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PUBLIC SERVICE COMMISSION OF WISCONSIN
WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Vista Sands Solar

Draft Environmental Impact Statement

PSC Docket 9820-CE-100

Date Issued: April 2024

PUBLIC SERVICE COMMISSION OF WISCONSIN

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Vista Sands Solar

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This draft Environmental Impact Statement for the proposed Vista Sands Solar project, and the proposals of Vista Sands Solar LLC to construct a photovoltaic electric generating facility, a battery energy storage system, collector and project substations and related transmission facilities towards compliance with the Public Service Commission's requirement under Wis. Stat. § 1.11 and Wis. Admin. Code § PSC 4.30. It also is progress toward compliance with the Department of Natural Resources requirements under Wis. Admin. Code § NR 150.22.

By: Date: April 29, 2024

Adam Ingwell
WEPA Coordinator
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Questions about information provided in this draft Environmental Impact Statement should be directed to:

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To the Reader

This draft environmental impact statement (EIS) fulfills part of the requirements of the Wisconsin Environmental Policy Act (WEPA) Wis. Stat. § 1.11. WEPA requires state agencies to consider environmental factors when making major decisions. The purpose of this EIS is to provide the decision makers, the public, and other stakeholders with an analysis of the social, cultural, and environmental impacts that could result from the construction of a new solar generating facility and its associated facilities. This document has been prepared jointly by the Public Service Commission of Wisconsin (Commission or PSC) and the Wisconsin Department of Natural Resources (DNR).

You are encouraged to comment on this draft EIS. The state agency comment period on this draft EIS ends on June 14, 2024. Please use the PSC docket number 9820-CE-100 on all e-mail and correspondence. Written comments should be addressed to:

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Comments may also be submitted electronically at the Commission's web site at http://psc.wi.gov. Once at the site, click on the "File a Public Comment" link under eServices at the bottom of the page. On the next page select the "File a comment" link that appears on the left side of the page. Locate the Vista Sands Solar docket (9820-CE-100) and file a comment. Specific questions on the draft EIS should be addressed to:

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Comments received during the comment period will be used to prepare the final EIS, which will become part of the record used by the Commission to make its final decisions on this project. At

this time, the Commission decision on the proposed project is expected in December of 2024 or January of 2025.

The Commission decision on the merits of this project will be based on the record of a public hearing that will be held about 30 days after the final EIS is issued. When the final EIS is prepared, the Commission will issue a Notice of Hearing. The hearing will satisfy the WEPA requirements of the Commission and DNR. The final EIS and testimony from the public hearing will be included in the hearing record.

If necessary, DNR will hold separate hearings on its water permits or other DNR regulatory actions discussed in this draft EIS.

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Contributors and Reviewers

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Public Service Commission

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Executive Summary

PROPOSAL

On January 3, 2024, Vista Sands Solar, LLC (Vista Sands), an affiliate of Doral Renewables, 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 (docket 9820-CE-100)[1] in the Village of Plover and towns of Grant, Plover, and Buena Vista in Portage County. The solar facility would have a nameplate capacity of 1,310.4 megawatts (MW). The proposed project would also include a 300 MW Battery Energy Storage System (BESS). It would also include construction of five new project substations, 4 to 6.5 miles of 345 kilovolt (kV) transmission line, and three 138 kV transmissions lines totaling 6 to 8 miles, depending on the project route. The project would also include and an approximately 1,600 foot long 345 kV generation tie line (gen-tie) that connects the facility to the transmission system. Vista Sand'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 January 25th, 2024[2]. Vista Sands 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 Federal Express (FedEx) on February 2, 2024[3].

The Vista Sands generation facility (also referred to as 'the project') would be a 1,310.4 MW alternating current (AC) photovoltaic (PV) electric generation site. The proposed project would be made up of separately fenced arrays, and approximately 6,737 acres would ultimately be used to reach the 1,310.4 MW capacity. Underground collector circuits would go from the arrays to a new collector substation. A 1,600-foot 345 kilovolt (kV) generator tie line would take the electricity to the existing Rocky Run to Werner West 345 kV transmission line, 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 transmission portion of this project would be longer than one mile and therefore requires CPCPN approval. The applicant submitted a transmission portion of the application to this docket and this EIS includes impacts from all proposed project facilities.

The majority of the land needed for the project would be leased from landowners. Vista Sands would develop, design, permit, and construct the generation facility and BESS, and may sell it to a utility or another independent power producer.

[1] PSC REF#: 487839, Vista Sands Solar CPCN Application and PSC REF #487840 Vista Sand TLine CPCN
[2] PSC REF#: 489626, Completeness Determination Letter
[3] PSC REF#: 490440, Proof of Deemed Complete Application Mailing to Clerks and Libraries

Project Location

The proposed project would be constructed in the Village of Plover and towns of Grant, Plover, and Buena Vista in Portage County. The project study area is predominantly agricultural rural landscape, south of Highway 54 that enters the Village of Plover. The overall acreage evaluated for inclusion totaled approximately 9,854 acres and the proposed project would occur on 6,737 acres total. The project as proposed would include the proposed solar arrays, five laydown yards (2.3 acres, 11.5 acres, 10.1 acres, 13 acres, and 2.7 acres), 32 miles of permanent access roads. The proposed facility area (totaling approximately 189 acres) is included in the proposed project area and includes five substations, one 300 MW battery energy storage system (BESS) and two operation and maintenance (O&M building) buildings (each requiring an area of 40,000 square feet).

The proposed project would also include the construction of 5 to 6.5 miles of 345 kV high-voltage transmission line and three new 2 to 4-mile 138kV of high voltage transmission lines. Specifically, the proposed routes of transmission facilities would include one 2.24 mile 138 kV line, one 3.43 mile 138 kV line, one 2.74 mile 138kV line, and one 5.12 mile 345kV line. The acres necessary for each proposed and alternative transmission routing option are described in the sections below.

In addition to the transmission facilities, a 1,600-foot generation tie line connecting the project to the existing Rocky Run to Werner West 345 kV transmission line.

The applicant does not propose to prepare the site or create any site disturbance for the construction of the interconnection switchyard. Vista Sands has waived its right to build the switching station in the MISO interconnection process and anticipates that ATC would be responsible to constructing the switching station and preparing the site for construction. [4] Separate PSC approval of the switching station construction would be necessary.

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). The BESS is a Type II action under Wis. Admin. Code § PSC 4.10(2). The Commission is preparing this EIS to evaluate the location of the project and its potential environmental and community impacts.

An EIS is required if an EA or staff analysis determines there are significant impacts to the environment as a result of the project.

Notification[5] 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 February 1, 2024. The WEPA mailing list includes:

[4] PSC REF#: 493477: Response-Data Request-PSC-Grant-3.23-r
[5] PSC REF#: 490308, Environmental Assessment Scoping Letter

- 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 the Public Comments section of this document.

DECISION TO PREPARE AN ENVIRONMENTAL IMPACT STATEMENT

The solar electric generation facility is a Type III action under Wis. Admin. Code § PSC 4.10(3). The BESS is a Type II action under Wis. Admin. Code § PSC 4.10(2). Type II actions are proposed actions involving requests for Commission approval that have the potential to significantly affect the quality of the human environment, within the meaning of s. 1.11 (2) (c), Wis. Stats. However, under Wis. Admin. Code § PSC 4.10(1), the Commission shall also prepare an EIS for actions not listed in Table 1 of Wis. Admin. Code § PSC 4 that it determines are Type I actions.

Ongoing staff analysis and public comments received suggested that this project warranted the preparation of an EIS for significant effects on the human environment. The DEIS addresses the considerations identified in Wis. Admin. Code § PSC 4.20(2)(d), including, but not necessarily limited to, the following:

- Effects on geographically important or scarce resources, such as historic or cultural resources, scenic or recreational resources, prime farmland, threatened or endangered species and ecologically important areas.
- Conflicts with federal, state or local plans or policies
- No controversy associated with the proposed action.
- Irreversible environmental effects.
- New environmental effects.
- The cumulative effect of the proposed action when combined with other actions and the cumulative effect of repeated actions of the type proposed.
- The foreclosure of future options.
- Direct and indirect environmental effects. The comments received by the Commission in response to its initial public notification letter mailed on February 1, 2024, satisfy the scoping requirements listed in Wis. Admin. Code § PSC 4.30(2).

SCOPE OF ENVIRONMENTAL REVIEW

The Commission's Division of Digital Access, Consumer, and Environmental Affairs (DACEA) prepared this draft Environmental Impact Statement (DEIS) in cooperation with the Department of Natural Resources (DNR) Office of Energy. The Commission sent an Environmental Assessment Notification/Scoping Letter to interested individuals, landowners, and other parties on February 1st, 2024. On March 8th, 2024 the Commission determined that an EIS will be necessary for this project and sent an EIS Preparation Notification Letter. [6]

This EIS is being submitted as an exhibit in the technical hearing on the proposed project. The scope of the EIS is to review and describe the expected or potential impacts the construction and operation of the proposed project would have on the environment. This includes impacts to the local residents and community as well as natural resources. The EIS also addresses potential ways impacts could be avoided or mitigated. The analysis in the EIS is provided to the public, intervenors, and the Commissioners to inform comments and decisions regarding the proposed project.

INFORMATION RECEIVED DURING EIS PROCESS

In addition to public comments received during the EA notification/scoping period, additional contributors to the EIS are listed here:

Contributors to EIS

No other persons besides staff at DNR and the Commission were contacted or involved in the preparation of this EIS. The following DNR and Commission staff contributed to the EIS:

- Geri Radermacher, DNR Office of Energy provided information about wetlands and waterway impacts and permit requirements and assisted with related EIS sections.
- Samantha Whitens, DNR Stormwater Engineer, provided information regarding stormwater.
- Stacy Rowe, DNR Conservation Biologist, Bureau of Environmental Analysis and Sustainability, provided information about potential impacts to endangered resources and assisted with related EIS sections.
- Lesa Kardash, Wildlife Biologist, DNR Bureau of Wildlife Management, provided information on Greater Prairie Chicken and Wildlife and assisted with related EIS sections.
- Anna Edmunds, PSC Environmental Analysis and Review Specialist, prepared the EIS
- Kayla Golden, PSC Public Service Engineer, assisted with EIS sections on purpose and need, technical information.
- Bert Chee, PSC Public Service Engineer, assisted with EIS sections on purpose and need, technical information.

[6] PSC REF # 493574, EIS Preparation Notification Letter

CPCN Hearing and Intervenors

The Commission issued a Notice of Proceeding for the docket on March 7, 2024,[7] 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 public hearing on the project is still to be scheduled, including any potential location. The technical hearing for parties to the proceeding will be held on August 16, 2024, via Zoom.

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

- RENEW Wisconsin (RENEW)
- Clean Wisconsin
- Town of Grant
- Town of Plover
- Wisconsin Wildlife Federation (WWF)

Public Comments

On February 1st, 2024 Commission staff sent an Environmental Assessment Scoping Letter[8] soliciting comments from the public, including property owners near the proposed project, individuals who had asked to be placed on the mailing list, or individuals who have expressed interest in the project. The letter was also sent to public officials, the news media, and area legislators. One hundred and fourteen (114) comments were received regarding the potential impacts of the project. General topics covered in public comments included general support for renewable energy, wildlife concerns, flooding concerns, agricultural land use concerns, future land use impacts, future water main development impacts, nearby public and state managed land use impacts, and potential impacts to the greater prairie chicken.

Staff reviewed all public comments submitted during the scoping period. Specific concerns raised in public comments are addressed in issue specific sections of this DEIS.

On March 8, 2024, Commission staff determined that ongoing staff analysis of the project, including the analysis of new information submitted as a part of the public comment period, warranted the preparation of an EIS.[9] The comments received by the Commission in response to its initial public notification letter mailed on February 1, 2024, satisfy the scoping requirements listed in Wis. Admin. Code § PSC 4.30(2).

PERMIT COMPLIANCE

Vista Sands 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

[7] PSC REF#: 493459, Notice of Proceeding Signed and Served3/7/2024
[8] PSC REF#: 490308 Environmental Assessment Scoping Letter
[9] PSC REF#: 493574 EIS Preparation Notification Letter

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 ES-1 Regulatory Requirements

Agency	Interest or Permit	Contact	Application/Notice Date	Status
Federal				
FAA	Federal Regulation Title 14 Part 77		Q4, 2023	
U.S. Army Corps of Engineers ("USACE")	Section 404 Wetland Permit		Q1, 2025	
U.S. Fish and Wildlife Service ("USFWS")	Federal Endangered Species Act ("ESA") Coordination	Dawn S. Marsh (952) 252-0092		Coordination Ongoing
State				
PSC	CPCN for construction of large energy generation facility of 100MW or more		Q1, 2024	To be submitted Q1, 2024
DNR	Wisconsin Pollutant Discharge Elimination System / Stormwater Runoff Permit (NR216)	Samantha Whitens (608) 301-6110	Q1, 2025	
DNR	General or Individual Permit for discharge of dredged or fill material into a wetland.	Geri Radermacher (262) 239-0994	Q1, 2025	
DNR	Wisconsin Endangered Species Law (s. 29.604, Wis. Stats.)	Stacy Rowe (608) 266-7012	Q2 2023	Coordination Completed
Wisconsin State Historical Society Historic Preservation Office	Cultural Resources (historical and archaeological) under Section 106 of the National Historic Preservation Act	Chip Brown (608) 264-6508	Q4, 2023	
Wisconsin Department of Transportation (WisDOT)	Heavy and oversized load permits	Bob Fasick (920) 492-0148	Anticipated Q2, 2025	
DATCP	Portage County Drainage District (ATCP 48.44 (related obstructing or altering district drains))	Richard Rashhke (715) 340-5656	Anticipated Q2, 2025	Ongoing
Local (to the extent the requirement to get such permits is not otherwise preempted by the CPCN)				
Town of Grant	Driveway Access Permit Ordinance	Mary Rutz (715) 421-9200	Q2, 2024	
Town of Plover	Building Permit	715-344-7684	Anticipated Q2, 2024	

County and local governments have numerous responsibilities that can be addressed during the Commission's CPCN project review. Vista Sands has discussed the project and maintains regular contact with representatives at the towns of Grant, Buena Vista, and Plover, as well as Portage County. Portage County's planning and zoning land use permits may not be required because the project is going through the state CPCN process. However, shoreland protection and floodplain zoning regulation is retained by Portage County. Potential effects on a local government jurisdiction would be considered by the Commission as an impact on the existing local social environment. Appendices E of the application contains a record of local plans.[10]

[10] PSC REF#: 487965 through 487974 Local Plans Part 1 through 10

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1. Project Description and Overview

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

1.1. PURPOSE, NEED, AND OWNERSHIP

Wisconsin Admin. Code § PSC 4.20(2)(a) directs the EIS 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[11] 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. Since many Wisconsin utilities have publicly expressed the need for solar power and have plans to decommission fossil fuel power plants, it is possible that this project would be purchased by a utility if approved.

Utility-scale solar electricity generation facilities can provide relatively low-cost energy for sale due to lower costs for operations and maintenance, and an essentially no cost fuel source. It is important to note the intermittency of the sun as a fuel resource which is not available at night or less available certain months of the year.

An important principle of utility-scale generation facilities is that they provide capacity to the electric system such that adequate generation can meet the load at any given time, including times of peak demand. Sufficient generation capacity needs to be available on the electric

[11] Wis. Stat. § 1.12(4).

system on a forward-looking basis to meet those expected peak demand periods. The Midcontinent Independent System Operator, Inc. (MISO) provides a resource accreditation capacity for generating facilities. Historically a solar generation facility in Wisconsin has received a typical capacity accreditation of 70 to 77 percent of their nameplate rating for the year. However, in August of 2022, the Federal Energy Regulatory Commission accepted MISO's proposal for a seasonal accreditation approach which could result in capacity accreditations ranging from 70 percent in the summer to 5 percent in the winter. The capacity accreditation calculations are expected to continue to evolve, including the hybrid resource capacity accreditation of solar photovoltaic generating systems and battery energy storage systems. If the project were to be approved, a utility could purchase the facility to help meet their planning resource capacity requirements.

Ownership

The applicant is Vista Sands Solar LLC which is an affiliate of Doral Renewables LLC (Doral).

1.2. APPLICANTS' SITING PROCESS

Vista Sands evaluated a range of variables to arrive at the selection of the proposed site facilities. The details of this selection process are in Section 1.4.3 of the application.[12] In the application, Vista Sands identifies primary selection criteria used to identify ideal sites for siting large scale solar in Wisconsin – transmission and injection capacity, land availability and infrastructure, environmental considerations and constraints, community factors, and landowner interest.

Developers 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. Vista Sands determined this area would be suitable and filed an interconnection request with the Midcontinent Independent System Operator, Inc. (MISO). After arriving at the project area level analysis, the list of the site variables and characteristics evaluated consists of:

- Transmission and injection capacity
- Land availability and infrastructure
- Environmental considerations
- Community feedback
- Brownfields
- Setbacks and screening
- Unavailable or restricted land
- Airport locations
- Existing renewable energy facilities
- Sound
- Constructability and collection

[12] PSC REF#: 487839 Vista Sands Solar CPCN Application

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, Vista Sands 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 Vista Sands 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 EIS, 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 Vista Sands project footprint.

1.3. 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.

Vista Sands did not identify 9,854 acre brownfields in the vicinity of the project, therefore brownfields were not considered to be a practicable alternative to the proposed project site and were not considered further as a part of this project. The applicant also noted that the project lands needed to be near a point of interconnection (POI) and no large brownfield sites were identified in close proximity to the POI.

The applicant states that no contaminated sites are located within the proposed project area. Vista Sands identified 71 open or closed contaminated sites within a 2-mile radius of the solar infrastructure and related facilities using the Wisconsin Remediation and Redevelopment Database (WRRD). There are 42 closed remediation sites within two miles of the proposed transmission infrastructure.

1.4. 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 applicant may propose minor adjustments to the approved locations of project facilities for the protection of environmental resources, landowner requests, or technical design changes that arise during final stages of engineering (up to the authorized nameplate capacity the solar facility stated in the application), but any changes from the approved layout may not affect a type of resource not discussed in the EA, nor may they affect new landowners who have not been given proper notice and hearing opportunity or affect landowners who were given proper notice and hearing opportunity in a significantly different manner than was originally approved, nor may they include a unique occurrence not discussed in the EA of, for example, a particular human burial, archaeological site, or protected species. The applicant shall consult with Commission staff regarding whether a proposed change rises to the level at which Commission review and approval is appropriate. For each proposed adjustment for which Commission review is appropriate, the applicant shall submit for Commission staff review and approval a letter describing:

1. the nature of the requested change;
2. the reason for the requested change;
3. the incremental difference in any environmental impacts;
4. communications with all potentially affected landowners regarding the change;
5. documentation of discussions with other agencies regarding the change; and
6. a map showing the approved layout and the proposed modification(s) of all facilities proposed to be modified, property boundaries, relevant natural features such as woodlands, wetlands, waterways, and other sensitive areas.

Regarding item (3), provide a table with incremental changes in acreage for all the land acres contained within the perimeter fences and the land acres that blocks of arrays/subarrays occupy, changes in length of all collector lines, access roads, and tie lines, and changes in distances to adjacent landowner buildings for all inverters/PCUs and substations where there is a shift in the originally approved location. Identify each change using the infrastructure identification used in the application (i.e. array 1A, inverter #22). Regarding item (4), provide documentation of communications with any landowner, participating or nonparticipating, related to proposed changes wherein any project facility (including perimeter fences as well as items within those fences such as inverters or panels) is proposed to be re-located closer to an inhabited residence than the location that was approved in the Commission's order. Documentation should include all the information provided to the landowner regarding changes, include any feedback provided by the landowner, identify any way in which landowner feedback has informed the changes proposed, and whether the landowner agrees to the proposed changes. Approval of the requests is delegated to the Administrator of the Division of Energy Regulation and Analysis with advice and consent from the Administrator of the Division of Digital Access, Consumer, and Environmental Affairs.

1.5. ALTERNATIVE SOLAR ARRAY AREAS

A CPCN for a large electric generation facility requires[13] the submittal of "site-related information for each of two proposed power plant sites." In its review of wind energy electric

[13] Wis. Admin. Code § PSC 111.53(1)(f)

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.

Vista Sands provided in its application acreage for alternative locations of solar arrays to meet an additional 25 percent MW capacity as 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.

1.6. PROJECT SCHEDULE

Before construction on the proposed project could proceed, a CPCN is needed from the Commission. Vista Sands provided an estimated project construction schedule in the application. Start of construction is anticipated to occur in March 2025, beginning with site preparation. Site preparation activities would include installation of erosion control and tracking pads, vegetation removal, and the construction of staging areas, laydown yards, inverter pads, and access roads. Construction of transmission facilities would occur beginning in March 2025. Post driving activity would be estimated to begin in June 2025, with rack installation beginning in September 2025. The installation of solar equipment is anticipated to begin in December 2025. Commissioning would begin in June 2028, with an anticipated in-service date for commercial operation in December of 2028.

1.7. SOLAR CONSTRUCTION PROCESS

The construction process for a large solar electric generation facility can generally be expected to follow the following steps:

1.7.1. Site Preparation

- Sensitive resources and site boundaries are mapped and marked on site plans and in the field as needed.

- Construction entrances and exits are stabilized with tracking pads and aggregate, and storm water and erosion control best management practices (BMP) are installed in accordance with the final site plans.
- Staging and laydown areas are developed and aggregate materials placed to create a stable area for the delivery of materials and equipment. Construction trailers are placed at the main laydown area.
- Vegetation removal in areas where it is necessary is completed, and other areas may be seeded to stabilize soils, particularly where limited or no ground disturbance is expected.

1.7.2. Construction Process

- Site grading occurs in accordance with the final designs. Erosion and storm water control BMPs should be regularly checked to ensure they are in compliance with DNR technical standards.
- Access roads are constructed if used, with topsoil typically stripped and spread onsite, before a layer of aggregate is placed.
- Delivery of machinery and equipment is done on a consistent basis as construction occurs across the project.
- Array perimeter fences and gates are installed, usually as driven posts, though on occasion concrete may be needed for supports.
- Lay concrete foundations and aggregate materials down at substation.
- Install driven piles or helical piers for arrays, moving from area to area as machinery, materials, and site conditions allow.
- Install the collection system through trenching, vibratory plows, and directional drilling as appropriate for conditions.
- Install inverters and tracking systems for arrays.
- Conduct site restoration in areas where ground disturbance is complete, including fine grading of surface soils, seeding the area, and removing waste materials.
- Install the solar PV modules.
- Install substation equipment and connect collection system to transformer substation.
- Construct generator tie-line as applicable.

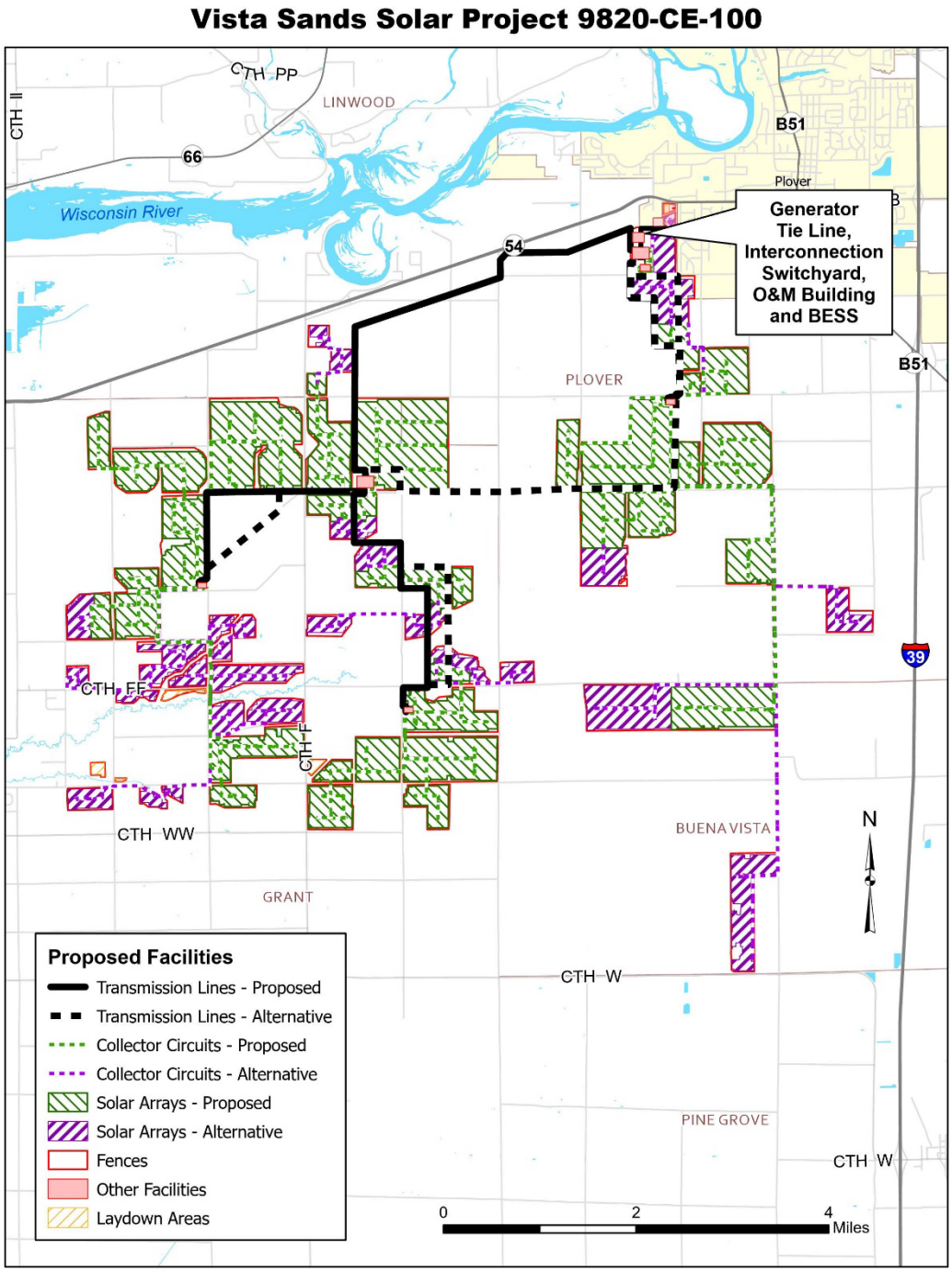
1.7.3. Project Finalization

- Conduct electrical testing and inspect solar equipment prior to energization.
- Install and inspect generator tie-line to ATC substation.
- Conduct interconnection inspections and testing.
- Remove any temporary laydown and staging areas. Remove any aggregate materials, decompact underlying subsoils, replace and decompact stored topsoils.
- Conduct final permanent seeding on site in accordance with vegetation plans.
- Continue monitoring erosion control and storm water BMPs until 70 percent vegetation establishment exists, allowing permit to be closed.

- Conduct any follow up studies or work required by Commission Final Decisions as applicable.

The construction of any solar facility may have some minor variations in construction process based on the developer, the contractor selected, and site-specific conditions.

Figure 1.1 Vista Sands Solar Project



1.8. PROJECT DESIGN

1.8.1 Facilities Overview

The proposed solar facility would consist of a solar farm with a nameplate capacity of 1,310.4 MWAC, a 300 MW BESS, an approximately 5.1-mile 345 kV transmission line, three 138 kV transmission lines totaling six to eight miles in length, and five substations. The proposed project would utilize a single-axis tracking system and would connect up to 1,182 MWAC of electric generation to the electrical grid. The proposed project is designed for approximately 2,715,908 PV panels, though the number of panels could range from 2,400,000 to 2,900,000 depending on the wattages of the panels selected in the final design. All PV panels would be grouped and organized into array areas. There are 39 proposed fenced-in array areas and 38 alternative fenced-in array area areas. PV panels in each array area would be connected to inverters sized at varying capacities. The inverters would convert the DC power produced by the solar panels into AC power. The converted power would go into collector circuits and eventually the transmission system. The project would consist of approximately 120 miles of underground collector circuit runs for the proposed arrays and 82 miles of underground collector circuit runs for the alternative arrays, as well as approximately five miles of underground collector circuit runs for the BESS. The collector circuits for the solar arrays would connect to one of three collector substations where the voltage would be converted from 34.5 kV to 138 kV. Power from the collector substations would be delivered to either project substation 1 or project substation 2 via the proposed 138 kV transmissions lines. The project substations would convert the voltage from 138 kV to 345 kV. The proposed 345 kV line would deliver power from project substation 2 to project substation 1. Once power from the solar arrays is delivered to project substation 1, it can either be delivered to the grid for immediate consumption, or delivered to the BESS where it can be stored for later delivery to the grid.

The proposed facility would connect to the existing transmission system via an ATC-constructed interconnection switching station in the northern portion of the project. A 1,600-foot generator tie line would be needed to connect the facility and new switching station to an existing ATC transmission line, the Rocky Run to Werner West 345 kV transmission line. The details required for the solar generation facility to be operational have been worked out in transmission studies between MISO, ATC, and the applicant as part of the MISO Definitive Planning Phase (DPP) Study Cycle 1. Vista Sands Solar expects DPP 2 study results in March of 2024 and DPP 3 study results in April of 2024.

Approximately 6,737 acres would make up the area affected by the proposed solar arrays, electrical collection system, collector substations, project substations, BESS, operations and maintenance (O&M) building, transmission lines, generation tie line, and access roads. Of that, the project substations, BESS, and O&M building would total approximately 189 acres. A total of five laydown areas (2.3 acres, 11.5 acres, 10.1 acres, 13 acres, and 2.7 acres) are also included in the project area. Five substations (two 13.9-acre project substations and three 3.4-acre collector substations) would be necessary for this project. The applicant has provided 3,012 acres of land as alternative array areas. The applicant also proposes the construction of 5.1 miles of 345 kV and 8.4 miles of 138 kV transmission line to support the project facilities.

1.8.2 PV Panels

Solar panels take light coming from the sun and convert it into electrical energy, which can then be used to provide electricity to homes. Solar panels produce the electricity as direct current (DC) power, which must then be converted to AC power before it can be sent to the electric grid and used for residential and commercial purposes. The electric power produced by the panel is rated as AC power and interconnected to the grid based on the AC rating of the site. The panels come in several different types, including thin film, polycrystalline silicon, and monocrystalline silicon. Some panels feature improved efficiencies by using features such as bifacial glass, which can absorb sunlight directly from the sun, as well as reflected off the ground on the underside of the panel.

Solar panels can either have a fixed orientation or have one or more axes of tracking. Fixed orientation panels point at one part of the sky during the entire day. Single axis tracking, which is proposed to be used at all the solar projects in this docket, allows the panels to track the sun's motion across the sky from the east to the west throughout the day. Tracking improves energy delivery and panel efficiencies by allowing the individual panels to be better able to face the sun and absorb more incident sunlight.

Vista Sands states that it used Longi LR5-72KBD bifacial M10 wafer 545W cell modules for the conceptual design. Additional modules evaluated during the conceptual design process include:

- Waaree, ELITE SERIES BiN-08-560-580W, Bi-Facial, TOPCon
- Jinko, JKM579N-72HL4-BDV, Bi-Facial, TOPCon
- Trina, TSM-590NEG19RC.21, Bi-Facial, TOPCon

Vista Sands states that the final panel selection would be made after detailed engineering is completed based on the most cost-effective option at that time. Moreover, the final site design may contain a mixture of different but similar wattages. All four 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. The Longi panels are approximately 1.1 meters by 2.3 meters in size. Depending on the watt rating of the panels, approximately 2,715,908 panels may be needed for the entire site to generate the proposed 1310.4 MWAC if the Longi model were to be selected. Panel numbers could range from approximately 2,400,000 to 2,900,000 if different wattages or manufacturers were to be used in final design.

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 geotechnical conditions require increased stability. Foundations or supports would be installed to a minimum depth of 4 feet below ground surface. Depth to bedrock within the project area

ranges from 5 to greater than 100 feet below ground surface, with most of it being between 50 and 100 feet below ground surface. Vista Sands states that it expects conditions within the project area to be suitable for standard driven pile foundations required to support the module racking and inverters.

Vista Sands also states that it used Sungrow SG3600UD inverters for the conceptual design, though final selection would be made in the final engineering design phase. Inverters are devices that take the DC electricity generated by the solar panels and convert it to the AC electricity that is transported through the electrical transmission and distribution system. Inverters have an inherent DC-to-AC conversion ratio that dictates how much AC power is transformed from the DC power generated at the panels. Inverters would be matched to the size of proposed power blocks to help efficiently deliver the generated electricity to the collector substation. The manufacturer specification sheet for the Sungrow SG3600UD inverters specifies permissible input DC voltages of up to 1,500 volts. Physical dimensions would be approximately 20 feet in width, 9.5 feet in height, and 8 feet in depth.

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 design, including proposed and alternate array areas, would include 492 solar inverter stations and 72 BESS inverters. This design plan could change when final equipment is selected and all engineering is complete. AC collector circuits would run throughout the PV arrays, requiring up to 17 collector circuits that would go to the collector substations. Again, this current design concept is subject to revision as further engineering evaluation is performed on the site.

1.8.3 Collector Circuits

Each solar project anticipates the use of buried collector circuits that would move the AC power from the inverters to the collector substation at each location.

Approximately 120 miles of underground collector circuits would be required for the project's proposed facility area and 82 miles of underground collector circuits for the alternative facility area, as well as five miles of underground collector circuits for the BESS. These collector circuits would be run underground from various power blocks to a collector substation at a 34.5 kV operating voltage. The application states that these collector circuits would be buried in trenches, three to four feet deep, with varying widths depending on the number of buried circuits in the trench, while maintaining an eight-foot spacing. The collector substations in combination with the project substations would transform the electric voltage from 34.5 kV on these collector circuits to the interconnection voltage of 345 kV.

1.8.4 Transmission Lines

Vista Sands Solar proposes the construction of approximately 5.1 miles of 345 kV and 8.4 miles of 138 kV transmission line to support the project facilities. Because the transmission portions of the project are greater than three miles in length, the applicant submitted a separate application

for the transmission line.[14] The application followed the Commission's Application Filing Requirements (AFR) for transmission.[15]

The applicant supplied both proposed and alternate routing options pursuant to Wis. Stat. § 196.491(3)(d)3.

The impacts from the transmission lines, solar arrays, and all related facilities are included in the EIS for this project.

The proposed project would consist of four transmission lines labeled 138 kV A-1, 138 kV B-2, 138 kV C-2, and 345 kV 2-1. The 138 kV transmission lines would serve to connect the project collector substations to the project substations, while the 345 kV transmission line connects the two project substations together. As previously mentioned, the applicant has supplied both prosed and alternate routing for each transmission line. Each proposed and alternate route is additionally broken down into individual segments.

The 345 kV 2-1 transmission line would be constructed as double-circuit line on steel monopoles at an approximate height of 96 feet. Each span between poles will be approximately 700 feet long. The 138 kV transmission lines would be constructed similarly with pole heights between 86 and 90 feet and spans typically 500 feet long. The applicants designed the proposed project using bundled 795 kcmil 26/7 strands Drake ACSR conductor for the 345 kV transmission line and 1272 kcmil 45/7 strands Bittern ACSR for the 138 kV transmission lines. The applicant notes that the final conductor sizing will be finalized during detailed design.

Table of Routing Options

The applicant provided the following information on the proposed routing options available for this project in section 1.3 of the Transmission Line Application.[16] The following is the table including the proposed and alternative routing options:

Table 1.1 Proposed and Alternative Transmission Lines

Route Name	Starting Point	End Point	Distance
Proposed Project 138kV A-1 Transmission Line	Project Collector Substation A	Project Substation 1	2.24 miles
Alternative Project 138kV A-1 Transmission Line	Project Collector Substation A	Project Substation 1	2.24 miles
Proposed Project 138kV B-2 Transmission Line	Project Collector Substation B	Project Substation 2	3.43 miles
Alternative Project 138kV B-2 Transmission Line	Project Collector Substation B	Project Substation 2	3.85 miles
Proposed Project 138kV C-2 Line	Project Collector Substation C	Project Substation 2	2.74 miles
Alternative Project 138kV C-2 Transmission Line	Project Collector Substation C	Project Substation 2	2.36 miles
Proposed Project 345kV 2-1 Transmission Line	Project Substation 2	Project Substation 1	5.12 miles
Alternative Project 345kV 2-1 Transmission Line	Project Substation 2	Project Substation 1	6.53 miles

[14] PSC REF#: 487840 Vista Sands TLine CPCN
[15] Transmission Line AFR.docx (wi.gov)
[16] PSC REF#: 487840 Vista Sands TLine Application, page 2

Description of Routing Options

Proposed Project 345 kV 2-1 Transmission Line

The proposed project 345 kV 2-1 Transmission Line right-of-way (ROW) would be approximately 5.12 miles long, 150 feet wide, and impact 92.69 acres. The line would be divided into three segments.

- *Segment 1* would run north from the project substation 1 for 1.66 miles with 0.75 miles constructed along the east side of 125th street.
- *Segment 2* would run northeast from Segment 1 for 3.2 miles. This line would replace a portion of an existing 115 kV transmission line. Segment 2 would be built and maintained by ATC and used as a 115/345 kV line.
- *Segment 3* would run southeast of segment 2 for approximately 0.25 miles and connect in project substation 1.

Alternative Project 345 kV 2-1 Transmission Line

The alternative project 345 kV 2-1 transmission tine would be all new construction and would total approximately 6.54 miles long, 150 feet wide, and impact 117.88 acres. The line would be divided into two segments.

- *Segment 1* would run east and north of Project substation 2 for 4.44 miles to the project collector substation. 2.86 miles would be constructed on the north side of Birch Drive.
- *Segment 2* would run north of Segment 1 for 2.09 miles from project collector substation A to project substation 1.

Proposed Project 138 kV A-1 Transmission Line

The proposed 138 kV A-1 transmission line would be all new construction and would total 2.24 miles long, 100 feet wide, and impact 26.47 acres. The line would divided into three segments.

- *Segment 1* would run north of project collector substation A 0.69 miles.
- *Segment 2* would run north and west from Segment 1 for approximately 1.22 miles.
- *Segment 3* would run north of Segment 2 on the north side of Forest Drive for 0.33 miles to project substation 1.

Alternative Project 138 kV A-1 Transmission Line

The alternative project 138 kV A-1 transmission line would be all new construction and would total 2.24 miles long, 100 feet wide, and 22.72 acres. This line would share approximately 200 feet of gas pipeline with Flint Hills Resources. In the case that this alternative line is ordered, the applicant would coordinate with Flint Hills Resources. The line would be divided into three segments.

- *Segment 1* would be identical to Segment 1 of the Proposed 138 kV A-1 Transmission Line. The segment would run north of the project collector substation 0.69 miles.
- *Segment 2* would run north and west from the northern part of Segment 1 and would be approximately 1.22 miles. Segment 2 of the alternative route would follow a different path than the proposed route.
- *Segment 3* would be identical to Segment 3 of the proposed route and would run north of Segment 2 on the north side of Forest Drive for 0.33 miles to project substation 1.

Proposed Project 138 kV B-2 Transmission Line

The proposed project 138 kV B-2 transmission line would be new construction and would total 3.43 miles long, 100 feet wide, and 41.37 acres. The line would be divided into three segments.

- Segment 1 would run north and east form project collector substation B for 0.51 until it reaches the north side of Buena Vista Road.
- Segment 2 would north and west from the north part of Segment 1 for approximately 1.51 miles
- Segment 3 would run north of Segment 2 on the west side of 130th Street for 1.40 miles to the project substation 2.

Alternative Project 138 kV B-2 Transmission Line

The alternative project 138 kV B-2 transmission line would be new construction and would 3.85 miles long, 100 feet wide, and impact 46.51 acres. The line would be divided into three segments.

- *Segment 1* would run north and east form project collector substation B for 0.51 until it reaches the north side of Buena Vista Road. This segment is identical to Segment 1 of the proposed line listed above.
- *Segment 2* would run east, north, and west from Segment One for approximately 1.93 miles to the west side of 130th street.
- *Segment 3* would run north of Segment 2 on the west side of 130th Street for 1.40 miles to the project substation 2. This segment is identical to Segment 1 of the proposed line listed above.

Proposed Project 138 kV C-2 Transmission Line

The proposed project 138 kV C-2 transmission line would be new construction and would be 2.74 miles long, 100 feet wide, and impact 32.48 acres. The line would be divided into three segments.

- Segment 1 would run north from project collector substation C for approximately 0.26 miles.
- Segment 2 would run north and east from Segment 1 for approximately 1.55 miles along the west side of 110th Street and the north side of Birch Drive.

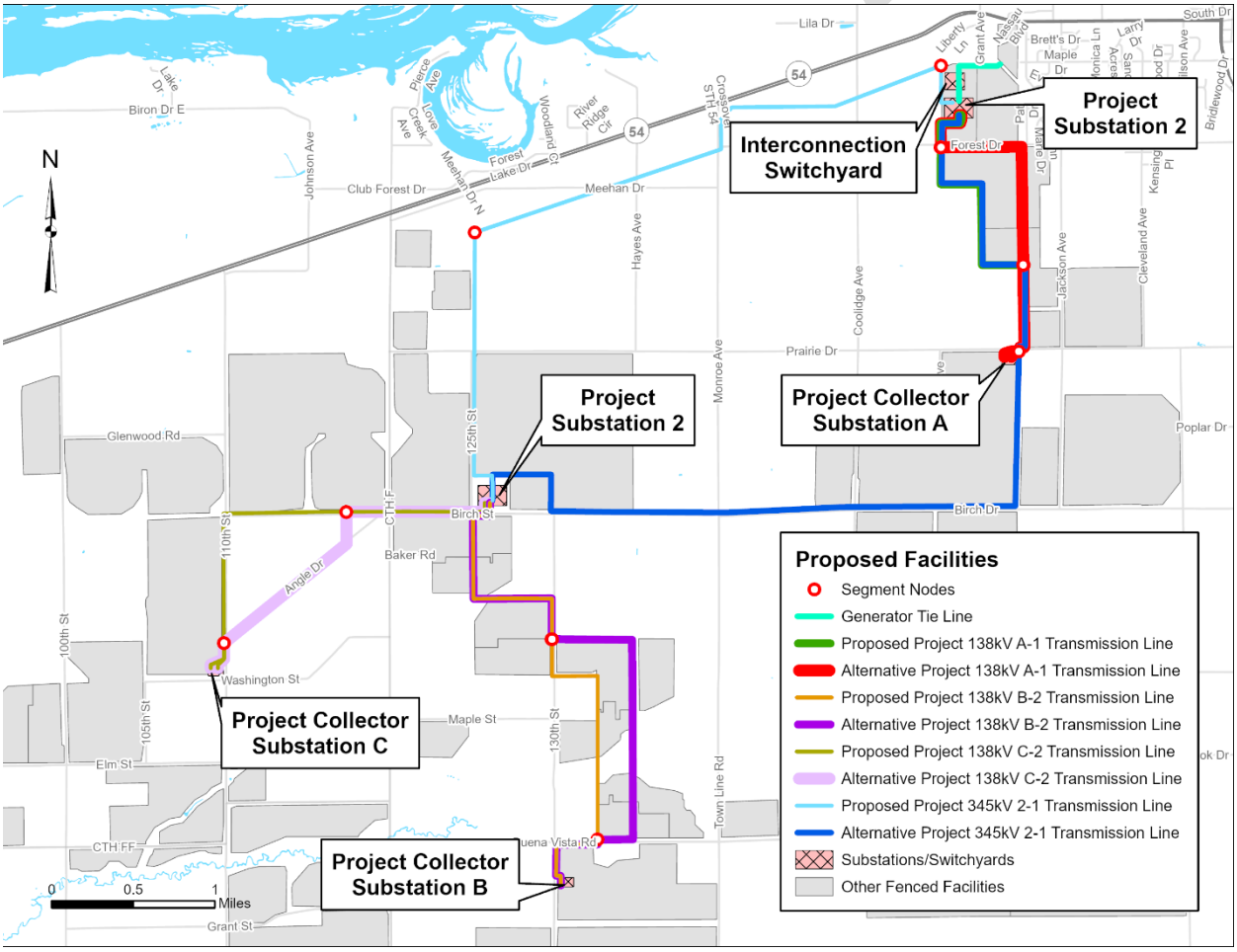
- Segment 3 would run east from Segment 2 on the north side of Birch Drive for 0.93 miles to project substation 2.

Alternative Project 138 kV C-2 Transmission Line

The alternative project 138 kV C-2 transmission line would be new construction and would be 2.36 miles long, 10 feet wide, and would impact 27.83 acres. The line would be divided into three segments.

- Segment 1 would run north from project collector substation C for approximately 0.26 miles. This segment is identical to Segment 1 of the proposed line listed above.
- Segment 2 would run north and east from Segment 1 for approximately 1.16 miles to the north side of Birch Drive. This segment would run along the southeast side of Angle Drive for 0.95 miles.
- Segment 3 would run east from Segment 2 on the north side of Birch Drive for 0.93 miles to project substation 2. This segment is identical to Segment 3 of the proposed line listed above.

Figure 1.2 Map of Routing Options



Shared ROW and Siting Considerations

Wisconsin Stat. § 1.12(6) also directs the Commission to consider corridor sharing opportunities when reviewing transmission facility projects. The statute states that, when siting new electric transmission facilities, it is the policy of the state to attempt to share existing corridors to the greatest extent feasible.

When selecting existing corridors to share, the Commission must determine that corridor sharing is consistent with economic and engineering considerations, reliability of the electric system, and protection of the environment.

When feasible, corridors should be utilized in the following order of priority:

- Existing utility corridors
- Highway and railroad corridors
- Recreational trails, to the extent that the facilities may be constructed below ground and that the facilities do not significantly impact environmentally sensitive areas
- New corridors

The project transmission lines would use primarily new ROW. Segment 2 of the proposed 345 kV 2-1 line in the northeastern section of the project area would replace a portion of the existing ATC-owned 115 kV single-circuit transmission line. This line would be built and owned by ATC as a double-circuit 115/345 kV transmission line.

Generally, Vista Sands Solar cannot access existing transmission line corridors as readily for this project because they do not own any transmission within the project area. The transmission routes were designed to maximize adjacency to transmission and road rights-of-way (ROW) as well as consider community preferences, and landowner impacts. Several public comments expressed concern for the impacts of overhead transmission lines in the project area. In Data Request-PSC-Grant-5 commission staff asked the applicant if they would consider underground transmission lines for this project.[17] The applicant responded that, while the initial decision to use overhead transmission was made to minimize electrical losses before the electricity reaches the point of interconnection, that they would be willing to review the need for overhead lines with certain conditions.[18]

Transmission Line Impacts

The transmission section of this proposed project would include different construction methods and processes than the solar portion of the proposed project. The construction process for the transmission portion of this project would be anticipated to follow the following sequence:

1. **Surveying and staking the rights-of-way (ROW):** The survey crew would stake or flag the edges of the transmission line ROW and boundaries of other transmission related facilities.
2. **Installation of Best Management Practices (BMP):** Sediment and erosion control measures would be installed. Any BMPs not installed during this time will be

[17] PSC REF#: 494694 Data Requst-PSC-Grant-5
[18] PSC REF#: 496585 Response-Data Request-PSC-Grant-5

implemented after tree and vegetation removal is complete. Sediment and erosion control measures would be monitored throughout construction.

3. **Vegetation Clearing:** Vegetation would be removed for the full width of the ROW to allow for equipment access. Side trimming and final mowing would then occur.
4. **Work Area Construction:** Access roads, work pads, and stringing location development would occur. Grading of work areas would occur in areas where needed for safety purposes.
5. **Material Delivery:** Transmission line structures would be delivered to the locations of each installation.
6. **Foundation Excavation:** Transmission line structures would be set into holes and backfilled. Drilled shaft foundations could be necessary for large dead-end structures. Excess soil would be spread in upland areas of hauled offsite to a disposal facility.
7. **Structure Placement:** Structures would be lifted into position and inserted into the foundation holes. Equipment necessary may include cranes, bucket trucks, excavators, or other equipment.
8. **Conductor Stringing:** Conductors and wires would be completed in pulls from one dead-end structure to another. Insulators and hardware would be installed at the dead-end structure.
9. **Cleanup and Restoration:** Construction mat removal, debris clean up, seed bed preparation, and seeding would occur at the completion of construction.

Transmission Line Construction Schedule

The applicant provided the following information on its estimated construction schedule for the transmission portion of the project:[19]

Table 1.2 Transmission Construction Schedule

Activity	Estimated Completion
Joint PSC CPCN and WDNR Utility Permit Application	Q1 2024
WDNR Utility Permit Issuance	30 days after PSC Order
Start Construction	March 2025
In-Service Date	December 2028

1.8.5 Access Roads

The proposed project would require approximately 32 miles of permanent access roads. The alternative array areas would require a total of approximately 13 miles of access roads. Access roads would be used to perform maintenance activities on the site and allows access to power conversion equipment. These access roads would not be accessible by landowners or the public and would be fenced in.

Permanent access roads would be constructed by removing topsoil, compacting the area, and adding a road base. Material used for the road base would be constructed with an aggregate material compliant with WisDOT specifications. Access roads would be 20 feet wide and would not be constructed in every aisle of the project area.

[19] PSC REF#: 487840 Vista Sands TLine Application, page 19

Restoration of permanent access roads at the time of decommissioning would include removing the aggregate material, de-compacting the soil, restring the topsoil, and seeding the disturbed areas.

When the project is no longer operational, the applicant would have one year to remove all above and below ground project facilities, including the restoration of access roads. During this time access roads would be reinstated to a state similar to the original condition before the project. More information on other decommissioning practices is included in the decommissioning section of this document.

Access roads would be 20 feet wide. The access roads in the proposed array areas would impact a total of 80.9 acres, including 76.2 acres of agricultural land, 3.3 acres of grassland, 0.5 acres of developed lands, and 0.9 acres of forested lands. The access roads in the alternative array area would impact a total of 29.3 acres, including 26.2 acres of agricultural lands, 1.3 acres of grasslands, and 1.7 acres of forested lands.[20]

1.9. COLLECTOR SUBSTATIONS AND PROJECT SUBSTATIONS

The proposed project would consist of five separate substations, including two project substations labeled project substation 1 and 2, and three collector substations labeled Project Collector Substation A, B, and C. The project collector substations would be the reception point for the 34.5 kV collector circuits mentioned above where project collector substation A would be located on the eastern portion of the project, project collector substation B would be located in the central portion of the project, and project collector substation A would be located in the western portion of the project. Each collector substation would transform the voltage from 34.5 kV to 138 kV to then deliver to one of the two project substations. The Project Substations will transform the voltage from either 34.5 kV for nearby collector circuits or 138 kV from the project collector substations to 345 kV. The project substations will be connected with each other and the transmission system at 345 kV. More specifically, project collector substations B and C will connect into project substation 2, while project collector substation A will connect to project substation 1. Each of the project collector substations' footprints would be approximately 500 feet by 300 feet while the project substations' footprints would be approximately 933 feet by 650 feet in size.

For each substation, 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, each collector substation would include:

- Main power transformer 34.5/138 kV, 60/80/100 MVA;
- 34.5 kV, 1200A air-insulated circuit breakers for the feeders to the solar plant;
- 34.5 kV, 3000A air-insulated bus and supporting structures (includes air insulated isolation switches and insulators for the transformer and the individual feeder circuit breakers, bus post insulators);

[20] PSC REF#: 488118 Appendix W- PSCW-Tables

- 34.5 kV metering and instrument transformers;
- 100 kVA station service transformer installation, which includes AC panels, station service transformer with fuses, equipment for a secondary source for AC power, conductors and support structure for all equipment;
- 138 kV, 600A circuit breaker;
- 138 kV, 600A & 1200A air-insulated gang operated disconnect switch;
- 138 kV surge arrestors;
- 138 kV bus and supporting structures;
- 138 kV metering and instrument transformers;
- 138 kV dead-end structure for outgoing transmission line to substation 2; Protection and control building, which will include DC battery and charger, AC/DC panels, and relay/control/communication equipment;
- Internal access roads;
- Trench;
- Foundation of equipment and structure support;
- Security fence with vehicle gate, man gate, barbed wire. Fence to be grounded to the substation ground grid per NESC requirements;
- Bare copper grounding grid (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 concrete trench, polyvinyl conduit and manholes as required;
- Above grade conduit and cable tray utilized within control building;
- Lightning protection masts (as required);
- Yard lighting and receptacles to be used during maintenance and or during emergency; and
- Any required power factor control equipment (i.e., capacitor bank) with associated isolation equipment such as reactive power switching equipment and disconnect switches.

Each project substation would include:

- Main power transformer 34.5/345kV, 95/126/158 MVA;
- 34.5 kV, 1200A circuit breaker;
- 34.5 kV, 3000A air-insulated bus and supporting structures (includes air-insulated isolation switches and insulators for the transformer and the individual feeder circuit breakers, bus post insulators);
- 34.5 kV metering and instrument transformers;
- 34.5 kV surge arrester for each feeder;
- 100 kVA station service transformer installation, which includes AC panels, station service transformer with fuses, equipment for a secondary source for AC power, conductors and support structure for all equipment;
- Auto transformer 345/199.2-138/79.67 kV 278/371/464 MVA;
- 138 kV, 2000A circuit breaker;

- 138 kV, 4-position ring bus project substation 1 and 65-position ring bus for project substation 2 and supporting structures (including air-insulated isolation switches for the auto transformer and circuit breaker in the ring bus configuration);
- 138 kV surge arrestors;
- 138 kV metering and instrument transformers;
- 138 kV dead-end structure for incoming transmission line from collector substation(s);
- 345 kV, 3000A circuit breaker;
- 345 kV, 6-position ring bus for project substation 1 and 5-position ring bus for project substation 2 and supporting structures (including air-insulated isolation switches for the auto transformer, main power transformers and circuit breaker in the ring bus configuration);
- 345 kV surge arrestors;
- 345 kV metering and instrument transformers;
- 345 kV dead-end structure for outgoing transmission line to Interconnect Switchyard (project substation 1) or to connect project substations (project substation 2);
- Protection and control building, which will include DC battery and charger, AC/DC panels, and relay/control/communication equipment;
- Internal access roads;
- Trench;
- Foundation of equipment and structure support;
- Security fence with vehicle gate, man gate, barbed wire. Fence to be grounded to the substation ground grid per National Electrical Safety Code (NESC) requirements;
- Bare copper grounding grid (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 concrete trench, polyvinyl conduit and manholes as required;
- Above grade conduit and cable tray utilized within control building;
- Lightning protection masts (as required);
- Yard lighting and receptacles to be used during maintenance and or during emergency; and
- Any required power factor control equipment (i.e., capacitor bank) with associated isolation equipment such as reactive power switching equipment and disconnect switches.

1.10. GENERATOR TIE LINE

In addition to the transmission lines connecting collector substations and project substations, the applicant is proposing the construction of an approximate 1,600-foot generator tie line to connect the project substation 1 to a new switching station to be constructed, owned, and operated by ATC. The proposed project substation 1 would be constructed adjacent to the new ATC switching station which would be adjacent to the existing ATC Rocky Run to Werner West 345 kV transmission line. The ROW for the generator tie line would be 150 feet wide and would be located on participating project parcels. The applicant expects to execute a Large Generator Interconnection Agreement (LGIA) with MISO in August 2024.

1.11. OPERATION AND MAINTENANCE BUILDING

Vista Sands proposes to construct two one or two story 45x110 foot operation and maintenance (O&M) buildings as a part of the proposed project. The buildings would be used for offices, meetings, storage, a maintenance bay, mechanical rooms, and Supervisory Control and Data Acquisition (SCADA) equipment. The proposed size of each O&M building would be approximately 5,000 square feet and would require an area of approximately 40,000 square feet total. A permanent driveway to access the buildings would be constructed and would be approximately 600 feet long. A total of approximately one acre would be necessary for the O&M buildings and would be located in the northeastern corner of the proposed project area.

A drawing of the proposed O&M building layouts is included in Appendix B of the application materials.[21] The constructed building would be metal and of commercial style. Outdoor lighting fixtures installed to light the building would be oriented 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. A potable water well and a septic system would be constructed to service the building. The applicant indicates in a data request response that they would incorporate modern efficiency standards into any new construction of an O&M building, to the extent feasible.[22]

1.12. 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. Vista Sands Solar proposes to construct five laydown areas for this project. Two laydown areas, one 2.3 acres and one 11.5 acres, would be constructed near Lake Road and 100th Street South near the southwestern portion of the project. A 10.1-acre laydown yard would be constructed in the south/southwestern section of the project near Lake Road and County Road F. There would also be a 13-acre laydown area constructed near County Road FF and 110th Street South in the southwest portion of the project. The fifth laydown yard would be 2.7 acres and constructed near the O&M building at the north end of the project. Project laydown areas are all entirely agricultural land.

1.13. BATTERY ENERGY STORAGE SYSTEM (BESS)

The proposed project would include construction of a BESS comprised of lithium-ion batteries in outdoor enclosures that have a self-contained HVAC system, a fire suppression system, and other related components.

1.13.1. Lithium-ion Batteries

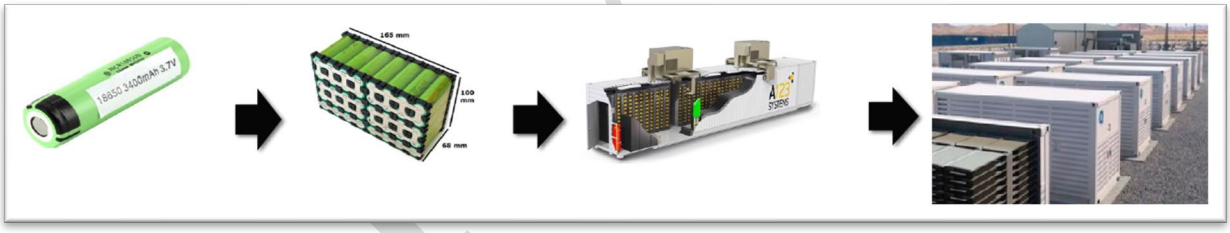
Vista Sands proposes to use lithium-ion batteries for the BESS in this docket. Lithium-ion batteries are a popular choice in many types of consumer electronics and other devices due to

[21] PSC REF#: 487986 Appendix B-Schematics- Part 3
[22] PSC REF#: 496585 Response-Data Request-PSC-Grant-5

being relatively inexpensive and having high energy density.[23] 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 Vista Sands, 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 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."[24]

Figure 1.3 Components of the BESS from individual cell to overall plant.[25]



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.[26]

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

[23] Environmental Protection Agency. (July 2021). An Analysis of Lithium-ion Battery Fires in Waste Management and Recycling. EPA 530-R-21-002.
[24] Ibid.
[25] Images from Sandia Labs presentation materials.
[26] PSC REF#: 487839, Vista Sands Solar CPCN Application 1-3-24.

absence of a fire. If thermal runaway 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.

Battery Storage Units

The batteries would be placed in modular storage units located in the area indicated on the maps (see Figure 1.1), located entirely within agricultural land with no schools, daycares, hospitals, or nursing homes within 300 feet of the proposed BESS location. The BESS will encompass approximately 5.5 acres of land south of the proposed project substation #1. This acreage includes BESS access roads and perimeter security fencing.

The BESS is proposed to be sized at 300 MW/1,200 MWh. The BESS would be interconnected into project substation #1 on a non-additive basis, per a Vista Sands-proposed MISO Surplus Interconnection request [27].

Battery storage systems are relatively new to Midwest utility scale solar facilities and the specifications of these systems are changing rapidly. Therefore, Vista Sands states that at this time, final equipment selection has not occurred, but a common battery storage system manufacturer was used to develop the layout and design set of this project. The specifications that were used for this design are as follows:

- Container-based battery storage system with on-board HVAC and fire suppression systems
- Container dimensions: 20’ (L) x 8’ (W) x 9.5’ (H)
- Operating temperature -30°C to 50°C
- 300 MW storage
- 1,200 MWh at Point of Interconnection
- 60 BESS blocks at beginning of life
- 72 BESS blocks at end of life
- 12 total augmentation blocks
- Augmentation will occur at a rate of 3 blocks every 4 years

Installation, Operations, and Maintenance

BESS installations are similar to installations of other heavy substation equipment such as transformers and switchgear. Typical construction equipment such as excavators, bulldozers, and cranes would be used to install the BESS. The BESS containers would include battery racks and HVAC equipment with significant static loads. Therefore, the foundations would be constructed on steel-reinforced concrete foundations or pads that can accommodate the heavy loads and would be designed based on regional soil conditions. Vista Sands states that BESS pad dimensions will be finalized once a battery storage manufacturer is chosen and final engineering and design is completed. The battery enclosures would be accompanied by a generator step-up transformer and a bi-directional inverter or Power Conversion System.

[27] Ibid.

Minimal construction impacts to the site are anticipated other than what would be typical for other substation equipment.

On-going maintenance of a BESS typically involves servicing of the moving equipment (HVAC systems, fans, and filters) as well as monitoring battery performance and degradation. Vista Sands anticipates that the BESS would be augmented over the duration of the project life cycle (typically, every 4 years) where additional battery enclosures would be added to replace degraded energy capacity. Proper site shut-down procedures shall be followed during these battery augmentation periods.

Safety Requirements

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[28] 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."

BESSs require similar safety awareness to other substation and solar PV equipment, especially related to electrical safety associated with high voltage AC and DC hazards. Vista Sands states that strict adherence to the NFPA's standard NFPA-70E will be followed as related to electrical safety. BESSs can also exhibit hazards associated with thermal events, off-gassing, and fires under adverse circumstances. Vista Sands states that all batteries will be certified by the manufacturer to comply with Underwriters Laboratories standard UL9540A at the cell, module, and unit (rack) level such that a thermal event occurring in a cell will not migrate outside the rack to adjacent racks and equipment. In addition, hazards associated with battery off-gassing will be detected and exhausted safely from the enclosure to prevent exposition hazards. In some cases, Vista Sands states that a dry-type Siamese connection can be provided at a safe distance from the enclosure so that a fire hose can be connected to the enclosure to dispense a water deluge to cool a battery fire. Adherence to NFPA-855 will be followed including facilitation of a Hazard Mitigation Analysis workshop by all stakeholders, including the battery manufacturer, the battery integrator, the installer, and the local fire department to determine how thermal and off-gassing events are detected, communicated to first responders, and mitigated.

[28] NFPA 855, Annex C.

1.14. 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. The applicant states that the project is anticipated to operate for at least 30-35 years. At the end of the project's useful life, the modules, batteries, and all associated components would be removed from the project area and restoration of the area be completed. A decommissioning plan was provided with the application materials in Appendix U[29], which includes a summary of decommissioning activities and cost estimates.

Vista Sands states in their application that they anticipate developing a joint development agreement with Portage County, the Village of Plover, the Town of Grant, the Town of Plover, and the Town of Buena Vista. These agreements would require the project provide a decommissioning plan and may determine financial assurance that the plan be completed.

Decommissioning would include removing the solar arrays and all associated facilities from the project area. The applicant would remove panels, tracking equipment, inverter/transformer stations, BESS components, solar arrays, perimeter fence, substations, and all project related facilities. The removal of interior roads and the underground cabling would be determined by the landowner. The site would also be restored by de-compacting soils, restoring, and revegetating disturbed lands. Access roads would also be restored, with landowner agreements, by removing aggregate materials and underlying geotextile fabric. The previous road areas would be de-compacted, backfilled, and graded if necessary.

Restored project areas would be revegetated with the current landowner and any regulations required at the time of decommissioning. Underground collection systems places at depths less than 4 feet, 4 inches would be removed. Cabling that is located deeper then 4 feet, 4 inches would be abandoned, unless contracts with landowners specify otherwise.

Decommissioning activities, including site restoration, would be estimated to take approximately twelve months to complete. All above-ground components would be removed, and restoration would occur within 18 months of the project permanently ceasing energy transfer.

[29] PSC REF#: 488067, Appendix U – Decommissioning Plan

2

2. Environmental Analysis

Wisconsin Admin. Code § PSC 4.20(3)(b) states that an EIS shall include a description of the environmental factors that the proposed project affects. 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. The applicant states that the initial civil work and grading would require dozers, motor graders, and rollers. P ile 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 circuits trenches, with the use of horizontal directional drilling (HDD) planned for wetland and waterbodies in the proposed project. Bucket trucks, forklifts, and small cranes would be used to place equipment for the substation. Backhoes, vehicle mounted power augers, cranes, and bucket trucks would be used during installation of the generator tie line.

2.1 DNR-DORAL MEMORANDUM OF UNDERSTANDING

As noted in application section 5.8.4[30], the applicant and DNR have been meeting since February 2023 to discuss the project and its potential impacts to rare species, especially as it relates to the Greater Prairie-chicken. Both parties agreed to look into what a potential MOU would address with additional measures being taken to protect the chicken. After multiple discussions with Vista Sands concerning the potential scope of an MOU, the DNR determined that the topics the applicant offered for consideration were best suited for consideration through the PSC CPCN process and chose not to pursue the possibility of an MOU any further. However, future wildlife research could still be considered as part of an MOU should the proposed project be ordered by the Commission.

2.2 GEOLOGY, TOPOGRAPHY, AND SOIL

The project is located in central Wisconsin and in southwestern Portage County. This area is located in the Eastern ridges a Lowlands of the Central Lowland Physiographic Province. Central Sands Plain landscape. This area is characterized as a large, flat expanse of lacustrine and outwash sand, distinctive from any other part of the state in its origin as an extremely large

[30] PSC REF#: 487839, Vista Sands Solar CPCN Application

glacial lake. The sand was deposited in Glacial Lake Wisconsin, along with outwash sand derived from glaciers to the north.

Bedrock within the project boundary is found by the applicant's geotechnical summary to be underlain by late Cambrian sandstone that contains strata of dolomite and shale. Precambrian igneous (granite) and metamorphic (gneiss) rocks lie beneath the sandstone and are exposed in a few locations along the Wisconsin River. Depth to bedrock in most of the project study area is between 50 and 100 feet below ground surface. USDA NRCS Soil Survey Geographic Database mapping indicates that depth to a restrictive layer for most of the project study area is greater than six meters (20 feet), with some areas less than one meter.

The project area is located in southwestern Portage County. Soils in this portion of the county are classified as Richford-Rosholt-Billet association which are formed mainly on outwash sand and gravel. Slopes are nearly level to gently sloping and the soil is well drained. The majority of land cover and land use within the project study area is row crops.

The applicant provided a desktop geotechnical review of the Wisconsin Geological and Natural History Survey, WDNR Well Construction Information System, and the U.S. Department of Agriculture Natural Resources Conservation Service Soil Survey Geographic Database (USDA NRCS SSURGO).

Vista Sands anticipates that project site soils would be suitable for standard driven pile foundations that would be required to support project facilities. The desktop soil review found that soils are generally sand loam and fine to medium grade sand. These soils are anticipated to be permeable for stormwater infiltration. The final geotechnical investigation would be conducted prior to construction to confirm these findings.

Approximately 11.6 percent of the soils in the proposed project are considered to have high frost potential. The mixing of surface and sub-surface soils from agricultural practices and water within or near the surface can affect the performance of subsurface infrastructure (piles, foundations, etc.). Field testing would occur to evaluate the solar panel design and prevent heave from the frost.

Vista Sands states in its application that the topography of the project would not be substantially changed by construction activities including installation of the foundations for the tracking systems and trenching for the collection system. Other than grading requirements for the substation/step-up transformer and other localized areas within the solar arrays, significant grading is not anticipated. Panel arrays would be designed and constructed to conform to the existing topography to avoid the need for significant grading. However, some localized grading would be necessary to meet racking tolerances. Access roads would be constructed as close to existing grade as possible, maintaining preconstruction hydrologic flow patterns.

The required grading would include preparing the site for the construction of substation, step-up transformers, certain array areas, and other related project facilities. Panel arrays have generally been designed to conform to existing topography, although some localized grading of the solar arrays may also be required to meet racking tolerances. A total of approximately 300-500 acres

of project area would be disturbed during these initial grading activities. Grading would occur in a north south orientation. When grading of a particular area is complete, the area would be temporarily seeded to prevent soil erosion. Disturbed lands would be stabilized prior to storms and at the end of the work day.

2.3 SOIL EROSION CONTROL

Preliminary review of soils, topography, and site characteristics suggest that the existing gentle slopes would not be subject to severe erosion. But without adequate soil erosion control measures put into place, there could be erosion during times of heavy precipitation. This could increase sediment loads to local streams or wetlands. It could also cause erosion of soils or flow of storm water onto adjacent properties. Vista Sands provided details on erosion control measures planned for the project in their application. This would need to be updated with final construction plans prior to use. Some assumptions of the plan are unlikely to be accurate based on observations of solar facilities construction in Wisconsin to date. The plan should be accurate and consider use of BMPs to avoid issues with 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.
- Installation of temporary erosion control measures such as wattles, silt fences, or erosion control matting.
- 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.
- Establish a winter stabilization plan should vegetation not adequately establish prior to the end of the growing season.

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 would include the maintenance of vegetated areas under the arrays and along the perimeter of the site to minimize storm water runoff and soil erosion.

2.4 WATER RESOURCES

2.4.1. 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. The project involves an increase in the impervious surfaces across the project site through increased aggregate surfaces for roads, as well as the substation, battery-energy storage system (BESS), O&M building, and associated parking area. Post-construction runoff from these types of sites is typically managed with swales and drainage basins and should be modeled separately from the solar array area. Solar panels are also considered disconnected impervious surfaces which could concentrate runoff and have potential to cause erosion and increased runoff from the site. Erosion and runoff issues can be minimized by spacing arrays to maintain vegetation between and underneath panels, establishing a maximum panel height from the ground of less than 10 feet, and phasing work areas to minimize the amount of unstable ground exposed at a time. Per the requirements in NR 151.11(8)(d), Wis. Adm. Code, temporary stabilization activity shall commence when land disturbing construction activities have temporarily ceased and will not resume for a period exceeding 14 calendar days.

An issue frequently observed during winter months is a lack of adequate erosion control practices in relation to the area of exposed soils present on construction sites. As construction crews continue earth work into the winter months, large areas of exposed soils are often left without adequate stabilization. Sediment basins tend to freeze in the winter, and construction site storm water entering the basins cannot infiltrate. Winter rainfall events on frozen ground contribute to the likelihood of offsite discharges of sediment-laden water. Because offsite discharge is often due to the amount of unvegetated and unstable soil, priority should be given to 1) completing construction in areas that drain to sensitive resources first to allow for adequate vegetation to grow, 2) focusing on establishing vegetation earlier in the growing season, and 3) creating a winter construction and stabilization plan to minimize the area of exposed soils.

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. Special attention should be given to compaction mitigation of soils prior to seeding to maximize germination potential. Vegetation under and around the arrays requires long-term maintenance for the lifetime of the facility, as it is the primary means of managing post-construction storm water runoff. 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.

Commission staff received comments expressing concern for seasonal flooding and high groundwater in and around the project areas, specifically near array areas 22 and 26. Commission staff asked the applicant how high ground water and seasonal flooding would be

managed in the project area.[31] The applicant responded that flooding risk would be addressed in detail in final project design. Mitigation measures may include designing appropriate stormwater infrastructure such as sediment basins, drains, and culverts. The applicant indicates that they would follow best management practices and rely on site topography and hydrologic conditions analysis to develop their final grading plan.[32]

2.4.2. Wetlands

Wetland Identification and Quality

Wetlands within the proposed project study area were identified through a combination of wetland field delineations, wetland determinations, and desktop reviews completed in 2020 and 2021. On-site field delineations were used to identify the presence and location of wetland across the majority of the Project area. The on-site wetland delineations followed the criteria and methodology described in the United States Army Corps of Engineers (USACE) *Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1 (1987)* and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region*. Wetland delineations included offsite evaluation of U.S. Geological Survey (USGS) topographic maps, Natural Resources Conservation Service (NRCS) soil survey data, DNR Wisconsin Wetland Inventory (WWI), and aerial photography. While the majority of the Project Area was field delineated, access was limited in some portions of the Project. A few areas were observable from legally accessible public roadways, and wetland boundaries were determined in the field by direct observation and sketched on aerial imagery. A desktop review was completed for other portions of the Project Area that were added after the field investigations, and wetland boundaries were conservatively estimated using aerial photograph interpretation, soil survey mapping, DEMs and WWI maps. The result of the wetland evaluations are found in the combined Wetland Delineation Report for the project in Appendix H of the application. The applicant stated that additional field investigations will be performed during the 2024 or 2025 growing season in areas where desktop methodology and/or field determinations were used to determine wetland locations.

One hundred forty-four (144) wetlands were identified within the project area. Of which, 142 wetlands are within the solar generation project facilities and 23 wetlands are within the transmission line routes. Twenty-one of the wetlands overlap the solar generation and transmission components of the project. Two wetlands are exclusively in the transmission line routes. The delineated wetlands located with the project area consist of wet meadow, farmed, seasonally flooded basin, shallow marsh, shallow open water, sedge meadow, shrub-carr, hardwood swamp, and floodplain forest wetlands.

The wet meadow communities were typically located within wet ditches or the edges of agricultural fields. Many of these wetlands are degraded by drainage attempts, mowing, grazing or other land conversion. These communities typically supported low plant diversity and were most often dominated by reed canary grass (*Phalaris arundinacea*). Other common plant species observed within the wet meadow wetlands include fall panic grass (*Panicum dichotomiflorum*), redtop (*Agrostis gigantea*), stinging nettle (*Urtica dioca)*, wool grass (Scirpus cyperinus), giant

[31] PSC REF#: 493356 Data Request-PSC-Grant-4
[32] PSC REF#: 494457: Response-Data Request-PSC-Grant-4

goldenrod (*Solidago gigantea*), panicled aster (*Symphyotrichum lanceolatum*), Pennsylvania smartweed (*Persicaria pensylvannica*), tussock sedge (*Carex stricta*), and yellow foxtail (*Setaria pumila*).

Farmed wetland communities were the most prevalent community type and were disturbed due to agricultural practices including vegetation removal (harvest), plowing, planting, excavation, sand fill, drainage via constructed ditches, and altered hydrology due to irrigation systems. As a result of these disturbances and abnormally dry conditions during the survey period, some of the farmed wetlands were dominated by non-hydrophytic agricultural weeds or lacked vegetative cover altogether. Where vegetation was present, typical dominant species included stressed crops, barnyard grass (*Echinochloa crus-galli*), fall panic grass, bog yellowcress (*Rorippa palustris*), lamb's quarters (*Chenopodium album*), narrow-leaved cattail (*Typha angustifolia*), blunt spikerush (*Eleocharis obtusa*), field pennycress (*Thlaspi arvense*), and shepherd's purse (*Capsella bursa-pastoris*).

Two, small seasonally flooded basins were documented within the project area and correlate with WWI-mapped Excavated Ponds. Both wetlands are located within a pasture and the topsoil was observed to have been historically removed. These communities were inundated at the time of the investigation and dominated by redtop grass and annuals, including barnyard grass, slender false fox-glove (*Agalinis tenuifolia*), spotted lady's thumb (*Persicaria maculosa*), and blunt spike-rush.

Two wetlands (064.0-W1, 081.0-W2) and portions of wetlands 053.0-W1, 055.0-W1 and 1043-W1 were identified as shallow marsh communities. These communities were either associated with field-delineated waterways, located within excavated ditches along the edges of agricultural fields and roadways, or associated with open water features. The shallow marsh communities were typically degraded by surrounding land use and dominated by reed canary grass, white panicled aster (*Symphyotrichum lanceolatum*), narrow-leaved cattail, soft rush (*Juncus effusus*) and scattered sandbar willow (*Salix interior*).

Shallow open water communities occurred as isolated features or were associated with larger wetland complexes. These communities were often degraded by surrounding land use and/ or historically excavated. Aquatic vegetation such as Illinois pondweed (*Potamogeton illinoensis*), duckweeds (*Lemna sp*,) and algae typically dominated the central portions, and reed canary grass, narrow-leaved cattail, common lake sedge (*Carex lacustris*), marsh pepper weed (*Persicaria hydropipier),* soft- stem bulrush (*Schoenoplectus tabernaemontani*) and various sedges (*Carex sp*.) around the perimeter of the open water.

Sedge meadow communities were observed in wetland 1021-W3 and a small portion of wetland 129.0-W1. Wetland 1021-W3 is an isolated depression dominated by yellow lake sedge (*Carex utriculata*) located between a farm field access and woodland. The sedge meadow in 129-W1 is located under a cleared transmission line corridor along the east side of 110th Street South. No sample points were collected in the sedge meadow portion of 129-W1; however, the area was observed to be dominated by tussock sedge (*Carex stricta*) and is contiguous with the hardwood swamp component of the wetland.

Few shrub-carr communities were identified in the project area and were typically part of larger complexes with waterways or drainageways. Dominant species common in the shrub layer are

sandbar willow and tree saplings, including black ash (*Fraxinus nigra*), red maple (*Acer rubrum*), and American elm (*Ulmus americana*). Herb layer dominants include jewelweed (*Impatiens capensis),* various sedges and reed canary grass.

Hardwood Swamp

Hardwood swamp communities were associated with other wetland community types in a complex, and/or were associated with waterways, smaller tributaries, or drainageways. Other hardwood swamp communities were isolated wetlands and were not observed to have a hydrologic connection to other features. Common canopy dominants observed in the hardwood swamp communities include black ash, quaking aspen (*Populus tremuloides*), green ash (*Fraxinus pennsylvanica*), silver maple (*Acer saccarhimum*), giant goldenrod (*Solidago gigantea*), Canada bluejoint (*Calmagrostis canadensis*), reed canary grass, sensitive fern (*Onoclea sensibilis*), American manna grass (*Glyceria grandis*, OBL), various sedges and skunk cabbage (*Symplocarpus foetidus*).

Floodplain forest communities were associated with Buena Vista Creek and Fourmile Creek. Wetland 133.0-W5, on the south side of Buena Vista Creek, was inaccessible to field crews and therefore the wetland boundary and community type was approximated based aerial imagery, NRCS soil and WWI mapping. The boundary of Wetland AD-W19 was digitized via desktop review on a segment of Fourmile Creek just east of a field-delineated segment of the waterway. The floodplain forest communities were often dominated by black ash and green ash in the overstory, with speckled alder (*Alnus incana*) and nannyberry (*Viburnum lentago*) in the shrub layer, and Canada bluejoint, sensitive fern, American manna grass, various sedges and skunk cabbage in the herbaceous stratum.

Generally speaking, the wetlands within the fence lines of the solar generation component of the project area are degraded wet meadows or farmed wetlands characterized by low floristic diversity. While they may be floristically degraded, they still provide hydrologic function such as water quality and groundwater recharge. These wetlands are frequently used by waterfowl such as Tundra and Trumpeter Swans, geese, ducks, Whooping and Sandhill Cranes, snipe, rails, and other birds during the spring as loafing/feeding areas and pairing ponds on an annual basis. They also do serve as runoff control to some degree. The sandy soils allow for quick percolation, but during intense storm events and snow melt, they function as natural infiltration basis that improve groundwater and surface water. The wetlands associated with waterways within the project area typically maintain higher floristic diversity and provide greater fish and wildlife habitat than the degraded wet meadows and farmed wetlands within the project area.

Generally speaking, the wetlands crossed by the project transmission line routes are degraded wet meadows or farmed wetlands characterized by low floristic diversity. These wetlands provide similar function to those within the solar generation component of the project. However, the hardwood swamp and shrub-carr wetlands associated with Buena Vista Creek which are crossed by the Proposed and Alternative Project 138 kV B-2 exhibit a higher floristic diversity. They also provide excellent fish and wildlife habitat, floodplain storage, and stream bank stabilization.

Potential Wetland Impacts

Construction activities conducted near and across wetlands have the potential to impact wetland functional values, such as floristic diversity, wildlife habitat and water quality protection. Disturbance in and adjacent to wetlands can lead to an increase of invasive species and a decrease in native species diversity. Wildlife habitat and corridors could be impacted by the siting of project components in relation to wetland. The natural water quality benefit of wetlands could be diminished if project components, such as driveways and substations, are installed in wetland.

Wetland soils consist of primarily organic matter (decomposed plant material) which forms very slowly. If disturbed by digging, filling, and/or compaction, these soils may not readily recover and may not easily be repaired. Compaction from heavy equipment or from placement of construction matting in wetland can impact surface and/or groundwater flow. Soil compaction reduces the water-holding capacity of the soil and may result in increased runoff. Compacted soils could result in a change in vegetation by reducing plant diversity and promoting the growth of invasive species. Operating equipment in wetland can also endanger amphibians and other aquatic life.

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.

Solar Generation

Solar panels would be placed in up to 55 wetland complexes; 46 wetland complexes in the primary project area and 9 wetland complexes in the alternative project area. The support structures for the solar panels installed within wetlands would be driven piles, with no excavation or concrete footings. This structure type and method of installation would not result in a regulated discharge of fill in wetlands.

Fencing would be installed in up to 36 wetland complexes. Twenty-four (24) wetland complexes would be crossed within the primary project area and nine wetland complexes would be crossed within the alternative project area. The fence posts installed within wetland would be driven with no excavation or concrete footings and would not result in a regulated discharge of fill in wetlands.

Construction equipment would operate in wetlands where solar panels and fencing would be installed. Soil compaction could be minimized by utilizing construction matting and constructing during frozen or dry, stable ground conditions. They applicant stated they would install the solar arrays and fences without land disturbance either during frozen ground conditions or with the use of construction matting. Construction matting could spread the distribution of equipment weight when crossing wetlands during the growing season or when wetlands are not stable or not frozen, as heavy machinery used for construction could crush wetland vegetation and damage wetland soils, causing soil compaction, rutting, and/or soil mixing. Up to 55 wetlands would have up to 75.1 acres of construction matting placed within them to facilitate vehicle access during construction of the solar arrays. These wetlands are all

farmed wetlands. Up to 11 wetlands would have approximately 1.7 acres of construction matting placed within them to facilitate vehicle access during installation of fences. The applicant stated that construction matting for the Project would be delivered by pulp trucks with attached cranes. The attached cranes would be used to put construction matting in place and then remove the construction matting. Construction matting in wetlands is not anticipated to remain in any wetland for longer than 60 consecutive days during the growing season. The placement of construction matting would typically be considered as temporary impact to wetlands and no permanent wetland impacts are anticipated from construction matting during the construction of the Project.

Transmission Lines

The transmission line component of the project would result in the discharge of permanent wetland fill for the installation of transmission line structures. Permanent wetland fill results in the loss of wetland acreage and the functional values the wetlands provided. The amount and degree of impact differs between the offered project routes. Proposed Project Route 138 kV B-2 would permanently impact 159 square feet of wetland for the installation of 4 structures. Alternate Route 138 kV B-2 would permanently impact 89 square feet of wetland for the installation of 2 structures. The remaining transmission line routes do not include the installation of permanent structures in wetland.

The applicant proposes to place temporary construction matting in wetlands along the transmission line routes in order to facilitate vehicle access and operation. Soil compaction could be minimized through the use of construction matting and constructing during frozen or dry, stable ground conditions. Construction matting is utilized to spread the distribution of equipment weight when crossing wetlands during the growing season or when wetlands are not stable or not frozen, as heavy machinery used for construction could crush wetland vegetation and damage wetland soils, causing soil compaction, rutting, and/or soil mixing. Approximately 38, 555 square feet of construction matting would be used in wetlands along the proposed project 138 kV B-2 transmission line route and 26,626 square feet of construction matting would be used in wetlands along the alternate project 138kV B-2 Transmission Line route. The applicant stated temporary construction matting would not be placed in wetlands for greater than 60 consecutive days between May 15th and November 15th.

Clearing of wetlands dominated by woody vegetation results in a conversion from forested wetland into emergent wetland and may impair the wetlands' functional values. Three hardwood swamps are crossed by the proposed project 138 kV B-2 transmission line route and the alternate project 138kV B-2 transmission line route and would be permanently cleared to facilitate project construction and operation. Clearing and removal of brush and trees from the proposed 100-foot ROW/permanent easement width would occur in preparation for construction. Large diameter trees would be removed from the wetlands and either disposed of in non-wetland locations or sold for timber or firewood if commercially viable. Shrubby debris from forestry mowing of small diameter shrubs may remain in wetlands. The applicant stated that the shrubby debris from forestry mowing of small diameter shrubs would result only in minimal amounts of debris that would not restrict re-vegetation, alter surface elevations or obstruct water flow. This debris would not create a uniform layer. Long-term, the entire width of the ROW would be continuously cleared and permanently maintained in an herbaceous state. These forested wetlands would be converted

to emergent or scrub-shrub wetland types. Approximately 1.25 acres of forested wetland conversion would result from the proposed project 138 kV B-2 transmission line route and 0.99 acres from the alternate project 138 kV B-2 transmission line route. The other transmission line routes do not cross forested wetland and therefore do not result in forested wetland clearing.

Wetland Impact Avoidance and Minimization

All attempts should first be made to avoid impacting wetlands. While up to 20 proposed collection lines would cross wetland, the project would avoid wetland impact by utilizing HDD installation method for those lines that cross wetland. The proposed project would not include any access roads, inverter pads, laydown yards, or substations in any wetlands. However, some array structures, fences, and transmission line structures would be constructed in wetland.

The solar generation component of the project avoids forested wetland clearing; however, both the proposed and alternate project 138 kV B-2 transmission line routes would impact forested wetland through clearing and conversion of forested wetland to non-forested wetland. The forested wetland clearing and wetland conversion could be avoided by siting the transmission lines to avoid forested wetland. Impacts could also be avoided and/or minimized by proposing underground transmission lines in lieu of overhead and by installing the underground line via trenchless installation method.

Where complete wetland avoidance is not practicable 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.

Secondary wetland impacts should be avoided and minimized as much as possible. Construction methods that can minimize impacts to wetlands include:

- Conducting construction activities when wetland soils were frozen or stable and vegetation is dormant.
- Using construction matting and wide-track vehicles with equipment crossing of wetlands when wetlands were not stable or not frozen.
- Siting structures and access roads on the edges of wetlands rather than in the middle of wetland to avoid fragmenting wetland complexes.
- Reducing the construction workspace in wetlands.
- Installing site-specific sediment and erosion control measures and devices prior to construction activities, with daily inspections and maintenance throughout all construction and restoration phases.
- Implementing a construction sequencing plan that minimizes the amount of land disturbed or exposed (susceptible to erosion) at one given time across the project.
- Marking the boundary of wetlands.
- Using alternative construction methods and equipment such as helicopters, marsh buggies, and vibratory caisson foundations.

- 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.
- Minimizing the amount of vegetation clearing in wetland and conversion of wetland types.
- Removing all brush piles, wood chips, and woody debris from wetlands following clearing activities.
- Conducting surface and sub-surface assessments prior to construction, including hydrology and soil evaluations. This includes modifying the engineering plans, as needed, to avoid and minimize long term impacts to surface and subsurface resources and to re-establish conditions post-construction.
- 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.
- Limiting forested wetland clearing areas to the proposed ROW and limiting the width of the proposed ROW.

To minimize wetland impacts associated with construction, the applicant stated bore pits associated with HDD installation of collection lines would be located in upland and that access to bore pits would be attained from upland areas (upland agricultural fields) within the project area utilizing existing public roads. Proper sediment, erosion control, and invasive species control BMPs would be installed/utilized adjacent to the bore pit prior to construction activities beginning to prevent sediment from leaving the workspace and entering any nearby wetlands. Dewatering activities may be necessary during the installation of the collection lines. The applicant stated that water pumped during dewatering activities would be discharged into upland vegetated areas or into a constructed dewatering basin and that the contractor would comply with WDNR Technical Standard 1061.

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. The applicant stated that proper erosion control BMPs would be installed around field delineated wetlands to prevent sediment from reaching any wetlands.

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. The applicant stated that the farmed wetlands that would be covered with construction matting would be re-vegetated with the wet-mesic Graminoid Plus seed mix found in Appendix I Vegetation Management Plan. Once permanent erosion control measures are installed, and vegetation is reestablished, temporary erosion control measures would be removed.

The applicant stated they would utilize internal environmental Construction Compliance Program (CCP) that would ensure compliance with all applicable environmental permits, plans, and regulations. An environmental monitor would conduct ongoing on-site inspections during construction to ensure all employees are environmentally aware and ensuring compliance throughout construction. The application states that the environmental monitor would be responsible for implementing the CCP, which would consist of environmental training, regularly scheduled inspections, and tools such as permit matrices and inspection summary logs to ensure all environmental laws and conditions are met. Under the CCP, the environmental monitor would also provide environmental training to all construction managers, foreman, and operators prior to construction.

2.4.3. 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. Based on the desktop mapping and field review, 47 waterways and 7 waterbodies are within the project area, none of which are within proposed fenced array areas. The applicant requested the DNR conducted a navigability determination on five waterways. The DNR determined the five waterways subject to that navigability determination request to be non-jurisdictional under Chapter 30. Therefore, 42 waterways and 7 waterbodies are considered jurisdictional under Chapter 30.

The project area is primarily within the Fourmile Creek Watershed. The watershed is primarily cool/cold water with primarily Class 1 and Class 2 Trout Streams. Seventeen (17) Class I Trout streams and seven Class II Trout Streams are mapped within the project area. A “Class I Trout Stream” is a stream or portion thereof with a self-sustaining population of trout. Such streams contain trout spawning habitat and naturally produced fry, fingerling, and yearling in sufficient numbers to utilize the trout habitat; or contains trout with 2 or more age groups, above the age of one year, and natural reproduction and survival of wild fish in sufficient numbers to utilize the available trout habitat and to sustain the fishery without stocking. A “Class II Trout Stream” is a stream or portion thereof that contains a population of trout made up of one or more age groups, above the age one year, in sufficient numbers to indicate substantial survival from one year to the next and may or may not have natural reproduction of trout occurring; however, stocking may be necessary to fully utilize the available trout habitat or sustain the fishery. There are a moderate to high abundance of Brook Trout populations in the portions of waterways within the Project Area which are supported entirely by natural reproduction. A portion of Fourmile Creek that is mapped as an Exceptional Resource Water flows along the north side of CTH W at the southern

boundary of Alternate Array #53 and is outside of the proposed fence line and any proposed project infrastructure. Additionally, NR 102.11(1)(a) identifies all Class I trout waters listed in Wisconsin Trout Streams publication 6-3600 (80) that are not listed in s.NR 102.10 as Exceptional Resource Waters.

Even though many of the waterways have been straightened and ditched to facilitate drainage to support agriculture, they have an Index of Biotic Integrity (IBI) rating primarily of good to excellent within the project area. Strong baseflow via groundwater through the sandy aquifer, promote cold water fish and macroinvertebrate species. These waterbodies provide abundant angling opportunities and habitat for the unique flora and fauna of the area.

Potential Waterway Impacts

Construction activities conducted near and across waterways have the potential to impact public interests in navigable waterways. 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 vegetation may decrease shoreline protection and may lead to increased sedimentation of waterways. Vegetation disturbance along waterways 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.

For the solar generation component of the project, one waterway would be crossed for the construction of a permanent access road utilizing a culvert crossing. The applicant stated that the proposed culvert crossing of waterway AD-S5 would comply with the Waterway Crossing General Permit WDNR-GP21-2021.[33] For the transmission line component of the application, five waterway crossings would be traversed with equipment and all crossings will be accomplished with Temporary Clear Span Bridges (TCSBs). The applicant stated that the proposed TCSBs would comply with the standards found in WDNR-GP3-2023.[34]

The project includes 300 MW of battery energy storage. These batteries could have a detrimental impact to surface waters if heavy metals or acids were to be leached from the batteries into groundwater and reach water resources. In the case of a battery fire, leachate from firefighting water could contain reactive metals and other elements that has the potential to reach the water table and/or surface water. Battery leachate and contaminated firefighting water could pose a threat to macroinvertebrates and fish if they reach water resources.

Beneficial impacts to the watershed could occur from the proposed land use change from primarily agricultural to solar generation. As a result of the land use change, there would be a

[33] Data Response WDNR-GR-3.19
[34] Data Response WDNR-GR-3.16

decrease in the amount of fertilizer and pesticide runoff to water resources within the project area. Reducing the regular soil disturbance associated with agriculture land use could also reduce local soil erosion and sedimentation into water resources once the site has established vegetation. It is unknown the degree of benefit these changed could have on the overall watershed, but the changes would result in some degree of environmental benefit.

Waterway Impact Avoidance and Minimization

All attempts should first be made to avoid impacting waterways. Impacts to waterways can be avoided by siting the project away from riparian corridors, using alternative collector line installation methods (trenchless), and utilizing alternate access routes such as off-ROW access roads to avoid equipment access across waterways.

Indirect waterway impacts should be avoided and minimized as much as possible. Construction and operation of projects near 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.
- Preparing and implementing 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.
- Minimizing 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.
- Developing a site-specific sediment and erosion control plan and installing measures and devices prior to construction activities and inspecting and maintaining them daily throughout all construction and restoration phases.
- Implementing a construction sequencing plan that minimizes the amount of land disturbed or exposed (susceptible to erosion) at one given time across the project.
- Maintaining existing vegetative buffers undisturbed whenever possible, or clearing of vegetation should be kept to a minimum in riparian zones.
- Revegetating 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.
- Managing invasive species in restored areas
- Preparing and implementing dewatering practices to prevent sedimentation into waterways.
- Marking the location of waterways in the project area.
- Isolating all soil piles from waterways with perimeter erosion control BMPs.

- Limiting the amount of time necessary to complete construction.
- Developing a site-specific fire control plan for battery storage and solar arrays, that includes BMPs, training for first responders, and appropriate access for emergency equipment.

Site disturbance for project construction would be temporary. Site restoration, including revegetation, 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. The application states that proper sediment, erosion control, and invasive species control BMPs would be installed/utilized adjacent to all waterways prior to construction activities.

The applicant should conduct regular inspections, including areas where construction is occurring adjacent to water resources and other sensitive resources, to ensure that proper BMPs are employed, minimization measures are being followed, permit conditions are met, and site restoration is completed. The application states that an internal environmental Construction Compliance Program (CCP) would ensure compliance with all applicable environmental permits, plans, and regulations. An environmental monitor would conduct ongoing on-site inspections during construction to ensure all employees are environmentally aware and ensuring compliance throughout construction. The application states that the environmental monitor would be responsible for implementing the CCP, which would consist of environmental training, regularly scheduled inspections, and tools such as permit matrices and inspection summary logs to ensure all environmental laws and conditions are met. Under the CCP, the environmental monitor would also provide environmental training to all construction managers, foreman, and operators prior to construction.

For the solar generation component of the project, collector circuits would cross 16 waterways for the proposed array area and cross 14 waterways for the alternate array area using the horizontal directional drilling (HDD) installation method to avoid direct impacts to the waterways. Construction activities associated with the collector circuits would occur in upland agricultural fields, outside of the waterway banks. The application indicates that bore pits would be located in upland areas 50-100 feet away from waterways. Vegetation removal for HDD installation would be minimal and confined to low growing herbaceous vegetation along the field edges. It is recommended that the HDD installations follow DNR Technical Standard for Horizontal Directional Drilling 1072. The application states that contingency plans for bore refusal and frac-outs would be developed by the construction contractor prior to construction start by the HDD contractor. The applicant has considered timing restrictions for HDD boring operations involving state listed Class I and Class II trout streams and other undesignated cold-water streams within the project area.[35] The applicant stated that boring under these types of waterways would be avoided between September 15 and May 15 if feasible. If HDD boring would be required between September 15 through May 15th because of construction scheduling, weather, or other unforeseen issues, the Applicant would consult with the local DNR fisheries biologist and apply for and obtain a fisheries waiver.[36]

[35] Data Response WDNR-GR-3.1
[36] Data Response WDNR-GR-3.1

Buena Vista Creek would be crossed by the proposed and alternative project 138 kV B-2 Transmission Line routes. The wetlands in this area exhibit a higher floristic diversity, and provide for greater fish and wildlife habitat, floodplains storage, and stream bank stabilization. The 100-foot ROW would be permanently cleared of woody vegetation which could impact bank stability, fish and wildlife habitat, and water quality. Operating equipment on the banks of the waterway could lead to soil compaction and further bank instability. An Aquatic Plant Management (APM) permit would be required for any herbicide use in areas hydraulically connected to trout waters. Impacts to Buena Vista Creek could be avoided and/or minimized by siting the proposed transmission line to avoid the waterway corridor or by proposing underground transmission lines in lieu of overhead lines and installing the underground lines via trenchless installation method.

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. As currently proposed, the project would require Chapter 30.123 and Chapter 281.36 permit authorization for the proposed wetland fill, the proposed TCSBs, and the proposed culvert. If the proposed 138 kV B-2 transmission line route is selected, the wetland fill and the TCSBs would require individual permit authorization because the proposed forested wetland clearing would exceed the one-acre threshold found in WDNR-GP3-2023. If the alternate 198 kV B-s transmission line route is selected, the impacts would qualify for general permit coverage if the forested wetland clearing would remain less than one-acre. The proposed culvert crossing would qualify for general permit coverage—under WDNR-GP21-2021.

The USACE and/or USFWS may 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.

2.4.4. Groundwater

The proposed project is situated in the Fourmile creek watershed of the Central Sands region of Wisconsin. The project anticipates between 5,700 and 7,900 acres of agricultural land will be converted to grassland to facilitate the project. The geology of the Central Sands is characterized by glacial lake sediments and sandy outwash sediments (Zaporozec and Carter 1985).[37] This type of aquifer is typically referred to as a sand and gravel aquifer. Within the Fourmile creek watershed there are over 400 existing high capacity wells, almost all of them withdrawing water from the sand and gravel aquifer. The depth to groundwater generally occurs between 6 feet and 12 feet below ground surface, with the bedrock surface being found at varying elevations anywhere from 23 feet to 108 feet below ground surface. The first bedrock encountered is typically a Cambrian sandstone with a shale unit infrequently found as well.

Wells completed in the outwash sediments tend to be extremely productive (Zaporozec and Carter 1985).[38] Generally, groundwater flows westward from the glacial moraines in the east towards the Wisconsin River, however flow in this area is complex vertically and horizontally (Bradbury et al. 1992).[39] Locally, groundwater flows towards streams such as Buena Vista Creek (Lippelt 1981).[40]

The hydrology of the proposed project area has been historically managed and numerous streams have been previously altered to conform to linear ditches to control water levels, with the earliest ditches in the region being developed around 1902 (Central Sands Lake Study, Appendix F). Additionally, downstream Wazeecha Lake is flow controlled by a dam that was installed in the early 20th century.[41]

Nearby groundwater monitoring wells (USGS Portage Well, USGS Wood Well) record interannual variations in groundwater level of multiple feet.[42] In April 2023, the Portage County well recorded a water level of 4 feet below the ground surface, and 5 months later it recorded a depth of approximately 7 feet in September, a change of over 36 inches. While these monitoring wells are over five miles from the project area, they are completed in a similar hydrogeologic setting, and we would anticipate similar groundwater level fluctuations in the project area.

The applicant states that there are 56 high capacity wells within the proposed array area and 24 high capacity wells within the alternative array area. High capacity wells are defined as a well that has the capacity to withdraw more than 100,000 gallons per day, or a well that, together with all other wells on the same property, has a capacity of more than 100,000 gallons per day. Per the applicant, many of the high capacity wells within the final array area are anticipated to run at maintenance levels far below their typical use for agricultural irrigation. Any high

[37] Major Ground-water Units of Wisconsin (ES028)
[38] Major Ground-water Units of Wisconsin (ES028)
[39] WGNHS (wisc.edu)
[40] WGNHS (wisc.edu)
[41] DG_CSLSAppendixF_2021.pdf (widen.net)
[42] USGS 441452089433001 WD-21/06E/36-1298

capacity wells not used for three consecutive years must be filled and sealed by an appropriately licensed individual as required in Wisconsin NR 812.26(4)(a)5.[43] All high capacity wells remaining in active status will be required to report their water use to the Department in accordance with Wisconsin NR 856, and the annual water use fees under NR 850 will apply, regardless of whether the source was used in a given year.[44]

Within the proposed array area, 49 high capacity wells are anticipated to run at "maintenance levels," while the remaining 7 high capacity wells in the proposed array area will operate at partial capacity irrigating agricultural area outside of the project area.

The applicant has not identified which specific wells are included in the 56 high capacity wells in the proposed array area; 56 high capacity wells were identified in an approximately 100-foot buffer around the proposed array area, and these wells are assumed to be the same as the wells identified by the applicant.

The high capacity wells in the proposed array area withdraw roughly 1 billion gallons of water annually, with any individual well withdrawing approximately 26 million gallons in any given year. The volume of water used varies greatly year-to-year, with drought years having much higher water withdrawals. In 2023, the same wells withdrew a cumulative 2.3 billion gallons, while only 0.8 billion gallons of water were used in 2016. This information is summarized in Table 2.1.

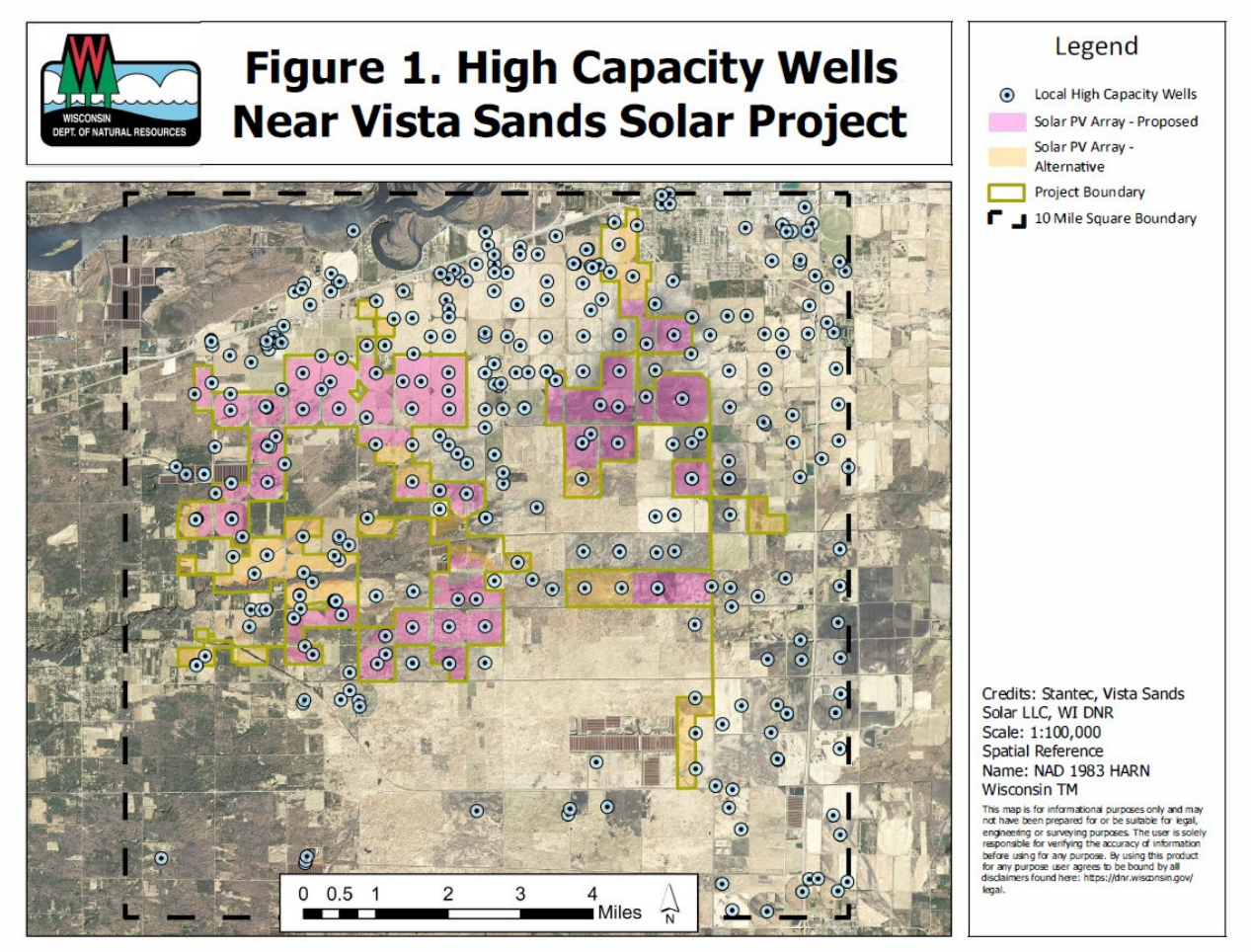
There are hundreds of high capacity wells near the proposed solar array. Within a 10 mile by 10 mile square containing the project area (Figure 1 Greater Buena Vista Area), there are 359 active high capacity wells that cumulatively withdraw between 3 and 12 billion gallons of water annually, depending on seasonal irrigation needs. The high capacity wells within the project area account for about 20% of the total water use within the Greater Buena Vista Area. Removing these wells from active irrigation will result in this water not being withdrawn from groundwater supplies; it will not result in additional water being applied to agricultural fields.

Table 2.1 Water Use near Proposed Project Area

	Water Use in Proposed Array Area (Billions of Gallons)	Water Use in Greater Buena Vista Area (Billions of Gallons)
Low Water Use Year (2016)	0.8	4.8
Average Water Use Year (2020)	1.1	5.4
High Water Use Year (2023)	2.3	12.9

[43] Wisconsin Legislature: NR 812.26(4)(a)5.
[44] Wisconsin Legislature: Chapter NR 856

Figure 2.1 Map of High Capacity Wells near Vista Sands Solar Project



2.5. FORESTED LAND IMPACTS

The forests in the project area are Midwestern, with dominant species consisting of red pine (*Pinus resinosa*) and white pine (*Pinus strobus*), northern pin oak (*Quercus ellipsoidalis*), black cherry (*Prunus serotina*), red oak (*Quercus rubra*) and quaking aspen (*Populus tremuloides*), honeysuckle (*Lonicera sp.),* jack pine (*pinus banksiana*, red oak saplings (*Quercus rubra*), scotch pine (*Pinus sylvestris)*, red maple (*Acer rubrum)* , sugar maple (*Acer saccharum*), and balsam fir (*Abies balsamea*). 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 and along fence lines. 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 would be cleared to avoid shading of panels depending on the array layout. The majority of proposed forested land impacts would occur in buffer areas around the agricultural fields.

The applicant indicates that the proposed solar project area and associated facilities would impact a total of 105 acres of forested lands. The alternative solar array areas would impact a total of 157 acres of forested lands.[45] 3.3 acres of forested land would be impacted from proposed collector corridor construction, 0.9 acres from proposed access road construction, and 7.6 acres from proposed fence construction. There are no forested land impacts associated with the construction of the BESS, gen-tie line, laydown areas, or O&M building.

The proposed transmission lines would impact a total of 30.7 acres of upland forest lands and 1.3 acres of forested wetland, for a total of 32 acres of forested land impacts. The alternative transmission lines would impact a total of 27.2 acres of upland forest lands and 1 acre of forested wetland, for a total of 28.2 acres of forested land impacts.[46]

A map of proposed forested land impacts was uploaded to the application as an attachment to the response to data request PSC-Grant-1.[47] There are eleven forested areas greater than four acres that could be impacted as a result of the project. Six of these areas would be located within the proposed array areas and would total approximately 43 acres of forested land clearing. The remaining five of these areas totaling more than four acres would be located in the alternative array areas and would total 135 acres of forested clearing. The applicant states that the 21% of the proposed forest clearing would be associated with the proposed array areas and 71% would be associated with the alternative array areas. In addition to these eleven areas of over four acres of tree clearing, the applicant notes that there are 161 small slivers of anticipated forested land impacts. Each of these areas would be under 4 acres in size. The proposed primary array areas would include 102 small sections of tree clearing (less than 4 acres), totaling 62 acres. The alternative array areas would include 74 small sections of tree clearing (less than four acres), totaling 22 acres.

The applicant stated it would avoid tree clearing from April 1–August 15 to avoid impacts to roosting bats as well as nesting birds, most of which are protected by the Migratory Bird Treaty Act.[48]

No forested wetland would be cleared as a result of the solar array impacts of this project. Forested wetland would be cleared as a part of the transmission portion of the project. One acre of forested wetland would be anticipated to be impacted in the proposed 138 kV A-1 Transmission Line and one acre of forested wetland would be impacted in the Alternative 138 kV B-2 Transmission Line. The wetland section of this EIS will discuss this wetland clearing in greater detail.

The transmission portions of the project would require a total of 27 acres of new ROW forested land impacts. The alternative route options would require a total of 26 acres of new ROW forested land impacts.

[45] PSC REF#: 498404 Response-Data Request-PSC-Grant-6
[46] PSC REF#: 488118 Appendix W- PSCW-Tables
[47] PSC REF#: 491610 Response-Data Request-PSC-Grant-1
[48] PSC REF#: 496585 Response-Data Request-PSC-Grant-5

One section of land along the route for the 345 kV transmission line is enrolled in the Managed Forest Law (MFL) program. During the easement negotiation process, the applicant states that, if the landowner is unable to continue participating in the program, Vista Sands would compensate the landowner for any financial impact. There is also one section of MFL land, a total of 55 acres, located in the proposed solar portion of the project. Because the land is located outside the fenced array areas, no portion of enrolled lands are expected to be impacted by the project.[49] There are no Forest Crop Law (FCL) programs within the project area.

2.6. ENDANGERED RESOURCES

Wisconsin'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 Wis. Admin. Code).

"Endangered resources" is a term that includes endangered, threatened, and special concern species, as well as certain natural communities and animal concentration sites. "Endangered" means a species is in danger of extinction throughout all or a significant portion of its range. "Threatened" means a species is likely to become endangered within the foreseeable future. At the state level, "Special Concern" refers to those species where some problem of abundance or distribution is suspected but not yet proved. The main purpose of this category is to focus attention on certain species before they become threatened or endangered. Reviews were completed at both the state and federal level to determine what, if any, actions may be required or recommended to avoid and/or minimize impacts to federal and state endangered resources. A summary of the endangered resources reviews is provided below.

2.6.1. Federally-listed Endangered Resources

The applicant requested an Official Species List report for the proposed project in this docket from the U.S. Fish and Wildlife Service (USFWS). This list identifies any federally threatened, endangered, proposed and candidate species that may occur within the boundary of the proposed project or may be affected by the proposed project. The list also includes designated critical habitat within the proposed project area. Information for these lists comes from the USFWS Environmental Conservation Online System – Information for Planning and Consultation (IPaC)

[49] PSC REF#: 498404 Response-Data Request-PSC-Grant-6

tool. The following list shows the federal species identified at the proposed project through this consultation:

The federal review did not identify any critical habitats within the proposed project area.

Northern Long-eared Bats

Northern long-eared bats, as well as other state-protected bat species, may use parts of the project area for summer habitat, particularly areas with trees. Female bats and their young are vulnerable to mortality during the maternity period because of their use of trees for maternity colonies and the inability of young bats to fly for several weeks after birth. USFWS determined that the project would not likely have an adverse impact to the Northern Long-eared Bat. In addition, per the state ER Review referenced below, no known roosts or hibernacula were identified within or adjacent to the proposed project area. However, identification of maternal roost trees used by bats is very difficult and very few across the state are known. The absence of any mapped roosts in the NHI should not be interpreted as meaning there are no bats present in local woodlands.

The applicant has stated they would avoid tree clearing from April 1–August 15 to avoid impacts to roosting bats as well as nesting birds, most of which are protected by the Migratory Bird Treaty Act.[50]

Karner Blue Butterfly High Potential Range

The Karner Blue Butterfly (KBB) is a federally-endangered species that is dependent on open to semi-open upland habitat and larval food plant, wild lupine, for persistence. Portions of this project are located within the High Potential Range (HPR) for this species. The HPR was developed through a model to identify areas where the KBB has the highest probability of occurring. Wisconsin has a statewide Habitat Conservation Plan (HCP) that was prepared by the DNR and 25 partner organizations that identifies how any destruction or harm ("take") of the species will be reduced and the actions that will be used to compensate for any "take" that occurs. The applicant is not a partner in this HCP. Surveys were completed for portions of the project in 2022 and found no wild lupine. However, suitable habitat for the KBB may be present in other portions of the proposed project area and these locations would still need surveys to be completed.

For the remaining federally-listed endangered resources identified within the IPaC review, no impacts are anticipated to occur due to lack of suitable habitats within the proposed project area.

2.6.2. State-listed Endangered Resources

A Certified Endangered Resources (ER) Review was completed for the proposed Project (ER Log #23-336). The ER Review is based off information from the Natural Heritage Inventory (NHI) database, maintained by the DNR Bureau of Natural Heritage Conservation. The purpose of the ER review is to use the NHI database to identify any known endangered resources within and near (one-mile for terrestrial and wetland species, two-miles for aquatic species) the proposed project area. The applicant completed a draft ER review for the proposed project area,

[50] PSC REF#: 496585 Response-Data Request-PSC-Grant-5

then sent it to the DNR for verification. The ER Review were checked, modified (if needed), and approved by DNR staff in the ER Review Program. As written, the ER Review only looked at the construction of the facility and associated building/structures. It did not review for ongoing activities or any indirect impacts such as potential habitat fragmentation. 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 those species.

If approved, the proposed 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 or when known populations are updated. Also, any species delisted would be removed from the database. If the project is approved, the applicants should renew the review closer to the construction start date to determine if any changes to the review would be needed. An ER Review should also be completed annually for ongoing maintenance and vegetation management activities to ensure rare species are not impacted by these activities which the applicant has agreed to do.[51]

The ER Review for the project determined there are several species located within the search buffers of the proposed impacted areas. While many of these endangered resources would not be directly impacted, a total of 16 species and natural communities could be impacted if actions are not put into place to prevent or minimize these impacts. They include:

- Four state threatened, one endangered, and two special concern bird species
- One state endangered and one special concern terrestrial invertebrate species (including the Karner Blue Butterfly which is discussed in the federal section above)
- One state threatened and one special concern herptile species
- One upland natural community
- One special concern mammal
- One state threatened and two special concern plant species (one special concern plant has since been removed from the ER Review)

The DNR provided required and recommended actions for each species as well as the natural community. 'Required actions' represent the DNR's best available guidance for complying with state and federal endangered species laws based on the proposed project information provided by the applicant and the endangered resources information and data that is available. If the required actions cannot be implemented, then the applicant must apply for an Incidental Take Authorization which would allow the project to take some individuals so long as minimization and mitigation measures are put into place. 'Recommended actions' are those the DNR strongly encourages to help prevent future endangered resources listings and protect Wisconsin's biodiversity for future generations. In the past, on a case-by-case basis, the Commission has required an applicant to undertake a DNR-recommended action to mitigate the environmental

[51] PSC REF#: 496585: Response-Data Request-PSC-SR-5.10

impacts associated with a project. Required and recommended actions for the proposed project include:

- Birds: Surveys were completed for most bird species in 2022 where suitable habitat was present within or adjacent to the project area and where access was available. While the targeted bird species were not identified, other rare bird species were identified. Surveys are good for two years and would need to be repeated prior to any work starting. If future surveys are conducted and document presence or if assuming presence, take can be avoided for these birds by avoiding impacts to suitable nesting habitat during the species' specific nesting season. If surveys are completed and the specific bird species is found not to be present, then timing restrictions would not be required.
- Terrestrial Invertebrates: Surveys were completed for the host plants of each species in 2022 where suitable habitat was present within the proposed project area and where access was available. While some host plants were found, they were found in low abundance and density. That, combined with the relatively low-quality habitat they were found in, these areas were determined to not be suitable for these terrestrial invertebrates. Host plant surveys are good for five years. Areas that were not surveyed and would be disturbed by proposed project activities would still need presence/absence host plant surveys completed.
- Herptile: The state threatened herptile species has a Broad Incidental Take Authorization in place that must be followed when in suitable habitat. For the special concern herptile, recommended actions that could be followed include time of year restrictions, herptile exclusion fencing, and moving any herptiles found outside the project area.
- Use of wildlife permeable fencing as outlined in section 2.9 Wildlife Impacts. would also be recommended where suitable herptile habitat, especially nesting habitat, is present to allow for movement within and amongst the solar arrays.
- Natural Community: Impacts should be minimized to the extent practicable when working within/adjacent to the community. In addition, implementing invasive species BMPs and working under frozen ground conditions are also recommended.
- Mammal: Avoiding construction to the extent practicable within suitable habitat during the summer breeding season (May-fall) and hibernation season (late fall to early spring) would help to minimize impacts to this small mammal.
- Plant: Conduct presence/absence surveys in areas of suitable habitat. If not present, then no further actions are necessary. If present, then impacts should be avoided when possible. Alternatively, conducting above-ground work when the species are dormant (November-April) is recommended.

Grassland Birds

The Wisconsin Bird Conservation Partnership has identified the Buena Vista-Leola State Wildlife Area as one of 88 Important Bird Area (IBA) which encompasses roughly the southeastern half of the proposed project area. It represents one of the best opportunities in the state for large-scale grassland management and supports many of Wisconsin's priority grassland bird species, including listed species. While direct impacts to grassland birds related to proposed project construction is not expected, there is likely going to be impacts to these grassland birds as it relates to habitat fragmentation and ongoing project activities. While managing at a large,

landscape scale is important to grassland birds[52], one could surmise that the quality of grassland bird habitat could decline if the landscape surrounding the IBA becomes saturated with solar arrays and other structures/facilities. However, little if any research has been done on grassland bird impacts related to solar facilities, so it is difficult to say just what those impacts may be. As the Greater Prairie-chicken (GRPC) is considered an umbrella species for other grassland birds in Wisconsin, conservation strategies that benefit GRPC are likely to encompass the needs of other grassland bird species that occupy similar habitat to where GRPC are found. Umbrella species are species selected for making grassland conservation decisions in central Wisconsin because protecting them indirectly conveys protection to many other grassland birds and other species. Therefore, impacts to grassland bird species from the proposed project is discussed under Greater Prairie-chicken Impacts in section 2.7.

The American Kestrel has seen declines in its population in recent years and is known to reside at the BVWA. This species favors open habitats and typically feeds on small mammals. The proposed solar arrays could create suitable habitat for small mammals, thereby bringing in kestrels. In turn, this could help decrease rodent populations which could nest in and/or damage the infrastructure. Kestrels are increasingly nesting in manmade structures as their natural habitat is decreasing. The applicant has stated they would consider placement of kestrel boxes and collaborate with DNR on potential locations for kestrel box installation[53] as it would overall, have a positive benefit on the ecosystem surrounding and within the proposed array areas while not impacting other listed species that may be present.

For most solar array projects, visual buffers, such as shrubs and trees, are recommended and encouraged to block the arrays from being seen from residences, public lands, etc. However, when placed near grassland bird habitat, shrubs and trees would likely further fragment the open landscape. Also, even if low-growing shrubs are planted, they wouldn't hide the height of the fences or solar arrays and may serve to facilitate mesopredator movement by creating travel corridors which could increase grassland bird nest predation where in proximity to brush/tree lines. Therefore, it is recommended that these visual buffers not be implemented when within one mile of all known GRPC habitat, including leks identified during 2021-2024 unless asked for by a nearby residence.

Several public comments have been received addressing impacts to avian species. Large-scale solar facilities are a relatively new addition to the landscape and research is ongoing to determine impacts to wildlife, including bird species. Some studies suggest that solar infrastructure may produce a reflection similar to a water body, which may lead to increased risk to waterfowl; however, these studies have only shown this infrequent behavior in the desert southwest. Other studies suggest that solar arrays may promote increased bird diversity in certain intensively managed agricultural landscapes[54] while others have shown that solar energy facilities may be ecological traps for birds[55] In 2016, a multi-agency collaborative working group released an

[52] Guttery, et al. 2017. Landscape Ecology 32:515-529
[53] PSC REF#: 496585: Response-Data Request-PSC-LK-5.21
[54] Solar parks can enhance bird diversity in agricultural landscape - ScienceDirect
[55] Avian interactions with renewable energy infrastructure, 2016, Smith & Dwyer

avian-solar science coordination plan[56] that discussed ways solar development may affect birds and areas where more information is needed to understand potential impacts to birds.

The Commission required the first two solar facilities it authorized, Badger Hollow and Two Creeks, to conduct post-construction mortality surveys. The results are listed here or in docket 9696-CE-100 for Two Creeks Solar[57] and here or in docket 9697-CE-100 for Badger Hollow Solar.[58] The results from these studies have been submitted and are being reviewed by Commission staff. It is important to note that these studies were only done over the course of one year shortly after both facilities were built and represent a very small snapshot in time of avian mortality that occurred. In the future, it would be at the discretion of the Commission, on a case-by-case basis, to determine if avian mortality studies would be required for additional projects. Overall, there have been very few studies, particularly systematic studies of mortality, at comparably sized solar facilities and within landscapes similar to those found in Wisconsin so it is difficult to assess just what the impacts solar facilities have on birds and other wildlife.

In 2019, the Department of Energy[59] 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 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. More discussion on the proposed project and specific research potentials can be found in Greater Prairie-Chicken Impacts (section 2.7).

2.7. GREATER PRAIRIE-CHICKEN IMPACTS

2.7.1. Greater Prairie-Chicken Status and Distribution and Landscape Scale Assessment

The Greater Prairie-chicken (*Tympanuchus cupido pinnatus*, GRPC) is a state-threatened grouse species that historically was present in every county in Wisconsin. By the mid-1900s, GRPC were primarily restricted to parts of Central Wisconsin. The range contraction and population concentration of GRPC is attributable to habitat loss and fragmentation driven by land use changes, a pattern that has been noted for decades.[60] [61] (Appendix B Figure 1). Currently, GRPC are concentrated in and around four wildlife areas in central Wisconsin that are managed by the DNR primarily for grassland habitat. In the north, GRPC are centered mostly around the Paul J. Olson Wildlife Area (PJOWA) and to a limited extent around the George W. Mead

[56] The Multiagency Avian-Solar Collaborative Working Group, 2016, Avian-Solar Science Coordination Plan, November 2016.
[57] PSC REF#: 467348 9696-CE-100 Post Construction Avian Study Two Creeks
[58] PSC REF#: 467344 9697-CE-100 O.P. 9 Post Construction Avian Study (REPLACES PSC REF#: 467332)
[59] 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.***
[60] Anderson, R.K. and J.E. Toepfer. 1999. History, status, and management of the Greater Prairie chicken in Wisconsin. Pages 39-58 *in* W.D. Svedarsky, R.H. Hier, and N.J. Silvy (eds.). *The Greater Prairie-chicken: A National Look*. Miscellaneous Publication 99-1999, Minnesota Agricultural Experiment Station, University of Minnesota, Saint Paul, MN.
[61] Sample, D.W. and M.J. Mossman. 2008. Two centuries of changes in grassland bird populations and their habitats in Wisconsin. Pp. 301-329 *in* D.M. Waller and T.P. Rooney (eds.). *The Vanishing Present: Wisconsin's Changing Lands, Waters, and Wildlife*. University of Chicago Press, Chicago, IL.

Wildlife Area (GWMWA, Appendix B Figure 2). In the south, GRPC are centered around the Leola Wildlife Area (LWA) and Buena Vista Wildlife Area (BVWA, Appendix B Figure 3). Portions of the Vista Sands Solar (VSS) project are located within the northern and western portions of the BVWA which harbors the largest concentration of GRPC among the four wildlife areas (Appendix B Figure 4).

GRPC travel over relatively short distances (<5 miles) in Wisconsin.[62] [63] [64] [65] Dispersal between BVWA and PJOWA is very rare.[64] [65] Dispersal requires a series of shorter movements between intermediate patches of grassland habitat that serve as stepping stones to connect subpopulations.[66] [67]

The DNR established the Central Wisconsin Grassland Conservation Area (CWGCA) in 2004, with the goal of permanently protecting core areas of grasslands within a predominantly open, unforested, undeveloped landscape where agriculture is the dominant land use, particularly in areas critical to the life history needs of GRPC and other grassland species.[68] Within this working agricultural landscape, the DNR established the objective of creating smaller stepping stone grassland areas to facilitate dispersal between GRPC subpopulations.[68] Past and current GRPC management plans also recognize the importance of establishing grassland stepping stones,[68] [69] which are essential to maintain GRPC genetic diversity and reduce the likelihood of their extinction.[70] The DNR continues to work with partner organizations towards establishing grassland habitat to serve as stepping stones on private lands, both within and surrounding the BVWA and PJOWA and between BVWA and LWA. Despite this, habitat fragmentation continues to contribute towards declining populations, increased isolation of GRPC across the four wildlife areas, and reduced gene flow. Past translocation of GRPC to Wisconsin have not increased genetic variation.[71] As such, GRPC in Wisconsin have lost genetic diversity[72] [73] [74] and the southern and northern subpopulations are genetically distinct.[73] [74]

GRPC require large areas of grassland and have specialized requirements for different stages of their life cycles. GRPC are selected for making grassland conservation decisions in central

[62] Hamerstrom, F.N., Jr., and F. Hamerstrom. 1949. Daily and seasonal movements of Wisconsin prairie chickens. Auk 66(4):313-337
[63] Hamerstrom, F.N., Jr., and F. Hamerstrom. 1973. The Prairie-chicken in Wisconsin: Highlights of a 22-year Study of Counts, Behavior, Movements, Turnover and Habitat. Wisconsin Department of Natural Resources, Technical Bulletin No. 64, Madison, WI
[64] Halfmann, D.A. 2002. Natal Dispersal of Juvenile Prairie-chickens in Wisconsin. M.S. Thesis, University of Wisconsin-Stevens Point
[65] Toepfer, J.E. 2003. Prairie-chickens and Grasslands: 2000 and Beyond. A Report to the Council of Chiefs, Society of Tympanuchus Cupido Pinnatus, Ltd., Elm Grove, WI
[66] Niemuth, N.D. 2000. Land use and vegetation associated with Greater Prairie-chicken leks in an agricultural landscape. *Journal of Wildlife Management* 64(1): 278-286
[67] Niemuth, N.D. 2003. Identifying landscapes for prairie-chicken translocation using habitat models and GIS: A case study. Wildlife Society Bulletin 31(1): 145-155
[68] WDNR. 2004. Feasibility Study and Environmental Analysis for the Central Wisconsin Grassland Conservation Area, A report to the Natural Resources Board. October 2004. 25pp
[69] WDNR. June 2022. Wisconsin greater prairie-chicken management plan, 2022-2032. Bureau of Wildlife Management, P.O. Box 7921, Madison, WI. PUB WM-692-2022, 122pp
[70] Pruett, C.L., M.A. Patten, and D.H. Wolfe. 2009. It's not easy being green: wind energy and a declining grassland bird. BioScience 59(3):257-262
[71] Bateson, Z. W., P.O. Dunn, S.D. Hull, A.E. Henschen, J.A. Johnson and L.A. Whittingham. 2014. Genetic restoration of a threatened population of greater prairie-chickens. Biological Conservation 174:12-19. doi:10.1016/j.biocon.2014.03.008
[72] Bellinger, M. R., Johnson, J. A., Toepfer, J., & Dunn, P. 2003. Loss of genetic variation in greater prairie-chickens following a population bottleneck in Wisconsin, U.S.A. Conservation Biology, 17(3), 717-724
[73] Johnson, J. A., J.E. Toepfer, and P.O. Dunn. 2003. Contrasting patterns of mitochondrial and microsatellite population structure in fragmented populations of greater prairie-chickens. Molecular Ecology 12:3335-3347
[74] Johnson, J.A., R. Bellinger, J.E. Toepfer, and P. Dunn. 2004. Temporal changes in allele frequencies and low effective population size in Greater Prairie-chickens. Molecular Ecology 13: 2617-2630

Wisconsin because protecting them indirectly conveys protection to many other grassland birds and other species (referred to as the umbrella effect). Conservation strategies that benefit GRPC are likely to encompass the needs of many other grassland species that spend at least a portion of their life cycle where GRPC are found year-round.

GRPC as well as other grassland birds may be especially sensitive to large-scale solar energy projects because they require large open landscapes, have large home ranges and specialized habitat requirements tied to their annual life cycles, and use leks for communal displays and breeding. Consistent avoidance behaviors to different structures place prairie-chickens at especially high risk for habitat loss and fragmentation effects, leading to population declines as grasslands and the areas surrounding them become more developed.[75]

2.7.2. Greater Prairie-chicken Life Cycles

GRPC and other prairie grouse species exhibit seasonal variation in habitat use that is associated with their annual life cycles. Impacts of the project will be discussed as they relate to GRPC life cycles and habitat needs, making it important to describe them. GRPC life cycles that are referenced in this assessment include lekking, nesting and brooding.

Lekking: Leks (a.k.a. booming grounds) are areas where male GRPC gather to display in the spring and attract females for breeding. Leks are typically open, exposed places with wide horizons and short, sparse vegetation, such as recently grazed, mowed, or burned grasslands or plowed ground (e.g. row crop agriculture) which mimics those habitats. Several leks occur on both BVWA and privately owned agricultural lands surrounding BVWA. Leks are year-round centers of GRPC activity, especially for males, but also for females, who nest and raise young relatively close to leks.[76] [77] The number of male GRPC attending leks in Wisconsin is considered to be an index of habitat quality.[63] Leks, whether on naturally occurring habitat or within row crop agriculture, and the habitat surrounding them, are important focal areas for GRPC habitat management.

Nesting and Brooding (a.k.a. young rearing): GRPC nests are located within 1-2 miles of leks.[63] [78] [77] [79] Nesting habitat is tall and dense enough to conceal GRPC from predators and protect them from the elements and close to food sources.[80] Brooding habitat is nearby to nesting habitat and provides similar protection as nesting, but allows for chick movement with less dense vegetation. Brooding habitat also has forbs[81] [76] that provide a suitable abundance and diversity of food and support insects, critical for chicks.[81] Brooding typically ends when broods break up in the fall. Chick and adult female survival are generally the drivers that regulate GRPC

[75] Londe, D.W., S.D. Fuhlendorf, R.D. Elmore, C.A. Davis, and J. Rutledge. 2019. Female greater prairie-chicken response to energy development and rangeland management. Ecosphere 10(12):e02982. 10.1002/ecs2.2982.
[76] Walk, Jefferey W. 2004. A plan for the recovery of the Greater Prairie-Chicken in Illinois. University of Illinois, Urbana, Illinois. Office of Resource Conservation, Illinois Department of Natural Resources, Springfield, Illinois. 72pp.
[77] Toepfer, J.E. 2007. Status and management of the Greater Prairie-chicken in Wisconsin – 2006. Passenger Pigeon 69(3): 258-289.
[78] Hamerstrom, F.N, Jr. 1939. A study of Wisconsin prairie-chicken and sharp-tailed grouse. Wilson Bulletin 51(2): 105-120.
[79] Johnson, J. A., M. A. Schroeder, and L. A. Robb. 2020. Greater Prairie-chicken (*Tympanuchus cupido*), version 1.0. In Birds of the World (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.grpchi.
[80] WDNR. June 2022. Wisconsin greater prairie-chicken management plan, 2022-2032. Bureau of Wildlife Management, P.O. Box 7921, Madison, WI. PUB WM-692-2022, 122pp.
[81] Svedarsky, W. D., J. E. Toepfer, R. L. Westemeier, and R. J. Robel. 2003. Effects of management practices on grassland birds: Greater Prairie-chicken. Northern Prairie Wildlife Research Center, Jamestown, North Dakota, USA.

population dynamics and impacts on nesting and brooding that lead to reductions in their survival may have a population level effect and are of significant concern.

2.7.3. Overview of Impacts Associated with Project Infrastructure

There is evidence of the negative impacts of anthropogenic structures (i.e. structures resulting from human activities, hereafter referred to as "structures"), such as those associated with the project, on prairie-chicken species, both GRPC and Lesser Prairie-chickens (*Tympanuchus pallidicinctus,* LEPC).[82] [83] [84] [85] [86] [87] [88] [89] [75] [90] [91] Structures addressed in literature include similar proposed project infrastructure such as transmission lines, fences, access roads, and buildings, etc. GRPC and LEPC appear to respond similarly with regards to avoidance of structures. When prairie-chickens avoid structures by altering their habitat use and movements, the amount of suitable habitat needed to meet their year-round needs is reduced, sometimes referred to as a functional loss of habitat. As such, avoidance behavior is similar to the loss or fragmentation of grassland habitat.[70]

The proposed project would convert approximately 5,700 to 7,900 acres of primarily active agricultural lands surrounding the BVWA[92] to separately fenced arrays and other structures. Even though the project proposes to site in primarily agricultural land, the likely avoidance of solar arrays and other project structures by GRPC that are within or in proximity to existing lek, nesting and brooding habitat may lead to functional habitat loss because GRPC would most likely no longer use these areas as habitat.

Even in landscapes where prairie-chickens, as well as other grassland bird species, occupy habitat close to structures due to their strong site fidelity (the tendency to return to previously occupied locations), there is a cost to occupying such areas. One such cost would be occupying a habitat sink, where a species mortality rate is greater than its birth rate. An example of this would be if predator communities are altered as a result of structures and there is an increased

[82] Robel, R.J., J.A. Harrington Jr., C.A. Hagen, J.C. Pitman, and R.R. Reker. 2004. Effect of energy development and human activity on the use of sand sagebrush habitat by Lesser Prairie-Chickens in southwestern Kansas. Transactions of the North American Wildlife and Natural Resources Conference 69:251-266.
[83] Pitman, J. C., C. A. Hagen, R. J. Robel, T. M. Loughin and R. D. Applegate. 2005. Location and success of lesser prairie-chicken nests in relation to vegetation and human disturbance. Journal of Wildlife Management 69: 1,259–1,269.
[84] Pruett, C. L., M. A. Patten, and D. H. Wolfe. 2009. Avoidance behavior by prairie grouse: implications f or development of wind energy. Conservation Biology 23: 1253-1259.
[85] Hagen, C. A., J. C. Pitman, T. M. Loughin, B. K. Sandercock, R. J. Robel, and R. D. Applegate. 2011. Impacts of anthropogenic features on habitat use by Lesser Prairie-Chickens. Pp. 63–75 *in* B. K. Sandercock, K. Martin, and G. Segelbacher (editors), Ecology, conservation, and management of grouse, Studies in Avian Biology (no. 39), University of California Press, Berkeley, CA.
[86] Hagen, C.A. 2011. Impacts of energy development on prairie grouse ecology: a research synthesis. Transactions of the 75th North American Wildlife and Natural Resources Conference. Session Four: Impacts of Energy Development on Prairie Grouse Ecology, pp. 96-103.
[87] Hovick, T.J., R.D. Elmore, D.K. Dahlgren, S.D. Fuhlendorf, and D.M. Engle. 2014. Evidence of negative effects of anthropogenic structures on wildlife: a review of grouse survival and behaviour. Journal of Applied Ecology 51:1680-1689.
[88] Bartuszevige, A.M and A. Daniels. 2016. Impacts of energy development, anthropogenic structures, and land use change on lesser prairie-chickens In D.A. Haukos and C.W. Boal (Eds.), *Ecology and Conservation of Lesser Prairie-Chickens,* Studies in Avian Ecology (Vol. 48., pp. 205-220). CRC Press.
[89] Robinson, S.G., D.A. Haukos, R.T. Plumb, J.D. Kraft, D.S. Sullins, J.M. Lautenbach, J.D. Lautenbach, B.K. Sandercock, C.A. Hagen, A. Bartuszevige, and M.A. Rice. 2018. Effects of landsacpe characteristics on annual survival of lesser prairie-chickens. American Midland Naturalist 180:66-86.
[90] Plumb, R.T., J.M. Lautenbach, S.G. Robinson, D.A. Haukos, V.L. Winder, C.A. Haugen, D.S. Sullins, J.C. Pitman, and D.K. Dahlgren. 2019. Lesser Prairie-Chicken Space Use in Relation to Anthropogenic Structures. Journal of Wildlife Management. 83:216-230.
[91] Londe, D.W., R.D Elmore, C.A. Davis, T.J. Hovick, S.D. Fuhlendorf, and J. Rutledge. 2022. Why did the chicken not cross the road? Anthropogenic development influences the movement of a grassland bird. Ecological Applications e2543. https://doi.org/10.1002/eap.2543
[92] Response-Data Request-WDNR-GR-3.24.

real or perceived mortality risk.[93] Occupying sites in proximity to structures could compromise prairie-chicken fitness (the ability to survive and reproduce), contributing to a loss in population viability.[86] Avoidance of structures by prairie-chickens and other grassland bird species must be recognized and carefully considered in the assessment of environmental impacts associated with energy projects to maintain grassland habitat and connectivity.[82] [91]

Solar Array Areas

There are no known studies on the behavioral responses of prairie-chickens and other grassland bird species towards solar panel arrays. Recently, some researchers documented some incidental observations of Greater Sage-Grouse (*Centrocercus urophasianus,* GSGR) foraging and loafing inside a solar facility in Wyoming over a two-year period.[94] They could only speculate as to reasons GSGR were observed within the facility. They noted that their observations did not provide evidence that GSGR selected for areas within the facility and stressed the need for research to evaluate behavioral responses to solar facilities. It's important to note that these observations were anecdotal and are not supported by published research designed to assess prairie grouse use of solar facilities.

While there is no research on prairie-chicken use of solar arrays, there is research that provides evidence of prairie-chicken avoidance of the proposed project's structures, including fences that surround the solar array areas, access roads throughout the fenced solar array areas, and disturbances related to those structures. Although it is currently not known if project solar panels would elicit similar avoidance behavior by prairie-chickens, research suggests GRPC may exhibit behavioral avoidance of solar arrays, resulting in functional loss of nearby lek habitat on private and BVWA lands and grassland habitat on BVWA. Project arrays immediately adjacent to BVWA property include primary arrays 12, 17, 20, 38, 44, 50, and 51 and alternate arrays 20, 32, 41, and 53 (Appendix B Figure 5), and development of these areas may impact the use of BVWA resulting in a functional loss of grassland bird habitat.

Project solar arrays that are sited between BVWA properties may create visual barriers that GRPC view as obstacles, reducing their movements between grassland habitat patches on BVWA. Actively farmed row-crop agricultural lands within the proposed project do not serve as visual barriers to GRPC movement between suitable grassland patches. Proposed project arrays that could serve as potential visual barriers for GRPC movement between suitable grassland habitat within the BVWA include primary arrays 17, 20, 21, 37, 38, 43, 44, 45, 50, and 51 and alternate arrays 20, 32, 41, and 53 (Appendix B Figure 5).

Project solar arrays sited near GRPC leks may result in a reduction in lek attendance or lek location abandonment. GRPC leks are found within proposed project alternate arrays 20, 41, and 53 (Appendix B Figure 5). There are additional project arrays within 0.25 mile of GPRC leks including primary arrays 20, 38, 44, 50, and 51 (Appendix B Figure 5). Project arrays within 0.5 mile of GRPC leks include alternate array 32 and primary arrays 11, 17, 31, 37, 43, and 45 (Appendix B Figure 5).

[93] Hagen, C. A., B. K. Sandercock, J. C. Pitman, R. J. Robel and R. D. Applegate. 2009. Spatial variation in lesser prairie-chicken demography: A sensitivity analysis of population dynamics and management alternatives. J. Wildl. Manage. 73: 1,325–1,332.
[94] Gerringer, M.B., K.T. Smith, and K.L. Kosciuch. 2022. Observations of Greater Sage-Grouse at a Solar Energy Facility in Wyoming. Western North American Naturalist 82(1): 196-200. https://doi.org/10.3398/064.082.0121.

The applicant stated that they would not include primary arrays sited south of Kellner Road as well as not include primary arrays sited within 500 feet of GRPC leks DNR identified during 2021-2023 lek surveys.[95] Based on GRPC avoidance behaviors towards structures, the presence of solar array sites >500 feet from leks may result in reduced lek persistence or lek abandonment. Therefore, while these measures would reduce some potential GRPC and other grassland bird impacts, they would not eliminate the potential for functional habitat loss of BVWA grassland bird habitat, as well as negative impacts to GRPC leks in those areas referenced above.

Additionally, the applicant has proposed to establish and maintain a project Conservation Area of 120 acres that is bounded by BVWA on three sides (same location as alternate array 20) and seed the area with the Solar Grassland Bird Conservation Seed Mix.[96] The proposed Conservation Area is currently the site of a known lek. If the Commission approves the project on primary arrays 17, 20, 38, and 50, then the applicant would lease the Conservation Area for the duration of the project and turn over management to the DNR. If the Commission approves the project without any one of those primary arrays, then the Conservation Area would not be created. While the Conservation Area is a good faith effort to create new grassland habitat for GRPC and other grassland bird species, it would not negate the potential adverse impacts of functional habitat loss on BVWA lands in proximity of proposed solar arrays.

The applicant stated they cannot commit to eliminating primary arrays 17, 20, 38, and 50 from consideration for final design.[97] Primary arrays 17, 20, 38, and 50 are adjacent to portions of the BVWA and their presence may result in functional loss of grassland habitat for GRPC, as well as a loss in lek persistence or lek abandonment of the leks mentioned above. Further, because these arrays are adjacent to portions of the BVWA, GRPC movement between BVWA grassland habitat or leks may be adversely impacted. Even if alternate array 20 is eliminated from consideration, primary arrays 17 and 20 still separate grassland habitat on BVWA and may serve as visual barriers that adversely impact GRPC movement between those grassland areas. While only adjacent to BVWA on one side, primary arrays 38 and 50 may still inhibit GRPC movements, as they are in between BVWA grassland patches and in proximity to leks.

The applicant has also stated they are willing to eliminate alternate arrays 20, 32, 41 and 53 from consideration for final design.[98] The removal of alternate arrays 20, 41, and 53 would minimize the negative impacts to the leks within those arrays and the leks in proximity of those arrays. The removal of alternate array 32 would also minimize the negative impacts to the lek in proximity to it. Removal of alternate arrays 20, 32, 41 and 53 would maintain a portion of the open, undeveloped agricultural landscape and preserve some of the connectivity between grassland habitat on BVWA, thereby providing some areas to serve as corridors for GRPC movement between grassland areas on BVWA.

Based on the information above, to minimize adverse impacts to GRPC and other grassland bird species, it is the foremost recommendation that the Commission require that:

[95] Response-Data Request-WDNR-GR-3.24
[96] Response-Data Request PSCW-LK-5.35
[97] Response-Data Request Response PSCW-LK-5.38
[98] Response-Data Request Response PSCW-LK-5.36

- Primary arrays 17, 20, 38, 44, 50, and southern half of 51 and alternate arrays 20, 32, 41, and 53 be removed from capacity consideration.

If that is deemed not feasible by the Commission, the next recommendation that the Commission could require includes:

- Primary arrays 17, 20, western half of 38, and the eastern half of 44 and alternate arrays 20, 32, 41, and 53 be removed from capacity consideration.

If the Commission orders the secondary recommendation, there will likely be functional loss of adjacent grassland habitat on the BVWA for GPRC and other grassland bird species as well as a likely loss in lek persistence or even abandonment for leks in proximity of primary arrays eastern half of 38, western half of 44, 50, and southern half of 51.

Fences

Nearly all the proposed project fences are placed around solar array areas. No research has been conducted on prairie chicken perception of fences in a specific solar context. G RPC and other grassland bird responses to project fences are likely to be associated with and compounded by the presence and configuration of solar panels, access roads, and other solar array structures. Consequently, this section describes the potential impacts of project fences on GRPC as part of the solar array areas, in addition to assessing potential impacts of the fences as a standalone.

The applicant proposes to install 7-foot-tall woven wire fences around all solar arrays. Some GRPC mortality may occur from collisions with project fences that are in proximity to suitable habitat. Studies have documented the susceptibility of prairie-chickens to fence collisions.[99] [100] [101] In Wisconsin, GRPC are most vulnerable during the lekking and nesting seasons when they experience the lowest survival rates. GRPC appear to have the greatest amount of flight activity during lekking, increasing their likelihood of encountering project fences during this already vulnerable time. The USFWS[102] and the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS)[103] have adopted conservation measures to mitigate fence collisions for GSGR and other North American prairie grouse species based on results of research studies. Key recommendations from the USFWS include avoiding the placement of new fences near all leks and at a minimum, marking all existing fences within 0.25 mile from all leks and in areas where collisions are known to occur. Additional guidance from the USFWS requires the NRCS to coordinate with state wildlife agencies on certain measures, since many states recommend addressing fences beyond the 0.25 mile minimum. In its guidance to reduce fence collisions[103], the NRCS references a proven fence marking method that has been shown to

[99] Wolfe, D.H., M.A. Patten, E. Shochat, C.L. Pruett, and S.K. Sherrod. 2007. Causes and patterns of mortality in lesser prairie-chickens Tympanuchus pallidicinctus and implications for management. Journal of Wildlife Biology 13(Suppl. 1):95-104.
[100] Winder, V. L., L. B. McNew, A. J. Gregory, L. M. Hunt, S. M. Wisely, and B. K. Sandercock. 2014. "Effects of Wind Energy Development on Survival of Female Greater Prairie-Chickens." Journal of Applied Ecology 51: 395–405.
[101] Robinson, S.G., D.A. Haukos, R.T. Plumb, J.D. Kraft, D.S. Sullins, J.M. Lautenbach, J.D. Lautenbach, B.K. Sandercock, C.A. Hagen, A. Bartuszevige, and M.A. Rice. 2018. Effects of landsacpe characteristics on annual survival of lesser prairie-chickens. American Midland Naturalist 180:66-86.
[102] U.S. Fish and Wildlife Service. 2010. Conference report for the Natural Resources Conservation Service sage-grouse initiative (SGI). July 30, 2010.
[103] U.S. Department of Agriculture, Natural Resources Conservation Service. November 2012. Applying the sage-grouse fence collision risk tool to reduce bird strikes. 5pp.

reduce fence collisions for GSGR[104] with anecdotal evidence for reduced prairie-chicken collisions.[105]

Indirect impacts (i.e. predator interactions, structure avoidance, wildlife permeability, etc.) of project fences on GRPC may occur but are more difficult to quantify than direct impacts such as fence collisions. Avoidance of vertical structures, including fences, has been demonstrated in prairie chickens with varying explanations for why.[83] [84] [85]

A public comment from the Wisconsin Wildlife Federation (WWF) expressed concern for increased predator presence in the proposed project area, including increased raptor presence.[106] The applicant indicated that they would consider modifications to fence design to discourage raptors from using the fences as hunting perches.[107]

Prairie-chickens may avoid fences because they can serve as perches for avian predators.[108] Fences are used as perch sites from which raptors, a common prairie-chicken predator, can hunt.[81] [109] [110] [111] Project fences will provide additional perching opportunities for raptors, which may result in GRPC avoidance of fences due to either real or perceived predation risk. Raptor perch deterrents have been used on transmission lines, but the feasibility of using diverters on tall fences is not known. Even if diverters could successfully reduce raptor perch opportunities, raptors have many other perch opportunities in the areas surrounding and within the BVWA (e.g. distribution lines, trees, etc.). Further, 7-foot-tall fence posts may not be a preferred perch location for raptors, especially if there are other higher available perch sites. For these reasons, it is not recommended that the Commission order the use of raptor perch diverters on project fences.

The applicant stated to have 7-inch by 12-inch apertures at the bottom of project fences around solar arrays to allow for the passage of wildlife.[112] Depending on availability at time of procurement, the applicant also stated they may elect to install woven wire fence with only standard 6-inch by 6-inch apertures at the bottom.[113] If this design is used, the applicant proposes to either raise the height a minimum of 6 inches off of the ground or provide larger openings or at least 1-foot by 6-inches, at 100-foot intervals throughout the perimeter fence, subject to NEC compliance.[114] The applicant is willing to discuss alternative fencing options

[104] Stevens, B.S., K.P. Reese, J.W. Connelly, and D.D. Musil. 2012. Greater sage-grouse and fenes: does marking reduce collisions? Wildlife Society Bulletin 36:297-303.
[105] Wolfe, D.H., M.A. Patten, and S.K. Sherrod. 2009. Reducing grouse collision mortality by marking fences. Ecological Restoration 27:141-143.
[106] PSC REF #492643 Public Comment by Wisconsin Wildlife Federation
[107] PSC REF #493278 Response-Data Request-PSC-Grant-3).
[108] Walters, K., K. Kosciuch, and J. Jones. 2014. Can the effect of tall structures on birds be isolated from other aspects of development? Wildlife Society Bulletin 38(2): 250-256.
[109] Hagen, C.A., J.C. Pitman, B.K. Sandercock, R.J. Robel, and R.D. Applegate. 2007. Age-specific survival and probable causes of mortality in female lesser prairie-chickens. Journal of Wildlife Management 71:518-525.
[110] Behney, A.C., C.W. Boal, H.A. Whitlaw, and D.R. Lucia. 2011. Interactions of raptor and lesser prairie-chicken at leks in Texas Southern High Plain. Wilson Journal of Ornithology 123:332-338.
[111] Boal, C.W. 2016. Predation and lesser prairie-chickens. Pages 145-158 *in* D.A. Haukos and C.W. Boal, editors. Ecology and conservation of lesser prairie-chickens. Studies in Avian Biology. CRC Press, Boca Raton, Florida, USA.
[112] Response-Data Request PSCW-AE-4.1
[113] Response-Data Request PSCW-AE-4.2
[114] Response-Data Request PSCW-AE-4.1

that reasonably addresses concerns about wildlife movement as long as they meet NEC code for compliance and lender requirements for financing.[115]

Since there is no research on prairie-chicken or other grassland bird species behavioral responses to solar array fences, it is not known if or how these birds would utilize openings at the bottom of project fences. If compelled to enter solar array areas, GRPC and other birds also have the ability to fly. The only exception would be early in brood-rearing when chick mobility is limited and broods walk or fly short distances to areas with abundant forbs and insect densities. In Wisconsin, WDNR has used baited wire walk-in traps placed on leks for capturing GRPC. Trap sites have guide fences that lead birds towards one-way funnels with entrance heights ranging from 9-11 inches. Although GRPC responses to baited walk-in traps on leks may not be analogous to their use of bottom project fence apertures, it suggests that GRPC may walk through wire openings of comparable size. Proposed aperture openings of 7-inch by 12-inch or fences 6 inches off the ground are lower in height than walk-in trap entrances and may deter GRPC from walking through them.

To minimize adverse impacts to GRPC and other grassland bird species, it is the primary recommendation that the Commission require that:

- To prevent bird collisions with the fence, fence height should be no more than 61" within one (1) mile of GRPC leks. Bird markers would not be necessary at this height or lower.
- To allow ground nesting birds and other small wildlife access in and out, the fence should be raised a minimum of 8" off the ground throughout the project area.

If that is deemed not feasible by the Commission, it is the secondary recommendation that the Commission require that:

- Bird markers be installed on all project fences within one (1) mile of GRPC leks that the DNR identified during 2021-2024 lek surveys to minimize fence collisions. The number and placement of bird fence markers will be in collaboration with DNR.
- Bottom apertures of all project fences around solar array areas be a minimum of 8-inches high by 12-inches wide at a minimum spacing of every 100 feet or having the fence raised 8-inches throughout the project area.

Buildings

Project buildings will include five separate substations. The presence of large buildings can impact GRPC behavior and habitat use.[82] Most substations are located on the outer perimeter of the project area to the north and west and are not likely to impact GRPC as they are in proximity to unsuitable habitat (e.g. heavily wooded and/or developed). Substation B in the central part of the project is within one mile of BVWA property and two active GRPC leks (Appendix B Figure 5). Developed areas such as building sites have been associated with lower GRPC occurrence and density in the Dakotas.[116] It is possible that disturbance from human activity may contribute to GRPC avoidance of the area surrounding this substation, but that disturbance will likely

[115] Response-Data Request PSCW-LK-5.25

[116] Runia, T. J., A. J. Solem, N.D. Niemuth, and K.W. Barnes. 2021. Spatially explicit habitat models for prairie grouse: implications for improved population monitoring and targeted conservation. Wildlife Society Bulletin 45(1): 36-54.

already be compounded by the presence of several proposed project primary arrays surrounding the substation (Primary Arrays 43, 45, and 51, Appendix B Figure 5).

Construction Activities and Road Use

The project construction phase is estimated to be at least 36 months. Project construction activities will include but are not limited to, site preparation (staging), vegetation removal, grading and excavating, constructing buildings, installing access roads, equipment delivery, and installing solar array areas. The project will require many different types of equipment to deliver and complete construction, including but not limited to dozers, graders, skid steers, cranes, drills, forklifts, and other heavy equipment. Roads most likely to be affected by project construction and material delivery that are in proximity to BVWA lands and GRPC leks include County W, County F, and Taft Avenue.[117] The applicant has stated they will avoid construction activities within 0.5 mile from GRPC leks the DNR identified during 2021-2023 during the GRPC breeding season (March 1–April 30). The applicant has stated they will also minimize construction between 0.5 and 1 mile from GRPC leks to the extent possible.[118] By following these measures, impacts to the GRPC lekking sites during construction would be minimized.

During the project's construction phase, light, medium, and heavy vehicles would be utilized with an average of 25 truckloads per day and an additional 50 personnel vehicles on public roads and project access roads within the project area.[119] Post-construction would involve almost no large or heavy trucks and daily traffic would include pick-up trucks and small vans for regular site work. Vehicles would be in use primarily, but not limited to, weekdays from 8 a.m.-5 p.m. During operation of the project, the applicant has stated they would reasonably minimize internal vehicle traffic within arrays proximate to BVWA lands in the months of March and April, subject to any need to access such lands for emergent or other urgent needs.[119] By following these measures, impacts to GRPC habitat on BVWA lands during normal project operations would be minimized; however, it does not include GRPC leks. Therefore, it is recommended that vehicle traffic be minimized in the months of March and April within 0.5 mile from GRPC leks the DNR identified during 2021-2024 surveys.

Direct mortality of prairie-chickens due to vehicle collisions is low.[99] [84] Prairie-chicken avoidance of roads appears to be associated with both proximity to roads and the amount of activity or use (based on improved vs unimproved road base and/or overall vehicle use). Noise and disturbance associated with roads can alter nest site selection, habitat use, and lek persistence.[83] [85] [90] [120] A review of the results from multiple studies documented a recurring trend of prairie-chickens avoiding roads[87] with many of the roads in the studies described as gravel or unimproved. GRPC behavioral responses to roads are likely analogous to disturbances associated with construction activities.

[117] VSS Application, PSC Docket 9820-CE-100
[118] Response-Data request PSCW-LK-5.37
[119] Response-Data request PSCW-LK-5.19
[120] Lloyd, J.D., C. Aldridge, T. Allison, D. Haukos, C. LeBeau, L. McNew, and V. Winder. 2023. Prairie grouse and wind energy: the state of the science. prairieGrouseAndWindEnergyWhitePaper.pdf (rewi.org).

Transmission Lines

Powerlines (transmission and distribution) can adversely impact prairie-chicken movement and habitat use due to their avoidance of these structures.[82] [83] [84] [85] [121] [87] [75] [90] LEPC place both their nests[83] [90] and home ranges[90] farther from transmission lines than would be expected. Toepfer[122] [65] reported low GRPC mortality rates (<7%) from collisions with distribution lines in Wisconsin relative to other causes of mortality. Mortality specific to transmission lines in that study would not have been known, as they were not present. GRPC often fly at heights above distribution line infrastructure and while it is possible they may be more vulnerable to collisions with transmission lines, there is no known research to support this.

Prairie-chickens may avoid transmission lines due to their detection of ultraviolet light associated with high-voltage,[90] [84] [123] noise associated with transmission lines,[83] and general low tolerance of tall structures.[83] For these reasons, transmission lines may have greater adverse impacts to GRPC than distribution lines. Prairie-chickens may also avoid both transmission and distribution lines due to increased raptor predation opportunities.[83] [85] [124] [108] [90]

Within the project area, the nearest existing transmission lines to BVWA lands and GRPC leks are just over two and three miles away, respectively. These transmission lines are located in highly fragmented areas with development (i.e. State Highway 54, buildings, etc.). Distribution lines are present throughout the project area, but rarely divide adjoining BVWA lands (Appendix B Figure 5).

Although the applicant stated they would consider no aboveground project electric transmission lines constructed within 0.75 mile of GRPC leks the DNR identified during surveys from 2021-2023,[125] there are segments of project transmission lines adjacent to or in proximity of BVWA lands that are likely to have adverse impacts to GRPC. These segments include the alternate 138kV transmission line that runs north from proposed array 31 to proposed array 19 and alternate 345 kV transmission line that runs from proposed array 60 along Birch Street to proposed array 8 (Appendix B Figure 5). The applicant stated they would review the need for overhead 138 kV and 345 kV transmission line throughout the project area, assuming that production is not further eroded as a result of large setbacks from primary arrays and that such a potential change or changes does not change the PSC's timeline for reviewing the current pending CPCN application.[126]

[121] Grisham, B.A., P.K. Bordsdorf, C.W. Boal, and K.K. Boydston. 2014. Nesting ecology and nest survival of lesser prairie-chickens on the southern High Plans of Texas. Journal of Wildlife Management 78:857-866.
[122] Toepfer, J.E. 1988. Ecology of the Greater Prairie-chicken as Related to Reintroductions. Ph.D. Dissertation, Montana State University, Bozeman, MT.
[123] Tyler N., K. Stokkan., C. Hogg, C. Nellemann, A. Vistnes, and G. Jeffery. 2014. Ultraviolet vision and avoidance of powerlines in birds and mammals. Conservation Biology 28:630-632.
[124] Messmer, T.A., R. Hasenyager, J. Burruss, and S. Liguori. 2013. Stakeholder contemporary knowledge needs regarding the potential effects of tall structures on sage-grouse. Human-Wildlife Interactions 7(2): 273-298.
[125] Response-Data Request WDNR-GR-3.24
[126] Response-Data Request PSCW-AE-5.22

Different types of deterrents have been placed on transmission lines to deter raptor perching, but results on their use and effectiveness are mixed.[127] [128] [129] Even if deterrents can reduce raptor perch opportunities, raptors have alternate perch opportunities in the areas surrounding and within BVWA lands (e.g. distribution lines, trees, etc.). For these reasons, it is not recommended that the Commission require the use of deterrents on transmission lines to deter raptor perching.

Bird diverters have been placed on transmission line infrastructure to minimize bird collisions. There are many different marking methods and results vary based on many factors, including marker type, transmission line infrastructure, and target bird species. While there is no research on the use of diverters to specifically reduce prairie-chicken collisions with transmission lines, there is research on the use of diverters to reduce other bird species. The applicant has not proposed placement of bird diverters on project transmission line infrastructure because project lines do not cross focused flyway corridors, but they have stated they would install them with input on placement from DNR.[130] This would not only benefit the GRPC and other grassland bird species but also large-bodied birds such as eagles, swans, and cranes known to be present within BVWA and surrounding lands.

To minimize adverse impacts to GRPC and other grassland birds, it is the primary recommendation that the Commission require that:

- No above ground project electrical transmission lines be constructed within one (1) mile of BVWA lands.
- Bird diverters be placed on above ground project electrical transmission lines within and immediately adjacent to the Buena Vista-Leola State Wildlife Area Important Bird Area (IBA) and that the determination of the appropriate type and location of bird diverters be determined by WDNR in consultation with the applicant.

If the Commission deems that is not feasible, it is the secondary recommendation that the Commission require that:

- No above ground project electrical transmission lines be constructed within 0.75 mile of BVWA lands.

If transmission lines are allowed to be above ground within 0.75 mile of BVWA lands, there will likely be adverse impacts to GRPC movement and habitat use resulting from GRPC avoidance of transmission lines and the functional loss of adjacent grassland habitat on the BVWA. If above ground transmission lines are constructed within 0.75 mile of BVWA lands, there may be some direct mortality of GRPC due to collisions with transmission lines.

[127] Lammers, W. M., and M. W. Collopy. 2007. Effectiveness of avian predator perch deterrents on electric transmission lines. Journal of Wildlife Management 71:2752–2758.
[128] Prather, P.R. and T.A. Messmer. 2010. Raptor and corvid response to power distribution line perch deterrents in Utah. Journal of Wildlife Management 74(4):796-800.
[129] Slater, S.J. and J.P. Smith. 2010. Effectiveness of raptor perch deterrents on an electrical transmission line in southwestern Wyoming. Journal of Wildlife Management 75(5):1080-1088.
[130] Response-Data Request PSCW-LK-5.17).

Staging (Laydown) Areas

According to the application, there are five laydown areas proposed for the project. The disturbances associated with the development and human activity at most of these staging areas are unlikely to impact GRPC since they are already located in compromised areas with regards to GRPC habitat needs (e.g. adjacent to heavily wooded areas and/or a heavily used, paved county road, Appendix B Figure 5).

2.7.4. Cumulative Prairie Chicken Impacts

The proposed project would convert approximately 5,700 to 7,900 acres of primarily agricultural lands to solar infrastructure surrounding the BVWA and areas to the west and north that are within the CWGCA. The already approved Portage Solar proposes to convert 2,167 acres of primarily agricultural land on the north end of the BVWA (Appendix B Figure 6). In addition to the proposed project and Portage Solar, staff are aware of an additional proposed solar project within the vicinity of BVWA and nearby GRPC and other grassland bird habitats. These solar projects would replace agricultural lands that are not perceived as visual barriers to GRPC movement between areas of grassland habitat on BVWA with structures (transmission lines, roads, fences, solar arrays) that may serve as visual barriers. Further, approved and proposed solar project structures that are in proximity to grassland habitat on BVWA may result in GRPC avoidance behaviors that would reduce available grassland habitat on the BVWA. If GRPC avoid solar facility structures, the proposed project and Portage Solar's conversion of agricultural lands to the north of BVWA would significantly limit the potential for the establishment of stepping stone grassland habitat between BVWA and PJOWA, thereby contributing to the further isolation of those GRPC subpopulations.

Staff are also aware of an additional proposed solar project within the vicinity of the PJOWA and adjacent GRPC and other grassland bird habitats, which could have adverse impacts on the northern GRPC subpopulation in that area. It's important that all of the direct, indirect, and especially cumulative GRPC population impacts of this proposed project and potential future projects are taken into consideration, not only at the local BVWA level but the population as a whole in Wisconsin and throughout its range.

Grassland Habitat Management on BVWA

Management practices conducted by the DNR on BVWA properties are essential in ensuring suitable grassland habitat for GRPC and other grassland-species. The overall goal of management actions is to set back succession of woody vegetation and maintain a primarily open grassland landscape. Management actions provide a diversity in vegetation structure (height and density of grasses and forbs) and plant species composition to meet habitat requirements for GRPC lekking, nesting, and brooding habitat, including food sources and loafing/roosting cover. Management actions that are used on the BVWA include prescribed burning, conservation grazing, mowing of trees/brush and herbaceous invasive species, herbicide application to control invasive brush and herbaceous species, and farming (primarily hay harvest).

The applicant stated that no changes to prescribed fire on nearby BVWA lands would be requested and no material impacts to the project's construction or operation are anticipated by

nearby prescribed burns. They also understand that DNR contacts nearby landowners and the local municipality fire departments prior to conducting prescribed burns.[131]

Based on proposed project fence setbacks, impacts to other DNR management actions are not expected.

Research

With utility-scale solar being relatively new to areas that overlap with GRPC range in Wisconsin or elsewhere, there is no known research specific to GRPC behavioral responses to solar facilities. It is especially important to understand GRPC behavioral responses to solar facilities within the context of the central Wisconsin landscape. DNR has identified research to investigate the possible impacts of solar farms on GRPC as a priority within the 2022-2032 GRPC Management Plan.[69]

To better understand the effects of solar energy on GRPC and other wildlife species, research objectives should consider pre, during, and post-construction assessments. Further, monitoring should be long enough to assess demographic responses of GRPC (e.g., survival, reproduction), as most studies assessing impacts of energy development on prairie-chickens are short-term (<3 years) and may not be sufficient[132]

DNR and the applicant have discussed the possibility of conducting wildlife research on the proposed project area, and the applicant has proposed to fund two graduate fellowships at the University of Wisconsin-Stevens Point for two- and one-half years each over a span of four- and one-half academic calendar years after the project begins commercial operation.[92]

2.7.5. Greater Prairie-chicken Summary

Recommended actions in this section are those that are strongly encouraged to minimize adverse impacts to the GRPC and other grassland bird species within and around the proposed project area. The approach to these recommendations above is based on considerations to minimize functional grassland habitat loss on the BVWA and to maintain connectivity between existing grassland habitat patches on the BVWA and other habitats such as for lekking. Maintaining open, mostly undeveloped habitat, such as agriculture, minimizes barriers to GRPC movement between grassland habitat patches on the BVWA and is one of the goals of the CWGCA.[133] This can be accomplished by grouping project infrastructure and siting within areas already fragmented, including areas that are heavily forested and/or developed with structures (i.e. roads, fences, buildings, etc.). This is particularly important for structures that act as filters to GRPC movement. Where siting in heavily fragmented areas is not possible, minimizing some fragmentation may be accomplished by providing suitable alternatives, such as burying transmission lines or consideration of different fencing and array options.

[131] Response-Data Request PSCW-SR-5.9)
[132] McNew, L.B., L.M Hunt, A.J. Gregory, S.M. Wisely, and B.K. Sandercock. 2014. Effects of wind energy development on nesting ecology of Greater Prairie-chickens in fragmented grasslands. Conservation Biology 28(4): 1089-1099.
[133] WDNR. 2004. Feasibility Study and Environmental Analysis for the Central Wisconsin Grassland Conservation Area, A report to the Natural Resources Board. October 2004. 25pp.

2.8. VEGETATION MANAGEMENT PLAN

With utility-scale solar being relatively new to areas that overlap with the GRPC and other grassland bird ranges, there is no research specific to grassland bird use of solar array areas and the vegetation beneath and around them outside of anecdotal observations.[134] GRPC avoidance behavior towards structures and their preference for open landscapes suggests that they may not utilize solar array areas. However, if GRPC and other grassland birds do utilize solar array areas, it is necessary to ensure that vegetation management would minimize adverse impacts to these species.

2.8.1. Site Preparation, Vegetation Installation, and Monitoring/Maintenance (excluding mowing)

As described in the proposed Vegetation Management Plan, site preparation, vegetation installation, and monitoring/maintenance (see mowing below) is not expected to have any adverse impacts to the GRPC and other grassland bird species.

Once established, the vegetation under and amongst the solar arrays may provide suitable habitat for state-listed grassland bird and terrestrial invertebrates species. The applicant has stated they would follow the DNR's Grassland and Savannah Broad Incidental Take Authorization (BITA) for all state-listed species that may be present in the project area to ensure take is minimized or even avoided. Species specific and/or host plant presence/absence surveys may be conducted and if the specific species is not present, then following this BITA would not be required.[135]

2.8.2. Seed Mixes

The proposed project would use three permanent seed mixes that include grasses, sedges, and forb species which are important habitat and food sources for pollinator species and grassland birds. Seed mixes include native wildflower species that bloom in spring, summer, and fall and are important for pollinators that utilize those wildflowers. The applicant shared research that documented an increase in local insect diversity following a solar project establishment and bees and flies traveling off-site to nearby soybean fields which would benefit grassland bird species.[136]

The applicant is proposing a fully native warm-season dry-mesic seed mix for under the panels which includes red fescue (Festuca rubra), a cool season grass. This species is commonly used with other cool season grasses as they form dense mats of vegetation allowing for quick stabilization at the ground surface. Warm season prairie species are slower to grow above ground and instead spend their first year or two developing roots that can reach several feet below ground. Over time, those roots can extend to 10 feet or more below ground. So, while these plants take longer to fill in and obtain a look of above ground stabilization, their roots are feet deeper than red fescue and other cool season grasses thereby stabilizing the ground below. By mixing red fescue with warm season prairie plants, even at a low seed rate, there is concern that the fescue would quickly outcompete the prairie plants and not allow them to survive long-

[134] Observations of Greater Sage-grouse at a solar energy facility in Wyoming, 2022, Gerringer et. al.
[135] PSC REF#: 496585: Response-Data Request-PSC-SR-5.2
[136] PSC REF#: 493278: Response-Data Request-PSC-GR-3.24

term. While the applicant is willing to remove red fescue from primary array areas in proximity to the BVWA[137], it would still be recommended that red fescue be removed entirely from all array seed mixes.

2.8.3. Mowing Frequency and Timing

As written, the proposed Vegetation Management Plan Establishment Phase mowing would allow for the prairie seed mixes to start establishing which would benefit the grassland bird species once established. The Transition Phase does not discuss timing or frequency except to state that mowing would occur less frequently than during the Establishment Phase. During this phase, prairie vegetation would be established enough to potentially support grassland bird species using it for nesting and brood rearing habitat. Therefore, the applicant would need to follow the DNR's Grassland and Savanna Protocols for mowing during this phase. Regarding the Long-term Maintenance Phase, the applicant has stated that the vegetation mowing avoidance period would be April 15–August 1 in areas within one mile of GRPC leks and potentially up to two miles of leks. In instances where mowing must occur during the avoidance period, the applicant has stated that they would have personnel trained to look for sensitive wildlife before engaging in such activities to avoid impacts. Neither of these statements meet the required actions necessary for all threatened and endangered species that may be present within the proposed project area. Instead, the applicant would need to avoid mowing during the nesting season stated above within a one- and two-mile buffer of threatened and endangered bird species unless they are following the Grassland and Savanna Protocols. As there are multiple listed species potentially present within the proposed project area, if mowing must occur during the nesting season, it is a recommendation that the Commission require that:

> During the long-term maintenance phase, the applicant work with DNR (ER Utility Liaison) prior to any mowing occurring during listed bird species' nesting seasons, to review the mowing plans to ensure all protocol measures are followed and provide any further recommendations for minimizing impacts.

2.8.4. Sheep Grazing

The applicant has stated they would consider using a commercial solar-sheep vegetation contractor to assist in project vegetation management of up to 1,500 acres. The contractor would prepare the grazing management plan and it would meet U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) grazing standards. The applicant has stated that the grazing management plan would also incorporate a grazing regime that would minimize impacts to grassland bird nests and follow DNR Grassland and Savannah Broad Incidental Take protocols for all species present in the proposed project area. Sheep grazing would be rotational and implemented within fenced areas <200 acres.[138] The applicant also stated that if they use sheep for vegetation management, they would consider approving grazing plans by DNR prior to implementing[139].

[137] PSC REF#: 496585: Response-Data Request-PSC-SR-5.6
[138] PSC REF#: 496585: Response-Data Request-PSC-LK-5.39
[139] PSC REF#: 493278: Response-Data Request-PSC-GR-3.24

Sheep grazing can be utilized to manage project vegetation and minimize adverse impacts to GRPC and other grassland birds if a grazing management plan is established and implemented. The NRCS Conservation Practice Standard 528 for prescribed grazing that the applicant would follow provides general considerations for achieving vegetation management with grazing and basic criteria for addressing objectives such as species composition and structure, soil erosion, water quality, and food/cover for wildlife (USDA NRCS 2017). It does not, however, provide detailed guidance for mitigating adverse impacts to specific wildlife species. To minimize adverse impacts to GRPC, the project grazing management plan must be adaptable, while also establishing a combination of stocking rate (number of sheep within a given area), rest (no grazing), and rotation (how long sheep are grazing in a given area and how often they are rotated to new areas) to minimize impacts to nests and provide adequate cover for GRPC and other grassland birds. To minimize adverse impacts to GRPC and other grassland birds, it is recommended that the Commission require that:

> The applicant work with the DNR to review and approve a sheep grazing management plan prior to implementation of grazing in the project area.

2.8.5. Vegetation Management Under Transmission Lines

After work for the transmission portion of the project is complete, the applicant indicates that crews would restore disturbed areas and clean up any construction debris in the project area. Disturbed areas would be restored based upon their level of disturbance and other environmental considerations, such as land type and the presence of wetland areas. The applicant indicates that, in some areas of the project, disturbed areas may be allowed to grow without any additional seeding. In areas where no signs of regrowth occur in the first month of the subsequent growing season, the applicant would assess and apply an appropriate seed mix. Monitoring and documentation of revegetation would comply with DNR requirements.[1] In the vegetation management plan the applicant indicates that seeding for the project is preferred in early spring through early summer or in September. Different seeding procedures may differ between non-panel and panel areas.[140] [141]

2.9. WILDLIFE IMPACTS

The predominant land use of the proposed solar facility is agricultural row crops. The project area is utilized by a variety of wildlife species. Common big game species present within the project area include white-tailed deer (*Odocoileus virginianus*), black bear (*Ursus americanus*),wild turkey (*Meleagris gallopavo*), and gray wolf (*Canis lupus*). Small game species present within the project area include Ruffed grouse (*Bonasa umbellus*), American woodcock (*Scolopax minor*), Mourning dove (*Zenaida macroura*), and Eastern cottontail rabbits (*Sylvilagus floridanus*), Eastern gray squirrel (*Sciurus carolinensis*). Common furbearer species include coyote (*Canis latrans*), red fox (*Vulpes vulpes*), river otter (*Lontra canadensis*), fisher (*Martes pennanti*), mink (*Neovison vison*), common raccoon (*Procyon lotor*), opossum (*Didelphus virginiana*), striped skunk (*Mephitis mephitis*), woodchuck (*Marmota monax*), and

[1] PSC REF#: 487840 Vista Sands TLine CPCN
[140] PSC REF#: 487840 Vista Sands TLine CPCN
[141] PSC REF#: 487840 Vista Sands TLine CPCN

weasel species (*Mustela spp*.). Other less common furbearer species present within the project area include badger (*Taxidea taxus*), beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), and bobcat (*Lynx rufus*). Common waterfowl game species include Canada geese (*Branta canadensis*) and duck species such as Mallards (*Anas platyrhynchos*), wood ducks (*Aix sponsa*), blue-winged teal (*Spatula discors*), and others. Bird species typical of the project area include red-tailed hawk, horned lark, tree swallow, American robin, gray catbird, common yellowthroat, song sparrow, red-winged blackbird, and the greater prairie chicken (discussed in the Endangered Resources section of this review). Wildlife present in the project area could use the land to forage and shelter. 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.

There are natural areas and wildlife management areas near the project facilities. Three DNR managed properties including Buena Vista Wildlife Area (BVWA), Central Wisconsin Grassland Conservation Area, and Whiting Station are adjacent to the southern part of the proposed project area. The Buena Vista Prairie Chicken Meadow State Natural Area, which is imbedded within the BVWA, is located approximately 0.25 miles from the proposed project. These conservation areas benefit wildlife and provide habitat for threatened and endangered species, game species, and non-game species.

Once construction is complete, the project area would be revegetated with pollinator-friendly prairie seed mixes. It is possible that this revegetation would provide suitable habitat for wildlife species, pollinator species, nesting birds, and small mammals.

Several public comments from the EA scoping period addressed wildlife concerns in the project area. Concerns included impacts to hunting grounds, wildlife movements, and loss of recreational opportunity on nearby publicly accessible lands. Possible impacts to hunting and recreation can be found in the recreation section of this document. Use of the deer exclusion fence around arrays, similar to what was required by the Commission in previous solar dockets could allow for the passage of some 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. Vista Sands Solar proposes using a seven-foot-high woven wire fence system surrounding the solar arrays areas. Several public comments expressed concern for the extent of fencing present in the project area and fencing impacts on wildlife movement. To mitigate for the impacts on small wildlife movement as a result of fencing, the applicant would install fencing with large apertures near the ground to allow for small mammal and herptile movement through the fences. The fence would be seven or eight feet tall and would include 7-inch-tall, 12-inch-wide apertures in the bottom of the fence. The applicant states that, depending on the material available at the time, they may choose to use fencing with the standard 6-inch by 6-inch apertures. If this is the case, they would raise the fence six inches off the ground for the entire fence or provide larger openings (12 inches by 6 inches) along the fence.[142] Fencing with apertures could help mitigate for impacts to small wildlife movement that occur as a result of fencing. The array fencing would be made from

[142] PSC REF#: 494457 Response-Data Request-PSC-Grant-4

wood or metal fenceposts. The applicant would use an eight-foot-high chain link fence with 3 strand barbed wire around substations, the BESS, and the O&M building.

The proposed project fencing around the arrays would affect wildlife corridors throughout the project area. Larger mammal species (i.e. deer, wolves, and bear) would find the fenced arrays a barrier to movement, which could cause habitat fragmentation and disruption to daily movement and migratory patterns. Where a proposed solar facility fence line runs parallel to a road, large mammals that move along the now restricted corridor may have movement restricted, thereby crossing the road more frequently, resulting in increased large mammal-vehicle collisions. For example, County Road F in the northern portion of the proposed project area could experience more large mammal-vehicle collisions because the proposed arrays would be on both sides of the road which would intensify the deer funneling through this corridor, especially with the increased vehicle usage along this road. The potential increased large mammal-vehicle collisions could be reduced by strategically placing additional wildlife corridors between arrays, breaking up arrays near where the potentially restricted corridors are located, or modified fence height as discussed below.

Comments often addressed the impact to nearby forest wildlife, specifically deer. Most of the project area is active row-crop agriculture which would primarily be used as a foraging resource for deer and not deemed as suitable cover. The loss of the foraging resource by conversion to solar panels may impact how wildlife utilize the landscape as they adjust foraging behavior to different areas still in agricultural production. Additionally, the placement of fences on the landscape could impact wildlife movement and concentrating them in areas that are unfenced and on the perimeter of fenced properties. It is possible that once these agricultural lands are no longer available, deer may congregate into the remaining agricultural lands for foraging purposes which may result in increased agricultural damage on the remaining agricultural lands available to deer within the areas surrounding the project. This concentration of wildlife may also increase nuisance complaints and wildlife disease spread (i.e. Chronic Wasting Disease).

Habitat fragmentation and disruption to daily movement and migratory patterns throughout the proposed project area is a concern for large mammals. To facilitate free movement, it is recommended that fencing be modified to provide free ingress and egress for these large mammals. Not only would free movement lessen habitat fragmentation, but it would also reduce large mammal-vehicle collisions by reducing the funneling effect along roads. In addition, lowered fence height could help prevent large mammals from getting trapped within the solar arrays which could result in additional DNR and applicant time to respond and remove those individuals. See section 2.7 for specific recommendations for the Greater Prairie-chicken.

One public comment from the Wisconsin Wildlife Federation (WWF) expressed concern for the use of rodenticides in the project area and their potential impact on wildlife species.[143] Commission staff asked in Data Request-PSC-Grant-5 if the applicant intends to use rodenticides to repel rodents in the project area.[144] The applicant responded that rodenticides will not be used for this project.[145]

[143] PSC REF#: 492643 Public Comment by Wisconsin Wildlife Federation
[144] PSC REF#: 494694 Data Requst-PSC-Grant-5
[145] PSC REF#: 496585 Response-Data Request-PSC-Grant-5

2.10. ARCHAEOLOGICAL AND HISTORIC RESOURCES

In accordance with Wis. Stat. s. 44.40 and the PSC-SHPO Interagency Programmatic Agreement (PSC-SHPO Agreement or PA), the Commission's Historic Preservation Officer (HPO) reviewed and evaluated the project application materials related to historic properties, which were provided by the applicant as part of the PSC Application Filing Requirements. These include a literature review and field survey report, completed by the applicant's consultant, Stantec. The report was submitted as Appendix J [146] with the application materials. The Commission HPO also reviewed and evaluated property records using the Wisconsin Historic Preservation Database (WHPD or database) online portal and its associated GIS data. As stated in the PSC-SHPO Agreement (3), the WHPD contains all listed property, the Wisconsin inventory of historic places, and the list of locally designated historic places. These recorded properties comprise all relevant "historic properties" for the purpose of this review.

2.10.1. Area of Potential Effect (APE)

The APE is the area where WHPD properties may be affected by the proposed activity. The PSC-SHPO Agreement (7g), requires the Commission HPO to determine the APE.

The direct APE is defined as the area where physical ground-disturbance occurs. Examples of ground disturbing activity include but are not limited to excavation, soil grading, and the compression of soils through heavy machinery movement and material staging. The application shows the size of the project area to be potentially disturbed by construction activities is approximately 9,854 acres which includes the proposed and alternative facility areas, transmission lines, and ancillary facilities. The project would use driven pier foundations and concrete foundations. The inverter/transformer skids would likely be installed on driven pier foundations but could be placed on concrete foundations if required by soil and geotechnical conditions. The largest foundation would be the main power transformer foundation which would be approximately 50 feet by 30 feet. The piers would be from 5 feet to 10 feet deep. The transmission line would include steel monopoles using direct embed or concrete pier foundations. Pole heights would be approximately 96 feet above ground. Conductors would typically be 50 feet or higher above ground and spans will typically be 700 feet long.

The indirect APE is determined as the distance from the project where visual disturbance reasonably occurs (e.g. line of sight). The surface topography of the project area is very flat across most of its extent, ranging from elevations approximately 1,029 feet above mean sea level (msl) to 1,084 feet msl. Topography is slightly more pronounced in and around the various drainage ditches throughout the project area. The landscape is comprised of 7,380 acres of agricultural cropland, 354 acres of grasslands, 250 acres of forest, and 5 acres of developed land. Therefore, there may be some existing vegetative screening but the area also has unhindered viewsheds.

[146] PSC REF#: 488796, Appendix J – Cultural Resource Survey Report

2.10.2. WHPD Archaeological Site Inventory (ASI) Properties in the APE

Sixteen (16) non-burial archaeological sites are located within the project area and a 1-mile buffer area; of those 16 sites, 10 would be within the direct APE of the alternative facility area concentrated along the north side of Buena Vista Creek:

1. **PT-0061** (Polum) is reported in WHPD as an unknown prehistoric/precontact period campsite/village on high ground between Buena Vista Creek and another creek flowing from the north, near County Highway FF. Lithic material was reportedly collected here in 1973. Private collections from the area include a fully-grooved axe, celt, large corner-notched point (Durst-like), and biface midsection. In 1978 it was reported that one quartz flake was collected, and the site was described as a concentration of four quartz chips, one quartz knife, and historic material, however the crew could not relocate the concentration, stating that there are probably small concentrations all along the creek. WHPD lists the site as related to PT-0105.

2. **PT-0068** (Buena Vista #8, D-1 & D-2) is reported in WHPD as a small scatter of historic and lithic artifacts identified in an agricultural field of harvested corn. The site is categorized as a campsite/village of an unknown prehistoric/precontact period. Surface collection at the site in 1978 identified a scattered collection of artifacts including chert scraper, quartzite knife and chips, a point fragment of chert, and ceramics. Locals report finding large spearpoints and axe heads in fields. WHPD lists the site as related to PT-0069.

    - Stantec field surveyed the site for the proposed project. New artifacts consisted of Historic period container and pane glass, metal, stoneware, whiteware, and precontact artifacts including a rhyolite tool and quartz, chert, and quartzite flakes. The precontact artifacts are all non-diagnostic lithics. The rhyolite tool is approximately 7.5 cm in length and 3.5 cm in width with a 1.5 cm long square stem base. This tool appears to be made from Marquette rhyolite. This material was intensively used in the Late Paleoindian and Early Archaic periods primarily for larger tools such as adzes and late Paleoindian projectile points.[147] While this tool may have been originally made in the Paleoindian period, the use-wear and retouching on this tool is significant and it is likely that it was used for a considerable amount of time after its original manufacture.

3. **PT-0069** (Buena Vista #7) is reported in WHPD as is a campsite/village of an unknown prehistoric/precontact period. The site was identified through surface survey in 1978 and comprises of a light surface scatter including one quartz flake and one corner-notched point. WHPD lists the site as related to PT-0068.

[147] Winkler, Daniel M., Dustin Blodgett, and Robert J. Jeske. 2004. The Lithic Resources of Wisconsin: A Guide to Lithic Materials that are Located in Wisconsin.

4. **PT-0070** (Buena Vista #6, C-1) is reported in WHPD as a campsite/village of an unknown prehistoric/precontact period. The site was identified through surface survey in 1978 and is described as concentrations of two chert and 25 quartz chips.

    - Stantec conducted field survey for the project and reported the site as a small scatter of precontact artifacts identified in an agricultural field of harvested corn. Artifacts consisted of quartz and chert flakes, a chert projectile point, and a chert tool. The flakes are all non-diagnostic precontact lithics. The projectile point is similar to the Adena Robbins Stemmed from the Ohio River Valley and the more western Liverpool Stemmed from Illinois and date to the Early Woodland period.[148]

5. **PT-0072** (Buena Vista #3, J-1) is reported in WHPD as a campsite/village of an unknown prehistoric/precontact period. The site was identified through surface survey in 1978 and is described as a concentration of lithic material including a side-notched point, quartz and quartzite chips, and chert chips.

    - Stantec conducted field survey for the project and reported the site as is a small scatter of precontact artifacts identified in an agricultural field of harvested corn. Artifacts consisted of a quartz flake and a quartzite projectile point, missing the base and the tip. The quartz flake is a non-diagnostic lithic. The quartzite projectile point is approximately 4 cm in length and 2 cm in width, however both the base and tip are broken. This point has an asymmetrical blade and slight side notches. This projectile point is similar to a Raddatz style, and the size and shape are indicative of the Early to Middle Archaic period[149]. The quartz and quartzite lithics date to the Early-Middle Archaic period. Previous survey at this site identified a concentration of lithics including a side notched projectile point and a quartz flake. However, they were not able to date the lithic scatter to any one precontact time period.

6. **PT-0105** (Buena Vista #2, C-3) is reported in WHPD as a small concentration of lithic materials, including one chert point, chert chips, and quartz and quartzite chips. WHPD lists the site as related to PT-0061.

    - Stantec conducted field survey for the project and reported the site as a small scatter of precontact and historic period artifacts identified in an agricultural field of harvested corn. Artifacts consisted of quartz and quartzite flakes, and clear and amber container glass. None of the precontact artifacts are diagnostic to a particular time period. Previous survey at these sites identified tools, bone fragments, and chert, quartz, and quartzite flakes that were also not able to date to any one precontact time period.

[148] Justice, Noel D. 2009. Stone Age Spear and Arrow Points of the Midcontinental and Eastern United States: A Modern Survey and Reference. Reprint. Indiana University Press, Bloomington.
[149] Boszhardt, Robert F. 2003. A Projectile Point Guide for the Upper Mississippi River Valley. University of Iowa Press, Iowa City.

7. **PT-0271** (Ochre Okray) is reported in WHPD as a kill site/bone bed site comprising of a large concentration of bone and tooth fragments coated with a yellow, powdery substance (yellow ochre). One of the teeth found was non-human. No lithic or ceramic materials were found in this area. The site was identified through surface survey in 1978.

8. **PT-0272** (Quartz Site) is reported in WHPD as a lithic scatter of an unknown prehistoric/precontact period comprising of two adjacent concentrations of quartz and quartzite debris, tools, and bone fragments. The site was identified through surface survey in 1978.

9. Two sites, PT-0071 and PT-0073, are near the project but outside of the area that would be physically altered by the project (i.e. outside the array fences), and therefore not in the APE.

2.10.3. Newly Identified Resources in the APE

Stantec created an archaeological site probability model that indicated 259 acres within the project area with a high potential to yield intact archaeological features. Stantec performed field surveys of the archaeological site high probability areas within the buildable areas. The survey identified fourteen newly identified archaeological sites. Upon examination of those sites, Stantec archaeologists found that three, A-2, B-2, and E-2, could be considered to have historic significance when related to the existing WHPD ASI properties located in an area of the alternative solar arrays near Buena Vista Creek.

2.10.4. Burial Sites and Cemeteries

Review of the WHPD ASI properties indicated there are no burial sites or cemeteries mapped within the project area. However, four registered cemeteries and two other burial sites are located within the 1-mile buffer of the project area. Stantec performed visual reconnaissance of these sites from public rights-of-way. They determined that all four cemeteries are intact, marked, and maintained with fencing bounding the perimeter. The locations of the two precontact burial sites have been developed into residential housing tracts. Intact mounds were not visible during the reconnaissance.

1. St. John's Lutheran Cemetery (BPT-0036)
2. Meehan Community Cemetery (BPT-0038)
3. St. Bronislava Catholic Cemetery (BPT-0071)
4. Plover Cemetery aka Plover Village Cemetery (BPT-0072)
5. Bigelow-Hamilton Site (PT-0029/BPT-0110)
6. Warnke Mounds Site (PT-0039/BPT-0095)

All six of these cemeteries/burial sites are located greater than 0.25-miles from the project area and therefore they would not be in the direct APE. Cemeteries, graves, and religious properties are not typically able to qualify as historic properties, unless they are an integral part of a district that meets the criteria of significance under Wis. Stat. s. 36(2)(a) or unless they are a religious property deriving primary significance from architectural or artistic distinction or historical

importance. None of these criteria have been met, therefore, these cemeteries and burial sites would not be considered historic properties for the purposes of Wis. Stat. s. 44.40.

2.10.5. Wis. Stat. § 36(2) Criteria for WHPD ASI Properties in the APE

Based on aerial imagery and WHPD records, the integrity of the ASI properties appears largely in-tact. Other than past and current agricultural activities, no areas of the sites seem to have been disturbed by modern construction. While agricultural activities can be detrimental to the integrity of subsurface archaeological deposits due to the effects of repeated plowing, the disturbance from plowing is typically limited to the upper layers of soil, while more deeply buried archaeological materials can remain with integrity below the plow-zone. Plowing can have greater impacts to surface features such as mounds, earthworks, and shallow post-holes, structures, or wall features. Historic period artifacts were recovered at some of the sites, indicating that there may be some minor impacts from post-contact human populations.

The Commission HPO reviewed Stantec's recommendations and WHPD to determine whether the eight WHPD ASI properties in the APE satisfy the criteria established in Wis. Stat. s. 44.36(2). Archaeological sites are typically only potentially eligible for meeting the criteria of Wis. Stat. s. 36(2)(a)5, "Yielding, or likely to yield, information important in prehistory or history." The WHPD ASI properties in the APE are not associated with any known significant event or person, do not embody distinctive characteristics of construction or master art, and do not represent a distinguishable entity that would qualify the properties under the any of the other Wis. Stat. s. 36(2) criteria.

Stantec recommends that the sites constitute a historic property as an archaeological district. The district would be comprised of the three new sites (A-2, B-2, E-2), the eight WHPD ASI properties in the APE (PT-0061, PT-0068, PT-0069, PT-0070, PT-0072, PT-0105, PT-0271, PT-0272), and the two WHPD ASI properties outside of the APE (PT-0071, PT-0073). WHPD records list relationships between several of the sites (PT-0061 with PT-0105, and PT-0068 with PT-0069). WHPD records also show that there are some similarities that could link together the sites: all are in a similar area along Buena Vista Creek, five of the eight sites are campsites/villages, and similar artifact types have been recorded at the sites. The presence of multiple similar sites within a close geographic area could suggest that the individual sites comprise portions of a larger settlement. Alternatively, the sites could represent multiple smaller campsites/villages occupied in the same area repeatedly over multiple seasons.

The WHPD ASI properties could be considered historic properties under Wis. Stat. s. 36(2)(a)5., "Yielding, or likely to yield, information important in prehistory or history." The sites have produced a significant number of precontact artifacts that show human modification and use of the area over a significant period of time. Artifact examples include small lithic scrapers, blades, flakes, or chips that may represent stone tool production, food processing, animal hide preparation, a refuse area, or other similar utilitarian activities. Lithic projectile points include spears or atlatls used for hunting activities and can indicate tool-making workshops when

associated with flakes/chips or ceremonial activities when associated with ochre.[150] Artifacts such as the full-grooved axe, celt, and other ground-stone tools could be used for building shelters or other construction activities.

The artifacts provide some context for potential time periods of occupation. The Raddatz, Durst- and Adena-like lithic projectile points suggest human use of the area from the Late Archaic period (1500-500 BCE) to the Early Woodland period (500 BCE-100 CE) (*Id.*). Rhyolite lithics recovered at one of the sites may date to the Late Paleoindian (8500 BCE-7000 BCE) or Early Archaic (7000 BCE-3000 BCE) periods (Winkler et. al. 2004). The full-grooved axe, celt, and other ground-stone artifacts have been associated with beginning use in the Late Archaic period continuing through the Woodland period (*Id.*).

The district and sites may yield important information that could add to our understanding of prehistory by answering research questions such as: *How is the settlement organized and is there any evidence of internal social stratification? What was the purpose of the settlement and how was it related to the larger region? How did use of the area and its resources change over time?*

Considering the integrity of the sites and the potential research questions, the WHPD ASI properties in the APE (PT-0061, PT-0068, PT-0069, PT-0070, PT-0072, PT-0105, PT-0271, and PT-0272) should be considered historic properties because they meet the criteria of Wis. Stat. s. 36(2)(a)5, "Yielding, or likely to yield, information important in prehistory or history."

2.10.6. WHPD Architecture History Inventory (AHI) Properties in the APE

WHPD records indicate that 17 AHI properties are located within 1-mile of the project area, of which nine properties would be within a reasonable unhindered visual range (0.25-miles) of the project comprising the indirect APE. Of these nine structures, eight are unevaluated, and one, AHI #26717, has been previously determined eligible for listing in the National Register. There are no AHI properties within the direct APE.

- According to WHPD, AHI #26717 is a Queen Anne house made of brick that was demolished in 1996.
- Although listed in WHPD as not demolished, a public right-of-way reconnaissance by Stantec of AHI #73035, AHI #73054, and AHI #73060 found they are no longer extant.
- AHI #73052 and AHI #73055 are screened from visual effects of the project by tree cover and other structures and therefore not affected by the project.
- AHI #73040 and AHI #73041 are partially screened from visual effects of the project.
- AHI #73034 is not screened from visual effects of the project.

[150] Theler, James, and Robert Boszhardt. 2003. Twelve Millenia: Archaeology of the Upper Mississippi River Valley. University of Iowa Press.

The Commission HPO reviewed WHPD and aerial imagery to determine whether AHI #73040 and AHI #73041 would be affected by the project. AHI #73040 comprises of a Gabled Ell residence and AHI #73041 is an Astylistic Utilitarian outbuilding. The two buildings are located adjacent to each other on the southwest edge of the project area. The nearest visual impacts from the project to the AHI properties would be temporary construction features including a laydown area approximately 180 feet to the east and a second laydown area would be 170 ft to the west. Alternative Array 47 would be 640 ft to the south of the AHI properties. Aerial imagery shows the potential of visual effects to both properties would be largely or completely blocked by existing vegetation and buildings. The nearby laydown areas would create only temporary visual effects on the properties during construction. Alternative array 47 would be mostly visually shielded from the AHI properties by nearby existing vegetation and buildings, as well as from vegetation along Fourmile Creek. Considering these factors, visual impacts to both properties would be minor and temporary, therefore the project would not affect these properties.

WHPD property AHI 73034 is a Gabled Ell house of clapboard material. According to aerial imagery, alternative array 30 would be approx. 1250 ft to the east, alternative array 33 would be 1575 ft to the west, and alternative array 36 would be 629 ft to the south. The property has no existing structures or vegetation on its east or south sides. There are farm buildings adjacent to the property on the north and west sides. The property would experience new visual effects from the project due to unrestricted views on the east and south sides of the property. Visual effects would be distant from the property, however, so the effects would be minimal to the immediate character, setting, and feeling of the property. There would be no direct effects to the physical characteristics of the property. The property is not associated with any known significant events or persons. Pictures of the property do not reveal any distinctive building characteristics. There is no known association with significant and distinguishable entities, nor is it likely to yield important historical information. Considering the above factors, the building would not be considered a historic property.

2.10.7. Wis. Stat. § 44.40 Determination

The Commission HPO reviewed the project for affects to historic properties in accordance with the PSC-SHPO Agreement. There are eight WHPD ASI historic properties in the APE that would be affected by the project. Therefore, the Commission requested SHPO review and comment on this undertaking as required by Wis. Stat. s. 44.40.

2.10.8. Compliance with Wis. Stat. § 44.40

On March 13, 2024, the Commission sent a letter to SHPO requesting review and comment in accordance with Wis. Stat. § 44.40 and the PSC-SHPO Interagency Programmatic Agreement. According to the Agreement, Appendix of PSC Authorization Actions Subject to Wis. Stat. § 44.40, this project is listed as Type I(a) Electric power plant siting and construction or expansion (including solar power) and Type I(b) Power line siting and construction, including rebuilds and upgrades. Therefore, Commission authorization of the project must comply with Wis. Stat. § 44.40, which is to enter negotiation with SHPO if any historic properties would be affected by the proposed project.

On April 1, 2024, SHPO completed Wis. Stat. s. 44.40 review[151] of the project. SHPO found that the project would have no adverse effect on historic properties within the APE providing the following conditions are met:

1. The area of the potential National Register district is removed from the primary and alternate solar field locations. SHPO provided a map that shows locations of archaeological sites and is therefore confidential. On the map, SHPO removed portions of Alternative Arrays 28, 29, 30, 34, 35, and 36 in order to avoid impacts to the district.
2. Areas with high potential for cultural resources as identified by the consultant may need additional survey. Consult with the SHPO before starting work in these areas.

SHPO stated that if plans change or cultural materials/human remains are found during the project, please halt all work and contact SHPO. Official SHPO concurrence for the project consisted of an email. The Commission requested a hard copy signed form, which is to be provided by SHPO as soon as possible.

Commission staff asked the applicant two data requests[152] related to SHPO's comments, as shown below.

PSCW-AC-6.11: Describe whether the applicant would consult with SHPO before conducting work within high probability areas that are identified in the Appendix J Phase I Cultural Resources Survey Report (PSC REF#: 488796).

RESPONSE: Vista Sands Solar has consulted with SHPO via the Phase I Cultural Resources Survey Report. If project construction is planned to occur within the high probability areas, and no cultural resources are found, the unanticipated discoveries report would detail additional steps if resources are found during construction. If cultural resources are found during additional Phase I efforts, Vista Sands Solar will coordinate appropriately to adhere to restrictions established by the agencies (OSA/WSH, SHPO).

PSCW-AC-6.12: Describe whether the applicant would remove the solar array areas and any infrastructure associated with the project that intersect with the historic archaeology district identified in Response-Request PSCW-AE-2.1 (PSC REF#: 491893).

RESPONSE: Vista Sands Solar is considering additional Phase I investigations to determine the extent to avoid potential sensitive areas in case the project is required to build in this area. Should that investigation result in a change in Vista Sands Solar's position on use of certain proposed project areas, Vista Sands Solar will update this data request response and provide relevant supporting testimony in the CPCN proceeding.

2.10.9. Mitigating Impacts to Historic Properties

Based on the identification and re-identification of several archaeological sites along Buena Vista Creek and its tributaries, Stantec archaeologists recommended that the parcels where

[151] SHPO Compliance Project ID: WHS #24-0561
[152] Response-Data Request-PSC-Grant-6 - PSC REF#: 498404

potentially significant archaeological sites have been recorded should be excluded from the primary array areas pending further archaeological study. Stantec reported that the project layout was therefore modified so that the parcels containing the potentially significant archaeological sites were moved from primary to alternate array areas.

Five newly identified sites (H-1, I-1, P-1, S-1, U-1) would remain located within the primary array area. However, all five of these sites date to the Historic Euro-American period and consist of the former locations of farmstead residences containing common 19th-20th century artifacts that would not be likely to produce information important to the history of the region and therefore would not be considered to have historic significance.

If the potentially significant archaeological sites along Buena Vista Creek and its tributaries are avoided by the project, Stantec recommends that no further archaeological investigations would be necessary. However, if those alternative arrays are used for the project, then Stantec recommends that additional investigations may be necessary to avoid disturbance of the sites.

2.10.10. Unanticipated Archaeological Discoveries Plan

The applicant provided their Unanticipated Archaeological Discoveries Plan in Appendix K of their application. Commission staff reviewed the applicant's proposed plan and found that it conforms to similar plans for other projects reviewed by the Commission. The plan describes that, in the case that cultural materials are observed during construction, work would stop, the on-site manager would notify the applicant, the applicant would arrange an initial field investigation, and SHPO would be consulted. The applicant and SHPO would agree if the resources are eligible for the National Register of historic places. Construction work in other areas of the project may continue during this time.

In the case that human remains or skeletal materials are observed in the project area, all work would stop, the on-site manager would notify the applicant and the on-call archaeologist would determine the nature of the find. If it is determined that human remains are present, Vista Sands would notify Portage County Sherriff's department, the county medical examiner and SHPO. If it is determined that the location where the remains are located is not a crime scene, jurisdiction would be passed over to SHPO to ensure state law is implemented. Construction work in other areas may continue during this time.

2.11. 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 field investigation for invasive species of the project study area was conducted in 2022 and 2023. The most dominant invasive plants during field investigations were as follows:

- reed canary grass (*Phalaris arundinacea*)
- spotted knapweed (*Centaurea stoebe*)
- bush honeysuckle (*Lonicera tatarica*)

The general locations of the invasive species were noted on the Invasive Species Data Request-PSC-Grant-1 map.[153]

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 applicants 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 applicants should implement the following BMPs to minimize or prevent the spread of invasive species throughout the project area during construction:

- Appropriately timed vegetation cutting to control invasive species.
- Cleaning of construction equipment including brushing, power washing, and/or steam cleaning.
- Herbicide treatments for the management of perennial invasive and noxious species and to remove undesirable vegetation to prepare for permanent seed installation.
- Ongoing management of invasive and noxious species compliant with Wisconsin Administrative Code ch. NR 40.

In addition to the noted BMPs above, the applicants 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 applicants have 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 vegetation management plan, which was provided in Appendix I of the application.[154] 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.

[153] PSC REF#: 491611 through #491615 Response-Data Request-PSC-Grant-1-Figure PSCW-AE-1.17 Part 1 – Part 5
[154] PSC REF#: 488004, Appendix I – Vegetation Management Plan

In addition to invasive and noxious plant species in the project area, oak wilt is known to be found in Portage County. Any tree clearing activities should take into account current Wisconsin-specific BMPs[155] 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 applicants are 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 applicants should implement the BMPs in the Wisconsin Council on Forestry's publication for Transportation and Utility Rights-of-Way Manual.[156]

2.12. 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.

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

In order to mitigate impacts from dust, the applicant indicates that they will establish temporary vegetation and permanent vegetation. Vista Sands Solar also indicates that water trucks would be used to spray interior access roads, especially during periods during high construction periods or high winds. The applicant anticipates that dust mitigation during project construction could cause some individual well usage to be higher during construction than during operation. The overall water pumped during both construction and operation would be significantly less than the current average use of 35,000,000 gallons per year.

No air quality impacts would be expected to occur once construction activities were complete, and the project was operational. The applicant anticipates that air quality will return to preconstruction conditions or better after project construction. Solar facilities generate energy without the creation of regulated pollutants or carbon dioxide.

[155] Forest Health: Promoting Healthy Wisconsin Forests
Accessed at: https://dnr.wisconsin.gov/topic/ForestHealth in January 2021.
[156] 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.

2.13. 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.

At the end of construction, items such as silt fences, stakes, and any non-biodegradable waste should be fully removed from the site when no longer needed. During operation of the project, there may be damage to project components that would generate waste. Damaged or defective items not able to be repaired would need to be removed to appropriate waste disposal facilities. This would likely include defective or broken electrical materials (including PV panels), empty containers, and other miscellaneous solid wastes. The applicant should ensure waste materials are separated and recycled as much as possible and promptly remove all waste from the project areas during both construction and operational phases to reduce safety and aesthetic impacts.

At the time of decommissioning, removed materials that cannot be resold would be salvaged or recycled to the extent possible. Other waste materials would be disposed of according to state and federal laws at a solid waster facility.

2.14. HAZARDOUS MATERIALS

Concerns have been raised by the public regarding potentially hazardous materials contained in solar PV panels 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, 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.[157]

[157] 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.

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 knowledge" of the waste.[158] 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[159]. 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.

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. The BESS would have the potential for hazardous material releases, and a safety plan should be developed and enacted for it.

2.14.1. DNR Guidance on Solar Panel Waste

In March 2024, the Wisconsin Department of Natural Resources Waste and Management Program released a guidance document for comment to clarify which waste regulations apply to end-of-life solar panels. This document explains requirements for individuals, governments, businesses, or others that collect, store, transport, refurbish, recycle, or dispose of solar panels. The guidance also indicates that some of these activities may need local, state or federal

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

approvals or licenses. The document directs facilities that are considering processing end-of-life solar panels to contact DNR to discuss further details. *In situ* and undamaged solar panels are not anticipated to be hazardous.

Metals present in solar panels, such as lead and cadmium, can be harmful to the environment and human health if they are not disposed of properly. This guidance indicates the materials present in solar infrastructure can create hazardous waste, including components of the lead solder in inverters, cadmium in semiconductors, and lithium-ion batteries in battery storage.

The DNR recommends the following best management practices to ensure panels remain recyclable and to avoid the most stringent requirements:

- Protect solar panels from the elements as much as possible—store indoors or in covered containers or move off-site frequently if stored outdoors.
- Whenever possible, have a contract with a recycler, or other documentation, confirming the solar panels will be recycled or reused.

The document is intended to provide information on the requirements and costs necessary to properly collect solar panels. The open comment period for the guidance closed on April 1, 2024. The document can be found here Managing Used Solar Panels and Components (wi.gov).[160]

[160] Managing Used Solar Panels and Components (wi.gov)

3

3. Impacts to Community Resources

3.1. 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, Vista Sands does not have condemnation rights and therefore is exempt from the AIS statute.[161] 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. Vista Sands 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. Vista Sands 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.

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

[161] Wis. Stat. § 32.035

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.

The project area is primarily crop lands that would be suitable for return to agricultural activities following the lifespan of the project. Following decommissioning, the subgrade and topsoil materials would be recompacted and restored to a density and depth similar to the surrounding areas. A deep till of the project may also occur at this time. However, because a solar farm of this size on farmland has never been decommissioned, the full restoration of agricultural land cannot be known with certainty.

Vista Sands states that project construction is not anticipated to generate any excess soil. In the case that excess soil is created, it would only be spread within the project area. The excavated soils would be graded back in after construction and would not be graded into cr opland, pasture, or wetlands.

All laydown yards in the project area are located on agricultural land. Vista Sands states that the designated areas used as temporary laydown yards during construction would be reclaimed and restored to pre-existing conditions.

3.1.1. Agricultural Land Use

The proposed solar array areas would impact a total of 5,436.4 acres of agricultural land. The alternative array areas would impact 1,943.8 acres of agricultural land. The proposed transmission lines would impact approximately 99.7 acres. The alternative transmission lines would impact approximately 122.3 acres of agricultural land.[162]

Most of the agricultural lands are in potato, corn, soybean, oats, millet, or rye production. There are no properties within the project study area that are enrolled in the Conservation Reserve Program (CRP), administered by the U.S. Department of Agriculture (USDA). There are also no properties within the study area that are part of an Agricultural Enterprise Area or restricted by any Farmland Preservation Agreements.

This project would not impact any prime farmland as defined by the Natural Resources Conservation Service (NRCS).

There are three sections of specialty crop production located within the proposed project area. There is one 1.5 acres of pine plantation in alternate array area 33, and two-0.7-acre sections in the northern part of the proposed project area in laydown yard 5.[163]

[162] PSC REF#: 488118 Appendix W- PSCW-Tables
[163] PSC REF#: 498404 Response-Data Request-PSC-Grant-6

The 2022 Census of Agriculture report[164] for Portage County stated that there were 951 farms, totaling 273,256 acres, in the county. Using the approximately 5,436.4 acres of agricultural land proposed to be impacted by the solar development and the 99.7 acres proposed to be impacted by the transmission lines, the amount of land that would be removed from agricultural use during the life of the project would be approximately 2 percent of Portage County's agricultural land. The alternative array areas and associated facilities would include approximately 1,943.8 acres of agricultural land. The alternative transmission facilities would include approximately 122.3 acres of agricultural land.

The applicants state that no proposed project facilities would impact prime farmland as designated by the Natural Resources Conservation Service (NRCS).

All of the land in the project area is zoned as A-1 Exclusive Agricultural, A-2 Transitional Agriculture, A-3 General Agriculture, c4 highway commercial, and CON conservancy zoning.

3.1.2. Drainage Tiles and Districts

Drainage tiles are commonly used in many fields in this region. Vista Sands states that, based on discussions with participating landowners and the available data, the majority of the project area is drained via underground drainage tiles. 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. Vista Sands indicates that they will coordinate with participating landowners and will contract with a professional drainage tile company to locate the drainage tiles in the project area.

Because locating the drain tiles can be difficult, there remains a risk of damage due to construction that may not become clear that tiles have been damaged until after previously drained fields flood during the next heavy precipitation period, which may not occur for months or even years.

Vista Sands states that to the extent possible, major tile channels will be completely avoided. However, depending on the location of project facilities, working around driven piles or facilities at various levels of completion to attempt to repair tiles could prove difficult and ineffective, so planning and avoidance to the extent possible and prompt repair of damaged tiles would be the best way to minimize impacts. If impacts to a major tile line are unavoidable, the tile line would be rerouted post-construction. In the event that tile is damaged, cut, or removed as a result of trenching, it would be repaired or replaced depending on structural conditions. Vista Sands would make efforts to complete permanent tile repairs within a reasonable timeframe, taking into account weather and soil conditions.

[164]https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_2_County_Level/Wisconsin/st55_2_0001_0001.pdf.

Drainage District

Portions of the primary and alternate arrays are within the Portage County Drainage District. These areas include Primary Arrays 3, 4, 11, 12, 13, 17, 20, 21, 23, 24, 31, 37, 38, 42, 43, 44, 45, 49, 50, 51, 59, 60 and Alternate Arrays 3, 20, 24, 25, 31, 32, 39, 41, 46, 48, 53. Vista Sands states that the need for a permit from the Drainage District Board would be determined during final project design. The applicant reached out to the Portage County Drainage District Commissioner in October of 2023 and will continue their coordination throughout the design process.

Commission staff asked the applicant in Data Resuest-PSC-Grant-4 if the applicant is aware of any Portage County Drainage District land rights for maintenance of drainage ditches.[165] The applicant responded to the WDNR-GR-4.14 request that the drainage district prefers to be able to access a 100-foot-wide area along the drainage ditches they are maintaining.[166] The applicant indicated that the current design includes fencing located 75 feet away from drainage ditches and that the applicant is in contact with the Portage County Drainage District to ensure that they can continue to maintain drainage ditches under the proposed project design. If they are not, Vista Sands would collaborate with the district to reach a solution.

Vista Sands states that no culverts would be installed within the project fenced area, but culverts may be installed within roadside ditches for access to fenced areas. Roadside ditch culverts may be located within the Drainage District.

3.1.3. Stray Voltage

Stray voltage is a term used by the Commission to describe a physical phenomenon that may affect confined livestock, primarily dairy cows. 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 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 will 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. For transmission line, solar energy, 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. 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.

[165] PSC REF#: 493356 Data Request-PSC-Grant-4
[166] PSC REF#: 494457 Response-Data Request-PSC-Grant-4

The applicant states that no DNR-designated CAFOs (concentrated animal feeding operations) are located within the project area or within 0.5 miles of the project area. The applicant does not plan to conduct pre and post construction stray voltage testing because no CAFO or confined livestock operations exist within 0.5 miles of the project.

One comment addressed concerns about other animal feeding operations in the project area. Commission Staff asked the applicant to indicate if other farms are anticipated to experience impacts from stray voltage. The applicant responded that the closet non-commercial animal operation building is approximately 45 feet away from the array areas and the closest commercial confined animal operation buildings are 245 away. The building referenced in the public comment is approximately 250 feet away from the nearest array area. The applicant indicated that farms near the project area are not anticipated to be impacted by stray voltage, because all electrical circuits would be properly grounded.[167]

3.2. 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.

There are few studies currently available that investigate whether a similar heat island effect is created from solar generation facilities, referred to in the literature as the photovoltaic heat island effect (PVHI effect or PVHI). The PVHI effect occurs when solar PV arrays elevate ambient air temperatures relative to its natural surroundings. PV 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.[168] Barron-Gafford (2018)[169] describes PVHI in general terms: as "…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 the available studies regarding PVHI. The published literature on the PHVI effect vary, with some theoretical in nature focusing on simulations and mathematical

[167] PSC REF#: 498404 Response-Data Request-PSC-Grant-6
[168] Barron-Gafford, G., Minor, R., Allen, N. Cronin, A.D., Brooks, A.E., and Pavao-Zuckerman, M.A. 2016. The Photovoltaic Heat Island Effect: Larger solar power plants increase local temperatures. Scientific Reports, 6, 35070. Accessed at: https://doi.org/10.1038/srep35070. (Barron-Gafford et al. 2016)
[169] 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-BarronGafford-PVHI-May-2018-Lemnos.pdf.

models[170,171] and others utilizing empirical research to measure PVHI.[172,173] Most of the published research to date has occurred at small-scale solar PV facilities in arid landscapes, dissimilar to the proposed facilities in Wisconsin. Currently there are no known studies that have been conducted at utility-scale (>100 MW) solar facilities in the temperate environments of the Upper Midwest.

The most relevant questions applicable to the proposed facilities and this EIS include: 1) to what degree is PVHI affecting local ambient air temperatures, 2) to what [spatial] extent is this effect occurring, and 3) how this affects the local environment. Observations from recent studies[174] show daily and seasonal variation in ambient air temperatures at PV facilities compared to similar sites without PV facilities, spatial dissipation of PVHI, and variations in soil temperatures beneath PV facilities. These results indicate that more information is needed to understand the PVHI effect for utility-scale solar PV facilities constructed in primarily agricultural land in Wisconsin, where soil characteristics and ambient air temperatures influence the productivity of agricultural operations.

The proposed Vista Sands project identifies a minimum distance of 150 feet between panels and non-participating residences with rows of solar panels spaced 11.70 feet apart (panel edge to panel edge). The fenced array areas would be vegetated (unlike most solar facilities in arid landscapes). The spacing and amount of vegetation, among and adjacent to PV array areas, plays a vital role in PVHI as vegetation actively cools ambient air through transpiration. It is unknown at this time if the proposed facility would cause a significant PVHI effect. Empirical research is needed to determine the occurrence and spatial extent of PVHI, as well as the potential impacts it could have on local environments at utility-scale (>100 MW) solar facilities in temperate landscapes, like Wisconsin. As noted, vegetation reduces ambient temperature through the process of transpiration. It has been shown that reduction in temperatures from vegetation has the ability to increase panel efficiency.[175] In theory, strategically placed vegetative buffers may then also have the ability to reduce PVHI.

[170] Demirezen, E., Ozden, T., and Akinoglu, B. 2018. Impacts of a PV Power Plant for Possible Heat Island Effect. 2018 International Conference on Photovoltaic Science and Technologies (PVCon). Accessed at: https://www.researchgate.net/publication/327838950_Impacts_of_a_PV_Power_Plant_for_Possible_Heat_Island_Effect.

[171] Fthenakis, V.M. and Y. Yu. 2013. Analysis of the potential for a heat island effect in large solar farms. 2013 IEEE 39th Photovoltaic Specialists Conference (PVSC), 3362-3366. Accessed at: http://www.clca.columbia.edu/13_39th%20IEEE%20PVSC_%20VMF_YY_Heat%20Island%20Effect.pdf.

[172] Barron-Gafford et al. 2016

[173] Yang, L., Gao, X., Lv, F., Hui, X., Ma, L., and Hou, X. 2017. Study on the local climatic effects of large photovoltaic solar farms in desert areas. Solar Energy, 144, 244-253. Accessed at: https://www.researchgate.net/profile/Xiaoqing_Gao/publication/312660952_Study_on_the_local_climatic_effects_of_large_photovoltaic_solar_farms_in_desert_areas/links/5b15f1f94585151f91fb0d4a/Study-on-the-local-climaticeffects-of-large-photovoltaic-solar-farms-in-desert-areas.pdf. (Yang et al. 2017)

[174] Barron-Gafford et al. 2016 and Yang et al. 2017

[175] Siegner et al. 2019

3.3. LANDOWNER IMPACTS

3.3.1. Setback Analysis

In previous Commission dockets for solar generation facilities, non-participating landowners adjacent to the project have often 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. Some landowners requested greater setbacks in, to lessen some of the described impacts. Table 1.5-1 in the application provides all the setbacks used by Vista Sands in development of the proposed project. An excerpt of setbacks applicable to residences, other infrastructure, and other natural features is shown in Table 3.1 below.

Table 3.1 Setbacks Stated as Used for the Vista Sands Solar Project

Type	Setback/Constraint	Setback	Clarification
Structures	Inhabitable Structures - Building Edge (nonparticipating)	150 feet (from building footprint)	As measured to edge of panel. Does NOT apply to access roads and fences
Structures	Inhabitable Structures - Building Edge (participating)	150 feet (from building footprint)	As measured to edge of panel. Does NOT apply to access roads and fences
Structures	Inhabitable Structures - Building Edge with Waiver	Per waiver	
Structures	Noninhabitable Structures	20 feet (from building footprint)	As measured to edge of panel. Does NOT apply to access roads and fences
Structures	Height	35 feet	Applies to principal structures (panels, O&M facility)
Property Lines	Side-yard	25 feet	Measured from side lot line; setbacks could be revised during permitting process. Does not apply to shared participating lot boundaries.
Property Lines	Rear-yard	25 feet	Measured from rear lot line; setbacks could be revised during permitting process. Does not apply to shared participating lot boundaries.

Type	Setback/Constraint	Setback	Clarification
Property Lines	Front-yard	Varies depending on class of road In no case shall the distance of the setback be less than the following; Town Roads: 68 feet from centerline or 35 feet from ROW County Roads: 75 feet from centerline or 42 feet from ROW Federal, State Highways: 110 feet from centerline or 50' from ROW	Measured from front lot line; setbacks could be revised during permitting process. Does not apply to shared participating lot boundaries.
Roads	Class 1 Highways—State and Federal Highways	110 feet from the centerline of the highway or 50 feet from the right-of-way line, whichever is greater	As measured to PV generation asset. Does NOT apply to access roads and fences
	Class 2 Highways – County Roads	75 feet from the centerline of the highway or 42 feet from the right-of-way line, whichever is greater	
	Class 3 Highways – Town Roads	63 feet from the centerline of the highway or 30 feet from the right-of-way line, whichever is greater	
Roads – Vision Corners	Road Intersections	Vision clearance triangle shall be bounded by the highway, street, or railroad right-of-way lines which are located a distance back from the intersection of the right-of-way lines equal to twice the setback required on the intersecting highway or street	As measured to PV generation asset. Does NOT apply to access roads and fences
Environmental	Trees (shading)	20 feet to the south 80 feet to the north, east, and west	As measured to PV generation asset. Does NOT apply to access roads and fences. Trees may be trimmed to reduce or eliminate setback requirement.
Environmental	Wetlands	100 feet minimum	Project boundary feces were sited no less than 100 feet from all field verified waterways
Environmental	Waterways	75 feet from Ordinary High-Water Mark (OHWM)	Applies to structures, including solid or chain link fences.
Existing Infrastructure	Railroad Easement	25 feet	From ROW edge, to edge of PV asset. Does NOT apply to access roads or fencing.
Existing Infrastructure	Overhead Communication Electric Utilities	5 feet	Edge of PV asset will be no closer than 5 feet from edge of utility line easement area
Existing Infrastructure	Pipelines	5 feet	Edge of PV asset will be no closer than 5 feet from edge of utility line easement area

3.3.2. 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. No "good neighbor" agreements have been executed.

3.3.3. Property Values

Residents located near previously reviewed solar generation projects have expressed concerns that construction of the proposed solar project 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. Vista Sands has provided a full decommissioning plan in Appendix U of the application.[176]

3.4. LAND USE PLANS

The project area within the Towns of Plover and Buena Vista are within A1 Exclusively Agricultural; A2 Agricultural Transition; A3 Low Density Agricultural zoning; small portions of C4 Highway Commercial; and a small portion of CON Conservancy zoning. The project area

[176] PSC REF#: 488067, Appendix U – Decommissioning Plan

within the Town of Grant is within A-1 Exclusive Agricultural / Farmland Preservation Overlay District; A-2 Transitional Agricultural; A-3 General Agricultural. The land use plans in Appendix E of the application include goals such as the "protection of economically productive areas, including farmland and forest" in the Portage County Comprehensive Plan.[177] 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 would not be using those acres as active farmland.

However, utility use is compatible with Wis. Stat. ch. 91 (Farmland Preservation) provided several conditions are met, and can also be compatible with agricultural zoning, as long as it can meet local approvals. The land could also be returned to agricultural use after the decommissioning of the solar farm (approximately 20-35 years). As such, the use of the leased properties for the solar facilities does not appear to be in conflict with the current land use plans of the towns or county. More details would be available in the JDAs between Vista Sands, the towns of Grant, Buena Vista, and Plover, Village of Plover, and Portage County, if any or all of them are eventually executed. Vista Sands stated that they are actively pursuing JDAs with these local government entities.

Future possible land use plans may be impacted by the project proposal. The Town of Grant submitted a public comment regarding future land use planning.[178] The comment indicated that, in May of 2023, a draft overlay map of was developed and shared at a plan commission meeting. The map was introduced to direct future solar projects to areas that fit with the land use plans, landowner preferences, and wildlife concerns in the area. The map identifies environmentally sensitive areas, such as Buena Vista Wildlife Area and surrounding lands, as not suitable areas for large scale solar use. The map also intended to create protection for landowners near solar development, including a requirement to install vegetative buffers and specification requirements for splitting agricultural parcels. As of March 2024, the land use plan is being presented and considered by the Town Board for a decision about adoption.

Appendix E of the application included documentation of a Town of Plover Solar Overlay Addendum to the Future Land Use Map.[179] The land use map was developed in 2023 and is, as of January 2024, and is being presented to the Town Board for consideration. Similar to the Town of Grant addendum, the map identifies environmentally sensitive areas, such as Buena Vista Wildlife Area and surrounding lands, as not suitable areas for large scale solar use. The map also intended to create protection for landowners near solar development, including a requirement to install vegetative buffers and specification requirements for splitting agricultural parcels.

One public comment expressed concern that future water or sewer utility extension projects in the area would be impacted by the construction of the project. Vista Sands indicates that no water or sewer utility projects are anticipated to be impacted as a result of the project.[180]

[177] PSC REF#: 487965 through 487974 Appendix E-Local Plans (Part 1 through Part 10)
[178] PSC REF#: 492373 Town of Grant Solar Overlay Map and Rationale for Vista Sands Solar Project
[179] PSC REF#: 487965 through 487974 Appendix E-Local Plans (Part 1 through Part 10)
[180] PSC REF#: 498404: Response-Data Request-PSC-Grant-6

Vista Sands is not a public or investor-owned utility and does not possess eminent domain statutory authority. Vista Sands must secure long-term lease agreements with landowners in the project area to acquire the property for the project facilities. Table 1.5-1 in the application[181] provides the proposed setback distances for the proposed project.[182]

3.5. FORECLOSURE OF FUTURE OPTIONS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Several public comments addressed concerns for future land use options, which could be impacted by project approval and construction.

Dane County Conservation League (DCCL) submitted a comment describing the possible impacts of this project on the GRPC and the possible impacts on habitat restoration and habitat creation efforts for the species. The comment expresses concern that the project, particularly the extent of fenced areas, could limit the ability for DCCL to manage GRPC habitat.[183]

The Wisconsin Wildlife Federation (WWF) submitted a public comment that expressed concern for the foreclosure of future options, stating that the impacts of the project on nearby lands could affect the future management of the species. The comment indicated that the project could impact or limit the options for public and nonprofit land areas to manage habitat in the area.[184]

This comment, alongside several others that expressed similar and general concerns for impacts to the GRPC, indicated that irreversible and irretrievable environmental effects could occur as a result of the project. Comments generally indicated that, because the GRPC population is declining and unique to the local area, irreversible impacts could occur to species habitat and the overall population health that could not be reversed.

3.6. CUMULATIVE ENVIRONMENTAL EFFECTS FROM NEARBY SOLAR DEVELOPMENT

The Wisconsin Environmental Policy Act (WEPA) requires that staff evaluate the cumulative environmental effect of a proposed action when combined with other actions. In April of 2023, the Commission approved the development of Portage Solar, a utility scale solar project under docket, 9810-CE-100, nearby the proposed project area for Vista Sands.[185] Portage Solar will be a 250 MW solar project located south of Highway 54 located in the towns of Grant and Plover in Portage County, Wisconsin. The solar array areas and associated facilities, including access roads, a BESS, O&M building, a gen-tie line, and laydown yards, would be located on approximately 1,719 acres. This project would be located surrounding Vista Sands array areas 8, 12, 11, 59 3, 2, and 1. Combined, Portage Solar and Vista Sands Solar would use approximately 8,456 acres of land in proximity to one another.

[181] PSC REF#: 433636, CPCN Application - page 8.
[182] Wisconsin Legislature: Chapter PSC 4
[183] PSC REF#: 491981 Dane County Conservation League Board of Directors Comment
[184] PSC REF#: 492643 Public Comment by Wisconsin Wildlife Federation
[185] PSC REF#: 463896 Final Decision Signed and Served

Any number of environmental impacts associated with the previously approved Portage Solar project could be exacerbated by construction and operation of the Vista Sands Solar project. Any construction activities that would occur at the same or similar time frames could be compounded. Any stormwater and soil erosion issues could be compounded. Noise, visual, local road transport, wildlife or other, all could be additional or cumulative impacts.

During the operational phase, there also would be cumulative impacts associated with both projects such as the amount of land that would be taken out of agricultural production, wildlife movement in the area, the inability for those lands to be acquired for conservation measures or use for wildlife in open agricultural fields, visual and any glare and noise impacts associated with both projects, and other related items.

Conversely, there could also be positive cumulative impacts associated with both projects related to additional habitat creation associated with the solar facilities, less runoff from bare soil agricultural fields, and less intensive land inputs through fertilizers and pesticides. The solar facilities also would likely result in reduced usage of high-capacity wells and irrigation systems, potentially benefiting groundwater supplies.

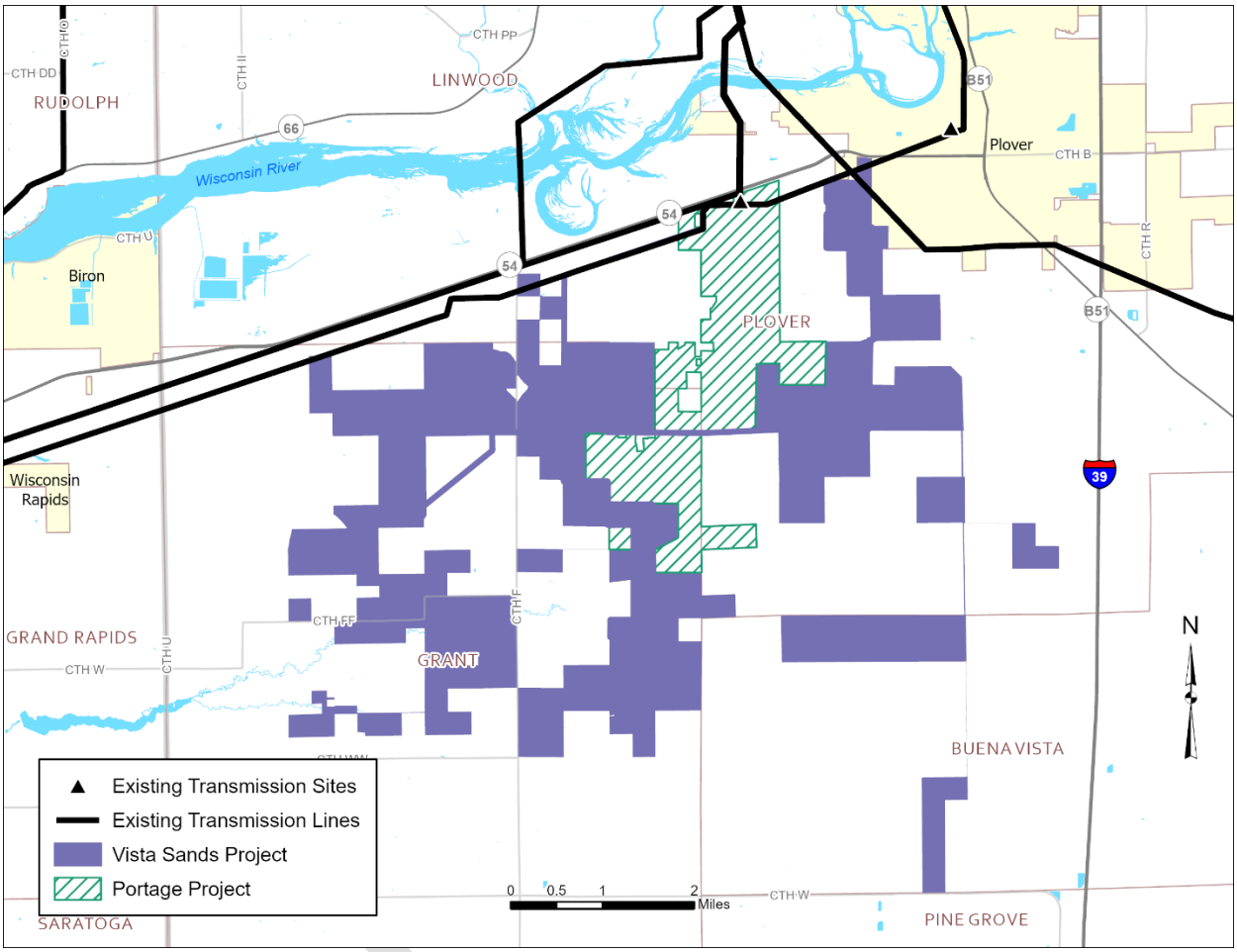
The applicant indicates that Vista Sands and Portage Solar have held informal discussions about the two projects, including collaboration on anticipated project timelines to limit disruptions to the local community. Vista Sands indicates that they would share results or resources from any future research conducted in the proposed project area.[186]

A map of the approved Portage Solar project and the proposed Vista Sands Solar project is shown below.

[186] PSC REF#: 496585 Response-Data Request-PSC-Grant-5

3.6.1. Map of Portage Solar and Proposed Vista Sands Solar

Figure 3.1 Map of Portage Solar and Proposed Vista Sands Solar



3.7. SENSITIVE RECEPTORS AND ENVIRONMENTAL JUSTICE ISSUES

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Historically, communities of color and low-income communities have been disproportionally impacted by adverse human health and environmental effects associated with pollution and developments. The first step towards evaluating whether a project may have disproportionate impacts is by evaluating the population in a project area. For the solar project, local census data was reviewed to determine whether any identifiable groups of minority or low-income persons are in the project study areas.

Table 3.2 Population and Income (2020 Data from census.gov and/or datause.io)

Location	Town of Grant	Town of Buena Vista	Town of Plover	Village of Plover[187]
Population	1,842	1,145	1,565	13,806
Median Household Income	85,000	$62,000	84,357	76,120
Poverty Rate	4.5%	4.0%	11.8%	8.7%

Table 3.3 Estimated Racial or Ethnic Distributions (2020 Data from census.gov and/or datausa.io)

Race or Ethnic Group	Town of Grant	Town of Buena Vista	Town of Plover	Village of Plover
White	95.55%	94.93%	89.2%	92.1%
Black or African American	0.05%	0.17%	0.38%	0.6%
American Indian & Alaska Native	0.65%	0.87%	0.57%	0.4%
Asian	0.59%	1.05%	3.32%	3.4%
Hispanic or Latino	0.92%	2.01%	5.3%	2.5%
Two or More Races	2.39%	3.67%	4.86%	1.8%
Native Hawaiian & Other Pacific Islander	-	-	-	-

*** Where (-) is shown, no census data on that group was provided due to low numbers.*

For the purposes of this analysis, a minority population consists of any geographic area in which minority representation is greater than the national average of 30 percent. The median household income[188] for the State of Wisconsin is $67,125 (Census 2020). The state of Wisconsin persons in poverty rate is 10.8% (Census, 2020).

Sensitive receptors are mainly 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 construction impacts such as fugitive dust, increased noise, and increased traffic hazards. No sensitive receptors were identified within any of these immediate boundaries. Five daycares and seven healthcare facilities were identified within a one-mile radius of the project area. The closest sensitive receptors to the project area is an assisted living facility approximately 70 feet from the project boundary and two churches 525 feet from the project boundary.[189]

3.8. 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 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. Approximately 300-500 construction workers would be employed by the project during construction. These jobs would

[187] U.S. Census Bureau QuickFacts: Plover village, Wisconsin
[188] For 2020, in 2020 dollars, from Census.gov.
[189] PSC REF#: 498404 Response-Data Request-PSC-Grant-6

be sources from surrounding communities when possible. Vista Sands expects the facility would employ 10-16 full-time staff employed at the facility during operation.

Vista Sands Solar proposes to support two graduate research assistantships at the University of Wisconsin – Stevens Point to study the relationship between wildlife and the solar facility.

3.9. LOCAL ROAD, RAIL, AND AIR TRAFFIC

3.9.1. 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. The applicant submitted a Road Condition Report in October of 2023 that is located in Appendix T of the application.[190] Vista Sands anticipates that the applicant would likely use I-39, STH-54, CTH W, CTH F, Taft Avenue, and Coolidge Avenue for deliveries of equipment and materials. They 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,[191] as well as a Road Conditions Report in Appendix T.[192] Vista Sands anticipates 7 to 10 box trucks and 2 to 5 flatbed trucks per day during the pile driving phase of the project. Overall, the applicant anticipates a total of 20,000 truck deliveries to support the construction phase of the project. Section 3.3.5 of the application describes the equipment necessary for each phase of construction and the estimated delivery traffic involved. The applicant states that some equipment may require a state road permit for delivery and may require police escort along local roadways. Any driveways onto state highways would need permits from WisDOT. Vista Sands 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. Vista Sands does not expect any infrastructure or upgrades to existing road facilities to be necessary for construction or operation activities. In the case that road damage does occur, it would be repaired by Vista Sands Solar to the original condition or better. The applicant states that no permanent impacts to road access would occur as a result of this project.

During construction, the volume of traffic in the project area would increase. A traffic increase is anticipated to occur twice a day during the work week when construction workers travel to and from the construction site. Material deliveries would likely be scheduled throughout the day. Visa Sands would have construction signs notifying deliveries and employees to reduces traffic around the project area.

3.9.2. Railroads

There is one railroad line, the Green Bay and Western Railroad, near to the proposed project area. This railway is nearest to sections of the proposed 345 kV transmission line in the northern

[191] PSC REF#: 487840, Vista Sands Solar CPCN Application
[192] PSC REF#: 488066, Appendix T – Road Conditions Report

part of the project area. The transmission line and project facilities would be located south of this railway and are not anticipated to impact rail facilities.

Recommended project haul routes do not cross the Green Bay and Western Railroad and the project is not anticipated to have impacts on rail traffic.

3.9.3. Air Traffic

A total of eight airports are located within 10 miles of the proposed project area. Airports include Runway Leasing Inc Nr 2, the crop-dusting airstrip in the Town of Pine Grove, the Stevens Point Municipal Airport, the Alexander Field Wood Country airport, Swan Field Airport, Runway Leasing Inc Nr 1, Plainfield International Airport, and Lake Ell Field Airport. No commercial air services are known to operate within the project area for this proposed project.

No impacts to air traffic are expected due to the limited maximum height of the panels and the distance to the airports. No mitigation measures pertaining to public air impacts are proposed. The applicant's consultant indicated that no structures associated with the proposed project meet the notice criteria proximity for FAA licensed facilities which include height of the facilities and proximity to an airport.[193]

3.10. MUNICIPAL SERVICES AND LOCAL GOVERNMENT IMPACTS

Vista Sands states it would not expect significant impacts to local public services or traffic. 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.

Vista Sands anticipates that local municipalities would provide fire and emergency medical services to the project in the case they are needed. Local emergency personnel would have access to the project area. The applicant intends to include training and coordination with local emergency responders to coordinate and provide training on its emergency response plan, which would be finalized in the post-CPCN an pre-construction process. The applicant would provide safety protocols and contact information to all local first responders. There would be a specific BESS Hazard Mitigation Analysis workshop provided to the local fire department, to provide information on how thermal and off-gassing events are detected and mitigated. There would also be meetings held with first responders, when requested or scheduled, to familiarize first responders with the site facilities. The applicant anticipates that the Portage County Sheriff Department would police the roadways near the project area.

Vista Sands Solar is working to partner with the Town of Grant, Town of Plover, Town of Buena Vista, Village of Plover, and Portage County to execute a JDA regarding Vista Sands Solar's formal commitments to the local community.

[193] PSC REF#: 488069 Appendix Y – FAA Determination

There is no mention of solar generation facilities included in the towns of Buena Vista and Portage County Zoning Ordinance.[194] There is mention of substations and utility facilities in several local ordinances. The Towns of Grant and Plover Comprehensive Plan includes the solar overlay map discussed in the Land Use Plans section of this document.

3.11. 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, Portage County and the towns of Grant, Buena Vista and Plover 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 $1,500.

Vista Sands' initial estimates indicate that the project would generate approximately $6,552,000 in annual shared revenue payments. The applicant estimates that Portage County would receive $3,712,800 annually, the Town of Grant would receive $1,856,400 annually, the Town of Buena Vista would receive $140,400 and the Town of Plover would receive $842,400 annually as Megawatt-based and Incentive Payments under the current Utility Shared Revenue Formula. The applicant's process for calculating shared revenue payments is detailed in Response-Data Request-PSC-Grant-5.[195]

3.12. ENVIRONMENTAL IMPACT ASSESSMENT FEES

Wisconsin communities in which high-voltage transmission lines at 345 kV or greater are constructed receive both a one-time payment and annual payments from fees paid by the utility. Under Wis. Stat. §§ 16.969 and 196.491(3g), and Wis. Admin Code ch. ADM 46, construction applicants that receive a CPCN from the Commission for a 345 kV line are required to pay an annual impact fee and a one-time environmental impact fee to the Department of Administration (DOA). The Commission is responsible for approving the cost of the project and the base cost from which the fees represent a percentage of that base cost. DOA distributes the money to the local municipalities and counties through which the transmission line is built. The fee payments may not be used to offset any other mitigation measure that is required of the applicants in the

[194] PSC REF#: 433705, Appendix E – Local Plans Part 6
[195] PSC REF#: 496585 Response-Data Request-PSC-Grant-5

CPCN order from the Commission. The communities that would receive these fees depend upon the route selected by the Commission.

One-time Environmental Impact Fees

Under Wis. Admin. Code § ADM 46.05, the one-time environmental impact fee, to be paid in the calendar year when construction begins, is equal to 5.0 percent of the cost of the transmission line as determined by the Commission in the CPCN. DOA distributes 50 percent of the funds from this one-time fee to the eligible counties in proportion to the length of line that is constructed through each county. Likewise, it distributes the other 50 percent of the funds to the eligible towns, villages, and cities in proportion to the percentage of the line that is constructed through each eligible political subdivision. The Commission determines the appropriate allocation after a project is approved.

As stated in Wis. Stat. § 16.969(4), a county, town, village, or city that receives money for the one-time environmental impact fee may use its distribution only for park, conservancy, wetland, or other similar environmental programs. The local government can request from the Commission approval of a different use for the funds, provided the use is in the public interest. This is usually done by submitting a formal written request to the Commission. For the proposed project, 50 percent of the one-time fee to Portage County. The other 50 percent would be allocated among all the towns, villages, and cities along the selected route described in the Commission's Order.

Annual Impact Fees

Under Wis. Admin. Code § ADM 46.04, the annual fee to DOA would equal 0.3 percent of the cost of the line as determined by the Commission under Wis. Stat. § 196.494(3)(gm). DOA distributes the funds from the annual fee to each eligible town, village, and city in proportion to the length of line constructed through each municipality as determined by the Commission in the CPCN. After construction of the line is completed and final costs are submitted to the Commission, the annual fee may be adjusted to reflect the actual cost of the line.

3.13. COMMUNICATION TOWERS

Vista Sands provided information on communications towers, structures, and communication equipment near the proposed solar facilities. There are no cellular towers, FM or AM radio stations, TV stations, or doppler radar networks within 1 mile of the project area. Vista Sands Solar does not anticipate disruptions to line-of-site communications and broadcast communications. If impacts to communication towers were to occur as a result of this project, Vista Sands would work with the affected resident or business to mitigate impacts to the extent practicable. If the project causes interferences with any foregoing communications infrastructure, it will mitigate impacts by providing the same level of coverage as prior to project installation.

3.14. 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 3.4 Average Maximum Noise Levels from Common Construction Equipment[196]

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, and the rotation of the tracking systems. Because the facilities would not be generating electricity at night, the tracking systems would not be rotating and inverters should be silent. Only noise from transformers would be expected during nighttime operational hours.

[196] Sound levels taken from Washington State DOT Biological Assessment Training Manual, updated July 2019.

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.

3.15. NOISE LEVEL STANDARDS

There are no statewide, county, or municipal noise standards for solar developments in Wisconsin, Portage County, the Village of Plover or the Towns of Grant, Buena Vista, and Plover. Portage County does have a public nuisance ordinance that restricts unreasonable loud or disturbing noises.

3.16. 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 Q[197] of the application. Noise-sensitive receptors for this analysis included 602 total receptors including residences, churches, schools, hospitals, and other noise sensitive areas within 0.5 miles of the proposed project area. An ambient noise survey was conducted at eight locations in the project area in April 2023 according to the PSC Noise Protocol requirements.[198] Passing cars and traffic volumes, especially during the morning and evening commute times, were observed in the project area. Measured existing average daytime noise levels range from approximately 29 to 62. Measured existing nighttime an evening noise levels range from approximately 21 to 59 dBA. It should be noted that the northern boundary of the proposed project is immediately adjacent to a major highway, Highway 54.

Noise levels from the full operation of the proposed project were predicted at each noise sensitive receptor within 0.5 miles of the project area. The modeling included ground attenuation factors of 0.8 (on a scale of 0.0 to represent hard ground to 1.0 to represent porous ground) was used to represent agricultural land. A range of assumptions were made regarding the noise produced by various components, including inverters and transformers.

The noise study found that the estimated mitigated project operational noise levels at the receptors would be as follows:

- 495 receptors would experience an estimated daytime noise level of 35 dBA or less
- 104 receptors would experience an estimated daytime noise level of 36 dBA to 40 dBA
- 3 receptors would experience an estimated daytime noise level of 41 dBA to 45 dBA
- 526 receptors would experience an estimated nighttime noise level of 35 dBA or less

[197] PSC REF#: 488064, Appendix Q – Sound Study
[198] Available at https://psc.wi.gov/SiteAssets/ConventionalNoiseProtocol.pdf

- 74 receptors would experience an estimated nighttime noise level of 36 dBA to 40 dBA
- 2 receptors would experience an estimated nighttime noise level of 41 dBA to 45 dBA[199]

Because there are no current PSC solar noise regulations, the results of the measurements find that the project would be below the regulatory requirements based on Wisconsin regulations for wind energy systems in Wis. Admin. Code Ch. 128. The project would be operated so sound does not exceed 50 dBA during the daytime or 45 dBA during the nighttime at a non-participating residence or occupied community building.

The applicant indicates that they would conduct a post-construction sound analysis that would be completed following construction that would verify the conclusions of this report and conclusions.

3.17. NOISE MITIGATION FOR BESS

The BESS would operate during day and nighttime hours. The BESS would be located in the northeastern part of the project area, where the highest unmitigated noise levels would be approximately 60 dBA, which exceeds the noise limits of 50 dBA during the daytime and 45 dBA during the nighttime. The applicant would mitigate the sound levels from the BESS by selecting quieter equipment or placing noise barriers to mitigate the noise levels from the system.

3.18. NOISE LEVELS DURING CONSTRUCTION

Vista Sands has not 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.

There are some residences that appear to be fairly close to 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. Vista Sands 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.

3.19. POST-CONSTRUCTION NOISE COMPLAINTS

If the project is approved, Vista Sands Solar 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

[199] PSC REF#: 488064, Appendix Q – Sound Study

the stated assumptions in the noise analysis provided, this should be conducted to test noise levels, particularly near the substation and BESS.

Vista Sands Solar indicates that they will maintain and repair equipment in a timely manner that avoids excessive sound. If the applicant does receive a noise complaint from a local resident, the complaint would be investigated and actions may be taken to resolve the complaint, if appropriate.

3.20. VISUAL IMPACTS, AESTHETICS, AND LIGHTING

3.20.1. Aesthetics

The existing visual landscape of the project area is made up of large somewhat flat agricultural fields, with some woodlots and tree lines interspersed with cropland. Several residences and farms dot the landscape along the roads near the project area. A major highway (54) abuts the proposed far northern end of the project, where some arrays would be located, along with the collector substation and BESS. Existing transmission lines, distribution lines, and communications towers currently impact the aesthetics of the project area. Portage Solar (9810-CE-100), a large-scale solar project near the proposed location for Vista Sands Solar, was approved by the Commission and will also contribute to the visual landscape in the areas surrounding 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.

Approximately 9,854 acres would be converted from agricultural land to the solar facility, for approximately 30-35 years. Photo simulations of several points in the project area are provided as Appendix G[200] of the application. Because of their relatively low height, the solar facilities would not be visible at a great distance from the project. Transmission facilities present in the project area would likely lead to visual effects from further distances and in a different part of the landscape. 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. Vista Sands' decision to use agricultural or "deer" fencing consisting of wide woven wire would lessen the visual impact of the facilities, when compared to other potential fence options such as chain link.

Commission staff asked the applicant to describe the methods they would use to mitigate aesthetic and visual impacts from the project.[201] The applicant responded that they would work with individual landowners who have arrays on one or more sides of their property to create visual buffers and screening to mitigate for visual impacts.[202] Different types of screening would

[200] PSC REF#: 487975, 487976, and 487977, Appendix G – Visual Simulations
[201] PSC REF#: 493356 Data Request-PSC-Grant-4
[202] PSC REF#: 494457 Response-Data Request-PSC-Grant-4

be used depending on the area of the project. For example, planting of visual buffer may be more dispersed along highly trafficked roadways. I n more residential areas, the applicant would provide more dense visual screening which would include planting evergreen and deciduous species. All vegetative screening would take several years to establish. It is likely that, even with screening, residents and nearby property owners would experience solar facilities to some degree in their viewsheds.

Several public comments expressed specific concern over the proximity of several residences to alternative array #33. Alternative array area 33 in close proximity to several residences and is near to 95th Street. Commission staff submitted a data request to the applicant that asked how impacts to these residents would be mitigated.[203] The applicant responded that they would use this alternative array area only if other array areas in the project area are severely restricted. If construction in this array area did occur, the applicant responded that a significant visual buffer area would be used and at least 60 feet of trees would be maintained between the solar array fences and the houses on the western side of the array area.[204]

The visual impacts of the generator tie line and transmission lines would be noticeable changes to the landscape. Visual impacts of the substation and BESS would likely 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. These impacts may be lessened if Vista Sands could maintain or create screening vegetation along roadsides and near residents.

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 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.

3.20.2. 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.

[203] PSC REF#: 494694 Data Request-PSC-Grant-5
[204] PSC REF#: 496585 Response-Data Request-PSC-Grant-5

Vista Sands used ForgeSolar web program, which visually depict glare effects, to analyze glare potential in the project area. This evaluation included an analysis of potential glare to 309 residences, 46 road segments, and 32 approach paths to airports. All routes and structures were analyzed using 9-foot and 12-foot panel heights. All residences were modeled at an assumed observer height of 16-foot viewing height. Roadways were evaluated at height values of 5 feet for automobile drivers and 9 feet for semi-trucks. The model provided the glint/glare results for a resting angle of 60 degrees. The predictions from the program are predicated upon certain assumptions and caveats, which can affect the accuracy of the glare analysis.[205]

The model predicted that with a resting angle of 60 degrees 6 of 309 residences would experience glare. Glare was predicted at 8 of 26 road segments modelled. The model also predicted glare at 2 of 32 runways and 2 of 14 airports analyzed.

The model categorizes glare into three general categories.

1) Green Glare: low potential for temporary after-image
2) Yellow Glare: potential for temporary after-image.
3) Red Glare: potential for permanent eye damage.

The glare anticipated from the model is described in more detail below:

Residential

Six residences are predicted from the model to receive glare, all located within block 9 (near Townline Road, Buena Vista Drive, 130th Street, Maple Street, North 120th Street) and block 15 (near 110th Street North, Angle Drive, 100th Street North, 95th Street North, Elm Street, 105th Street, and Washington Street). A description of the location and extent of glare anticipated is listed below.

Table 3.5 Estimated Residential Glare

OP Number	Block Location	Description
1	9	11,785 minutes of green glare and 9,861 minutes of yellow glare per year
2	9	3,898 minutes of green glare per year
4	9	4, 254 minutes of green glare and 165 minutes of yellow glare per year
11	15	3,441 minutes of green glare per year
12	15	4,184 minutes of green glare per year
13	15	3,755 minutes of green glare per year

More information on anticipated glare for residential properties is detailed in the Glare Hazard Analysis appendix of the application materials.[206]

[205] https://www.forgesolar.com/help/
[206] PSC REF#: 488134 and PSC REF#: 488134 Appendix O-Glare Analysis-Part 1 and Appendix O-Glare Analysis-Part 2

Road Segments

Eight road segments modeled are anticipated to experience glare. A description of the location and extent of glare anticipated is listed below.

Table 3.6 Estimated Road Segment Glare

Location	Description
Route 54 Westbound	402 minutes of green glare and 352 minutes of yellow glare per year, up to 17 minutes of glare per day between November and January
Cleveland Avenue	4,173 minutes of green glare per year, up to 32 minutes per day in mid-morning from October to March
Townline Road	806 minutes of green glare per year, 55 minutes per day in the late morning from November to January
100th Street	6,161 minutes of green glare and 4,459 minutes of yellow glare per year, 120 minutes per day from November to February
105th Street	154 minutes of green glare and 2,730 minutes of yellow glare per year, 73 minutes per day from November through January
110th Street	3,313 minutes of green glare per year, 53 minutes per day in the early afternoon from November through January
North 120th Street	5,855 minutes of green glare and 5,870 minutes of yellow glare per year, 175 minutes from November through February
Maple Street	37 minutes of green glare per year, expected in March and October

More information on anticipated glare for residential properties is detailed in the Glare Hazard Analysis appendix of the application materials.[207]

Airports and Runways

Two airport runways, including two airports, could experience glare as a result of the project. A description of the location and extent of glare anticipated is listed below.

Table 3.7 Estimated Airport and Runway Glare

Runway/Airport Location	Description
Runway Leasing Inc. NR 2 Airstrip, Eastbound Approach	25,569 minutes of green glare per year, up to 130 minutes per day in the mid-afternoon from annuary through November
Runway 21 at Stevens Point Municipal Airport	664 minutes of green glare per year, up to 15 minutes per day from November through January

The applicant noted that the FAA does not consider green or yellow glare to be problematic for pilots, as the glare is similar to that of buildings, bodies of water, or other common features. More information on anticipated glare for residential properties is detailed in the Glare Hazard Analysis appendix of the application materials.[208]

Glint and Glare Mitigation

Vista Sands states that in the event of a complaint about glare made within or outside the project, they would use ForgeSolar modelling to assess the extent and time of day of glare concerns.

[207] PSC REF#: 488134 and PSC REF#: 488134 Appendix O-Glare Analysis-Part 1 and Appendix O-Glare Analysis-Part 2

[208] PSC REF#: 488134 and PSC REF#: 488134 Appendix O-Glare Analysis-Part 1 and Appendix O-Glare Analysis-Part 2

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 proves to be problematic for an observer, mitigation actions such as screening vegetation, fencing, other visual screening or altering the resting angle should be considered by the applicant to mitigate the impacts. As more solar energy facilities are constructed and come into operation, practical experience will help establish guidelines that may be appropriate for Commission staff to suggest for Commission consideration.

3.21. LIGHTING

The proposed project would include some temporary lighting. Portable temporary light plants and associated generators on a trailer could be moved around the construction site as needed. The laydown areas and parking areas may have lights mounted to poles to be used during non-daylight construction hours. The applicant states that any lighting in the project area would be directed away from adjacent properties and rights of way.

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 have lighting directed away from adjacent properties and rights of way. Installing motion sensors that would be triggered by movement would reduce impacts to nearby residences compared to outdoor lighting that is constantly on.

There are no lighting ordinances in the Towns of Plover, Grant, and Buena Vista or the Village of Plover. The Portage County Code for exterior lighting was provided in Appendix E of the application.[209]

3.22. RECREATION

Commission staff reviewed the project for the presence of and the project's potential impact on recreation. The review found that no fisheries areas, state parks, state forests, federal properties, wildlife refuges, parks, or scenic riverways are located within the project area or within two miles of the project area. There are two county parks, South Wood County Park and Belecke Park, 17 municipal parks, and one privately owned park located within two miles of the project area. A map of nearby public land is included in Appendix A of the application.[210]

Buena Vista Wildlife Area is located southern portion of the proposed project and borders Array Areas 12, 20, 21, 38, 41, 44, and 53. This property is the Buena Vista Wildlife Area and the Buena Vista Prairie Chicken Meadow State Natural Area. This property is owned and managed by the WDNR. Impacts to Prairie Chickens and this habitat area are included in the Prairie Chicken Section of this document. The applicant indicates that reasonable visual buffers to limit the impact on viewsheds to public lands would be implemented.

[209] PSC REF#: 487965 through 487974 Appendix E-Local Plans (Part 1 through Part 10)
[210] PSC REF#: 487929 Appendix A-Solar AFR fig4173 Public Lands

One snowmobile trail is located within the project area and runs east-west through the northern section of the proposed project area. Approximately eight miles of the trail is located within the project area and an additional sixteen miles is located within two miles of the project area. The trail is located on private property and is managed by the local snowmobile club. Vista Sands states that they would work with the Kellner Knights Snowmobile Club to determine how to be re-route the snowmobile trail once the project is constructed. Commission Staff asked how the applicant intends to mitigate for impacts to the trail that would occur as a result of the project in Data Request-PSC-Grant-5.[211] The applicant responded that they have not yet directly engaged with the snowmobile club. They indicate that they would consult with the club to determine how access throughout the project could be maintained and explore co-locating the snowmobile trails with wildlife corridors.[212]

Several public comments addressed potential impacts to trout fishing in the project area. Commission staff submitted a data request asking the applicant to address these concerns and indicate how fishing near the project area would be impacted.[213] The applicant responded that safety restrictions to shore fishing may occur during the installation of underground cabling during the horizontal directional drilling process (HDD) underneath areas such as Ditch #1, Buena Vista Creek, Ditch #8 and Ditch #3; and during the installation of project 138kV B-2 Transmission Line across Buena Vista Creek. These restrictions would occur during project construction in workspaces and areas where HDD is occurring. During project operation, fishing areas and trout stream access is not likely to be limited, as these trout stream areas, including Ditch #1, Ditch #3, Buena Vista Creek, Ditch #8, are not proposed to be enclosed by fencing.[214]

The applicant states that timing restrictions to minimize adverse impacts on fish movement, fish spawning, and egg incubation periods in the case that an inadvertent release were to occur, have been considered. Boring under Class I and Class II waterway would be avoided between September 15th and May 15th to the extent possible. The installation and removal of temporary span bridges (TCSB) would comply with the September 15 through May 15th time of year restriction for all trout streams and March 1 through June 15 for all other waters. More information on safety restrictions, HDD use, TCSB use, and impacts to these waterways are discussed further in the wetlands and waterways section of this document.

Impacts to recreational opportunities on publicly accessible and private lands will be varied across the project area. Impacts will primarily be based on the personal perception of the impact of the solar facilities. For publicly accessible properties, the only acreage in the project area with potential impact would be land owned and managed by the DNR. All recreational opportunities currently allowed on DNR will continue to be available. Infrastructure from the solar facility may impact wildlife movements as previously mentioned, which may impact wildlife movement on DNR properties. Conversely, the infrastructure may create new wildlife travel corridors as wildlife is restricted from adjacent lands, increasing wildlife presence on lands next to the project. Impacts to deer hunting were mentioned frequently in the public comment process, specifically on DNR properties. Presence of the solar facility will not impact the ability to deer

[211] PSC REF#: 494694 Data Request-PSC-Grant-5
[212] PSC REF#: 496585 Response-Data Request-PSC-Grant-5
[213] PSC REF#: 491728 Data Request-PSC-Grant-3
[214] PSC REF#: 493278 Response-Data Request-PSC-Grant-3

hunt on DNR properties. As with any hunting situation, it will be the responsibility of the hunter to ensure safe hunting practices are followed. Land occupied by the arrays would be unavailable for hunting or other access by the public or landowners.

3.23. ELECTRIC AND MAGNETIC 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.

Vista Sands hired a consultant, Stantec, to complete an analysis of the estimated magnetic profile of the proposed project. The EMF Study for the project is provided in Appendix P of the application. Magnetic field levels have been estimated for the proposed underground collector system, overhead project transmission lines and overhead 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. Model and software results for the underground collection system indicated the maximum magnetic field strength at the centerline of the cable trench with one underground cable was at 14.23 mG. The maximum magnetic field strength model output for this project was present in a scenario that included three parallel underground cables (14.91 mG). The maximum electric and magnetic field strength near of any project transmission lines or gen-tie centerline was 606.76 mG magnetic field and 8.12 kV/m electric field, both modeled at the gen-tie line. No sensitive receptors were identified within any of these immediate boundaries. Five daycares and seven healthcare facilities were identified within a one-mile radius of the project area. The closest sensitive receptors to the project area is an assisted living facility approximately 70 feet from the project boundary and two churches 525 feet from the project boundary.[215] For more information on EMF and human health, a free publication, entitled EMF – Electric and Magnetic Fields is available on the PSCW web site.[216]

[215] PSC REF#: 498404 Response-Data Request-PSC-Grant-6
[216] https://psc.wi.gov/Documents/Brochures/EMF.pdf

4

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

4.1. NO ACTION ALTERNATIVE

The no action alternative, which would be a withdrawal or denial of Vista Sands' application, is a potential outcome of the Commission's consideration of this application. Another no action alternative would have been Vista Sands 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 DEIS would not occur if the Commission denies the application or if Vista Sands had never filed an application with the Commission.

4.2. ALTERNATIVE SITES FOR PV ARRAYS

Vista Sands proposed a grouping of arrays that could serve as sites for the proposed 1,310.4 MW (AC) 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.

4.4. HORIZONTAL MARKET POWER

Wisconsin Stat. § 196.491(3)(d)7. requires the Commission, before issuing a CPCN, to find that the proposed wholesale merchant power plant facility "will not have a material adverse impact on competition in the relevant wholesale electric service market." The Commission will make its decision regarding adverse impact on completion as part of its decision in this docket.

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5. Summary

The Commission will review this CPCN application for a wholesale merchant electric power plant. It must issue an order on whether to approve the project facilities, and under what conditions. Unless granted a time extension by the circuit court, it must issue an order by January 19, 2025, 360 days after the Commission declared the application to be complete (including the 180-day extension granted on April 2, 2024).

This EIS 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 a 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 proposed solar arrays and associated facilities would impact approximately 6,737 acres in the Village of Plover and towns of Grant, Plover, and Buena Vista in Portage County. This would include the construction of fenced array areas, underground collector circuits, substations, a BESS, laydown areas, access roads, and a generator tie line. The applicant also proposes impacting 193.01 acres for the construction of transmission lines to support the solar facilities which would include 5 to 6.5 miles of 345 kV high-voltage transmission line and three new 2 to 4-mile 138kV of high voltage transmission lines.

It is anticipated that the largest and most direct cumulative impact to natural resources would be habitat fragmentation for local wildlife resulting from the large sections of fenced array areas, temporary vegetation removal, forested land impacts, and construction impacts to rare species. This project is uniquely situated near Buena Vista Wildlife Area and could have adverse habitat and environmental impacts on the GRPC population. The GRPC is a state threatened species with habitat in the area, both on state managed and privately managed lands, as well as project area private land that could be impacted by project construction. The project could also impact archaeological resources present in the western portion of the project, which could result in permanent effects on these resources. This EIS also discusses possible natural resource impacts to wetlands, waterways, agricultural lands, rare species, wildlife, and invasive species management.

Notable cumulative impacts to the local community may include an increase in traffic congestion on local roads, as well an increase in the overall level and duration of noise levels during the

construction phase(s) of the project. Changes in viewsheds and aesthetics of the nearby area would also change as a result of the project.

In addition to the possible adverse environmental effects, the project could positively impact certain environmental features. It is possible that the revegetation of the project area with pollinator-friendly prairie seed mixes would provide suitable habitat for wildlife species, pollinator species, nesting birds, and small mammals. Additionally, the project would be constructed on largely existing agricultural lands. Once constructed, the use of fertilizers and pesticides used in the direct area would likely decrease, which could benefit the local water resources and ecosystems. Once constructed, solar facilities do not create notable air quality concerns, which may contribute to local and regional air quality benefits compared to other sources of energy production.

The EIS concludes that construction and operation of the solar generation facility would be likely to have a range of environmental effects. This evaluation includes suggested mitigation measures from Commission staff, DNR, and public comments to reduce potential impacts of this proposed project.

6

6. Acronyms

§	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

7. Appendix A

7.1. GENERAL PROJECT MAPS

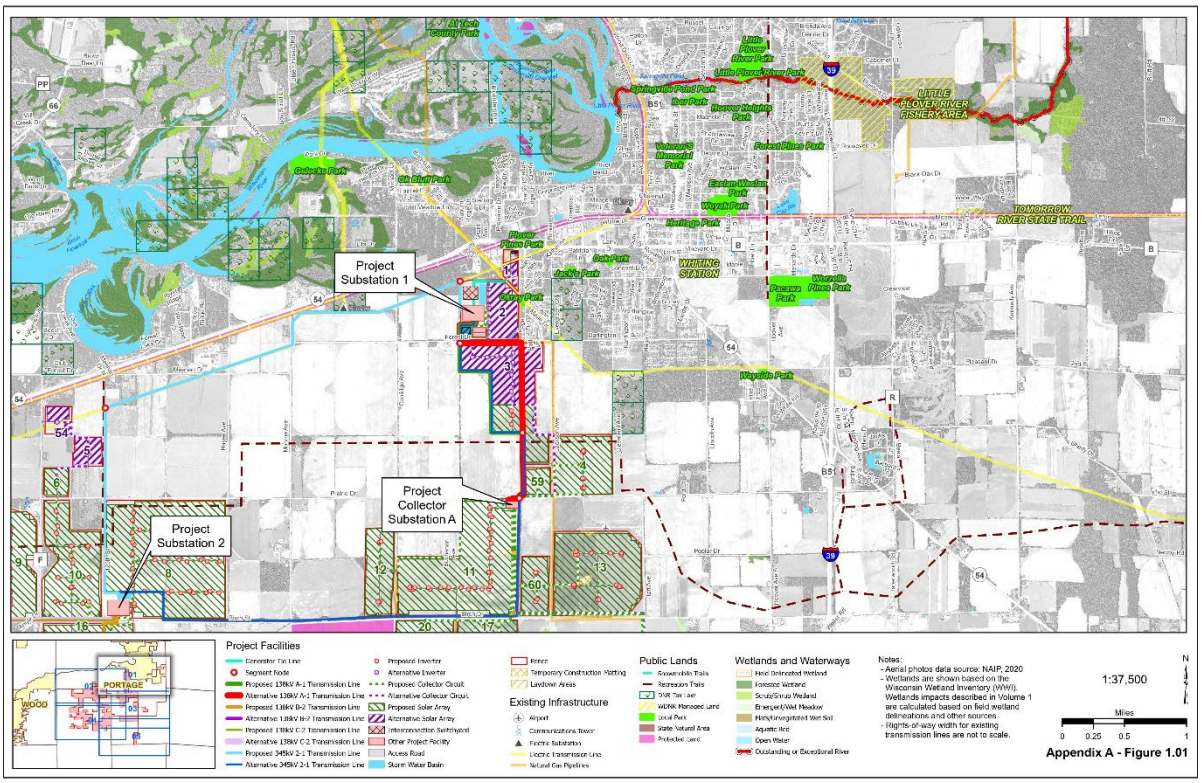

Figure 1(Appendix A)

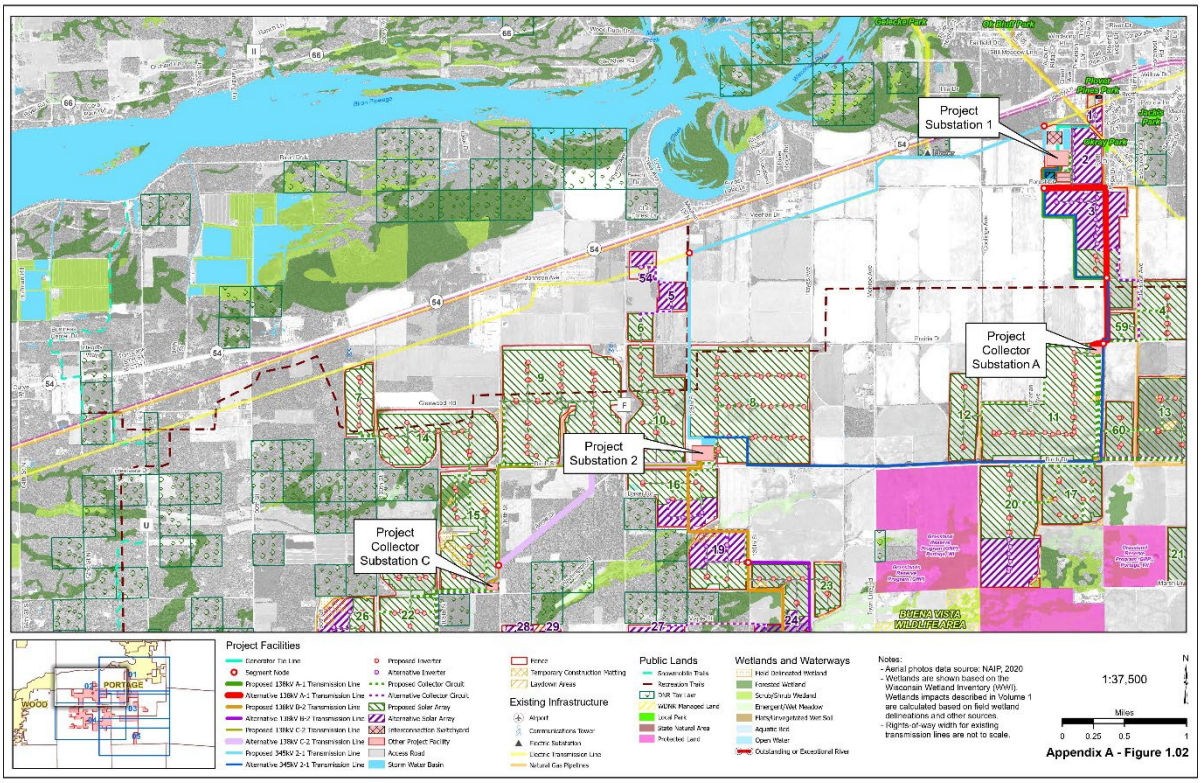

Figure 2(Appendix A)

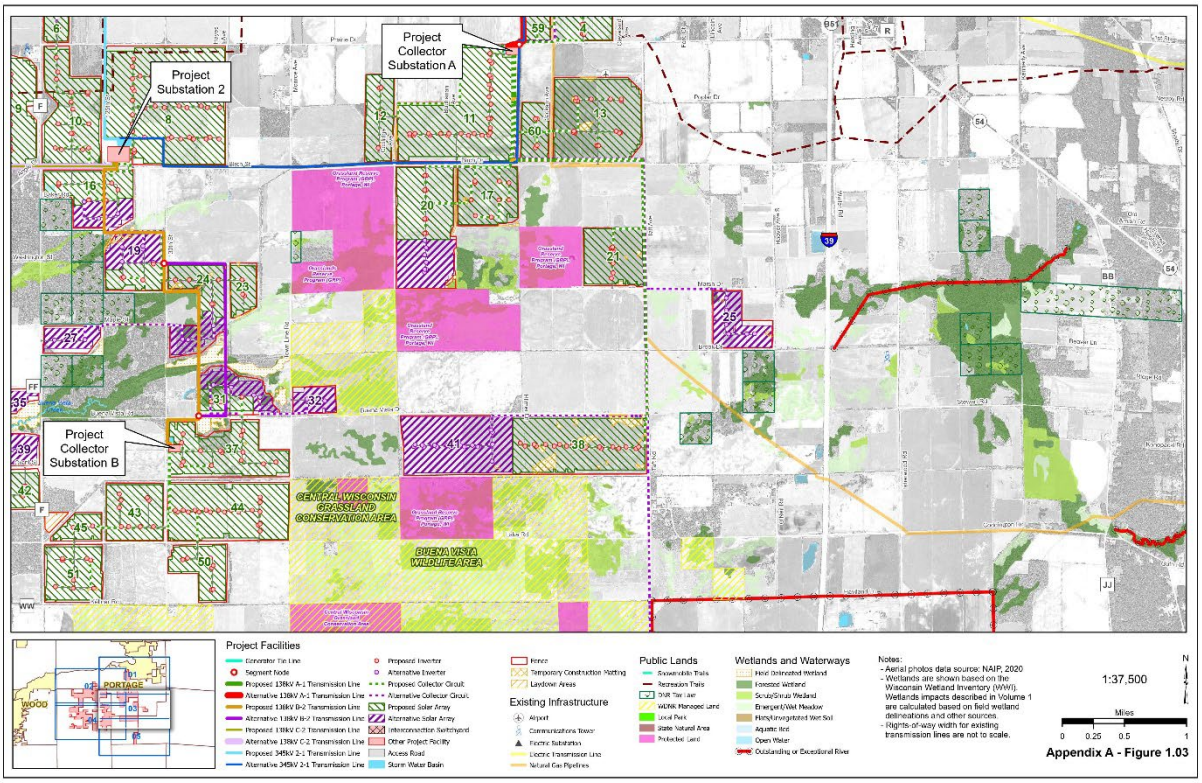

Figure 3(Appendix A)

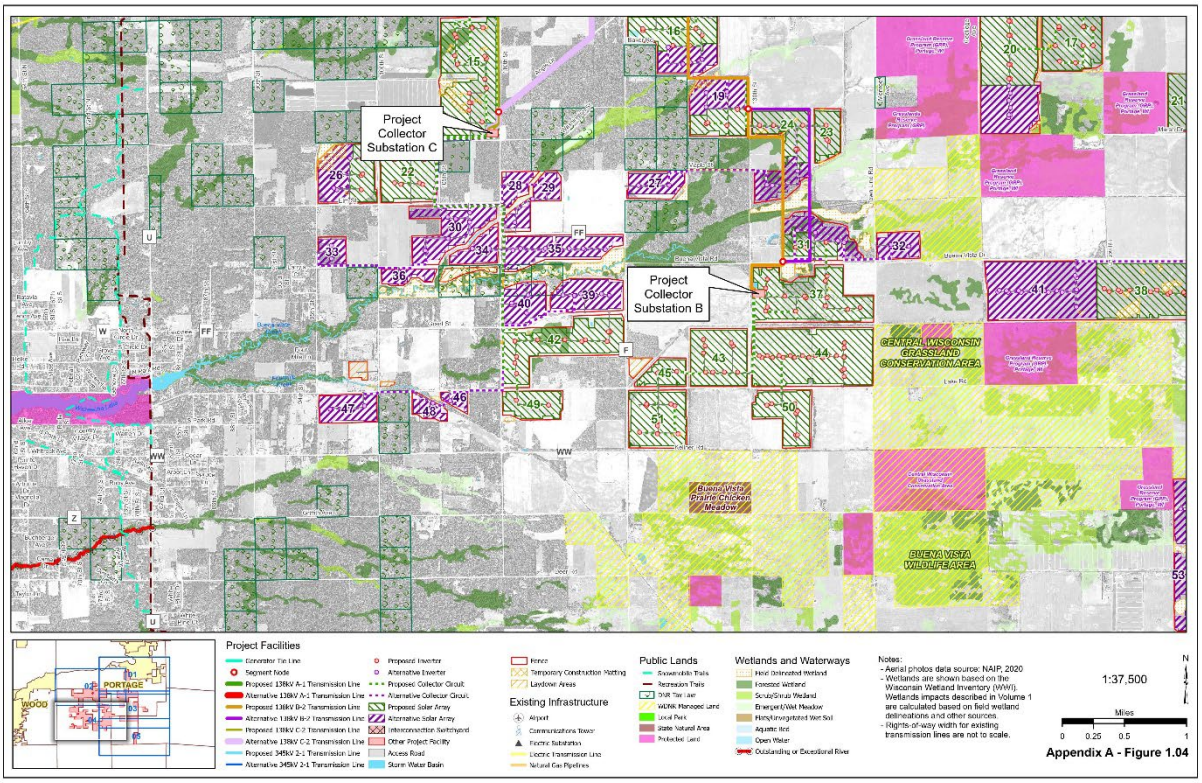

Figure 4(Appendix A)

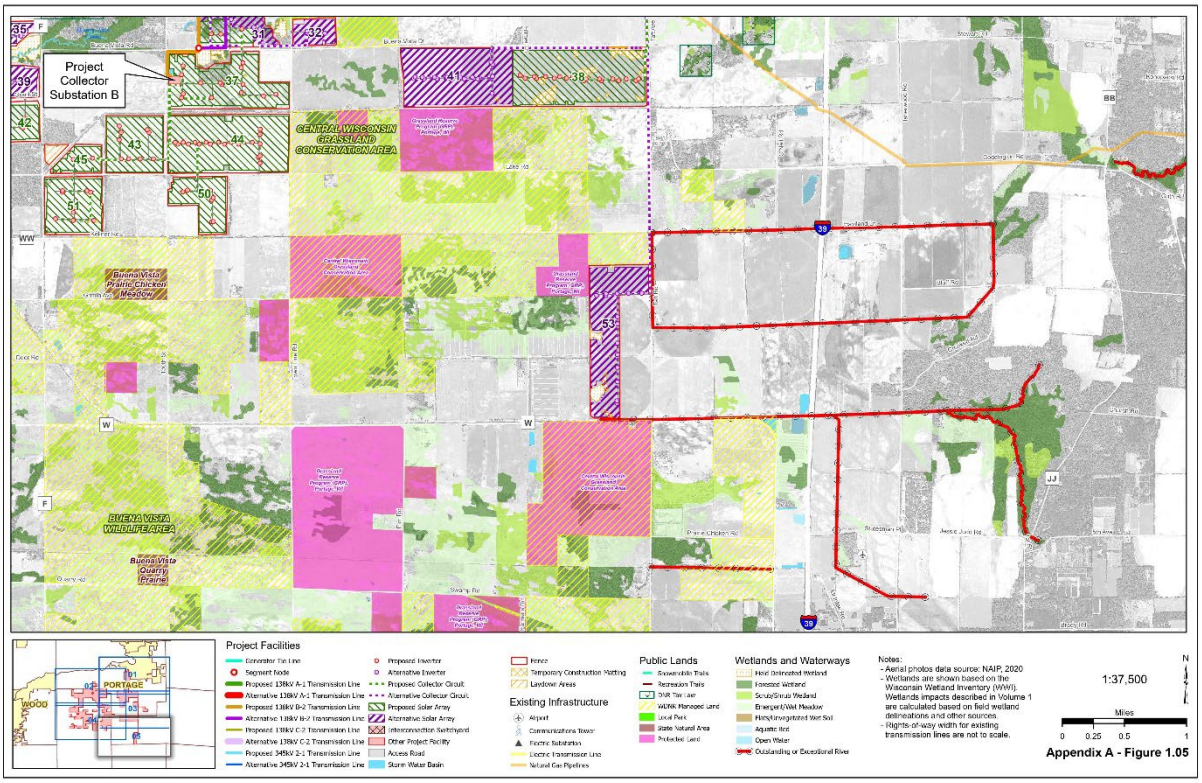

Figure 5(Appendix A)

8

8. Appendix B

8.1. PRAIRIE CHICKEN MAPS AND FIGURES

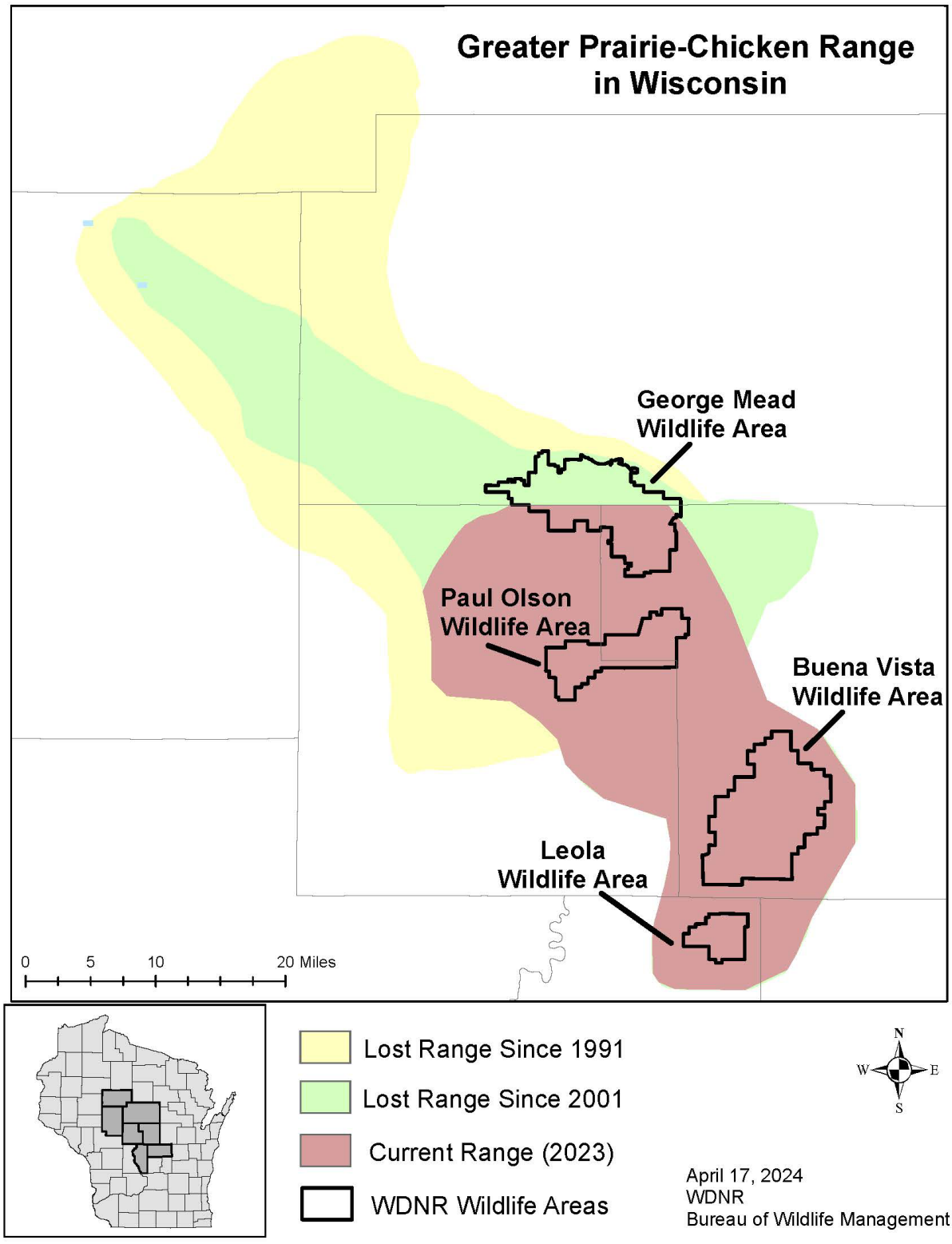

Figure 1 (Appendix B)

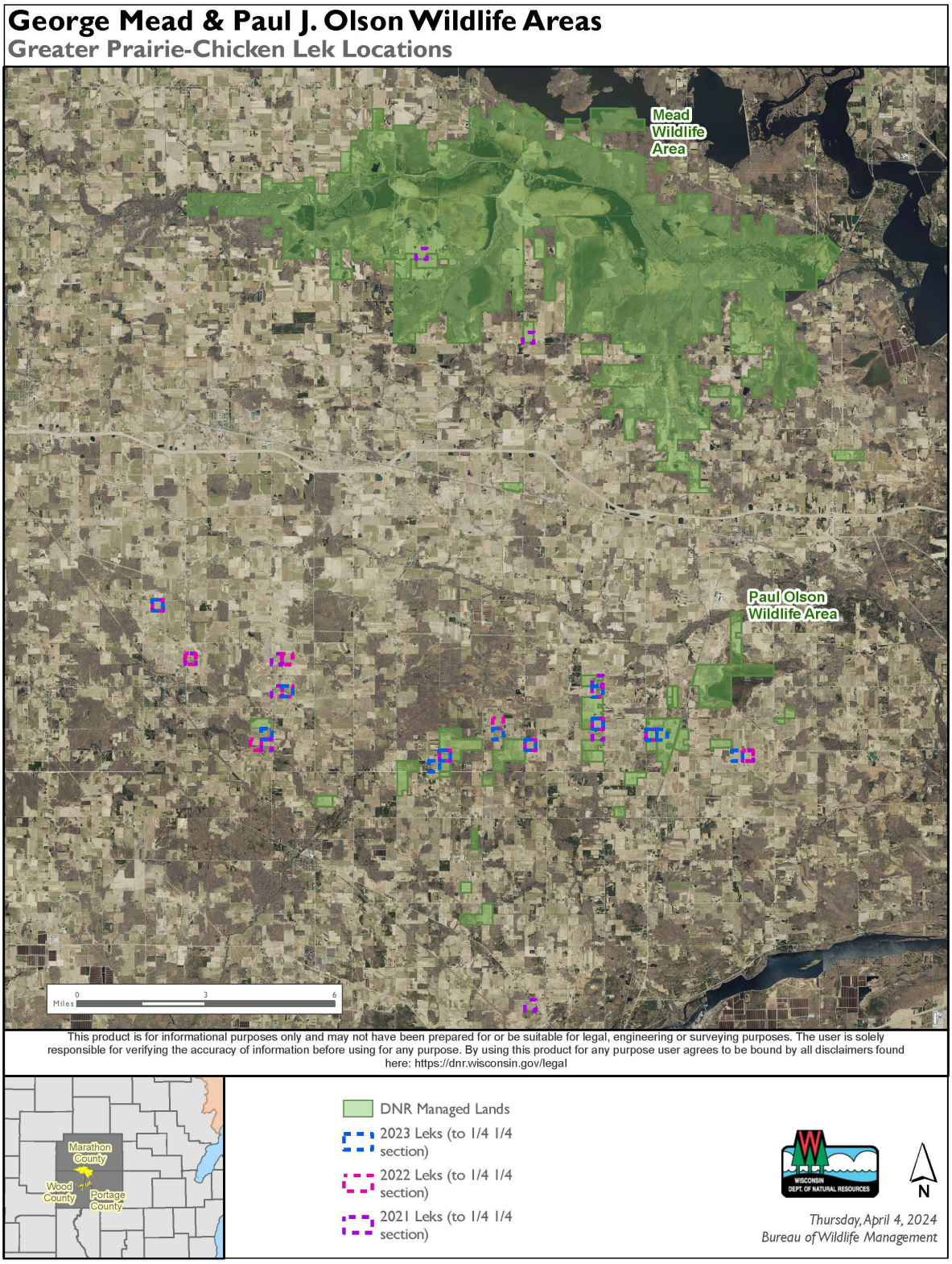

Figure 2 (Appendix B)

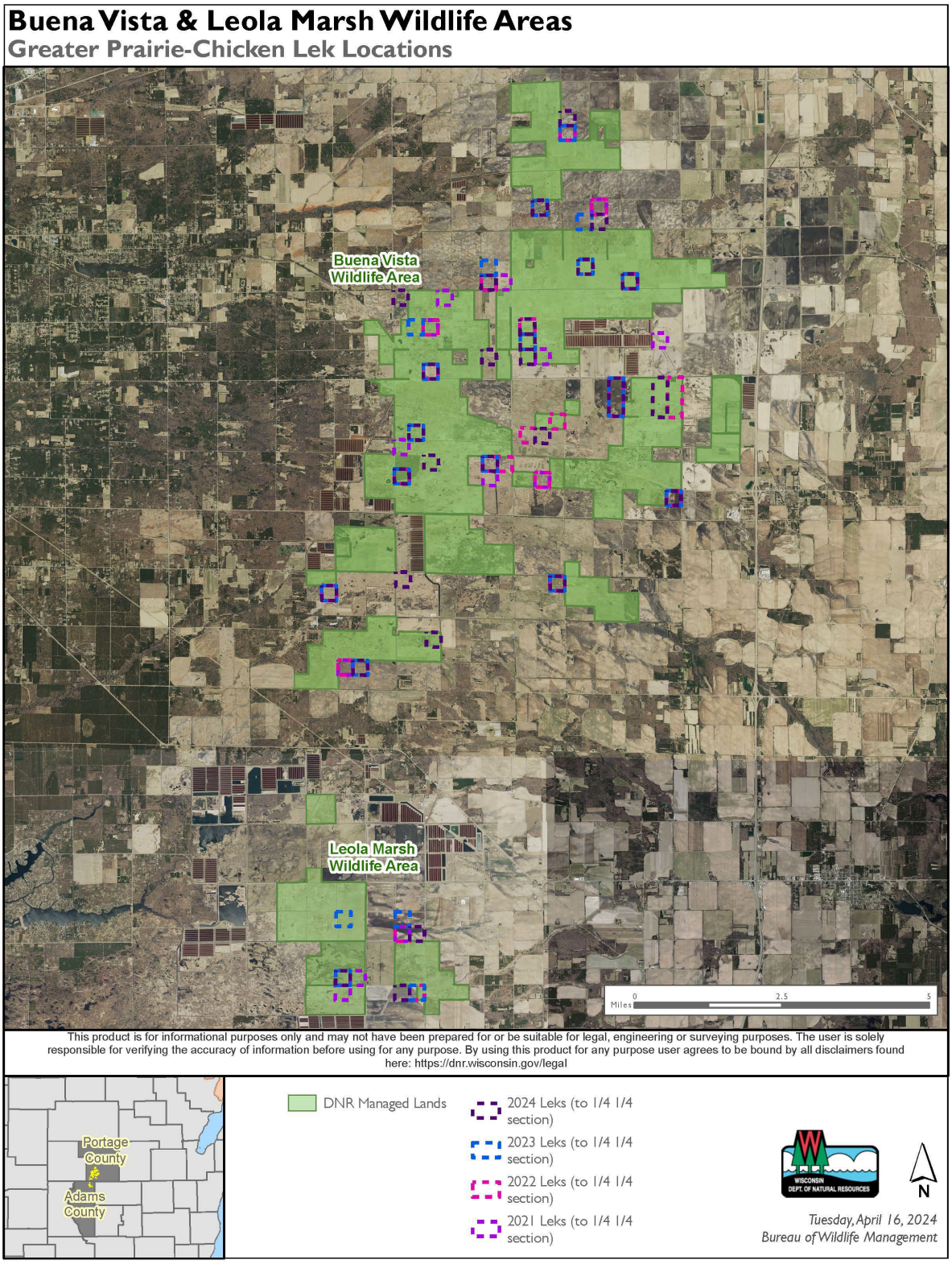

Figure 3 (Appendix B)

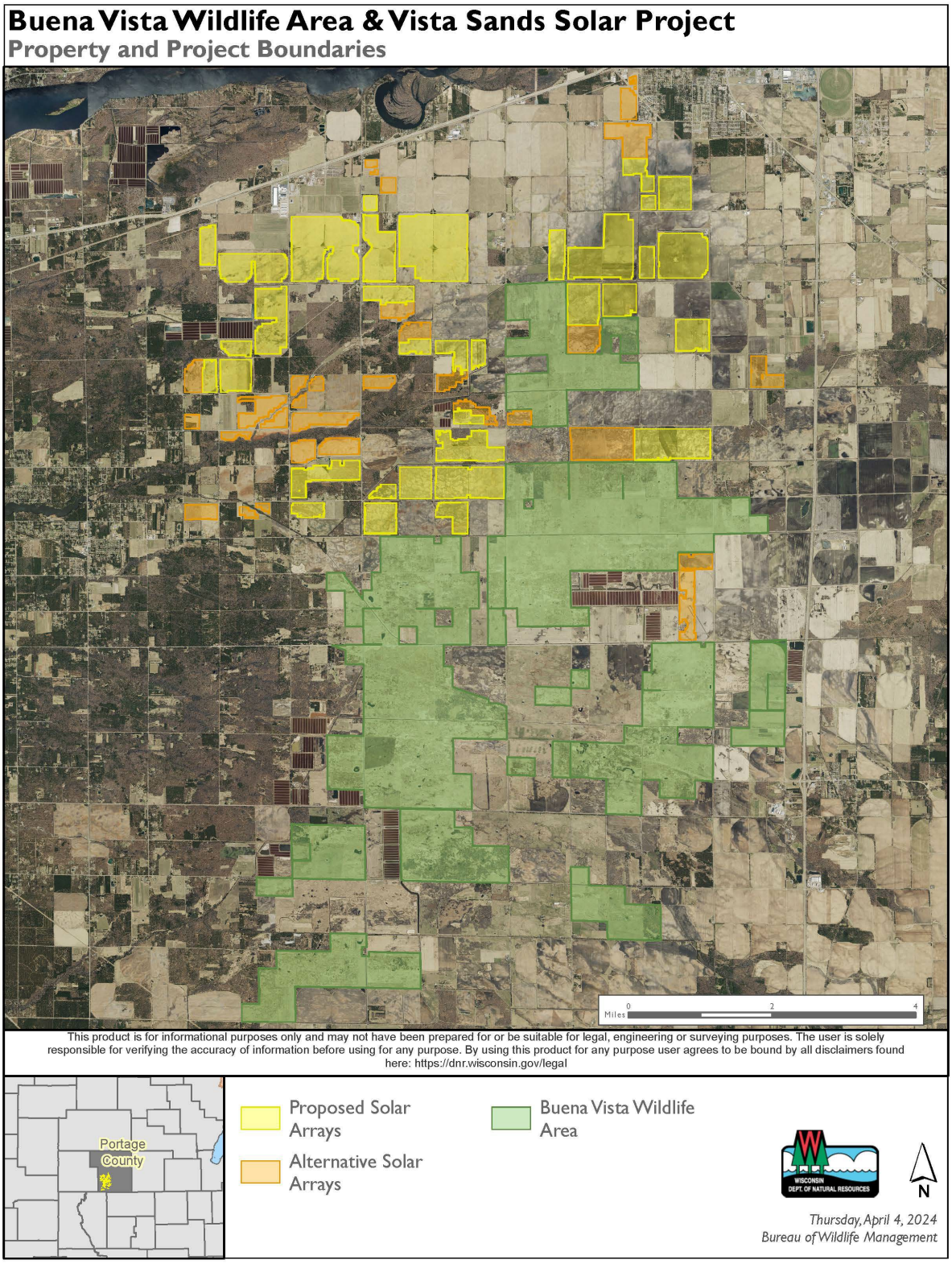

Figure 4 (Appendix B)

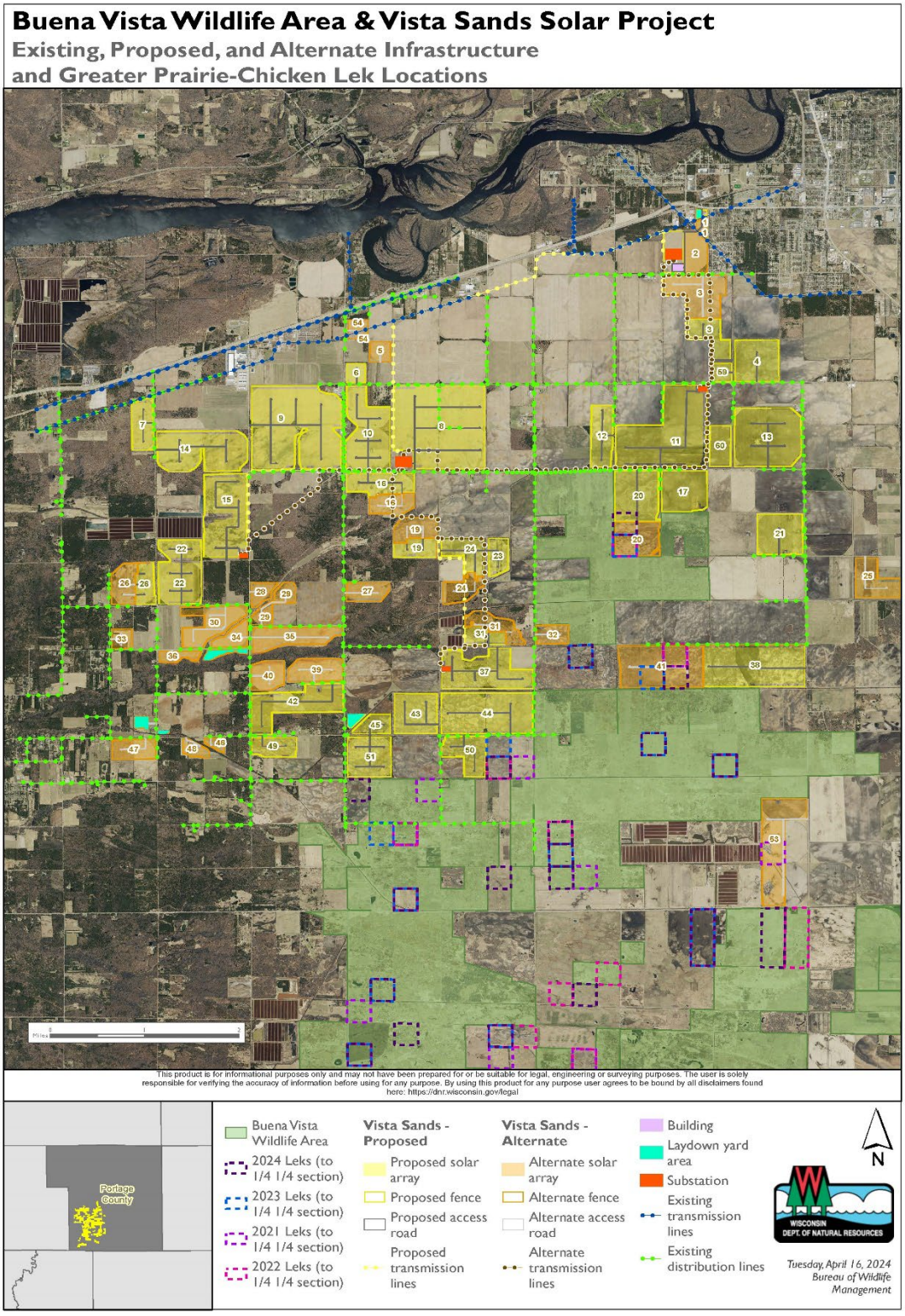

Figure 5 (Appendix B)

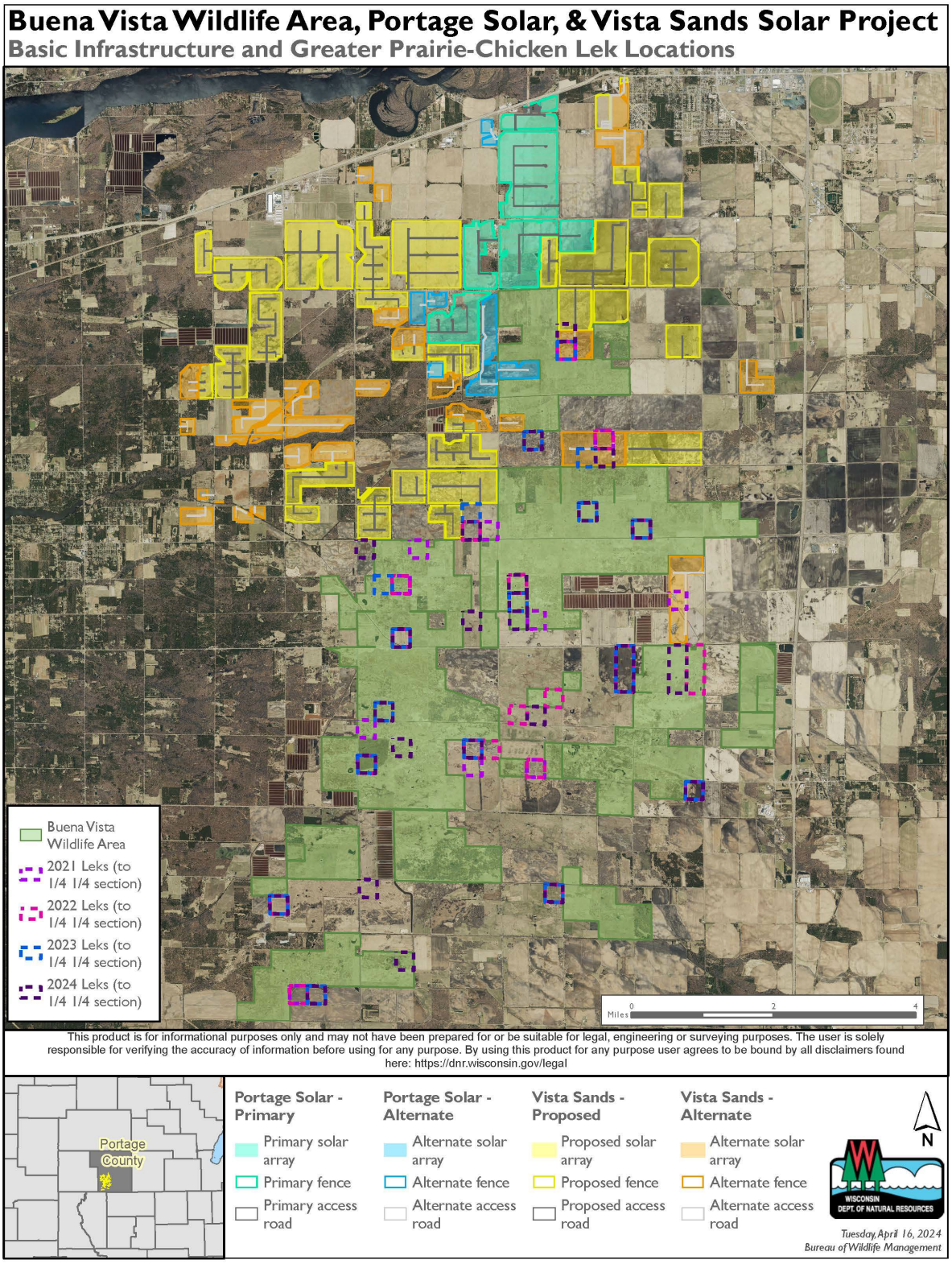

Figure 6 (Appendix B)