate planning, maintenance, and monitoring considerations.
- To remain in compliance with the Siting Rules for Grid Supply and Large Net Metered Solar Facilities (N.J.A.C. 14:8-12.1), a developer must document 80% or greater success/survival of the pollinator-friendly native plant species and seed mixes planted within *each category* of Vegetation Management Unit identified in the Vegetation Management Plan.
- Developers must fully assess existing, pre-development wildlife habitats and resource use of the site. The proposed solar panels and infrastructure layout must consider any existing use of the proposed development footprint by state or federally-listed species and avoid disturbance of any such habitats. Habitats presumptively utilized by endangered, threatened, and special concern wildlife species are documented via New Jersey's Landscape Project mapping. Note, however, that the Landscape Project does not reflect data for rare wildlife that occurs on many private or inaccessible properties. As such, any site selection process should include proactive surveys for rare species. Solar facility design and installation should ensure that no adverse impacts occur to endangered or threatened species habitats, nor that any local populations of endangered, threatened, or special concern wildlife are extirpated as a result of development activities or subsequent operation of the proposed facility.
- Vegetation Management Plans that create *new* habitats for threatened or endangered species that may be documented adjacent to the site or within the region, such as grassland bird habitat(s), may be eligible for reduced compliance metrics comparable to the difficulty in establishing any such habitats and reflective the degree of effort to implement any such design as opposed to a standard pollinator installation. Any such decision shall be made on a case-by-case basis in consultation with the BPU or its delegated authorities.
- Developers should consider taking advantage of the areas under panels as management units to incorporate bare friable soil nesting areas or make clay available for the construction of nest structures. Note that this should only be designed to the degree warranted and does *not* suggest or condone that areas under panels need not be vegetated. Shade tolerant plant species should be a primary consideration for these areas. No more than 2% of any Vegetation Management Unit should be dedicated as "bee nesting habitat."
- Developers must minimize the extent of impervious surfaces and ensure that any such surfaces drain to stormwater management features designed to meet or exceed current water quality standards. No more than 5% of a site should be covered in impervious surfaces.
- Fencing required for proposed solar facilities shall be designed and installed so as to minimize adverse effects on wildlife, particularly reptiles and small mammals. Consideration must also be given to the obstruction or removal of wildlife connectivity "cores" or "corridors" as identified via New Jersey's "Connecting Habitat Across New Jersey" (CHANJ) Mapping.

Element 2: Plant Selection

The Habitat Installation Guide cited above provides a comprehensive standard that addresses plant selection criteria for the general creation of pollinator habitats and native meadows. A master list of native grass and wildflower plant species are identified that are highly valuable for pollinators and beneficial insects. However, the plant species recommended do not *specifically* acknowledge species that would address some of the unique design challenges associated with solar facilities, such as planting under solar panels or in high-access areas. Ultimately, in selecting a plant seed mix for use on solar sites, the project's landscape architect or similarly qualified professional responsible for developing the site's Vegetation Management Plan must consider a range of site-specific factors including, but not limited to, the site's geographic location, soil type(s), aspect and/or prevailing weather exposure(s), water availability, surrounding vegetative conditions, and must also acknowledge any specific wildlife resource goals (such as replicating pre-construction grassland bird habitat). Accordingly, the following additional standards specific to solar facilities must be considered and – as required – incorporated into the site's Vegetation Management Plan:

- The Vegetation Management Plan must document and justify the plant species and/or seed mixes selected for each category of Vegetation Management Unit, consistent with each category's specific goals and objectives. For example, it should be clear that plant selection for Vegetation Management Unit's within which solar panels will be installed has considered plant species heights and tolerance to shade.
- Plant selection for each management unit should endeavor to provide representative flowering species for **each period of the growing season** so that there is adequate food availability for pollinators throughout the season. Unless specific site conditions or vegetation goals warrant reconsideration, seed mixes should generally include approximately 60% grasses and 40% forbs by weight to provide suitable habitat and structure for pollinator nectaring, nesting, and larval host plants for lepidoptera. To help ensure continuous blooming from spring into fall, at least 6 species should be selected from the early-season blooming group, at least 6 from the mid-season blooming group, and 4 species from the late-season group. A mix of native grass species should also be incorporated.
- An example of a suitable seed mix recommended by DEP would include the species and the seed rates specified in Appendix 1.
- While native plant species should remain the focus of any Vegetation Management Plan, consideration may be given to incorporating reasonable numbers of the following non-native species (see Table 1). These species are a good early-season source of nectar and, due to their potential tolerance to disturbance from routine access or maintenance activities, may also be particularly useful for incorporation within management areas that includes frequent access or management:

Table 1: Early Season Non-Native Species

Common Name	Scientific Name	Height	Notes
Red clover	*Trifolium pratense*	1'	**Non-native naturalized annual**, may become an aggressive spreader, but a hardy pollinator resource
White clover	*Trifolium repens*	1"	**Non-native naturalized perennial**, but a hardy pollinator resource, tolerates moist soils
Alsike clover	*Trifolium hybridum*	2'	**Non-native naturalized perennial**, but a hardy pollinator resource

- If the pre-construction site assessment and/or the overall project design dictate that habitat for grassland bird species be a focus of the Vegetation Management Plan, or of specific Vegetation Management Units within the site, the following plant species should be incorporated (see Table 2).

Table 2: Species for Grassland Birds

Common Name:	Scientific Name:	Height:	Notes:
Little Bluestem	*Schizachyrium scoparium*	3’	Low height, tolerates drought and sandy soils
Purpletop	*Tridens flavus*	4’- 5’	Warm-season grass, tolerates drought
Switchgrass	*Panicum virgatum*	4’–5’	Warm-season grass, tolerates poorly drained soils, yet is also moderately drought tolerant
Virginia Wildrye	*Elymus virginicus*	4’-5’	Cool season grass, tolerates shade and moist soils, moderately drought tolerant, short lived
Broomsedge	*Andropogon virginicus*	4’	Warm-season grass, tolerates drought and dry infertile soils
Deertongue	*Dicanthelium clandestinum*	4’	Warm-season grass, tolerates wet soils, yet is also drought tolerant.
Sideoats Grama	*Bouteloua curtipendula*	3’	Warm-season grass, high winter forage value,

- **The DEP and BPU note that professional judgement and/or other available resources may inform the final selection of native plant species incorporated into the final site design.** The plant selection standards presented in the Habitat Installation Guide and as expanded upon above, represent baseline species from which a site designer may select. Ultimately, a site’s Vegetation Management Plan must both document and explain the final plants selected, with the goal of establishing long-term, readily maintained pollinator habitats designed to reduce stormwater run-off and erosion and provide native perennial vegetation and foraging habitat beneficial to gamebirds, songbirds, and pollinators.

Element 3: Site preparation

The Habitat Installation Guide cited above provides a comprehensive standard that addresses site preparation tasks regarding the creation of pollinator habitats and native meadows. The following additional standards specific to solar sites must also be considered and – as required – incorporated into the site’s Vegetation Management Plan:

- All site development contractors must be aware of the post-construction planting/Vegetation Management Unit plan, ensuring that all prior facility construction tasks, ranging from initial grading to solar panel installation, do not adversely affect soil health or condition prior to pollinator habitat installation.
- Care must be taken not to overly compact the upper 12" of soils in Vegetation Management Unit areas where the Vegetation Management Plan calls for the application of a pollinator seed mix and/or where conditions are to be maintained in a condition where ground-nesting native bee species can excavate soils.
- Because of the unique vegetative community proposed, particular attention must be made within the Vegetation Management Plan to pre-construction weed eradication/management.
- Accommodations must be made to ensure that weed or invasive species seeds are not introduced via construction equipment, undeveloped portions of the site, or adjacent properties.

Element 4: Planting methods

The Habitat Installation Guide cited above provides comprehensive standards that address planting methods regarding the general creation of pollinator habitats and native meadows. Additional considerations specific to solar sites might include:

- Ensuring that the planting methods required for specific plant species desired to be incorporated into a management area would not preclude its ultimate use. For example:
  - Seeding or planting practices in management areas where existing solar panels may already have been installed may preclude using specific planting methodologies, such as seed drilling.
  - Seeding or planting on specific sites, such as a remediated site, may preclude the use of specific planting methodologies, such as those that require tilling or excavation.

Element 5: Maintenance requirements

The Habitat Installation Guide cited above provides comprehensive standards that address both short and long-term maintenance needs associated with pollinator and native meadow habitat installations. The DEP and BPU also recognize that there are other meaningful resources addressing this issue, including some very relevant standards established in "Mid-Atlantic Native Meadows, Guidelines for Planning, Preparation, Design, Installation, and Maintenance," prepared by The Xerces Society and Mahan Rykiel Associates (2020). Pollinator habitat installations designed within solar facilities must accommodate maintenance practices that fully consider compatibility with grid-supply solar facilities' security, reliability, and routine operation. The following additional standards specific to solar sites may also need to be considered and – as required – incorporated into the site's Vegetation Management Plan:

- The Vegetation Management Plan must anticipate the potential inability to maintain or restore a particular management unit via large-scale clearing or grading, should that management unit contain facility infrastructure such as solar panels or underground utilities.
- Management units within which solar panels are located may require greater and/or more frequent vegetation maintenance efforts to manage the heights of plant species planted below the solar panels.
- Management areas wherein access lanes between panel arrays are located may require greater and/or more frequent maintenance efforts to manage the heights or conditions of plant species planted therein, such that access by maintenance equipment or personnel is not precluded, nor that the vegetation encroaches above the adjacent solar panel arrays.
- To ensure such fencing is free of entangled vegetation and is readily inspected for security or overall site maintenance purposes, requirements for perimeter fencing may present specific maintenance requirements.

Element 6: Monitoring requirements

The Habitat Installation Guide cited above does ***not*** provide meaningful standards to address long-term monitoring needs associated with pollinator and native meadow habitat installations at solar facilities regulated by the Solar Siting Rules for Grid Supply and Large Net Metered Solar Facilities (N.J.A.C. 14:8-12.2) proposed at the time of writing. This is in part because that resource, as well as the "Mid-Atlantic Native Meadows, Guidelines for Planning, Preparation, Design, Installation, and Maintenance," prepared by The Xerces Society and Mahan Rykiel Associates (2020), tend to discuss "monitoring" in the context of both short- and long-term "maintenance." However, compliance with the Solar Siting Rules for Grid Supply and Large Net Metered Solar Facilities will require establishing a specific monitoring program that starts with the commencement of site preparation/construction and continues annually throughout the facility's operation. Facility construction and post-installation monitoring must be addressed as a specific element ("Element 6") of a site's Vegetation Management Plan, and must include the following:

- An overall acknowledgment that both construction and post-construction monitoring protocols are required and that they are proposed therein. Monitoring protocols should reflect any specific management objectives established by the Vegetation Management Plan, such as whether the Vegetation Management Plan focuses on establishing generic pollinator habitat or perhaps takes a more "focal-species" approach, such as focusing on maintaining, restoring, or creating grassland bird habitat.
- The monitoring plan should clearly identify the party/parties responsible for Vegetation Management Plan monitoring, noting their professional qualifications. Such persons are expected to possess sufficient botanical experience in identifying native plants, native plant communities, invasive species, and non-native species typical of New Jersey.
- The monitoring plan must include twice-annual assessments made during the period(s) of site prep and construction (i.e., prior to vegetation seeding/planting) to ensure that soil health and condition is maintained in all management units designated to be planted. This includes, but is not limited to, monitoring issues regarding soil compaction, soil erosion, stormwater run-off, and soil separation and storage. Following the

completion of construction, the site monitoring shifts to focus on meeting vegetation establishment and management objectives established in the site's Vegetation Management Plan.

- "Site Preparation/Construction" monitoring performed during the site prep/construction period shall occur twice annually and concludes upon the planting of each Vegetation management Unit identified in the Vegetation Management Plan. Upon the completion of each monitoring period, a monitoring report must be prepared and submitted addressing the findings of the specified monitoring period. Reports must address all site pre, and construction activities conducted January through June (to be reported/submitted by July 31 of the calendar year), and July through December (to be reported/submitted by January 31 of the calendar year), as such activities are relevant to the Vegetation Management Plan.
- "Vegetation Monitoring" commences upon the seeding/planting of each specific Vegetation Management Unit identified in the Vegetation Management Plan, must occur twice annually during the "establishment phase" (first five years) of each management unit identified in the Plan, and shall continue annually thereafter. Upon the completion of each monitoring period, a monitoring report must be prepared and submitted addressing the findings of the specified monitoring period. The monitoring report must be prepared by the party(ies) performing the monitoring and must address the progress made specific to the goals and objectives of each category/subcategory of Vegetation Management Unit identified in the Vegetation Management Plan. Twice annual reporting must address activities conducted January through June (to be reported/submitted by July 31 of the calendar year) and July through December (to be reported/submitted by January 31 of the calendar year). Annual reporting shall address the entire calendar year, to be reported by February 28 of the following year.
- Monitoring methods should provide an unbiased assessment of each category/subcategory of Vegetation Management Unit within the overall site. Quantitative measures may be supplemented by qualitative measures to assess how well the project's management objectives are being achieved.
    - *Quantitative* – Quantitative techniques allow for comparisons of subsequent reporting to understand the progression of vegetation establishment over time. Vegetation should be sampled using standardized techniques with fixed sample locations and photo points. Include percent vegetation cover and estimated species richness. Report the seed mix planted and assess estimated success rates for each species.
    - *Qualitative* – Include systematic monitoring of location-specific management issues, including noxious weed/invasive species populations, localized surface erosion issues or other disruption of established vegetation, including impacts related to operations.
- Monitoring should address and reflect stated Vegetation Management Plan goals. It should evaluate seed mixes and associated Vegetation Management Unit's for the establishment, including species present and percent cover. It should also address invasive species and subsequent management activities needed to control same. A timeline of monitoring activities should be included in this section.
- The monitoring plan should include proposed adaptive strategies to address site management challenges or noncompliance issues. The DEP and BPU shall consider a site compliant with the requirements of the Solar Act of 2021 and the Solar Siting Rules for Grid Supply and Large Net Metered Solar Facilities if the site has achieved and maintains 80% successful coverage (within each category of the site's Vegetation Management Units) of pollinator-friendly native plant species and seed mixes designed to reduce stormwater run-off and erosion, and that provide native perennial vegetation and foraging habitat beneficial to gamebirds, songbirds, and pollinators.
- The professional(s) responsible for implementing the required monitoring plans must conclude each monitoring report with a finding as to whether the goals and objectives of the Vegetation Management Plan are being met. The report should refer to the original signed/sealed plans depicting proposed site conditions and all relevant details of the Vegetation Management Plan, including the location of all Vegetation Management Unit's. It should also cite any corrective actions necessary or recommended to restore or achieve compliance with the sites Vegetation Management Plan. The report should explain why any such measures are being recommended and what specific Vegetation Management Plan goals or objectives or areas of noncompliance or concern the adaptive response aims to address or correct. Additionally, results from required monitoring may inform a proposal by the site developer to revise or modify the Vegetation Management Plan to adaptively respond to site conditions and experiences. Any such request must be submitted for the review and approval, in writing, of the BPU or its designee.

01 Site Intro/Executive Summary

02 VMP Template

03 Reporting

04 Attachments

05 Self Certification Statement

Vegetation Management Plans

The development of a Vegetation Management Plan by a team of qualified professionals is the key to demonstrating and maintaining compliance with the requirements of the Solar Act of 2021 and its implementing regulations, the Siting Rules for Grid Supply and Large Net metered Solar Facilities (N.J.A.C. 14.8-12). A properly developed Vegetation Management Plan will detail all applicable site assessment and design elements, including identifying the facility's "Vegetation Management Units". Vegetation Management Units are specific areas of a proposed solar facility that share unique vegetation planting opportunities or challenges, such as the areas immediately below solar panels, the areas that comprise the lanes between panel arrays, or the footprints of proposed stormwater facilities, site buffer areas, etc. A Vegetation Management Plan must establish, map, and specifically design pollinator habitat prescriptions for each category or sub-category of Vegetation Management Unit on site. The Vegetation Management Plan must explain and support the plants or seed mixes selected for each Vegetation Management Units and establish both short-term (5-year period of vegetation establishment) and long-term maintenance and monitoring requirements for each Vegetation Management Units. Collectively, the professional design, planting, maintenance, and monitoring of individual Vegetation Management Units combine to result in a successful site habitat installation. A Vegetation Management Plan will detail and document these collective efforts when appropriately developed. This, in turn, facilitates the BPU's certification of a proposed solar facility as being compliant with the Siting Rules for Grid Supply and Large Net Metered Solar Facilities (N.J.A.C. 14.8-12) and serves as the facility manager's blueprint for long-term maintenance and monitoring requirements to remain in compliance with said standards.

Each facility must prepare a Vegetation Management Plan that includes the following components:

Section 1: Site Intro/Executive Summary

This section should provide general site information dressing the following points:

- An "Introduction," including the name of the project, the project developer and owner, and professionals who developed or contributed to the development of the Vegetation Management Plan.
- An overview of the project location in terms of the major jurisdictional boundaries and physical features in or near the project area. At a minimum, these features should include counties, townships, cities, major roads, water features and natural environments in the local region. Site location maps should be provided showing all relevant features. These objectives should be minimally addressed via the use of a USGS map reference and a typical county road map or equivalent.
- A general description of the site's pre-construction condition, the size of the proposed project, and the proportion of the overall site to the project footprint, including all associated grading and disturbance the facility will occupy. Include maps or aerial photographs depicting the pre-construction site conditions as well as the proposed facility layout at identical scales.

- A general description of the broad vegetation goals for the project. For example, the introduction section should:
    - Establish the overall Vegetation Management Plan goals for the site. I.e., an intent to install generic, regionally focused pollinator/beneficial insect/wildlife habitat versus an installation that endeavors to restore or create a specific type of wildlife habitat, such as a grassland installation designed to serve the needs of grassland bird species that might be known to occur adjacent to the site or in the region.
    - Establish specific planting goals for the site development footprint.
    - Establish maintenance, planting, and/or restoration goals for existing barren, agricultural, or herbaceously vegetation portions for the site outside of the development footprint.

Section 2: Vegetation Management Plan Template

This section is the core of the Vegetation Management Plan and will provide all the details addressing the existing and proposed site conditions, proposed installation details and acknowledge/establish short- and long-term maintenance and monitoring requirements.

Element 1 – Site Assessment, Planning, and Design

Element 1 addresses the initial assessment of a site proposed for the development of a solar facility and details all subsequent planning and design decisions regarding the proposed solar facility and how it will comply with the Solar Act of 2021 and the Solar Siting Rules for Grid Supply and Large Net Metered Solar Facilities (N.J.A.C. 14:8-12.2). As relevant in addressing these details, the Vegetation Management Plan should reference specific signed and sealed plans prepared by a professional engineer, planner of landscape architect at appropriate scales using no greater than 2' contours depicting the factors or criteria being addressed. This section of the Vegetation Management Plan should also include the following information:

- Details regarding the site of the proposed facility and its general pre-construction condition, both at the site scale and, more broadly, at the scale of the adjoining region. Site plans and discussion should identify opportunities for vegetation preservation or restoration. Identify existing wildlife habitats that will be preserved, maintained, or restored. This description will assist the applicant and agencies in identifying both concerns and opportunities to maintain the existing ecological functions of the site and immediate vicinity.
- The results of pre-construction habitat suitability assessments and – when warranted – species presence/absence surveys for state or federally listed endangered, threatened, and species concern wildlife species. Habitats presumptively utilized by endangered, threatened, and special concern wildlife species are documented via New Jersey's Landscape Project mapping. However, the Landscape Project does not reflect data for rare wildlife that occur on many private or inaccessible properties, such as on closed and capped landfills. As such, any site assessment should include proactive pre-development surveys for rare species. Solar facility design and installation should ensure that no adverse impacts occur to endangered or threatened species habitats, nor that any local populations of endangered, threatened, or special concern wildlife are extirpated as a result of development activities or subsequent operation of the proposed facility.
- A description of the general historic and current vegetation communities on and adjacent to the project site.
- A description of the land use types on the site, adjacent, and within the local region.
- A description of the soils on and adjacent to the site using the USDA-NRCS Soil survey. Include on-site investigations conducted to verify and adjust mapped soil locations as well as a discussion of soil types, including hydric soils, drainage class, depth of topsoil, prime farmland designation, depth to water table, frequency of flooding, and any other soil characteristic relevant to vegetation establishment and management. Provide a soil map at site scale showing the project boundary and the identified soil types grouped by drainage class.
- A description of the topography within and adjacent to the site, including the general landform and any specific high points, low points, and swales that will direct water on to or away from the site using no greater than 2' contours. Provide a signed and sealed site plan of the site and adjacent areas including 2' contour intervals.

- Describe the general hydrologic conditions of the site and adjacent areas noting any significant features, including public waters, water bodies, drainage ways, wetlands, farmed wetlands, restorable wetlands, sinks, hydric soils, and other features that affect water movement across the site and adjacent areas. Include a wetlands delineation map if one has been performed and approved by the DEP Division of Land Resource Protection. Provide a plan that locates all the identified features. Describe the known presence and likelihood of agricultural drainage features on and adjacent to the site, including drainage tile and inlets, private drainage ways, drainage outlets, and public drainage ditches. Provide a map that locates all the identified features.
- A description of the proposed project in terms of acres and boundary distances described in terms of feet. Site plans depicting existing and proposed conditions at an appropriate scale showing the proposed project layout and associated details, including both existing and proposed grading, should be provided as appendices. Plans should depict wetlands and flood hazard areas, as applicable.
- A description of the proposed landscape design for the site, detailing how and why specific pollinator-friendly native plant species and seed mixes have been selecting, noting their utility in reducing stormwater run-off and erosion and providing native perennial vegetation and foraging habitat beneficial to gamebirds, songbirds, and pollinators, while considering compatibility with the security and reliability of the solar facility. Within this section, the developer must introduce and explain the designation of the site's **Vegetation Management Units**:
  - **Vegetation Management Units** are specific areas of a proposed solar facility that share unique vegetation preservation, restoration, or planting opportunities or challenges, such that their design, maintenance, and monitoring might be approached in a largely consistent manner. Such areas may include but are not limited to the areas immediately below solar panels, the areas that comprise the lanes between panel arrays, the footprints of proposed stormwater facilities, site buffer areas, etc. A Vegetation Management Plan must establish, label, map, and specifically design pollinator habitat prescriptions for each category of Vegetation Management Unit identified on site (see proposed labeling convention below). Individual categories of Vegetation Management Unit's may be further subdivided into "Vegetation Management Unit sub-categories" as helpful to identify subtle differences in a Vegetation Management Unit category's goals or habitat design, such as noting minor differences in plant selection to address sub-categories of a Vegetation Management Unit that occur on differing soil types (see proposed Vegetation Management Unit labeling convention, below). The Vegetation Management Plan must explain and support the specific habitat goals and establish both short (5 years) and long-term maintenance and monitoring requirements for each category or sub-category of Vegetation Management Unit. Goals should address a variety of conservation issues in addition to the creation of pollinator habitats, such as factors that address soil stabilization, water infiltration, carbon sequestration, panel cooling, creation of wildlife habitats such as grassland bird or songbird habitat, etc.
  - The section addressing Element 1 must establish all site Vegetation Management Unit's and explain why specific areas were selected for their unique habitat installations. Specific plant species or seed mixes should be discussed in Element 2. A site landscape design plan must depict all site Vegetation Management Unit's, labeling all such areas with their specific category/sub-category, that in total comprise all areas of the site (see proposed labeling convention, below). A written description of the goals and management objectives for each Vegetation Management Unit type must be provided, identifying all related the habitat conditions proposed and their related wildlife habitat and erosion control benefits. Goals and objectives should be specific, measurable, attainable, realistic, and, where appropriate, time bound.
  - The Vegetation Management Plan should use the following Vegetation Management Unit labeling convention:
    - <u>Vegetation Management Unit-categories</u>: The first 26 Vegetation Management Unit areas identified on any site should be labeled "VMU-A" through "VMU-Z," resorting to double letters as necessary.
      - Vegetation Management Unit's that present at more than one unique location on a site (for example, a site with "**100** rows of solar panels" or "**two** separate stormwater detention facilities") should identify each unique replicate of the Vegetation Management Unit category by assigning each a consecutive area a unique number. For example, suppose a site proposes to manage all of its stormwater facilities with the same habitat prescription. In that case, it

might assign the category of "Stormwater Facilities" with the label "VMU-B," and then specifically identify each of the two stormwater facilities actually proposed as "VMU-B-**1**" and "VMU-B-**2**." They will each receive the identical habitat prescription but can be uniquely addressed regarding all site planning, design, maintenance, and monitoring tasks.

- Vegetation Management Unit-sub-categories: Site designers should further specify Vegetation Management Unit sub-categories, as found to be constructive in identifying subtle differences in habitat prescriptions between otherwise similar Vegetation Management Unit areas, by adding a decimal point and roman numeral after the "category" letter (ex: "VMU-A**.i**").
  - For example, a site proposing 100 rows of solar panels may identify "VMU-A" as the Vegetation Management Unit label for "Footprint of Solar Arrays." If the rows were all managed equally, these would be labeled "VMU-A-1" through "VMU-A-100." However, these 100 rows could *also* be further divided into two sub-categories to reflect slightly different prescriptions, such as minor changes to plant species selection to address different soil moisture conditions. In such an example, the first 50 rows might be identified as one "sub-category" of the Vegetation Management Unit and labelled "VMU-A.**i**-1" through VMU-A.**i**-50", and might be prescribed plant species with slightly greater tolerance to drought conditions – factors warranting unique maintenance or monitoring considerations. The remaining 50 rows might be assigned as a second sub-category and labeled "VMU-A.**ii**-1" through "VMU-A.**ii**-50," to address higher moisture tolerance needs.

- Short-term management objectives must be established for each category of Vegetation Management Unit, addressing the pollinator habitat planting/restoration prescription purpose/goals/objectives for the first 5 years post-planting. The emphasis will be on management strategies used during the vegetation establishment phase, including but not limited to: establishing a cover community for soil stabilization, management of weeds and non-native or undesirable species, how management techniques such as mowing, spot-spraying of herbicides, introduced grazing, targeted re-seeding of areas with low germination (by year 5), etc.
- Long-term management objectives must also be established for each category of Vegetation Management Unit (5 years after establishment to end of participation). These objectives should reflect the final habitat condition designed for each Vegetation Management Unit. For example: establishment and maintenance of a native pollinator meadow or a native grassland condition. Each Vegetation Management Unit must also have a long-term monitoring plan designed to evaluate target objectives of each Vegetation Management Unit, and that will ultimately ensure each Vegetation Management Unit type achieves the required 80% success criteria for continued facility compliance. Management plans should also address what adaptive management strategies will be implemented if monitoring documents that one or more Vegetation Management Unit types are failing to achieve compliance metrics. This should include targets for action, as well as potential adaptive management strategies such as supplemental seeding, supplemental plantings, etc.

Element 2 – Plant Species Selection

Element 2 addresses the specific seed mixes or plant species selected for each Vegetation Management Unit type established on the site. Species selection will primarily be determined by opportunity area and the specific opportunities or constraints that resulted in the unique identification of any such category of Vegetation Management Unit. For Vegetation Management Unit areas outside the footprint of proposed solar panel arrays and lanes, there should be few limitations on seed selection. In such areas, the Vegetation Management Plan should assess the appropriate selection based upon site location, aspect to the sun and prevailing winds, soil conditions, availability of water, and related factors, and select appropriate plant species from those recommended in the "Habitat Installation Guide - Conservation Cover (327) for Pollinators New Jersey Installation Guide and Job Sheet (2013)" cited above, other appropriate resources, or based upon their professional judgement.

Seed selection for Vegetation Management Unit areas *within* the footprint array or lane areas will depend upon several additional factors. Adjustments to traditional solar photovoltaic panel installation, density, design, or maintenance

regimes in a manner that can increase the potential for the successful establishment of native perennial vegetation providing foraging habitat for gamebirds, songbirds, and pollinators are options to any developer. Shading by photovoltaic panels and/or maintenance activities such as mowing or the use or operation of equipment are the primary challenges to establishing native perennial vegetation within or around solar arrays. Ultimately, the Vegetation Management Plan must assess the final infrastructure installation conditions and associated maintenance requirements and determine what vegetation species could reasonably be planted in such conditions. Primarily, this will be driven by plant height at maturity, tolerance to mowing, and utility to wildlife under such "maintained" conditions. With regard to the latter, it is noted that a site planted with a highly desirable pollinator mix but that is mowed or maintained such that the vegetation can never achieve a flowering state or go to seed will, in the end, be of little value to wildlife. Such challenges must be considered in the discussion regarding Element 2. It is also possible that certain "goal-oriented" vegetative assemblages might be more successful at some sites than at others. For example, a seed mix selected specifically to establish warm- or cool-season grasses might benefit native grassland birds, should such opportunity exist in the project area, provided mowing/vegetation maintenance considerations were considered and site design reasonably accommodated such species use. A project site might also feature records of a specific wildlife species of conservation concern, such as a state-listed butterfly, where a seed mix selected to provide that species' specific host plant would be highly desirable, even if accomplishing that goal results in a less robust overall assemblage of pollinator habitat.

The above factors should all be considered and discussed within Element 2 of the Vegetation Management Plan. To those ends, this section of the Vegetation Management Plan should be sure to address the following:

- The professional(s) and their qualifications who were responsible for the design and selection of Vegetation Management Unit habitat installations.
- The specific seed mix or plant species selections for each Vegetation Management Unit type (include scientific names, ounces/ac, seeds per sq ft., % of the mix based on seeds per sq ft., and seed origin).
- The criteria for selecting the specific seed mix or plant species for each Vegetation Management Unit type. This should include referencing any specific plant species resources or recommendations relied upon or deferred to and the goal-specific reasons why specific species were incorporated into the design.
- Unless specific site conditions or vegetation goals warrant reconsideration, seed mix should generally include approximately 60% grasses and 40% forbs by weight to provide suitable habitat for bee and lepidoptera cover, nectaring, and nesting (inclusive of incorporating plant species suitable for stem-nesting bees), and for larval host plants for lepidoptera.
- To help ensure continuous blooming from spring into fall, at least 6 forb species should be selected from the early-season blooming group, at least 6 species from the mid-season blooming group, and 4 species from the late-season group.
- A mix of native grass species should also be incorporated. (See Appendix 1:DEP Custom Seed Mix for Solar facilities).
- Species selection should include representation of all species guilds (i.e., cool-season grasses; warm-season grasses; sedges/rushes; legume; and non-legume forbs) and should include species from different plant families to support the widest diversity of pollinator species
- As was previously noted, many pollinators have species-specific larval host plant needs. As such, optimal pollinator habitat design standards must include a variety of plant species suitable for the lepidopteran species anticipated to occur on site.
- As noted previously, many pollinators have species-specific nesting area preferences, such as bee species that nest in plant stems, within bare, friable soil or incorporate available mud or clay into constructed nest structures. Accordingly, Vegetation Management Unit areas should incorporate a variety of plants, grasses, and soil conditions that address these life history needs.
- Regarding the availability of “bare, friable soil” or “mud or clay,” these soil conditions are habitat elements critical for many species of ground-nesting or structure-nesting bees. The availability of bare, friable soil, mud,

or clay may be afforded merely per the allowable "80% success" requirement, should as much as 20% of the site that fails to fully meet the prescribed habitat installation for the subject Vegetation Management Unit nonetheless result in the presence of bare, friable soil, mud or clay. The occurrence of bare friable soil, mud, or clay may also be achieved merely via the selection of very low-growing vegetation that naturally affords unobstructed access to the soil. However, it will be acceptable for a site designer to purposefully incorporate as much as 2% of a Vegetation Management Unit as "bare, friable soil" or "mud or clay," and if formally identified as a Vegetation Management Unit goal *and* properly implemented, this would contribute towards the 80% success criteria required of any Vegetation Management Unit type.

Element 3 – Site Prep

This section of the Vegetation Management Plan identifies and addresses site preparation needs based upon the site's existing pre-construction conditions and the proposed habitat goals for specific Vegetation Management Unit's. The section addressing Element 3 must include:

- A proposed schedule/sequence of planned construction, planting, and management activities. This should include a Gantt chart or equivalent depicting the planned sequence for construction, planting, and management activities, including the proposed month and summary of the activity.
- Details regarding the management of topsoil and subsoil during grading and construction.
- A summary of steps and practices that will be employed to ensure the protection of soil health during the construction, including steps to avoid mixing soil layers and preserving the biological health of the upper soil layers.
- Details concerning any proposed soil additions or amendments anticipated.
- Details concerning practices that will address potential soil compaction within Vegetation Management Unit's prior to seeding or habitat installation. Examples include loosening any compaction with soil rippers or tillers prior to final site preparation prior to seeding.
- Details regarding seedbed preparation following grading and/or construction activities, including the management of weeds, the use of temporary covers, and equipment such as disks, tillers, harrows, or rollers, or other methods to prepare the seedbed for seeding.
- A plan to address invasive species. Element 3 must describe how the project will prevent invasive species establishment and spread. Include best practices employed to address equipment staging, transport, inspection, and cleaning. Detail how the site will be inspected and managed for weeds and invasive plant species at the project site during the establishment phase.
- Describe any planned use of cover species at the site to address initial soil erosion concerns and/or the introduction of invasive species or weeds.

Element 4 – Planting

Element 4 addresses the developer's proposed planting methodology and must be specific to unique Vegetation Management Units throughout the site. Discussion must specifically address, though not be limited to:

- The planting sequence (which Vegetation Management Unit's will be planted and when), planned month of planting, planting method (drilled, broadcast, bareroot or plugs), and equipment to be used for each Vegetation Management Unit.
- Identification of any specific planting constraints, such as those that might present within Vegetation Management Unit's representing the areas under solar panel arrays or areas where excavation or disturbance of the soil is restricted for cause.
- Establishment of adaptive management strategies that might be required should construction or related activities performed after Vegetation Management Unit planting preclude the re-application of the original planting methodology, should that be required for cause (such as if a Vegetation Management Unit planting fails and needs to be re-planted).

Element 5 – Maintenance

Regular, proactive, and reactive maintenance will be a critical component of any facility's ability to successfully establish the target habitat conditions and meet the Vegetation Management Plan's habitat installation goals. This section addresses the anticipated maintenance needs of the site design. The discussion regarding Element 5 must include:

- Acknowledgement and establishment of short-term (0-5 years post-planting) maintenance requirements, including but not limited to those specified in the "Habitat Installation Guide - Conservation Cover (327) for Pollinators New Jersey Installation Guide and Job Sheet (2013)" cited above. This should include a Gantt chart or equivalent depicting the planned sequence for maintenance activities during years 0–5, including the proposed month and summary of activities proactively proposed to be implemented to ensure habitat installation success.
- Acknowledgement and establishment of long-term (5 years post-planting) maintenance requirements, including but not limited to those specified in the "Habitat Installation Guide - Conservation Cover (327) for Pollinators New Jersey Installation Guide and Job Sheet (2013)" cited above. This should include a Gantt chart or equivalent depicting the planned sequence for long-term maintenance activities, including the proposed month and a summary of proactively proposed activities to ensure habitat installation success.
- A list of available, implementable *reactive* management practices that would be employed to respond to issues of noncompliance including, but not limited to, occurrences of soil erosion or sedimentation, observed failures in soil preparation, failure of seeded areas to germinate, the introduction of weeds or invasive species, animal damage, etc.
- Any additional best practices proposed to be employed based upon the best professional judgement of the professional(s) who prepared the Vegetation Management Plan or per other available resources such as the "Mid-Atlantic Native Meadows, Guidelines for Planning, Preparation, Design, Installation, and Maintenance," that was cited above.

Element 6 – Monitoring and Adaptive Management

This section addresses both short- and long-term monitoring needs typically associated with habitat installations, including pollinator habitats. However, Element 6 also addressed specific obligations required pursuant to the Board of Public Utilities "Siting Rules for Grid Supply and Large Net Metered Solar Facilities" (N.J.A.C. 14.8-12). Information that must be addressed in this section includes, but is not limited to:

- An overall acknowledgment that both construction and post-construction monitoring protocols are required and proposed herein. Monitoring protocols should reflect any specific management objectives established by the Vegetation Management Plan, such as whether the Vegetation Management Plan focuses on establishing generic pollinator habitat or perhaps takes a more "focal-species" approach, such as a focus on grassland bird habitat.
- The monitoring plan should clearly identify the party/parties responsible for Vegetation Management Plan monitoring, noting their professional qualifications. Such persons are expected to possess sufficient botanical experience identifying native plants, native plant communities, invasive species, and non-native species typical of New Jersey, should complete the vegetation monitoring to ensure an unbiased reporting of vegetation establishment.
- The monitoring plan must include twice-annual assessments made during the period(s) of site prep and construction (i.e., prior to vegetation seeding/planting) to ensure that soil health and condition is maintained in all management units designated to be planted. This includes, but is not limited to, monitoring issues regarding soil compaction, soil erosion, stormwater run-off, and soil separation and storage. After construction completion, the site monitoring focuses on meeting vegetation establishment and management objectives established in the site's Vegetation Management Plan.
- "Site Preparation/Construction Monitoring" performed during site prep/construction period shall occur twice annually and concludes upon the planting of all management units identified in the Vegetation Management

Plan. Upon the completion of each monitoring period, a monitoring report must be prepared and submitted addressing the findings of the specified monitoring period. Reports must address all site pre and construction activities conducted January through June (to be reported/submitted by July 31 of the calendar year) and July through December (to be reported/submitted by January 31 of the calendar year), as such activities are relevant to the Vegetation Management Plan.

- "Vegetation Monitoring" commences upon the seeding/planting of each specific management unit identified in the Vegetation Management Plan, must occur twice annually during the "establishment phase" (first five years) of each management unit identified in the Plan, and shall continue annually thereafter. Upon the completion of each monitoring period, a monitoring report must be prepared and submitted addressing the findings of the specified monitoring period. Twice annual reporting must address activities conducted from January through June (to be reported/submitted by July 31 of the calendar year) and July through December (to be reported/submitted by January 31 of the calendar year). Annual reporting shall address the entire calendar year, to be reported by February 28 of the following year. The monitoring report much be prepared by the party(ies) performing the monitoring and must address the progress made specific to the goals and objectives of each "management unit" identified in the Vegetation Management Plan.
- Monitoring methods should provide an unbiased assessment of each management unit within the overall site. Quantitative measures may be supplemented by qualitative measures to assess how well the project's management objectives are being achieved.
    - *Quantitative* – Quantitative techniques allow for comparisons of subsequent reporting to understand the progression of vegetation establishment over time. Vegetation should be sampled using standardized techniques with fixed sample locations and photo points. Include percent vegetation cover and estimated species richness. Report the seed mix planted and assess estimated success rates for each species.
    - *Qualitative* – Include systematic monitoring of location-specific management issues, including noxious weed/invasive species populations, localized surface erosion issues, or other disruption of established vegetation, including impacts related to operations.
- Monitoring should address and reflect stated Vegetation Management Plan goals. It should evaluate seed mixes and associated planting areas for the establishment, including species present and percent cover; presence of invasive species, and subsequent management activities needed—this includes both species on site and early detection of new invasions. A timeline of monitoring activities should be included in this section.
- The monitoring plan should include proposed adaptive management strategies to address site management challenges or noncompliance issues. At this time, the DEP and BPU shall consider a site compliant with the requirements of the Solar Act of 2021 if the site has achieved and maintains 80% successful coverage of pollinator-friendly native plant species and seed mixes designed to reduce stormwater run-off and erosion, and that provide native perennial vegetation and foraging habitat beneficial to gamebirds, songbirds, and pollinators.
- The professional(s) responsible for implementing the required monitoring plans must conclude each monitoring report with a finding as to whether the goals and objectives of the Vegetation Management Plan are being met. It should also cite any corrective actions necessary or recommended to restore or achieve compliance with the sites Vegetation Management Plan. The report should explain why any such measures are being recommended and what specific Vegetation Management Plan goals or objectives, or what areas of noncompliance or concern the adaptive response aims to address or correct. Additionally, results from required monitoring may inform a proposal by the site developer to revise or modify the Vegetation Management Plan to adaptively respond to site conditions and experiences. Any such request must be submitted for the review and approval, in writing, of the BPU or their designee.

Section 3: Reporting

"Site Preparation/Construction Monitoring" reporting:

As noted above, the developer must submit the results of "Site Preparation/Construction Monitoring" twice annually, concluding upon planting all management units identified in the Vegetation Management Plan. Upon the completion of each required monitoring period, a monitoring report must be prepared and submitted addressing the findings of the specified monitoring period. Reports must address all site pre and construction activities conducted January through June (to be reported/submitted by July 31 of the calendar year) and July through December (to be reported/submitted by January 31 of the calendar year), as such activities are relevant to the Vegetation Management Plan. Reports are to be submitted to the NJ Board of Public Utilities or their authorized agent.

"Vegetation Monitoring" reporting:

As noted above, "Vegetation Monitoring" commences upon the seeding/planting of each specific management unit identified in the Vegetation Management Plan. It must occur twice annually during the "establishment phase" (first five years) of each management unit identified in the Plan and shall continue annually thereafter. Upon the completion of each monitoring period, the developer must submit a monitoring report addressing the findings of the specified monitoring period. Twice annual reporting must address activities conducted from January through June (to be reported/submitted by July 31 of the calendar year) and July through December (to be reported/submitted by January 31 of the calendar year). Annual reporting shall address the entire calendar year, to be reported by February 28 of the following year. The monitoring report much be prepared by the party(ies) performing the monitoring and must address the progress made specific to the goals and objectives of each "management unit" identified in the Vegetation Management Plan. Reports are to be submitted to the Bureau of Public Utilities or their authorized agent.

Section 4: Attachments

This section of the Vegetation Management Plan is where the developer shall present all applicable site maps, signed and sealed plans, etc., documenting or otherwise depicting the details discussed elsewhere in the Vegetation Management Plan. Maps and their associated data are a critical component of a Vegetation Management Plan. To facilitate Vegetation Management Plan review, please include maps in the relevant section of the plan as appropriate. However, in addition to including maps(s) in the relevant section, this Section serves as a dedicated location containing copies of all relevant maps and plans

- Maps and aerial photographs incorporated into the Vegetation Management Plan should be of sufficient scale to convey the desired information and be of use in comparison to other maps of figures in the Plan.
- Engineering and/or landscape plans must be prepared, signed, and sealed by a licensed professional. At least one hard copy of all applicable site plans must be included in the Vegetation Management Plan submission, with electronic copies provided as well. Plans should include:
  - A cover sheet identifying the general site locations, size and surrounding land zoning.
  - An aerial map.
  - A sheet depicting existing/pre-construction conditions, including wetlands and flood hazard area delineations, limits of existing vegetation, site conditions, and existing structures as applicable.
  - A sheet depicting the proposed solar facility.
  - A sheet depicting proposed grading and clearing.
  - A utility plan depicting any existing or proposed utility infrastructure, such as stormwater facilities, energy supply or delivery infrastructure, etc.
  - Landscaping plans at sufficient scale(s) to depict and label all Vegetation Management Units and sub-units. A table should be provided on the plans (if not in the section addressing Element 1) summarizing the number, size, and habitat prescriptions proposed for each Vegetation Management Unit/sub-unit.

- A Soil Survey Map (or other soil information if Web Soil Survey is not available for the area). Within each drainage classification, provide the types of soils, drainage classification, and location of any hydric soils.
- A soil erosion and sediment control plan.
- A sheet depicting any relevant construction details, such as solar panel installation design, perimeter fence design(s), stormwater facilities, etc.

- GIS shapefiles depicting the existing site and all major features proposed should also be submitted as appropriate. The most current version of the ESRI ArcGIS platform is preferred (unless other data forms have been agreed upon).
- Additional maps included in the plan should include:
  - A site location map, including county and municipal boundaries, cities, villages, lakes and rivers, and all major roads and highways delineated. The extent should be at least 3-5 miles from the project boundary. Include the nearest city or town to the site.
  - A project area map based upon a recent (within the last 3 years) aerial photograph as a base, depicting:
    - Boundaries of the project area,
    - Location of all proposed arrays
    - Location of any new substation facilities or existing substation expansion
    - Location of collector circuits, access roads
    - Fencing
    - Vegetation Management Units
    - Stormwater facilities
    - Existing topography
- The developer must also submit a collection of no less than 24 representative color photographs depicting relevant site conditions.

Section 5: Self Certification Statement

This section of the Vegetation Management Plan is where the developer shall include a statement of self-certification that the Vegetation Management Plan complies with the New Jersey Department of Environmental Protection's "Standards for the use of Pollinator-friendly Native Plant Species and Seed Mixes in Grid Supply and select Net Metered Solar Facilities." The self-certification shall certify that the developer to the best of their abilities complied with the "Standards for the use of Pollinator-friendly Native Plant Species and Seed Mixes in Grid Supply and select Net Metered Solar Facilities" and the information provided in the Vegetation Management Plan is true and correct. The certification statement will also include the name, address, signature, date, and contact information for the developer of the solar project.

References

"Conservation Cover (327) for Pollinators New Jersey Installation Guide and Job Sheet," prepared by The Xerces Society and Rutgers University (https://www.xerces.org/sites/default/files/2018-05/13-047_02_XercesSoc_HabitatInstallGuide_NewJersey_ConservationCover327_web.pdf, 2013)

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Jarrod Fowler and Sam Droege (2020), Pollen Specialist Bees of the Eastern United States https://jarrodfowler.com/specialist_bees.html

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Appendix 1

DEP Custom Seed Mix for Solar Facilities

The following seed mix is recommended by DEP for use of solar facilities:

%	% by weight	Ernst Seed: Species Common Name / Ecotype	Ernst Seed: Species Scientific Name
10-67%	25	Little Bluestem - FIG-PA Ecotype	*Schizachyrium scoparium*
1-20%	15	Purpletop - FIG-PA Ecotype	*Tridens flavus*
1-50%	10	Switchgrass - NJ Ecotype	*Panicum virgatum*
1-25%	10	Virginia Wildrye - PA Ecotype	*Elymus virginicus*
.5-2%	5	Common Milkweed - PA Ecotype	*Asclepias syriaca*
.1-.5%	5	Wild Bergamot - FIG-PA Ecotype	*Monarda fistulosa*
.5-3	4	Butterfly Milkweed - PA Ecotype	*Asclepias tuberosa*
.5-3%	3	Slender Lespedeza - VA Ecotye	*Lespedeza virginica*
.1-3%	3	Blackeyed Susan - PA Ecotype	*Rudbeckia hirta*
.1-.4%	3	Hoary Mountainmin - MD Ecotype	*Pycnanthemum incanum*
.5-2%	2	Smooth Blue Aster - NY Ecotype	*Symphyotrichum laevis*
1-4%	2	Partridge Pe - PA Ecotype	*Chamaecrista fasciculata*
.5-2%	2	New England Aster - PA Ecotype	*Symphyotrichum novae-angliae*
.1-4%	2	Tall White Beardtongue	*Penstemon digitalis*
.1-.3%	2	Indianhemp - PA Ecotype	*Apocynum cannabinum*
.5-5%	1	Purple Node Joe-Pye Weed	*Eupatorium purpureum*
.1-.3%	1	Grassleaf Goldenrod - PA Ecotype	*Euthamia graminifolia*
.1-.3%	1	Early Goldenrod - PA Ecotype	*Solidago juncea*
.1-.4%	1	Narrowleaf Mountainmint	*Pycnanthemum tenuifolium*
.5-3	0.5	Purplehead Sneezeweed - VA Ecotype	*Helenium flexuosum*
.5-2%	0.5	Calico Aster	*S. lateriflorius*
.5%	0.5	Heath Aster - PA Ecotype	*Symphyotrichum pilosum*
.1-.5%	0.5	Yellow False Indigo - PA Ecotype	*Baptisia tinctoria*
.1-.7%	0.5	Licorice Scented Goldenrod - PA Ecotype	*Solidago odora*
.5-5%	0.5	Marsh Blazing Star - PA Ecotype	*Liatris spicata*

Notes:

1. Seeds should be sourced from a reputable nursery capable of providing native, genetically suitable stock.
2. This seed mix maintains the recommended ratio of 60% grasses (4 species) 40% forbs (21 species)
3. If making substitutions due to seed availability or site conditions, do not include Big Bluestem (*Andropogon gerardia*) or Indian Grass (*Sorghastrum nutans*). These species are too tall and too invasive.