ENVIRONMENTAL ASSESSMENT

Koshkonong Solar Energy Center LLC
(a wholly-owned subsidiary of Invenergy Solar Development North America LLC and an affiliate of Invenergy LLC)

Docket 9811-CE-100

Application for a Certificate of Public Convenience and Necessity of Koshkonong Solar Energy Center LLC to Construct a Solar Electric Generation Facility in the Towns of Christiana and Deerfield, Dane County, Wisconsin

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1. Introduction

On April 15, Koshkonong Solar Energy Center LLC (KSEC), a wholly-owned subsidiary of Invenergy Solar Development North America LLC and an affiliate of Invenergy LLC, filed an application with the of Public Service Commission of Wisconsin (Commission) to receive a Certificate of Public Convenience and Necessity (CPCN) for the authority to construct a solar electric generation facility and battery energy storage system (BESS) in docket 9811-CE-100[1]. The solar facility would have a nameplate capacity of 300 megawatts (MW) and the BESS would have a power injection capacity of 165 MW and energy storage capacity of 660 megawatt-hours (MWh). KSEC's request to receive a CPCN was filed with the Commission pursuant to Wis. Stat § 196.491(3) and Wis. Admin. Code § PSC 111.53. The application for the generating facility was determined to be complete on May 14, 2021[2]. KSEC sent copies of the complete applications to the clerk of each municipality in which the project might be located and to the libraries in the wider project region by U.S. mail on May 24, 2021[3].

The KSEC generation facility (also referred to as 'the project') would be a 300 MW alternating current (AC) photovoltaic (PV) electric generation site and 165 MW/660MWh battery energy storage system (BESS). The proposed project would be made up of separately fenced arrays, and approximately 2,400 acres would ultimately be used to reach the 300 MW capacity. Underground collector circuits would go from the arrays to a new collector substation. A 4,435-foot 345 kilovolt (kV) generator tie line would take the electricity to the existing Rockdale Switchyard, which is owned by American Transmission Company (ATC), where it would interconnect to the existing electric grid. The generator tie line is less than one mile in length, and therefore does not require a separate CPCN. The majority of the land needed for the project would be leased from landowners. KSEC would develop, design, permit, and construct the generation facility, and may sell it to a utility or another independent power producer.

1.1 Analysis for Wisconsin Environmental Policy Act Compliance

The solar electric generation facility is a Type III action under Wis. Admin. Code § PSC 4.10(3). Type III actions normally do not require preparation of an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) under Wis. Admin. Code § PSC 4.10(3). A proposed BESS is categorized as a Type II action under Wis. Admin. Code § PSC 4.10(2). The Commission is preparing this EA to evaluate the location of the project and its potential environmental and community impacts. When the EA is complete a preliminary determination will be made on whether to undertake a full EIS and considered before a final determination is made. At the time of the preliminary determination, the Commission shall make copies of the EA available to those persons that request it.

An EIS is required if an EA determines there are significant impacts to the environment as a result of the project. The EA is a written review of the potential impacts of the proposed project that would affect the quality of the human environment as described in Wis. Stat. § 1.11(2)(c). The EA also describes ways of mitigating or avoiding some of the expected impacts and concludes with the evaluation of ten items described in Wis. Admin. Code § PSC 4.10(2)(d).

[1] PSC REF#: 409310, Koshkonong Solar Energy Center CPCN Application
[2] PSC REF#: 411465, Completeness Determination Letter
[3] PSC REF#: 411879, Confirmation of delivery of CPCN Application CDs to Clerks and Libraries

Notification[4] of the Commission's intent to prepare an EA, including a solicitation for comments on the environmental aspects of this proposed project, was sent to the WEPA mailing list for this docket on May 26, 2021. The WEPA mailing list includes:

- Local residents and landowners potentially affected by the project;
- Municipal officials in the towns and counties covered by the project area;
- Local news media;
- Libraries in the project area;
- Senators and legislators representing the affected area, and;
- Any other persons with a demonstrated interest in the proposed project.

Through the EA scoping period, Commission staff solicit public comments about the proposed project, and take any comments or concerns regarding the environmental assessment or review of the project into consideration during the analysis of the project. The comments received are discussed further in Section 1.4.2 of this EA.

1.2 Environmental Assessment Scope

The Commission's Division of Digital Access, Consumer, and Environmental Affairs prepared this EA in cooperation with the Department of Natural Resources (DNR) Office of Energy to determine if an EIS is necessary under Wis. Stat. § 1.11. A preliminary determination was made on October 18, 2021, concluding that preparation of an EIS was not necessary. This preliminary determination has a comment period ending November 3, 2021.

This EA is being submitted as an exhibit in the technical hearing on the proposed project. The scope of the EA is to review and describe the expected or potential impacts the construction and operation of the proposed project would have on the environment. The review was conducted with the understanding that areas that would physically host facilities (including all underground collector circuit rights-of-way (ROW), all generator tie-line ROW, some access roads, and all areas within facility fences) would experience permanent impacts during construction and operation. However, leased land outside these facility areas, referred to as perimeter areas, may experience temporary impacts during construction. Expected and potential impacts evaluated include impacts to local residents and community as well as natural resources. The EA also addresses potential ways impacts could be avoided or mitigated. The analysis in the EA is provided to the public, intervenors, and the Commissioners to inform comments and decisions regarding the proposed project.

1.3 CPCN Hearing and Intervenors

The Commission issued a Notice of Proceeding for the docket June 24, 2021,[5] indicating that a hearing would be held on the proposed project. The Commission will issue a Notice of Hearing for this project with details on the public and technical hearings. The technical hearing for parties to the proceeding will be held on January 19, 2022, at a location to be determined. The public hearing on the project will be held on January 20, 2022, at a location to be determined.

[4] PSC REF#: 412142, Environmental Assessment Scoping Letter
[5] PSC REF#: 414242, Notice of Proceeding Signed and Served 6/24/2021

Due to the COVID-19 pandemic, recent hearings have been held over an internet web meeting platform, with the ability for the public to call in via telephone.

The following entities requested to intervene in the dockets and were accepted:

- Barnes
- Clean Wisconsin
- Danielson
- Engelstat-Lovell
- Klopp
- RENEW WI
- School District of Cambridge
- Town of Christiana
- Vasby
- Village of Cambridge

1.4 Persons Contacted, Comments, and Permit Compliance

Wisconsin Admin. Code § PSC 4.20(2)(f) states that the EA shall include a list of other persons contacted and a summary of comments or other information received from them, including information regarding whether the proposed project complies with the regulations of other governmental units.

1.4.1 Persons Contacted

No other persons besides staff at DNR and the Commission were contacted or involved in the preparation of this EA.

1.4.2 Public Comments

Approximately 260 comments were received during the EA scoping period regarding potential impacts of the proposed project. Approximately 35 percent of these comments expressed support for the project. The remaining comments came from members of the public, mostly in clear opposition to approval, who voiced concerns regarding a wide variety of environmental impacts associated with the project. The issues and concerns raised in these comments, applicable to the scope of the environmental review, have been addressed in subsequent sections of this EA.

1.4.3 Permit Compliance

KSEC submitted an application to the Commission for a CPCN, as required by Wis. Stat. § 196.491, for proposed electric generation facilities of 100 MW or more. The Commission will decide whether to approve, deny or modify the project.

The Commission must make a number of determinations regarding construction projects in a short timeframe, without knowing whether other regulatory permits will be issued. The Commission typically includes language in an order authorizing a project that states an applicant is required to obtain all necessary federal, state, and local permits prior to starting construction as a practical way of mitigating that uncertainty. The reason for this requirement is to ensure the Commission does not approve, and the applicant does not begin work on, a project that would

not be able to obtain permits from other regulatory agencies, or begin construction in an area without following possible mitigation or construction requirements that are required by another regulatory agency permit.

Table 1.8.1 of the application provides information on potential regulatory permits and requirements, with a regulatory point of contact, description of what triggers the permit, potential filing date and status. The following table lists some of the permits, approvals, and standards that are potentially necessary for the proposed project:

Table 1 - Regulatory Requirements

Approval/Requirement	Agency	Process
Section 404 of Clean Water Act	U.S. Army Corps of Engineers	Applicant states that this permit is not required for the project as they expect to avoid all waters of the U.S.
Endangered Species Act, Bald and Golden Eagle Protection Act, and Migratory Bird Treaty Act	U.S. Fish and Wildlife Service	Information for Planning and Consultation-Completed and is included in Appendix K[6] of the application.
Certificate of Public Convenience and Necessity (CPCN	Public Service Commission of Wisconsin	Required for construction of electric generation facility over 100MW.
DT1504 and DT1553 Permits	Wisconsin Department of Transportation	Required to construct a new connection to a state highway as well as a permit to construct, operate and maintain utility facilities in highway ROW.
MV2604 or MV2612 Permits	Wisconsin Department of Transportation	Some items may require vehicle and road use permits during delivery due to weight or size.
Wetland or Waterway General Permits	Wisconsin Department of Natural Resources	Applicant states that none of these permits would be required as the project is expected to avoid all wetlands and waterways.
Pond/Artificial Waterbody/Stormwater General Permit	Wisconsin Department of Natural Resources	Required for construction of a storm water basin within 500 feet of a navigable waterway.
Wisconsin Pollutant Discharge Elimination System (WPDES) Construction Site Storm Water Runoff General Permit	Wisconsin Department of Natural Resources	Required for land disturbance involved with project. Erosion Control Storm Water Management Plan included in Appendix L[7].
Pit/Trench Dewatering General Permit	Wisconsin Department of Natural Resources	Required for pit/trench dewatering associated with the project.
State Endangered Resources Review	Wisconsin Department of Natural Resources	Review of Natural Heritage Inventory database and project area. Identification of any species or habitat records and actions to avoid impacts. Certified ER review included in Appendix K of the application.
Private Well Notification Number	Wisconsin Department of Natural Resources	Required if a new well is deemed necessary as part of the O&M building.

[6] PSC REF#: 409955, Koshkonong Solar CPCN Appendix K ER Review
[7] PSC REF#: 409381, Koshkonong Solar CPCN Appendix L Erosion Control and Stormwater Management Plan

Approval/Requirement	Agency	Process
Cultural and Archaeological Resources Review under Wis. Stat. § 44.40	Wisconsin Historical Society	Cultural report submitted to Commission in Appendix J[8]. The Commission is determining compliance with WHS. Expected to avoid significant impacts to cultural and archaeological resources.
Burial Site Disturbance	Wisconsin Historical Society	Required for alternative collector circuit route(s) through a burial site (no impact anticipated).
Storm Water/Erosion Control Permits	Dane County	Required for land disturbance involved with project.
Permit to Access County Trunk Highway	Dane County Department of Public Works, Highway and Transportation	Required for new connection to county ROW.
Permit to Work in County Trunk Highway ROW	Dane County Department of Public Works, Highway and Transportation	Required to construct or maintain any utility infrastructure in county ROW.
Permit to Transport Non-Divisible Load Exceeding Statutory Size and/or Weight	Dane County Department of Public Works, Highway and Transportation	Required for transportation of oversize-overweight loads, such as the substation.
Sanitary Permit/POWTS Plan Review	Public Health Madison and Dane County Environmental Health	Required for installation of on-site septic system.
Well Location Permit	Public Health Madison and Dane County Environmental Health	Required if a new well is deemed necessary as part of the O&M building.
Agricultural Impacts Statement	Wisconsin Department of Agriculture, Trade and Consumer Protection	Report not required as all land included in the project is acquired voluntarily.
Driveway Permit	Towns of Christiana and Deerfield	Required for any new connection to municipal roads.
Building Permit	Town of Christiana	Required for construction of new structure(s) in municipality.

County and local governments have numerous responsibilities that can be addressed during the Commission's CPCN project review. KSEC has discussed the project and maintains contact with representatives at the Towns of Christiana and Deerfield, as well as Dane County. Dane County or other local government planning and zoning land use permits would not be required because the project is going through the state CPCN process. However, shoreland protection and floodplain zoning regulation is retained by Dane County. Potential effects on a local government jurisdiction would be considered by the Commission as an impact on the existing local social environment. Appendix A[9] of the application contains a record of correspondence and reviews with agencies and local governments.

[8] PSC REF#: 409962, Koshkonong Solar CPCN Appendix J Cultural Resources Review
[9] PSC REF#: 409951, Koshkonong Solar CPCN Appendix A Correspondence with Permitting Agencies

2. Project Overview

In accordance with Wis. Admin. Code § PSC 4.20(2)(b), the EA includes an overview of the design of the facilities to be constructed, the construction process, and the project area.

2.1 Purpose and Need

Wisconsin Admin. Code § PSC 4.20(2)(a) directs the EA to describe the purpose and need for the proposed project. Under Wis. Stat. § 196.491(3)(d)2, the project is a wholesale merchant plant and is therefore exempt from the needs analysis that would be required of a state public utility. The applicant did not provide an estimated total cost for the new solar generation facility because that requirement is only applicable to public utility sponsored projects.

The Commission's review of CPCN applications for wholesale merchant plants is more limited than for projects proposed by public or investor-owned utilities. Under Wis. Stat. § 196.491(3)(d)2 and 3, a wholesale merchant plant CPCN need not demonstrate that its facility would meet the reasonable needs of the public for electricity, and the Commission may not consider economic factors when evaluating the application. The Energy Priorities Law[10] ranks energy conservation and efficiency as its highest priority, with noncombustible renewable resources as the second highest priority.

The purpose of this proposed project is to generate utility-scale solar electricity for sale. The applicant anticipates that Wisconsin utilities would own the solar generation project, since many utilities have publically expressed the need for solar power and have plans to decommission fossil fuel power plants. On April 30, 2021, Wisconsin Electric Power Company (WEPCO), Wisconsin Public Service Corporation (WPSC), and Madison Gas and Electric Company (MGE) submitted a joint application for a Certificate of Authority to acquire, own, and operate the proposed project, see PSC docket 5-BS-258[11]. KSEC also anticipates building the project upon CPCN approval regardless of the approval of 5-BS-258.

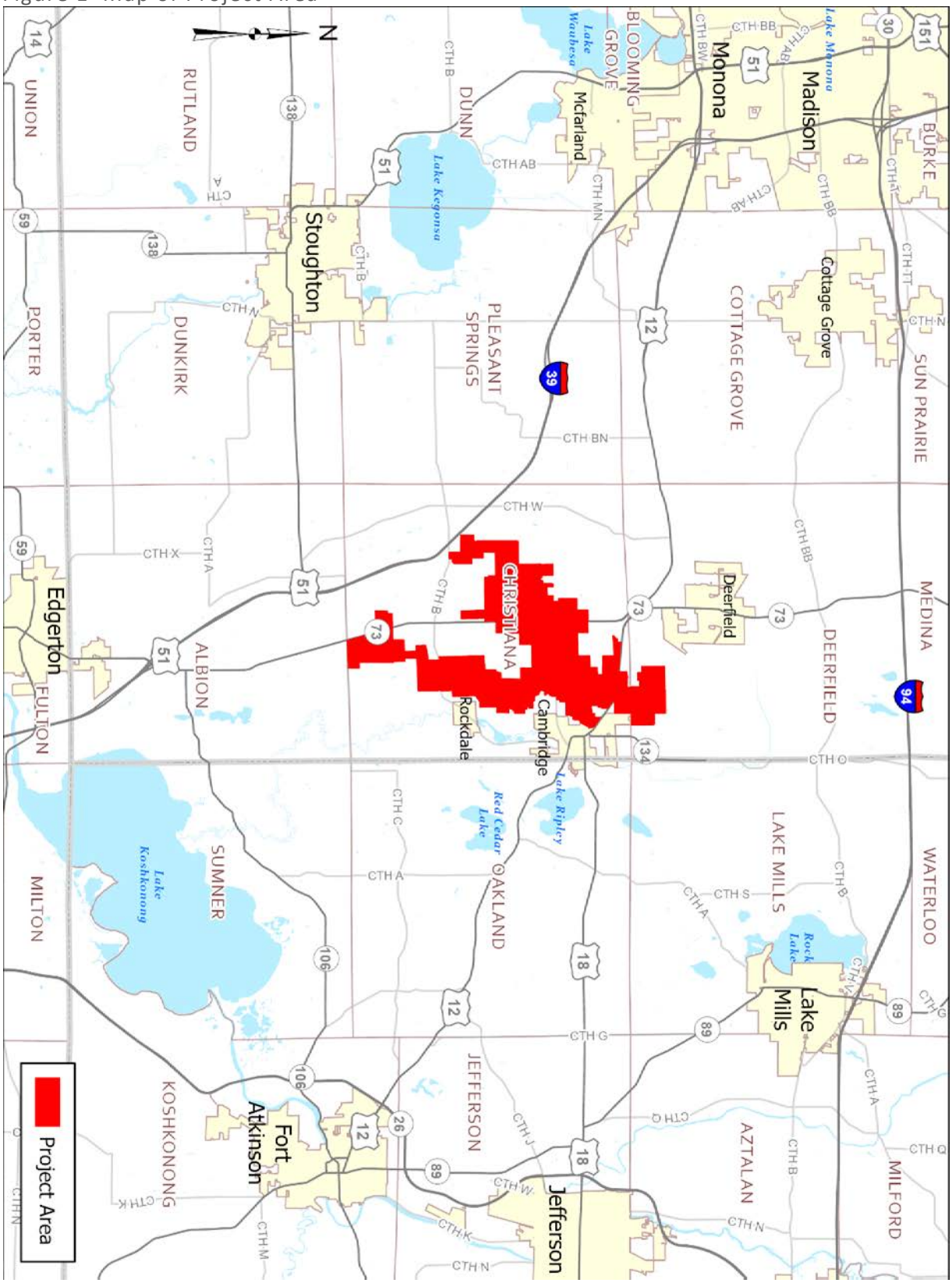
2.2 Project Location

The proposed project would be constructed in the Towns of Christiana and Deerfield in Dane County, located just west of the Village of Cambridge, approximately six miles northeast of the City of Stoughton, two miles south of the Village of Deerfield, seven miles north of the City of Edgerton, and ten miles west of the Cities of Jefferson and Fort Atkinson. The project study area is 6,384 acres of predominantly agricultural rural landscape, north and east of I-90 and intersected by Highway 12/18 and west of the Dane-Jefferson County Line. The project study area covers Sections 1-4, 8-12, 14-17, 20-23, 26-27, and 33-34, Township 6N (Christiana Township), Range 12E in Dane County and Sections 35-36, Township 7N (Deerfield Township), Range 12E in Dane County (see Figure 1 on page 9). Within the project study area, KSEC has approximately 4,600 acres under contract, which includes the proposed solar arrays, electric collector system, access roads, collector substation (4 acres including fenced areas), BESS (15 acres including fenced areas), operations & maintenance (O&M) building (2 acre), and alternative solar arrays, and alternative collector circuits (12 acres within and outside fenced areas). An 18-acre laydown area that would be used during construction would be located inside

[10] Wis. Stat. § 1.12(4).
[11] PSC REF#: 410709, Koshkonong Solar with Storage CA Application.

the facility fence at the north end of Array Area O. The 9 acres of proposed generator tie line right-of-way (ROW) impacts was evaluated inside the 6,384-acre project study area. While the footprint of the existing American Transmission Company (ATC) Rockdale Substation is located within the project study area it was not included in the impacts reviewed for the CPCN.

Figure 1 Map of Project Area



2.2.1 Applicant's Siting Process

KSEC evaluated a range of variables to arrive at the selection of the proposed site facilities. The details of this selection process are in Section 1.4.2 of the application. It describes a three-tiered evaluation; state level, regional level, and project area level. At the state-level, the solar resource was evaluated to determine where a project could be economically feasible. That part of the analysis led to southern Wisconsin being identified as an area of good solar resources based on its latitude and weather conditions.

At the regional level, the applicant looked for areas with adequate solar resources and sufficient available land that meets engineering and design considerations, such as generally level topography. The region is evaluated for broader environmental compatibility, and a community that supports the project. Market access for the project is also evaluated at this level.

Developers typically evaluate different points of interconnection to the existing transmission system and look for locations that have existing transmission capacity with existing infrastructure or cost-effective upgrades. Siting a solar PV facility near these points on the transmission system reduces the amount of new infrastructure needed. KSEC determined that the area near an existing ATC transmission switch yard would be suitable and filed interconnection requests with the Midcontinent Independent System Operator, Inc. (MISO) in 2020 and a re-allocation request in 2021. After arriving at the project area level analysis, the list of the site variables and characteristics evaluated consists of:

- Existing transmission resources
- Land ownership and usage
- Topography in the project area
- Natural resources and endangered species
- Historic and cultural resources
- Transportation infrastructure and community services
- Municipality and landowner feedback
- Efficiency of construction and conformity to uniform power block

Solar PV generation sites benefit from areas with flat topography and minimal grading requirements. Avoiding areas that would cast shade onto the PV panels is another suitability factor. Large agricultural fields that are not surrounded by forests or tall buildings are often considered preferred sites. Siting reviews also attempt to avoid impacts to natural resources such as wetlands, waterways, rare species, and historic resources to the greatest extent possible. As a developer of a wholesale merchant plant, KSEC would not have the ability to use eminent domain to acquire property for the construction of the generation site or associated facilities, so there needs to be local support for the project from landowners in order to obtain parcels that allow for the construction of arrays in efficient layouts.

As the KSEC project is a merchant plant, the Commission may not consider economic factors when evaluating its proposal. A meaningful comparison of alternative project locations is not possible without the ability to consider costs and economic factors. As a result, discussion of alternative project sites in this EA, other than the larger project siting process described in this

section, focuses primarily on how the Commission may choose among the range of array sites within the KSEC project footprint.

2.2.2 Brownfield Evaluation

Under Wis. Stat. § 196.491(3)(d)8, the Commission shall consider whether brownfields are used to the extent practicable when evaluating large electric generation facilities. Brownfields, as defined by ch. 283.13(1)(a) are abandoned, idle, or underused industrial or commercial facilities or sites, the redevelopment of which is adversely affected by actual or perceived environmental contamination.

KSEC's application states that the potential use of existing brownfield sites within the region was evaluated. A comprehensive list of Brownfield sites was accessed from the US EPA website covering southern Wisconsin, particularly Dane, Columbia, Dodge, Green, Jefferson, Rock, Sauk and Iowa Counties. Dane County has the most brownfields sites although all but three are less than five acres, with the largest at 42.6 acres which is insufficient to support a utility scale solar project.

2.2.3 Minor Siting Flexibility

It is the applicant's obligation to minimize the need for minor siting flexibility by rigorously analyzing its proposed project. The Commission recognizes that detailed engineering is not complete prior to authorization of a project and that minor siting flexibility may be needed to accommodate the final design of the project. Situations may be discovered in the field that were not apparent based on the information available to the applicant in development of the proposed project or to the Commission in making its authorization. Therefore, the Commission typically includes an order condition that allows for minor siting flexibility when authorizing a project.

The minor siting flexibility order condition requires that the applicant consult with Commission staff when proposing a change in siting. If the review determines that the proposed change requires Commission approval, the applicant must request authorization in the form of a letter containing details on the following items:

- Scope of the change
- Reason for the change
- Incremental differences in any environmental impacts
- Communications with potentially affected landowners
- Documentation of discussions with other agencies regarding the change
- Maps of the approved route and the proposed change, including property boundaries and natural features

Minor siting flexibility requests are reviewed by Commission staff. Approval is delegated to the Administrator of the Division of Energy Regulation and Analysis with the advice and consent of the Administrator of the Division of Digital Access, Consumer, and Environmental Affairs.

Proposed changes require reopening of the docket unless the following two criteria are met:

- No new landowners are affected who have not been given notice and hearing opportunity
- No new resources are affected that were not described in the EA

Additional requirements for the applicant following an approved change include:

- Obtaining all necessary permits
- Complying with agreements made with local units of government
- Complying with all landowner agreements
- Avoiding parts of the project area that the Commission finds unacceptable
- Complying with the applicant's environmental siting criteria

2.2.4 Alternative Solar Array Area

A CPCN for a large electric generation facility requires[12] the submittal of "site-related information for each of two proposed power plant sites." In its review of wind energy electric generation facilities, the Commission interpreted this site alternative requirement would be met if an applicant provided 25 percent additional turbine locations for the Commission to use in its alternatives analysis. This was due to a decision that it would not be practicable to require an entirely separate electric generation facility proposed when the footprint of such a site would be up to tens of thousands of acres. This has been interpreted for solar electric generation facilities to be a requirement for an additional 25 percent of MW capacity that could be developed.

KSEC provided, in its application, acreage for an additional 43 percent capacity (129 MW) of alternative locations for solar arrays, which exceeds the additional 25 percent MW capacity required by Wis. Stat § 196.491 and Wis. Admin. Code § PSC 111. The alternative area is required for two reasons:

- The alternative area may be used to avoid portions of the proposed area that are found undesirable or unusable during the Commission's review of the application.
- The alternative area may be used to resolve problems that arise during the construction process.

Situations that may prompt the use of alternative areas include, but are not limited to: protecting resources, avoiding unanticipated sub-surface conditions, accommodating governmental requests, addressing landowner concerns, minimizing construction costs, or improving electric generation. Both reasons for utilizing the alternative area are addressed when the Commission authorizes a project in siting decisions and as order conditions.

2.3 Project Design

2.3.1 Facilities Overview

The solar facility would consist of solar PV panels on a single-axis tracking system. The proposed project would have a generation capacity of up to 387 megawatts direct current (MWDC) and connect up to 300 megawatts alternating current (MWAC) to the electrical grid. The number of solar panels would range from 566,037 to 730,188 high efficiency PV panels depending on the final selection of panels used for the project. All PV panels would be grouped and organized into power blocks. Each fenced-in array site would include one or more power

[12] Wisconsin Admin. Code ch. PSC 111.53(1)(f)

blocks. There would be up to 145 power blocks, which includes 89 primary array sites and 56 alternative array sites that may not be necessary for use. The PV panels in each power block would be connected to inverters sized at varying capacities to ultimately achieve the 300 MWAC nameplate capacity of the solar generation facility. The inverters would convert the DC power produced by the solar panels into AC at a maximum at a rating of 4.2 MW.

There would also be a battery energy storage system (BESS), comprised of lithium-ion batteries housed inside outdoor enclosures that have a power management system, climate control, fire suppression system, and other related components. The BESS units are made up of many small lithium-ion batteries, joined together into groups, referred to as 'modules' and placed into the racks of the storage containers. The BESS also has inverters and medium voltage transformers used to transfer energy to and from the batteries. The energy from the inverters and the transformers would then go to a common bus, and then to the collector substation. The BESS is proposed to have an injection capacity of 165 MW connected to the transmission system, per KSEC proposed MISO agreements.

The converted power from the solar arrays would go into collector circuits and eventually the transmission system. Single feeder collector circuits would be constructed underground in trenches approximately three feet to five feet deep and 12 to 18 inches wide. The collector circuits would connect to a collector substation where the voltage would be converted from 34.5 kV to 345 kV. The electricity would then go into the existing ATC Rockdale Substation, which would connect the facility to the existing transmission system.

A 0.84-mile ROW would be required for the generator tie line, and would extend east from the existing ATC Rockdale Substation, following the existing Lakehead Cambridge-Rockdale 138 kV transmission line, west of Highland Drive and turning north across Koshkonong Road, to the proposed collector substation near the southeast edge of proposed array site W2. KSEC has secured the land required for the generator tie line through a long term lease and easement agreement. The details required for the solar generation facility to be operational have been reviewed in MISO transmission studies between the applicant, MISO, and ATC as part of the MISO Definitive Planning Phase (DPP) 2019 Study Cycle, and an additional capacity in the 2020 DPP Study Cycle, and KSEC expects to execute a Large Generator Interconnection Agreement with MISO in September 2022. The 2019 MISO interconnection transmission study contains one position for 300 MW of solar generation and one position for a 75 MW BESS. The 2020 MISO interconnection transmission study contains one position to build out an additional 90MW of BESS, and would require additional approvals from MISO outside of the traditional interconnection process.

Approximately 3,443 acres would make up the potentially impacted areas designated as the proposed solar arrays (2,348 acres including fenced areas and facilities within), Commission-required alternative solar arrays (1,007 acres including fenced areas and facilities within), proposed collector circuit ROW outside fenced areas (48 acres), alternative collector circuit ROW outside fenced areas (12 acres), collector substation (4 acres inside fenced footprint), generator tie line ROW (9 acres), permanent access roads outside fenced areas (1 acre), operation and maintenance (O&M) building (included in proposed array fences), and BESS (15 acres inside fenced footprint). Of that 3,443 acres, approximately 2,424 acres would ultimately make up the necessary area to host the 300 MWAC solar facility and 165 MWAC/660 MWh BESS

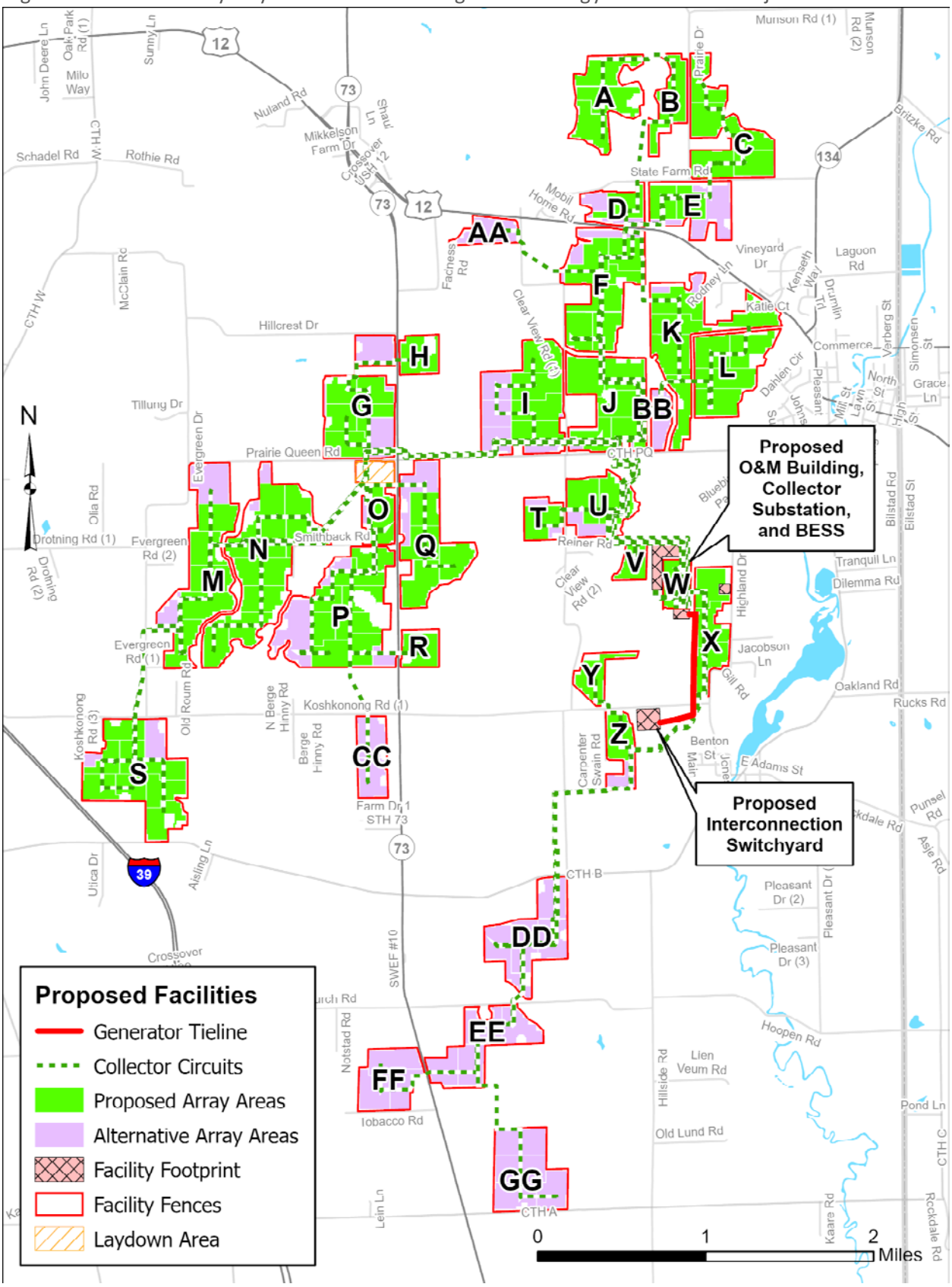
(see Table 2 below). However, KSEC states the use of additional alternative acreage may be beneficial to reduce costs, optimize generation efficiency, and increase setback distances from fences, trees, roads, residences, etc. The majority of the land needed would be leased by the applicant while 15 acres would need to be purchased for collection routing, site access, Project Substation, O&M building, parking, and storage areas. Laydown areas, that would be used during construction of the generating facility accounts for another 50 acres inside the fence line of the proposed project area.

Table 2 – Permanently Impacted Areas

Area Type	**Acres**
Proposed Array Areas*	2,348
Alternative Array Areas	1,007
Proposed Collector Circuit ROW**	48
Alternative Collector Circuit ROW**	12
Generator Tie Line ROW	9
BESS	15
Collector Substation	4
O&M Building***	0
Total	**3,443**

*Some alternative power blocks are included within proposed array fences.
**Excludes facilities within array fences.
***Included in array fence acreage.

Figure 2 - Preliminary Layout of Koshkonong Solar Energy Center LLC Project



2.3.2 PV Panels

KSEC provided information on the six models of solar PV panels that are under consideration for this project[13]. KSEC is currently considering the following models:

- Canadian Solar CS7L- or CS7N models ranging from 570 W – 665 W bifacial mono-crystalline
- JA Solar JAM-72D30 525 W – 550 W bifacial mono-crystalline
- Jinko Eagle or Tiger Pro ranging from 520 W-585W bifacial mono-crystalline
- LONGi Solar Hi-MO models ranging from 450 W-565 W bifacial mono-crystalline
- Risen – Titan models ranging from 535 W – 600 W bifacial mono-crystalline
- Trina - Vertex models ranging from 550 W – 600 W bifacial mono-crystalline

KSEC states that the final panel selection would be made, after detailed engineering is completed, based on the most cost-effective option at that time. All of the panels under consideration are described to use bifacial technology, which would allow the absorption of light from the back side of the panel, as well as the front side. This type of technology would increase the energy production of the solar panels. Panel electric capacities would range from 450 to 665 watts DC per module, with the rectangular panels containing multiple modules and panel sizes ranging from 3.4 to 4.3 feet in the shorter dimension to 6.9 to 7.8 feet in the longer dimension. Depending on the watt rating of the panels, approximately 566,372 to 730,188 panels may be needed for the entire site to generate the proposed 300 MWAC.

Panels would be installed in a single-axis tracker system arrangement. Each single power block within each single array site would involve multiple solar panels strung together, with multiple strings associated with one tracker. The tracking system allows the panels to follow the movement of the sun from 60 degrees east to 60 degrees west during the day, with zero degrees being level to the ground, when the sun is directly overhead. The tracking system is usually constructed out of galvanized or stainless steel or aluminum. The supports would typically be installed by a pile driver. Inverters are also typically installed using driven pier foundations, similar to the supports for the solar panels, although concrete foundations may be used if soil or ground conditions require increased stability. Thirteen site sample borings at depths of up to 20 feet did not indicate any presence of bedrock; and two of the borings reached refusal due to possible bedrock and/or boulder at depths of 3 feet and 6.5 feet below ground surface (bgs). Possible cobbles or boulders are also noted in several borings at or beneath 3 feet bgs. Subsurface conditions encountered generally consist of 0 to 36 inches of clayey topsoil over stiff to hard, lean, sandy, and silty clay with variable but generally trace amounts of sand and gravel. Silty sand and sandy silt with variable but generally little to some amounts of gravel was observed beneath the clay soils.

Groundwater was encountered in 12 of 15 borings during drilling at depths between 3 and 17 feet bgs. After drilling, groundwater was observed in 5 of the 15 borings at depths between 6 and 10 feet bgs. If driven pile installation would be used, there would be no excavation of topsoil. KSEC expects to use steel, driven piles, with a minimum embedment depth of 5 feet for both panel foundations and inverter foundations pending final engineering. Piles would vary in size and embedment depth and may or may not be galvanized. If pile refusal is expected or encountered due to shallow bedrock or other subsurface obstructions, alternate foundation installation techniques or

[13] PSC REF#: 409375, Koshkonong Solar CPCN Appendix C Equipment Datasheets

designs such as pre-drilled, cast-in-place or helical piles may be needed. Alternate foundation types for inverters, such as concrete footings, may be considered during final design.

KSEC also provided a description of the inverters that would be used for this project. Inverters are devices that take DC electricity generated by the solar panels and convert it to AC electricity that is transported through the electrical transmission and distribution system. Inverters would be matched to the size of proposed power blocks to efficiently deliver the generated electricity to the collector substation. Inverters would be rated at and producing approximately 4.2 MWAC, depending on temperature and other conditions at an output voltage of 34.5 kV. Permissible input DC voltages are about 1,500 volts for the inverter manufacturers being considered. Physical dimensions would approximately be 15 to 20 feet in width, 6 to 7 feet in depth, and 7 to 8 feet in height.

The number of panels for each inverter would be determined by the final inverter design selected. Large inverters can accommodate the connection of more panels. The current project is designed around approximately 145 inverters with operational capacity of 4.2 MW depending on the number of single axis trackers assigned to each inverter. This design plan could change when final equipment is selected and all engineering is complete. AC collector circuits would run throughout the PV arrays, combining to seven collector circuits that would go to the collector substation. Again, this current design concept is subject to revision as further engineering evaluation is performed on the site.

2.3.4 Battery Energy Storage System

The proposed project would include construction of a battery energy storage system (BESS), comprised of lithium-ion batteries in outdoor enclosures that have a power management system, climate control, fire suppression system and other related components.

2.3.4.1 Lithium Ion Batteries

KSEC proposes to use lithium ion batteries for the BESS in this docket. Lithium ion batteries are a popular choice in many types of consumer electronics and other devices due to being relatively inexpensive and having high energy density.[14] Some examples of their use in consumer electronics include cell phones, laptops, portable tools, and cameras. Larger applications of lithium ion batteries include electronic vehicles and energy storage systems, with safer battery chemistries, such as the one proposed in this docket. Commission staff reviewed information on the proposed lithium ion battery technology from KSEC, as well as from the University of Wisconsin – Madison Interdisciplinary Professional Programs, National Association of Regulatory Utility Commissioners – Committee on Consumers and Public Interest (NARUC-CPI), Environmental Protection Agency (EPA), Sandia Labs, and Department of Energy. A lithium ion battery consists of similar components as other batteries: an anode, a cathode, a separator, electrolyte, and current collectors. These function as follows:

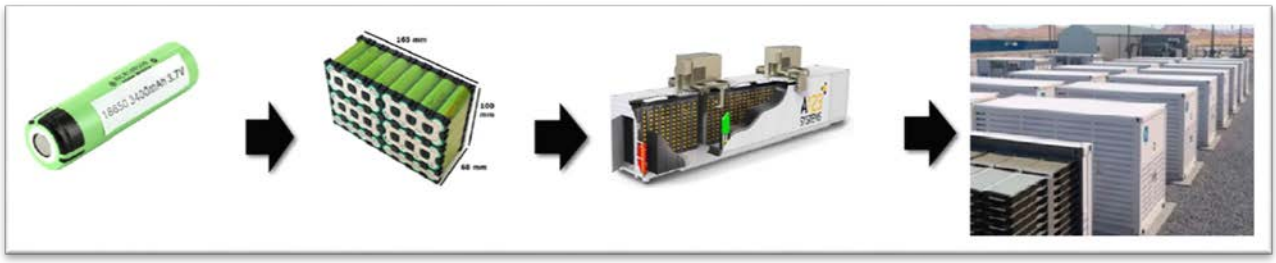
> "The anode, or negative end of the battery cell, is usually composed of a graphite matrix embedded with a lithium compound. The anode also contains a current collector, which

[14] Environmental Protection Agency. (July 2021). An Analysis of Lithium-ion Battery Fires in Waste Management and Recycling. EPA 530-R-21-002.

is often comprised of copper. On the opposite end of the cell, the cathode (or positive end) is often cobalt oxide, though other compounds (e.g., iron phosphate, sulfur, manganese oxide, etc.) can be used, depending on the chemistry of the battery. A liquid electrolyte is located between the anode and cathode, and a thin layer of polyethylene or polypropylene acts as the 'separator' in the middle that selectively allows the lithium ion to pass from one side to another, creating the useful voltage that powers a device."[15]

There are several different types of lithium ion batteries, with different advantages or disadvantages. KSEC states that it prefers to use a battery chemistry with characteristics that improve its safety, such as more stable chemistry and higher temperature range tolerances[16]. The lithium iron phosphate (LFP) battery has a more stable chemistry and higher temperature range tolerances. The most commonly used lithium ion battery uses nickel manganese cobalt oxide (NMC), which has advantages in energy density and smaller loss of capacity. However, as stated by KSEC, NMC batteries have a higher risk of thermal runaway which may increase risk of accidents or fires on site.

Figure 3 - Components of the BESS from individual cell to overall plant[17].



During the energy discharge process, the positive electrode is reduced and the negative electrode is oxidized. The reaction is reversed in the charging process. Over time, the lithium ions are consumed slowly through parasitic reactions. This degradation, or loss of lithium ions, reduces the life and capacity of the battery over time. A battery augmentation process, where new batteries and inverters are added to the BESS over time, would be used to maintain the working capacity of the BESS, as further described in the application and data request response[18]. The process would begin approximately 3 years after initial operation, and would occur subsequently every year or every several years to maintain the export capacity. The augmentation process would occur on 25 acres within the 50 acre fenced area for the BESS system.

Each BESS unit has an HVAC system to maintain temperatures within a specified range. This climate control is important because the lithium ion reaction produces heat which can be exacerbated by high temperatures around the battery units or outside the storage container. The batteries can experience thermal runaway reactions, if not properly cooled. Thermal runaway is a condition where individual lithium ion cells making up the battery can overheat, even in the

[15] Ibid.
[16] PSC REF#: 420939, Response-Data-Request-PSC-Kitsembel-4.07
[17] Images from Sandia Labs presentation materials.
[18] PSC REF#: 409375, Appendix C Equipment Datasheets; and PSC REF#: 413342, Response-Data-Request-PSC-Kitsembel-1

absence of a fire. If thermal run-away occurs, it can spread to other cells in the battery, which can eventually create a condition for a fire or explosion to occur. Likewise, if the battery is too cold, the lithium ions are not able to flow and the battery does not operate as intended. Maintaining the climate control systems is vital for the performance, lifecycle, and safety of the BESS.

2.3.4.2 Battery Storage Units

The batteries would be placed in modular storage units located in the areas indicated on the maps (see Figure 2) located entirely within agricultural land with no schools, daycares, hospitals, or nursing homes within 300 feet of its proposed location. The BESS footprint would be on approximately 15 acres. KSEC states that at this time, final equipment selection has not occurred, but some details regarding facility type are known.

The batteries would be placed in racks, and the racks would be installed in modular storage units that are similar to steel shipping containers. These containers would be separated, and this containerized option, rather than installing all batteries within one larger building, is stated as one way to mitigate thermal runaway and fire propagation across the BESS. The racks consist of loaded batteries that are electronically connected, and bolted into a stainless steel, climate controlled enclosure. Each enclosure would be on a concrete foundation. Next to each BESS enclosure would be inverters, and then pad-mounted transformers. The energy from the inverters and the transformers would then go to a common bus, and then to the collector substation. From the collector substation, it would go to the generation tie-line and then to the electric grid at the ATC Rockdale substation. The BESS is proposing to transmit up to 165 MW of output onto the transmission system, per KSEC proposed MISO agreements.

Figure 4 - An illustration of a BESS with external access to the battery racks (image cutaway at the corner to see the battery racks inside) from GE.[19]

[19] GE is one of the two project component examples provided in the Paris Reopening Request. Image obtained at https://www.ge.com/news/reports/leading-charge-battery-storage-sweeps-world-ge-finding-place-sun. Accessed 8/31/21.

KSEC states that the storage units would only be accessible externally. The design of the storage units would not allow for people to enter the structure, but would require they conduct any work or emergency response from outside. This would reduce one element of risk should a thermal runaway or fire event occur, as opposed to housing batteries in an enclosed structure where gasses may build up and be explosively released if an external door is opened and staff or responders enter. Fire suppression canisters and HVAC modules are incorporated into the storage unit according to the supplier's designs.

The sizes of the containers provided as examples in the application materials vary in length, but are similar in width and height. Most of the examples are approximately 8-9 feet in width, and 7.5-9.5 feet in height, and are stated as 5-6 or 20 feet in length[20].

There are key characteristics and measurements of the BESS. KSEC is proposing, as per the application and data request response[21], an export capacity of 165 MW/165-660 MWh, which is essentially the maximum amount of power that can be transmitted at any moment, and the nameplate capacity which is how much energy may be stored in the BESS, which would typically be in the range of 200 to 400 kWh, up to 660 MWh. The battery cells in the BESS are rated to last for up to 7,300 cycles or approximately 20 years of calendar life assuming one full cycle per day. Because batteries slowly lose total volume of energy they can store, augmentation of fresh batteries to the project would ensure the project produces its rated energy for 20 years. The BESS is expected to discharge ½ cycle to 1 cycle of discharge per day and recharge during the day.

The BESS would be surrounded by a solid wall or chain link fencing to meet security requirements, as required by the National Electric Safety Code. In addition, if a solid wall is utilized, it may also provide a noise barrier.

Within the fenced area, the BESS would include:

- Pad mounted transformers for the BESS;
- Inverters for the BESS;
- Lithium-ion batteries on racks;
- Enclosures to house the batteries;
- HVAC systems for climate control;
- Control systems,
- Fire suppression systems;
- Internal access roads;
- Security fence with vehicle gate, man gate, barbed wire; fence to be grounded to the substation ground grid per National Electrical Safety Code requirements;
- Power cables and control cables installed in a below grade trench as required; and
- Yard lighting and receptacles to be used during maintenance and or during emergency.

[20] PSC REF#: 409375, Appendix C Equipment Datasheets; and PSC REF#: 413342
[21] PSC REF#: 409375, Appendix C Equipment Datasheets; and PSC REF#: 413342, Response-Data-Request-PSC-Kitsembel-1

The enclosures would have auxiliary systems to protect the enclosed batteries. The systems would contain HVAC, controls, and fire suppression. The layout and location of the enclosures would depend on whether the designed system is DC-Coupled or AC-Coupled. Both types of systems have advantages and disadvantages as described by KSEC[22]. KSEC has chosen an AC-coupled system, where the BESS enclosures would be grouped together, and surrounded by a fence.

2.3.4.3 Fire Suppression Systems

The main concern identified by Commission staff reviewing the application and literature on BESS appears to be the risk of thermal runaway causing a fire. Thermal runaway often begins when a damaged battery releases energy in the form of heat, which can in turn damage surrounding batteries, which then also release energy in the form of heat. This creates a cascading event where the increase in heat causes damage, which further increases heat. Temperatures during these thermal runaway events can reach hundreds of degrees Celsius, and depend on battery size and materials. The National Fire Protection Association (NFPA) defines[23] thermal runaway as:

> "…the process in which a battery creates heat but cannot dissipate that heat, resulting in dynamic temperature increase. Initial signs of thermal runaway might include pressure increase at the cell level, temperature increase, and off-gassing. As the process continues, additional signs might include vent gas ignition, exploding cells, projectile release, heat propagation, and flame propagation."

KSEC provided some details on how the components and design of the KSEC BESS would address these risks. KSEC states that the choice of battery chemistry would result in a lower risk for thermal runaway or fire. KSEC states that a fire retardant foam, approximately 2.5 millimeters thick, would be placed between battery cells to mitigate self-heating and further reduce thermal runaway potential[24]. One of the most critical ways to prevent this occurrence is absolute protection of the batteries during transport and installation to avoid physical damage. However, operational actions such as overcharging, fast charging, or low temperature charging can cause lithium dendrites, or metallic microstructures, to form on the battery and cause short circuits, even in the absence of physical damage[25].

The BESS would include a Battery Management System (BMS) that can monitor each battery cell for conditions that indicate or lead to thermal runaway or self-heating. The BMS system would monitor the voltage, current, and temperature for each battery cell and ensure each variable is within safety margins. The BMS would be programmed to send alarms or notification to the project control center, or directly disconnect battery racks if safety margins are exceeded.

[22] PSC REF#: 413342, Response-Data-Request-PSC-Kitsembel-1
[23] NFPA 855, Annex C.
[24] PSC REF#: 420932, Response-Data-Request-PSC-Kitsembel-4.01
[25] Jin et al., Detection of Micro-Scale Li Dendrite via H2 Gas Capture for Early Safety Warning, Joule (2020), https://doi.org/10.1016/j.joule.2020.05.016

The BESS system would have maintenance requirements. KSEC[26] proposes that maintenance would include annual capacity testing, BESS inverter maintenance if applicable, data monitoring from a control center including temperature, voltage, current, state of charge and other warnings/monitoring, semi-annual preventative maintenance, and annual preventative maintenance on the BESS transformers. The data monitoring system would continually monitor parameters and may automatically stop operations, if necessary. An alarm would notify remote locations and have the ability to shut-down or further investigate conditions. Annual capacity testing would evaluate the BESS to ensure the batteries are operating within their designated degradation curves, by measuring the charging and discharging of the batteries at set rates. Semi-annual preventative maintenance would check for safe operation using infrared scans, busbar torque checks, battery cell balancing, filter cleaning, coolant refractor testing, visual inspections, and cleanings. The proposed annual preventive maintenance would include infrared scans, oil sample/analysis, protective relay testing, high voltage connection torque checks, general visual inspections, and cleanings. The proposed emergency response plan would typically require quarterly safety drills and annual safety training with local first responders, and first responders should not enter a project enclosure or area.

In addition, KSEC[27] would follow the BESS safe design criteria specified in NFPA 855 and additional explosion prevention measurements per NFPA 68 or NFPA 69. Under NFPA 68, the BESS is required to vent combustion gases and pressure resulting from burning within an enclosure while minimizing structural and mechanical damage. To comply with NFPA 68, the BESS, would have deflagration panels, designed to allow safe pressure relief of gases in the event of thermal runaway. Under NFPA 69, the design requirements for ventilation, require monitoring of sensors for 25% of Lower Flammability Limit (LFL) for the battery off-gases. The BESS would be equipped with gas detection systems that activate emergency ventilation to manage the hazardous and combustible gas concentrations. The design of the evacuation of hazardous and combustible gases for NFPA 68 and 69 would be determined using the UL9540A computer simulation standards and fire test results. The Commission may want to require the BESS to be tested to UL9540A Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems at the cell, module and rack level.

Should an accident occur or the BMS fail to operate as intended, there would be an automatic fire suppression system in place to attempt to lower the temperature of the battery cells or extinguish a fire if one is occurring. According to the response to data request 4.08, the suppressant would be aerosol-based and would not contain any per- and polyfluoroalkyl substances (PFAS). KSEC plans to use a system such as Stat-X[28], which has a potassium based, non-toxic, and non-corrosive composition that causes chemical interference with flames. It is approved for use in energized electrical components.

NFPA 855, Annex C states that although many BESS designs incorporate the use of inert or clean agent fire suppression systems, research by NFPA and other organizations show that the

[26] PSC REF#: 409375, Appendix C Equipment Datasheets; and PSC REF#: 413342, Response-Data-Request-PSC-Kitsembel-1

[27] PSC REF#: 420936, Response-Data-Request-PSC-Kitsembel-4.04

[28] https://www.controlfiresystems.com/products/fire-suppression/stat-x-aerosol-generators/ Accessed September 2021.

cells must be cooled to stop thermal runaway. Sandia labs, NARUC-CPI, and University of Wisconsin – Madison Interdisciplinary Professional Programs, in information presented to Commission staff, also discussed the need to have water available to reduce cell temperatures to effectively stop thermal runaway that causes fires to break out. The use of water was not discussed by KSEC in its description of response to thermal runaway or fire events. Even use of water sprinklers may have their limitations as stated in an article[29] by NFPA, which states:

> "Water systems in lithium ion batteries work effectively to cool the battery and can stop the spread of thermal runaway, but as soon as the faucet shuts off, heat quickly builds and the process resumes."

The Commission may want to receive more detailed information as final designs and components are finally selected by KSEC leading to the construction of the BESS. Subsequent reporting on incidents and any technology changes, at a schedule the Commission finds appropriate, may allow for the consideration of best practices and need for any changes to the systems installed.

2.3.5 Collector Circuits

Approximately 75 miles of underground collector circuits would be required for the project. These collector circuits would be run underground from various power blocks to the collector substation at a 34.5 kV operating voltage. The application states that these collector circuits would be buried in a trench, three to four feet deep, and varying width depending on the number of buried circuits in the trench, while maintaining a fifteen-foot spacing. The collector substation would transform the electric voltage from 34.5 kV on these collector circuits to the interconnection voltage of 345 kV.

2.3.6 Access Roads

The project would require approximately twenty-one miles of permanent access roads that would be used during the construction and then operation of the solar facility. These access roads would be located to provide access to inverters and around the project perimeter to accommodate maintenance or access during emergencies. Most of the access roads would be located within the fenced boundary of the project and not available for use by landowners or the public during site operation. Access roads would typically be located along the edge and/or through the center of a solar array. Exact road locations and distances depicted in project maps are preliminary because the final array setup is not known at this time.

Project roads would typically be 12 feet wide with 4 feet for each shoulder and additional 15-foot buffer on each side, totally a 50-feet wide corridor to accommodate construction vehicle requirements. There would be approximately 3 acres of permanent impacts due to access road construction and use within the final design project. The topsoil and any vegetation or other organic material would be removed prior to subsoil grading and compaction. Access roads can vary in the depth of subgrade treatment and aggregate due to soil or weather conditions. Road aggregate would be acquired from a local pit that meets WisDOT specifications. Specific details of the aggregate are not currently available, but would be available after the completion of detailed engineering plans.

[29] Roman, Jesse. "Learning from Surprise". NFPA Journal. July 26, 2021.

When the generation site is decommissioned, permanent access roads would be removed and the land would be returned to its original condition, unless negotiated differently with the landowner.

2.3.7 Collector Substation

The proposed project would include construction of a collector substation (also referred to as project substation or transformer substation) located near the transmission interconnection point. This substation would be located on the south end of proposed array area W2, located entirely within agricultural land with no schools, daycares, hospitals, or nursing homes within 300 feet of its proposed location. The collector substation footprint would be approximately 325 feet by 500 feet in size, and is oriented on the eastern portion of the project area. The generator tie line would run south and then west from the collector substation to connect to the ATC Rockdale Substation. Site grading would be required to bring the transformer pad to the engineered elevation. Best Management Practices (BMPs), such as temporary seeding and silt fences, would be implemented prior to commencing civil work.

A perimeter security fence made up of chain link fence with barbed wire, with access gate, would surround the substation facilities, as required by the National Electric Safety Code. Within the fenced area, the collector substation would include:

- Three power transformers that may not be identical, up to a maximum nameplate rating size of 120/160/200 MVA;
- Three 345 kV circuit breakers;
- Three 345 kV disconnect switches;
- Three 345 kV buses and supporting structures;
- Two 34.5 kV circuit breakers;
- Two 34.5 kV disconnect switches;
- Two 34.5 kV collection system buses with supporting structures;
- Properly sized surge arrestors at each collection system;
- Conductor sizes up to 1500 KCMIL;
- Three station service transformer installations, which includes AC panels, station service transformer with fuses, equipment for a secondary source for AC power, conductors and support structure for all equipment;
- Protection and control building, which would include SCADA equipment;
- Internal access roads;
- Security fence with vehicle gate, man gate, barbed wire; fence to be grounded to the substation ground grid per National Electrical Safety Code requirements;
- Grounding (to be installed below grade) with high resistance gravel/rock installed above grade for protection against electrical shock;
- Power cables and control cables installed in a below grade trench as required; and
- Yard lighting and receptacles to be used during maintenance and or during emergency.

2.3.8 Existing Substation Modifications

KSEC stated that the Rockdale Substation is owned by ATC, and responsibilities for modifications to achieve interconnection at the site are still being worked out between ATC and KSEC through the MISO interconnection application review process.

2.3.9 Generator Tie Line

In addition to the solar generation facility, KSEC is proposing the construction of an approximate 0.84-mile generator tie line to connect the collector substation to the existing ATC Rockdale Substation. The proposed collector substation location is approximately 0.6 miles north by northeast of the Rockdale Substation. The ROW would be less than 120 feet wide and has been secured via purchase of the land or easement options. KSEC expects to execute a Large Generator Interconnection Agreement (LGIA) with MISO in September 2022.

2.3.10 Operation and Maintenance Building

KSEC proposes to construct an Operation and Maintenance (O&M) building on the west side of Highland road, adjacent to the east side of proposed array area X1. The building would be used as a work location for O&M up to five full-time equivalent employees and two traveling employees, and would house three offices, 2700 square feet of warehouse space, a control center/library, a bathroom with shower, and a breakroom/kitchen. A drawing of the proposed O&M building was included in Appendix B of the application[30]. The constructed building would be of commercial style. The 4,000-5,000 square-foot O&M building footprint, storage areas, and access/parking area outside the building would be included on the 15-acre plot of land purchased for collection routing, site access, and collector substation. Outdoor lighting fixtures installed to light the building would be down-shielded, and on manual and motion detection switches to limit lighting of the night sky and be directed away from adjacent properties and public ROWs. The O&M building would be located within a secure fenced area. KSEC would work with applicable local regulatory authorities to source water from an on-site well. KSEC also states that while detailed plans for the building have not been finalized, energy efficiency measures including but not limited to installing high efficiency lighting, appliances, and HVAC systems would be implemented.

2.3.11 Laydown Yards

Laydown areas would be needed for storing materials and equipment, vehicle parking, and hosting temporary construction offices. Laydown areas typically require removing and stockpiling topsoil, and placing a layer of aggregate material down for a stable surface. KSEC proposes a primary laydown area on the southwest corner of Prairie Queen Road and STH 73 as well as many smaller laydown areas throughout the project area. The primary laydown area is approximately 19 acres, and the additional lay-down areas within the fenced boundary may be used during construction, not exceeding a total of 50-acres. Construction worker parking and temporary construction offices would be included in the laydown area.

[30] PSC REF#: 409324, Appendix B – Maps Figure 4.1.4/4.1.5 Substation, POI, O&M area, Battery Storage, and Laydown Yard, O&M Building Diagram

2.4 Project Schedule

Before construction on the proposed project could proceed, a CPCN is needed from the Commission. KSEC provided an estimated project construction schedule in the application and in Appendix H[31]. Construction would begin as early as February 2022. PV panel installation would then occur starting as early as August 2022. Collector substation construction and circuit installation would start as early as January 2023. The generator tie line construction and connection to ATC infrastructure would begin in January 2023. Expected commercial operation of the site is in July 2024.

2.5 Decommissioning Plan

No solar facility similar to the one proposed has reached the point of decommissioning or repowering, and projected actions may change from the description provided in the application materials. KSEC states in its application that at the end of commercial operation, it would be responsible for dismantling facilities and restoring the site to its pre-construction condition. A decommissioning plan was provided with the application materials, which includes a summary of decommissioning activities and cost estimates. It should be noted that these estimates are subject to revision throughout the construction and operation of the generation facility, based on materials purchased for construction, cost of labor, equipment, fuel, etc., and other potential or unforeseen factors.

KSEC states in its application that upon its 15th anniversary of the commencement of operations, it would establish a decommissioning funding source. KSEC expects the total cost of decommissioning would be in the range of $0 to $8.4 million of net salvage value.

Decommissioning would include removing the solar arrays and all associated facilities from the project area. Standard decommissioning practices would include the dismantling and repurposing, recycling, or disposing of the solar energy facilities, followed by the restoration of the site. Decommissioning activities, including site restoration, are estimated to take approximately twelve months to complete.

Underground project facilities and concrete foundations would be removed and holes would be filled with adjacent top soil. To allow for agricultural use of the area the land would be tilled to break the new vegetative growth. Unless otherwise requested by a landowner, permanent access roads constructed for the facility would be removed. After all equipment is removed, the project area would be restored to a condition similar or better to its pre-construction state.

KSEC proposes to decommission the following components via removal or disposal as listed:

- Solar and battery modules would be inspected for physical damage, tested for functionality, and removed from racking. Functioning modules would be packed and stored for reuse. Non-functioning modules would be sent to the manufacturer or a third party for recycling or other appropriate disposal method.
- Aboveground wire would be sent to a facility for proper disposal and/or recycling. Belowground wire would be cut back to a depth of four feet and abandoned in place.

[31] PSC REF#: 409379, Appendix H – Schedule.

- Aboveground conduit would be disassembled onsite and sent to a recycling facility.
- Junction boxes, combiner boxes, and external disconnect boxes would be sent to an electronics recycler.
- Inverters would be sent to the manufacturer or an electronics recycler as applicable and functioning parts would be reused.
- Computers, monitors, hard drives, and other components would be sent to an electronics recycler and functioning parts would be reused.
- Operational batteries would be considered for second-life operations and batteries that cannot be reused would be recycled or safely disposed of. Other BESS components would be disassembled and recycled, and the containers would be removed from the site.

3. Environmental Analysis

Wisconsin Admin. Code § PSC 4.20(2)(c) states that the EA shall include a description of the environmental factors that the proposed project affects most directly. Wisconsin Admin. Code § PSC 4.20(2)(d)(1) directs the EA to describe the proposed project's effects on geographically important or scarce resources, such as historic or cultural resources, scenic or recreational resources, prime farmland, threatened or endangered species, ecologically important areas, as well as the potential impacts to other environmental matters the Commission considers relevant. There would be potential impacts from constructing and from operating the new proposed facilities. These potential impacts and, if applicable, corresponding mitigation actions, are described in the following sections.

The project would use different equipment types depending on the phase of construction. During access road construction and initial grading of the site, dozers, motor graders, and rollers would be used. Pile drivers, skid steers, and telehandler forklifts would be used during the installation of supports and panels. Excavation equipment such as backhoes would be used for collector circuit trenches, with the use of horizontal directional drilling (HDD) planned for avoiding impacts to wetlands and waterbodies. Backhoes, vehicle mounted power augers, cranes, and bucket trucks would be used during installation of the generator tie line.

3.1 Potential impacts to natural resources

3.1.1 Geology, topography and soils

The project is located in southern Wisconsin, in Dane County. This area is part of the Southeast Glacial Plains ecological landscape as categorized by the DNR. This landscape was entirely glaciated, glacial till is the major type of material deposited throughout. The topography of the project area is characterized by mostly rolling till plain surfaces that were cleared of forests for agricultural use.

A preliminary geotechnical investigation of the project area was conducted by Terracon Consultants, Inc. (Terracon) and the report was provided as Appendix T[32] of the application. Fifteen test borings were conducted in the project area with soil analysis and evaluation considering the proposed facilities to be constructed. The report stated that most topsoil in the project area is clay, from 0 to 36 inches thick. Subsoils are made up of stiff to hard, lean, sandy, and silty clay with trace amounts of sand and gravel. Below this layer silty sand and sandy silts with variable but generally little amounts gravel are present.

Two of the borings reached refusal due to possible bedrock and/or boulder at depths of 3 feet and 6.5 feet bgs. Possible cobbles or boulders were also noted in several borings at or beneath 3 feet bgs. Therefore, KSEC expects to experience bedrock, boulders, gravel, or other refusal conditions requiring additional construction methods and techniques, such as but not limited to pre-drilling. Further geotechnical exploration would be conducted prior to final engineering design and site construction, to further inform soil characteristics across the project area.

Groundwater was observed in 12 of the 15 soil borings. Groundwater levels may also fluctuate with precipitation and amounts of runoff. Dewatering may be needed during any excavations.

[32] PSC REF#: 409413, Appendix T – Geotechnical Engineering Report

The soils in the project area are susceptible to frost heave, and proposed facilities could experience heaving and settlement. Piles would need to be driven to a point where frost heave would not substantially impact the facility. KSEC states in the application that the geotechnical study would be incorporated into the detailed design, and the design would address the impact of frost heave by calculating the appropriate post quantity, size, and length. If the risk of frost heave is not accounted for, increased repairs would be necessary as piles might shift separately and damage solar panels, inverters, or supports.

KSEC states that approximately 900 acres of grading would be required for construction of the collector substation, switchyard, inverters, access roads, and tracker systems in the proposed array areas, and approximately 750 acres for the alternative array areas. This can be a substantial amount of soil disturbance if done all at one time, and KSEC should ensure soil stabilization work is conducted and the site remains in compliance with DNR soil erosion and storm water permits. If excess soils are generated, they would be spread in part of the project area in accordance with the ECSWMP. Spreading subsoil on cropland/pasture would require topsoil BMPs.

The application states that topsoils would be stripped prior to construction of the estimated 21 miles of permanent access roads associated with the proposed array areas, pending final engineering. Road cross sections would typically range from 12 to 24 inches thick with and average depth of 16 inches. This would result in approximately 109,000 cubic yards of excavation for Project access road construction, dependent on final engineering.

Trenching to install collector circuits should ensure that topsoils and subsoils are kept separate and replaced in correct order to avoid impacts to vegetation establishment. Depending on the soil conditions at the time of construction, matting or low pressure equipment, or decompaction of soils after work, may be needed to improve conditions for vegetation establishment.

3.1.1.1 Soil Erosion Control

The soils in the project area consist of HSG B and C soils which have moderately high runoff potential during precipitation events and moderate to low infiltration rates. Without utilizing adequate soil erosion control measures, erosion is likely during times of heavy precipitation resulting in increased sediment loads to local streams and wetlands. In addition to wetland and stream impacts, erosion of soils can occur as well as stormwater runoff onto adjacent properties. KSEC provided an Erosion Control and Storm Water Management Plan (ECSWMP) created by Westwood as Appendix L[33] of the application. The ECSWMP would need to be updated with final construction plans prior to use. The plan should be accurate and consider use of BMPs to avoid issues concerning non-compliance with DNR permits.

The following actions are examples of BMPs that should be taken to reduce the impacts of soil erosion and storm water runoff during construction:

- Preserve existing vegetation as much as possible on site and limit the amount of grading done to reduce soil disturbance.

[33] PSC REF#: 409381, Koshkonong Solar CPCN Appendix L Erosion Control and Stormwater Management Plan.

- Installation of temporary erosion control measures such as wattles, silt fences, erosion control matting and/or sediment traps and basins.
- Seeding or stabilization of areas of bare soil after site grading or topsoil stockpiling. The time of year may require use of mulches or other stabilizers if seeds would not germinate and establish in time to stabilize soils.
- Establish stabilized construction entry/exists including rock/aggregate vehicle pads.
- Monitoring of erosion control measures every seven days or within 24 hours of a rainfall event of 0.5 inches or greater.

As the erosion control and storm water plan provided with the application is preliminary, and does not reflect specific construction plans or schedules, a finalized, site-specific plan would be required when a DNR Wis. Admin. Code ch. NR 216 permit is obtained for the construction phase of the project. During the operational phase of the project, a low impact development plan shall include the maintenance of vegetated areas under the arrays and along the perimeter of the site to minimize storm water runoff and soil erosion.

3.1.2 Water resources

3.1.2.1 Storm Water Runoff

The project must meet Wisconsin Pollutant Discharge Elimination System (WPDES) storm water regulations as established by the Clean Water Act and regulated by the Wisconsin DNR. The DNR's Storm Water Discharge Permit Program is administered under the authority of Wis. Admin. Code ch. NR 216. There would be an increase in the impervious surfaces across the project site through increased aggregate surfaces for roads and the substation sites. Post-construction runoff from these surfaces are typically managed with swales and drainage ponds or basins. Solar panels are also disconnected impervious surfaces which could concentrate runoff and have potential to cause erosion and increased runoff from the site. ARS asserts that these issues would be minimized by spacing arrays to maintain vegetation between and underneath panels.

Well-maintained vegetation between and underneath solar panels can minimize water scour or erosion from driplines, filter runoff, and improve infiltration capacity of the soil. Infiltration of storm water typically improves in areas where row cropland is converted to grassland. Vegetation under and around the arrays would require long-term maintenance for the lifetime of the facility, as it would be the primary means of managing post-construction storm water runoff. ARS should also minimize the vertical clearance between the panels and the ground in order to reduce the potential for erosion and scour at the dripline of the panels. The exact amount of increased impervious surface would be determined in final engineering design of the site and would be discussed in the Storm Water and Erosion Control Plan submitted to the DNR as part of the permit application under Wis. Stat. § 30.025 and Wis. Admin. Code ch. 216.

3.1.2.2 Wetlands

Wetland Identification and Quality

Wetlands within the proposed project study area were identified through a combination of desktop determinations and field delineations. A total of 259.2 acres of wetland were identified within the

overall project area, of which 26.76 acres are within the proposed primary site layout and 1.01 acres are in the proposed alternate site layout.

The field delineated wetlands in the project study area, as defined by their predominant type, consist primarily of seasonally flooded basins and wet meadows. The project area contains smaller amounts of shallow marsh, shrub-carr and floodplain forest. Desktop determined wetlands within the project study area are mostly comprised of seasonally flooded basins located in farmed fields, wet meadows, and floodplain forests. The majority of wetland within the proposed project facilities are considered to have overall low functional value as they are within or in proximity to agricultural fields and have generally low vegetative diversity and are dominated by non-native and invasive species.

Potential Wetland Impacts

The project's impact to wetlands would be avoided by siting project components outside of wetlands and by utilizing construction practices that avoid wetland impact. The proposed site layout would avoid direct regulated wetland impacts for all inverter pads, solar arrays, substation, driveways, fencing, and buildings. No forested wetland clearing would occur.

Collector circuits would cross four wetlands using horizontal directional drilling (HDD), three wetlands would be crossed in the primary site layout and one would be crossed in the alternate. Trenching of wetlands would not occur for any wetland collector circuit crossing. Entry points and exit points of the bore would be positioned at least ten feet outside of the established wetland boundaries and would be moved further away when appropriate to achieve the proper depth required for each bore and to avoid tree lines or other obstacles. Temporary staging and equipment storage would be located in uplands.

Wetland Impact Avoidance and Minimization

All attempts should first be made to avoid impacting wetlands. Impacts to wetlands can be avoided by adjusting structure placements to avoid wetlands and siting permanent access roads, laydown yards, and substations outside of wetlands. The proposed project includes perimeter fencing in wetland within the proposed alternate layout. The applicant stated this impact would be avoided at final site design. The project does not propose any transmission line structures, solar arrays, inverter pads, access roads, laydown yards, or substations in any wetlands.

Where complete wetland avoidance is not possible due to engineering constraints, existing infrastructure, or other factors, wetland impacts should be minimized as much as possible. The degree and nature of impacts to wetlands depend on factors such as the type of wetland, quality of the wetland, ground conditions at the time of construction, and the type and duration of construction activities. Short-term wetland impacts can become long-term impacts if the construction phase is not well managed, or if restoration techniques are not properly applied.

Construction methods that can minimize impacts to wetlands include:

- Utilizing HDD installation methods under wetlands to avoid disturbance.
- Preparing and implementing a contingency plan to address the containment and clean-up of inadvertent releases of drilling fluid (frac-outs) in wetlands. This should include

having the appropriate materials on-site to contain and clean-up any frac-outs that may occur.

- Utilizing construction matting and wide-track vehicles when equipment would cross wetlands that are not stable or frozen.
- Utilizing existing roadways, constructed permanent access roads, and temporary off-ROW access roads for access when possible.
- Marking the boundary of wetlands to avoid disturbance by equipment.
- Installing and maintaining sediment and erosion control measures to protect wetland from impact during construction until final restoration.
- Implementing a construction sequencing plan that minimizes the amount of land disturbed or exposed (susceptible to erosion) at one given time across the project.
- Preparing and implementing an invasive species management plan that identifies known areas of invasive species populations, addresses site restoration activities, and includes specific protocols to minimize the spread of invasive species. Best management practices (BMP's) should be used, including cleaning construction vehicles and using construction matting. To minimize the introduction of new invasive species populations, equipment and matting should be cleaned before entering this site or moved between sites.
- Preparing and implementing dewatering practices that prevent sedimentation into wetlands.
- Revegetating disturbed areas and areas of exposed soil as soon as possible, and seeding with a cover crop and/or native seed mix to help prevent the establishment of invasive species.
- Scheduling construction to avoid disrupting sensitive species.
- Limiting the amount of time necessary to complete construction.

Site restoration consists of the activities required to return the areas impacted by the construction of an approved project back to their original condition, if not better. Restoration typically occurs in any disturbed areas within the project area, including temporary construction areas, staging areas or laydown yards, transportation routes, off-ROW access roads, and any other areas used for project related activities. Site restoration, including revegetation, of the disturbed areas should be completed as soon as possible following construction. Sediment and erosion control devices would be installed before ground disturbance occurs to reduce erosion and trap sediment from entering sensitive resources and would be in place until vegetation is reestablished.

Temporary seeding should be used in areas of exposed soils where construction has temporarily ceased. Seeding disturbed wetlands with a cover crop would help prevent the establishment of invasive species and would not compete with the existing seed bank. Disturbed wetlands not infested with invasive species should be evaluated individually for revegetation with either a native seed mix or by allowing the native seed bank to reestablish naturally, and wetland areas infested by invasive species should be revegetated with an annual cover crop. Once permanent erosion control measures are installed, and vegetation is reestablished, temporary erosion control measures would be removed.

The Project would not utilize a dedicated environmental monitor. The Project would utilize a third-party stormwater/environmental monitor on site periodically throughout construction to

ensure wetland impacts area voided and to ensure best management practices are being implemented to minimize impacts to wildlife during construction. A storm water inspector would be on site to ensure compliance with the construction storm water permit. The Applicant should conduct regular inspections, including areas where construction is occurring within sensitive resources, to ensure that proper BMPs are employed, minimization measures are being followed, permit conditions are met, and site restoration is completed. Applicant should ensure a specific staff person has the duty of ensuring environmental conditions and permit requirements are met. The Applicant should also ensure that all managers and foremen would receive environmental training prior to construction.

3.1.2.3 Waterways

Waterway Identification and Quality

Waterways were identified using the 24K hydro layer of the DNR Surface Water Data Viewer and during field investigations conducted by the applicant. Twenty-three waterways flow through the Project Area, of which nine flow through the proposed primary site layout and one flows through the proposed alternate site layout and are within the Koshkonong Creek Watershed. All waterways area assumed navigable unless determined otherwise by the DNR. None of the waterways are designated as Outstanding or Exceptional, Trout Streams or Wild or Scenic Rivers.

Potential Waterway Impacts

Collector circuits would cross six waterways, five in the proposed primary layout and one in the proposed alternate layout using horizontal directional drilling (HDD). Construction activities associated with the collector circuits would occur outside of the waterways. Collector circuits would be installed a minimum of five-feet below the bed of waterways. Entry points and exit points of the bore would be positioned at least ten feet outside of the established waterway boundaries and would be moved further away when appropriate to achieve the proper depth required for each bore and to avoid tree lines or other obstacles. Temporary staging and equipment storage would be located in uplands.

Construction activities conducted near and across waterways have the potential to impact water quality and aquatic species habitat. Forested and shrub areas along waterways provide a natural corridor for wildlife movement, help maintain soil moisture levels in waterway banks, provide bank stabilization, filter nutrient-laden sediments and other runoff, maintain cooler water temperatures, and encourage a diversity of vegetation and wildlife habitats. The removal of riparian vegetation can cause water temperatures to rise and negatively affect aquatic habitats, especially cold-water systems. Removing riparian wetland vegetation may decrease shoreline protection and may lead to increased sedimentation of waterways. Vegetation disturbance along the waterway can also lead to the infestation by invasive and nuisance species.

The use of heavy equipment on waterway banks may also cause soil compaction. Constructing in areas with seeps and springs may temporarily alter the surface and subsurface hydrology feeding waterways. Recreational use such as sight-seeing, boating, fishing, or bird watching could be adversely affected by activities in and adjacent to waterways.

Waterway Impact Avoidance and Minimization
All attempts should first be made to avoid impacting waterways. Impacts to waterways can be avoided by routing the tie line away from riparian corridors, routing the solar arrays away from waterways, adjusting structure placements to span waterways, using alternative installation methods (trenchless), and utilizing alternate access routes such as off-ROW access roads to avoid equipment access across waterways.

Where complete waterway avoidance is not possible, waterway impacts should be minimized as much as possible. Construction and operation of transmission lines across waterways may have both short-term and long-term impacts. The type and significance of the impact is dependent on the characteristics of the waterway and the construction activities proposed. Physical features of the waterway are considered when assessing potential impacts to water quality, water quantity, habitat, recreational use, and the scenic quality of the waterway.

In order to minimize impacts to waterways, the following practices should be followed:

- Utilizing trenchless installation method under waterways when possible to avoid disturbance to the bed and banks.
- Prepare and implement a contingency plan to address the containment and clean-up of inadvertent releases of drilling fluid (frac-outs) in waterways. This should include having the appropriate materials on-site to contain and clean-up any frac-outs that may occur.
- Minimize the number of potential vehicle crossings of waterways by accessing the ROW on either side of the stream or from adjacent roads.
- Minimizing the width of road crossing of waterways.
- Site-specific sediment and erosion control measures and devices should be installed prior to construction activities and inspected and maintained daily throughout all construction and restoration phases.
- Implement a construction sequencing plan that minimizes the amount of land disturbed or exposed (susceptible to erosion) at one given time across the project.
- Existing vegetative buffers should be left undisturbed whenever possible, or vegetation clearing should be kept to a minimum in riparian zones.
- Revegetate disturbed areas and areas of exposed soil as soon as possible.
- Avoiding the use of herbicides near waterways, or utilizing herbicides approved for use in aquatic environments. .
- Preparing and implementing dewatering practices to prevent sedimentation into waterways.
- Marking the location of waterways in the project area.
- Restoring waterway banks to pre-existing conditions.
- Isolating all soil piles from waterways with perimeter erosion control BMPs.
- Limiting the amount of time necessary to complete construction.

The Project would not utilize a dedicated environmental monitor. The Project would utilize a third-party stormwater/environmental monitor on site periodically throughout construction to ensure waterway impacts are avoided and to ensure best management practices are being implemented to minimize impacts to wildlife during construction. A storm water inspector

would be on site to ensure compliance with the construction storm water permit. The Applicant should conduct regular inspections, including areas where construction is occurring within sensitive resources, to ensure that proper BMPs are employed, minimization measures are being followed, permit conditions are met, and site restoration is completed. Applicant should ensure a specific staff person has the duty of ensuring environmental conditions and permit requirements are met. The Applicant should also ensure that all managers and foremen would receive environmental training prior to construction.

Benefits to water quality in the project area could result from a decrease in the amount of fertilizer and pesticide runoff as a result of the change from agricultural land use to the solar facility. Reducing the regular disturbance of vegetation and soil could also reduce local soil erosion and sedimentation once the site has established vegetation.

3.1.2.4 State wetland and waterway impact permitting

DNR participates in the joint review process with the Commission, as detailed in Wis. Stat. § 30.025, with respect to wetlands, navigable waterways, and storm water management. Wisconsin Stat. § 30.025 describes DNR process for reviewing and permitting utility projects that require authorization from the Commission and DNR.

DNR is responsible for regulating the discharge of dredge and fill material into wetlands under Wisconsin Statutes, and Wisconsin Administrative Code Chapter 281.36. State compensatory wetland mitigation is not required for this project, per Wis. Stat. §281.36(3n)(d)2. DNR is also responsible for regulating impacts to navigable waterways and waterbodies under Wisconsin Statutes and Wisconsin Administrative Code Chapter 30. Some of the state legal protections and permitting requirements for activities affecting public waterways relevant to this project include, but are not limited to:

- Wis. Stat. § 30.12 and Wis. Admin. Code NR 329, requires permits for structures placed on the bed of navigable waters;
- Wis. Stat. § 30.123 and Wis. Admin. Code NR 320, requires permits for bridges placed over public waters and culverts placed within navigable waters;
- Wis. Stat. § 30.19 and Wis. Admin. Code NR 341, requires permits for ponds within 500-feet of or connected to navigable waters;

The USACE and/or USFWS might also require additional permits and approvals. Some of the federal legal protections and permitting requirements for activities affecting waters include, but are not limited to:

- 33 USC § 403 Section 10 of the Rivers and Harbors Act of 1899 prohibits the unauthorized obstruction or alteration of any navigable waters of the U.S.
- 16 USC §§ 1271-1287 prohibit federal agencies from authorizing a water resources project that would have a direct and adverse effect on the values for which a river protected by the Wild and Scenic Rivers Act was established.

CPCNs granted by the Commission are often contingent upon an applicant's ability to secure all necessary permits from state and federal agencies. Likewise, any permit granted by DNR or

USACE could be contingent on the implementation of all mitigation procedures ordered by the Commission in its CPCN authorization.

3.1.3 Forested land impacts

The forests in the project area are Midwestern, with dominant species consisting of red oak, white oak, bur oak, shagbark hickory, bitternut hickory, and elms. The majority of lands in the project area are non-forested, agricultural lands. Forests in the project area are often isolated or fragmented within the landscape, occasionally connected with windbreaks or thin tree lines around property boundaries or riparian areas. Generally, solar projects in Wisconsin have avoided forested areas due to the ready availability of open, relatively flat, agricultural land that does not require tree clearing. Some tree lines or windbreaks may be cleared to avoid shading of panels depending on the array layout.

The proposed arrays include approximately 20 acres of upland forest that would require clearing. The alternative array areas include 18 acres of forest that would potentially need to be cleared for array installation. No forested wetland clearing would be required for the project. In addition to the array areas, installation of collector circuits and the generator tie line would include up to approximately 2 acres of impacts to upland forest.

3.1.4 Endangered Resources

The state's Endangered Species Law, Wis. Stat. § 29.604, makes it illegal to take, transport, possess, process, or sell any wild animal that is included on the Wisconsin Endangered and Threatened Species List. In addition, it is illegal to remove, transport, carry away, cut, root up, sever, injure or destroy a wild plant on the Wisconsin Endangered and Threatened Species List on public lands. Although utility practices are exempted from the taking prohibitions of listed plant species on public lands, it may still be prudent for the applicant to actively avoid activities in certain areas that are known to host rare plants. The Federal Endangered Species Act (ESA) protects all federally listed animals from direct killing, taking, or other activities that may be detrimental to the species. Federally listed plants have similar protection, but the direct killing or taking prohibitions are limited to federal lands or when federal funds/permits are necessary. In addition, there may be other state and federal laws protecting rare species including the federal Migratory Bird Treaty Act, the federal Bald and Golden Eagle Protection Act, and the Protected Wild Animals (NR 10.02 WI Admin Code).

A certified Endangered Resources (ER) review was completed for the project area. The review was checked, modified (if needed), and approved by DNR staff in the ER Review Program. The review is based off information from the Natural Heritage Inventory (NHI) database, maintained by the DNR Bureau of Natural Heritage Conservation, to identify any endangered, threatened, or special concern species, natural communities, and animal concentration sites in the project area.

The NHI database contains known records for endangered resources. However, most areas of the state have not been surveyed extensively or recently, so the NHI data should not be solely relied upon, particularly in areas dominated by private lands. In areas where suitable habitat exists for protected species but occurrences have not been recorded in the NHI database, there may be recommended activities that could mitigate or avoid potential impacts to protected species.

If approved, this project would begin construction over a year from the certified ER review date. DNR regularly updates the NHI database as new species records are discovered and when previous records are checked to determine if the species is still present. If the project is approved, the applicants should conduct an updated review closer to the construction start date to determine if any change to the ER review would create the need for additional actions to avoid impacts to protected species. An ER review should also be completed annually for ongoing maintenance and mowing activities.

The ER review for the KSEC array sites determined there are several species located within the search buffers of the proposed project. While many of these endangered resources would not be impacted, a total of eight species and natural communities may be impacted if actions are not put into place to prevent or minimize these impacts. They include:

- One state and federally listed and three special concern plant species.
- One federally listed and state special concern as well as one state special concern bumble bee species.
- One upland natural community.
- One special concern herptile species.

The DNR provided recommended actions to protect the special concern species as well as the state listed plant species and natural communities. Impacts to these resources can be minimized or even avoided by following these recommended actions:

- minimizing impacts to and/or incorporating buffers along the edges of the upland natural community along with incorporating native species within the restoration plan.
- avoiding areas of suitable habitat for the plant species or if suitable habitat would be impacted, then conducting presence/absence surveys and avoiding individual plants if they are found.
- implementing time of year restrictions for the herptiles when working within upland habitat and/or installing herp fencing during appropriate times of the year to ensure these species are kept out of the project area. In addition, it would be recommended that the permanent fencing around the arrays allow for herptile (and other small animals) movement under the fences. Raising the fencing up approximately six inches or providing passages intermittently along the fence would be suggested.
- incorporating native pollinator species into the restoration plan to provide suitable habitat for the bumble bee species.

Portions of the project are also located within the federally designated Rusty Patched Bumble Bee High Potential Zone. The applicant has worked with the U.S. Fish and Wildlife Service and would be following the below Best Management Practices to ensure the bee is protected:

General Practices:

- The Smith-Reiner Drumlin Prairie State Natural Area and the Smith-Reiner Drumlin Prairie Area would be entirely avoided by Project design, where known presence of RPBB exists.
- Project-wide, infrastructure would be focused in areas of non-RPBB habitat, which include agriculture lands identified from site visits and desktop resources.
- A RPBB factsheet would be posted in the construction trailer during construction and O&M building during operations. Factsheets would identify what the species looks like, notes on look-alike species, where employees would have the potential to encounter the RPBB near the project area, and how it could be protected.
- An annual training program on general wildlife best practices would be conducted for construction and operations staff, which would include an annual overview of the RPBB factsheet and RPBB-specific best management practices.

Vegetation Management:

- Mowing of pollinator habitat zones would occur between October 15 and March 15.
- Pollinator habitat zones would not be placed in array areas and would be strategically placed in areas that are easily identifiable to construction and operation teams. Signage would be established in the pollinator habitat zones where mowing restrictions would be required and would outline these restrictions.
- Mowing would occur at reduced speeds, averaging < 8mph, to allow time for bees to avoid mowing equipment within the project area.
- Insecticide use would be avoided within the project area 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 would work with a qualified party to address the occurrence in a manner consistent with the principles of Integrated Pest Management.
- Herbicides would be applied as locally and directly as possible within the project area, following all preparation and application requirements.
- Upon decommissioning of the project, pollinator habitat zones identified for conversion to pre-existing conditions (at the landowner's discretion) would be converted outside of the RPBB active season (October 15 – March 15).

Based on the information available from the DNR and USFWS, the project layout, and planned activities as described in the application, this project is not expected to have a significant impact on endangered or threatened species. DNR recommended actions should be done as practicable to further decrease the risk of impacts to rare species.

3.1.5 Wildlife impacts

The predominant land use of the proposed solar facility is agricultural row crops, along with areas of pasture and fallow fields. The most common wildlife in these fields are likely species

that are generally more common and are accustomed to agricultural habitats or human disturbance. Examples of these species include white-tailed deer, muskrat, coyote, common raccoon, red fox, eastern gray squirrel, groundhog, opossum, eastern cottontail, rabbit, deer mouse, red-tailed hawk, horned lark, tree swallow, American robin, gray catbird, common yellowthroat, song sparrow, and red-winged blackbird. These species generally do not require specialized habitats and would be able to find suitable habitat nearby. Wildlife that resides within the construction zone of the project would likely be temporarily displaced to adjacent habitats during the construction process. If erosion control netting is used, it would be beneficial to use wildlife-friendly varieties, rather than plastic netting, which can entangle small wildlife species.

Once the facility is operational, the current agricultural habitat would be replaced by a long-term established grass habitat, with smaller areas of pollinator plantings. The decrease in vegetation disturbance and more diverse species composition may benefit species of grassland birds and other wildlife. KSEC tates that mowing activities would be avoided during the peak grassland bird nesting season to minimize impacts to ground nesting grassland birds that may be drawn to the new habitat.

Use of the deer exclusion fence around arrays, similar to what was recommended by the Minnesota DNR for large solar sites and required by the Commission in previous solar dockets should allow for the passage of smaller mammals, reptiles, and amphibians while preventing the access of larger animals such as deer. By not using barbed wire on the array fences, the risk of wildlife injury due to entanglement is decreased. The additional fencing in the landscape around the arrays would affect wildlife movement corridors across the project area. Larger animal species would find the fenced arrays a barrier to movement, which could cause habitat fragmentation. Where a solar facility fence line runs along a road, deer that start to proceed along the ROW may have movement restricted, which could lead to more interactions with drivers. The proposed project does have some areas free of fences, particularly along drainage features or waterways, where wildlife may find routes between the arrays.

Large-scale solar facilities are a relatively new addition to the landscape and research is ongoing to determine impacts to wildlife. Most research on the impacts of solar facilities on wildlife has occurred in different habitats than are found in Wisconsin. In 2016, a multi-agency collaborative working group released an avian-solar science coordination plan[34] that discussed ways solar development may affect birds and areas where more information is needed to understand potential impacts to birds. There have been few studies, particularly systematic studies of mortality, at comparable large-scale solar facilities. The Commission required the first two solar facilities it authorized, Badger Hollow and Two Creeks, to conduct post-construction mortality surveys. However, these projects have not yet finalized the survey methodology, and any results from the surveys are years away. In 2019, the Department of Energy[35] announced that it would award $4.3 million in grant funds to three projects to study solar project effects on bird populations. Although the impacts to birds from a solar facility are likely to be less significant

[34] The Multiagency Avian-Solar Collaborative Working Group, 2016, Avian-Solar Science Coordination Plan, November 2016.

[35] https://www.energy.gov/eere/solar/seto-fy2019-balance-systems-soft-cost-reduction, accessed on June 10, 2020. See ***Data Collection Methods to Assess Avian Impacts.***

than impacts from building window strikes, cats, or climate change in terms of sheer numbers, continuing to build the understanding of how solar facilities at this scale impact species is necessary to acknowledge and mitigate the specific impacts of any given project.

3.1.6 Archaeological and Historic resources

KSEC commissioned Westwood to conduct a study of archaeological and historic resources within one mile of the 6,344-acre project study area. The study area for direct impacts included all areas where there could be ground disturbance for all possible solar facilities (proposed arrays, collector substation, O&M building, and alternative arrays). The review was submitted as Appendix J[36] in the application materials.

Westwood's study included a desktop review of the Wisconsin Historic Preservation Database (WHPD), GIS data from the Wisconsin Historical Society (WHS), and information from the National Register of Historic Places (NRHP). This review identified previously recorded resources, which included one archaeological site, one human burial site, and 13 inventoried historic structures within the project area along with additional historic structures immediately adjacent to the project study area in the one-mile buffer. The report asserts that these recorded archaeological and human burial sites would not be impacted by the current project design. While historic structures would not be impacted physically, the report asserts they could incur visual impacts from the proposed project. An architectural history evaluation and impact assessment on historic structures was completed and found that all effects from the project would be mitigated[37]. Additionally, two NRHP listed resources are located within one mile of the project study area. However, they are not expected to be impacted by the proposed project.

Since no known human burial sites would be affected by the project, no Burial Site Disturbance Authorization/Permit would be required from WHS. KSEC submitted an Unanticipated Archaeological Discoveries Plan[38] that details contingencies in the event that previously unidentified resources are encountered during construction. If the applicant encounters grave markers or human skeletal remains during construction, all activities in the area would cease and the State of Wisconsin Burial Sites Preservation Office would be contacted for further instructions.

Commission staff requested that KSEC provide a model showing high potential areas where unrecorded archaeological or human burial sites would most likely be present, similar to such models that have been provided in other solar facility dockets. KSEC provided a report describing the results of their modeling that showed a number of high potential areas. Commission staff then requested that KSEC complete field surveys to identify any resources within the high potential areas that would have ground disturbance during construction of the project. KSEC agreed to conduct a Phase I archaeological survey of the high potential areas where ground disturbing construction could occur in October or November of 2021, as soon as field conditions allow. KSEC plans to provide the report once complete, which is estimated to be approximately 4-5 weeks after conclusion of field survey. They state that the report would

[36] PSC REF#: 409962, Koshkonong Solar CPCN Appendix J Cultural Resource Review.
[37] Koshkonong Solar CPCN Appendix J Architectural History Evaluations - PSC REF#: 411251
[38] PSC REF#: 418513, Response-Data Request-PSC-Kitsembel-3.01

describe any archaeological or human burial sites identified during field survey and determine the eligibility for such listing on State or National Registers of Historic Places. KSEC would then avoid impacts to any archaeological resources identified as being potentially eligible for listing on State or National Registers of Historic Places during final site design, and avoid impacts to any human burial sites identified.

Based on the investigations conducted, and as long as KSEC completes the field surveys and avoids any new resources identified as a result, there would be no adverse effects to cultural resources listed in or eligible for either the NRHP or Wisconsin State Register of Historic Places associated with the proposed project.

3.1.7 Invasive species

Non-native plants, animals, and microorganisms found outside of their natural range can become invasive when they colonize new ecological communities. Non-native invasive species are highly tolerant of a wide range of conditions and are able to quickly establish and spread in new communities. Over time, non-native invasive species can overwhelm an area and eliminate native species, subsequently reducing biodiversity and negatively affecting local ecological communities.

A windshield survey of the project study area conducted in November 2020 identified the following invasive species that are listed as restricted in Wis. Admin. Code ch. NR 40:

- Canada thistle (*Cirsium* arvense)
- common buckthorn (*Rhamnus cathartica*)
- common reed grass (*Phragmites australis*)
- garlic mustard (*Alliaria petiolate*)
- narrow-leaf cattail (*Typha angustifolia*)
- reed canary grass (*Phalaris arundinacea*)
- Siberian elm (*Ulmus pumila*)
- Tartarian honeysuckle (*Lonicera tatarica*)

Construction of the proposed project may cause the spread and establishment of noted non-native invasive species as well as others in the project area that were not identified by the applicant during their initial site visits. Construction equipment traveling from infested to non-infested areas could spread noxious and/or invasive weed seeds and propagules between array sites, laydown yards, access roads, etc. The removal of existing vegetation during construction causes soil disturbance and removes vegetative competition that could increase the subsequent spread and establishment of noxious and invasive species. Although much of the proposed project area is currently in agricultural production where weeds are typically controlled to increase crop production, removal of vegetation may release existing seedbanks and expose bare soil allowing for new populations to establish, if not monitored or controlled effectively.

The applicant noted that they would implement the following BMPs to minimize or prevent the spread of invasive species throughout the project area during construction:

- machinery would be cleaned prior to delivery and prior to leaving the project,
- all equipment used, including construction matting, would be cleaned prior to work in areas without invasive species,

- minimize soil disturbance,
- weed control consisting of mowing and herbicide treatment,
- herbicide application would be done by certified pesticide applicators,
- annual monitoring, and
- adaptive management of invasive species.

In addition to the noted BMPs above, the applicant should clean equipment whether or not it is entering an area with existing invasive species. The equipment may be carrying new invasive species that could cause new infestations of invasive species or noxious weeds. The applicant has identified locations of invasive species in the project area. With this information the applicant can be more strategic and efficient (saving time and money) with the types of BMPs they implement over such a large project area. Another critical element to effectively control invasive species includes a site specific monitoring plan, which was provided in Appendix W of the application[39]. Contractors and staff that access the site should be trained to look for early establishing invasive species and have a process for mapping and reporting new populations for treatment. The plan and list of species should be adaptive, and able to address new invasive species that might be found in the project area.

In addition to invasive and noxious plant species in the project area, emerald ash borer (*Agrilus planipennis*), gypsy moth (*Lymantria dipar*), and oak wilt (*Ceratocystis fagacearum*) are known to be found in Dane County. Any tree clearing activities should take into account current Wisconsin-specific BMPs[40] to prevent the introduction and spread of tree pests and diseases.

Wis. Admin. Code ch. NR 40 prohibits certain activities that result in the spread of invasive species and establishes preventive measures to assist in minimizing the spread of invasive species. The applicant is required to comply with the regulations in Wis. Admin. Code ch. NR 40 and are encouraged to follow preventative actions (i.e. implementation of BMPs). More specifically, to minimize the potential impacts of spreading existing and introducing new invasive and/or noxious species into the project area, the applicant should implement the BMPs in the Wisconsin Council on Forestry's publication for Transportation and Utility Rights-of-Way Manual[41].

3.1.8 Vegetation management

Unlike solar facilities located in arid desert landscapes, solar facilities sited in the Midwest can expect to have vegetation growing wherever there is not impervious surface, including fenced array areas, along perimeter fences, between and underneath panels, etc. A vegetation management plan (VMP) should address essential items to consider at solar facilities to maintain effective vegetation ground cover that ensures maximum energy efficiency, minimizes environmental harm, and maximizes environmental benefits including water infiltration, pollinator enhancements, wildlife movement, species diversity, and soil health.

[39] PSC REF#: 409461, Koshkonong Solar CPCN Appendix W Vegetation Management Strategy.
[40] Forest Health: Promoting Healthy Wisconsin Forests
Accessed at: https://dnr.wisconsin.gov/topic/ForestHealth in January 2021.
[41] Invasive Species Best Management Practices For Transportation and Utility Rights-of-Way (January 2010).
Accessed at: https://councilonforestry.wi.gov/Documents/InvasiveSpecies/ROW-Manual.pdf.

The applicant details its Vegetation Management Strategy (VMS) in Appendix W of its CPCN application[42]. The applicant's objectives, in regards to how they would manage vegetation within the project area, include:

- 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 applicant states that all disturbed, non-impervious surfaces would be stabilized with perennial herbaceous vegetation as described in the VMS. The applicant would implement BMPs such as annual (temporary) seed mixes and winter cover crops, according to the project's ECSWMP and VMS, which would stabilize disturbed soils and reduce soil erosion from construction traffic and heavy rain events. The first few years would be spent establishing compatible vegetation and once established, general maintenance (i.e. mowing) would occur throughout the life of the facilities. KSEC proposes one temporary and four different permanent seed mixes for different purposes and areas within the project site. The proposed Pollinator Habitat Species for Upland (PHU) and Moist Soils (PHM) seed mixes showcase a variety of native species that would benefit many of the state's pollinators such as butterflies and bumble bees.

The applicant would use Invasive and Weed Species Management practices to ensure successful establishment of vegetation and maintenance of permanent vegetative cover. The intensity of vegetation management practices are expected to decrease over time as the vegetation within the site matures.

If the project is approved and the applicant implements a vegetation management regime that does not reflect its practices or seed mixes stated in Appendix W of its CPCN application[43], the impacts of the project could be significantly different than stated in this EA.

3.1.9 Air quality

Temporary, localized impacts to air quality would occur during the construction phase of the project. These impacts would be a result of construction machinery and delivery vehicles in the project area. Diesel engines can create exhaust impacts that are typically short term in nature, but can be a nuisance or, in high enough quantities, a health hazard. Keeping vehicles and construction equipment in good working order is one way to mitigate these impacts.

Fugitive dust may be generated from excavation or grading work, exposed soils, or materials transport, and could create a nuisance for local homeowners or drivers. The extent of fugitive dust generated during construction would depend on the level of construction activity, weather conditions such as high winds, and the moisture content and texture of soils being disturbed. High winds and dry conditions increase the chance of fugitive dust affecting air quality.

[42] PSC REF#: 409461, Koshkonong Solar CPCN Appendix W Vegetation Management Strategy.
[43] PSC REF#: 409461, Koshkonong Solar CPCN Appendix W Vegetation Management Strategy.

Watering exposed surfaces and covering disturbed soils with quick-growing non-invasive plant species can reduce the chance of fugitive dust.

No air quality impacts would be expected to occur once construction activities were complete and the project was operational. Solar facilities generate energy without the creation of regulated pollutants or carbon dioxide.

3.1.10 Solid wastes

Solid wastes would be generated during the construction of this project and would need to be removed to appropriate waste disposal or treatment facilities. Examples of the types of wastes expected to be generated include scrap steel and other metals, sanitary waste, scrap plastics and wood, and other items used by construction staff. Observations of large stacks of rejected support pilings have been seen at some utility scale solar facilities in Wisconsin. During operation of the solar generating facility, staff using the O&M building would generate waste, which would need to be removed to appropriate waste disposal facilities. This would likely include defective or broken electrical materials, empty containers, the typical refuse generated by workers and small office operations, and other miscellaneous solid wastes.

The treatment of waste materials produced during the eventual decommissioning of the project is discussed in the Decommissioning section of this EA.

3.1.11 Hazardous materials

Concerns have been raised by the public regarding potentially hazardous materials contained in solar PV panels and batteries and the potential exposure to these materials as a result of the construction and operation of the proposed project. Concerns have also been raised about the future disposal of the solar PV panels and batteries, with discussion on amounts of waste, as well as potential for hazardous materials to leach from panels if placed in landfill.

During the operational phase of the project, the panels are considered to be at low risk of releasing hazardous materials into the environment due to small amounts of heavy metals in proportion to the overall panel and the encapsulation of these materials due to panel design. The State of California Department of Toxic Substances Control (DTSC) finds that PV modules are constructed to withstand environmental conditions to last up to 30 years, which requires durability and structural integrity. The hazardous materials that may be found in the PV modules, including the toxic metals (e.g., lead, copper, cadmium, etc.) are in laminated solid form and sandwiched between glass panes or types of protective layers which render mobility in the environment unlikely[44].

The disposal of solar PV generation facility components is governed by the Federal Resource Conservation and Recovery Act (RCRA) and state-specific waste rules. If waste has the potential to be hazardous, the generator of that waste must determine the presence and quantity of toxic substances through representative sampling and laboratory analysis, or “acceptable

[44] California Department of Toxic Substances Control, 2019. Initial Statement of Reasons, Photovoltaic (PV) Modules – Universal Waste Management, Ref. No R-2017-04. Accessed at: https://dtsc.ca.gov/wp-content/uploads/sites/31/2019/04/ISOR-Final-PVM.pdf.

knowledge" of the waste[45]. Some items used during construction and operation of the facilities are known hazardous materials (fuels, solvents, herbicides), however, the waste status of PV panels is not universally recognized and requires more evaluation when disposing of materials.

The eventual disposal of the PV panels, including any crushing or damage to the panels, as well as the potential quantities of panels placed in a landfill, would require additional consideration. The US EPA classifies types of hazardous wastes based on one of four characteristics, with "toxicity" the potential type that might apply to solar PV panels. The toxicity of a waste is determined by the Toxicity Characteristic Leaching Procedure (TCLP). Solar PV panels may exhibit the hazardous waste characteristic of toxicity due to the presence of heavy metals such as cadmium, copper, lead, or selenium[46]. If testing is done on a panel and it passes the TCLP, it can be treated as general waste, but if it fails the test, it must be disposed of according to federal and state hazardous waste rules. In Wisconsin, solar PV panels must be evaluated according to the TCLP and state rules on hazardous waste. There is much discussion on improving the ability to recycle solar PV panels and other components of a solar PV generation facility. Increasing the ability to recycle components or whole panels could reduce the potential for these facilities to be sources of increased amounts of hazardous wastes.

Battery Energy Storage Systems would have the potential for hazardous material releases, and a safety plan should be developed and enacted if that technology is used in the future. OSHA has determined that lithium ion batteries (LIB) are subject to the OSHA HCS regulations. Although these batteries are sealed, they have the potential to leak, spill or break during normal conditions of use and in foreseeable emergencies causing exposure to chemicals. Thus, since owners/operators of facilities are required to prepare or have an MSDS for lithium ion batteries, they must complete MSDS Reporting and Tier II Reporting if the applicable reporting thresholds in 40 CFR Part 370.10 are met or exceeded.[47]

When discarded, LIBs are regulated under federal and state waste rules. Under the Resource Conservation and Recovery Act (RCRA), anyone generating solid wastes must determine if they are hazardous waste (HW). When determined to be hazardous waste, waste must be managed from cradle to grave to prevent releases into the environment. A solid waste can be determined to be hazardous either because it is specifically listed as hazardous in the regulations, or because it exhibits a hazardous waste characteristic (ignitability, corrosivity, reactivity, or toxicity). LIBs are not a listed waste, but commonly exhibit the characteristic of ignitability due to the flammable electrolyte. Some LIBs also exhibit the reactivity characteristic. Since some LIBs possess characteristics of HW, this means that some LIBs are HW.[48]

Potentially hazardous materials in fire suppression agents used for the battery system are listed below. The fire suppression agents proposed by KSEC are common to many industrial, military, and healthcare applications.

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[45] Wisconsin Department of Natural Resources, 2017. Waste Determinations & Recordkeeping, Publication WA 1152. Accessed at: https://dnr.wi.gov/files/PDF/pubs/wa/wa1152.pdf.
[46] Ibid.

[47] https://www.epa.gov/epcra/lithium-ion-batteries-and-epcra-311-312-reporting-requirements
[48] https://www.epa.gov/system/files/documents/2021-08/lithium-ion-battery-report-update-7.01_508.pdf

• Potassium Nitrate
• DCDA - Dicyandiamide or Cyanoguanidine
• Organic Resin
• Heptafluoropropane

The following are hazardous materials found in common Lithium Ion batteries. Final materials would be dependent on final battery selection, but the list below is representative of similar batteries KSEC would use.
• Graphite
• Lithium Iron Phosphate
• Acetylene
• Fluoride polymers (used in high purity plastics applications such as wiring insulation and piping)
• Lithium Hexafluorophosphate
• Various organic solvents

During the construction phase of this project, there could be spills of potentially hazardous pollutants such as diesel fuel, insulating oils, hydraulic fluid, drilling fluids, lubricants, and solvents. These materials would be used during construction of the facilities or during the refueling and maintenance of equipment and vehicles. Herbicides could be used during construction or operation of the project. These various substances would need to be kept onsite in limited quantities and brought in as required. The contractor selected would be required to prepare a Spill Prevention, Control and Countermeasures Plan that would describe measures to be used to prevent spills or releases of hazardous substances, as well as response and cleanup procedures. Spill kits and staff training in the use of these materials would decrease the risk of spills leading to site or water contamination. Batteries used in vehicles or machinery could also be a source of hazardous materials depending on the type of battery used and would need to be disposed of at appropriate disposal facilities.

3.2 Potential Impacts to Community Resources

3.2.1 Agricultural Land Impacts

In many Commission reviews where a project would impact agricultural lands, the Department of Agriculture, Trade, and Consumer Protection (DATCP) would complete an Agricultural Impact Statement (AIS) for use during land right acquisition discussions between a farmer and utility. As a wholesale merchant plant, KSEC does not have condemnation rights and therefore is exempt from the AIS statute[49]. In other solar projects proposed by merchant plants, DATCP has provided letters confirming the understanding that since there is no condemnation authority, there is no scope for DATCP to produce an AIS.

Potential construction related impacts on agricultural lands outside the fenced arrays could consist of crop losses, soil mixing, and/or soil compaction along equipment access routes or staging areas. KSEC could mitigate these short term impacts by providing compensation to the farmer for crop loss, and/or by restoring agricultural lands to pre-construction conditions. KSEC

[49] Wis. Stat. § 32.035

could minimize construction impacts on agricultural soils by using one or more of the following techniques: completing construction during dry or frozen conditions; using equipment with low ground pressure tires or tracks; placing construction matting to help minimize soil and vegetation disturbance, and distributing axle loads over a larger surface area to reduce the bearing pressure on agricultural soils. Subsoils are less productive than topsoil, and mixing the soil types should be avoided as much as practicable. This includes avoiding creating large ruts, which can lead to soil mixing. KSEC states that any excess excavated soils would only be spread within the project area in accordance with their BMPs. Field perimeter fences may need to be removed or altered during construction.

During the operation of the solar facility as proposed, land used for solar arrays would no longer be available for crop production or manure disposal. Farmland leased for the project would not be available as rental cropland during the project lifespan, which might increase rental prices on other local fields due to a decreased supply. Because the land would be taken out of agricultural production, there could also be a reduced demand for agricultural products and services in the immediate area, such as seed, fertilizer, and harvesting services. If fields that make up the project were utilized for manure spreading, they would no longer be available, which may increase the amount that is applied to surrounding fields or increase the distance it would need to be transported for disposal if dairy farms in the area continue normal operations. Further, if the land proposed for the facility were purchased rather than leased, it may affect the likelihood that the land would be returned to agricultural use. However, as currently proposed the entirety of the project is under lease and easement agreements.

The predictable annual payments to participating landowners can support continuing agricultural operations on their remaining lands not leased for the project. Some landowners may use the project as an opportunity to retire from farming, relying on the income stream from the project for much of their income.

KSEC states that any area used for temporary laydown yards and/or parking only for use during construction would be converted to a vegetated state, similar to the conceptual array mix described in the VMS[50], for the remainder of the generation facility's operation. KSEC states that agricultural lands impacted by the project could be returned to agricultural production after decommissioning of the project. When the project is decommissioned, the solar panels could be removed, the land tilled to break up the ground cover, and access roads removed and replaced with topsoil. KSEC states that crop yields would be expected to return to preconstruction levels or better. However, because a solar farm of this size on farmland has never been decommissioned this cannot be known with certainty.

3.2.1.1 Agricultural Land Use

Across the 6,384-acre project study area, 84 percent (5,423 acres) of the land is currently in agricultural use. Most of the agricultural lands are in corn, soybean, and alfalfa production. There are four properties within the project study area that are enrolled in the Conservation Reserve Program (CRP), administered by the US Department of Agriculture (USDA). There are

[50] PSC REF#: 409957, Koshkonong Solar CPCN Appendix W Vegetation Management Strategy.

no properties within the study area that are part of an Agricultural Enterprise Area or restricted by any Farmland Preservation Agreements.

The 2017 Census of Agriculture report[51] for Dane County stated that there were 2,566 farms, totaling 506,688 acres, in the county. This was a decrease of seven percent in agricultural land from the 2012 Census. Using the 2,430 acres that includes the proposed array areas, associated access roads, collector circuits, collector substation, generator tie line, and O&M building for the project to generate 300 MW, the amount of land that would be removed from agricultural use during the life of the project would be approximately 0.47 percent (2,367 acres) of Dane County's agricultural land. The 1,019 acres of alternative array areas and associated facilities include approximately 980 acres of agricultural land.

The 6,384-acre project study area includes approximately 5,227 acres of prime farmland. Prime farmland of statewide importance makes up approximately 11 percent (575 acres) of that 5,227 acres. The entirety of all facilities and ROWs, including all proposed and alternative fenced areas, includes approximately 2,900 acres of prime farmland (including approximately 205 acres of statewide importance) that could be impacted by the project. Due to alternative power blocks being placed within proposed array areas, it is difficult to determine a minimum estimate of impacts associated with fenced areas. However, if all proposed power blocks were used, it would result in at least approximately 1,641 acres of impacts to prime farmland (71 acres of statewide importance). The alternative power blocks include approximately 427 acres of prime farmland (19 acres of statewide importance).

All of the land in the project is zoned as Farmland Preservation districts by Dane County, which complies with Wisconsin's Farmland Preservation law, Wis. Stat. ch. 91. Utility substations are considered as a conditional use of this land designation. Utility use is stated in Wis. Stat. ch. 91 and promulgated by Dane County as a conditional use, if the political subdivision finds that the following applies:

a) The use and its location in the farmland preservation zoning district are consistent with the purposes of the farmland preservation zoning district.
b) The use and its location in the farmland preservation zoning district are reasonable and appropriate, considering alternative locations, or are specifically approved under state or federal law.
c) The use is reasonably designed to minimize conversion of land, at and around the site of the use, from agricultural use or open space use.
d) The use does not substantially impair or limit the current or future agricultural use of surrounding parcels of land that are zoned for or legally restricted to agricultural use.
e) Construction damage to land remaining in agricultural use is minimized and repaired, to the extent feasible.

[51] https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Wisconsin/cp55025.pdf, accessed January 14, 2021.

There is no mention of solar generation facilities included in the Dane County Farmland Preservation Plan[52]. However, the Dane County Zoning Ordinance[53] designates renewable energy systems, such as solar, as a utility service, and that free-standing solar collectors may be located no closer than 3 feet from any lot line. Additionally, under Wis. Stat. §§ 91.42(2) and 91.46(1)(f)28, allowable uses in a farmland preservation zoning district include "[t]ransportation, communications, pipeline, electric transmission, utility, or drainage uses that qualify under sub. (4)." Under Wis. Admin. Code ATCP 49.01(19)29, "[u]tility use" as used in s. 91.46(1)(f), Stats., includes facilities for the generation of electricity from sunlight, wind, coal, or natural gas." Therefore, by state law, the proposed project appears to qualify as an allowable use in the farmland preservation zoning district.

3.2.1.2 Drainage Tiles

Drainage tiles are commonly used in many fields in this region. If extant, drainage tiles could be damaged during construction activities due to vehicle use, excavation, or pile driving in fields. Damaged tiles could cause slower drainage which is known to cause flooding in the fields. This impact to drainage can negatively impact vegetation establishment, which has implications for the company's closing out of DNR permits.

KSEC expects that drain tile would be impacted in portions of the project that are tiled and would undergo construction. KSEC has reached out to all participating landowners to ask for their assistance in locating tile; requesting drain tile maps, personal knowledge of their property, and knowledge of existing tile that was placed without written record. KSEC states that they would continue communication with landowners on a parcel-by-parcel basis as construction approaches; possibly utilizing field location services and historical satellite imagery when necessary to identify drain tiles systems that may be impacted by construction activities. Drain tile mains within the construction areas that service upstream farms would be maintained or relocated as needed to maintain drainage in the project area.

KSEC states they would take a proactive approach to identify the location of drain tiles, in an effort to mitigate damage to existing tile. KSEC states they would make commercially reasonable efforts to prevent damage to drain tile mains through locating the mains and incorporating the identified locations into engineering designs. In the event damage to a drain tile main is unavoidable and such damage would create adverse drainage effects to participating or neighboring property, KSEC would re-route or repair the existing drain tile main during the construction process.

3.2.2 Stray Voltage

Stray voltage is a term used by the Commission to describe a physical phenomenon that may affect confined livestock, primarily dairy cows. There are numerous farms dotted throughout the project area, some of which clearly are still operating dairy farms, and others that have barns and pastures. Several riding stables are seen in the project area. Electrical systems, including farm systems and utility distribution systems, are grounded to the earth to ensure safety and reliability, as required by the National Electrical Safety Code and the National Electrical Code. Because of this, some current flows through the earth at each point where the electrical system is grounded

[52] https://plandev.countyofdane.com/documents/pdf/Dane-County-Farmland-Preservation-Plan-08-16-2012.pdf, accessed 9/10/2021.
[53] PSC REF#: 398752, Appendix E – Local Plans

and a small voltage develops. This voltage is called neutral-to-earth voltage (NEV). When NEV is measured between two objects that are simultaneously contacted by an animal, a current would flow through the animal and it is considered stray voltage. Animals may then receive a mild electrical shock that can cause a behavioral response. At low voltages, an animal may flinch with no other noticeable effect. At higher levels, avoidance or other negative behaviors may result. Stray voltage may not be noticeable to humans.

Stray voltage can be caused by the operation of transmission lines in close proximity and parallel to a distribution line. To minimize the chance of stray voltage, utilities sometimes propose relocating or burying distribution lines for transmission line projects. The Commission has information on stray voltage testing and mitigation on its website in a publication[54] on the environmental impacts of transmission lines. The Commission developed this information and its testing protocols during dockets 05-EI-106 and 5-EI-115. Similar concerns about stray voltage have been raised in both wind and solar generation projects. For transmission line and wind energy projects that are reviewed by the Commission, an order condition that requires stray voltage testing at farms located within a half-mile of the facilities is commonly included. This order condition has also been included in each of the orders for solar energy facilities already approved by the Commission. The pre-construction stray voltage testing is protective for local farmers, and also the applicant, and helps in preventing potential future litigation over stray voltage concerns.

The suggested language for this order condition would be:

> The applicant shall work with the applicable distribution or transmission utility to test for stray voltage at each agricultural confined animal operation within a half mile of project facilities, prior to construction and after the project is energized. The applicant shall work with the applicable distribution or transmission utility and farm owner to rectify any identified stray voltage problem arising from the construction or operation of the project. Prior to testing, the applicant shall work with the applicable distribution or transmission utility and Commission staff to determine where and how it will conduct the stray voltage measurements. The applicant shall report the results of its testing to Commission staff.

It is worth noting that this testing protocol would be offered to all owners of confined animal operations, not limited to confined animal feeding operations (CAFO) defined by DNR as facilities with over 1,000 animals. Previous project testing has been offered to farms with far fewer animals, again, to protect both the farmer and the applicant from future problems or litigation.

3.2.3 Photovoltaic Heat Island Effect

The heat island effect is a term used when local air and surface temperatures are higher than nearby natural areas as a result of heat absorbing surfaces at a developed site. This has been observed in urban environments where heat builds up during daytime hours and becomes stored in rooftops and pavement.

[54] https://psc.wi.gov/Documents/Brochures/Enviromental%20Impacts%20TL.pdf - page 21-22.

There are few studies currently available that investigate whether a similar heat island effect is created from solar electric generation facilities, referred to in the literature as the photovoltaic heat island effect (PVHI effect). The PVHI effect is described as solar photovoltaic arrays elevating ambient air temperatures relative to their natural surroundings. Solar electric generation facilities do this by changing the albedo, vegetation, and structure of the terrain; therefore, affecting how incoming energy is reflected back to the atmosphere or absorbed, stored, and reradiated.[55] A description of the PVHI effect is described in general terms here, from the expert testimony of Greg Barron-Gafford (2018):[56]

"… much like clouds trap the energy radiating from the Earth's surface. On cloudy nights, air temperatures do not cool off as much as they do on clear nights. This is the same principle in the PVHI, and I believe the reason that the PVHI dissipates so quickly as one moves away from the edge of the panels. Under the panels, it is analogous to a cloudy night, and away from the array, where those panels are absent, conditions are analogous to a clear night sky."

Commission staff reviewed available studies regarding heat island effects related to solar generation facilities. The published literature on the PHVI effect vary, with some theoretical in nature focusing on simulations and mathematical models[57,58] and others utilizing empirical research to measure PVHI.[59,60] Most of the published research to date has occurred at small scale solar electric generation facilities in arid landscapes, dissimilar to the proposed facilities in Wisconsin. Currently there are no known studies that have been conducted at large utility-scale solar facilities in the temperate environments of the Upper Midwest. While none of the studies reviewed were in locations similar to the proposed project, each found that solar electric generation facilities were altering the temperature of the air and in some cases the soil near the solar panels by a small amount. Some of the studies found that temperatures completely returned to normal overnight, while others found that temperatures remained altered.

In Wisconsin, the fenced array areas would be vegetated, unlike most solar facilities in arid landscapes. The vegetation within and around panels would actively cool ambient air through transpiration. Empirical research is needed to determine the occurrence and spatial extent of PVHI as well as any potential impacts it may have on local environments at utility scale solar facilities in temperate landscapes. In recent discussions of record conducted by Commissioners on solar generation facilities, Commission staff were directed to reach out to academic research institutions to gain more understanding of PVHI effect and its potential impacts to agricultural

[55] Barron-Gafford, G., Minor, R., Allen, N. *et al.* (2016). The Photovoltaic Heat Island Effect: Larger solar power plants increase local temperatures. *Sci Rep* 6**,** 35070. https://doi.org/10.1038/srep35070.
[56] Barron-Gafford, G, 2018. Statement of evidence by Greg Barron-Gafford on Solar Heat Islanding Issues. Prepared for Neoen Australia Pty Ltd. Accessed at: https://www.planning.vic.gov.au/__data/assets/pdf_file/0024/126555/301-Expert-Witness-Statement-of-G-Barron-Gafford-PVHI-May-2018-Lemnos.pdf.
[57] Demirezen, E. & Ozden, T. & Akinoglu, B. (2018). Impacts of a PV Power Plant for Possible Heat Island Effect. 10.1109/PVCon.2018.8523937.
[58] Fthenakis, V.M., & Yu, Y. (2013). Analysis of the potential for a heat island effect in large solar farms. *2013 IEEE 39th Photovoltaic Specialists Conference (PVSC),* 3362-3366.
[59] Barron-Gafford, G., Minor, R., Allen, N. *et al.* (2016). The Photovoltaic Heat Island Effect: Larger solar power plants increase local temperatures. *Sci Rep* 6**,** 35070. https://doi.org/10.1038/srep35070.
[60] Yang, L., Gao, X., Lv, F., Hui, X., Ma, L., & Hou, X. (2017). Study on the local climatic effects of large photovoltaic solar farms in desert areas. *Solar Energy, 144*, 244-253.

landscapes in Wisconsin to further inform environmental impact assessments and subsequent policy decisions. Formation of those relationships and research is in development.

3.2.4 Landowner impacts

3.2.4.1 Setback Analysis

In previous Commission dockets for solar generation facilities, as well as in this docket, non-participating landowners adjacent to the project have voiced concerns regarding the proximity of arrays and fences to their property. Concerns raised include the noise from construction and increased vehicles in the area during construction. The concerns raised regarding the operational phase include the change in aesthetics, potential for noise or glare, limits to wildlife use of the area occupied by the array, and potential impacts to property value. Landowners requested greater setbacks in previous dockets, to lessen some of the described impacts. Table 1.5.3.1 in the application provides all the setbacks used by KSEC in development of the proposed project. An excerpt of setbacks applicable to residences is shown in Table 2 below.

Table 3 Setbacks stated as used for the KSEC Solar Project

Structure	Distance to Nearest Panel Edge
All Residences	Not less than 100 feet
Property Lines	Not less than 20 feet

The concept of using a standard setback distance of 300 feet has been introduced in other solar electric generation facility dockets. The Commission could consider requiring the use of additional setback distances or screening vegetation to mitigate the impacts described by landowners that are concerned about solar facilities adjacent to their properties.

3.2.4.2 Landowner agreements/easements/good neighbor agreements

Some renewable energy projects offer "good neighbor agreements" to nearby non-participating residences. These typically include payments to mitigate some impacts that may affect the non-participant. KSEC states that they would make offers of good neighbor agreements to landowners of residential property immediately adjacent to proposed arrays and would negotiate such agreements in good faith. KSEC states that, since June 2021, they have offered and executed such agreements with non-participating landowners..

3.2.4.4 Property Values

Residents located near the proposed project have expressed concerns that construction of the solar generation facility would reduce their property values due to changes in views, rural character, and land use in the townships. Property values can be influenced by a complex interaction of factors specific to individual parcels. These factors can include, but are not limited to, condition, improvements, acreage, or neighborhood characteristics, as well as proximity to schools, parks, and other amenities. In addition, local and national market conditions often influence property values. The presence of a utility-scale solar PV facility would become one of many interacting factors that could affect a property's value.

Solar generating facilities have the potential to impact property values. Negative effects from these facilities could be the result of impacts that extend beyond the immediate footprint of the arrays. Examples could include noise and visual impacts. However, unlike fossil-fueled electric generating facilities, a PV facility would have no emissions and essentially no noise impacts to adjacent land uses during operation of the facility. The installation of PV facilities would create a visual impact, but lacking the height of smokestacks or wind turbines, the visual impact at ground level, or within a neighboring building, would be more limited. Some landowners may not like the change in the area from agricultural land use, however other landowners may prefer the solar project to other land uses, such as row crop agriculture, housing developments, or industrial buildings.

A review of peer-reviewed literature found no research specifically aimed at quantifying impacts to property values based solely on proximity to utility-scale PV facilities. As the industry continues to develop, comparable data should become available. For these reasons, the impact to the value of one particular property based solely on its proximity to a utility-scale PV facility is difficult to determine. Widespread negative impacts to property values are not anticipated. In certain situations it is possible that individual property values could be negatively impacted.

On a long-term basis, improper or incomplete decommissioning of the proposed project could adversely affect local property values.

3.2.4.5 Potential Property Damage

In this and previous dockets, members of the public have expressed concerns regarding property damage resulting from extreme weather events such as high winds and tornadoes. In previous dockets, developers have stated that the racking and tracker supports are designed to withstand wind loads of 175 MPH, which takes into consideration weather specific to southern Wisconsin, including the likelihood and intensity of tornadoes. In addition, proposed facilities would need to meet the site-specific wind load requirements of both the Wisconsin Department of Professional Services (DSPS) and the American Society of Civil Engineers (ASCE) 7-10. In the unlikely event that damage occurs to the project facilities or neighboring properties from extreme weather, these damages would be addressed in KSEC's commercial general liability insurance for bodily injury and/or property damage.

3.2.5 Land use plans

The zoning map provided in the Dane County Farmland Preservation Plan depicts that the land within the project area planned for construction of solar facilities is exclusively classified by Dane County Zoning as Agricultural Preservation Areas. As currently proposed, the fenced solar PV arrays, collector substation, interconnection switchyard, O&M building, and laydown area would not be in agricultural use while the facility is operational, which is not in keeping with the goal of using those acres as active farmland.

However, utility use is compatible with Wis. Stat. ch. 91 (Farmland Preservation) provided several conditions are met, which is discussed in detail in the Agriculture Use section of this EA. KSEC would allow landowners to continue to use leased land outside facility fences for any use that is compatible with operations of the project, including agriculture. KSEC may retain management of portions of property located outside of facility fences for project-related use

including but not limited to: vegetative buffers, native seed production, pollinator habitat, and access for maintenance of project facilities.[61]. KSEC stated they would explore the use of grazing by livestock to manage vegetation under the panels. The use of grazing sheep around the solar panels might allow the land to retain a more agricultural land use. The land could also be returned to agricultural use after the decommissioning of the solar farm. As such, the use of the leased properties for the solar facilities does not appear to be in conflict with the land use plans of the towns or county. More details would be available in the JDAs between KSEC, Dane County, the Towns of Christiana and Deerfield, and the Village of Cambridge. KSEC stated that they are actively pursuing JDAs with all four of these local government entities.

KSEC is not a public or investor-owned utility and does not possess eminent domain statutory authority. KSEC must secure long-term lease agreements with landowners in the project area to acquire the property for the project facilities. KSEC also applied additional setback distances from existing pipelines and electric transmission lines. Table 1.5.3.1 in the application[62] provides the proposed setback distances for the proposed project. Commission staff is unaware of any other local development plans that would have significant impacts from the installation of the solar facilities in the project area.

3.2.6 Sensitive receptors and environmental justice issues

Environmental justice seeks to prevent the impacts or burdens of development from being disproportionally placed on vulnerable populations. These are groups and communities at a higher risk for poor health as a result of the barriers they experience to social, economic, political and environmental resources, as well as limitations due to illness or disability. There are no areas of disproportionately high minority populations or low-income populations in the proposed project area.

Vulnerable populations include those individuals that are very young, elderly, or infirm. Local day care facilities, schools, hospitals, and elderly care facilities could have a greater potential to be affected by operational impacts associated with this project and/or construction impacts such as fugitive dust, increased noise, and increased traffic hazards. There are multiple sensitive sites within one mile of the project, including three schools, two childcare facilities, and a medical clinic in the Village of Cambridge. Fort HealthCare-Cambridge Family Practice is located approximately 350 feet northeast of the project, across USH 12 from proposed array area K5. Cambridge Elementary School, the adjoined Child Care Center, and associated playgrounds are located approximately 300 feet southeast of the project, on the other side of a tall-growing forested area from proposed array area L4. Most potential impacts to these sites could be mitigated by general best management practices during construction and subsequent operation of the facility.

3.2.7 Local jobs

There would be a short-term influx of contractor employees during the construction of the project. The communities near the project are expected to experience short-term positive economic impacts during this construction phase as the employees use various local businesses

[61] PSC REF#: 409957, Koshkonong Solar CPCN Appendix W Vegetation Management Strategy.
[62] PSC REF#: 409310, Koshkonong Solar CPCN Application - page 14.

for food, lodging, supplies, and fuel. Local vendors may also benefit from sales of some materials such as fuel, concrete, and aggregate materials.

The project construction workforce would consist of laborers, craft workers, and electricians, along with onsite management personnel. The project's contractor would likely use a traveling workforce as observed on projects currently being constructed. During peak construction periods, up to 600 workers are anticipated. KSEC estimates 308 of these jobs would be sourced within the State of Wisconsin, 74 coming from the Dane County workforce. KSEC expects the facility would employ up to five permanent maintenance technicians that are anticipated to reside locally in Dane County.

3.2.8 Local road, rail, and air traffic

3.2.8.1 Road Use and Traffic Impacts

There would be increased impacts to roads and traffic during the construction of the project as workers arrive and leave the site, deliveries are made, and any large machinery travels to or within the project area. KSEC provided a list of roads affected by construction in Table 3.3.5.1 of the application and potential for road damage in Section 3.3.4.3 of the application[63], as well as a map of affected roads in Appendix B[64]. KSEC estimates 25-35 daily deliveries of materials, using road legal trucks, depending on period of construction. KSEC does not anticipate using vehicles that are larger than standard flatbed and box trucks for deliveries, apart from an oversize vehicle needed for the main step-up transformer for the collector substation. The construction contractor would be tasked with obtaining any oversize-overweight permits closer to delivery dates. Any driveways onto state highways would need permits from WisDOT. KSEC should ensure that appropriate aggregate tracking pads are located on access roads to reduce the amount of soils deposited on local roads when vehicles exit a construction area. Road cleaning equipment may be necessary if mud or soils are tracked onto local roads. No substantial modifications of roads in the project area are expected prior to construction. KSEC does not expect to see road damage during the construction phase of the project. Repair of road damage is a subject that would be covered in the JDA with the affected local governments.

During construction, the volume of traffic in the project area would increase. KSEC would develop and review a traffic control plan with Town, County, or WISDOT officials as appropriate. Project signage would be used to guide trucks to the appropriate roads and staging areas. Trucks would not be allowed block public roads and if needed would be directed to a designated staging area. Deliveries would be expected throughout the project construction timeline, with most of the construction equipment arriving during the mobilization phase, aggregate and other road material early in the site development phase, and equipment deliveries throughout the installation process. Most deliveries would occur throughout the day, avoiding hours when residents are most likely to be driving to and from work.

3.2.8.2 Railroads

The project would not cross any railroads, and the proposed project is not expected to create impacts to railroads or rail traffic.

[63] PSC REF#: 409310, CPCN Application - pages 57-59.
[64] PSC REF#: 409374, Appendix B Maps Figure 8.5.1 Haul Routes

3.2.8.3 Air Traffic

The proposed project is not expected to impact air traffic. KSEC identified several airports, landing strips, and heliports within ten miles of the solar project facilities. KSEC provided a list of these facilities with descriptions in Table 5.14.1 of the application.

No impacts to air traffic are expected due to the limited maximum height of the panels, expected to be up to fifteen feet, and the distance of the facilities to airports in the project area. Transmission structures for the generator tie line are estimated to be between 90 and 130 feet in height. Project development would not trigger the need for any FAA Notice or WisDOT high structure permits. Therefore, KSEC has not considered further mitigation measures or other airport safety assurance for the project.

3.2.9 Municipal Services and Local Government Impacts

KSEC states it would not expect to require unique public services during construction or operation of the facility. Public services in the form of fire departments, law enforcement, and emergency services are provided by the state, counties, and municipalities where the project would be located. KSEC is engaged with Dane County, the Towns of Christiana and Deerfield, and the Village of Cambridge, and states it has made several attempt to negotiate a Joint Development Agreement (JDA) with these local government entities. The JDA is anticipated to include the dispute resolution process, road maintenance and repair, allocation of Utility Shared Revenue Funds, as well as several other issues listed in Section 6.1 of the application. However, KSEC asserts there has been very little response to their efforts to negotiate.

Cambridge Fire/EMS Department, located approximately 2 miles to the northeast of the collector substation, O&M building, and BESS, is the nearest emergency service. Deerfield Fire Department and Deer-Grove EMS Department are located approximately 4 miles north of the project. The O&M building would need a physical address that emergency services could use to respond to a call. KSEC states that the solar generation facilities would conform to all applicable electrical and fire codes, and would not present unique or unusual fire or other safety hazards. Most research on this topic is done on rooftop mounted solar facilities, and the specific risks for those scenarios. Guidance specific to ground mounted systems is usually focused on preventing the ability of a fire to spread beyond the array. Normal local fire and EMS service would be relied upon during construction and during facility operation. KSEC states it would provide a fire safety protocol for the project site to local authorities, which would outline procedures, safety drills, and training with local first responders.

During operation, the facility would obtain potable water from either an onsite well or via connection with the nearest municipal water service. KSEC would work with applicable local regulatory authorities to either install a new septic system or connect with the nearest municipal wastewater system.

3.2.9.1 Shared revenue

A solar energy generation facility is considered tax-exempt utility property in Wisconsin. The loss of property taxes from the land taken up by new generation facilities could be a negative impact to any hosting municipalities and counties. However, the project owners pay into a

shared revenue utility aid fund that is then distributed to both counties and municipalities by the Wisconsin Department of Revenue on an annual basis. If the proposed project is approved, Dane County and the Towns of Christiana and Deerfield would receive shared revenue payments based on the nameplate capacity of the facility and the number of residents in their jurisdiction. This shared revenue program would not apply to nearby municipal areas where the generation facilities were not constructed.

Under Wis. Stat. § 79.04, local municipalities are paid annually for generation that is located within their boundaries. A per capita limit is placed on the payments determined by the distribution formulas. The municipalities and counties that host a solar facility also qualify for an incentive payment under Wis. Stat. § 79.04(7)(c)1 which applies to production plants that derive energy from an alternative energy resource. This incentive payment would be an amount that is equal to the number of megawatts that represents the production plant's name plate capacity, multiplied by $4,000, for a total annual amount of $1,200,000.

KSEC's initial estimates are that Dane County would receive approximately $700,000 annually and the Towns of Christiana and Deerfield would receive a total of $500,000 annually as Megawatt-based and Incentive Payments under the current Utility Shared Revenue Formula.

3.2.10 Communication Towers

KSEC provided locational and descriptive data of communications towers, structures, and communications equipment near the proposed solar facilities. KSEC provided reports prepared by Comsearch describing communications facilities and electromagnetic interference (EMI) studies in the project area in Appendix O of the application materials, which conclude that no impacts to cell phone communications, radio broadcast, internet, television communication systems, Doppler radar, or airport radar systems are anticipated from the project.

3.2.11 Noise

Noise is unwanted sound considered unpleasant, loud, or disruptive to hearing. Noise is measured in units of decibels (dB) on a logarithmic scale. Because the human ear is not equally sensitive to sounds throughout the range of hearing frequencies, a weighted scale is commonly used, with the A weighted scale (dBA) most often used for sound measurements affecting human hearing. Due to the logarithmic scale of sound measurements, a change of 3 dBA is considered barely perceptible, while a change of 10 dBA is perceived as a doubling/halving of noise. For reference, the sound level of normal breathing is about 10 dBA, normal conversation at three feet is about 60 dBA, and emergency vehicle sirens are about 115 dBA.

Impacts associated with noise can be subjective and vary from person to person, based on factors such as loudness, environmental conditions, time of day, frequency, or duration, and the amount of other background noise audible to the listener. Most noise impacts caused by the project would occur during the construction phase due to the use of heavy machinery and particularly, use of pile drivers, which would likely be in use for six to eight weeks. Noise levels during operation of the solar facility are expected to be less than construction.

Construction noise would come from a series of intermittent sources, most of which would be diesel engine construction equipment. Because of the unique nature of large-scale solar projects,

construction would be spread over a large area. Construction noise impacts would vary significantly with time of day, stage of construction, and panel locations. Construction would occur primarily during daytime hours, so there should be little or no construction noise impact at night. During pile driving activities, the regularly spaced noises for the length of time of construction may be disruptive and annoying for nearby residents. Table 6 shows some of the typical noise levels at 50 feet for commonly used construction equipment.

Table 6 Average Maximum Noise Levels from Common Construction Equipment[65]

Equipment	Noise level at 50 feet (dBA)
Dozer	82
Grader	89
Excavator	81
Flat Bed Truck	74
Pile Driver	110
Crane	81
Roller	80

During operation of the solar facility, the primary source of noise would be the inverters, the transformers, the rotation of the tracking systems, and the BESS components. Because the facilities would not be generating electricity at night, the tracking systems would not be rotating and inverters should be silent. Noise from transformers and the BESS components could occur during nighttime operational hours.

In previous electric generation facility projects, the Commission has typically required that a post-construction noise survey be prepared as a condition of approval of the project. A similar post-construction noise survey would likely be required of this project to confirm noise impact assumptions.

3.2.11.1 Noise level standards

There are no statewide, county, or municipal noise standards for solar developments in Wisconsin, Dane County, or the Towns of Christiana and Deerfield, respectively.

3.2.11.2 Pre-Construction noise study

A pre-construction noise analysis determined the location of all noise-sensitive receptors located near the project, measured existing noise levels within the project study area, and predicted both construction and operational noise levels at noise-sensitive receptors. For more detailed information, refer to the pre-construction sound report, in Appendix P[66] of the application. Noise-sensitive receptors for this analysis included 397 residences. An ambient noise survey was conducted in the project area in March of 2021 according to the PSC Noise Protocol[67]. The most common and persistent sources of existing noise in the project area were natural sounds (birds, wind), distant traffic (Interstate 39/90, Route 73, and Highway 12/18), and local traffic.

[65] Sound levels taken from Washington State DOT Biological Assessment Training Manual, updated July 2019.
[66] PSC REF#: 409393, Appendix P – Noise Study
[67] Available at https://psc.wi.gov/SiteAssets/ConventionalNoiseProtocol.pdf

Less frequently observed noise sources included agricultural equipment aircraft overhead, and distant dog barks. Measured existing average broadband daytime noise levels range from approximately 34 to 63 dBA. Measured existing nighttime noise levels range from approximately 29 to 67 dBA. For areas removed from traffic, typical noise conditions were in the 30's dBA for light wind, 40's dBA moderate wind and greater than 50 dBA for high winds.

Noise levels from the full operation of the proposed project were predicted at each noise sensitive receptor. The modeling included ground attenuation factors of 0.0 (representing hard ground) and 0.5 (a conservative representation of farmland). A range of assumptions were made regarding the noise produced by various components, including inverters, transformers, the design of the BESS.

The analysis predicted worst-case sound level at a modeling receptor is 41 dBA. Therefore, the project sound levels would be well below the most restrictive Commission-designated nighttime standard for wind energy facilities of 45 dBA at all receptors, and mitigation measures are not anticipated to be necessary beyond those which were built into the noise model. Further, the worst-case sound level at 41 dBA is less than the measured existing nighttime noise levels ranging from approximately 43 to 54 dBA.

3.2.11.3 Noise levels during construction

KSEC performed an analysis to predict noise levels during site preparation, civil work (grading, etc.), mechanical assembly, and electrical assembly. Noise from construction would vary at each receptor depending on the type of equipment used, the distance from a receptor, and environmental conditions. Noise levels at the nearest residences to the construction site could reach as high as 74 dBA.

There are some residences that appear to be less than 200 feet away from construction areas, which may experience substantial disturbances from noise, especially during the pile driver operation in the area. The noise impacts caused by construction could be mitigated somewhat by limiting the hours of construction to daytime hours and weekdays. KSEC should communicate with nearby residences when construction work moves into an area to make them aware of increased noise and disturbance and provide contact information if there are any issues.

3.2.11.4 Post-construction noise complaints

If the project is approved, KSEC may be required by the Commission's order to collect post-construction noise measurements in accordance with the PSC Noise Protocol. These measurements are taken at the same places and during the same time periods as the pre-construction measurements. Two sets of measurements are required: one with the project in operation, and one where the facility would not be operating. This could identify any areas where actual sound levels were greater than predicted and higher than permitted levels. Given the stated assumptions in the noise analysis provided, this should be conducted to test noise levels, particularly near the substation, and the inverters, transformers and cooling systems at the BESS. KSEC states that they would investigate and mitigate to resolve any reasonable sound complaint submitted by landowners. Some mitigation measures KSEC may consider and implement include constructing a noise wall, adjusting the location of the collector substation

and BESS to be further from receptors, specifying lower noise equipment, or enclosing the equipment.

3.2.12 Visual impacts, Aesthetics, and Lighting

3.2.12.1 Aesthetics

The existing visual landscape of the project area is made up of large somewhat flat agricultural fields, with some woodlots and treelines interspersed with cropland. Several residences and farms dot the landscape along the roads near the project area, with a concentration of residential neighborhoods just east of the project in the Village of Cambridge. Existing transmission lines, distribution lines, and communications towers currently impact the aesthetics of the project area. The scenic value, or aesthetics, of any area is a subjective matter and can depend on the values and actions of the viewer. Whether a landowner sees any benefits from the project, directly or indirectly, has been shown to influence attitudes towards aesthetic impacts. Comments from the public during the EA scoping period described some frustration at the spread out footprint of the solar facility and amount of land changed from open agricultural fields to what is characterized by commenters as an industrial landscape. This impact to aesthetics was particularly brought up in reference to homes in the area and how the change in their landscape view may affect property values.

Approximately 2,292 acres would be converted from agricultural land to the solar facility, for at least 35 to50 years. Photo simulations of several points in the project area are provided as Appendix E[68] of the application. Because of their relatively low height, the solar facilities would not be visible at a great distance from the project. Most aesthetic impacts would occur to nearby road users and local residents.

Visual impacts of the solar arrays would include changing open agricultural fields with woodland edges to a view of mono-structural, industrial-appearing features across the span of the fields. In some areas, agricultural features and homes along the horizon would be obscured by the panels, with only thin bands of tree-line vegetation visible above the panels. KSEC's decision to use agricultural or "deer" fencing consisting of wide woven wire and wooden posts would lessen the visual impact of the facilities, when compared to other potential fence options such as chain link.

The visual impacts of the generator tie line would be minimal and likely not noticeable given existing infrastructure at that location. Visual impacts of the substation would be more substantial than PV array sites. Fencing requirements at substations are more substantial than around PV arrays, and chain link fence with barbed wire would be required, which increases aesthetic impacts. However, since the collector substation would be set back approximately 0.25 miles from the nearest road and houses, its impact to views would be less substantial.

The most effective way of mitigating aesthetic impacts of solar facilities is likely to be retaining existing vegetation between arrays and residences. If no vegetation exists, creating landscaping plans that use compatible vegetation to block or soften the view from a residence to the arrays may mitigate visual impacts. Finally, avoiding the placement of arrays on all sides of a

[68] PSC REF#: 409377 Koshkonong Solar CPCN Appendix E Photo Simulations

residence, allowing at least one unimpeded landscape view for a resident, or setting back panels on at least one side to a point where they are at the same level as a tree line, may mitigate aesthetic impacts.

3.2.12.2 Glint and Glare

Solar PV panels are constructed of dark, light-absorbing materials and covered with an anti-reflective coating designed to maximize absorption and minimize reflection. However, the glass surfaces of solar PV panels and metal supports do reflect sunlight to varying degrees throughout the day and year. The amount of reflected sunlight is based on the incidence angle of the sun relative to the light-sensitive receptor (e.g., a pilot or road user). The amount of reflection increases with lower incidence angles. The intensity of any light reflected from the solar panel would decrease with increasing distance, and landscape features such as vegetation could prevent glint or glare affecting a viewer. Topography can affect glint or glare, for example, a residence or road above a solar facility may experience more glare than when they are at the same level.

KSEC contracted Westwood to perform glare analyses[69] for the proposed project arrays using the ForgeSolar GlareGauge model. This evaluation included an analysis of potential glare to 86 residences and one hospital within the project study area, as well as 38 segments on 22 roadways within 500 feet of the project area. The hospital and all residences were modeled with two observation points (OP) at assumed observer heights of five feet and 15 feet above the ground to simulate first-floor and second-floor views. Roadways were evaluated at a height of 3.5 feet above the ground to account for automobile drivers.. The model provided the glint/glare results for resting angles of zero degrees at a height of nine feet and five degrees at a height of six feet. The predictions from the GlareGauge model are predicated upon certain assumptions and caveats, which can affect the accuracy of the glare analysis.[70]

The model classifies the impact of glare for an observer into three color-coded levels: low potential for producing an after-image (green), potential for producing an after-image (yellow), and potential for permanent eye damage (red). The model did not identify any potential for permanent eye damage instances (red) for any resident OP or route segments under any scenario, i.e. 0 or 5 degree rest angle and 6 or 9-foot array height. However, at a 0 degree rest angle the model did identify instances of low potential for producing an after-image (green) at 146 resident OPs and 29 route segments and potential for producing an after image (yellow) glare to 159 resident OPs and 35 route segments. With a 5 degree rest angle the model reported (green) glare to 40 resident OPs and 5 route segments and (yellow) glare to 22 resident OPs and 4 route segments. The remaining OPs and road segments are not expected to experience glint or glare effects. The sampling of arrays modeled at 9 feet essentially produced the same or less glare as arrays modeled at 6 feet.

KSEC is not proposed to be developed on or near a federally obligated airport or within five miles of an Air Traffic Control Tower cab. The Federal Aviation Administration (FAA) does not require glare analysis for aircraft flying over a photovoltaic solar energy system that is not located on a federally obligated airport. KSEC anticipates that, based on the FAA's analysis, any glint and glare from solar energy systems experienced by pilots flying through the project area

[69] PSC REF#: 409394, Koshkonong Solar CPCN Appendix Q Glare Study
[70] https://www.forgesolar.com/help/

would also be similar to glint and glare pilots routinely experience from water bodies, glass-façade buildings, parking lots, and similar features.

KSEC states it is confident that glare will not present safety issues. Visual impacts from project-related glare are expected to be mitigatable, minimal, or insignificant. KSEC would utilize a single-axis tracking system that would enable the surface of the panels to follow the position of the sun on a single-axis. Due to this feature, steep glancing angles would be minimized to the extent practicable. Slight adjustments could be made to the module angle for single-axis tracking systems to reduce or eliminate glare to receptors at elevations similar to the arrays when glare is encountered near sunrise and sunset. However, notable production losses would be incurred by changing the array angles. For this reason, KSEC may prefer to use visual buffers or obstructions, such as vegetation or fencing, to address any glare-related concerns.

KSEC states that in the event of a complaint about glare by a resident within or outside of the project area, GlareGauge modeling would likely be used to assess the extent and time of day of glare at the point of concern and to determine potential mitigation options. However, there may be limitations to the model that do not accurately represent all variables that could lead to glare, so it is unclear how modeling afterwards would document glare better than reports and documentation by viewers on the ground in the area. If glint or glare prove to be problematic for an observer, KSEC stated they may use fencing, vegetation, or other objects of obstructive nature to mitigate glint or glare effects, or possibly slightly adjust the resting angle. KSEC expects nighttime resting angles to be consistent across the project area and states they would seek to minimize any potential impacts from glint or glare during final engineering of the site. The planned overnight resting angle for the proposed solar arrays varies across tracker manufacturers and the planned resting angle would be determined during final design engineering. The resting angle would likely be approximately 0 degrees to 30 degrees. As more solar energy facilities are constructed and come into operation, practical experience would help establish guidelines that may be appropriate for Commission staff to suggest for Commission consideration.

3.2.12.3 Lighting

The proposed project would primarily be constructed during daylight hours, however, KSEC states in the application that if an extension to available working hours is needed, temporary lighting of workspaces may occur. Portable temporary light plants and associated generators on a trailer could be moved around the construction site as needed. The main parking and laydown area may have lighting installed on poles to support construction during non-daylight hours. KSEC states that it and its contractors would utilize temporary lights on the project site for safety purposes.

During operation of the facilities, the O&M building and collector substation would have lighting for security and safety of workers. The O&M area would include down-shielded lighting, most likely turned on either by a local switch, as needed. Installing motion sensors that would be triggered by movement would reduce impacts to nearby residences compared to outdoor lighting that is constantly on.

3.2.13 Public Lands and Recreation

While there are no recreational resources located within the project area, KSEC identified one county park and one state trail within two miles of the project study area, and one state natural

area adjacent to the project. CamRock County Park is located across Highland Road, directly east of proposed array area X. The project would likely be visible from several portions of that property. Glacial Drumlin State Trail is located approximately 0.3 miles north of the project study area. The project would likely be visible from several portions of the trail.

KSEC states that they are engaged with and support the efforts of the CamRock Bike Trail Connector Committee and Dane County to create a bike trail connecting the CamRock County Park to the Glacial Drumlin State Trail, which would traverse through a portion of the nearby proposed array area C. KSEC states that they have donated to the effort, shared field wetland delineation data for the section that traverses through the project area, offered to setback solar facilities from the proposed trail route, and will continue working with the applicable parties to help implement the project.

Smith-Reiner Drumlin Prairie State Natural Area is located between Array Areas Q and T. The project is not expected to physically disturb the natural area during construction or operation. However, despite some visual screening from existing trees, it would likely be visible throughout the natural area to the northeast and west, especially at the top of the drumlin.

There are no other federal wildlife refuges, federal parks, federal scenic riverways, state wildlife areas, state fisheries areas, state parks, state forests, state recreational trails, county parks, or city parks within two miles of the project area.

Land occupied by the arrays would be unavailable for hunting or other access by the public or landowners. Seasonal snowmobile trails on private lands exist within the project area. KSEC states they have been in contact with the Utica Nora Rockdale Trailblazers and would work with this organization to propose alternate routes as applicable for the continued use and enjoyment of this trail system.

3.2.14 Electromagnetic Fields

Electricity produces two types of fields, electric and magnetic, which are often combined and referred to as electromagnetic fields or EMF. Electric fields are associated with any device or wire that is connected to a source of electricity, even when current is not flowing. Magnetic fields are only created when there is an electric current, and are proportional to the current flow through an electric line. Electric fields are typically reduced to a negligible level by the inclusion of "shielding cables," which are electrical conductors encasing the current-carrying conductor. Magnetic fields are generally more difficult to reduce. Concerns regarding exposure to EMF are often raised during power plant and transmission line construction cases.

One way to lower the public's exposure to the magnetic fields generated by transmission lines is to increase the distance of the conductors from the public. The magnetic fields decrease drastically with distance. Another way to reduce the public's exposure to magnetic fields is to use multiple current-carrying conductors to partially cancel the magnetic fields. In nature, magnetic fields interact with each other and can partially or fully cancel out when the fields are moving in opposite directions. Transmission system planners can make use of this knowledge and incorporate such natural cancellations into their design process.

Magnetic fields are measured or estimated in units of Gauss (G) or milligauss (mG) (a milligauss is equal to 1/1000th of a Gauss). Measurements of power line EMF are typically reported in mG.

Magnetic field levels have been estimated for the proposed generator tie line. These levels vary from location to location due to differences in current flows, conductor arrangement, and the cancellation effect of fields generated by other nearby electric transmission and distribution lines. The magnetic field is calculated to be 12.8 mG for the underground circuits, and 319.41 mG for the maximum overhead circuit. KSEC predicts zero electric field from the underground circuits and 5.34 kV/m maximum from the overhead circuits. The range accounts for different configurations of the proposed tie-line where the minimum vertical clearance could be 16.5 feet to 40 feet above ground. For more detailed information, refer to the EMF report, in Appendix N[71]. For more information on EMF and human health, a free publication, entitled EMF – Electric and Magnetic Fields is available on the PSCW web site.[72]

[71] PSC REF#: 409385, Appendix N – EMF Study
[72] https://psc.wi.gov/Documents/Brochures/EMF.pdf

4. Evaluation of Reasonable Alternatives and Some of their Environmental Consequences

4.1 No Action Alternative

The no action alternative, which would be a denial of KSEC's application, is a potential outcome of the Commission's consideration of this application. Another no action alternative would have been KSEC choosing not to make the effort to bring this potential project to the Commission in the first place, or that effort falling short prior to filing an application with the Commission. The potential environmental consequences, or benefits, of the proposed project described in this EA would not occur if the Commission denies the application or if KSEC had never filed an application with the Commission.

4.2 Alternative Sites for PV Arrays

KSEC proposed a grouping of arrays that could serve as sites for the proposed 300 MW solar project. Wisconsin. Stat. § 196.491(3)(d)3 requires the Commission to consider alternative locations when determining whether a proposed generating plant is in the public interest. Wisconsin Admin. Code §§ PSC 111.53(1)(e) and (f), which implement this statutory provision, require a CPCN application to describe the siting process, to identify the factors considered in choosing the alternative sites, and to include specific site-related information for each site. Based on previous Commission process with large wind energy systems, this has been interpreted as requiring the applicant provide 25 percent additional siting areas with the proposed project as an alternative. These alternative arrays provide options the Commission could select as allowable areas for the installation of the solar electric generation facility. The Commission will account for a wide variety of factors as it reaches its decision about what sites in the proposed project area could be utilized for the installation of the solar arrays.

4.3 Other Alternatives

An alternative to the solar PV facility could take the form of other energy generation technologies, such as wind energy systems, coal, or natural gas electric generation facilities. Any alternative generation facility would have its own suite of impacts on the human environment, some of which would be similar to those discussed in this EA. Other impacts, such as air quality impacts, would be significantly different if an alternative that utilized fossil fuels was considered. All forms of combustible fuels, both fossil fuels and biomass, create some amount of air pollution, which would be subject to air permitting requirements.

5. Wisconsin Environmental Policy Act Determination

Wisconsin Admin. Code § PSC 4.20(2)(d) identifies ten broad factors that are useful to consider when evaluating whether an EIS is warranted for a given Commission action. The following subsections consider and discuss each of the ten factors with respect to this case.

5.1 Effects on geographically important or scarce resources, such as historic resources, scenic or recreational resources, prime farmland, threatened or endangered species, and ecologically important areas

No geographically important or scarce resources were identified within the area to be affected by construction of the proposed project. If proposed mitigation actions are followed, the proposed project is not expected to significantly affect historic resources, scenic or recreational resources, threatened or endangered species, or ecologically important areas. There would be agricultural land taken out of production, including areas classified as prime farmland, for the duration of the project's operation. When the project is eventually decommissioned, these agricultural areas may again be available for production.

5.2 Conflicts with federal, state, or local plans or policies

The large-scale, industrial-like, solar facilities proposed do not seem to be in keeping with the exclusive agricultural designation of the project area in local land use plans. The solar farm is intended to be a long-term non-agricultural land use. Applicable land use plans currently allow for solar energy production as a permitted or conditional use of land designated as agricultural preservation. The solar facilities would not interfere with farming on adjacent lands. When the project is decommissioned, the project lands could be returned to agricultural use. The Village of Cambridge feels that the encroachment of a facility of this nature within the current extra-territorial boundaries detailed in its smart growth plan represent an unreasonable interference with its orderly land use and development plans, constrain its orderly growth, hinder the proper operation and financing of its existing infrastructure, and hinder its ability to expand.

5.3 Significant controversy associated with the proposed action

Notice of the proposed project was sent to local municipal offices and local media, as well as potentially impacted landowners. The Commission is not aware of any controversies regarding the type, magnitude, or significance of the expected environmental impacts related to the proposed project.

5.4 Irreversible environmental effects

Few aspects of the proposed project would be truly irreversible, although reversing project actions would incur significant costs and create additional disturbance and environmental effects. Short-term impacts such as noise, air quality, disturbance to local residents, erosion, and removal of vegetation would occur as a result of construction activities, and would be irreversible. Fuels and some construction materials would be irreversibly committed and unavailable for other uses. It is expected that at the end of the useful life of this project, with an effective de-commissioning process undertaken, that the land and resources impacted from this project could return to a state similar or the same as it was prior to the construction of the project.

5.5 New environmental effects

The installation of all the solar generation facility infrastructure would be new environmental effects in the project area. The physical presence of these facilities on the landscape would create environmental effects, or changes, relating to land use, aesthetics, wildlife impacts, changes to vegetation, and storm water runoff and infiltration.

Although the Commission has approved several large solar projects in the state so far, only two of those projects has been fully constructed and placed in operation at the time of this review, and there are still uncertainties regarding some of the potential impacts that might occur as a result of this project. The installation of smaller solar PV facilities has occurred elsewhere in the state, but impacts created by those projects are unlikely to be accurately extrapolated for utility-scale projects in general. The large increase in fenced acreage along roadsides no longer accessible to certain wildlife could have effects on how animals move through the wider project area. Water movement and drainage throughout the impacted site would change from the original patterns and would have to be managed accordingly.

5.6 Unavoidable environmental effects

Construction of the proposed project would result in some unavoidable environmental effects in the project area that could not be avoided by array location, route selection, or construction methods. Some of these could be reduced or minimized, but would not be entirely eliminated as a result of project activities. Some of the unavoidable environmental effects would occur during construction, such as:

- Soil compaction and erosion,
- Storm water ponding and runoff,
- Disturbance to nearby residents due to noise, dust, and vibration,
- Air quality impacts as a result of diesel fumes and dust,
- Disturbance of wildlife,
- Increased traffic in the project area, and
- Cutting or alteration of vegetation.

There would be some unavoidable impacts caused by the proposed project that would be longer term, likely lasting the entire time the project is in operation. These long-term unavoidable environmental effects include:

- Removal of agricultural land from production,
- Aesthetic impacts due to the change from a typical rural landscape to a more industrial appearance, and;
- Displacement of wildlife that previously was able to access the fenced array sites.
- Different surface water drainage patterns than currently exist.

5.7 Precedent-setting nature of the proposed action

This is one of several recent large utility-scale solar electric generation facilities to be reviewed by the Commission. Most of the reviewed projects thus far that have been proposed by wholesale merchant plants have been acquired or are being proposed to be acquired by public utilities. While this is one of many currently proposed utility scale solar developments in

Wisconsin, along with those already in operation and under construction, this project does not appear to set any unique precedents.

5.8 Cumulative effect of the proposed action when combined with other actions and the cumulative effect of repeated actions of the type proposed

The construction of more solar arrays in the project area, or possibly elsewhere in the state, would exacerbate some of the impacts that may be caused by this proposed project. Another large solar array would remove additional lands from agricultural use, or if no agricultural fields are available, another project may cause increased impacts to more natural areas such as wetlands, forests, or natural grasslands. Another large solar array would likely use similar fencing around the arrays, further restricting the movement of wildlife through the area and access to habitat. Additional facilities in the area would increase the impact to aesthetics and the local rural character. Further solar farm construction could displace fossil-fueled generation, benefitting air quality in areas near those types of generation sites.

5.9 Foreclosure of future options

The construction of the proposed solar generation facility would remove fields from agricultural production or any other use during the operational life of the project, which is proposed to be at least 35 years. With an effective de-commissioning of the project at the end of its useful life, it appears that the lands being used for the facility could be returned to agricultural production or other uses.

5.10 Direct and indirect environmental effects

There would be both direct and indirect environmental effects as a result of this project. The analysis of the proposed project by Commission staff assumes that the multiple construction methods and BMPs described in the applications and responses to data requests are implemented.

The direct impacts include disturbance to vegetation in areas of more natural habitat, where the fields are not already cleared of vegetation. There is an increased risk of soil erosion during excavation activities or if grading is done prior to vegetation establishment. In areas near wetlands and waterways, soil erosion can cause sedimentation. Topsoil loss or deposition can occur on cropland. Storm water and erosion control methods can decrease this risk. Site stabilization and restoration actions, including prompt vegetation establishment on disturbed soils, can allow soil and vegetation disturbance to be temporary. Disturbed soils can be high-risk areas for invasion by non-native invasive plants. This would be an indirect and potentially long-term negative effect on the environment, particularly if difficult to control plants such as non-native phragmites were able to establish. Therefore, loose soils should be stabilized with non-invasive cover crops as soon as possible. Machinery or equipment should be cleaned in accordance with invasive species BMPs as applicable.

Construction in and through agricultural fields would result in both temporary and long-term impacts. The solar PV arrays, new collector substation, and O&M building would be out of agricultural production for the operational life of the project--potentially 35 years or more. Soil compaction and topsoil loss in agricultural fields are serious concerns and can impact future productivity. If drainage tiles are broken or damaged, the drainage of the array and surrounding

fields could be affected, although some impacts might not be immediately known. The use of BMPs and post-construction soil restoration can reduce many direct impacts to agricultural operations. The eventual impacts of decommissioning the project site are not well known, but it is likely that thorough decommissioning, including decompacting soils and repairing any damaged drainage tiles, would allow for a return to agricultural use.

During construction activities, there would be increased noise, dust, and vibration in the construction areas. There would be increased traffic in the project area as employees and deliveries arrive and leave the project work areas. A visual change in the project area from open agricultural fields to a more industrial landscape would affect likely viewers differently. Some landowners that do not receive direct benefits from the project may react more negatively to the proposed project. Site-specific landscaping plans or larger set back distances might limit the impacts to adjacent landowners.

Areas through which wildlife currently freely pass would be fenced, restricting movement and use by certain species. Direct displacement of species could occur during construction activities. Indirect effects of the proposed project could include increased pressure on or use of adjacent, non-fenced areas, and changes in overall wildlife movement and habitat usage. There could be negative effects, including mortality or injury, on birds due to the generator tie line and, potentially, the solar arrays. The environment could benefit from the use of a diverse native seed mix, particularly one that contains a range of flowering plants known to benefit pollinator species. The level of that effect would depend on the amount of, and location of, any land planted with a more 'pollinator-friendly' seed mix. The reduced amount of herbicides would be a benefit to biodiversity and local water quality.

Air quality would be improved by the displacement of fossil-fueled power generation by non-emitting solar-generated electricity.

The lease and easement payments to landowners and shared revenue dollars to the county and township could have an indirect net positive impact on the long-term economy of the area.

6. Recommendation

This EA informs the Commissioners, the affected public, and other interested people about the proposed project and its potential environmental and social impacts. Through data requests, additional analyses, and a review of public comments, Commission staff has attempted to provide very thorough, factual and up-to-date information about the project, potential impacts of the proposed project, and the mitigation measures that could address some of those potential impacts.

The EA concludes that construction and operation of the solar generation facility would be likely to have a range of environmental effects. Commission staff has not identified any potential environmental effects of the proposed project that could be considered significant. This evaluation is arrived at assuming that some, if not all, of the mitigation measures proposed by KSEC and Commission and DNR staff are used.

This assessment finds that approval and construction of this project is unlikely to have a significant impact on the human environment as defined by Wis. Stat. § 1.11, therefore the preparation of an EIS is not required.

__X__ Environmental review complete. Preparation of an environmental impact statement is not necessary.

_____ Prepare an environmental impact statement.

Submitted by: Tyler Tomaszewski
Environmental Analysis and Review Specialist

Date: October 15, 2021

This environmental assessment complies with Wis. Stat. § 1.11 and Wis. Admin. Code § PSC 4.20.

By:

Adam Ingwell, Environmental Affairs, WEPA Coordinator

Date: November 11, 2021

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§	Section
AC	Alternating current
BMP	Best management practices
CdTe	Cadmium telluride
ch.	Chapter
Commission	Public Service Commission of Wisconsin
CPCN	Certificate of Public Convenience and Necessity
CTH	County Trunk Highway
dB	Decibel
DC	Direct current
DNR	Department of Natural Resources
DPP	Definitive Planning Phase
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMF	Electric and magnetic fields
EPA	U.S. Environmental Protection Agency
ER	Endangered resources
FAA	Federal Aviation Administration
G	Gauss
HDD	Horizontal directional drilling
JDA	Joint Development Agreement
kV	Kilovolt
mG	Milligauss
MISO	Midcontinent Independent System Operator, Inc.
MP	Measurement point
MW	Megawatt
NEC	National Electric Code
NESC	National Electrical Safety Code
NEV	Neutral-to-earth voltage
NHI	Natural Heritage Inventory
NRHP	National Register of Historic Places
O&M	Operations and maintenance
PPA	Purchase power agreements
PSC	Public Service Commission of Wisconsin
PV	Photovoltaic
ROW	Right-of-way
STH	State Highway
TCSB	Temporary clear span bridge
USACE	U.S. Army Corps of Engineers
US EPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WEPA	Wisconsin Environmental Policy Act
WEPCO	Wisconsin Electric Power Company
WHS	Wisconsin Historical Society
Wis. Admin. Code	Wisconsin Administrative Code
Wis. Stat.	Wisconsin Statutes
WisDOT	Wisconsin Department of Transportation