PSC REF#:409461

Public Service Commission of Wisconsin
RECEIVED: 04/15/2021 2:42:44 PM

Vegetation Management Strategy

Koshkonong Solar Energy Center
Dane County, Wisconsin

Invenergy

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1.0 Executive Summary

Invenergy prepared this Vegetation Management Strategy (VMS, the "Strategy") for the proposed Koshkonong Solar Energy Center, a solar photovoltaic (PV) generation facility planned for approximately 2,349 acres in Dane County, Wisconsin ("Koshkonong Solar"). Koshkonong Solar is within a 6,384-acre Project Area in the Townships of Christiana and Deerfield. This strategy will be used for permitting and to develop a final Vegetation Management Plan (VMP). The VMP will be an evolving plan as the site layout, schedule, costs, weather, and other factors are finalized.

Prior to the development of this Strategy, the biophysical site conditions, including current land cover types, soil classifications, slopes and other environmental factors were evaluated. The biophysical site conditions were used to inform where certain native species and species mixes would perform best. Local genetic native seed varieties as a seed source, if available, should be used, as they are more likely to germinate and persist compared to genetically similar specimens sourced from further away.

The Strategy has been developed to achieve the following objectives:

- Minimize interference with solar panels
- Maintain a high degree of weed and invasive species management
- Benefit soil health, water, plants, and wildlife
- Minimize soil stabilization and maintenance costs
- Use native species adapted to a range of soil moisture conditions now or in the future

The Strategy envisions a three-phase vegetation establishment process with the first phase being site preparation for weed management to occur over varying timeframes and methodologies depending on soil types, soil moisture regimes, weather, and construction schedule. In the second phase, a matrix of native grasses and sedges will be installed in much of Koshkonong Solar. Establishing a native grass and sedge matrix will help control broadleaf weeds and will aid in soil stabilization. Some areas will receive an additional seed mix comprised of pollinator species. The third phase begins the management requirements to establish and maintain the native seeding zones.

Depending on several factors, the seed mix of grasses, sedges, wildflowers, and pollinators may be seeded at the same time or as separate seedings. A pollinator-friendly seed mix containing a variety of species with differing bloom times will benefit bees, butterflies, and other pollinators. The Strategy will increase plant community diversity and ecosystem functionality within the Solar site.

There are numerous benefits of the Strategy, including but not limited to:

- Improved water quality due to reduced sediment and nutrient runoff, cessation of fertilizer application and insecticide use and reduced herbicide use.

- Improved erosion control, stormwater storage and infiltration due to diverse and dense ground cover and deep rooted and dense fibrous root systems.

- Improved agricultural productivity due to progression and accumulation of native bacteria, microbes, moisture content, and root network.

- Improved habitat for wildlife including birds, reptiles, pollinators such as butterflies and bees.

Seed mixes will be planted depending on microhabitats in Koshkonong Solar, which will require different vegetation and management. Plant growth height is an important consideration in specific areas as well. For example, beneath and near PV panels vegetation heights must remain below approximately 18 inches. Consequently, the species chosen for planting beneath and near PV panels are low in stature or able to withstand periodic mowing.

The vegetation zones that may be planted include:

- Grass Sedge (GS) Zone – A native Grass and Sedge species containing cover mix for Upland soils (GSU) and Moist soils (GSM). This zone will be the most extensive on the solar facility.

- Pollinator Habitat (PH) Zone – A seed mix containing a range of short, mid, and taller statured pollinator species in addition to the Grass Sedge mix will create pollinator habitats within the fenced solar array and are not intended for use in between panels. The intent of the PH is to provide early, mid, and late summer to early fall growing season pollinator blooming plant species.

- View Screening (VS) Zone – Limited areas within the site to obscure or soften solar farm views, as requested by neighbors or regulators.

2.0 Introduction

This Strategy provides for the establishment and management of vegetation at the proposed Koshkonong Solar Energy Center in Christiana and Deerfield Townships in Dane County, Wisconsin. The Project Area is in all or portions of Sections 1-4, 8-12, 14-17, 20-23, 26-27, 33-34 in Township 6N, Range 12E and Sections 35-36 in Township 7N, Range 12E (Figure 1). The Project Area extends north of U.S. Highway 12/18, west of the Village of Cambridge, south past the Village of Rockdale, Wisconsin and just east of I-90/39. The proposed Project Area encompasses 6,384 acres (10 square miles) and the potential solar array area consists of 2,349 acres (3.7 square miles).

The Vegetation Management Strategy (VMS, the “Strategy”) first describes the biophysical attributes of the Project Area. Next, it describes site preparation methods followed by seeding methods and lastly describes the expected vegetation maintenance and monitoring requirements for both the short and long-term persistence of the vegetation. The Strategy includes using native plants for soil stabilization and as the primary pollinator plants.

The Strategy will be converted into a Vegetation Management Plan (VMP) prior to construction. The VMP will be materially similar to the Strategy and will incorporate onsite conditions within the final limits of disturbance, seed mix availability, weather, and timing of construction.

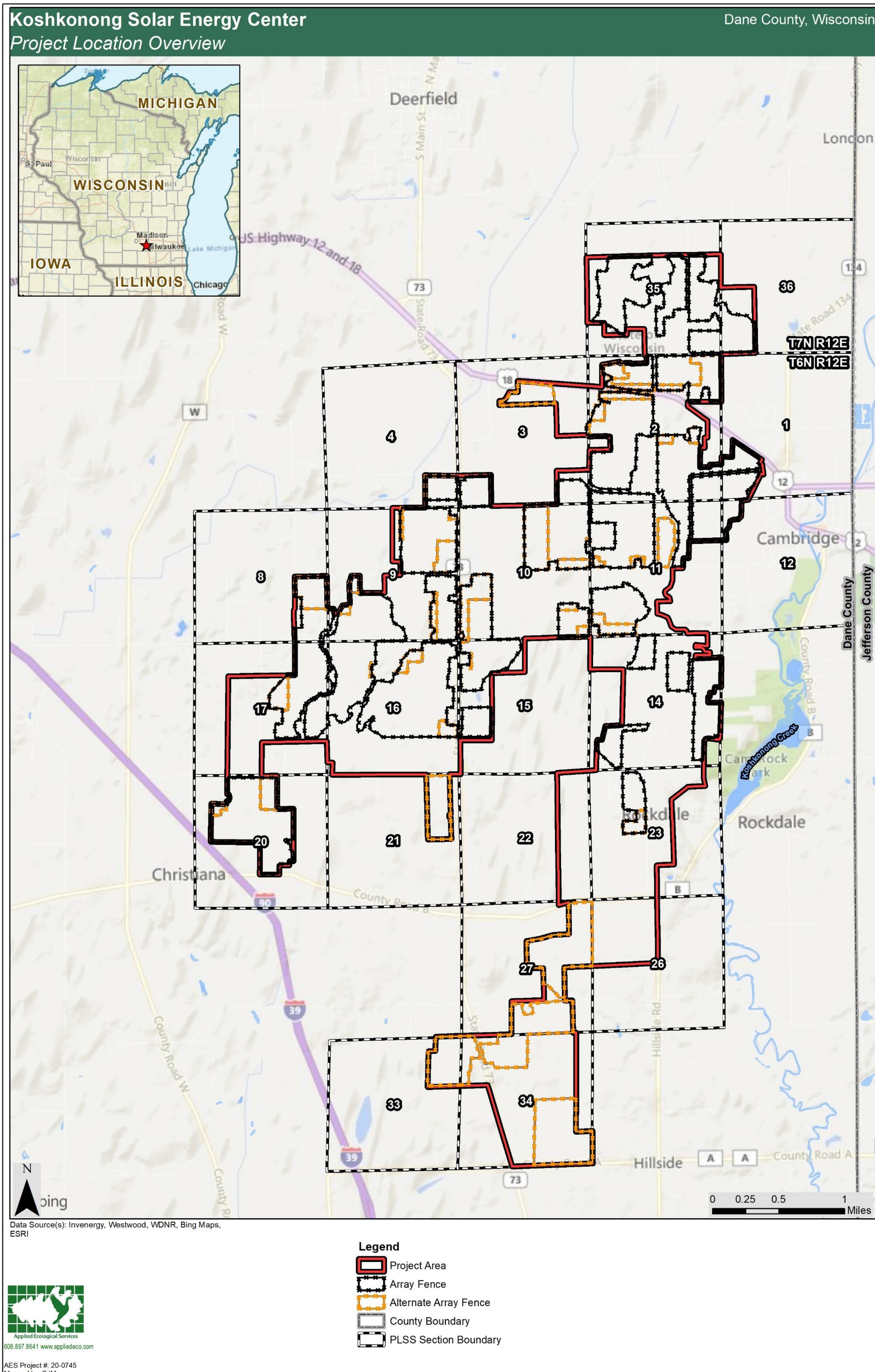

Figure 1. Location of the Koshkonong Solar Energy Center in Dane County, Wisconsin.

3.0 Biophysical Attributes of the Koshkonong Solar Energy Center

This VMS incorporates the existing land cover types, soils, topography, water, wetlands, plant life, climate, geology, and other factors. The biophysical attributes of the Project Area were used to inform the site preparation and seeding methods and to make recommendations for the planting zones and for the development of seed mixes. An overview of the land cover was previously described and mapped by the WI DNR Wiscland 2 Land Cover data, which was refined by Westwood Professional Services (2021a), and the USDA National Agricultural Statistics Service Cropland Data Layer (NASS CDL), which was field checked on November 19, 2020 and refined by Applied Ecological Services (AES). Westwood's delineated wetlands and watercourses map (Westwood 2021b) and the Wisconsin Wetland Inventory (WWI) were also used to prepare the land cover map (Figure 2). The land cover classification scheme is to be used to identify seeding zones within the Project Area.

3.1 Land Cover Classification

Historical (e.g. pre-settlement) vegetation described by the early land surveyors, identified much of the Project Area as native prairie with scattered bur oak, black oak and white oak in openings and oak woodlands with hickories and hazel. Marshlands were scattered throughout on hydric soils, along water courses and in-between drumlins. Prairie was generally expansive with few trees as evidenced by the lack of nearby marker trees in the land surveyor's records. The native prairie was subsequently put under the plow and the marshlands drained and converted to agricultural lands. Some prairie remnants can still be found on the drumlins in southeast Dane County.

Dominant land cover types were classified, mapped, and refined during field observations, from aerial images and other available data. The land cover classification was delineated by land cover/uses by visually distinct ecotones. The classified land cover types previously mapped were generally consistent with the November 2020 field observations. The two major land cover type categories observed are corn and soybeans and combined comprise 78% of the Project Area (Table 1). The third-most extensive land cover type is prairie/grasslands/pasture/fallow field at 6% followed by upland forest at 4%. Delineated wetlands are present on approximately 183 acres (2.8 %) of the Project Area (Figure 2 & Table 1).

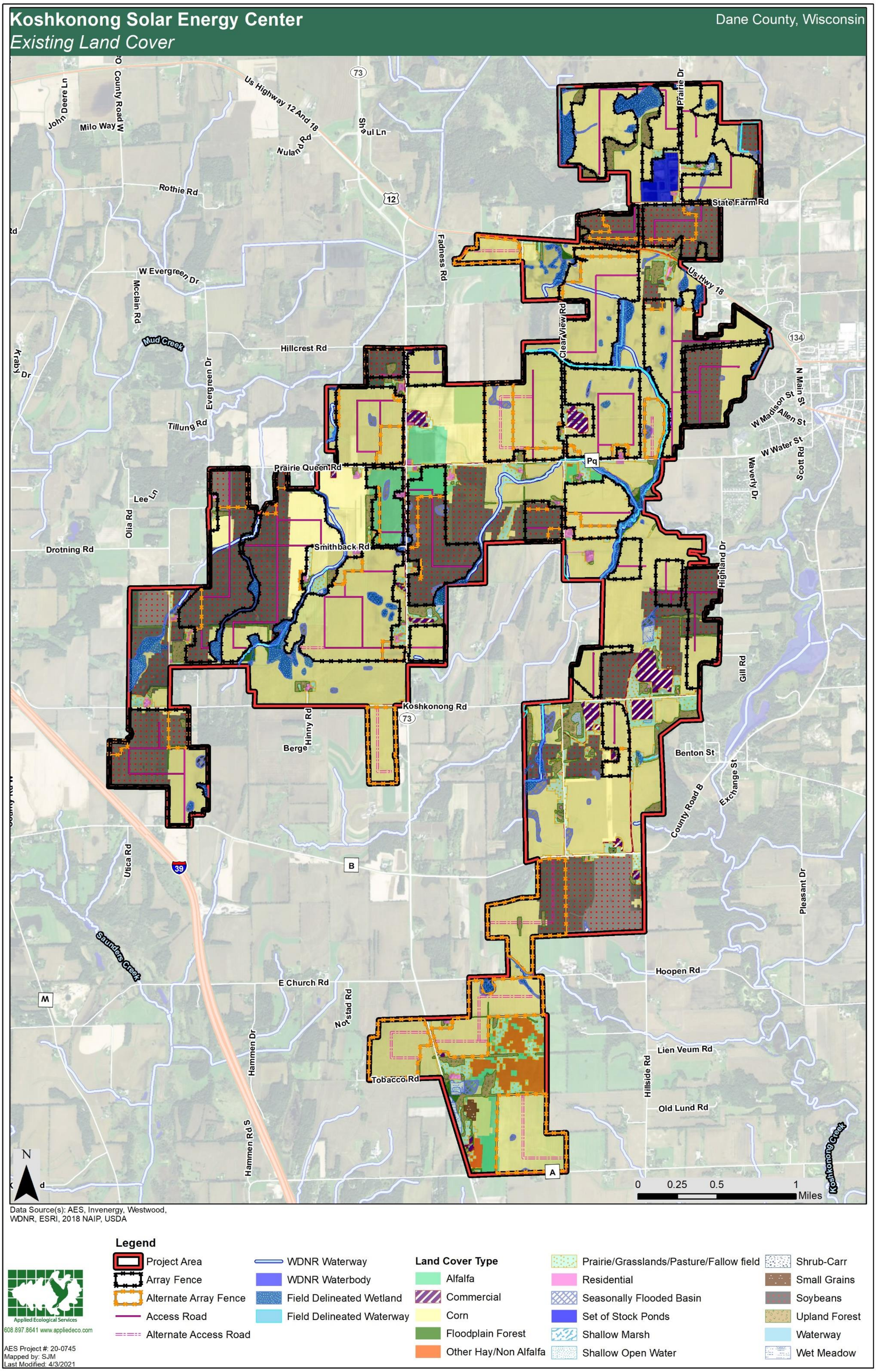

Figure 2. Existing Land Cover at the Koshkonong Solar Energy Center.

Table 1. Existing Land Cover Types* in the Koshkonong Solar Energy Center Project Area.

Category	Acres	Percent
Alfalfa	172	3
Commercial	148	3
Corn	3,517	55
Floodplain Forest	33	1
Other Hay/Non-Alfalfa	75	1
Prairie/Grasslands/Pasture/Fallow field	368	6
Residential	46	1
Seasonally Flooded Basin	184	3
Set of Stock Ponds	36	1
Shallow Marsh	5	0.1
Shallow Open Water	7	0.1
Shrub-Carr	<1	<0.1
Small Grains	6	0.1
Soybeans	1,458	23
Upland Forest	248	4
Waterway	25	0.4
Wet Meadow	46	1
Total	**6,384**	**100**

* The NASS CDL was used to provide greater detail for the "Row/Traditional crops" land cover category.
Note: individual acres or percentages may not sum to total due to rounding.

3.2 Existing Field Conditions and Potential Herbicide and Insecticide Carryover

Herbicide carryover, or retention in the soil, is an important factor to consider prior to native seeding. Depending on the herbicide and soil type, carryover can last many months after the cessation of herbicide use. Seed installation before herbicide carryover has been alleviated can result in the unsuccessful establishment of newly seeded areas. Available data regarding 2020 crop history, herbicide and pesticide use, and the anticipated field conditions after harvest were collected by phone calls to landowners in November-December 2020. Commonly used herbicides in south central Wisconsin agricultural fields are provided in Table 2.

Tobacco used to be a major cash crop in Wisconsin, but today very few farms remain with approximately 1,000 acres of tobacco being planted annually in southeast Dane, Jefferson, Columbia, and Rock Counties. Individual tobacco fields are generally small, less than 10 acres, and comprise a small footprint in the region. Tobacco growers apply large amounts of fertilizer, herbicides, and pesticides to their crops during a three-month growing period.

Among the pesticides commonly used on tobacco are aldicarb and chlorpyrifos. Methyl bromide is sometimes used to fumigate the soil prior to planting tobacco seedlings. A few of the agricultural chemicals listed in Table 2 have been used on tobacco fields within the Koshkonong Solar Energy Center.

Insecticide carryover is an important factor to consider as to the impacts on beneficial pollinator insects, especially monarch butterflies [redacted].

Table 2. Commonly Used Agricultural Chemicals. Based on Prior Research and Local Landowner Interviews with Recommended Waiting Times for Native Grass and Forb Plantings.

Product Name	Agricultural Chemical	Months Before Select Native Grasses Can Be Planted	Months Before Select Native Forbs Can Be Planted
2,4-D	2,4-Dichlorophenoxyacetic Acid	1	3
Acuron	Atrazine, Bicyclopyrone, Mesotrione, S-Metolachlor	2	18
Affinity	thifensulfuron, tribenuron	1.5	1.5
Aim	Carfentrazone-ethyl 22.3%	12	12
Authority First	Sulfentrazone, Chlorimuron Ethyl	4-12	10-36
Basis	rimsulfuron, thifensulfuron	10	18
Command/Commence	Clomazone	4	4
Command 3me Tobacco	Clomazone	16	16
Dual II Mag Tobacco	S-Metolachlor	4	12
Durango DMA	Glyphosate	1	1
Enlight	Chlorirnuron ethyl, Flumioxazin, Thifensulfuron methyl	12	18
Firstrate	cloransulam	18	18
Goaltender	Oxyfluorfen	10	10
Huskie	Pyrasulfotole, Bromoxynil octanoate, bromoxynil heptanoate	Conduct bioassays	Conduct bioassays
Nortron	Ethofumesate	12	12
Poast	Sethoxydim	1	1
Prefix	S-metolachlor + Sodium Salt of Fomesafen	4	18
Prowl h2o	Pendimethalin	12	12
Resicore	Acetochlor, Mesotrione, Clopyralid MEA salt	12	18
Roundup PowerMax	Glyphosate	0-1	0-11
Simazone	Simazine	18	18

Product Name	Agricultural Chemical	Months Before Select Native Grasses Can Be Planted	Months Before Select Native Forbs Can Be Planted
Sonic	sulfentrazone, cloransulam-methl	12	12
Status	dicamba, diflufenzopyr	4	4
Staunch	Acetochlor, Mesotrione, Clopyralid MEA salt	12	18
Surestart II	Acetochlor, Mesotrione, Clopyralid MEA salt	12	18
Triple Flex	Acetochlor, Mesotrione, Clopyralid MEA salt	12	18
Valor	Flumiozazin	4	8
Verdict	Dimethenamid-P (25), Saflufenacil (8)	4	12
Warrant	Acetochlor	6	18

Many native grasses and sedges can be planted within 1-12 months of the last application for most herbicides. Herbicides like 2,4-D and Glyphosate (Roundup®) have a low residence time and most native grasses can be safely planted after 1 month from the date of last application. If Atrazine (and its derivatives) is used on farm fields planted to corn within the Project Area, an 18-month wait period after last application prior to native seeding is recommended, unless it can be documented that the residual activity is no longer present.

Native forbs/wildflowers are less tolerant than native grasses to most herbicides, with some forbs requiring up to two years since the last herbicide application before they can be planted. Herbicides like Sethoxydim, are grass specific with a low residence time (half-life in soil is 5 days). Most native prairie forbs can safely be installed less than 1 month from the date of last application in most fields where commonly used herbicides have been used. Seed mixes will be planted after the risk of herbicide carryover has passed.

3.3 Characterization of Existing Crop and Vegetative Land Cover

Two AES Ecologists conducted a site reconnaissance on November 19, 2020 to map and review existing land cover conditions. Field observations were completed from windshield surveys via public roads and other public access locations. Observable land cover units were mapped on hard copy aerial maps. Land cover units were classified using the following categories: hardwood forest, pine plantation, wetlands, potential farmed wetlands, grassed waterway, treelines, soybean, corn, and pasture/hay (grass). AES mapped several locations of invasive species populations, mostly reed canary grass (*Phalaris arundinacea*). Not all invasive species could be mapped as they were not observable at the time of the survey due to limited site access, plant senescence and the post-harvest/recently mowed condition in most of the Project Area. Non-agricultural areas mapped as "wetlands" tended to be dominated by invasive species such as narrow-leaved cattail (*Typha angustifolia*) and reed canary grass or aggressive native species such as sandbar willow (*Salix interior*) and box elder (*Acer negundo*).

Invasive or weedy plant species were noted in the windshield surveys. Invasive weed identification and control are important components of short-term and long-term vegetation management. The final crop and land cover classification map of the Project Area is presented in Figure 2. The results of the windshield survey are summarized below.

3.3.1 Agricultural and Non-agricultural Land Cover

Agricultural fields and areas adjacent to or surrounding agricultural fields and residential yards included the following habitats:

- Agricultural fields are dominated by corn and soybeans, with woodlands on drumlins and in woodlots. Alfalfa/clover developed land and grassland provided secondary cover (Figure 2). Although it appeared cover crops have not been used on the agricultural fields, significant soil erosion issues were not observed, due to the level of gently sloping topography and the reduced use of steeper sloped drumlins for row crop agriculture. The agricultural fields are occasionally bordered by tree rows containing a variety of native and non-native species. Some fields contained alfalfa and/or clover, and some had pasture grasses. Trees and shrubs of bird dispersed wild black cherry (*Prunus serotina*) and non-native European buckthorn (*Rhamnus cathartica*), and mulberry (*Morus alba*) are moderately common.

- Road easements are dominated by cool season grasses; Kentucky blue grass (*Poa pratensis)*, European brome grass (*Bromus inermis)*, orchard grass (*Dactylis glomerata) and foxtail grass (Setaria* spp.), and weedy or common native and non-native forbs, such as common dandelion (*Taraxacum officinale*), bull thistle (*Cirsium vulgare*), and occasional common milkweed (*Asclepias syriaca*).

- Woodlands and tree rows feature open-grown oaks of the former savanna landscape, including bur, white, and red oaks (*Quercus macrocarpa*, *Q. alba* and *Q. rubra*). Understory growth is typically dense with species of younger trees and shrubs such as wild black cherry, boxelder (*Acer negundo*), bush honeysuckle (*Lonicera* spp.), common buckthorn, and a shade-suppressed, low-diversity ground layer with dame's rocket (*Hesperis matronalis)* and garlic mustard (*Alliaria petiolata*) in wooded areas. It is not uncommon to find conifers and pines or hardwood species such as black walnut (*Juglans nigra*) planted in rows on some of the numerous drumlins, or as small independent plantations.

- Small to extensive wetland complexes were observed on private properties and in agricultural fields. These habitats varied from stands of cattail (*Typha* spp.), reed canary grass with occasional patches of wetland species. Open wetlands often transitioned to dense shrubs and young trees, with species such as red-osier dogwood (*Cornus stolonifera*), willows (*Salix discolor*, *S. interior*, *S. nigra*), and American elm (*Ulmus americana*).

- An inactive fish rearing facility was observed north of Highway 12 in the Project Area. A series of ponds, which are no longer being maintained and for the most part have dried up, harbor non-desirable invasive species such as reed canary grass, giant reed grass (*Phragmites australis*) and cattails. This area may serve as a source for the spread of these undesirable species.

- Vegetated waterways that have been ditched or were shallow mowed grass swales were quite common throughout the Project Area. Some could contain jurisdictional wetlands while others are grassed non-wetland water conveyance features. Ditched waterways were dominated by reed canary grass, while shallow swales contained European brome grass, Kentucky blue grass and orchard grass. Cottonwood (*Populus deltoides*), willows (*Salix* spp.), buckthorn, honeysuckles, wild black cherry were observed. Some areas had giant ragweed (*Ambrosia trifida*) and due to its height (up to 10 feet) could be problematic in solar array areas.

- Drumlins are found throughout the Project Area with the smaller ones have been cleared and planted to agricultural row crops. Steeper sloped drumlins likely have soils less nutrient rich than lands between and thus have not been converted to farm ground. Many of these remain wooded with some having been planted to pine plantations and some areas have a scrub/shrub component of dogwoods (*Cornus* spp.) and sumacs (*Rhus* spp.).

During the survey, existing vegetation, land conditions, and floristic elements of interest were documented within the Project Area. The Smith-Reiner State Natural Area (SNA), located outside of the Project Area, was walked to identify native species that may be appropriate for use in the VMP (Appendix A). The Smith-Reiner Drumlin Prairies was acquired in 2011 by The Prairie Enthusiasts and is owned by WDNR and managed by the Empire-Sauk Chapter. It encompasses two dry upland remnants of original prairie on drumlin hills with displays in August of cylindrical and rough blazing stars (*Liatris cylindracea* and *L. aspera*). The site harbors over 100 native prairie species including stunning displays of early spring wildflowers and a population of the federally threatened prairie bush-clover (*Lespedeza leptostachya*). Since the SNA is all in grassland cover, many grassland birds use it for nesting, including eastern meadowlark, field sparrow, dickcissel, grasshopper sparrow and (outside of breeding season) short-eared owl.

Species adapted to low nutrient soils and shallow topsoil observed include little bluestem grass (*Schizachyrium scoparium*), blazing stars, whorled milkweed (*Asclepias verticillata*), Big bluestem grass (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), leadplant (*Amorpha canescens*), side oats grama (*Bouteloua curtipendula*), common milkweed, wild rose (*Rosa* spp.) and silky aster (*Symphyotrichum sericeum*).

Between the drumlins is a planted tallgrass prairie dominated by Big blue stem, Indian grass, and switch grass (*Panicum virgatum*). Along with the grasses were interspersed native forbs, such as, bergamot (*Monarda fistulosa*), stiff goldenrod (*Oligoneuron rigidum*), yellow cone flower (*Ratibida pinnata*), little blue stem, prairie bush clover (*Lespedeza capitata*), culver's root (*Veronicastrum virginicum*), rattlesnake master (*Eryngium yuccifolium*) prairie dock (*Silphium terebinthinaceum*), compass plant (*Silphium laciniatum*) and purple coneflower (*Echinacea purpureum*).

3.3.2 Floristic Elements of Interest

A total of 66 vascular plant species were documented during the windshield survey and during brief walking forays (Appendix A). Due to the late growing season conditions, the list is limited to the fall flora of the region.

Of the 66 species observed, 39 are native grasses, sedges, forbs, and woody species representative of upland and wetland habitats of the Southeastern Wisconsin savannah and Till Plain ecoregion. The remaining 27 species consist largely of non-native species considered weedy or highly invasive. A few native species such as boxelder, giant ragweed, cattail, and sandbar willow were included in this category due to their clonal or weedy growth habit, and therefore not appropriate for use in the lists developed for the native plant seeding strategy (Appendix B).

3.3.3 Invasive Species of Concern

Several locations were noted during the field investigation to document observed invasive species populations (Figure 3). Invasive species of concern include common reed grass, reed canary grass, sandbar willow and cattail in wet soil conditions, and dame's rocket, garlic mustard, giant ragweed, Siberian elm (*Ulmus pumila*), common buckthorn, and bush honeysuckles in better drained soils. The seed bank will likely contain additional invasive and weedy species that may be encountered during installation and maintenance phase.

Weedy species such as Eurasian cool-season grasses such as smooth brome and Kentucky bluegrass, and broadleaf agricultural weeds such as dandelion are of short stature, and while problematic in most native prairie restorations should not be as problematic in the grass sedge only areas and pollinator areas. These weedy and other low growing non-native species will be discussed in a VMP as to their impact on the native plantings and for their potential management.

The wetter portions of the Project Area are at risk for invasion by taller species arising from the agricultural areas seed bank with the conversion from agricultural use to solar panels, such as narrow-leaved cattail, purple loosestrife (*Lythrum salicaria*) and reed canary grass. There are also several common agricultural weeds such as pigweed (*Amaranthus retroflexus*), giant ragweed and velvetleaf (*Abutilon theophrasti*). Weed management planning for Koshkonong Solar should anticipate and manage the potential presence of these species.

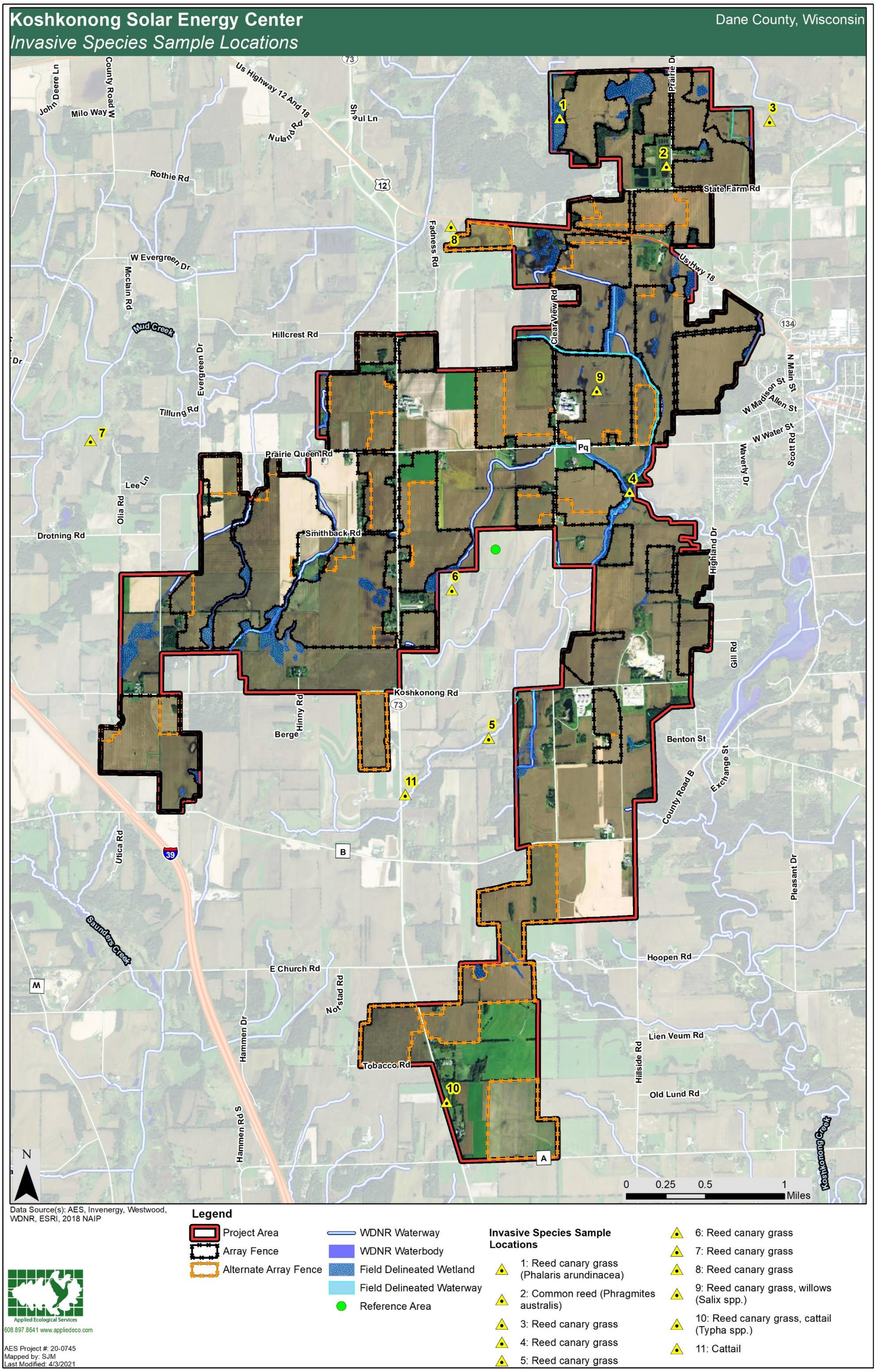

Figure 3. Invasive Species Sample Location Points Within the Koshkonong Project Area.

3.4 Regional Soils

Two factors of the glacial and early post-glacial history are important for the soil formation in the region. First, is the distribution of glacial materials, particularly tills. Tills in the region are predominantly sandy loam in texture and often contain large volumes of coarse fragments greater than 2 millimeters in size. The second is the westerly winds following the final retreat of the ice, which picked up silt-sized materials transported over great distances and deposited in broad flood plains and lake basins. These silt-sized materials, called loess, together with the various glacial materials make up most of the soil parent materials in Southern Wisconsin. Other conditions such as relief, climate, natural vegetation, and the time that the soil has had to form, have also influenced the type of soil that develops.

The sandy tills and lacustrine sediments in the vicinity of the Project Area are generally fine-grained and less permeable and are considered moderately permeable. Those tills with silty and clayey deposits are the least permeable units found in the region and are considered low permeability units. Southeastern Dane County is generally comprised of moderately permeable soils.

Two soil orders (Mollisols & Alfisols), make up most of the soils in the Project Area. Mollisols formed under grassland vegetation and have been heavily influenced by dense sod and matted roots of thick-growing grasses. The roots eventually decay, turning into humus and give Mollisols a thick dark brown or black color surface layer.

Alfisols formed under a hardwood forest cover. They have a clay-enriched subsoil and relatively high native fertility. "Alf" refers to aluminum (Al) and iron (Fe). Alfisols are commonly found in glaciated areas. Alfisols are widely used both in agriculture and forestry and are easier to keep fertile than other humid-climate soils. Alfisols have undergone moderate leaching with calcium, magnesium, and potassium remaining relatively abundant.

The soil rating in Figure 4 indicates the percentage of map units that meets the criteria for hydric/moist soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are dominated by hydric soils may have small areas of minor non-hydric components in the higher elevations on the landform, and map units that are made up dominantly of non-hydric soils may have small areas of minor hydric components in the lower elevations on the landform.

3.4.1 Project Area Upland Soils

Soils with less than 10% hydric inclusions can be generally described as being upland soils and are mapped as yellow and light blue (Figure 4). Upland soil series are comprised of silt loams and loams and range from soils on 0-2% slopes to soils on greater than 35% slopes. A few of these upland soils have a till or gravelly substratum. Upland soils account for approximately 69% of the Project Area. Typical upland loams within the Project Area are Griswold (6-12% slopes), Dresden (12-20% slopes) and Kidder (10-20% slopes). The dominant upland silt loams are Plano (2-6%) and Ringwood (2-6%). The upland soil series historically supported upland prairies and woodlands.

3.4.2 Project Area Moist Soils

Moist soils are based on their percentage of hydric soil components (Figure 4). Hydric soils are defined as soils that form under conditions of saturation, flooding, or ponding for long enough time during the growing season to develop low or no oxygen conditions. These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation. Soils mapped as the darkest shade of blue, based on NRCS data, have an 87% or greater hydric soil component and have few to no upland soil inclusions (Figure 4). Soils mapped as hydric include silt loams, silty clay loams and all the muck soil types. Most of the hydric soils under agricultural production are likely drain tiled or surface drained and will be less problematic than undrained hydric soils.

Hydric soils comprised of Adrian muck, Elvers silt loam, Granby loamy sand, Houghton muck, Marshan silt loam, Montgomery silty clay loam, Orion silt loam, Otter silt loam, Palms muck, Sable silty clay loam, and Wacousta silty clay loam are found in the Project Area. These hydric soils are typically found on flat areas or on slopes that are less than 2%. Hydric soils make up 15% of the acreage found in the Project Area with soils having hydric inclusions another 16%. Hydric soils (either drained or undrained) will require different site preparation, seeding and management approaches compared to upland soils. Plant species adapted to a range of moisture regimes associated with the hydric soils are found in (Appendix B). Except for the histosols (mucks), most of the hydric and moist soil series are classified as Mollisols and historically supported wet prairie and sedge meadow.

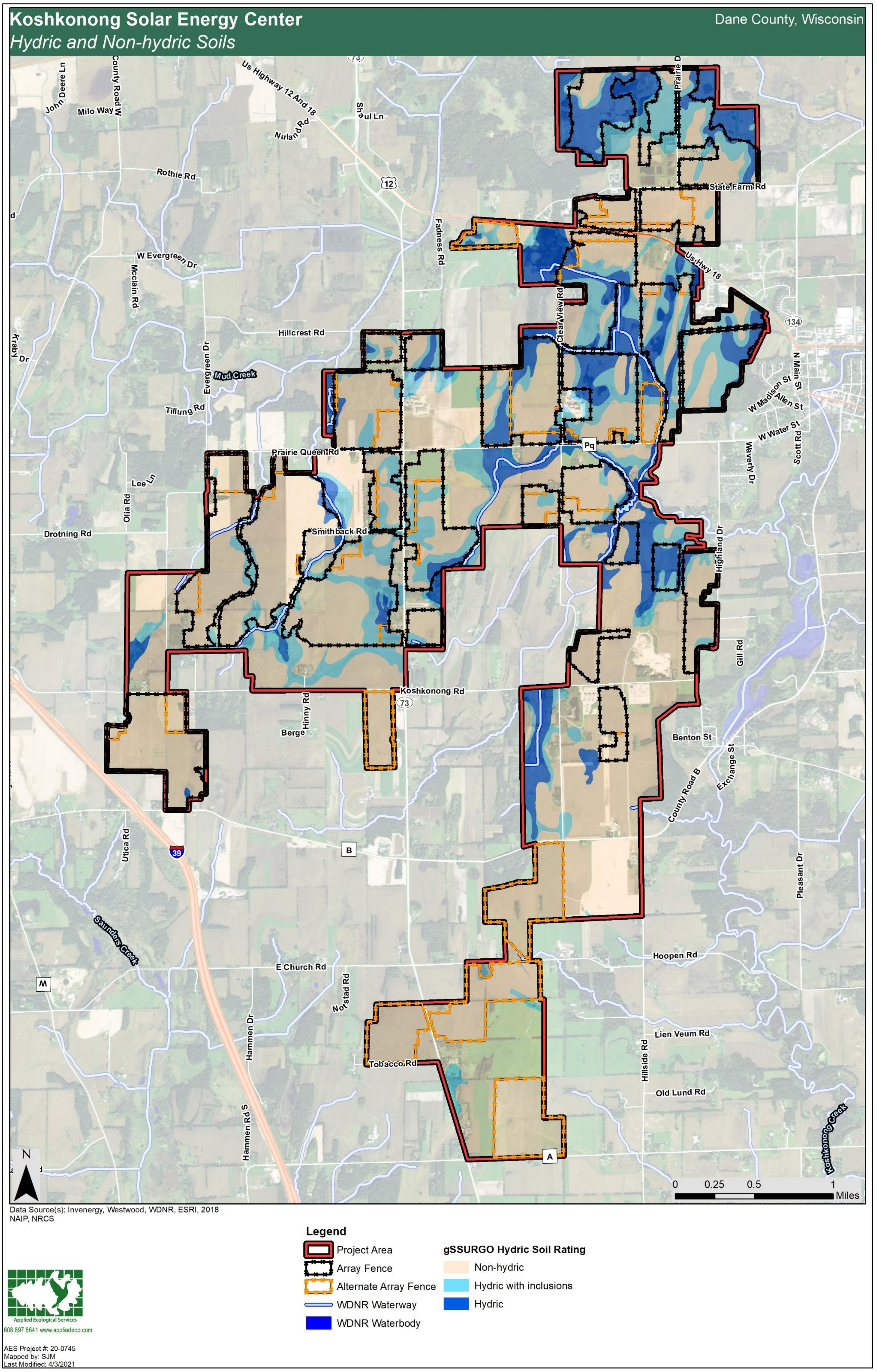

Figure 4. Hydric and Non-hydric Soils at the Koshkonong Solar Energy Center.

3.4.3 Soil Health

In most agricultural settings, including the Koshkonong Solar Project Area, there is a paucity of native plant species in the landscape. Using native plants to increase biodiversity and productivity can improve soil health. Native deep-rooted and densely fibrous rooted cool and warm season grasses and native nitrogen fixing legumes accelerate soil benefits and benefit the larger ecosystem.

Soil health microbial improvements can be achieved by planting native vegetation. As the soil microbial activity is enhanced and restored through prairie plantings, significant soil health improvements will be achieved. The use of native vegetation in Koshkonong Solar array areas can serve as "landscape islands" which can begin the process of rebuilding soil microbial and fungal systems required for developing and maintaining soil health. Reducing soil runoff, controlling erosion, and improving soil fertility through microbial and fungal pathways can accelerate soil health. Native species-dominated prairie vegetation provides conditions for many fungal species to dominate the microbial communities. Because soil fungi are dispersed by spores, the native vegetation on the solar facility can be useful as a center of origin to replenish depleted soil micro-biomes of large acreages of surrounding farmlands. This soil health improving strategy can be an added benefit on solar farms planted to large-scale prairie vegetation.

Soil health improvements can be achieved by increasing grass productivity and increasing drought resilience by planting native vegetation. Native grass plantings having a variety of native wildflowers can put soils on a trajectory to increase soil carbon levels and improve water infiltration rates. Carbon credit and nutrient credit opportunities may be present in some locations through conversion of farmland to native species because of the degraded nature of the agricultural soils.

3.5 Regional Geology

The Project Area is in the Southeastern Wisconsin Savannah and Till Plain ecoregion. The surficial geology of southeastern Dane County was greatly influenced by the events of the Wisconsin Glaciation, especially the last advances of ice about 25,000 to 11,000 years ago. The Wisconsin Glaciation was the latest and sculpted the bedrock and the land surface, leaving characteristic landforms and depositing sediments consisting of till, outwash, and glaciolacustrine deposits. At the farthest advance of the ice sheets and locations where the ice margin was stationary, deposits accumulated in ridges called moraines. These moraines are the major topographic features in Southeastern Wisconsin and occur east of the Koshkonong Solar Energy Center in the Kettle Moraine region.

At some distance behind the belts of moraines, elongated hills called drumlins were sculpted beneath the ice. Drumlins are oval shaped hills composed of glacial drift resembling an inverted spoon or half -buried egg and are aligned in the direction of the ice flow. They tend to exist as "fields" or "swarms" of drumlins, at times found in the thousands and are typically not found as an isolated feature.

This ecoregion supports a mix of agriculture (mostly cropland and dairy operations) and woodland. Most of the original native vegetation has been cleared with forested areas remaining only on steeper drumlins, end moraines and poorly drained depressions. Wetlands are found throughout the region, especially along end morainal ridges and between drumlins.

3.6 Regional Climate

Southern Wisconsin has a cold winter/hot summer, humid continental climate. Southern Wisconsin precipitation consists of rain, snow, sleet, or hail. The area receives regular snowfall averaging around 40 inches per year with Dane County averaging 42 inches. Dane County averages 36 inches of rain per year, while the U.S. averages 38 inches of rain per year. Dane County receives precipitation 123 days per year. There are typically 185 sunny days per year in Dane County with the U.S. average being 205 sunny days.

Southern Wisconsin's climate is changing (August 2016 EPA 430-F-16-051). In the past century, most of the state has warmed about two degrees (F). Heavy rainstorms are becoming more frequent. In the coming decades, the state will have more extremely hot days, which may harm public health in urban areas and crop harvests in rural areas.

Heavy precipitation is likely to increase the frequency of future floods in Wisconsin. Over the last half century, average annual precipitation in most of the Midwest has increased by 5 to 10 percent. But rainfall during the four wettest days of the year has increased about 35 percent. During the next century, spring rainfall and annual precipitation are likely to increase, and severe rainstorms are likely to intensify (August 2016 EPA 430-F-16-051).

Migratory birds are arriving in the Midwest earlier in spring today than 40 years ago. Along with range shifts, changes in timing can disrupt the intricate web of relationships between animals and their food sources and between plants and pollinators. Because not all species adjust to climate change in the same way, the food that one species eats may no longer be available when that species needs it (for example, when migrating birds arrive). Scientists have demonstrated that maintaining grasslands is among the most cost-effective and scalable solutions to mitigating climate change. Grassland is categorized as any managed or natural area dominated by herbaceous or non-woody vegetation, like tall grasses and prairie plants. These landscapes are well-known for their ability to absorb and store carbon in roots and soil. Maintaining grasslands near agricultural fields can also boost crop production, because grasslands promote biodiversity, support pollinators and ground nesting birds and host predators that can help suppress potential pests. They also help improve biodiversity, soil health and water quality[1].

3.7 Wetlands

The wetland delineation found 62 wetlands and wetland complexes comprising 76 Eggers and Reed (2015) wetland components totaling 182.57 acres within the Koshkonong Solar Energy Center Delineation Area (Westwood 2021b). The Delineation Area is approximately a 4,327-acre portion of the overall Project Area and covers planned construction areas. Most wetlands fall under the following: seasonally flooded basins and wet meadow with a few areas described as deep and shallow marsh, shrub carr, hardwood swamp, shallow open water, and floodplain forest. In addition to the delineated wetlands, there are 15 field-delineated waterways totaling 17.50 acres (6.39 miles) within the Delineation Area (Westwood 2021b). Many wetlands are in an agricultural setting and dominated by annual wetland grasses (*Panicum capillare* and *Echinochloa crusgallii*), reed canary grass (*Phalaris arundinacea*) and rough-fruit amaranth (*Amaranthus tuberculatus*). These agriculturally situated wetlands were generally of low diversity and low quality.

[1] https://uwmadscience.news.wisc.edu/ecology/grasslands-among-the-best-landscapes-to-curb-climate-change/

4.0 Vegetation Installation Strategy

The biophysical conditions described in Section 3 were used, in part, to develop this VMS. A key aspect of the VMS is to use native perennial plant species from upland and moist soil prairie ecosystems of the region.

Shallow-rooted, non-native turf grasses, corn, and soybeans (Figure 5) cannot stabilize soils to the extent that the deep roots of native, perennial prairie plants (Figure 6) and the dense, shallow fibrous rooting of moist and wet soil prairie plants can (Figure 7).

Annual agricultural crops can be stressed in moist soils with low oxygen concentrations. Many native species are adapted to this low oxygen and wet soils condition. Species from Tables in Appendix B will be selected to grow well with the degree of moisture in both drained and non-drained hydric soil conditions.

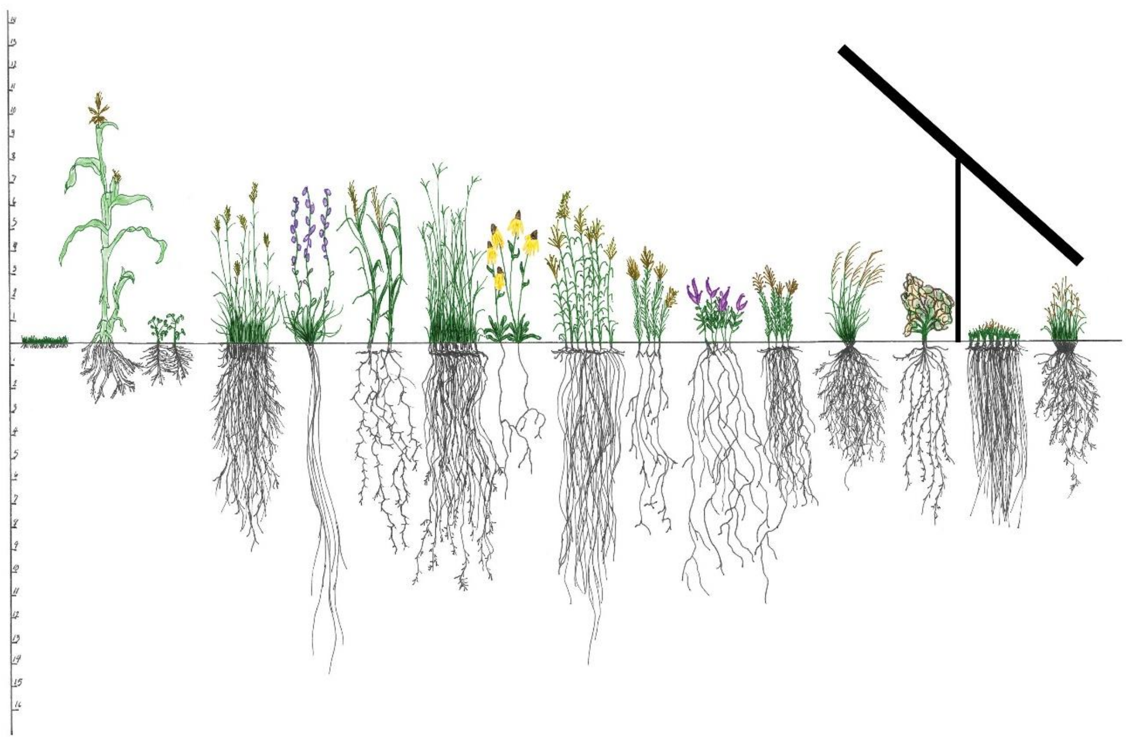

Figure 5. Selected Upland Native Prairie Plant Rooting Depths and Growth Heights.

From left to right, the plants depicted are turf grass, corn, soybeans, native prairie grasses and forbs, and a solar racking system depicted in a 2x1 portrait configuration. Scale is in feet.

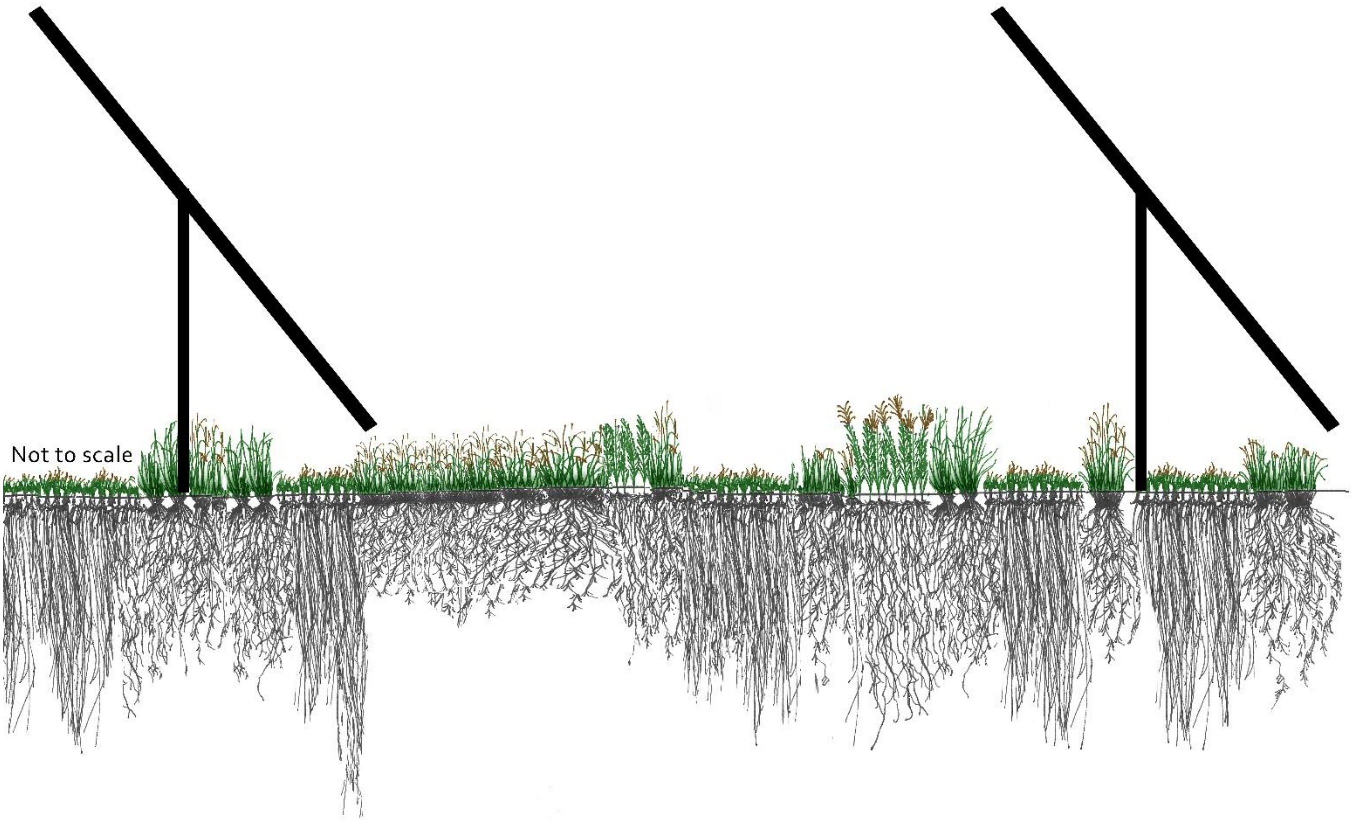

Figure 6. Schematic of a Grass Sedge Cover in Upland Soils in Relation to Solar Panels.

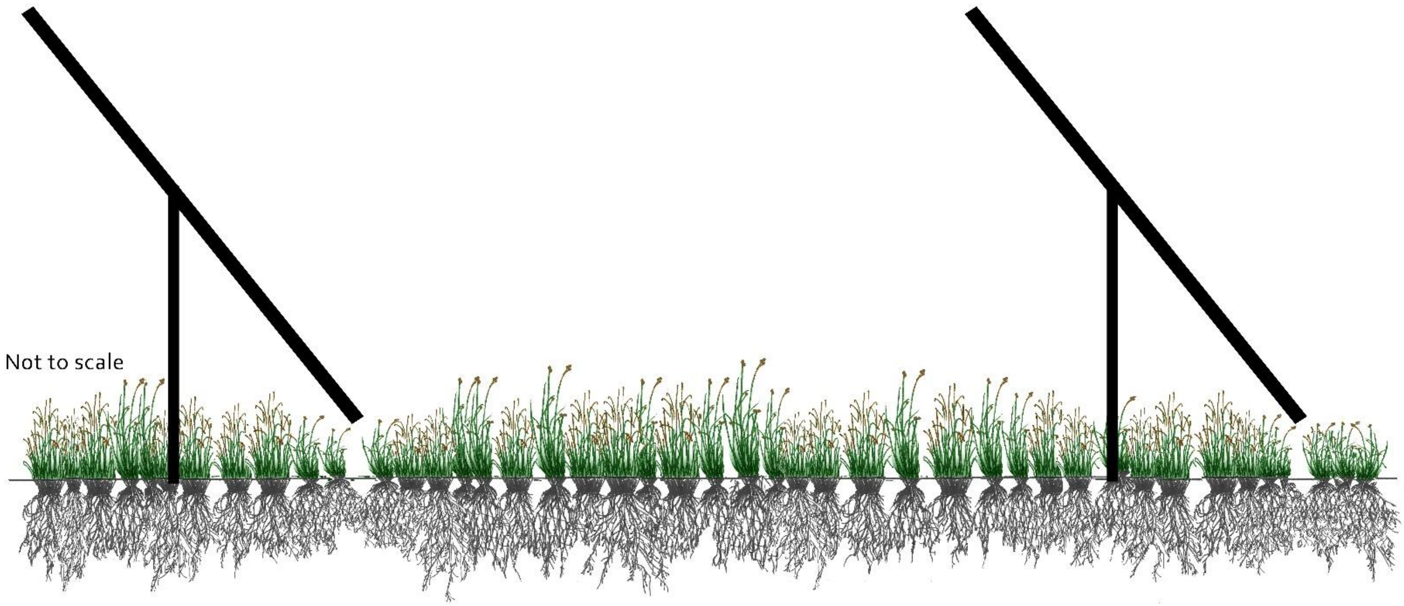

Figure 7. Schematic of a Grass Sedge Cover in Moist Soils in Relation to Solar Panels.
Short stature bunch and rhizomatous shallow rooted species adapted to low soil oxygen levels.

4.1 Vegetation Establishment

Native perennial plantings require several years to establish. In the first year, growth is concentrated in deep and fibrous root system development. Another 1-2 years follow before root and above ground growth is enough to promote flowering and seed set. Tall and aggressive native and non-native weeds concentrate on above ground growth in the first year or two and expend less energy on root development. The soil must be properly prepared and undesirable weeds diligently controlled before and after planting. A phased approach, beginning with soil preparation (Phase 1), followed by the Zone Establishment of a native grass and sedge ground cover and pollinator mixes (Phase 2) reduces the risk of native plantings being overtaken by weedy plants and results in reduced long-term maintenance. The third Phase, site management begins after the solar facilities and the seed has been installed.

Implementing Phase 1 and Phase 2 can occur before or after solar panel installation and other facility construction but will ideally occur prior to panel installation. Soil preparation scheduling depends on construction schedules, weather, seasonality, soil preparation requirements and initial cover crop and/or native grass and sedge seeding. Maintaining plan flexibility will be key to the successful implementation of the VMP.

4.1.1 Phases 1 & 2 Site Preparation and Seeding

The three-phased approach results in a vegetation matrix containing a diversity of species while minimizing disturbance and maximizing weed control. The location of the ecological communities proposed in the Zone Establishment section will be finalized based on weather conditions, seasonality, site construction schedules, final panel layout and seed availability.

4.1.1.1 Phase 1a – Site Preparation

The most critical aspect of preparing the site for native plants is to have adequate soil preparation. Specific steps during the site preparation phase are tied directly to the existing land cover types and soil moisture conditions related to the PV panels and other features within Koshkonong Solar.

Weed seeds persist for years and dominate agricultural land seed banks. Additionally, weed seeds typically germinate earlier and grow faster than perennial native grasses and wildflowers. Weed species arising from the seed bank or through wind dispersal can especially be a problem in moist soils. Therefore, soil preparation is even more important in moist and wet soils as compared to drier soils. Tall-growing invasive species can dominate wet and moist soils upon cessation of agricultural practices and if detected will need to be controlled.

Prior to native seeding, emerging weeds will need to be controlled by a variety of site preparation strategies. One or two herbicide applications may be necessary as part of the seed bed preparation, either before or after potential cover crop installation. Herbicides selected will be those documented as not being harmful to pollinators.

Cover crops, herbicide treatment, mowing, disking, raking, dragging and soil ripping/chisel plowing are some of the soil preparation methods that may be needed. Depending on crop history, soil moisture regime, emerging weeds from the seed bank, wind-blown seeds, weather, compaction, and construction schedule, are activities that will determine the most appropriate site preparation methods. Excessive soil compaction can inhibit, delay, or result in poor native vegetation establishment. Methods such as disking, ripping or chisel plowing as part of soil preparation are potential solutions to compacted soil conditions.

In areas where the conversion of continuously covered fields, such as alfalfa, clover, or pasture areas to Grass Sedge Upland (GSU) or a Grass Sedge Moist (GSM) community is desired, the first step will be a species-specific herbicide treatment of the existing vegetation. Conversion to Grass Sedge Zones could begin before or after solar panel installation. The dead standing crop residue of alfalfa, clover and pasture grass will remain in place to provide soil stabilization and to control weeds until the site is prepped and native seed installed. Another option for pre-existing alfalfa, clover or pasture areas is for them to remain as a low diversity pollinator or avian habitat.

4.1.1.2 Temporary Stabilization

A Storm Water Pollution Prevention Plan (SWPPP) detailing the required sediment and erosion controls shall be installed prior to the start of any grading work to ensure all soils and sediments are retained onsite. The maintenance and removal of sediment and erosion control materials will be required once Notice of Termination of the SWPPP permit has been received.

4.1.1.3 Phase 1b – Temporary Cover Crop Seeding

Crop history and herbicide residence times are useful in determining where and what species to use as a cover crop (Appendix B, Table 1). When cover crop seeding is performed, several methods are used and include, broadcast, air seeding or no-till drill methods to limit soil disturbance and to minimize re-introduction of broadleaf weed species from the seed bank and surrounding areas. Once cover crop seeding has occurred, growing season mowing may be enough to maintain a low vegetation profile before installing the native species. Installation and establishment of a cover crop will help stabilize soils and reduce erosion potential during construction. Depending on construction scheduling, cover crop may be included with and occur simultaneously with the other types of seeding zone installations. Areas of bare soil created by grading or construction disturbance, steeper slopes, and erosion potential may require a cover crop followed by mulching or installation of straw bales, unreinforced silt fences – and netless erosion control blankets. When straw mulching is needed it shall be clean, weed-free wheat straw mulch and applied at 1 ½ tons per acre after temporary seed materials have been installed. Straw mulch should be crimped or pressed into the soil to ensure material adheres to the soil surface.

Air seeding is a recent method developed for installing cover crop. There are a variety of vertical air seeder systems (e.g. Turbo-Seeder™ attachment from Great Plains®). Air seeders offer a cost-effective, highly productive method for seeding cover crops with a vertical tillage tool. Air seeders can place high seed rates of cover crops and small grains, such as oats, wheat, rice, and rye grass. Other air seeders can be attached to a combine head that blows the seed forward, so it is ahead of the mulch coming through the head. This helps the seeds germinate and establish a great cover crop stand.

To kill off a cover crop, a method of terminating cover crops by mechanical rolling-crimping is one alternative technology, rather than herbicide application. Traditional rolling-crimping machines are designed so that a weighted roller flattens the crop to create a protective layer of residue on the soil surface. The native seed can then be seeded directly into the residue cover. The mat of residue protects the soil from water erosion and acts like a mulch, preventing moisture loss through evaporation. The residue also adds carbon to the soil. However, simply rolling the cover crop flat will not terminate the cover plants. Hence, the crimping process is needed to damage the stems, so the plants die. Crimping must be accomplished at the late flowering stage of the cover crop to kill it and to provide enough mulch biomass to suppress weeds. An effective no-till drill with a relatively high planting rate is essential to make this system work.

4.1.1.4 Phase 2 – Permanent Zone Seeding

Once the soil/seed bed has been prepared, the remainder of the site preparation approach will be to perform the permanent seeding of the Grass Sedge matrix over most of the panel array area using a variety of methods, such as no-till drilling, drilling, broadcast, and air seeding methods using low impact seeding equipment to minimize soil disturbance.

Seed mixes were designed to provide native vegetative cover while ensuring performance goals for the solar facility. The seed mixes are to be installed at various stages of construction, utilizing the appropriate methodology for installation. The initial seed mixes will consist of a mix of native grasses and grass-like plants, such as native sedges and rushes and a few non-native short-lived and short statured grasses (Appendix B, Table 2).

Seed mixes were developed by using the resources of Taylor Creek Nurseries to ensure appropriate species have been selected for the site conditions along with determining the adequacy of supply within the market. Seed should be provided on a Pure Live Seed (PLS) basis. PLS is a measure used by the seed industry to describe the percentage of a quantity of seed that will germinate, which is determined by multiplying the percentage of total viable seed by the purity percentage and then dividing by 100. PLS is determined by a qualified seed laboratory.

Local genetic native seed varieties as a seed source, if available, should be used, as they are more likely to germinate and persist compared to genetically similar specimens sourced from farther away. Seed should be shipped and stored in the supplier’s original, labeled packaging until installed and stored in a manner to protect from moisture, heat, or other conditions that would jeopardize viability. Seed for individual mixes shall be categorized, blended, and packaged by small, large, and fluffy seed to accommodate for installation implements. Legume seed should be inoculated by the supplier, prior to shipment.

Appropriate seeding strategies, such as broadcasting (e.g. Vicon seeder or equivalent), and air seeding are especially important for moist and wet soil areas. The use of low impact seeding equipment will be effective in moist soils and in previous row crop (soybean and corn) fields. These methods do not expose buried weed seeds to sunlight keeping them as a seed bank component and thus do not hamper germination of the broadcasted native seed. In some fields, no-till seed drilling may be used. For instance, in upland soils with low soil moisture, no-till drill seeding with standard farm equipment can be an effective seeding method. While no-till drill seeding creates some soil disturbance, it is less disruptive than standard disking followed by drilling, thereby reducing the germination of weeds present in the seed bank.

The Grass Sedge mix will stabilize soils against erosion, control weeds, and act as a nurse crop for additional zone seedings. Surface broadcasting and no-till seed drilling of the Grass Sedge mix will reduce topsoil disturbance. Broadleaf weeds of concern due to their height and aggressiveness arising after broadcasting or no-till drilling will need to be herbicide treated with a broadleaved herbicide or spot mowed. Local farm equipment and/or modified lightweight and low impact farm equipment for use in moist and wet soils (and upland soils) will be used for some of these activities. Ground cover establishment of either a cover crop in Phase 1 and/or mix native grasses and sedges in Phase 2 could be installed prior to, or concurrent with site construction.

After soil preparation, temporary ground cover seeding, and the grass sedge seeding is done, a cover of annual, biennial, and perennial plants will be established in various Pollinator Habitat locations. Depending on weather and site conditions, the Pollinator Habitat species could be installed prior to the solar panel installation and before most facilities are constructed.

4.2 Zone Descriptions

4.2.1 Grass Sedge Cover for Upland (GSU) and Moist Soil (GSM) Zones

The Grass Sedge Zones for Upland Soils (GSU) and Moist Soils (GSM) will be the dominant and primary vegetation zones seeded across the majority of the Project Area (Appendix B, Table 2).

The GSU and GSM Zones will require the lowest level of maintenance because they will contain grass and grass-like plants which can be selectively treated with broadleaf herbicides to remove weedy colonizers such as: Canada thistle (*Cirsium arvense*), giant ragweed, sweet clovers (*Melilotus* spp.), tall and Canada goldenrods (*Solidago altissima*, and *S. canadensis*), pokeweed (*Phytolacca americana*), burdock (*Arctium minus*), purple loosestrife, and cottonwood seedlings. The rapid growth and a heavy seeding of the Grass Sedge cover will effectively outcompete weedy colonizers.

Because of the site scale, several different grass and sedge seed mixes selected from Appendix B, Table 2 may be used to ensure success of planting and achieve site-specific vegetation goals. This will provide for more diversity of native and naturalized grasses, sedges, grass-like plants and will provide additional ecological benefits. The grass and sedge root matrices are expected to contribute agricultural benefits, such as carbon accrual and assist with water infiltration and reduced runoff. Most of the grass species proposed are native to the prairie and moist soil areas of Wisconsin and were selected for short stature and bunch growth habit. A few naturalized and/or low stature non-native grasses may also be used to help maintain a low stature.

The Grass Sedge cover for Upland and Moist Zones will have a dense network of fibrous roots and some deep-rooted species in aerated soils (Figure 6), which are home to numerous beneficial organisms that play a key, yet often overlooked, role in soil-building, soil fertility, and plant health. Significant improvements are expected to the biodiversity of habitats and organisms in both the below ground and above ground biomass within these areas.

Grass Sedge Zones will be planted in the following locations:

- Between and under solar arrays.
- Unused areas next to fallow fields, pastures, and drainageways.
- Some Buffer Areas next to cropland from where herbicides or pesticides could drift and damage other planting types and harm pollinators.
- Areas that may be used for sheep grazing.

If grazing (e.g. sheep) at Koshkonong Solar is considered, a site-specific grazing plan will be developed which will include variations in the plant species to optimize sheep health.

4.2.2 Pollinator Habitat for Upland (PHU) and Moist Soil (PHM) Zones

Pollinator Habitat Upland Soils (PHU) and Moist Soils (PHM) will be seeded into areas having the Grass Sedge cover already established or will be seeded with the Grass Sedge seeding depending on site conditions, weather, and schedules. The Pollinator Habitat Zones will provide benefits for wildlife by providing host plants and habitat for a variety of pollinators and other beneficial native species[redacted]. These seed mixes will feature a range of short, moderate, and taller statured plant species and display a variety of plant life and color and provide a diversity of pollinator plants that bloom at various times. Depending on soil conditions, site constraints and seed availability, a subset of the species listed in Appendix B, Table 3 will be selected for seeding in select areas of the Project Area. The Pollinator Habitat Zones will provide refugia for pollinator faunal species, such as monarch butterflies [redacted]. Pollinator Habitat Zones will not be placed in array areas and will be strategically placed in areas that are easily identifiable to construction and operation teams. Signage will be established in the Pollinator Habitat Zones where mowing restrictions are required and will outline these restrictions.

Upon decommissioning of the Project, Grass Sedge and Pollinator Habitat Zones identified for conversion to pre-existing conditions (at the landowner's discretion) will be converted between October 15 – March 15 to avoid the [redacted] active season.

Pollinator Habitat Zones will be planted within the following locations:

- Areas with low risk of herbicide/insecticide drift from neighboring properties.
- Areas with less frequent mowing requirements.
- Unused areas next to fallow fields, pastures, and drainageways.
- Temporary or permanent stormwater management areas.

4.2.3 View Screening (VS) Zone

Identified View Screening Zones will be planted into the Grass Sedge cover with a few native wildflowers beneath a series of horticultural native woody shrubs and taller trees to serve as visual screen in discrete locations. This zone will screen or soften views of solar facilities with colorful, native vegetation (Appendix B, Tables 4 and 5). While completely blocking views of solar arrays may not be possible, landscaping plants can soften or obscure the view of the solar facility and provide wildlife cover and food plants. If this zone is desired, it will be identified and designed prior to or during construction activities.

4.3 Example Zone Planting Plan

Figures 8 and 9 offer an illustrative representation of how the two different seed mix zones may be located at Koshkonong Solar depending on existing land cover types, using an area along Hwy 12/18 in portions of Section 2 of T6N, R12E as an example. This area was chosen as it will provide a visual and colorful display of pollinator wildflowers.

This concept (Figure 9) of the VMS will be applied in varying degrees across other areas of the Project Area, as determined by an ecological consulting firm/landscape professional, Koshkonong Solar staff, and construction contractors. The VMP will be implemented by a similar group of experienced professionals with oversight by the ecological consulting firm/landscape professionals, Koshkonong Solar staff, and the construction contractor.

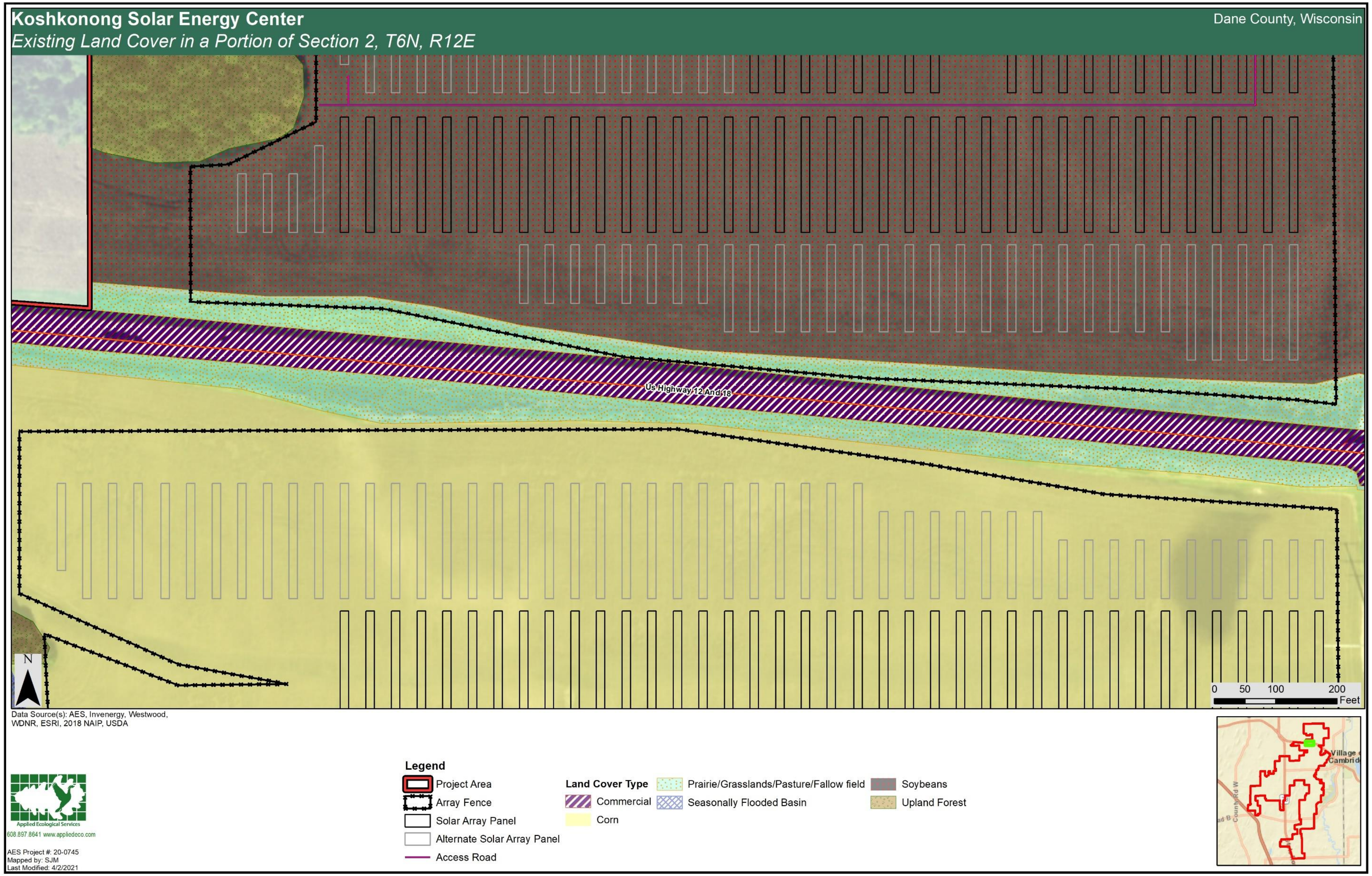

Figure 8. Existing Land Cover in a Portion of Section 2, T6N, R12E.

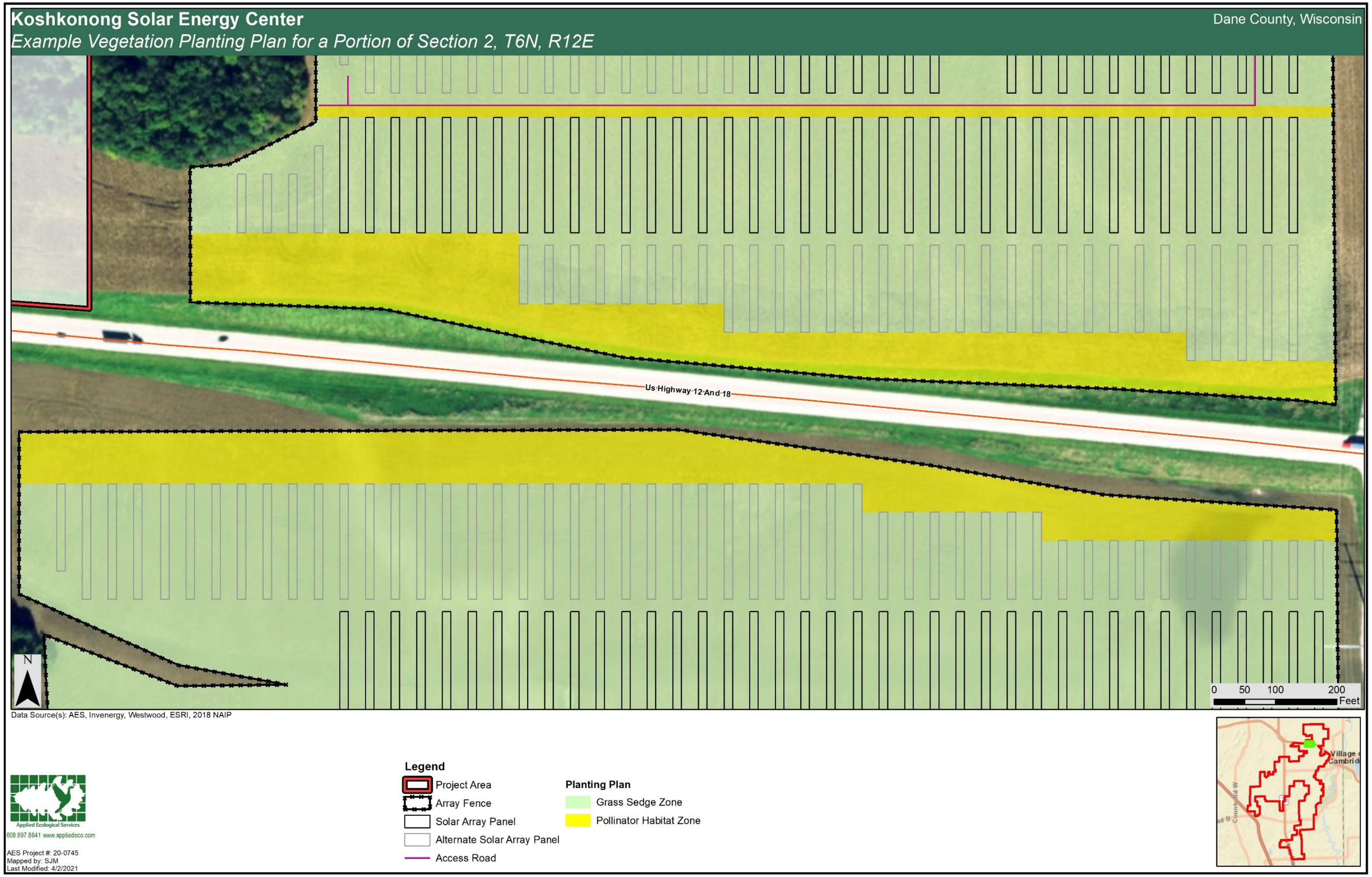

Figure 9. Example Vegetation Planting Plan for a Portion of Section 2, T6N, R12E.

5.0 Vegetation Maintenance

Weeds (by their very nature) allocate most resources into stems, leaves, flowers, and seed production in their initial year(s) of growth. In contrast, native perennials allocate most of their resources to root development in their initial years. The management techniques and schedules to be employed recognize these different growth strategies. The vegetation establishment period for this Strategy focuses on ensuring the Grass Sedge cover seed mixes for Upland and Moist soil areas (GSU and GSM) develop relatively quickly and stabilize the soil.

The third phase of the Strategy includes a framework for the short and long-term vegetation management. Vegetation maintenance begins in the first year of native plant installation and will last for the life of Koshkonong Solar. The most intense maintenance period will occur in the first 1-3 years as native seed zones establish. Maintenance will focus on invasive plant control, especially tall invasive native and non-native annuals, perennials, and woody species. Prevention of tree and shrub invasion and establishment of weeds from surrounding outside sources will need a management focus. Proper timing of maintenance activities is essential to minimize the development and spread of weed and woody species seeds. The maintenance practices include the following:

5.1 General Practices

[redacted]

[redacted]

[redacted]

5.2 Mowing

In years 1-3, mowing to control weeds will be required at various times during the growing season to favor native vegetation establishment. During Year 4 and beyond, mowing of Pollinator Habitat Zones will occur between October 15 and March 15 to maintain a vegetation height that will not shade the PV panels and to minimize disturbance to ground nesting birds and their young as well as to minimize disturbance to peak pollinator movements. The mowing schedule, where to mow and how frequently it will occur will need to be quite flexible and likely will need to be adjusted across zones in any year. Additional mowing(s) in fall or winter, if necessary, to decrease plant heights over winter and prevent snow accumulation on vegetation will need to be scheduled. Annual mowing will manage plant heights and help to prevent woody species establishment. In areas of high soil moisture, mowing may need to be scheduled when ground is dry enough to prevent tire rutting or when the moist soil areas are frozen.

Mowing may take place in late to mid-summer in some areas to establish and maintain vegetation under 18 inches in areas with a risk of shading the PV panels. The most important purpose and result of treating annual invasive plants through mowing is to prevent their seed production. If mowing must occur outside this period, it will occur at the highest cutting height possible. This mowing may need, at times, to be modified if Avian and pollinators timing conflicts with weed seed production. Common invasive plants encountered include grasses like barnyard grass (*Echinochloa crus-galli*), brome grasses (*Bromus* spp.) and broadleaf weeds like garlic mustard, giant ragweed, velvetleaf, and non-native thistle (*Cirsium* spp.). Repeated mowing (e.g. more than twice per year) may produce a buildup of organic thatch, which discourages the development and persistence of diverse native vegetation.

Specialized mowing equipment, such as a tractor with low impact tires, and specialized tractor mounted mowing equipment may need to be implemented at times and in high soil moisture areas. To help prevent thatch buildup onsite, mowing shall be conducted with a flail-type mower to mulch the cut vegetation. A swing arm specifically designed for mowing under solar panels is recommended for cutting beneath panels[4] but spot-mowing with brush saws, weed whips, and similar equipment is also recommended. Mowing equipment shall be cleaned prior to use on site to prevent the introduction and spread of invasive and non-native species. The mowing regime will prevent annual and perennial weeds from flowering and setting seed, prevent weeds from shading out the solar panels, help control woody plant growth onsite and reduce fire susceptibility. Mowing will occur at reduced speeds, averaging < 8mph, to allow time for any potential bees [redacted] to avoid mowing equipment within the Project Area[redacted].

[4] https://www.superbmowingcompany.com/md-series-solar-mowers
[redacted]

5.3 Spot-Herbicide Treatment

Herbicide applications to individual plants and groups of targeted plants will be performed as needed. Herbicide application will be by State of Wisconsin certified applicators using approved State of Wisconsin herbicides. Herbicide application shall follow instructions provided by the manufacturer. Apply herbicides as locally and directly as feasible, following the preparation and application requirements. Wisconsin listed noxious weeds found on site shall be treated by spot herbicide treatment or mowing, or a combination of both methods, with the intention of materially preventing the weeds from setting seed or spreading by rhizomes, stolons, or other vegetative means.

Many weeds will diminish with proper maintenance during the establishment phase, but several will require special attention due to their highly competitive behavior. These include grasses like reed canary grass, common reed, and several species of brome grass. Broadleaf weeds in this category include sweet clovers and Canada thistle. Herbicide application is generally required to prevent the spread of perennial invasive plants.

Non-native perennial tall grasses shall be treated by spot-spraying or boom spraying as warranted, with glyphosate, triclopyr, clopyralid, or comparably effective herbicides, or the aquatic formulation of the same if near open water. Perennial broadleaf invasive plants shall be treated by spot-spraying or boom spraying, as warranted, with glyphosate or comparably effective herbicides. The contractor/applicator shall consult the manufacturer's guidelines regarding the effective residence time of herbicides being used and shall apply herbicides sufficiently in advance of planting and seeding to avoid inhibiting the germination and growth of planted species.

Several native species have the potential to interfere with the functioning of the solar panels. Several native vines have the potential to overgrow installations, including wild grape (*Vitis* spp.), wild cucumber (*Echinocystis lobat*a), bur cucumber (*Sicyos angulatus*), and woodbine/Virginia creeper (*Parthenocissus quinquefolia*). Giant ragweed and other native species shading the arrays should be controlled by mowing (see above). Where these are found growing beneath or near solar panels, wild cucumber and bur cucumber may be pulled and removed manually, but woody vines such as wild grape and woodbine/Virginia creeper shall be cut to within 1 inch of the ground and stump treated with glyphosate, triclopyr, or a comparable herbicide by a licensed applicator, following instructions provided by the manufacturer.

Trees and shrubs can shade or otherwise interfere with the operation of solar panels. Siberian elm, an invasive non-native woody species was observed within the Project Area. This species establishes easily and grows rapidly within grass fields. In addition, seeds blown in from nearby areas, after solar panel construction, such as native woody shrub species of willows and female cottonwood trees will need to be monitored. Seed establishment of trees and shrubs transported by birds, such as wild black cherry and shrubs, such as, European buckthorn will also require monitoring. Removal of woody plants within the solar array areas will be necessary and consideration of removal of non-native European buckthorn in outside but leased lands will be considered. This can be done by herbicide applications, mowing, or a combination of both methods. Woody plants that are too large to mow shall be cut to within 1 inch of the ground and the stump treated with triclopyr or a comparable herbicide by a licensed applicator. Cut brush will need to be removed from the site.

Avoidance of insecticide use within the Project Area will be employed except if there is risk to human safety or solar equipment function. If pest species (plant or animal) are identified during operational activities within the fenced areas, the Project will work with a qualified party to address the occurrence in a manner consistent with the principles of Integrated Pest Management.

5.4 Waterway Management

Vegetation in grassed waterways where tall and invasive species are not problematic will remain largely undisturbed, except for mowing to prevent erosion. However, if these waterways located within the fenced array area are found to harbor tall, invasive, non-native species, such as giant ragweed, reed canary grass, common reed grass and purple loosestrife, some management control (e.g. herbicide treatment, mowing and re-vegetation) will be necessary.

5.5 ROW and Tree Line Management

Weedy herbaceous and woody plant species will have an opportunity to enter Koshkonong Solar from Road Rights-of-Way (ROW) and tree lines crossing through non-panel areas and thus remaining tree lines will be a priority for monitoring the likelihood of species invading through seed dispersal. Within lands under lease/control by Invenergy, it may be necessary for spot-herbicide treatments to control the invaders. Seed production and seed dispersal by native and non-native trees, shrubs and herbaceous species from nearby and adjacent ditches, woodlots and treelines will need to be monitored prior to and after the solar arrays have been installed.

5.6 Performance Standards

To assess the success of the native and non-native species and habitats installed at Koshkonong Solar a monitoring program will be established to address a set of Performance Standards, yet to be developed. These standards will be established to provide guidance to the native seeding contractor to determine if plantings are currently on a trajectory to becoming established and are providing diverse and successful pollinator habitat. A program will be prepared to collect the necessary vegetation information.

5.7 Monitoring

Periodic visual inspections of the establishing and established vegetation will be made to detect both native and non-native invasive species and their expansion, ensure plant growth is not shading part of the panel array, and identify erosion and soil stabilization issues. The results of the inspections will provide information on the achievement of Performance Standards and will provide recommendations on management methods, erosion and soil stabilization issues and recommendations on additional seeding. The invasive species monitoring protocol will be implemented by a qualified contractor. The timing and frequency of these inspections will be adapted in response to needs identified during and immediately following construction. The outcome of these inspections will be contractor-developed control recommendations based on the species and circumstances observed. These control recommendations will be reviewed and implemented as appropriate by Koshkonong Solar Energy Center staff.

5.8 Remedial Seeding

Areas damaged by construction activities or otherwise failing to meet vegetation Performance Standards will be addressed in a remedial action plan and will likely require some site preparation followed by supplemental seeding of appropriate species or seed mixes.

6.0 References

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[redacted]

Appendix A. Representative Vascular Plant Species list of the Koshkonong Project Area and Reference Area.

Scientific Name	Common Name	Woodlands	Wetlands	Other
Native Species				
Acer saccharinum	Silver maple	x	x	
Agrimonia gryposepala	Tall agrimony	x		
Amorpha canescens	Lead plant			x
Andropogon gerardii	Big bluestem grass			x
Asclepias syriaca	Common milkweed			x
Asclepias verticillata	Whorled milkweed			x
Cornus racemosa	Gray dogwood	x	x	
Cornus stolonifera	Red-osier dogwood		x	
Eryngium yuccifolium	Rattle snake master			x
Geum canadense	White avens	x		x
Helianthus sp.	Sunflower			
Juglans nigra	Black walnut	x		x
Lespedeza capitata	Prairie bush clover			x
Liatris aspera	Rough blazing star			x
Liatris cylindracea	Few headed blazing star			x
Monarda fistulosa	Bergamot			x
Oenothera biennis	Evening primrose			x
Oligoneuron rigidum	Stiff goldenrod			x
Panicum virgatum	Switch grass		x	x
Populus deltoides	Eastern cottonwood	x	x	x
Prunus serotina	Wild black cherry	x		
Quercus alba	White oak	x		
Quercus macrocarpa	Bur oak	x		
Quercus rubra	Red oak	x		
Ratibida pinnata	Yellow coneflower			x
Rosa spp.	Wild roses			x
Schizachyrium scoparium	Little bluestem			x
Silphium laciniatum	Compass plant			x
Silphium terebinthinaceum	Prairie dock			x
Solidago canadensis	Canada goldenrod			x
Solidago spp.	Goldenrod	x	x	
Sorghastrum nutans	Indian grass			
Spartina pectinata	Prairie cordgrass		x	
Symphyotrichum sericeum	Silky aster			x
Ulmus americana	American elm	x	x	x
Vitis riparia	Riverbank grape	x	x	
Abutilon theophrasti	Velvet leaf			x

Scientific Name	Common Name	Woodlands	Wetlands	Other
Acer negundo	Boxelder	x	x	
Alliaria petiolata	Garlic mustard	x		
Arctium minus	Common burdock	x		x
Ambrosia artemisiifolia	Common ragweed			
Ambrosia trifida	Giant ragweed		x	x
Barbarea vulgaris	Yellow rocket		x	x
Bromus inermis	Smooth brome	x	x	x
Cichorium intybus	Chicory			x
Cirsium vulgare	Bull thistle			x
Dactylis glomerata	Orchard grass	x		x
Daucus carota	Queen Anne's lace		x	x
Echinocystis lobata	Wild cucumber	x		x
Hesperis matronalis	Dame's rocket	x	x	x
Juniperus virginiana	Red cedar			x
Lolium arundinaceum	Tall fescue			x
Lonicera spp.	Bush honeysuckles	x	x	x
Melilotus sp.	Sweet clover			x
Morus alba	White mulberry	x		
Panicum dichotomiflorum	Fall panic grass		x	
Parthenocissus quinquefolia	Virginia creeper	x		
Phalaris arundinacea	Reed canary grass		x	x
Phragmites australis	Common reed		x	x
Poa pratensis	Kentucky bluegrass	x	x	x
Rhamnus cathartica	Common buckthorn	x	x	
Salix interior	Sandbar willow		x	
Setaria faberi	Giant foxtail			x
Setaria pumila	Yellow foxtail			x
Taraxacum officinale	Dandelion	x	x	x
Trifolium pratense	Red clover			x
Typha spp.	Cattail		x	
Ulmus pumila	Siberian elm	x		x
Total Number of Native Species		**13**	**10**	**21**
Total Number of Non-native/Native Invasive or Weedy Species		**14**	**15**	**22**
Total Number of Species		**27**	**25**	**43**

Appendix B. Proposed Seed Mixes

(These or similar species, depending on availability).

Table 1. Temporary Cover Crops for Use in the Koshkonong Solar Energy Center. Apply at a variable rate depending on species selected (40-110 lbs./acre as a single species or mix of species, depending on site conditions).

Botanical Name	Common Name	Soil Condition (mesic, moist, wet)
Alopercurus aequalis	Short awn foxtail	Wet
Avena sativa*	Oats	Mesic
Chamaecrista fasciculata	Partridge pea	Mesic
Dactylis glomerata*	Orchard grass	Mesic
Echinochloa crusgallii	Barnyard grass	Moist, Wet
Elymus virginicus	Virginia wild rye	Moist, Wet
Fagopyron esculentum*	Buckwheat	Mesic well drained
Festuca spp.*	Fescue species	Mesic
Hordeum jubatum*	Squirrel tail barley	Mesic, Moist
Lolium multiflorum *	Annual rye	Mesic, Moist
Panicum capillare	Common witch grass	Moist, Wet
Panicum dichotomiflorum	Knee grass	Moist, Wet
Phleum pratense*	Timothy	Mesic
Secale cereale*	Winter rye	Mesic, Moist
Triticum aestivum*	Winter wheat	Mesic

*Non-native species

Table 2. Grass Sedge Upland and Grass Sedge Moist Soil (GSU & GSM) Plant Species for Use in the Koshkonong Solar Energy Center. For upland soil conditions (GSU) select FAC, FACU and UPL species. For moist and wet soil conditions (GSM) select FAC, FACW and OBL species. Install at a rate of approximately 40 seeds/ft^2.

Botanical Name	Common Name	Wetland Category	Functional Group	Form
Alopecurus aequalis	Short-awn foxtail	OBL 4	Annual/perennial grass	Small clumps
Bouteloua curtipendula	Side oats grama	UPL 8	Perennial warm season grass	Rhizomatous
Bromus ciliata	Fringed brome	FACW 7	Perennial cool season grass	Rhizomatous
Bromus kalmia	Kalm's brome	FACU 8	Perennial cool season grass	Rhizomatous
Carex bebbii	Bebb's sedge	OBL 4	Perennial sedge	Bunch
Carex bicknellii	Bicknell's sedge	UPL 6	Perennial sedge	Bunch
Carex blanda	Wood sedge	FAC 1	Perennial sedge	Bunch
Carex brevior	Short beak sedge	FACU 4	Perennial sedge	Bunch
Carex cristatella	Crested oval sedge	FACW 4	Perennial sedge	Bunch

Botanical Name	Common Name	Wetland Category	Functional Group	Form
Carex hystricina	Porcupine sedge	OBL 3	Perennial sedge	Bunch
Carex normalis	Spreading oval sedge	FAC5	Perennial sedge	Bunch
Carex scoparia	Broom sedge	OBL 4	Perennial sedge	Bunch
Carex stipata	Awl fruited sedge	OBL 2	Perennial sedge	Bunch
Carex vulpinoidea	Brown fox sedge	OBL 2	Perennial sedge	Bunch
Danthonia spicata	Poverty wild oats	UPL 4	Perennial grass	Bunch
Eleocharis erythropoda	Red rooted spikerush	OBL 6	Perennial spikerush	Rhizomatous
Eleocharis obtusa	Blunt spikerush	OBL 8	Annual spikerush	Bunch
Elymus virginicus	Virginia wild rye	FACW 4	Perennial cool season grass	Bunch
Eragrostis spectabilis	Purple love grass	UPL 3	Perennial grass	Bunch
Glyceria striata	Fowl manna grass	OBL 4	Perennial cool season grass	Bunch
Hierochloe odorata	Sweetgrass	FACW 7	Perennial grass	Rhizomatous
Hordeum jubatum	Foxtail-barley	FAC	Perennial grass	Bunch
Juncus acuminatus	Tufted rush	OBL 6	Perennial rush	Bunch
Juncus canadensis	Canada rush	OBL 7	Perennial rush	Bunch
Juncus dudleyi	Dudley’s rush	FACW 4	Perennial rush	Bunch
Juncus effusus	Common rush	OBL 4	Perennial rush	Bunch
Juncus nodosus	Inland rush	OBL 6	Perennial rush	Bunch
Juncus tenuis	Path rush	FACU 1	Perennial rush	Bunch
Juncus torreyi	Torrey’s rush	FACW 4	Perennial rush	Rhizomatous
Koeleria macrantha	June grass	UPL 7	Perennial cool season grass	Bunch
Leersia oryzoides	Rice cut grass	OBL 3	Perennial cool season grass	Rhizomatous
Muhlenbergia mexicana	Muhly grass	FACW 4	Perennial cool season grass	Bunch
Panicum leibergii	Prairie panic grass	FACU 1O	Perennial cool season grass	Bunch
Phleum pratense	Timothy	UPL	Perennial non-native cool season grass	Bunch
Sporobolus heterolepis	Prairie dropseed	FACU 10	Perennial cool season grass	Bunch

*Number represents Native Coefficient of Conservativism

Table 3. Pollinator Habitat Species for Upland (PHU) and Moist Soils (PHM) for Use in the Koshkonong Solar Energy Center. Each area seeded will contain species that bloom early, mid, and late season. For moist soil mixes (PHM) select FAC, FACW and OBL species and for upland soil mixes (PHU) select FAC, FACU and UPL species. Select one or more representatives from these key groups: legumes, sedges, grasses, umbels, mints, asters, and sunflowers. Install at a rate of approximately 30 seeds/ft^2 in an addition to grass sedge seed in Table 2.

Botanical Name	Common Name	Wetland Category	Functional Group	Bloom Time Season	Flower Color	Notes
Achillea millefolium	Yarrow	FACU	Non-native perennial forb	Summer	White	Non-native
Agalinus tenuifolia	Common False foxglove	FACW 6	Annual forb	Summer	Pink	
Allium cernuum	Nodding wild onion	FAC 7*	Perennial forb	Summer	Pink	
Andropogon gerardii	Big bluestem grass	FAC 4	Perennial grass	Summer	NA	Bunch grass, tall
Amorpha canescens	leadplant	UPL 7	Perennial forb	Summer	Purple	
Anemone canadensis	Meadow anemone	FACW 4	Perennial forb	Spring, Summer	White	
Arnoglossum atriplicifolium	Pale Indian-plantain	UPL 4	Perennial forb	Summer	White	Tall
Asclepias incarnata	Marsh milkweed	OBL 5	Perennial forb	summer	Lavender/Pink	
Asclepias tuberosa	Butterfly milkweed	UPL 6	Perennial forb	Summer	Orange	
Asclepias syriaca	Common milkweed	UPL 1	Perennial forb	summer	Lavender	
Asclepias verticillata	Whorled milkweed	UPL 1	Perennial forb	Summer	White	
Baptisia alba	White wild indigo	FACU 8	Perennial forb	Summer	White	Legume
Baptisia bracteata	Cream wild indigo	UPL 7	Perennial forb	Spring	Yellow	
Bidens cernua	Nodding bur marigold	FACW 3	Perennial forb	Summer	Yellow	
Bouteloua curtipendula	Side oats grama	UPL 8	Perennial warm season grass	N/A	N/A	
Chamaecrista fasciculata	Partridge pea	FACU 5	Annual forb	Summer, Fall	Yellow	Legume
Coreopsis lanceolata	Sand coreopsis	FACU 5	Perennial forb	Spring, Summer	Yellow	
Coreopsis palmata	Prairie coreopsis	UPL 8	Perennial forb	Summer	Yellow	
Dalea candida	White prairie clover	UPL 8	Perennial forb	Summer	White	Legume
Dalea purpurea	Purple prairie clover	UPL 9	Perennial forb	Summer, Fall	Purple	
Danthonia spicata	Poverty oats grass	UPL 4	Perennial grass	N/A	N/A	

Botanical Name	Common Name	Wetland Category	Functional Group	Bloom Time Season	Flower Color	Notes
Dodecatheon meadia	Shooting star	FACU 7	Perennial forb	Summer	Pink	
Echinacea purpurea	Purple coneflower	UPL 3	Perennial forb	Summer	Purple	
Elymus canadensis	Canada wild rye	FACU 4	Perennial grass	Summer	N/A	
Elymus virginica	Virginia wild rye	FACW 6	Perennial grass	Spring	N/A	
Epilobium coloratum	Cinnamon willow herb	OBL 3	Perennial forb	Summer	Pink	
Eryngium yuccifolium	Rattlesnake master	FAC 8	Perennial forb	Summer	white	
Eupatorium perfoliatum	Common boneset	FACW 6	Perennial forb	Summer	White	
Euthamia graminifolia	Grass leaf goldenrod	FACW 4	Perennial forb	Summer	Yellow	
Gentiana alba	Yellowish gentian	FACU 9	Perennial forb	Summer, Fall	White/Yellow	
Gentiana andrewsii	Bottle gentian	FACW 6	Perennial forb	Summer	Blue	
Gentiana puberulenta	Downy gentian	UPL 9	Perennial forb	Summer, Fall	Blue	
Geranium maculatum	Wild geranium	FACU 4	Perennial forb	Spring	Lavender	
Heliopsis helianthoides	False sunflower	FACU 5	Perennial forb	Summer	Yellow	
Heuchera richardsonii	Alumroot	FACU 7	Perennial forb	Spring	Yellow/ Green	
Helenium autumnale	Sneezeweed	FACW 4	Perennial forb	Summer/fall	Yellow	
Iris virginica	Blue flag	OBL 5	Perennial forb	Spring, Summer	Blue	
Liatris aspera	Rough blazing star	UPL 5	Perennial forb	Summer, Fall	Blue	
Liatris cylindracea	Dwarf blazing star	UPL 9	Perennial forb	Summer/Fall	Purple	
Liatris pycnostachya	Prairie blazing star	FAC 8	Perennial forb	Summer	Purple	
Lobelia cardinalis	Cardinal flower	OBL 7	Perennial forb	Summer	Red	
Lobelia siphilitica	Great blue lobelia	FACW 5	Perennial forb	Summer	Blue	
Lobelia spicata	Pale spiked lobelia	FAC 6	Perennial forb	Summer	Pink	
Lupinus perennis	Wild lupine	UPL 7	Perennial forb	Summer, Fall	Blue	Legume
Lythrum alatum	Winged loosestrife	OBL 6	Perennial forb	Summer	Lavender	
Mentha arvensis	Wild mint	FACW 3	Perennial forb	Summer	Lavender	
Mimulus ringens	Monkey flower	OBL 6	Perennial forb	Summer	Pink	
Monarda fistulosa	Wild bergamot	FACU 4	Perennial forb	Summer, Fall	Lavender	
Monarda punctata	Horse mint	UPL 3	Perennial forb	Summer	White	
Oligoneuron album	Stiff aster (goldenrod)	FACU 8	Perennial forb	Fall	Yellow	

Botanical Name	Common Name	Wetland Category	Functional Group	Bloom Time Season	Flower Color	Notes
Oligoneuron riddellii	Riddell's goldenrod	OBL 7	Perennial forb	Summer	White	
Oligoneuron rigidum	Stiff goldenrod	FACU 5	Perennial forb	Summer	Yellow	
Panicum capillare	Old witch grass	FAC 1	Annual grass	N/A	N/A	
Panicum virgatum	Switch grass	FAC 4	Perennial grass	Summer	N/A	
Parthenium integrifolium	Wild quinine	UPL 8	Perennial forb	Summer, Fall	White	
Penstemon calycosus	Small beardtongue	FACU 7	Perennial forb	Spring, Summer	White	
Penstemon digitalis	Smooth penstemon	FAC	Perennial forb	Early Summer	White	Introduced
Penthorum sedoides	Ditch stonecrop	OBL 3	Perennial forb	Summer	Green	
Potentilla arguta	Prairie cinquefoil	FACU 7	Perennial forb	Summer	Yellow	
Ratibida pinnata	Yellow coneflower	UPL 4	Perennial forb	Summer	Yellow	
Rudbeckia hirta	Black-eyed Susan	FACU 1	Biennial forb	Summer, Fall	Yellow	
Rudbeckia triloba	Brown-eyed Susan	FACU 3	Perennial forb	Summer, Fall	Yellow	
Schizachyrium scoparium	Little bluestem	FACU 5	Perennial warm season grass	N/A	N/A	
Senna hebecarpa	Wild senna	FACW 9	Perennial forb	Summer, Fall	Yellow	Legume
Solidago nemoralis	Old-field goldenrod	UPL 4	Perennial forb	Summer, Fall	Yellow	
Solidago speciosa	Showy goldenrod	FACU 5	Perennial forb	Summer, Fall	Yellow	
Sorghastrum nutans	Indian grass	FACU 5	Perennial grass	Summer	N/A	Tall Bunch grass
Symphyotrichum ericoides	Heath aster	FACU 4	Perennial forb	Fall	White	
Symphyotrichum laeve	Smooth blue aster	FACU 6	Perennial forb	Summer, Fall	Blue	
Symphyotrichum novae angliae	New England aster	FACW 3	Perennial forb	Fall	Blue	
Symphyotrichum oolentangiense	Sky blue aster	UPL 8	Perennial forb	Summer	Blue	
Spartina pectinata	Prairie cord grass	FACW 5	Perennial grass	Summer	N/A	Rhizomatous grass
Symphyotrichum sericeum	Silky aster	UPL 5	Perennial forb	Fall	Blue	
Tradescantia ohiensis	Spiderwort	FACU 5	Perennial forb	Early Summer	Blue	
Trifolium pratense L.	Red clover	UPL	Perennial non-native forb	Spring	Red	Legume
Veronicastrum virginicum	Culver's root	FACW 6	Perennial forb	Summer	White	
Zizia aurea	Golden Alexanders	FAC 7	Perennial forb	Spring	Yellow	

*Number represents Coefficient of Conservativism.

Table 4. View Screen Perennial Plant Species for Use in the Koshkonong Solar Energy Center. Species selected for optional screening and selective herbicide control.

Botanical Name	Common Name	Wetland Category	Herbicide Tolerance	Stature
Asclepias tuberosa	Butterfly milkweed	UPL 6*	Moderate tolerance	Medium
Bouteloua curtipendula	Side oats grama	UPL 8	Moderate tolerance	Short
Chamaecrista fasciculata	Partridge pea	FACU 5	High tolerance	Short
Coreopsis lanceolata	Sand coreopsis	FACU 5	High tolerance	Short
Dalea purpurea	Purple prairie clover	UPL 9	High tolerance	Short
Echinacea purpurea	Purple coneflower	UPL 3	Moderate tolerance	Medium
Elymus canadensis	Canada wild rye	FAC 4	Low tolerance	Medium
Liatris aspera	Rough blazing star	UPL 6	Moderate tolerance	Medium
Lupinus perennis	Wild lupine	UPL 6	Low tolerance	Short
Monarda fistulosa	Wild bergamot	FACU 4	Low tolerance	Medium
Penstemon digitalis	Beardtongue	FAC 4	Low tolerance	Medium
Ratibida pinnata	Yellow coneflower	UPL 4	Low tolerance	Medium
Rudbeckia hirta	Black-eyed Susan	FACU 1	Moderate tolerance	Short
Schizachyrium scoparium	Little bluestem	FACU 5	High tolerance	Short
Solidago nemoralis	Old-field goldenrod	UPL 4	Moderate tolerance	Short
Verbena hastata	Blue vervain	FACW 4	Low tolerance	Medium

*Number represents native Coefficient of Conservativism.

Table 5. View Screen Trees and Shrubs.
Species selected for low risk of invasion and a moderate maximum height and width.

Botanical Name	Common Name	Wetland Category	Height (feet)	Width (feet)
Amelanchier laevis	Serviceberry	UPL 8*	20	10
Aronia prunifolia	Chokeberry	FACW 7	4	2
Carpinus caroliniana	Hornbeam	FAC 6	15	10
Ceanothus americanus	New Jersey tea	UPL 6	2	2
Cornus spp.	Various dogwoods		15	6
Corylus americana	American hazelnut	FACU 5	10	8
Crataegus spp.	Various hawthorns		20	8
Hamamelis virginiana	Witch hazel	FACU 8	10	10
Hypericum prolificum	Shrubby St. John's wort	FACU 9	4	4
Ilex verticillata	Winterberry	FACW 10	7	3
Malus ioensis	Prairie crabapple	UPL 3	15	10
Rosa blanda	Early wild rose	FACU 5	4	4
Rosa carolina	Carolina rose	FACU 5	2	2
Rosa setigera	Savanna rose	FACU 7	5	6
Salix humilis	Prairie willow	FACU 6	4	2
Spiraea alba	Meadowsweet	FACW 4	3	2

Botanical Name	Common Name	Wetland Category	Height (feet)	Width (feet)
Spiraea tomentosa	Steeple bush	FACW 6	3	2
Thuja occidentalis	Arbor vitae	FACW 9	30	4
Vaccinium spp.	Blueberry	FACW 6-10	2-4	2
Viburnum prunifolium	Black haw viburnum	FACU 5	12	10
Viburnum acerifolium	Maple leaf viburnum	UPL 7	6	6
Viburnum trilobum	Highbush cranberry	FACW 6	8	4

*Number represents native Coefficient of Conservativism.

*The Coefficient of Conservatism is a number from 0-10 given to each native species occurring in a regional flora. It represents an estimated probability that a species is likely to occur in a landscape relatively unaltered from what is believed to be a pre-settlement condition. The most conservative species (number 9-10) require a narrow range of ecological conditions, are intolerant of disturbance and are unlikely to be found outside undegraded remnant natural areas. The least conservative species (numbers 0-3) can be found in a wide variety of settings and thrive on disturbance.

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